Connectivism and Connective Knowledge

Essays on meaning and learning networks

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Introduction

Eight years ago George Siemens coined the term 'Connectivism' to describe learning networks[1] and has been generous enough to share it with me. This volume represents the bulk of my contribution to the field since then.

Connectivism is the thesis that knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks. An account of connectivism is therefore necessarily preceded by an account of networks. But the bulk of this work is devoted to tracing the implications of this thesis in learning.

Yes, this could have been a shorter book – and perhaps one day I'll author a volume without the redundancies, false starts, detours and asides, and other miscellany. Such a volume would be sterile, however, and it feels more true to the actual enquiry to stay true to the original blog posts, essays and presentations that constitute this work.

Here is the abridged version of my philosophy, for those not wishing to read the 600 or so pages that follow:

The scope of my work covers three major domains, knowledge, learning and community. Each of these represents an aspect of network theory: the first, examining the cognitive properties of networks, the second, looking at how networks learn, and the third, tracing the properties of effective networks. These also represent the processes of learning, inference and discovery in society writ large.

Knowledge is literally the set of connections between entities. In humans, this knowledge consists of connections between neurons. In societies, this knowledge consists of connections between humans and their artifacts. What a network knows is not found in the content of its entities, nor in the content of messages sent from one to the other, but rather can only be found through recognition of patterns emergent in the network of connections and interactions.

Learning is the creation and removal of connections between the entities, or the adjustment of the strengths of those connections. A learning theory is, literally, a theory describing how these connections are created or adjusted. In this book I describe four major mechanisms: similarity, contiguity, feedback, and harmony. There may be other mechanisms, these and others may work together, and the precise mechanism for any given person may be irreducibly complex.

In the concept of community we describe the conditions for successful or effective networks, that is, networks that can learn, networks than can adapt, or networks that avoid stagnation or network 'death'. In this book I describe a set of physical conditions, such as dynamism and distribution, as well as a 'semantic condition', which contains four elements: autonomy, diversity, openness and connectivity (or interactivity). Networks that instantiate these conditions –

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[1] George Siemens. Connectivism: A Learning Theory for the Digital Age. elarnspace (weblog). December 12, 2004. http://www.elearnspace.org/Articles/connectivism.htm

whether they be learning communities, technologies or societies – are able to develop and grow. Those that do not will be impaired in some fashion.

Education is often depicted as 'making meaning' but this underlying structure forces us to think about what we mean when we say this. To be sure, it is easy to say that knowledge is not merely a collection of 'facts' or 'statements', but if not that, then what is it? It is not the 'content' of the words and sentences we use. What we know – what we learn – is distributed across a network. It's the patterns and regularities in that network – not the descriptions of these patterns, but the patterns themselves, even patterns created by the creation of images, videos and cartoons. We need a new literacy to understand this language, which I describe in 'Speaking in LOLcats'.

This new description of knowledge bears some examination. We have through the industrial age depended on a model of knowledge as a set of theses that are hypothesized and tested against experience. In this model, articulation and measurement are essential skills. But our understanding of what it means to know, to infer, and to give reasons evolves in an environment where knowing consists of pattern recognition. The effectiveness of knowing is defined not by conformity but by adaptation. The idea of truth devolves into an account of perspectives and points of view. The having of a reason for action is not a matter of argumentation or deduction, but rather of comfort, familiarity and an inner sense of balance, the sort of instant awareness we would characterize of an expert.

The 'semantic condition' describes an efficient and effective functioning of networks, that is, the functioning of networks that will achieve knowledge as just described. To the extent this condition holds, some of our long-standing ideas about community and collaboration need to be reconsidered. The most important function of a person in a community is no longer conformity, but rather, creativity and expression. It is through the cooperation of autonomous and diverse individuals that communities function most effectively, not through collaboration or cohesion. This thesis is explored through the (imperfectly named) distinction between groups and networks.

The semantic condition itself requires explanation and description. It can be described as a set of mechanisms that defend against cascade phenomena. In this discussion I offer a model of autonomy that describes factors affecting metal states, the capacity to act on those states, the scope and range of such action, and the effectiveness of that action. It is also important to understand the nature of sameness as, on the one hand, an important learning principle, and on the other hand, the contrary of diversity. I explore these concepts through an extended discussion of collaboration and knowledge production.

In the years since the development of the thesis of connectivism George Siemens and I have attempted to realize these principles on a practical scale. The result has been the development of the Massive Open Online Course, an effort to create learning communities modeled explicitly on the theses described in these pages. Starting with the first MOOC in 2008 I have drawn on these principles to describe how the course works, how a person should learn in such a course, and what constitutes success in such a course.

These principles are especially important when considering the questions of course content and assessment. The idea that there is some body of content to be acquired or remembered is explicitly rejected; to learn in a connectivist course is to grow and develop, to form a network of connections in one's own self. The model of learning that is based on instruction and memory, especially insofar as that model depends on a theory of knowledge as hypothesis formation and confirmation, is observably inaccurate and incorrect when applied to learning. Connectivist learning is a process of immersion in an environment, discovery and communication – a process of pattern recognition rather than hypothesis and theory-formation. Learning is not a matter of transferring knowledge from a teacher to a learner, but is rather the product of the learner focusing and repeating creative acts, of practising something that is important and reflecting on this practice.

Thus concludes this volume, though obviously, not this discussion. The topic of 'openness' in education was sufficiently large as to require a separate work, 'Free Learning'. I have written other works on the impact of this perspective on contemporary debates on education. There are interviews, there are other talks – and then, there is the future, a need for a more articulated description of the new literacy, a completion of the gRSShopper software that instantiates the model, and an effort to place our work in the context of a rapidly changing and growing environment of open online courses.

Introducing My Work

Knowledge, Learning and Community

Contribution to #Change11 online course,[2] February 27.

The intent of these short contributions to the #Change11 course is to allow guest speakers to summarize their sum contribution to the field of online learning and new educational technology. Though I have recently become better known because of my contributions to connectivism and to the concept of the massive open online course, these are reflective of a wider philosophy that has characterized my work as a whole much more generally. In the early 2000s I took to characterizing it under the heading of knowledge, learning and community – I even posted an eBook[3] with that title. I'd like to return to that framework in order to describe my contributions to the field today.

These three are intended to be represented as a cycle. Knowledge informs learning; what we learn informs community; and the community in turn creates knowledge. And the reverse: knowledge builds community, while community defines what is learned, and what is learned becomes knowledge. The three are aspects of what is essentially the same phenomenon, representations of communications and structures that are created by individuals interacting and exchanging experiences. So I have examined each of these three in detail, as well as the languages of communication between them, and as well as the experiences that inform them.

Knowledge

The traditional model of knowledge is what we may call propositional or representative: it consists of a series of signs, expressions, propositions or representations, which stand in relation to an external reality, or some subset of it, such that properties of that external reality are reflected in the expression. Knowledge, properly so-called, within such a framework consists of a set of such statements, models or propositions, the ability to manipulate them in order to create explanations, make predictions, or define concepts, and the ability to apply those to the world.

Theories of knowledge in this paradigm are based almost entirely on the properties of those signs, their origins, and how they are used to generate and preserve truth or meaning. Take for example what has come to be called the traditional definition of knowledge, "justified true belief," and its counterexamples. Knowledge is through to be a statement or expression, like a belief. It is expected to correspond or correctly represent the world, and hence be true. And it presupposes a connection between that external world and the representation, which is a justification.

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[2] Stephen Downes, George Siemens and Dave Cormier. Change 2011. Website, 2011. http://change.mooc.ca Presentation posted on Stephen's Web (weblog). February 29, 2012. Audio and slides available. http://www.downes.ca/presentation/292
[3] Stephen Downes. Knowledge, Learning and Community. eBook. September 7, 2001. http://www.downes.ca/files/books/KnowledgeLearning.pdf

This model has served us well over the years; it is the foundation behind the scientific method, which consists of the creation of representations that enable predictions to be tested experimentally. It forms the foundation for logic and inference, which are the basis for being able to tell when a statement someone makes is true, or false.

But it is a fiction. Our knowledge is not actually composed of propositions and representations. As Wittgenstein has said, what we know is more accurately demonstrated in what we do, and language derives its meaning not from what it represents but by how we use it. The logical structures we think comprise 'knowledge' are but one part of a far more complex series of expressions, behaviours, interactions, manipulations, creations, emotions and more, all of which point to a much deeper structure. The words we use, the facts we describe, the principles and rules we infer – these are simple abstractions of what we really know.

The theory I have advanced (and I am by no means the only person to reason in this way) is that our knowledge is literally the set of connections between neurons in the brain (or between bits in a computer, or between people in a society, or between crickets in a forest). Our knowledge is the state of organization that results in our brains and bodies after our interactions with the world. For example, 'to know that Paris is the capital of France' is not to have some sentence in the brain, nor is it to be in possession of some fact, it is to be organized in a certain way.

This state of 'being organized in a certain way' is manifest in different ways. For an individual, to 'know' something is characterized by a feeling of recognition. How do we 'know' a person is Fred? We 'recognize' him. Subjectively, we feel we 'know' something when we can't see the word differently; we see a tiger and can't think of what we are seeing as a horse. We visit Paris and can't make sense of the suggestion that we are not in the capital of France. We see '1+1' and don't have any way to make that into '3'. We perceive what we know through the actions of our own brains when presented with this or that situation.

Learning

To learn that 'Paris is the capital of France' involves far more than presentation and memory of the sentence or proposition that 'Paris is the capital of France'. Our actual knowledge of 'Paris is the capital of France' consists of much more than the simple content contained in such a sentence; it involves not only a knowledge of the language and the conventions surrounding the language, but also the idea that 'Paris' is a city, that cities are the sorts of things that are capitals, and more, an entire set of thoughts, feelings and behaviours that would be appropriate of a person who knows such a thing.

To learn, therefore, that 'Paris is the capital of France', is to incorporate, not a simple physical state, but instead to instantiate a complex physical state, so complex it is beyond description. Indeed, we say 'Fred knows X' because we have no way of describing the physical state that constitutes 'knowing X'. It is unique for each person, both physically (there is no necessary nor sufficient set of connections that consists 'knowing X') and conceptually (no two people mean exactly the same thing by 'X').

The challenge of pedagogy, indeed, is that learning is not simply remembering. If all that was needed was to enable a student to recite back a set of facts, pedagogy would be simple; as in archaic schools, we would simply have students recite the fact aloud until they could repeat it back without error. But we know that a person does not know 'Paris is the capital of France' even if he recites that fact should he turn around and book a flight to Marseilles to see the President.

To learn, therefore, even a simple fact (such as 'Paris is the capital of France') or as much as an entire discipline (Chemistry, Physics, economics) is to become like a person who already knows that fact or practices that discipline. Part of being 'like' a person who practices a discipline is agreement on the same set of facts, and answering the same questions in the same way. But it also involves seeing the world in the same way, recognizing some things as important and other things as not, in approaching problems in the same way, having the same standards of proof and reference, and more.

Historically, education has recognized this. The various tests and exercises we ask students to perform are efforts to replicate the major elements of practice undertaken by one who has already mastered the relevant domain. In science, we set up labs and ask students to perform 'experiments'. In mathematics, we pose 'problems' and in more advanced classes as them to provide 'proofs'. In carpentry students are asked to build bookshelves. We are seeking to replicate not simple representational states, but complex patterns of experience and performance.

The best way to replicate an expert's organizational state is to be that person – to have the same DNA, the same physical environment, and the same experiences. None of this is possible; each person is physically, environmentally and experientially unique. But by exposing the student to some aspect of the expert's environment and experience we can create something like the expert's knowledge. And we can narrow in on this through communication, either directly or indirectly (though a teacher), about that experience. And we can develop a more concrete personal understanding by trying out our own understanding in this environment, creating new and unplanned experiences, which on reflection we can relate to our own unique experiences.

I have expressed my (very unoriginal) theory of pedagogy very simply: to teach is to model and demonstrate, to learn is to practice and reflect. Both teaching and learning consist of talking about and of doing. Theorizing and practicing. Abstracting and making concrete. Nothing new there, but what is key is the attitude we take as we understand that to learn is to emulate an entire organizational state and not merely to possess a simple set of facts.

Community

The community is the place in which we have learning experiences, and the environment through which we communicate with each other about these experiences. It is at one moment the place where we learn and at another moment the instantiation, as an artifact, of what we

have learned, as a society. It is at one moment the place where we communicate, and at another moment, an expression of what we have communicated.

A community is the totality of a society's knowledge, and that knowledge is contained not only in its law courts and libraries, but also in its buildings and bridges, statues and artwork, community halls and schools and taverns, houses, apartments, and cardboard shelters built by people who live on the street.

A community is not the same as a brain – obviously – but we can talk about a community learning in the same way we can talk about a person learning. A community has experiences – whether an invasion or drought, earthquakes, political upheaval, stock market fluctuations, pollution, weather and all the other wider social and environmental phenomena that we as a society experience as a whole. These experiences imprint and shape the community as a whole – each person, working alone and with others, creates one or another aspect of community in response to these – builds houses to shelter against the storm, roads to travel to sources of food, art to express our anguish or joy.

As with a human, no simple words can express what a community knows; as with a human, what a community knows is reflected by what it does. You would say, for example, that a society as a whole does not 'know' about global warming, does not 'comprehend' it, if it takes no action in response to it; we individual members of a society may see the impact, but the pain of the experience has not yet been felt by the whole.

Whether a community can know, whether its experiences can be transformed into knowledge, depends on how the community is organized, on how it can be organized. Rocks do not learn as much as humans because they cannot be organized beyond simple alignments of their constituent molecules. Moreover, rocks cannot express this organization through present or future behaviour. The best rocks can do is to form a pile; humans, through their creative acts and interactions with each other, compose vastly more complex artifacts.

A community relates to its constituent members in several ways. In is the environment within which a person experiences, practices and learns. It is therefore a mechanism whereby the experiences of one person may be replicated by another, through immersion in the same environment. A factory isn't simply a mechanism for building hammers; it is a mechanism whereby one member is able to show another how hammers are built (and how forges are used, and how labour is organized, and all the rest). A community is also the medium through which one person communicates with another. It create a thick network of connections, whether of wire, highway, text or acoustics, through which signals are sent and received.

We take great stock in the meaning expressed by these signals, in the state of affairs in the world these signals are intended to represent, but this focuses our attention artificially only on those signals, or those aspects of signals, that are designed explicitly to represent, and to disregard what is in fact the bulk of these communications. A person may intend only to say 'Paris is the capital of France', but a wealth of information is contained in that communication, in the language, the tone, the context, the attitude, and more. Not only is each expression an act,

each act is also an expression, and our communications are far more than the simple words that express them.

Language

As a result of my understanding of knowledge, learning and community I have a very broad concept of language, which to my mind the content of any communicative act from one entity to another. As such, to my mind, most language does not have 'meaning' as such – indeed, more accurately, no language inherently has meaning.

A language may be thought of as an entity in its own right, with its own internal form of organization, though arguably it is inseparable from the community that creates it. As such, while I would be hesitant to say that a language expresses knowledge, I feel comfortable in saying that a language contains knowledge. For example, the fundamental elements of written language – subjects and actions, objects, tenses and connections – are expressions of elements of our knowledge of the world. What (say) the English language says about us is that we see the world as something that progresses through time and space, and contains subjects and objects, which interact with each other. Other languages – music, say, or bricks – say other things about us.

What is crucial to understand about language is that it reflects, and does not prescribe. Put another way, the rules of language are not the rules of the world. Language follows learning and experience, is reflective of learning and experience, and does not constitute learning and experience. A sentence is like a picture: an abstraction, a snapshot, a moment, an artifice. It is not inherently true or false, does not inherently contain its own meaning. When we read, when we comprehend, a language, we do so by recognizing, and not by decoding.

Moncton, February 27, 2012

E-Learning Generations

Presentation delivered to Clair 2012, Clair, New Brunswick, February 14, 2012, originally in French.[4]

In recent years I have been working on two major concepts: first, the connectivist theory of online learning, which views learning as a network process; and second, the massive open online course, or MOOC, which is an instantiation of that process. These, however, represent only the most recent of what can be seen as a series of 'generations' of e-learning. In this talk I describe these generations and discuss how they led to, and are a part of, the most recent work in online learning.

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Thank you for welcoming me to your conference.

The theme I would like to explore today concerns the growth and development of our idea of online learning, or as it is sometimes called, e-learning. What I would like to do is to describe a series of 'generations' of technologies and approaches that have characterized the development of online learning over the years. These generations of have informed the shape of online learning as it exists today, and will help us understand something of the direction it will take in the future.

These generations span more than a 20-year period. Indeed, there may even be described a 'generation zero' that predates even my own involvement in online learning. This generation is characterized by systems such as Plato, and represents the very idea of placing learning content online. This includes not only text but also images, audio, video and animations. It also represents, to a degree, the idea of programmed learning. This is the idea that computers can present us with content and activities in a sequence determined by our choices and by the results of online interactions, such as tests and quizzes. We have never wandered far from this foundational idea, not even in the 21st century. And it continues to be the point of departure for all subsequent developments in the field of online learning.

For me, 'generation one' consists of the idea of the network itself. My first work in the field of online learning was to set up a bulletin board system, called Athabaska BBS, in order to allow students from across the province to communicate with me online. It was also the time I first began using email, the time I began using the Usenet bulletin Board system, and the time I first began using online information systems such as Gopher. The process of connecting was involved and complex, requiring the use of modems and special software.

As generation one developed, generation zero matured. The personal computer became a tool anyone could use to create and store their own content. Commercial software came into

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[4] Stephen Downes. E-Learning: Générations. Stephen's Web (weblog). February 14, 2012. Audio and slides available. http://www.downes.ca/presentation/289

existence, including both operating systems and application programs such as spreadsheets, word processors, and database tools. Content could be created in novel ways - the 'mail merge' program, for example, would allow you to print the same letter multiple times, but each with a different name and address drawn from a database.

The next generation takes place in the early 1990s and is essentially the application of computer games to online learning. These games were in the first instance text-based and very simple. But they brought with them some radical changes to the idea of learning itself.

One key development was the idea that multiple people could occupy the same online 'space' and communicate and interact with each other. This development coincided with the creation of IRC - inter-relay chat - and meant that you were in real time communication with multiple people around the world. But more: the gaming environment meant you could do things with other people - explore terrain, solve puzzles, even fight with them.

Another key idea was the design of the gaming space itself. Early computer games (and many early arcade games) were designed like programmed learning: they were like a flow chart, guiding you through a series of choices to a predetermined conclusion. But the online games were much more open-ended. Players interacted with the environment, but the outcome was not predetermined. At first it was created by chance, as in the rolling of dice in a Dungeons and Dragons game. But eventually every game state was unique, and it was no longer possible to memorize the correct sequence of steps to a successful outcome.

The third element was the technology developed to enable that which we today call object oriented programming. This changed the nature of a computer program from a single entity that processed data to a collection of independent entities - objects - that interacted with each other: they could send messages to each other to prompt responses, one could be 'contained' in another, or one could be 'part' of another. So a game player would be an object, a monster would be an object, they would be contained in a 'room' that was also an object, and gameplay consisted of the interactions of these objects with each other in an unplanned open-ended way.

During the development of this second generation we saw the consolidation of computer-based software and content, and the commercialization of the network itself. The many brands we saw in the 80s - Atari, Amiga, Tandy, IBM, and many more - coalesced into the now familiar Mac-PC divide. A few major software developers emerged, companies like Microsoft and Corel. Computers became mainstream, and became important business (and learning) tools.

Meanwhile, the world of networks began to commercialize. Commercial bulletin board services emerged, such as Prodigy, AOL, GEnie and Compuserv. And the first local internet service providers came into being. Networking became the way important people connected, and communities like the WELL began to define a new generation of thought leaders.

You can begin to see a pattern developing here. Through the first three generations, a familiar process of innovation occurs: first the development and piloting of the technology (which is also when the open source community springs up around it), then the commercialization of the

technology, then the consolidation of that commercial market as large players eliminate weaker competitors.

The next generation sees the development of the content management system, and in learning, the learning management system.

Both of these are applications developed in order to apply the functionality developed in generation zero - content production and management - to the platform developed in generation one - the world wide web. The first content management systems were exactly like mail merge, except instead of printing out the content, they delivered it to the remote user (inside a computer program, the commands are exactly the same - 'print' is used to print data to a page, print data to a file, or print data to the network).

Early learning management systems were very easy to define. They consisted of a set of documents which could be merged with a list of registered users for delivery. They also supported some of the major functions of networks: bulletin boards, where these users could post messages to each other, chat rooms, where they could occupy the same online space together, and online quizzes and activities, where they could interact with the documents and other resources.

It is interesting to me to reflect that the major debates about online learning around this time centered on whether online learning would be mostly about online content - that is, reflective of generation zero - or mostly about online interaction - that is, reflective of generation one. I remember some teachers in Manitoba swearing by the interaction model, and using a bulletin-board style application called FirstClass - eschewing to more content-based approach I was favouring at the time.

Learning management systems drew a great deal from distance learning. Indeed, online was (and is still) seen as nothing more than a special type of distance learning. As such, they favoured a content-based approached, with interaction following secondarily. And a very standard model emerged: present objectives, present content, discuss, test. More advanced systems attempted to replicate the programmed learning paradigm. The Holy Grail of the day was adaptive learning - a system which would test you (or pretest you) to determine your skill level, then deliver content and activities appropriate to that level.

Despite its now-apparent shortcomings, the learning management system brought some important developments to the field.

First, they brought the idea that learning content could be modularized, or 'chunked'. This enabled a more fine-grained presentation of learning content than traditional sources such as textbooks and university courses. Shorter-form learning content is almost ubiquitous today.

Second, it created the idea that these content modules or chunks were sharable. The idea that books or courses could be broken down into smaller chunks suggested to people that these chunks could be created in one context and reused in another context.

And third, they brought together the idea of communication and content in the same online environment. The learning management system became a place where these smaller content objects could be presented, and then discussed by groups of people either in a discussion board or in a live chat.

These were the core elements of learning management technology, and a generation of online learning research and development centered around how content should be created, managed and discussed in online learning environments. People discussed whether this form of learning could be equal to classroom learning, they discussed the methodology for producing these chunks, and they discussed the nature, role and importance of inline interaction.

Around this time as well an ambitious program began in an effort to apply some of the generation two principles to learning management systems (and to content management in general). We came to know this effort under the heading of 'learning objects'. In Canada we had something called the East-West project, which was an attempt to standardize learning resources. The United States developed IMS, and eventually SCORM. Most of the work focused on the development of metadata, to support discoverability and sharing, but the core of the program was an attempt to introduce second generation technology - interactive objects - to learning and content management.

But it didn't take hold. To this day, the learning management system is designed essentially to present content and support discussion and activities around that content. We can understand why when we look at the development of the previous generations of online learning.

By the time learning management systems were developed, operating systems and application programs, along with the content they supported, were enterprise software. Corporations and institutions supported massive centralized distributions. An entire college or university would standardize on, say, Windows 3.1 (and very few on anything else). 'Content' became synonymous with 'documents' and these documents - not something fuzzy like 'objects' - were what would be created and published and shared.

The network was by this time well into the process of becoming consolidated. Completely gone was the system of individual bulletin board services; everything now belonged to one giant network. Telecoms and large service providers such as AOL were coming to dominate access. The internet standardized around a document presentation format - HTML - and was defined in terms of websites and pages, constituting essentially a simplified version of the content produced by enterprise software. The same vendors that sold these tools - companies like Microsoft and Adobe - sold web production and viewing tools.

Probably the most interesting developments of all at the time were happening outside the LMS environment entirely. The tools used to support online gaming were by this time becoming commercialized. It is worth mentioning a few of these. New forms of games were being developed and entire genres - strategy games, for example, sports games, and first-person shooters - became widely popular.

Though gaming remained a largely offline activity, online environments were also beginning to develop. One of the first 3D multi-user environments, for example, was Alpha Worlds. This was followed by Second Life, which for a while was widely popular. Online gaming communities also became popular, such as the chess, backgammon and card playing sites set up by Yahoo. And of course I would be remiss if I didn't mention online gambling sites.

As I mentioned, these developments took place outside the LMS market. The best efforts of developers to incorporate aspects of gaming - from object oriented learning design to simulations and gaming environments to multi-user interactions - were of limited utility in learning management systems. LMSs were firmly entrenched in the world of content production, and to a lesser extent the world of networked communication.

This leads us next to the fourth generation, paradoxically called web 2.0 - and in the field of online learning, e-learning 2.0.

The core ideas of web 2.0 almost defy description in previous terminology. But two major phenomena describe web 2.0 - first, the rise of social networks, and second, the creation of content and services that can interact with those networks. Web 2.0 is sometimes described as the 'web as a platform' but it is probably more accurate to see it as networking being applied to data (or perhaps data being applied to networking).

The core technology of web 2.0 is social software. We are most familiar with social software through brand names like Friendster, MySpace, Twitter, Linked In, Facebook, and most recently, Google+. But if we think for a moment about what social software is, it is essentially the migration of some of your personal data - like your mailing list - to a content management system on the web. These systems then leverage that data to create networks. So you can now do things online - like send the same message to many friends - that you could previously only do with specialized applications.

E-learning 2.0 is the same idea applied to e-learning content. I am widely regarded as one of the developers of e-learning 2.0, but this is only because I recognized that a major objective of such technologies as learning objects and SCORM was to treat learning resources as data. The idea was that each individual would have available online the same sort of content authoring and distribution capabilities previously available only to major publishers. And these would be provided online.

E-learning 2.0 brings several important developments to the table.

First, it brings in the idea of the social graph, which is essentially the list of people you send content to, and the list of people who send you content, and everyone else's list, all in one big table. The social graph defines a massive communications network in which people, rather than computers, are the interconnected nodes.

Second, it brings in the idea of personal publishing. The beginning of web 2.0 is arguably the development of blogging software, which allowed people to easily create web content for the first time. But it's also Twitter, which made creating microcontent even easier, and YouTube,

which allowed people to publish videos, and MySpace, which did the same for music, and Facebook and Flickr, which did the same for photos.

Third, it brings in the idea of interoperability, first in the form of syndication formats such as RSS, which allow us to share our content easily with each other, but also later in the form or application programming interfaces, which allow one computer program on one website to communicate with another program on another website. These allow you to use one application - your social network platform, for example - to use another application - play a game, edit content, or talk to each other.

And fourth, it brings us the idea of platform-independence. Web 2.0 is as much about mobile computing as it is about social software. It is as much about using your telephone to post status updates or upload photos as it is about putting your phonebook on a website. Maybe even more so.

What made web 2.0 possible? In a certain sense, it was the maturation of generation 0, web content and applications. After being developed, commercialized and consolidated, these became enterprise services. But as enterprises became global, these two become global, and emerged out of the enterprise to become cloud and mobile contents and applications.

Some of the major social networking sites are actually cloud storage sites - YouTube and Flickr are the most obvious examples. Some are less obvious, but become so when you think about it - Wikipedia, for example. Other cloud storage sites operate behind the scenes, like Internet Archive and Amazon Web Services. And there are cloud services, like Akamai, that never reach the mainstream perception.

These cloud services developed as a result of enterprise networking. On the research side, high-speed backbones such as Internet 2 in the U.S. and CA*Net 3 in Canada virtually eliminated network lag even for large data files, audio and video. Similar capacities were being developed for lease by the commercial sector. And the now-consolidated consumer market now began to support always-on broadband capacity through ASDL or cable internet services.

The consolidation of core gaming technologies took place largely behind the scenes. This era sees the ascendance of object-oriented coding languages such as Java and dot Net. The open-ended online environment led to massive multiplayer online games such as Eve and World of Warcraft. In learning we see the emergence of major simulation developers such as CAE and conferencing systems such as Connect, Elluminate, and Cisco. These have become dominant in the delivery of online seminars and classes.

Content management services, meanwhile, were increasingly commercialized. We saw the emergence of Blackboard and WebCT, and on the commercial side products like Saba and Docent. Google purchased Blogger, Yahoo purchased Flickr, and even the world of open source systems came to be dominated by quasi-commercial enterprises. Innovators moved on and began to try radical new technologies like RSS and AJAX, Twitter and Technorati. Today we think of social networking in terms of the giants, but when it started in the mid-2000s the

technology was uncertain and evolving. In education, probably the major player from this era was Elgg, at that time and still to this day a novel technology.

Today, of course, social networking is ubiquitous. The major technologies have been commercialized and are moving rapidly toward commodification and enterprise adoption. The ubiquity of social networking came about as a result of the commercialization of content management services. A new business model has emerged in which providers sell information about their users to marketing agencies. The proliferation of social networking sites has now been reduced to a few major competitors, notably YouTube, Facebook and Twitter. The providers of search and document management services - Yahoo, Microsoft, Apple and Google - have their own social networks, but these are also-rans. Hence when people speak of 'social network learning' they often mean 'using Facebook to support learning' or some such thing.

This is the beginning of the sixth generation, a generation characterized by commercialized web 2.0 services, a consolidation of the CMS/LMS market, the development of enterprise conferencing and simulation technology, cloud networking and - at last - open content and open operating systems.

Now before the Linux advocates lynch me, let me say that, yes, there have always been open operating systems. But - frankly - until recently they have always been the domain of innovators, enthusiasts and hobbyists. Not mainstream - not, say, running underlying major commercial brands, the way Linux now underlies Apple's OSX, and not widely used, say, the way Android powers a large percentage of mobile phones.

So that's the history of online learning through five generations, but it is also a listing of the major technologies that form the foundation for sixth-generation e-learning, which I would characterized by the Massive Open Online Course.

Let me spend a few moments talking about the development of the MOOC model.

When George Siemens and I created the first MOOC in 2008 we were not setting out to create a MOOC. So the form was not something we designed and implemented, at least, not explicitly so. But we had very clear ideas of where we wanted to go, and I would argue that it was those clear ideas that led to the definition of the MOOC as it exists today.

There were two major influences. One was the beginning of open online courses. We had both seen them in operation in the past, and had most recently been influenced by Alec Couros's online graduate course and David Wiley's wiki-based course. What made these courses important was that they invoked the idea of including outsiders into university courses in some way. The course was no longer bounded by the institution.

The other major influence was the emergence of massive online conferences. George had run a major conference on Connectivism, in which I was a participant. This was just the latest in a series of such conferences. Again, what made the format work was that the conference was open. And it was the success of the conference that made it worth considering a longer and more involved enterprise.

We set up Connectivism and Connective Knowledge 2008 (CCK08) as a credit course in Manitoba's Certificate in Adult Education (CAE), offered by the University of Manitoba. It was a bit of Old Home Week for me, as Manitoba's first-ever online course was also offered through the CAE program, Introduction to Instruction, designed by Conrad Albertson and myself, and offered by Shirley Chapman.

What made CCK08 different was that we both decided at the outset that it would be designed along explicitly connectivist lines, whatever those were. Which was great in theory, but then we began almost immediately to accommodate the demands of a formal course offered by a traditional institution. The course would have a start date and an end date, and a series of dates in between, which would constitute a course schedule. Students would be able to sign up for credit, but if they did, they would have assignments that would be marked (by George; I had no interest in marking).

But beyond that, the course was non-traditional. Because when you make a claim like the central claim of connectivism, that the knowledge is found in the connections between people with each other and that learning is the development and traversal of those connections, then you can't just offer a body of content in an LMS and call it a course. Had we simply presented the 'theory of connectivism' as a body of content to be learned by participants, we would have undercut the central thesis of connectivism.

This seems to entail offering a course without content - how do you offer a course without content? The answer is that the course is not without content, but rather, that the content does not define the course. That there is no core of content that everyone must learn does not entail that there is zero content. Quite the opposite. It entails that there is a surplus of content. When you don't select a certain set of canonical contents, everything becomes potential content, and as we saw in practice, we ended up with a lot of content.

Running the course over fourteen weeks, with each week devoted to a different topic, actually helped us out. Rather than constrain us, it allowed us to mitigate to some degree the effects an undifferentiated torrent of content would produce. It allowed us to say to ourselves that we'll look at 'this' first and 'that' later. It was a minimal structure, but one that seemed to be a minimal requirement for any sort of coherence at all.

Even so, as it was, participants complained that there was too much information. This led to the articulation of exactly what connectivism meant in a networked information environment, and resulted in the definition of a key feature of MOOCs. Learning in a MOOC, we advised, is in the first instance a matter of learning how to select content.

By navigating the content environment, and selecting content that is relevant to your own personal preferences and context, you are creating an individual view or perspective. So you are first creating connections between contents with each other and with your own background and experience. And working with content in a connectivist course does not involve learning or remembering the content. Rather, it is to engage in a process of creation and sharing. Each person in the course, speaking from his or her unique perspective, participates in a conversation that brings these perspectives together.

Why not learn content? Why not assemble a body of information that people would know in common? The particular circumstances of CCK08 make the answer clear, but we can also see how it generalizes. In the case of CCK08, there is no core body of knowledge. Connectivism is a theory in development (many argued that it isn't even a theory), and the development of connective knowledge even more so. We were hesitant to teach people something definitive when even we did not know what that would be.

Even more importantly, identifying and highlighting some core principles of connectivism would undermine what it was we thought connectivism was. It's not a simple set of principles or equations you apply mechanically to obtain a result. Sure, there are primitive elements - the component of a connection, for example - but you move very quickly into a realm where any articulation of the theory, any abstraction of the principles, distorts it. The fuzzy reality is what we want to teach, but you can't teach that merely by assembling content and having people remember it.

So in order to teach connectivism, we found it necessary for people to immerse themselves in a connectivist teaching environment. The content itself could have been anything - we have since run courses in critical literacies, learning analytics, and personal learning environments. The content is the material that we work with, that forms the creative clay we use to communicate with each other as we develop the actual learning, the finely grained and nuanced understanding of learning in a network environment that develops as a result of our working within a networked environment.

In order to support this aspect of the learning, we decided to make the course as much of a network as possible, and therefore, as little like an ordered, structured and centralized presentation as possible. Drawing on work we'd done previously, we set up a system whereby people would use their own environments, whatever they were, and make connections between each other (and each other's content) in these environments.

To do this, we encouraged each person to create his or her own online presence; these would be their nodes in the course networks. We collected RSS feeds from these and aggregated them into a single thread, which became the course newsletter. We emphasized further that this thread was only one of any number of possible ways of looking at the course contents, and we encouraged participants to connect in any other way they deemed appropriate.

This part of the course was a significant success. Of the 2200 people who signed up for CCK08, 170 of them created their own blogs, the feeds of which were aggregated with a tool I created, called gRSShopper, and the contents delivered by email to a total of 1870 subscribers (this number remained constant for the duration of the course). Students also participated in a Moodle discussion forum, in a Google Groups forum, in three separate Second Life communities, and in other ways we didn't know about.

The idea was that in addition to gaining experience making connections between people and ideas, participants were making connections between different systems and places. What we wanted people to experience was that connectivism functions not as a cognitive theory - not as a theory about how ideas are created and transmitted - but as a theory describing how we live

and grow together. We learn, in connectivism, not by acquiring knowledge as though it were so many bricks or puzzle pieces, but by becoming the sort of person we want to be.

In this, in the offering of a course such as CCK08, and in the offering of various courses after, and in the experience of other people offering courses as varied as MobiMOOC and ds106 and eduMOOC, we see directly the growth of individuals into the theory (which they take and mold in their own way) as well as the growth of the community of connected technologies, individuals and ideas. And it is in what we learn in this way that the challenge to more traditional theories becomes evident.

Now I mentioned previously that the MOOC represents a new generation of e-learning. To understand what that means we need to understand what the MOOC is drawing from the previous generations, and what the MOOC brings that is new.

Let me review:

Generation 0 brings us the idea of documents and other learning content, created and managed using application programs. In this the sixth generation of such technologies we have finally emerged into the world of widespread free and open online documents and application programs. The ability to read and write educational content, to record audio and make video, is now open to everybody, and we leverage this in the MOOC. But this is not what makes the MOOC new.

Additionally, a fundamental underlying feature of a connectivist course is the network, which by now is in the process of becoming a cloud service. WiFi is not quite ubiquitous, mobile telephony is not quite broadband, but we are close enough to both that we are connected to each other on an ongoing basis. The MOOC leverages the network, and increasingly depends on ubiquitous access, but this is not what makes the MOOC new.

The MOOC as we have designed it also makes use of enterprise 'game' technology, most specifically the conferencing system. Elluminate has been a staple in our courses. We have also used - and may well use again in the future - environments such as Second Life. Some other courses, such as the Stanford AI course, have leveraged simulations and interactive systems. Others, like ds106, emphasize multimedia. Using these and other immersive technologies, the MOOC will become more and more like a personal learning environment, but this is not what makes the MOOC unique.

The MOOC also makes explicit use of content management systems. The early MOOCs used Moodle; today we encourage participants to use personal content management systems such as WordPress and Blogger. The gRSShopper environment itself is to a large degree a content management system, managing a large store of user contributions and facilitator resources. But clearly, the element of content management is not what makes the MOOC new.

And the MOOC makes a lot of use of commercial social networking services. Twitter feeds and the Facebook group are major elements of the course. Many students use microblogging services like Posterous and Tumblr. Like membership in a social network, membership in the course constitutes participation in a large graph; contents from this graph are aggregated and

redistributed using social networking channels and syndication technologies. But many courses make use of social networks. So that is not what makes a MOOC unique.

So what's new? I would like to suggest that the MOOC adds two major elements to the mix, and that it is these elements that bear the most investigation and exploration.
First, the MOOC brings the idea of distributed technology to the mix. In its simplest expression, we could say that activities do not take place in one central location, but rather, are distributed across a large network of individual sites and services. The MOOC is not 'located' at cck12.mooc.ca (or at least, it's not intended to me) - that is just one nexus of connected sites.

In fact, it is the idea of distributed knowledge that is introduced by the MOOC again, and the means of learning is really involved with this idea. When you learn as a network, you cannot teach one fact after another. Each fact is implicated with the others. You cannot see a single fact, even if you extract a fact from the data, because it would be only one abstraction, an idealization, and not more true that the identification of regularities in the data - and learning becomes more like a process to create landforms, and less like an exercise of memory. *It is the process of pattern recognition* that we want to develop, and not the remembering of facts.

Accordingly, the second element the MOOC brings to the mix revolves around the theory of effective networks. More deeply, the MOOC represents the instantiation of four major principles of effective distributed systems. These principles are, briefly, autonomy, diversity, openness and interactivity.

For example, it is based on these principles that we say that it is better to obtain many points of view than one. It is based on these principles that we say that the knowledge of a collection of people is greater than just the sum of each person's knowledge. It is based on these principles that we argue for the free exchange of knowledge and ideas, for open education, for self-determination and personal empowerment.

These four principles form the essence of the design of the network - the reason, for example, we encourage participants to use their preferred technology (it would be a lot easier if everybody used WordPress).

We are just now as a community beginning to understand what it means to say this. Consider 'learning analytics', for example, which is an attempt to learn about the learning process by examining a large body of data.

What is learned in the process of learning analytics is not what is contained in individual bits of data - that would be ridiculous - but overall trends or patterns. What is learned, in other words, emerges from the data. The things we are learning today are very simple. In the future we expect to learn things that are rather more subtle and enlightening.

Let me now say a few words in closing about Generation 6 and beyond.

From my perspective, the first three generations of e-learning (and the web generally) represent a focus on documents, while the second three represent a focus on data. Sometimes people speak of the second set as a focus on the Semantic Web, and they would not be wrong. Data

does not stand alone, the way documents do; the representation of any object is connected to the representation of any number of other objects, through shared features or properties, or by being related by some action or third party agency.

Indeed, if the first three generations are contents, networks and objects respectively, the second three generations are those very same things thought of as data: the CMS is content thought of as data, web 2.0 is the network thought of as data, and the MOOC is the environment thought of as data. So what comes after data is pretty important, but I would say, it is also to a certain degree knowable, because it will have something to do with content, the network, and the environment.

Here's what I think it will be - indeed, here's what I've always thought it would be. The next three generations of web and learning technology will be based on the idea of flow.

Flow is what happens when your content and your data becomes unmanageable. Flow is what happens when all you can do is watch it as it goes by - it is too massive to store, it is too detailed to comprehend. Flow is when we cease to think of things like contents and communications and even people and environments as things and start thinking of them as (for lack of a better word) media - like the water in a river, like the electricity in our pipes, like the air in the sky.

The first of these things that flow will be the outputs of learning (and other) analytics; they will be the distillation of the massive amounts of data, presented to us from various viewpoints and perspectives, always changing, always adapting, always fluid.

Inside the gRSShopper system I am working toward the development of the first sort of engines that capture and display this flow. gRSShopper creates a graph of all links, all interactions, all communications. I don't know what to do with it yet, but I think that the idea of comprehending the interactions between these distributed systems in a learning network is an important first step to understanding what is learned, how it is learned, and why it is learned. And with that, perhaps, we can take our understanding of online learning a step further.

But that, perhaps, may take the efforts of another generation.

Thank you.

Clair, February 8, 2012

A Gathering of Ideas

Submitted to the iDC Mailing List [5]

I haven't had much to contribute this week because I have been engaged in a couple of projects that will I hope eventually offer open and free access to learning.

- Personal Learning Environment[6] – this project, which is an application and systems development project being undertaken by Canada's National Research Council, is intended to enable learners easy access to the world's learning resources from their own personal environment

- Critical Literacies 2010[7]– this is an open online course, on the model of the Connectivism and Connective Knowledge courses George and I have offered in the past, designed to study and foster the fundamental capacities learners need to flourish in an online environment

For myself, I have little to no interest in 'trends' in higher education, nor am I interested in the 'globalization' of higher education. Where perhaps once I thought mass movements or mass phenomena were important, these no longer interest me. And where I once thought the needs of learning could be addressed institutionally, I now see institutions playing a smaller and smaller role.

I come to this field originally as a bit of a futurist. I was working as a web developer and instructional designer when I posted 'The Future of Online Learning'[8] in 1998. This paper, written originally to explain to my managers what I was working on, caught people's imagination and, because of its accuracy, had a remarkably long shelf life. A couple of years ago I wrote 'The Future of Online Learning: Ten Years On'[9] to update the predictions and draw out some of my thoughts on them.

Today, my work is still very much forward-directed, but I do not (and never have) believe in the inevitability of the future. Yes, we can detect patterns and regularities in events, as I describe in 'Patterns of Change'[10], an article I wrote for Critical Literacies last week. But as I state near the end of that article, I believe that choice, decision and selection play a major role in shaping the future.

Thus, while I often think of the future generally, and the future of education in particular, as a gradual migration of mass phenomena to network phenomena, I do not see this progression as inevitable, and indeed, I observe on the part of many quarters efforts to keep us firmly entrenched in the world of mass (I document these and other observations, for those not familiar

[5] IDC Mailing List. Website. https://mailman.thing.net/mailman/listinfo/idc

[6] National Research Council Canada. Personal Learning Environment. June 25, 2010. http://www.nrc-cnrc.gc.ca/eng/projects/iit/personal-learning-environment.html

[7] Stephen Downes and Rita Kop. Critical Literacies. Website National Research Council Canada. http://ple.elg.ca/course/

[8] Stephen Downes. The Future of Online Learning. Website. July, 1998. http://www.downes.ca/future/

[9] Stephen Downes. The Future of Online Learning: Ten Years On. Half an Hour (weblog), November 16, 2008. http://halfanhour.blogspot.ca/2008/11/future-of-online-learning-ten-years-on_16.html

[10] Stephen Downes. Patterns of Change. Critical Literacies Course Weblog, June 7, 2010. http://ple.elg.ca/course/?p=33

with it, in an online newsletter, OLDaily[11]). Change is not only progression, it is also conflict (and it is also cooperation).

So, I don't care what the majority of educational institutions are doing, I don't care what the 'best practices' are, I don't care how 'higher education can make you a better leader', I don't even care about debates such as 'equity or utility' (sorry George) because these are all things that trade on commonality, general principles, massification, manipulation and control, and ultimately, corporatism and statism (the twin pillars of the mass age).

What I do care about is the personal. This is not some pseudo-Randist individualism, not some sort of Lockean atomism, not a definition of the individual as the granules who, when assembled together, create the commonwealth. I am interested in the person as embedded in society, the person as a member of a network of communications and collaborations, a person who works and creates with and for other people, a person who experiences sociality, but also, and contra the mass nation, a person who is self-governing, guided by his or her own interests and principles, and is living a fully engaged life in a technological civilization.

It is the development of this sort of person that I had in mind when I wrote 'Things You Really Need to Learn'[12]. I am by no means the first to advocate such an attitude toward education. This is certainly what Illich has in mind in 'Tools for Conviviality'[13]:

> if we give people tools that guarantee their right to work with high, independent efficiency, thus simultaneously eliminating the need for either slaves or masters and enhancing each person's range of freedom. People need new tools to work with rather than tools that "work" for them. They need technology to make the most of the energy and imagination each has, rather than more well-programmed energy slaves.

So little of what we read or see in the field of online learning is concerned with providing people with the tools they need to create their own freedom. Study the work on e-learning and you will find a preponderance of material addressed to achieving corporate objectives and ROI, advancing the interests of colleges and universities, meeting employment needs and developing industrial strategies, assisting in the privatization or corporatization of the learning infrastructure, extending the reach of a given technology or product network, or subsumption of learning entirely under the individual's relation as 'consumer' with a corporate entity (whether that entity is government or private sector).

"The master's tools will never dismantle the master's house." This phrase from Audre Lorde[14] has haunted me ever since I first heard it. The development of, and provision of, tools for the higher education sector, the corporate e-learning sector, or even for the school system, parents, priests or non-profit agencies to use, will never provide the degree of conviviality envisioned by

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[11] Stephen Downes. OLDaily (website). http://www.downes.ca/news/OLDaily.htm
[12] Stephen Downes. Things You Really Need to Learn. Half an Hour (weblog). November 16, 2008. http://halfanhour.blogspot.ca/2006/08/things-you-really-need-to-learn.html
[13] Ivan Illich. Tools for Conviviality, section 2 'Convivial Reconstruction', paragraph 2. Harper & Row, 1973. http://clevercycles.com/tools_for_conviviality/
[14] Wikipedia. Audre Lorde. Retrieved May 26, 2010. http://en.wikipedia.org/wiki/Audre_Lorde

Illich. In these tools there is, and will always be, embedded a dependence back to the originator of the tool, back to the system of mass that makes it both possible and necessary.

I have struggled with the role[15] of the mass in relation to individual freedom and autonomy. I can certainly see the benefit and need of everything to do with mass, from that sense of belonging we all get from being a part of a team to the organized production we require to sustain a modern technological society. I am no myopic idealist looking for the utopian society of perfectly enlightened autonomous individuals working in perfect harmony. But I also write wishing that the mass had some sort of 'escape' or 'no-harm' clause, or that educators had their own version of the Hippocratic Oath, pledging first, to do no harm.

In the meantime, I work with and for what I believe the internet truly is – an explosion of capacity thrust into the hands of people worldwide, the instrument not only for the greatest outburst of creativity and self-expression ever seen, but also of the greatest autonomy and self-determination, and as well on top of that an unparalleled mechanism for cooperation and cohesion. My view of the internet is as far from the factory as one can imagine. But not as an inevitable or guaranteed future. Only one where there is a determined and directed effort to place the tools – the physical tools, the digital tools, and the cognitive tools – into the hands of a worldwide population, to do with as they will.

I've followed the discussions on this list with some interest. But these, too, seem in many respects distant to me. The distinctions of academia, the dialectic of class struggle – these seem to me to miss the essential nature of the change. In the end, to me, the meaning of the internet boils down to a simple utility. One person, one voice. The freedom of each of us to form and to have and to share our own thoughts, created by us, contributed freely to the world, and a society built, not on the basis of a propagation of ideas, but rather, on the basis of a gathering of them.

Moncton, May 26, 2010

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[15] Stephen Downes. Groups vs Networks: The Class Struggle Continues. Presentation. Stephen's Web, September 27, 2006. http://www.downes.ca/presentation/53

A Series of Questions

The second installment in my contribution to the iDC discussion.[16]

My call to arms[17] of the previous week didn't really attract the attention of this list. Whether that be because it was either trivial or implausible I cannot judge. But it seems to me that "a society built, not on the basis of a propagation of ideas, but rather, on the basis of a gathering of them" captures something important in the changes that are happing in our culture.

The concept of the course is one point where this can be seen. What has happened to the course over the years has also happened to other parts of our culture, and the current concept of the course has become so entrenched that we cannot conceive of it being something else, but rather, only more of what it has currently become.

Let me explain. The 'course' was originally a series of lectures given by a professor at a university, sometimes at the invitation of a student or academic society, and sometimes on his own initiative. The actual academic work being undertaken by a student, understood as a person who was "reading in such-and-such", typically under the direction of one of these professors, was completely separate. Courses were resources, rather like books, that could be used to extend their knowledge and suggest new ways of thinking, not a body of content intended to be learned and remembered.

Even at the lower grades, the idea of the course had little meaning. Read texts such as the autobiography of John Stuart Mill and we see that while there was a certain body of material - classical languages, rhetoric and logic, history, geography, science and mathematics - that was expected to be learned, an education was a continuous and fluid process of teaching and learning, not an assemblage of 'courses', much less 'credits' (or that atrocity, the 'credit-hour'). These are inventions that came into being only with the industrialization of education, with the division of the labour of teaching, the devolution from an individual tutor who specialized in the student, to a series of tutors who specialized in the subject.

But as the use of the course expanded, the infrastructure and way of talking about an education gradually grew to be centered on the course itself. With individual courses came individual textbooks designed for specific courses, and with distance education came complete course packages with textbooks and designed learning packages describing sequences of activities and interactions. The practice of the lecture, once an almost spontaneous act of creativity, became one of delivering a standard set of learning materials, conformant with a course outline, and congruent with learning outcomes that would be measured in a summative student evaluation at regular intervals.

Thus, when we think of the future of the course, it is tempting to think of an acceleration of this model, where the 'deliver' becomes more and more efficient, where 'textbooks' and 'course

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[16] IDC Mailing List. Website. https://mailman.thing.net/mailman/listinfo/idc
[17] Stephen Downes. A Gathering of Ideas. Half an Hour (weblog), June 10, 2010. http://halfanhour.blogspot.ca/2010/06/gathering-of-ideas.html

packages' are combined into easily packaged multimedia entities, and where the concept of 'talking a course', far from being an interesting and engaging set of genuinely academic work, has become nothing more than the demonstration of mastery of a set of competences known, defined, and well-described far in advance of any actual learning experience.

And so we get exactly this prediction of what the concept a course will become: ""Do you really think in 20 years somebody's going to put on their backpack drive a half hour to the University of Minnesota from the suburbs, hault their keester across campus and listen to some boring person drone on about Spanish 101 or Econ 101? . . . Is there another way to deliver the service other than a one size fits all monopoly provided that says show up at nine o'clock on Wednesday morning for Econ 101, can't I just pull that down on my iPhone or iPad whenever the heck I feel like it from wherever I feel like, and instead of paying thousands of dollars can I pay 199 for iCollege instead of 99 cents for iTunes, you know?" As posted by Trebor Scholz[18]

And a lot of stuff in our world has become like that. Books, once originally hand-written (and not so long ago either) are now dictated off the cuff to some secretary, or are assembled using some link-catching software[19] (cf Steven Johnson) or some other industrial-age process that involves only a small amount of actual authorship and a great deal of assembling, packaging and marketing (I think also of Jaron Lanier[20] observing that creativity today is being replaced by assembly of many small bits of not-so-creative content). Music is based on synthed voices, drum machines, and packaging and distribution contracts.

It is not enough to say these things are hard. It is not enough to say "Quality online courses are in fact neither cheap nor easy to teach." Because this just reifies the original idea, that what we are producing is some sort of packaged and marketed version of something that was once earlier a much more continuous and much more human process. Saying that "music is hard to create" is neither true nor useful. The same criticism applies to courses. It's not true because, with good technology, things that were really hard are now very accessible to people. I can, in a matter of seconds, lay down a really good and creative backing beat with Roc[21]. Putting together a 'course', for anyone with some degree of subject matter expertise, is no more difficult. There's nothing wrong with Hubert Dreyfus's lectures in iTunes University. They are perfectly good 'courses' and a great many people have already learned a great deal from them.

What is wrong with the idea of "instead of paying thousands of dollars can I pay 199 for iCollege" is not that you can't get a course for that kind of money - you can - but rather the concurrent acceptance of a model that has been developing for decades to the effect that one's education, one's self, is something that is consumed, passively, rather than created actively. And even that's not quite it, because people who are listening to Dreyfus every morning on their iPod are actually actively engaged in supporting their own learning.

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[18] Jon Stewart. Exclusive - Tim Pawlenty Extended Interview Pt. 1. The Daily Show with Jon Stewart (website), June 10, 2010. http://www.thedailyshow.com/watch/thu-june-10-2010/exclusive---tim-pawlenty-unedited-interview-pt--1

[19] Steven Berlin Johnson. Tool for Thought. Weblog post, January 29, 2005. http://www.stevenberlinjohnson.com/movabletype/archives/000230.html

[20] Jaron Lanier. You Are Not a Gadget: A Manifesto. Knopf; 1 edition (Jan 12 2010). http://www.amazon.ca/You-Are-Not-Gadget-Manifesto/dp/0307269647

[21] Aviary. Roc Music Creator. Website. http://aviary.com/tools/music-creator

What is missing here is the answer to the question "Is this all there is?" Is 'getting existentialism' now equivalent to listening to Dreyfus on tape? Well, no - but that's not because creating a course is hard. Rather, it has everything to do with the learner's investment and contribution to the act of learning. Sitting in the lecture hall, listening to one of the greats hold forth on a series of questions that you helped articulate and pose, engaged in a series of lectures that you helped organize, because they fed into a research programme that you created and implemented, is very different than listening to Hubert Dreyfus on tape, not because it's hard for Hubert Dreyfus to do his part, but because it's hard for you to do your part. We don't (as we all know, right?) consume an education, but our education system has become based on the model of consumption, so much so that even the critics of it can articulate only about how hard it is to create the consumable.

This is why we - George and I and David and Alec and Dave and others - are working on opening up education. Not because we think it will reduce the cost of the consumable to zero, not because we think we can package and deliver an education more cheaply and more efficiently, but because we understand that, unless an education is open, unless it's precisely *not* a consumable, it's not an education at all. And while *this* observation, that education is not a consumable, is hardly new or unique, our approach to it appears to have been (though you know if you go back into the history of education you can also find[22] [23] [24] a great deal about self-organizing learning communities and the pedagogies based on such models).

We have structured our approach to openness in learning in three stages:

1. Open Content - here we refer to any material that may be of use in the purpose of education, not merely the professional materials that might be produced by educators and publishers, such as looks, learning packages, learning content, learning objects, but also the artifacts created by people generally as evidence of their own learning, blog posts, videos, music, animations, software and the like; and distributed, not in the sense that they are collected and packaged and flaked and formed and sold or distributed through advertiser-based media, but rather, exchanged peer to peer, through a network of connections, as a conversation rather than a commodity. We have all of us offered reams of learning materials online, freely available to all who wish to read them, watch them, listen to them, or to use the to create and share and create anew.

2. Open Instruction - here we refer to the 'lecture' portion of open learning, or rather, the internet analogue of the original lecture described at the top of this post, a series or sequence of activities undertaken by experts (or possibly putative experts) in a field, but conducted not merely so fully-subscribed students at Cambridge or Oxford can attend, but rather, set out into the open, taking advantage of modern streaming and conferencing technology, so that an entire community can attend, the conduct, then, of learning activities and dialogue and reflection in an

[22] Manish Jain. Towards Open Learning Communities: One Vision Under Construction. UNESCO, March 22, 1997. http://www.unesco.org/education/educprog/lwf/dl/cies97.pdf
[23] Ronald David Glass. On Paulo Freire's Philosophy of Praxis and the Foundations of Liberation Education. Educational Researcher Vol. 30, No. 2 (Mar., 2001), pp. 15-25 http://br.librosintinta.in/biblioteca/ver-pdf/www.aera.net/uploadedFiles/Journals_and_Publications/Journals/Educational_Researcher/3002/AERA3002_Glass.pdf.htx
[24] John Perazzo. Saul Alinsky. Discover the Networks (website), April 2008. http://www.discoverthenetworks.org/individualProfile.asp?indid=2314

open forum, engaging learners, and modeling the practice of the discipline or domain. Thus the Connectivism and Connective Knowledge course conducted all its activities, including synchronous class sessions, in a free and open environment, and at its peak was attended by 2200 students, each engaged in a more or less self-determined set of individual activities.

3. Open Assessment - there we refer to the practice of obtaining and displaying credentials demonstrating what one has learned, and therefore of the process and procedures leading to the assessment of such credentials, and instead of maintaining and enforcing a monopoly on the recognition of learning. In Connectivism and Connective Knowledge, for example, we published assignment directions and questions, as well as rubrics for the assessment of these assignments, and stated that any external agency that wished to assess students (who in turn wished to be assessed) attending our course could do so. This, in a given 'course' there is not a single mode of assessment, but can be as many as there are students, and the assessment of individual accomplishment is not only separated from the presentation of course content or the conduct of course instruction, it is independent of it.

This three-fold opening of learning allows anyone with the interest and inclination (and computer connection and time - two factors that cannot be overlooked when considering the widespread applicability of this model) to benefit from the learning we offer, but not to benefit simply as a passive consumer of the learning (such would in one of our connectivist courses be a very poor learning experience indeed, as we have all been told by disgruntled (and putative) 'students'), but as an active participant in the creation of their own learning. It restores the learner's investment and contribution to the act of learning, and does so in the only way that would possibly work, by the elimination of corporate or institutional proprietorship over the instruments of learning. To the extent that learning is produced and owned and sold to the student by a provider, is the extent to which the student fails to realize the benefit of that learning, and must substitute some alternative mechanism of their own.

This is what you see in actual universities and is what is exactly not produced by prepackaged and syndicated lectures. You don't see the learning the students create for themselves, by arguing until the wee hours in pubs, by forming and reforming into clubs and associations and societies, by undertaking projects profound to mundane, from the student newspaper to student government to charitable works to engineering pranks, by forming study circles and reading circles and discussion groups and debating events and even sports and recreation and music and theatre. All these are the education proper that happens in a university system, and what are abstracted out of course packages, and none of these are 'easy' or 'hard' to deliver at greater or lesser quality because these are not delivered at all, but rather are created by the students themselves.

These, indeed, are the things we look for as products of the three degrees of open education - not a demonstration of some learned body of knowledge, not mastery of a true-false test or even the wiring of a definitive essay or passing of an oral exam, but rather, evidence that the facilitation provided - open content, instruction and assessment - have led to the development of these learning activities, in whatever shape or form, by the learners themselves, evidence that they have begun to find and form and work with their own understanding, to create their own

infrastructure, to prepare themselves to become practitioners and therefore teachers in their own right. We judge the success of a course not by the grades but by the proliferation of learning activity in its wake, and by that measure, the Connectivism course was significantly successful, having spawned activities and communities that thrive two years later.

None of this, however, is relevant to a community that still sees academic and learning as having to do with the propagation of ideas, and can only view creative acts from the perspective of a publisher or aggregator. A society based on the aggregation of ideas is not one based on the idea of free labour, because the concept of labour applies only is what is produced, as though in a factory, is commoditized and sold, as though a good or a package.

And though this may be hard for anyone involved in the 'production' of knowledge or information or content or learning to understand, it doesn't matter whether the call to arms received any reaction from this list or any other list, because what was important in the call to arms wasn't the propagation of the ideas inside it, Wasn't the marketing and distribution and popularization of those ideas, but the very act of creating those ideas in the first place, a space where designations of 'trivial' or 'implausible' don't even have any meaning, much less relevance. In writing this, I create my own learning, and its meaning is determined, not by the effect it has on you, but by the impact it had on me through the act of its creation. What matters, of the work that I do, is that it help provide, and not hinder, an open space for content, instruction, and assessment.

Moncton, June 10, 2010

What I'm Working On

In response to an in-house request to describe, in accessible language, what it is that I'm working on.

I don't mind explaining - though I will confess it's difficult to explain. It really combines a number of quite distinct ideas in a way that isn't always clear.

The idea is based in e-learning but isn't limited to that. The challenge of e-learning has always been to locate and deliver the right resources to the right person. A *lot* of digital ink has been spilled on this. Mostly, the way people approach it is to treat online resources as analogous to library resources, and hence to depict the problem of locating resources as a search and retrieval problem. Which in a certain sense makes sense - how else are you going to find that one resource out of a billion but by searching for it?

And some good work has been done here. The major insight, prompted by the Semantic Web, was that resources could be given standardized descriptions. In e-learning we got the Learning Object Metadata, which is a set of 87 or so data fields that e-learning designers should provide in XML format to describe their learning resources. This would allow for searches - not just keyword or phrase searches, Google already does that, but structured searched. For example, Google could never discover a resource that is best for Grade 10 students, but if somebody filled out the TypicalAgeRange tag then the resource would become discoverable.

That, indeed, has always been the limit of data mining technologies. No matter how good your analysis, you have only the resource itself to look at. And sometimes these resources are pretty opaque - a photo, for example - and while we can (and do) locate resources on the basis of their similarity to each other, we cannot differentiate between physically similar, but otherwise very different, resources. Consider, for example, the problem of detecting pornography in image libraries (from either the standpoint of retrieval or filtering - it's the same either way). It's not just a question of being able to distinguish between porn and sports coverage of a swimming meet, but also distinguishing between porn and medical journals, anthropology and art. Naked bodies always look pretty similar; whether one is scientific or pornographic is a matter of interpretation, not substance.

On the internet, what some people have realized is that this sort of problem is not so much a problem of description as a problem of relation (good thing, too, because studies showed that *nobody* was going to fill out 87 metadata fields). A type of technology called 'recommender systems' was employed to do everything from pick music to match you with your perfect date. A recommender system links three different types of data: a description of a resource, a description of a person, and an evaluation or ranking. In summary, we were looking for statements of the type, "people like P thought that resources like R were rated Q". This formed the basis of the sifter-filter project, which was adopted by some people in Fredericton and became RACOFI. Here's one presentation[25] of the idea, which predates RACOFI: Here's another.[26]

Part of this work involves the idea of the resource profile. This is a concept that is unique to our project. The main point here is that, for any resource, there are *multiple* points of view. The very same book may be described as heavy or light, as good or bad, as appropriate or inappropriate, depending on who is doing the describing. Crucially, it is important that the people producing the book *not* be the only ones describing the book (otherwise every book would be 'excellent!!'). That's why we have reviewers. Looking at this more closely, we determined that there are different types of metadata: that created by the resource author, that created by the user of the resource, and that created by disinterested third parties (such as reviewers and classifiers). But now, when we look at this, the different types of resource, and the different types of metadata, it becomes clear, that any idea of thinking of metadata as anything like a *document* is misguided. Metadata is the *knowledge* we have of an object - specifically, the *profile* - but this varies from moment to moment, from perspective to perspective. My paper, Resource Profiles,[27] describes this in detail.

The key here is this: knowledge has many authors, knowledge has many facets, it looks different to each different person, and it changes moment to moment. A piece of knowledge isn't a *description* of something, it is a way of *relating* to something. My 'knowing that x is P' is not a description of 'x', it is a description of 'the relation between me and x'. When I say 'x is P' and you say 'x is P' we are actually making two different statements (this is why the semantic web is on the verge of becoming a very expensive failure - it is based on a description, rather than a relational, theory of knowledge). One way of stating this is that my 'knowing that x is P' is a way of describing how I *use* x. If I think 'x is a horse', I use it one way. If I think 'x is a tree', I use it differently. This is especially evident when we look at the meanings of words (and especially, the words that describe resources). If I think "'x' means P" then I will use the word 'x' one way. If I think "'x' means Q", I will use it a different way. Hence - as Wittgenstein said - "meaning is use".

The upshot of all of this is, no *descriptive* approach to resource discovery could ever work, because the words used to describe things mean different things to different people. You don't notice this so much in smallish repositories of only tens of thousands of items. But when you get

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[25] Stephen Downes, Hélène Fournier, Chaouki Regoui. Projecting Quality. Presented at MADLaT, Winnipeg, May 7, 2004. Slideshare. http://www.slideshare.net/Downes/projecting-quality
[26] Stephen Downes. Quality Standards: It's All About Teaching and Learning? Presented at NUTN, Kennebunkport, June 4, 2004. Slideshare. http://www.slideshare.net/Downes/quality-standards-its-all-about-teaching-and-learning/
[27] Stephen Downes. Resource Profiles. Journal of Interactive Media in Education 5 Online May 20, 2004. http://www.downes.ca/post/41750

into the millions and billions of items, this becomes a huge problem (even huger when you add into the mix the fact that people *deliberately* misuse words in order to fool other people).

OK. Let's put that aside for the moment. As metadata was being developed, on the one hand (by the semantic web people) as a description format, it was also being developed (by the blog people) as a *syndication* format. That is to say, the point of the metadata wasn't so much to describe a resource as it was to put the resource into a very portable, machine-readable format. The first, and most important, of these formats, was RSS. I have been involved in RSS for a very long time, since the beginning (my feed was Netscape Netcenter feed number 31). It was evident very early to me that syndication would be the best way to address the problem of how to deliver selected learning resources to people. Here's[28] where I first proposed it.

As we looked at the use of RSS to syndicate resources, and the use of metadata to describe resources, it became clear that content syndication would best be supported by what may be known as *distributed* metadata. The idea here is that the metadata distributed via an RSS feed *links to other* metadata that may be located elsewhere on the internet.

We used this to develop and propose what we now call 'distributed digital rights management'. The idea is that, in resource metadata, which is retrieved by a user or a 'harvester', there is a link to 'rights metadata', in our cased described in open Digital Rights Language (ODRL). This way, the RSS metadata could be sent out into the world, distributed to any number of people, stored who knows where, and the rights metadata could sit right on our own server, where we could change it whenever we needed to. Since the rights metadata in the RSS file was only a pointer, this meant that the rights information would always be up to date. Here are several presentations [29] related to the concept.

This is the mechanism ultimately employed by Creative Commons to allow authors to attach licenses to their work (and there is a CC declaration in RSS). It is also, belatedly, how other standards bodies, such as Dublin Core, have been approaching rights declarations. To be sure, there is still a large contingent out there that things rights information ought always accompany the object (to make the object 'portable' and 'reusable'). It is, again, this old idea that everything there is to know about an object ought to be *in* the object. But 'rights', like 'knowledge', are volatile. A resource (such as an Elvis recording) might be worth so much one day (Elvis is alive) and twice as much the next day (Elvis is dead). The owner of a Beatles recording might be Paul McCartney one day and Michael Jackson the next.

The combination of resource profiles, syndication, and distributed metadata gives us the model for a learning resource syndication network. Here are the slides[30] describing the network and the paper.[31] This is what we had intended eduSource to become (unfortunately, people with different interests determined that it would go in a different direction, leaving our DRM system a

[28] Stephen Downes. Content Syndication and Online Learning. Presented to NAWeb 2000, October 16, 2000. http://www.downes.ca/post/148
[29] Slideshare search result for 'DDRM'. http://www.slideshare.net/search/slideshow?searchfrom=header&q=ddrm+downes
[30] Stephen Downes. Design and Reusability of Learning Objects in an Academic Context: A New Economy of Education? eLearning: a challenge for universities, Milan, November 12, 2002. Slideshare. http://www.slideshare.net/Downes/design-and-reusability-of-learning-objects-in-an-academic-context-a-new-economy-of-education/
[31] Stephen Downes. Design and Reusability of Learning Objects in an Academic Context: A New Economy of Education? in USDLA Journal Volume 17, Number 1 online January 16, 2003. http://www.downes.ca/post/31468

bit of an orphan - and eduSource, ultimately, a failure). But if we look at the RSS network (which now comprises millions of feeds) and the OAI/DSpace network (which comprises millions of resources) we can see that something like this approach is successful.

That's where we were at the end of the eduSource project. But the million dollar question is still this: how does your content network ensure that the right resource ends up in the right hands?

And the answer is: by the way the network is organized. That - the way the network is organized - is the core of the theory of learning networks.

But what does that *mean*?

Back in the pre-history of artificial intelligence, there were two major approaches. One approach - called 'expert systems' - consisted essentially of the attempt to codify knowledge as a series of statements and rules for the recovery of those statements. Hence, rule-based AI languages like LISP. The paradigm was probably the General Problem Solver of Newell and Simon, but efforts abounded. The expert system approach brought with it (in my view) a lot of baggage: that knowledge could be codified in sentences, that thought and reasoning were like following rules, that human minds were physical symbol systems, that sort of thing. (This approach - not coincidentally - is what the Semantic Web is built upon).

The other approach, advocated by Minsky and Papert, among others, was called 'connectionism'. It was based on the idea that the computer system should resemble the mind - that is to say, that it should be composed of layers of connected units or 'neurons'. Such a computer would not be 'programmed' with a set of instructions, it would be 'trained' by presenting it with input. Different ways of training neural nets (as they came to be called) were proposed - simple (Hebbian) associationism, back-propagation, or (Boltzmann) 'settling'. The connectionist systems proved to be really good at some things - like, say, pattern recognition - but much less good at other things - like, say, generating rules.

If we look at things this way, then it becomes clear that two very distinct problems are in fact instances of the same problem. The problem of locating the right resource on the internet is basically the same problem as the problem of getting the question right on the test. So if we can understand how the human mind learns, we can understand how to manage our learning resource network.

Connectionism says that "to learn that 'x is P' is to be organized in a certain way", to have the right set of connections. And if we recall that "A piece of knowledge isn't a *description* of something, it is a way of *relating* to something. My 'knowing that x is P' is not a description of 'x', it is a description of 'the relation between me and x'" it becomes evident that we're working on the same theory here. The problem of content organization on the internet is the same as the problem of content organization in the brain. And even better: since we know that 'being organized in a certain way' can constitute knowledge in the brain, then 'being organized in a certain way' can constitute knowledge in the network.

Connectionism gives us our mechanics. It tells us how to put the network together, how to arrange units in layers, and suggests mechanisms of interaction and training. But it doesn't give

us our semantics. It doesn't tell us *which* kind of organization will, successfully produce knowledge.

Enter the theory of social networks, pioneered by people like Duncan J. Watts. In the first instance, this theory is an explanation of how a network of independent entities can become coordinated with no external intervention. This is very important - a network cannot produce knowledge unless it *itself* produces knowledge, for otherwise we have to find the knowledge in some person, which simply pushes the problem back a step. Networks organize themselves, Watts (and others) found, based on the mathematical properties of the connections between the members of the network. For example: a cricket will chirp every second, but will chirp at an interval of as short as 3/4 of a second if prompted by some other cricket's chirp. provided every cricket can hear at least one other cricket, this simple system will result in crickets chirping in unison, like a choir, all without any SuperCricket guiding the rest.

Similar sort of phenomena were popularized in James Surowiecki's *The Wisdom of Crowds.* The idea here is that a crowd can determine the right answer to a question better than an expert. I saw personally a graphic example of this at Idea City in 2003 (they don't let me go to Idea City any more - too bad). The singer Neko Case asked the crowd to be her chorus. "Don't be afraid that you're out of tune," she said. "One voice is out of tune - but when 300 voices sing together, it's always perfectly in tune." And it was. The errors cancel out, and we each have our own way of getting at least close to the right note, with the result that all of us, singing together, hit it perfectly.

So knowledge can be produced by networks. But *what kind* of networks? Because everybody knows about lemmings and mob behaviour and all sorts of similar problems - 'cascade phenomena', they are called in the literature. They are like the spread of a disease through a population - or the spread of harmful ideas in the brain. This is where we begin with the science of learning networks.

The first part of to combine the science of social networks with the idea of the internet and metadata, which was done in papers like The Semantic Social Network.[32] Thus we have a picture of a network that looks like the social networks being described by Watts and Surowiecki. These have been (badly) implemented in social network services such as Friendster and Orkut. To make this work, a distributed identity network is required. This was

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[32] Stephen Downes. The Semantic Social Network. Stephen's Web (Weblog). February 14, 2004. http://www.downes.ca/post/46

developed as mIDm - here[33] and here[34] - today, a similar concept, called OpenID, is in the process of being implemented across the internet.

Another part was to provide a set of design principles for the creation of networks that will effectively avoid cascade phenomena. Drawing for the earlier part of our work, including ideas such as distributed metadata, a theory of effective networks was drafted. Slides[35] and Robin Good's nicely illustrated version[36] of my paper. The proposal here is that networks that exhibit the eight principles will effectively self-organize (and this is a *very* rough rule of thumb, intended to cover for mathematics which might never be possibly solved - very very simple examples of these sorts of organizing principles are seen in things like 'the game of Life' - because the phenomena being described are *complex* phenomena (like weather system or ecologies) with multiple mutually dependent variables).

Adding to this was what I called the 'semantic principle', which is our assurance that the forms of organization our networks take will be *reliable* or *dependable* forms of organization. The epistemology of network knowledge is described in detail in my paper An Introduction to Connective Knowledge[37] and Learning Networks and Connective Knowledge.[38]

On the technical side, my main attempt to instantiate these principles is embodied in my development of Edu_RSS. I am currently migrating Edu_RSS from the NRC server to my own server, as directed. The idea behind Edu_RSS is that it harvests the RSS feeds of roughly 500 writers in the field of online learning, combines these feeds in different ways, and outputs them as a set of topical feeds. The system also merges with my own website and commentary. the idea is that a system like Edu_RSS is like one node in the network - ultimately, layers of the network will be created by other services doing much the same sort of thing. For a description of edu_RSS see here.[39]

Very similar to EduRSS in concept and design is the student version of the same idea, generally known as the Personal learning Environment. The PLE differs from EduRSS in that it depends explicitly on external services (such as Flickr, del.iciop.us, Blogger and the like) for data retrieval and storage. The 'node in the network', with the PLE, is actually virtual, distributed over a number of websites, and also very portable (ideally, it could be implemented on a memory stick). I am working on the concept of the PLE both by myself[40] and with external organizations.

Again, the idea behind these applications is to bring some of the threads of this whole discussion into convergence - distributed metadata, content syndication, distributed rights,

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[33] Stephen Downes. Authentication and Identification in International Journal of Instructional Technology and Distance Learning Volume 2 No. 10 Online September 30, 2005. http://www.downes.ca/post/12

[34] Stephen Downes. mIDm - Self-Identification the World Wide Web. Stephen's Web (weblog). May 4, 2005. http://www.downes.ca/idme.htm

[35] Stephen Downes. Learning Networks: Theory and Practice. Slideshare. March 9, 2006. http://www.slideshare.net/Downes/learning-networks-theory-and-practice

[36] Robin Good. Learning Networks + Knowledge Exchange = Learning 2.0. kolabora (website). October 20, 2006. http://www.kolabora.com/news/2006/10/20/learning_networks_knowledge_exchange.htm

[37] Stephen Downes. An Introduction to Connective Knowledge in Hug, Theo (ed.) (2007): Media, Knowledge & Education - Exploring new Spaces, Relations and Dynamics in Digital Media Ecologies. Proceedings of the International Conference held on June 25-26, 2007. http://www.downes.ca/post/33034

[38] Stephen Downes. Learning Networks and Connective Knowledge in Collective Intelligence and E-Learning 2.0: Implications of Web-Based Communities and Networking, Harrison Hao Yang and Steve Chi-Yin Yuen, eds. April 27, 2009. http://www.downes.ca/post/36031

[39] Stephen Downes. Edu_RSS. Website. 2005. http://www.downes.ca/edurss02.htm

[40] Stephen Downes. RSS Writr. Website. 2005. http://www.downes.ca/editor/writr.htm

identity, data, autonomy and diversity of perspective and view, multiple simultaneous connections creating 'layers' of interconnected individuals, and the rest.

The purpose of the Learning Networks project, over and above the theorizing, is to build (or help build) the sorts of tools that, when used by largish numbers of people, result in a self-organizing network.

The idea is that, when a person needs to retrieve a certain resource (which he or she may or may not know exists) that the network will *reorganize itself* so that this resource is the most prominent resource. Such a network would never need to be searched - it would flex and bend and reshape itself minute by minute according to where you are, who you're with, what you're doing, and would always have certain resources 'top of mind' would could be displayed in any environment or work area. Imagine, for example, a word processor that, as you type your paper, suggests the references you might want to read and use at that point. *And does it well* and without prejudice (or commercial motivation). Imagine a network that, as you create your resource, can tell you exactly what that resource is worth, right now, if you were to offer it for sale on the open market.

That's what I'm working on. In a nutshell.

Moncton, March 29, 2007

Some Principles of Effective E-Learning

Presented as 'How to Be a Good Learner', North Bay, May 26, 2005[41]

What makes e-learning effective is, of course, typically in the eye of the beholder. One person's toast and jam may be another person's steak and kidney pie. This is what makes the drafting of a set of guidelines for effective e-learning so difficult. Follow the guidelines exactly, and you still may have provided some e-learning which, while it satisfies the CEO's artistic eye, does not capture the attention and interest of the students.

Good e-learning practice, indeed, may not even flow from the principles of pedagogy at all. As my colleague Jay Cross points out, the bulk of learning, even in a corporate environment, is comprised by informal learning. Techniques that work in the classroom are not so likely to work on the web page, primarily because much of what makes a classroom a classroom - the scheduling, the lesson plans and direction, the cohort - are not likely to be present online.

Probably the best indicator of what works in informal e-learning is what works on the web in general. After all, this is where much informal learning is already taking place. And the web is a medium that supports informal, random-access on-the-job training. Probably much of what counts as learning from the web is not even recognized as learning at all. When I needed yesterday to make my controller work with my video baseball game, I turned to the web - and as a result of my search (made more difficult, not easier, by advertising sites - there is a business opportunity here) I learned how software communicates with alternative input devices in a Windows environment.

When I was asked recently, therefore, to list what I thought were the features that distinguished successful from unsuccessful e-learning, I relied on my experience with successful websites in general and listed the following three criteria: interaction, usability and relevance.

Interaction

By 'interaction' what I mean is the capacity to communicate with other people interested in the same topic or using the same online resource. In a learning environment, interaction means the capacity to speak with your fellow students or your instructor. Of course, online, such roles are not so distinct - your student at one moment may be your instructor the next, depending on the subject.

Interaction distinguishes online learning from the old computer-based training (CBT) because it fosters the understanding that there are people out there, that we aren't merely communicating with a machine. As any user of one of those automatic telephone answering services can attest, when you want to be heard there is little else more frustrating that speaking to a device that

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[41] Stephen Downes. How To Be A Good Learner. Keynote presentation delivered to This Is IT, North Bay, Ontario. May 26, 2005. http://www.downes.ca/presentation/86

cannot understand you. Even an answering machine provides some relief, proportional to the hope it engenders of receiving an eventual reply.

But more than the human contact, interaction fosters the development of human content. When we think of online learning we typically think of a pre-packaged course or instructional program. And, of course, such learning materials are useful for novice learners; it is hard to know what to ask someone when you know nothing about the field at all. When I first installed my new software, I used the bundled training program to give myself a lay of the land. But even the best designers cannot create lessons for every contingency (and even the best learners are unlikely to sit through them all).

Indeed, I found my solution to my baseball controller problem not through an online course or any sort of prepared lesson plan; I found it through a discussion list. My problem was unique - very few people have tried to use a fighter simulation controller to power a baseball game. But some had - and those people had taken advantage of an online forum to discuss the issue and, ultimately, to point to a new controller file located deep in the software company's website that solved the problem for me.

The problem was - this discussion was nowhere to be found on the game developer's website. Reading page after page of 'tips and tricks' - along with some more formal content- offered not one link to the rich wealth of discussion laying just beneath the surface. Had the game developers fostered and offered rich links to its user community, it would have been much easier for me to find the learning I needed. I would also have felt more comfortable, knowing that there was a base of support out there that I could rely on to help me through the rough sports (after all - I'm going to have to pitch to Sammy Sosa with the bases loaded *sometime* - it happens to all of us -- and it's not going to be in any book).

Interaction not only promotes human contact, it provides human content. It gives people not only the opportunity to communicate but also to help each other. And it creates a deep layer of learning content that no developer could ever hope to create.

Usability

Most people are familiar with usability through the writings of Jakob Nielsen or John S. Rhodes. Design purists are probably familiar with Jeffrey Zeldman. But probably the greatest usability experts are found in the design labs of Google and Yahoo!

There is no denying that these are two of the most successful enterprises on the web. But what made them successful was not that they were large or had great products - after all, Microsoft has both and yet nobody classes Microsoft's online presence ion the same category as these two. No, what made these companies successful is that they solved the usability problem.

Yahoo! and Google, though both ostensibly search sites, take completely different approaches to serving their clientele. Yahoo!, which came first, evolved as a portal site. This meant that it would have to solve the problem of navigation through complex and rich information. Google, by

contrast, approached its challenge as a search engine. This meant it has to offer the most direct access to its powerful technology possible.

Between the two sites, designers have hit on what are probably the two essential elements of usability: consistency and simplicity. The two, indeed, go hand in hand: it is not possible to be consistent without being simple, and it is not possible to be simple without being consistent.

Simplicity is the feature that strikes the user first. Many of us probably recall Google's debut on the web. At that time, it was little more than a text form and a submit button. Results listings were unadorned and easy to follow. At a time when websites were getting more and more complex, Google's design was a startling change of pace. But an effective one, and users soon began using Google in droves, lured by the site's simplicity and retained by its effective search engine.

Fewer people remember the early days of Yahoo!, but this company too hit on a design that would become a standard. Yahoo!'s early design was nothing more than a set of links pointing to different categories. Through a process of selection, users would delve deeper and deeper into Yahoo!'s hierarchy of search categories. There was nothing to learn about the use of Yahoo! - simply click on the link. The 'Yahoo! portal' soon became the standard to which other portal sites aspired.

The list of other online enterprises that broke away from the pack through simplicity is too long to list. Amazon made buying books online simple. eBay made hosting an online auction simple. Blogger made authoring your own website simple. Bloglines made reading RSS simple. The web itself is actually the simplification of earlier, more arcane technologies - the web does no more than what was already enabled by the holy triumvirate of Gopher, Archie and Veronica, but it did away with the typing and allowed documents to link directly to each other.

The concept of consistency is less well understood but to get an idea of what it entails take a look at the links on both Yahoo!'s and Google's current sites. What you won't find are things like dropdown menus, fancy icons, image maps and the other arcana of the typical website. Links on both Yahoo! and Google are not only simple, they are consistent: they are the same colour and the same type throughout the site, for the most part unadorned. They use the ultimate standard of consistency: words - a system of reference with which readers are already familiar.

Contrast the navigation offered by these two sites with the navigation offered by the typical e-learning offering. Students are presented with a dizzying array of mysterious icons, expanding and collapsing file-manager style lists, dropdowns, forms, buttons, and more. Frequent are the columns and articles advising that students be trained in how to use the learning management system before the course commences. Had Yahoo! or Google depended on this mode of design, they would be out of business. The website must teach the user how it functions *as the user uses it*.

There is one more advantage of both consistency and simplicity: speed. Both Yahoo and Google are fast-loading sites, because they rely on a minimum of extraneous content. They are also able to rely on the user's browser caching elements that are repeatedly used (Google has

advanced this to a high art, it's cached Javascript engine running Google leading to the now popular Ajax website interaction engine). Other sites that could be fast are bogged down with downloads that are not required, browser rendering that adds nothing to beauty and functionality, bells and whistles, as they are so often called, that do nothing but make noise.

The principle of simplicity applies to more than just web design and navigation, of course. The mantra must be repeated in all aspects of the learning material. Is it easy to access? Is it easy to understand? To use? As Stanley Fish says, "Answer the question as precisely as possible and then stop. Don't complicate, don't explain, don't pontificate, don't muse, don't speculate, don't be reflective, don't be creative, don't take offense, don't be defensive, don't take anything personally, don't take anything in any way."[42] There may be more elegant was to write and to design, but it is unlikely that there are more effective ones.

Relevance

This is probably the most difficult of the three criteria to get right. It is what marks, at its core, the distinction between formal and informal learning. It is the principle that learners should get what they want, when they want it, and where they want it (one might also say 'how they want it' but for today I will assume that this is covered under the principle of simplicity).

What learners want is typically the answer to a current problem or enquiry. It is in this regard that formal learning fails, because it addresses no specific need and consequently provides a range of learning content on a 'just in case' basis. Sometimes, this is in fact what the learner wants - if the objective is not to solve a particular problem but rather to lay out a groundwork of understanding or to address foundational knowledge. Most learning - according to Jay Cross, up to 90 percent of learning - is not of this variety.

In fact, learners will do most of the work in defining what they want. This is what drives the use of search engines forward, as web users attempt to specify and work through results lists in an effort to state precisely what it is they are looking for. This is what drives the users of community and hobby groups on Yahoo! Groups and other discussion boards to pose increasingly detailed statements of exactly what it is they are trying to learn.

What makes it so difficult? For one thing, online marketers have almost completely failed the relevance test. A web search, even using a finely tuned and powerful system such as Google's, leads the reader to a raft of advertising sites and similar irrelevancy. Even your email, which one would suspect would contain the most relevant content in the world, is plagued by advertisers' attempts to be heard. When your potential readers are installing software to actually prevent your content from being seen, you know you have failed the relevance test.

In online learning, the failure of relevance may be seen in less technical attempts to block out content. The oft-cited problems with course completions in many cases reflects not student inability but student disinterest; having learned what they wanted from the course (if anything) the web user quickly abandons the material (studies show that users read websites that way

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[42] Stanley Fish. Minimalis, The Chronicle of Higher Education. June 25, 2004. http://chronicle.com/article/Minimalism/44675/

too, so don't take it personally). Long and lingering lunch breaks, late arrivals, a focus on other tasks, reading material or email during training - these are all the non-technical equivalent of popup-blockers and spam-blockers.

Relevance is obtained through precision, through simplicity. Making each bit of web content about one and only one thing greatly increases the chance that a reader will find the resource being sought (it also helps with search engine optimization, another aspect advertisers rarely take into account). Placing each lesson on its own page, making sure the page contains words and phrases that would lead a searcher to its content, and placing it in a logically designed directory of related content - all these ensure that a learner will find exactly what is needed. Burying it in an online course, hidden behind a registration wall , forcing the reader to navigate through an unrelated home page - these guarantee that the content will never be found.

It has been argued - and will continue to be argued - that metadata is the key to discoverability. In fact, as Google and other search engines have shown - content is the key to discoverability. A resource, if it is well and clearly written, and focused on a clear topic, is its own metadata.

The remaining two clauses - 'when you want it' and 'where you want it' - are aspects of the same problem. When I was installing my game controller, I wanted my lesson right away, and I wanted it to appear on the screen I was using to try to install the game controller (because that's where I was when I wanted the instruction). The second key to relevance, after content, is therefore placement.

Location, location, location. We hear it all the time from real estate agents, and yet hear so seldom the same mantra from e-learning designers. But from the point of view, every second spent navigating from the place where learning is needed to the place where learning is provided is wasted time and wasted effort. It also increases the distance between the knowledge of the problem and the knowledge of the solution - by the time you find a site that suggests a solution to what you are trying to do, you have to go back and refresh your memory. In my case, it took two or three trips back and forth in order to remember the precise name of the controller I was trying to install. Distance creates dissonance, and dissonance means less effective learning.

If you follow the logic of this article from beginning to end, what emerges is that the possibility of interaction - of accessing learner generated content - ought to be built right into the software or equipment a person is trying to learn how to use. That's why they put radio systems in spacecraft and planes. That's also why the most popular gaming sites - such as Yahoo!'s gaming area - provide chat and discussion screens right where the game is being played. If you visit Yahoo! backgammon for the first time, for example, and don't know what to do, just ask your opponent. You will get a detailed reply. Yahoo! could not build a better backgammon training system if it tried.

Placing relevant content in to exactly the right context at the right time is a high art, and few (if any) e-learning enterprises have yet succeeded in attaining this magical combination. It involves both aspects of effective content design and aspects of dynamic search and placement. Game designers have had somewhat more success (their businesses depend on it, because a game

must be challenging enough to require learning, but at the same time hold the player's interest and not send them off to some faraway learning site). Placement depends on the precise nature of the request sent by a piece of software or tool, and the ability of a piece of content to respond to that success.

Effective E-Learning

No doubt there are other aspects of effective e-learning. Pedagogical theorists will talk about scaffolding, talk about learning objectives and outcomes, talk about practice and examination, and more. In various contexts these are all important and will play a significant role in determining the success of failure of a given learning enterprise.

None of these, though, are as central to the design of effective learning as the three criteria listed above. By ensuring that e-learning content is interactive, usable and relevant a designer can be virtually sure that the e-learning outcome will be a success. or at the very least, appreciated by the learners. Who are, after all, the final judge.

North Bay, May 26, 2005

Networks, Connectivism and Learning

Semantic Networks and Social Networks

This article published as *Semantic Networks and Social Networks* in The Learning Organization Journal *Volume 12, Number 5 411-417 May 1, 2005.*[43]

Abstract

Purpose: To illustrate the need for social network metadata within semantic metadata.

Design/methodology/approach: Surveys properties of social networks and the semantic web, suggests that social network analysis applies to semantic content, argues that semantic content is more searchable if social network metadata is merged with semantic web metadata.

Findings: The use of social network metadata will alter semantical searches from being random with respect to source to direct with respect to source, which will increase the accuracy of search results.

Research limitations/implications: Suggests that existing XML schemas for semantic web content be modified.

Practical implications: Introduction and overview of a new issue.

Originality/value: Foundational to the concept of the semantic social network; will be useful as an introduction to future work.

Keywords: Information networks, Internet, Social networks

Paper type: Conceptual paper

Semantic Networks and Social Networks

A social network is a collection of individuals linked together by a set of relations. In discussions of social networks the individuals in question are usually humans, though work in social network theory has found similarities between communities of humans and, say, communities of crickets[44] or members of a food web.[45] Entities in a network are called "nodes" and the

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[43] Stephen Downes. Semantic Networks and Social Networks. The Learning Organization Journal Volume 12, Number 5 411-417 May 1, 2005. http://www.ingentaconnect.com/content/mcb/119/2005/00000012/00000005/art00002

[44] M. Buchanan. Nexus: Small Worlds and the Groundbreaking Science of Networks. 2002. Perseus Publishing, Cambridge, MA. p. 49.

[45] Ibid. p. 17.

connections between them are called "ties".[46] Ties between nodes may be represented as matrices, and the properties of these networks therefore studied as a subset of graph theory.[47]

A key property of social networks is that nodes that might be thought of as widely distant from each other - a farmer in India, say, and the President of the United States - may actually be much more closely connected that otherwise imagined. This phenomenon, sometimes known as "six degrees", was measured[48] and, as the name suggests, no more than six steps were required to connect any two people in the United States.[49] With the arrival of the internet as a global communications network ties between individuals became both much easier to create and much easier to measure.

Social networking web sites fostering the development of explicit ties between individuals as "friends" began to appear in 2002. Sites such as Friendster, Tribe, Flickr the Facebook and LinkedIn were early examples. Less explicitly based on fostering relationships than, say, online dating sites, these sites nonetheless sought to develop networks or "social circles" of individuals of mutual interest. LinkedIn, for example, seeks to connect potential business partners or prospective employers with potential employers. Flickr connects people according to their mutual interest in photography. And numerous sites offer dating or matchmaking services. After an initial surge of interest, however, social networking sites have tended to stagnate[50] It is arguable that social networking, by itself, has limited practical use.

The semantic web, as originally conceived by Tim Berners-Lee, "provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries"[51] Developed using the resource description framework, it consists of an interlocking set of statements (known as "triples"). "Information is given well-defined meaning, better enabling computers and people to work in cooperation."[52] The semantic web is therefore, a network of statements about resources.

In particular, RDF enables the creation of statements intended to describe different types of resources. The terms used in these statements are defined in schemas, themselves RDF documents, which list the terms to be used and (in some cases) the types of values allowed, and the relations between them. "Using RDF Schema, we can say that 'Fido' is a type of 'Dog', and that 'Dog' is a sub class of animal." Beyond schemas, ontologies enable complex representations of related entities and their descriptions.

Though applications of the semantic web in particular have thus far been limited, there have emerged since its introduction numerous projects characterizing and encoding descriptions of

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[46] J.M. Cook. Social Networks: A Primer. Ebook. 2001. Available at: http://www.soc.duke.edu/jcook/networks. html
[47] Garton, L., Haythornthwaite, C. and Wellman, B. "Studying online social networks", JCMC, Vol. 3 No. 1. 1997. http://www.ascusc.org/jcmc/vol3/issue1/garton.html
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[50] J. Aquino. The Blog is the social network. Weblog Post. 2005. http://jonaquino. blogspot.com/2005/04/blog-is-social-network.html
[51] World Wide Web Consortium (W3C). Semantic Web. Paper presented at the World Wide Web Consortium (W3C). 2001. http://www.w3.org/2001/sw/
[52] Tim Berners-Lee, Hendler, J. and Lassila, O. The Semantic Web. Scientific American, May, 2001. http://www.scientificamerican.com/article.cfm?articleID=00048144-10D2-1C70-84A9809EC588EF21&catID=2

different types of resources in XML.[53] The majority of these projects seem to be centred around the classification of information and resources. For example, learning object metadata (LOM) describes learning resources. Dublin Core provides bibliographic information about resources. These resources are typically identified explicitly in the XML or RDF, typically using a uniform resource identifier (URI) based on its address on the world wide web, or via some other form of identifier system, such as digital object identifier (DOI).

Outside professional and academic circles, arguably the most widespread adoption of the semantic web has been in the use of RSS. RSS, known variously as rich site summary, RDF site summary or really simple syndication, was devised by Netscape in order to allow content publishers to syndicate their content, in the form of headlines and short introductory descriptions, on its My Netscape web site.[54] The use of RSS has increased exponentially, and now RSS descriptions (or its closely related cousin, Atom) are used to summarize the contents of 100s of newspapers and journals, weblogs (including the roughly eight million weblogs hosted collectively by Blogger, Typepad, LiveJournal and Userland), wikis and more.

There are no doubt purists who deny that RSS is an instantiation of the semantic web. However, all RSS files are undeniably written in XML, and a type of RSS (specifically, RSS 1.0) is explicitly written in RDF.[55] At its core, RSS consists of some simple XML elements: a "channel" element defining the publication title, description and link; and a series of "item" elements defining individual resource titles, descriptions and links. Since, RSS 1.0, however, the RSS format has allowed these basic elements to be extended; the role of schemas is fulfilled by namespaces, and these namespaces define (sometimes implicitly) a non-core vocabulary. Such extensions (also known in RSS 1.0 as "modules") include Dublin Core, Creative Commons, Syndication and Taxonomy.[56]

Initiatives to represent information about people in RDF or XML have been fewer and demonstrably much less widely used. The HR-XML (Human Resources XML) Consortium has developed a library of schemas "define the data elements for particular HR transactions, as well as options and constraints governing the use of those elements".[57] Customer Information Quality TC, an OASIS specification, remains in formative stages.[58] And the IMS learner information package specification restricts itself to educational use.[59] It is probably safe to say that there is no commonly accepted and widely used specification for the description of people and personal information. As suggested above, developments in the semantic web have addressed themselves almost entirely to the description of resources, and in particular, documents.

Outside the professional and academic circles, there have been efforts to represent the relations between persons found in social networks explicitly in XML and RDF. Probably the

[53] Stephen Downes. Canadian Metadata Forum – Summary. Stephen's Web (weblog). September 20, 2003. http://www.downes.ca/post/52
[54] Stephen Downes. Content Syndication and Online Learning. Stephen's Web (weblog). September 22, 2000. http://www.downes.ca/post/148
[55] G. Beged-Dov, et al. RDF Site Summary 1.0. 2001. http://web.resource.org/rss/1.0/ spec
[56] G. Beged-Dov, et al. RDF Site Summary 1.0 Modules. 2001. http://web.resource. org/rss/1.0/modules/
[57] HR-XML Consortium. "Downloads". 2005. p. 139.
[58] OASIS. Customer Information Quality TC. 2005. http:// www.oasis-open.org/ committees/ciq/charter.php
[59] IMS Global Learning Consortium. IMS Learner Information Package Specification. 2005 http://www.imsglobal.org/profiles/

best known of these is the Friend of a Friend (FOAF) specification.[60] Explicitly RDF, a FOAF description will include data elements for personal information, such as one's name, e-mail address, web site, and even one's nearest airport. FOAF also allows a person to list in the same document a set of "friends" to whom the individual feels connected. A similar initiative is the XHTML Friends Network (XFN) (GPMG, 2003). XFM involves the use of "rel" attributes within links contained in a blogroll (a "blogroll" is a list of web sites the owner of a blog will post to indicate readership).

Though FOAF and XFN have obtained some currency, it is arguable that they have declined to the same sort of stagnation that has befallen social network web sites. While many people have created FOAF files, for example, few applications (and arguably no useful applications) have been developed for FOAF. And while some useful extensions to FOAF have been proposed (such as a trust metric, PGP public key, and default licensing scheme), these have not been adopted by the community at all.

Perhaps, given the demonstrable lack of enduring interest in social network systems, either site-based, as in LinkedIn? and Orkut, or semantic web-based, as in FOAF or XFN, it could be argued that there is no genuine need for a social network system (beyond, perhaps, matching and dating sites). Perhaps, as some have argued, such systems, once they get too large to be manageable, simply collapse in on themselves, their users suffocated under the weight of millions of enquiries and advertising messages, as happened to e-mail, Usenet and IRC.[61]

But the evidence seems to weigh against this supposition. Certainly, the management of personal information has long been touted as necessary for authentication. Authentication - i.e. a mechanism of proving that a person is who they say they are - is used to control access to restricted information. Projects such as Microsoft s Passport and the liberty alliance have for years attempted to promote a common authentication scheme. Sites such as LiveJournal and Blogger have begun to require login access in order to submit comments, as a means of discouraging spam. Newspapers, online journals and online communities typically require some sort of login process. Projects such as SxIP and light-weight identity (LID)[62] have attempted to create a single sign-on solution for logins. So there is a need for personal descriptions, at least to control access.

We could perhaps leave descriptions of identity as something for individual sites to work out were there not wider issues pertaining to the semantic web that also require at least some element of personal identity to address. To put the problem briefly: so long as descriptions of resources are based solely on the content of those resources then users of the semantic web will be hampered in their efforts to learn about new resources outside the domain of their own expertise. The reason for this is what might be called the "dictionary principle" - in order to find a resource, the searcher must already know about the topic domain they are searching through,

[60] Edd Dumbill. Finding Friends with XML and RDF. XML Watch (weblog). 2002. Accessed June 1, 2002. http://www-106.ibm. com/developerworks/xml/library/x-foaf.html

[61] A.L. Cervini, A.L. Network connections: an analysis of social software that turns online introductions into offline interactions. Master's thesis, Interactive Telecommunications Program, NYU. 2003. http://stage.itp.tsoa.nyu.edu/alc287/thesis/thesis.html

[62] Light-weight Identity Description. Website. No longer extant. Original URL: 2005. http://lid.netmesh. org/

since resources are defined in terms specific to that domain (in other words if you want to find a word in a dictionary, you have to already know how to spell it).

In fact, what has tended to happen in the largest current implementation of the semantic web, the network of RSS resources, is that searchers have, within certain parameters, tended to seek out resources randomly. They type in a search term in Google, for example, without any foreknowledge of where the resource they are seeking will turn up. They tend to link to sources they find in this manner; thus, the network of connections between resources (expressed in RSS, as on web sites, as links) manifests itself as a random network.

The proof of this is found in the studies of social networks discussed at the beginning of this paper. The links found in web pages are instances of what are known as "weak ties". Weak ties are are acquaintances who are not part of your closest social circle, and as such have the power to act as a bridge between your social cluster and someone else's.[63] Weak ties created at random in this way lead to what Gladwell called "supernodes" individuals with many more ties than other resources. (Gladwell, in other words, some sites get most of the links, while most others get many fewer links. "A power-law distribution basically indicates that 80 per cent of the traffic is going to 1 per cent of the participants in the network."[64]

Numerous commentators, from Barabasi forward, have made the observation that power laws occur naturally in random networks, and some pundits, such as Clay Shirky, have shown that the distribution of visitors to web sites and links to web sites follow a power law distribution.[65] Our purpose here is to take the inference in the opposite direction: because readership and linkage to online resources exhibits a power law distribution, it follows that these resources are being accessed randomly. Therefore, despite the existence of a semantic description of these resources, readers are unable to locate them except via the location of an individual - a super connector - likely to point to such resources.

It is reasonable to assume that a less random search would result in more reliable results. For example, as matters currently stand, were I to conduct a search for "social networking" then probability dictates that I would most likely land on Clay Shirkey, since Shirky is a super-connector and therefore cited in most places I am likely to find through a random search. But Shirky s politician affiliation and economic outlook may be very different from mine; it would be preferable to find a resource authored by someone who shares my own perspective more closely. Therefore, it is reasonable to suppose that if I were to search for a resource based on both the properties of the resource and the properties of the author, I would be more likely to find a resource than were I to search for a random author.

Such a search, however, is impossible unless the properties of the author are available in some form (presumably, something like an RDF file), and also importantly, that the properties of the author are connected in an unambiguous way to the resources being sought.

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[63] Cervini, 2003.
[64] Albert-Laszlo Barabasi (2002), Linked: The New Science of Networks, Perseus Press, Cambridge, MA, p. 70.
[65] Clay Shirky. Power Laws, Weblogs, and Inequality. Weblog post. February 8, 2003.http://www.shirky.com/writings/powerlaw_weblog.html

I have proposed[66] that social networking be combined explicitly with the semantic web in what I have called the semantic social network (SSN). Essentially, SSN involves two major components: first, that there be, expressed in XML or RDF, descriptions of persons (authors, readers, critics) publicly available on the web, sometimes with explicit ties to other persons; and second, that references to these descriptions be employed in RDF or XML files describing resources.

Neither would at first glance seem controversial, but as I mention above, there is little in the way of personal description in the semantic web, and even more surprisingly, the vast majority of XML and RDF specifications identify persons (authors, editors, and the like) with a string rather than with a reference to a resource. And such strings are ambiguous; such strings do not uniquely identify a person (after all, how many people named John Smith are there?) and they do not identify a location where more information may be found (with the result that many specifications require that additional information be contained in the resource description, resulting in, for example, the embedding of VCard information in LOM files).

It should be immediately obvious that the explicit conjunction of personal information and resource information within the context of a single distributed search system will facilitate much more fine-grained searches than either system considered separately. For example, were I look for a resource on social networks , I may request resources about social networks authored by people who are similar to me , where similarity is defined as a mapping of commonalities of personal feature sets: language and nationality, say, commonly identified friends , or even similarities in licensing preferences. Or, were I to (randomly or otherwise) locate an individual with, to me, an interesting point of view, I could "search for all articles written by n and friends of n".

Identity plays a key role in projected future developments of the semantic web. In his famous architecture diagram , Tim Berners-Lee identifies a digital signature as being the backbone of RDF, ontology, logic and proof.[67] A digital signature establishes what he calls the provenance of a statement: we are able to determine not only that "A is a B", but also according to whom A is a B. "Digital signatures can be used to establish the provenance not only of data but also of ontologies and of deductions."[68] But as useful as a digital signature may be for authentication, a digital signature is an unfaceted identification. To know something about the person making the assertion, it will be necessary to attach a personal identity to an XML or RDF description.

As we examine the role that personal identity plays in semantic description, it becomes apparent that much more fine-grained descriptions of resources themselves become possible. For there are three major ways in which a person may be related to a resource: as the author or creator of the resource; as the user or consumer of the resource; and as a commentator or evaluator of the resource. Each of these three types of person may create metadata about a resource. An author may give a resource a title, for example. A user may give the resource a "hit" or a reference (or a "link"). And a commentator may provide an assessment, such as

[66] Stephen Downes. The Semantic Social Network. Stephen's Web (weblog). February 14, 2004. http://www.downes.ca/post/46
[67] Tim Berners-Lee. Semantic Web XML2000. 2000. http://www.w3.org/2000/Talks/ 1206-xml2k-tbl/slide10-0.html
[68] Edd Dumbill. Berners-Lee and the Semantic Web Vision. XML.com (ezine). December, 2000. http://www.xml. com/pub/a/2000/12/xml2000/timbl.html

"good" or "board certified". Metadata created by these three types of persons may be called "first party metadata", "second party metadata" and "third party metadata", respectively.

The semantic web and social networking have each developed separately. But the discussion in this short paper should be sufficient to have shown that they need each other. In order for social networks to be relevant, they need to be about something. And in order for the semantic web to be relevant, it needs to be what somebody is talking about. Authors need content, and content needs authors.

Further reading

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Palmer, S.B. (2001), The Semantic Web: An Introduction, available at: http://infomesh.net/2001/swintro/

Vitiello, E. (2002), FOAF, available at: www.perceive.net/xml/foaf.rdf

Moncton, October 10, 2005

The Space Between the Notes

On reading Kathy Sierra...[69]

We turn clay to make a vessel; but it is on the space where there is nothing that the usefulness of the vessel depends. - Tao Te Ching

An old insight, often forgotten.

Listening to the recent talks from TED, all these speakers were roaring along at top speed, delivering a hundred words a minute. In my own talks, I speak more slowly (something I learned to do to facilitate simultaneous translation). Why would a professional speaker move so quickly, I wondered, when greater comprehension comes from more paced delivery?

Then I understood. A person who speaks quickly appears to be intelligent, appears to be worth listening to, appears, therefore, to be worth paying to speak. Every speech given by one of these speakers is an advertisement for the next.

It's the same with things, with objects. Greater accumulation conveys the greater appearance of worth. But the sheer mass of objects demonstrates that the only purpose of the one object is the obtaining of another.

In this way, the filling of space results in emptiness. When the purpose of obtaining the one is only for obtaining the next, then you can never have anything.

Moncton, July 19, 2006

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[69] Kathy Sierra. Hooverin' and the space between notes. Creating Passionate Users (weblog). July 18, 2006. http://headrush.typepad.com/creating_passionate_users/2006/07/hooverin_and_th.html

The Vagueness of George Siemens

Posted to Half an Hour.

I like George Siemens and he says a lot of good things, but he is often quite vague, an imprecision that can be frustrating. In his discussion[70] of my work on connective knowledge, for example, he observes, "In this model, concepts are distributed entities, not centrally held or understood...and highly dependent on context. Simply, elements change when in connection with other elements." What does he mean by 'elements'? Concepts? Nodes in the network? Entities? You can't just throw a word in there; you need some continuity of reference.

Why is this important? Siemens dislikes the relativism that follows from the model. Fair enough; people disagreed with Kant about the *noumenon*[71] too. But he writes, "I see a conflict with the fluid notions of subjectivity and that items are what they are only in line with our perceptions...and what items are when they connect based on defined characteristics (call them basic facts, if you will)" And I ask, what does he mean by 'in line' or 'defined characteristics... basic facts' - if they are *defined*, how can they be basic facts?

Then he says, "I still see a role for many types of knowledge to hold value based on our recognition of what is there." Now I'm tearing my hair. "Hold value?" What can he mean... does he know? Does he mean "'Snow is white' is 'true' if and only if 'snow is white'?" Or is he simply kicking a chair and saying "Thus I refute Berkeley." In which case I can simply recommend On Certainty[72] (one of my favourite books in the world) and move along.

He continues, "The networked view of knowledge may be more of an augmentation of previous categorizations, rather than a complete displacement." Now I'm quite sure that's not what he means. He is trying to say something like 'knowledge obtained through network semantics does not replace knowledge obtained by more traditional means, but merely augments it.' Fine - if he can give us a coherent account of the knowledge obtained through traditional means. But it is on exactly this point that the traditional theory of knowledge falters. We are left *without* certainty. You can't "augment" something that doesn't exist.

Here is his main criticism: "At this point, I think Stephen confuses the original meaning inherent in a knowledge element, and the changed meaning that occurs when we combine different knowledge elements in a network structure." Well I am certainly confused, but not, I think, as a result of philosophical error. What can Siemens possibly mean by 'knowledge element'. It's a catch-all term, that refers to whatever you want it to - a proposition, a concept, a system of categorization, an entity in a network. But these are very different things - statements about a 'knowledge element' appear true only because nobody knows what a 'knowledge element' is.

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[70] George Siemens. Knowing Knowledge Discussion Forum. Website. http://www.knowingknowledge.com/ Specific citation no longer extant. Original link: http://knowingknowledge.com/2007/04/toward_a_future_knowledge_soci.php
[71] Wikipedia. Noumenon. Accessed April 19, 2007. http://en.wikipedia.org/wiki/Noumenon
[72] Ludwig Wittgenstein. On Certainty. Blackwell. January 16, 1991.
http://books.google.ca/books/about/On_Certainty.html?id=ZGHG6WkVF5EC&redir_esc=y

He writes, "Knowledge, in many instances, has clear, defined properties and its meaning is not exclusively derived from networks..." What? Huh? If he is referring to, say, propositions, or concepts, or categorizations, this is exactly *not* true - but the use of the fuzzy 'knowledge elements' serves to preclude any efforts to pin him down on this. And have I ever said "meaning is derived from networks"? No - I would never use a fuzzy statement like 'derived from' (which seems to suggest, but not entail, some notion of entailment).

He continues, "The meaning of knowledge can be partly a function of the way a network is formed..." Surely he means "the meaning of a item of knowledge," which in turn must mean... again, what? A proposition, etc.? Then is he saying, "The meaning of a proposition can be partly a function of the way a network is formed..." Well, no, because it's a short straight route to relativism from there (if the meaning of a proposition changes according to context, and if the truth of a proposition is a function of its meaning, then the truth of a proposition changes according to the way the network was form).

What is Siemens's theory of meaning? I'm sorry, but I haven't a clue. He writes, "The fact that the meaning of an entity changes based on how it's networked does not eliminate its original meaning. The aggregated meaning reflects the meaning held in individual knowledge entities." An entity - a node in a network? No.

He *has* to be saying something like this: for any given description of an event, Q, there is a 'fact of the matter', P, such that, however the meaning of Q changes as a consequence of its interaction with other descriptions D, it remains the case that Q is at least partially a function of P, and never exclusively of D. But if this is what he is saying, there is any number of ways it can be shown to be false, from the incidence of mirages and visions to neural failures to counterfactual statements to simple wishful thinking.

But of course Siemens doesn't have to deal with any of this because his position is never articulated any more clearly than 'Downes says there is no fact of the matter, there is a fact of the matter, thus Downes is wrong'. To which I reply, simply, *show me* the fact of the matter. Show me one proposition, one concept, one categorization, one *anything*, the truth (and meaning) of which is *inherent in the item itself and not as a function of the network in which it is embedded.*

Siemens says, introducing my work that I explore "many of the concepts I presented in Knowing Knowledge...and that others (notably Dave Snowden and Dave Weinberger) have long advocated - namely that the structured view of knowledge has given way to more diverse ways of organizing, categorizing, and knowing."

I don't think this is true. Siemens, Snowden and Weinberger may all be talking about "more diverse ways of knowing" - but I am not talking about *their* 'diverse ways of knowing' but rather - as I have been consistently and for decades - on how networks learn things, know things, and do things.

Network Diagrams

Created for Connectivism and Connective Knowledge #cck11

Here is a selection of network diagrams:

Web of Data. From Linked Data Meetup [73]
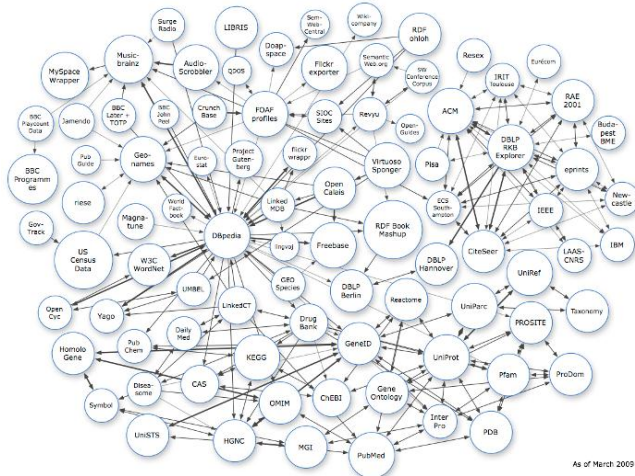
Last.fm Related Musical Acts. From Sixdegrees.hu[74]

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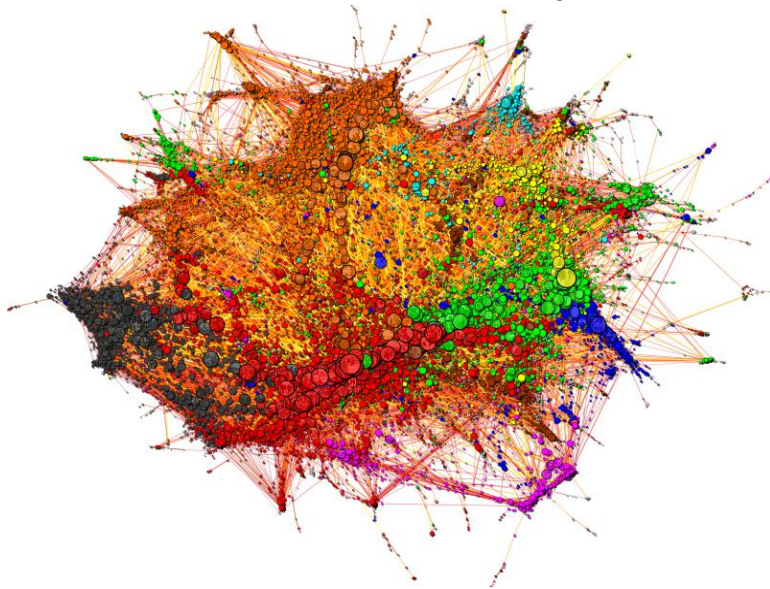
[73] Georgi Kobilarov. Meetup Group Photo Album. Web Of Data Meetup. January 21, 2010. http://www.meetup.com/Web-Of-Data/photos/807995/#12724766
[74] Sixdegrees.hu. Reconstructing the structure of the world-wide music scene with Last.fm. Undated, accessed January 24, 2011. http://sixdegrees.hu/last.fm/

Map of Science. From Plos One,[75] Clickstream Data Yields High-Resolution Maps of Science.

Comment

Bonni Stachowiak has left a new comment on your post "Network Diagrams": LinkedIn just came out with an incredible way of visualizing your professional network connections, called InMaps.[76]

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[75] Bollen J, Van de Sompel H, Hagberg A, Bettencourt L, Chute R, et al. (2009) Clickstream Data Yields High-Resolution Maps of Science. PLoS ONE 4(3): e4803. http://www.plosone.org/article/info:doi/10.1371/journal.pone.0004803

[76] Bonni Stachowiak. Visualize your network connections #CCK11. Teaching in Higher Education (weblog), January 24, 2011. http://teachinginhighered.com/visualize-your-network-connections-cck11-0

Downes said... The InMaps are here: http://inmaps.linkedinlabs.com/

Moncton, November 14, 2010

What Networks Have In Common

David T. Jones asks,[77] "Does connectivism conflate or equate the knowledge/connections with these two levels ("neuronal" and "networked")? Regardless of whether the answer is yes or no, what are the implications that arise from that response?"

The answer to the first question is 'yes', but with some *caveats*.

The first caveat is expressed in several of my papers. It is that historically we can describe three major types of knowledge:

- qualitative – i.e., knowledge of properties, relations, and other typically sensible features of entities
- quantitative – i.e., knowledge of number, area, mass, and other features derived by means of discernment or division of entities within sensory perception
- connective – i.e., knowledge of patterns, systems, ecologies, and other features that arise from the recognition of interactions of these entities with each other.

(There is an increasing effect of context-sensitivity across these three types of knowledge. Sensory information is in the first instance context-independent, as (if you will) raw sense data, but as we begin to discern and name properties, context-sensitivity increases. As we begin to discern entities in order to count them, context-sensitivity increases further. Connective knowledge is the most context-sensitive of all, as it arises only after the perceiver has learned to detect patterns in the input data.)

The second caveat is that there is not one single domain, 'knowledge', and, correspondingly, not one single entity, the (typically undesignated) knower. Any entity or set of entities that can (a) receive raw sensory input, and (b) discern properties, quantities and connections within that input, can be a knower, and consequently, know.

(Note that I do not say 'possess knowledge'. To 'know' is to be in the state of perceiving, discerning and recognizing. It is the state itself that is knowledge; while there are numerous theories of 'knowledge of' or 'knowledge that', etc., these are meta-theories, intended to assess or verify the meaning, veracity, relevance, or some other relational property of knowledge with respect to some domain external to that knowledge.)

Given these caveats, I can identify two major types of knowledge, specifically, two major entities that instantiate the states I have described above as 'knowledge'. (There are many more than two, but these two are particularly relevant for the present discussion).

1. The individual person, which senses, discerns and recognizes using the human brain.

2. The human society, which senses, discerns and recognizes using its constituent humans.

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[77] David T. Jones. A question (or two) on the similarity of "neuronal" and "networked" knowledge. The Weblog of (a) David Jones, March 5, 2011. http://davidtjones.wordpress.com/2011/03/05/a-question-or-two-on-the-similarity-of-neuronal-and-networked-knowledge/

These are two separate (though obviously related) systems, and correspondingly, we have two distinct types of knowledge, what might be called 'personal knowledge' and 'public knowledge' (I sometimes also use the term 'social knowledge' to mean the same thing as 'public knowledge').

Now, to return to the original question, "Does connectivism conflate or equate the knowledge/connections with these two levels ('neuronal' and 'networked')?", I take it to *mean*, "Does connectionism conflate or equate personal knowledge and public knowledge."

Are they the same thing? No.

Are they each instances of an underlying mechanism or process that can be called (for lack of a better term) 'networked knowledge'? Yes.

Is 'networked knowledge' the same as 'public knowledge'? No. Nor is it the same as 'personal knowledge'. By 'networked knowledge' I mean the properties and processes that underlie both personal knowledge and public knowledge.

Now to be specific: the state we call 'knowledge' is produced in (complex) entities as a consequence of the connections between and interactions among the parts of that entity.

This definition is significant because it makes it clear that:

- 'knowledge' is not equivalent to, or derived from, the properties of those parts.
- 'knowledge' is not equivalent to, or derived from, the numerical properties of those parts

Knowledge is not compositional, in other words. This becomes most clear when we talk about personal knowledge. In a human, the parts are neurons, and the states or properties of those neurons are electro-chemical potentials, and the interactions between those neurons are electro-chemical signals. Yet a description of what a person 'knows' is not a tallying of descriptions of electro-chemical potentials and signals.

Similarly, what makes a table 'a table' is not derivable merely by listing the atoms that compose the table, and there is no property, 'tableness', inherent in each of those atoms. What makes a table a 'table' is the organization and interactions (which produce 'solidity') between those atoms. But additionally, ascription of this property, being a 'table', is context-dependent; it depends on the viewer being able to recognize that such-and-such an organization constitutes a table.

A lot follows from this, but I would like to focus here on what personal knowledge and public knowledge has in common. And, given that these two types of knowledge result from the connections between the parts of these entities, the question now arises, what are the mechanisms by which these connections form or arise?

There are two ways to answer this:
- the connections arise as a result of the actual physical properties of the parts, and are unique to each type of entity. Hence (for example) the connections between carbon atoms that arise to produce various organizations of carbon, such as 'graphite' or 'diamond', are unique to carbon, and do not arise elsewhere

- the connections arise as a result of (or in a way that can be described as (depending on whether you're a realist about connections)) a set of connection-forming mechanisms that are common to all types of knowledge

Natural science is the domain of the former. Connective science (what we now call fields such as 'economics', 'education', 'sociology') is the domain of the latter.

One proposition of connectivism (call it 'strong connectivism') is that what we call 'knowledge' is what connections are created solely as a result of the common connection-forming mechanisms, and not as a result of the particular physical constitution of the system involved. Weak connectivism, by contrast, will allow that the physical properties of the entities create connections, and hence knowledge, unique to those entities. Most people (including me) would, I suspect, support both strong and weak connectivism.

The question "Does connectivism conflate or equate the knowledge/connections with these two levels" thus now resolves to the question of whether strong connectivism is (a) possible, and (b) part of the theory known as connectivism. I am unequivocal in answering 'yes' to both parts of the question, with the following caveat: the connection-forming mechanisms are, and are describable as, physical processes. I am not postulating some extra-worldly notion of 'the connection' in order to explain this commonality.

These connection-forming mechanisms are well known and well understood and are sometimes rolled up under the heading of 'learning mechanisms'. I have at various points in my writing described four major types of learning mechanisms:

- Hebbian associationism - what wires together, fires together
- Contiguity - proximate entities will link together are form competitive pools
- Back Propagation - feedback; sending signals back through a network
- Settling - eg., conservation of energy or natural equilibrium

There may be more. For example, Hebbian associationism may consist not only of 'birds of a feather link together' but also associationism of compatible types, as in 'opposites attract'.

What underlying mechanisms exist, what are the physical processes that realize these mechanisms, and what laws or principles describe these mechanisms, is an empirical question. And thus, it is also an empirical question as to *whether* there is a common underlying set of connection-forming mechanisms.

But from what I can discern to date, the answer to this question is 'yes', which is why I am a strong connectivist. But note that it does place the onus on me to actually *describe* the physical processes that are instances of one of these four mechanisms (or at least, since I am limited to a single lifetime, to describe the conditions for the possibility of such a description).

There is a separate and associated version of the question, "Does connectivism conflate or equate the knowledge/connections with these two levels," and that is whether the principles of the *assessment* of knowledge are the same at both levels (and all levels generally).

There are various ways to formulate that question. For example, "Is the reliability of knowledge-forming processes derived from the physical constitution of the entity, or is it an instance of an underlying general principle of reliability." And, just as above, we can discern a weak theory, which would ground reliability in the physical constitution, and a strong theory, which grounds it in underlying mechanisms (I am aware of the various forms of 'reliablism' proposed by Goldman, Swain and Plantinga, and am not referring to their theory with this incidental use of the word 'reliable').

As before, I am a proponent of both, which means there are some forms of underlying principles that I think inform the assessment of connection-forming mechanisms within collections of interacting entities. Some structures are more (for lack of a better word) 'reliable' than others.

I class these generally as types of methodological principles (the exact designation is unimportant; Wittgenstein might call them 'rules' in a 'game'). By analogy, I appear to the mechanisms we use to evaluate theories: simplicity, parsimony, testability, etc. These mechanisms do not guarantee the truth of theories (whatever that means) but have come to be accepted as generally (for lack of a better word) reliable means to select theories.

In the case of networks, the mechanisms are grounded in a distinction I made above, that knowledge is not compositional. Mechanisms that can be seen as methods to define knowledge as compositional are detrimental to knowledge formation, while mechanisms that define knowledge as connective, are helpful to knowledge formation.

I have attempted to characterize this distinction more generally under the heading of 'groups' and 'networks'. In this line of argument, groups are defined compositionally - sameness of purpose, sameness of type of entity, etc., while networks are defined in terms of the interactions. This distinction between groups and networks has led me to identify four major methodological principles"

- autonomy - each entity in a network governs itself
- diversity - entities in a network can have distinct, unique states
- openness - membership in the network is fluid; the network receives external input
- interactivity - 'knowledge' in the network is derived through a process of interactivity, rather than through a process of propagating the properties of one entity to other entities

Again, as with the four learning mechanisms, it is an empirical question as to *whether* these processes create reliable network-forming networks (I believe they do, based on my own observations, but a more rigorous proof is desirable), and I am by this theory committed to a description of the *mechanisms* by which these principles engender the reliability of networks.

In the case of the latter, the mechanism I describe is the prevention of 'network death'. Network death occurs when all entities are of the same state, and hence all interaction between them has either stopped or entered into a static or stead state. Network death is the typical result of what are called 'cascade phenomena', whereby a process of spreading activation eliminates diversity in the network. The four principles are mechanisms that govern, or regulate, spreading activation.

So, the short answer to the first question is "yes", but with the requirement that there be a clear description of exactly what it is that underlies public and personal knowledge, and with the requirement that it be clearly described and empirically observed.

I will leave the answer to the second question as an exercise for another day.

Downes said...

> *What are strong and weak connectivism?*

Let me give you an example.

Salt is created by the forming of a link between an atom of sodium and an atom of chlorine. While bonds of this sort are common, they require that the two elements be of a specific type. If the elements are different, the resulting compound will not be salt, but something quite different.

This is weak connectivism. The nature of the connection, and indeed, whether the connection will form at all, depends on the nature of the entities.

Here's another example. Birds (say, sparrows) will only mate with other birds. They will not mate with lizards. So no mating-connection will form between a bird and a lizard. So, an account of a network based on the mating habits of birds is a form of weak connectivism. The structure and shape of the network depends on the nature of its constituent parts.

By contrast, if you talk about network formation without reference to the nature of the things connecting, that's strong connectivism. If you simply think, for example, of the way any two atoms interact, or the way any two animals interact, then you're talking about the nature of connections abstractly. That's strong connectivism.

No account of connectivism is purely strong connectivism or purely weak connectivism. All descriptions are a combination of both. Some descriptions rely more on the nature of the entities being connected, and so we call those examples of weak connectivism. Others emphasize more the nature of connections generally, and we can call that strong connectivism.

Moncton, February 27, 2011

The Personal Network Effect

The presumption in the design of most networks is that the value of the network increases with the number of nodes in the network. This is known as the Network Effect, a term that was coined by Robert Metcalfe[78] the founder of Ethernet.

Source: http://web2.wsj2.com   79
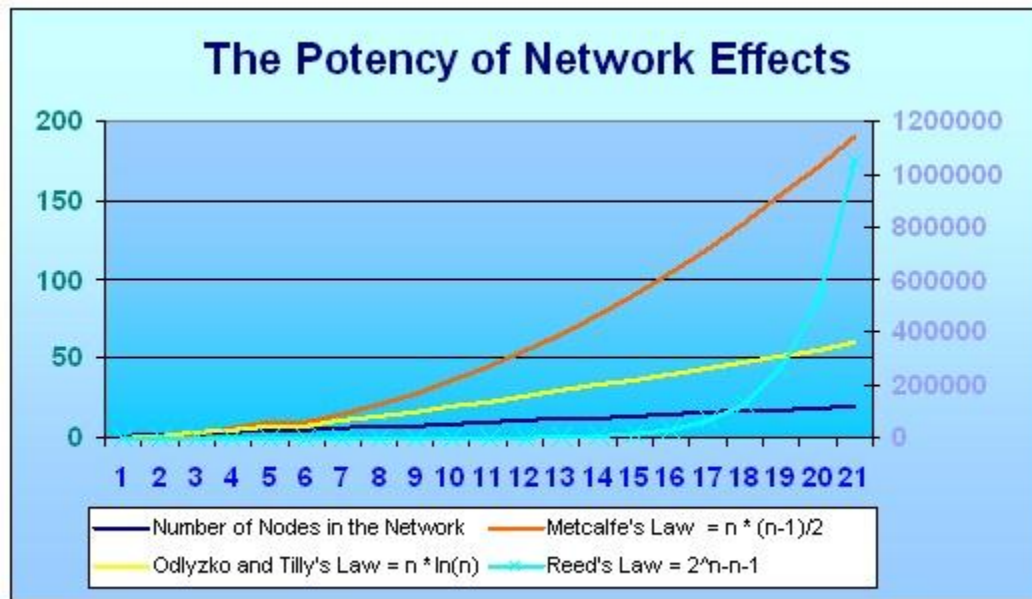
It is therefore tempting to suggest that a similar sort of thing holds for members of the network, that the value of the network is increased the more connections a person has to the network. This isn't the case.

Each connection produces value to the person. But the *relative utility* of the connection - that is, its value compared to the value that has already been received elsewhere - decreases after a certain point has been reached.

The reason for this is that value is derived from *semantic relevance*. Information is semantically relevant only if it is meaningful to the person receiving it (indeed, arguably, it must be semantically relevant to be considered information at all; if it is not meaningful, then it is just *static* or *noise*).

Semantic relevance is the result of a combination of factors (which may vary with time and with the individual), according to whether the information is:

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[78] Wikipedia. Robert Metcalfe. Accessed November 4, 2007. http://en.wikipedia.org/wiki/Robert_Metcalfe
[79] Dion Hinchcliffe . Web 2.0's Secret Sauce: Network Effects. Social Computing Magazine. July 15, 2006. http://web2.socialcomputingmagazine.com/web_20s_real_secret_sauce_ network_effects.htm

- *new* to the receiver (cf. Fred Dretske *Knowledge and the Flow of Information*)

- *salient* to the receiver (there are different types of salience: perceptual salience, rule salience, semiotic salience, etc)

- *timely*, that is, the information arrives at an appropriate time (before the event it advertises, for example) - this does *not* mean 'soonest' or 'right away'

- *utile*, that is, whether it can be used, whether it is actionable

- *cognate*, that is, whether it can be understood by the receiver

- *true*, that is, the information is consistent with the belief set of the receiver

- *trusted*, that is, comes from a reliable source

- *contiguous*, that is, whether the information is flowing fast enough, or as a sufficiently coherent body

Because of these conditions, the value of each new piece of information, on average, will decrease relative to its predecessors. At a certain point, the value of the new information will be such that it actually *detracts* from the value of the information already received (by, say, blocking it, distracting one's attention from it, contradicting it, and the like).

For example, suppose someone tells you that the house is on fire. This is very relevant information, and quite useful to you. Then another person tells you on fire. It's useful to have confirmation, but clearly not as useful as the first notice. Then a third and a fourth and a fifth and you want to tell people to *shut up* so you can hear the next important bit of information, namely, how to get out.

This is the *personal network effect*. In essence, it is the assertion that, for any person at any given time, a certain finite number of connections to other members of the network produces maximal value. Fewer connections, and important sources of information may be missing. More connections, and the additional information received begins to detract from the value of the

network.
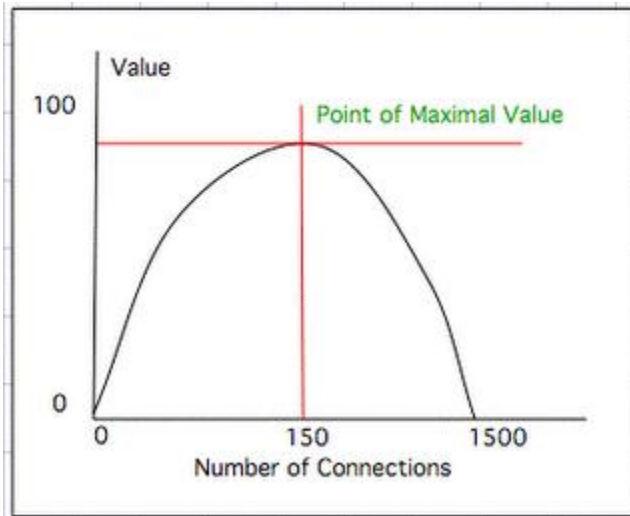
Most people can experience the personal network effect for themselves by participating in social networks. One's Facebook account, for example, is minimally valuable when only a few friends are connected. As the number grows over 100, however, Facebook begins to become as effective as it can be. If you keep on adding friends, however, it begins to become *less* effective.

This is true not only for Facebook but for networks in general. For any given network, for any given individual in the network, here will be a certain number of connections that produces maximum value for that member in that network.

This has several implications.

First, it means that when designing network applications, it is important to build in constraints that allow people to limit the number of connections they have. This is why the opt-in networks such as Facebook produce more value per message than open networks such as email. Imagine what Twitter would be like is *anyone* could send you a message! The value in Twitter lies in the user being able to restrict incoming messages to a certain set of friends.

Second, it provides the basis for a metric describing what will constitute valuable communications in a network. Specifically, we want out communications to be new, salient, utile, timely, cognate, true and contiguous.

Third, it demonstrates that there is *no single set* of best connections. A connection that is very relevant to one person might not be relevant to me at all. This may be because we have different interests, different world views, or speak different languages. But even if we have exactly the same needs and interests, we may get the same information from different sources. By the time your source gets to me, the 'new' information it gave you might be very 'old' to me.

We see this phenomenon is web communities. Dave Warlick[80]today posted a link to a video[81] produced by Michael Wesch's Cultural Anthropology students at Kansas State University. Warlick obviously does not read OLDaily because I linked to the site two weeks ago.[82] Warlick credits John Moranski, a school librarian from Auburn High School and Middle School in Auburn, Illinois (no link, which means he probably told him about it in person or by email). Warlick's link, therefore, is of little value to me; it's old news. However, to many of his readers (specifically, those who don't read me), this will be new. And hence he is a valuable part of their network.

Now here is the important part: the people who read Warlick don't need to read me (at least with respect to this link). They are getting the same information either way. There is no particular reason to select one source over another. Warlick may be part of his readers by accident (he is the first ed tech person they read, for example) or he may be more semantically relevant to them for other reasons: he is a folksy storyteller, he writes in a simple vocabulary, they have met him personally and trust him, whatever.

One final point: if we change the way we design the network, we can change the point of maximal value:
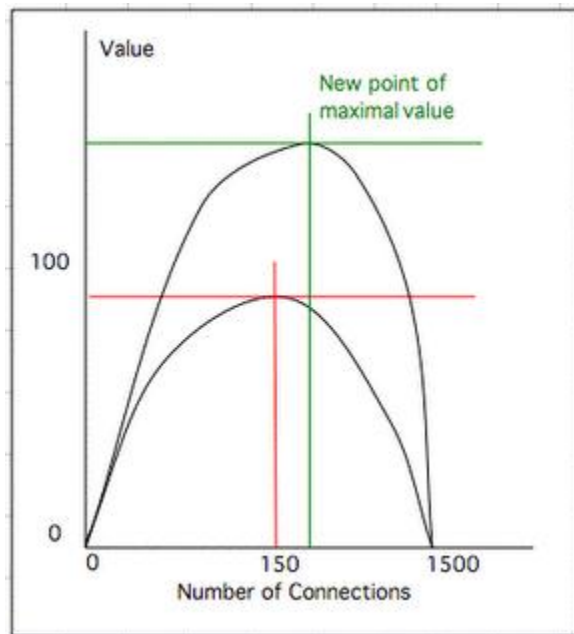
It is toward this effect that much of my previous writing about networks has been directed. How can we structure the network in such a way as to *maximize the maximal value*? I have suggested four criteria: diversity, autonomy, openness, and connectedness (or interactivity).

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[80] Dave Warlick. Another Amazing Video About Teaching and Learning. 2¢ Worth (weblog). November 4, 2007. http://davidwarlick.com/2cents/?p=1240
[81] Michael Wesch. A Vision of Students Today. YouTube (video). October 12, 2007. http://www.youtube.com/watch?v=dGCJ46vyR9o
[82] Stephen Downes. A Vision of Students Today. OLDaily (weblog). October 15, 2007. http://www.downes.ca/post/42024

For example, networks that are more diverse - in which each individual has a *different* set of connections, for example - produce a greater maximal value than networks that are not. Compare a community of people where people only read each other. You can read ten people, say, of a fifty person community, and hear pretty quickly what every person is thinking. But reading an eleventh will produce almost no value at all; you will just be getting the same information you were already getting. Compare this to the value of a connection from *outside* the community. Now you are reading things nobody else has thought about; you learn new things, and your comments have more value to the community as a whole.

It is valuable to have a certain amount of clustering in a network. This is a consequence of the criterion for semantic relevance. This is that people like Clark are getting at when they talk about the need for a common ground,[83] or what Wenger means by a shared domain of interest.[84] However, an excessive focus on clustering, on what I have characterized as *group* criteria, results in a decrease in the semantic relevance of messages from community members.

Moncton, November 4, 2007

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83 John Black. Creating a Common Ground for URI Meaning Using Socially Constructed Web sites. WWW 2006, May 23-26, 2006, Edinburgh, Scotland. http://www.ibiblio.org/hhalpin/irw2006/jblack.html
84 Etienne Wenger. Communities of Practice: A Brief Introduction. June, 2006. http://www.ewenger.com/theory/

Diagrams and Networks

Responding to Paul Ellerman:[85]

I was actually pretty careful with the diagrams,[86] though on reflection I considered that I should have, for the network diagram, used the standard connectionist (neural network) diagram. See e.g. this.[87]
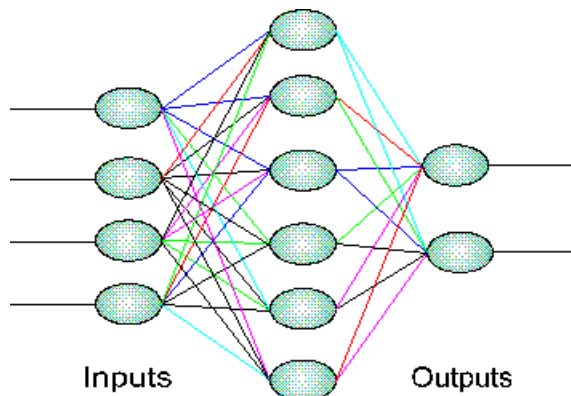
Now in fact there are even in networks people like myself, Will Richardson and Dave Warlick, and they are sometimes called "leaders". But from the perspective of a network, what makes an entity emphasized in this way is the number and nature of the connections it has, and not any directive import. People like Will, Dave and I stand out because we are well-connected, and not (necessarily) because we are well informed, and certainly not (necessarily) because other people do what we say they should do.

There are in fact two major ways that such people can emerge in a network:

First, as a consequence of the power law phenomenon. This is discussed at length in the discussion of scale-free networks. It is essentially the first-mover advantage. The person who was in the network first is more likely to attract more links. This is also impacted by advertising and self-promotion, phenomena I would not disassociate with the list of names you provide.

Second, as a consequence of the bridging phenomenon. Most networks occur in clusters (prototypes of Wenger's communities of practice) of like-minded individuals. Philosophers of science, say, or naturalistic poets, or the F1 anti Michael Schumacher hate club. Some people, though, have their feet in two such clusters. They like both beat poetry and the Karate Kid. And so they act as a conduit of information between those two groups, and hence, obtain greater recognition.

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[85] Paul Ellerman. Thinking About Networks Part 2. Thoughts on Training, Teaching and Technology. October 2, 2006 http://www.downes.ca/post/35916 Original link (n o longer extant): http://tottandt.wordpress.com/2006/10/02/thinking-about-networks-part-2/#comment-17
[86] Stephen Downes. Groups and Networks. Stephen's Web (weblog). September 25, 2006. http://www.downes.ca/post/35866
[87] E-Sakura System. Images. Probably not the original source, but that's where I got it. http://www.e-orthopaedics.com/sakura/ Image URL: http://www.e-orthopaedics.com/sakura/images/neural.gif

In neither case is the person in question a 'leader' in anything like the traditional sense. The person does not have 'followers' of the usual sort (though they may have fans, but they most certainly don't have 'staff' - at least, not as a consequence of their network behaviour). They do not 'lead' - they do not tell people what to do. At best and at most, they exemplify the behaviour they would like to see, and at best and at most, they act as a locus of information and conversation.

In the diagram, this difference is represented by depicting the 'traditional' leader and group as a 'tree', with one person connected to a number of people, while at the same time depicting the network as a 'cluster', with many people connected to each other.

Pushing the model back to the 'leader' mode suggested by this item would push the diagram back to a 'cluster' or 'hub and spoke' model such as this[88]
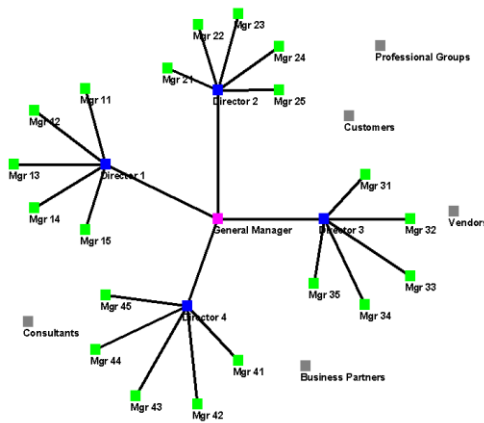
which I was anxious to avoid. Not because it doesn't depict a network (it does, technically, a scale-free network) but because it depicts what I would call a 'group' dominated by 'leaders', where the leaders have a directive function.

Moncton, October 02, 2006

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[88] Valdis Krebs. Decision-Making in Organizations. Orgnet.com. 2008. http://orgnet.com/decisions.html

The Blogosphere is a Mesh

I said

> *You say "Wrong both descriptively - it's not what the blogosphere actually looks like... What we are more like ... is a mesh, and not a hub-and-spokes network."*

And Mark Berthelemy asked[89]

> *I'd be very interested to know the evidence for that statement.*

My evidence is that this is what I see, and that if you looked at it from the same perspective, you would see it too.

Yes, you could measure it 'empirically' via a formal study, but (as I have commented on numerous occasions) you tend to find whatever you're looking for with such studies.

For example, you could do a Technorati sort of survey and list all of the blogs that link to each other. From this, you could construct a social network graph. And that graph would show what the link cited in this thread shows, that there is a power-law distribution and therefore a hub-and-spoke structure.

And thus you would have found what you were looking for.

And yet, from my perspective - as a hub - I see remarkably little traffic flowing through me. How can this be?

The edublogosphere - and the wider blogosphere - isn't constructed out of links. The link is merely one metric - a metric that is both easy to count and particularly susceptible to power-law structuring. Links play a role in discovery, but a much smaller role in communication.

We can identify one non-link phenomenon immediately, by looking at almost any blog. After any given post, you'll see a set of comments. Look at this post of Will Richardson's[90]. There's a set of 25 comments following. And the important thing here is that these comments are communications happening in a social space. They are one-to-many communications. This forms a little cluster of people communicating directly with each other.

Now look at any social network, say del.icio.us.[91] This tool was ranked second[92] on a list composed mostly of inputs from edubloggers. People link to each other on social networks. Each person keeps his or her own list of 'buddies'. Here's mine.[93] Empty; I don't use del.icio.us

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[89] Mark Berthelemy. Comment to Stephen Downes, Top Edublogs - August 2007. August 20, 2007. http://www.downes.ca/post/41338

[90] Will Richardson. The Future of Teaching. Weblogg-Ed (weblog). August 15, 2007. http://weblogg-ed.com/2007/the-future-of-teaching/

[91] Delicious. Website. http://del.icio.us/

[92] Jane Hart. Top 100 Tools for Learning. Centre for Learning & Performance Technologies. 2007. http://c4lpt.co.uk/top-tools/top-100-tools/ Original link (no longer extant): http://www.c4lpt.co.uk/recommended/top100.html

[93] Downes. Tag Search. Delicious. http://delicious.com/network/Downes

much. Here's someone else's network.[94] Edubloggers are using dozens of networks - Friendster, Bebo, Facebook, Myspace, Twitter and more.

But that's not all. A lot of the chatter I see going on between people I'm connected to is taking place via email, Skype, instant messaging, and similar person-to-person messaging tools. People put people on their 'buddy lists' that they want to call and to hear from. They collect email addresses (and white-list them in their spam filters).

Communications maps are typically clustered.[95] Like so:
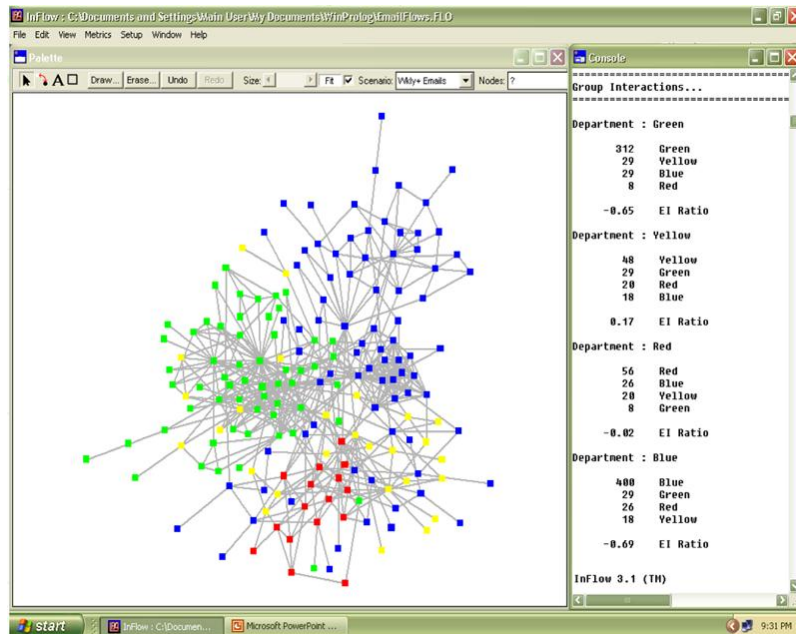
The result is also observable. You get a clustering of distinct groups of people with particular interests. In the edublogosphere, for example, I can very easily identify the K12 crowd, the corporate e-learning bloggers, the college and university bloggers, the webheads (ESL), and various others.

This diagram[96] is well known: it charts linkages between books read by bloggers:

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[94] Delicious. Peartree4. Tag Search. Was full of links when originally referenced August 20, 2007. http://delicious.com/network/peartree4
[95] Valdis Krebs, et.al. Social Network Interaction Will Become… Network Weaving. May, 2007. http://www.networkweaver.blogspot.ca/ Original link no longer extant: http://www.networkweaving.com/blog/2007/05/social-network-interaction-will-become.html
[96] Valdis Krebs. Divided We Stand? Orgnet.com (weblog). 2003. http://www.orgnet.com/leftright.html
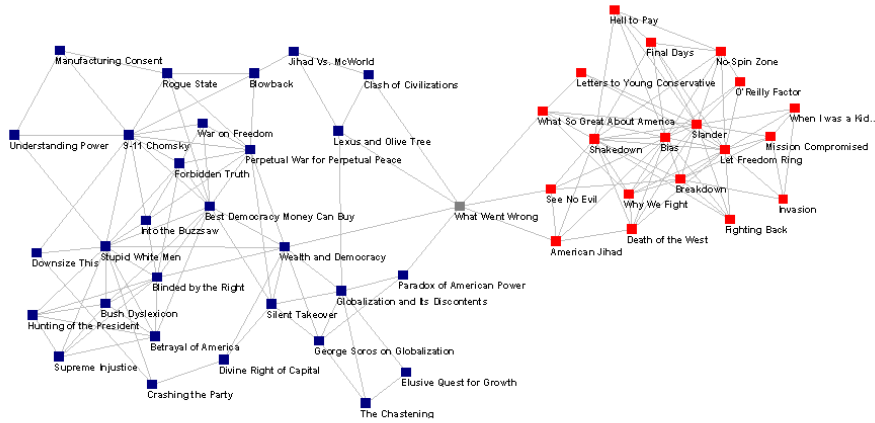
This chart is semantic; that is, it depicts what the people talked *about*. This tells you about the flow of ideas, and not just the physical connections. And when we look at the flow of ideas, we see the characteristic cluster formation.

The network of people[97] who talk about engineering is, similarly, a cluster:
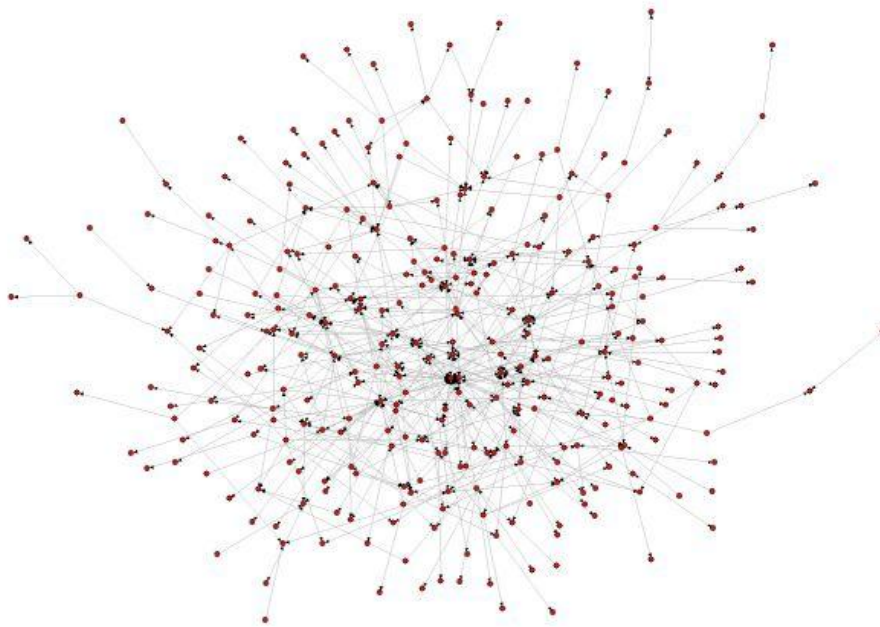
Another way to spot the blogging network is to look at conference attendance. You can again find these clusters. I don't have diagrams of the edubloggers, but this conference attendee network of Joi Ito's is typical:[98]

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[97] Erik van Bekkum. Visualization of engineering community of practice. Efios (website). October 7, 2006.
[98] Joichi Ito. Social Network Diagram for ITO JOICHI. Joi Ito (weblog). August 7, 2002. http://joi.ito.com/weblog/2002/08/07/social-network.html
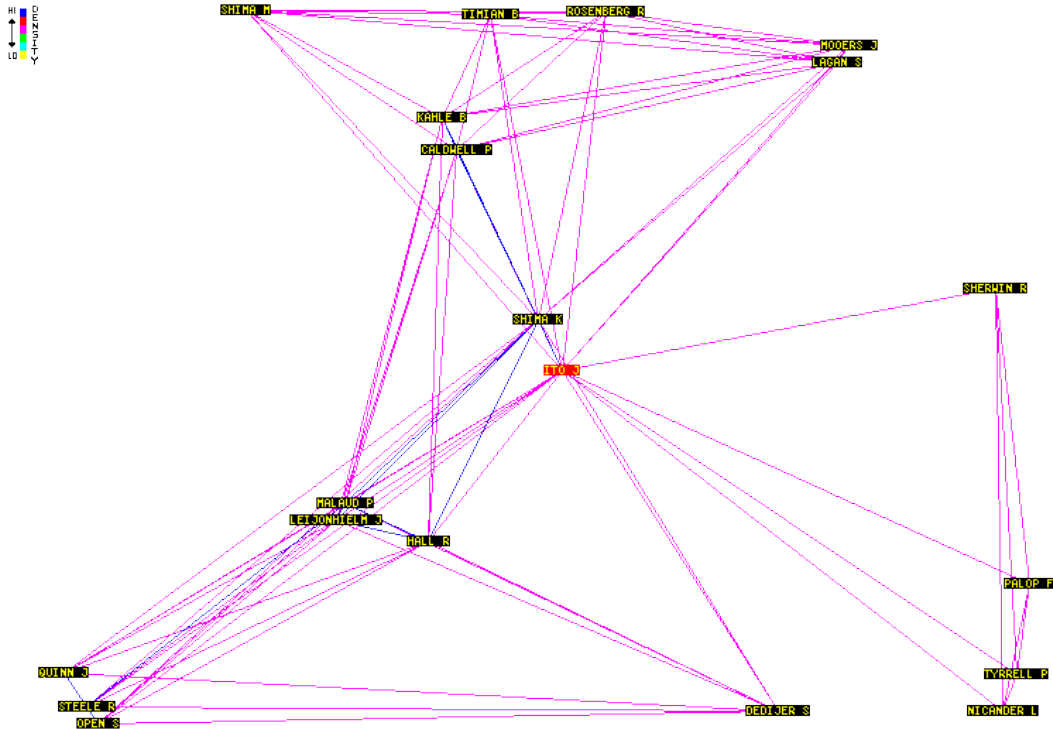
If we focus, not on a single physical indicator, but on the set of interactions taken as a whole, it becomes clear that the blogosphere is in fact a cluster-style network, and not a hub-and-spoke network. Bloggers form communities among themselves and communicate using a variety of tools, of which their blogs constitute only one.

Moncton, August 20, 2007

The Google Ecosystem

Posted to Google+
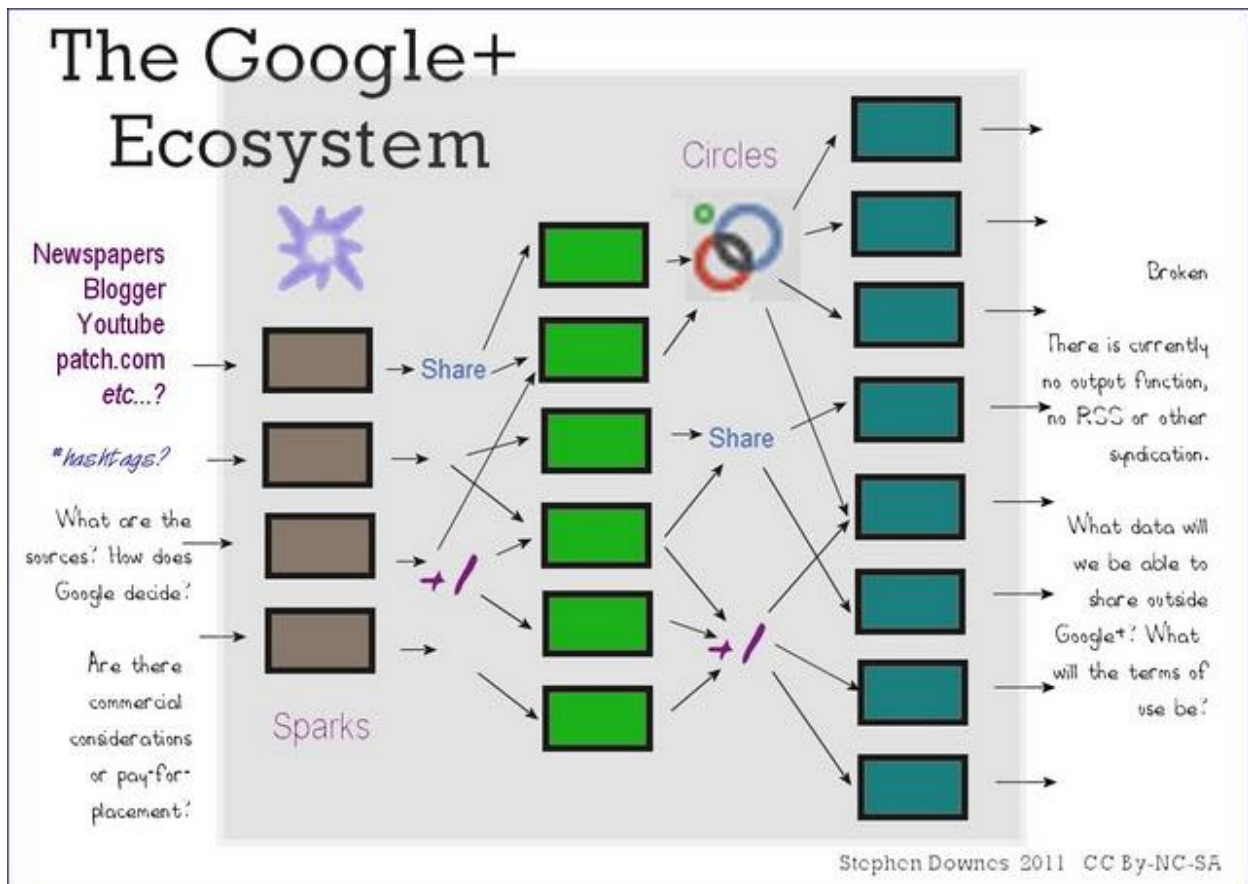
This is an illustration of the Google Plus Ecosystem I created to try to explain the flow of information through Google Plus from its (currently undocumented) sources through to its (currently broken) output.

Moncton, July 9, 2011

What Connectivism Is

Posted to the *Connectivism Conference forum*[99]

At its heart, connectivism is the thesis that knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks.

It shares with some other theories a core proposition, that knowledge is not acquired as though it were a thing. Hence people see a relation between connectivism and constructivism or active learning (to name a couple).

Where connectivism differs from those theories, I would argue, is that connectivism denies that knowledge is propositional. That is to say, these other theories are 'cognitivist', in the sense that they depict knowledge and learning as being grounded in language and logic.

Connectivism is, by contrast, 'connectionist'. Knowledge is, on this theory, literally the set of connections formed by actions and experience. It may consist in part of linguistic structures, but it is not essentially based in linguistic structures, and the properties and constraints of linguistic structures are not the properties and constraints of connectivism or connectivist knowledge.

In connectivism, a phrase like 'constructing meaning' makes no sense. Connections form naturally, through a process of association, and are not 'constructed' through some sort of intentional action. And 'meaning' is a property of language and logic, connoting referential and representational properties of physical symbol systems. Such systems are epiphenomena of (some) networks, and not descriptive of or essential to these networks.

Hence, in connectivism, there is no real concept of transferring knowledge, making knowledge, or building knowledge. Rather, the activities we undertake when we conduct practices in order to learn are more like growing or developing ourselves and our society in certain (connected) ways.

This implies a pedagogy that (a) seeks to describe 'successful' networks (as identified by their properties, which I have characterized as diversity, autonomy, openness, and connectivity) and (b) seeks to describe the practices that lead to such networks, both in the individual and in society (which I have characterized as modeling and demonstration (on the part of a teacher) and practice and reflection (on the part of a learner)).

Response to comments by Tony Forster

A link to my paper 'An Introduction to Connective Knowledge'[100] will help with some of the comments in this post (long, sorry).

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[99] George Siemens. Forum. Online Connectivism Conference. February 1, 2007.
http://ltc.umanitoba.ca/moodle/mod/forum/discuss.php?d=12#385

Tony writes, "Knowledge is not learning or education, and I am not sure that Constructivism applies only to propositional learning nor that all the symbol systems that we think with have linguistic or propositional characteristics."[101]

I think it would be very difficult to draw out any coherent theory of constructivism that is not based on a system with linguistic or propositional characteristics. (or as I would prefer to say, a 'rule-based representational system').

Tony continues, "The Constructivist principle of constructing understandings is an important principle because it has direct implications for classroom practice. For me it goes much further than propositional or linguistic symbol systems."

What is it to 'construct an understanding' if it does not involve:

-   a representational system, such as language, logic, images, or some other physical symbol set (i.e., a semantics)
-   rules or mechanisms for creating entities in that representational system (i.e., a syntax)?

Again, I don't think you get a coherent constructivist theory without one of these. I am always open to be corrected on this, but I would like to see an example.

Tony continues, "I am disturbed by your statement that 'in connectivism, there is no real concept of transferring knowledge, making knowledge, or building knowledge'. I believe that if Connectivism is a learning theory and not just a connectedness theory, it should address transferring understand, making understanding and building understanding."

This gets to the core of the distinction between constructivism and connectivism (in my view, at least).

In a representational system, you have a thing, a physical symbol, that stands in a one-to-one relationship with something: a bit of knowledge, an 'understanding', something that is learned, etc.

In representational theories, we talk about the creation ('making' or 'building') and transferring of these bits of knowledge. This is understood as a process that parallels (or in unsophisticated theories, is) the creation and transferring of symbolic entities.

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[100] Stephen Downes. An Introduction to Connective Knowledge. Stephen's Web (weblog). December 22, 2005. http://www.downes.ca/post/33034
[101] Unlinked quotes in this article are all from the Connectivism Conference forum, http://ltc.umanitoba.ca/moodle/mod/forum/discuss.php?d=12#385

Connectivism is not a representational theory. It does not postulate the existence of physical symbols standing in a representational relationship to bits of knowledge or understandings. Indeed, it denies that there are bits of knowledge or understanding, much less that they can be created, represented or transferred.

This is the core of connectivism (and its cohort in computer science, connectionism). What you are talking about as 'an understanding' is (at a best approximation) distributed across a network of connections. To 'know that P' is (approximately) to 'have a certain set of neural connections'.

To 'know that P' is, therefore, to be in a certain physical state - but, moreover, one that is unique to you, and further, one that is indistinguishable from other physical states with which it is co-mingled.

Tony continues, "Connectivism should still address the hard struggle within of deep thinking, of creating understanding. This is more than the process of making connections."

No, it is not more than the process of making connections. That's why learning is at once so simple it seems it should be easily explained and so complex that it seems to defy explanation (cf. Hume on this). How can learning - something so basic that infants and animals can do it - defy explanation? As soon as you make learning an intentional process (that is, a process that involves the deliberate creation of a representation) you have made these simple cases difficult, if not impossible, to understand.

That's why this is misplaced: "For example, we could launch into connected learning in a way which forgets the lessons of constructivism and the need for each learner to construct their own mental models in an individualistic way."

The point is:

- there are no mental models per se (that is, no systematically constructed rule-based representational systems)
- and what there is (i.e., connectionist networks) is not built (like a model) it is grown (like a plant)

When something like this is said, even basic concepts as 'personalization' change completely.

In the 'model' approach, personalization typically means more: more options, more choices, more types of tests, etc. You need to customize the environment (the learning) the fit the student.

In the 'connections' approach, personalization typically means less: fewer rules, fewer constraints. You need to grant the learner autonomy within the environment.

So there's a certain sense, I think, in which the understandings of previous theories will not translate well into connectivism, for after all, even basic words and concepts acquire new meaning when viewed from the connectivist perspective.

Response (1) to Bill Kerr

Bill Kerr writes, "It seems that building and metacognition are talked about in George's version but dismissed or not talked about in Stephen's version."

Well, it's kind of like making friends.

George talks about deciding what people make useful friends, how to make connections with those friends, building a network of those friends.

I talk about being open to ideas, communicating your thoughts and ideas, respecting differences and letting people live their lives.

Then Bill comes along and says that George is talking about making friends but Stephen just ignores it.

Bill continues, "Either the new theory is intended to replace older theories... Or, the new theory is intended to complement older theories. By my reading, Stephen is saying the former and George is saying the latter but I'm not sure."

We want to be more precise.

Any theory postulates the existence of some entities and the non-existence of others. The most celebrated example is Newton's gravitation, which postulated the existence of 'mass' and the non-existence of 'impetus'.

I am using the language of 'mass'. George, in order to make his writing more accessible, (sometimes) uses the language of 'impetus'. (That's my take, anyways).

Response (2) to Bill Kerr

Bill Kerr writes, "Words / language are necessary to sustain long predictive chains of thought, eg. to sustain a chain or combination of pattern recognition. This is true in chess, for example, where the player uses chess notation to assist his or her memory."

This is not true in chess.

I once played a chess player who (surprisingly to me) turned out to be far my superior (it was a long time ago). I asked, "how do you remember all those combinations?"

He said, "I don't work in terms of specific positions or specific sequences. Rather, what I do is to always move to a stronger position, a position that can be seen by recognizing the patterns on the board, seen as a whole."

See, that's the difference between a cognitivist theory and a connectionist theory. The cognitivist thinks deeply by reasoning through a long sequence of steps. The non-cognitivist thinks deeply by 'seeing' more intricate and more subtle patterns. It is a matter of recognition rather than inference.

That's why this criticism, "Words / language are necessary to sustain long predictive chains of thought," begs the question. It is levelled against an alternative that is, by definition, non-linear, and hence, does not produce chains of thought.

Response (3) to Bill Kerr

Bill Kerr writes, "I don't see how what you are saying is helpful at the practical level, the ultimate test for all theories."

This is kind of like saying that the theory of gravity would not be true were there no engineers to use it to build bridges.

This is absurd, of course. I am trying to describe how people learn. If this is not 'practical', well, that's not my fault. I didn't make humans.

In fact, I think there are practical consequences, which I have attempted to detail at length elsewhere,[102] and it would be most unfair to indict my own theoretical stance without taking that work into consideration.

I have described, for example, the principles that characterize successful networks in my recent paper[103] presented to ITForum (I really like Robin Good's presentation[104] of the paper - much nicer layout and graphics). These follow from the theory I describe and inform many of the considerations people like George Siemens have rendered into practical prescriptions.

And I have also expounded, in slogan form, a basic theory of practice: 'to teach is to model and demonstrate, to learn is to practice and reflect.'

No short-cuts, no secret formulas, so simple it could hardly be called a theory. Not very original either. That, too, is not my fault. That's how people teach and learn, in my view.

Which means that a lot of the rest of it (yes, including 'making meaning') is either (a) flim-flammery, or (more commonly) (b) directed toward something other than teaching and learning. Like, say power and control.

Bill continues, "Stephen, your position on intentional stance sounds similar to Churchland's position on eliminative materialism."[105]

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[102] Stephen Downes. Stephen's Web (website). http://www.downes.ca
[103] Stephen Downes. Learning Networks and Connective Knowledge. IT Forum (website). October 16, 2006.
http://it.coe.uga.edu/itforum/paper92/paper92.html
[104] Robin Good.
Learning Networks + Knowledge Exchange = Learning 2.0. Kolabora (website). October 20, 2006.
http://www.kolabora.com/news/2006/10/20/learning_networks_knowledge_exchange.htm
[105] Wikipedia. Eliminative Materialism. Accessed February 3, 2007. http://en.wikipedia.org/wiki/Eliminative_materialism

Quite right, and I have referred to him (Churchland) in some of my other work.

"Other materialist philosophers, such as Dennett, argue that we can discuss in terms of intentional stance[106] provided it doesn't lead to question begging interpretations."

Well, yes, but this is tricky.

It's kind of like saying, "Well, for the sake of convenience, we can talk about fairies and pixie dust as though they are the cause of the magical events in our lives." Call it "the magical stance".

But now, when I am given a requirement to account for the causal powers of fairies, or when I need to show what pixie dust is made of (at the cost of my theory being incoherent) I am in a bit of a pickle (not a real pickle, of course).

The same thing for "folk psychology" - the everyday language of knowledge and beliefs Dennett alludes to. What happens when these concepts, as they are commonly understood, form the foundations of my theory?

"Knowledge is justified true belief," says the web page.[107] Except, it isn't. The Gettier problems[108] make that pretty clear. So when pressed to answer a question like, 'what is knowledge' (as though it could be a thing) my response is something like "it's a belief we can't not have." Like 'knowing' where Waldo is in the picture after we've found him. It's like recognition. And what is 'a belief'? A certain set of connections in the brain. Except now that these statements entail that there is no particular thing that is 'a bit of knowledge' or 'a belief'.

Yeah, you can talk in terms of knowledge and beliefs. But it requires a lot of groundwork before it becomes coherent.

Bill continues, "Even though we don't understand 'constructing meaning' clearly we can still advise students in certain ways that will help them develop something that they didn't have before."

What, like muscles?

Except, they always had muscles.

Better muscles? Well, ok. But then what do I say? "Practice."

"I think it's more useful and practical to operate on that basis, for example, Papert's advice on 'learning to learn' which he called mathetics still stands up well."

But what if they're wrong? What if they are exactly the wrong advice? Or moreover, what if they have to do with the structures of power and control that have developed in our learning environments, rather than having anything to do with learning at all?

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[106] Wikipedia. Intentional Stance. Accessed February 3, 2007. http://en.wikipedia.org/wiki/Intentional_stance
[107] Tony Forster. OLCC2007 - Knowledge and Learning. Weblog. February 3, 2007. http://tonyforster.blogspot.com/2007/02/olcc2007-knowledge-and-learning.html
[108] Wikipedia. Gettier Problem. Accessed February 3, 2007. http://en.wikipedia.org/wiki/Gettier_problem

"Play is OK" has to do with power and control, for example. "Play fosters learning" is a different statement, much more controversial, and yet more descriptive, because play is (after all) practice.

"The emotional precedes the cognitive." Except that I am told by psychologists that "the fundamental principle underlying all of psychology is that the idea - the thought - precedes the emotion."

And so on. Each of these aphorisms sound credible, but when held up to the light, are not well-grounded. And hence, not practical.

Moncton, February 03, 2007

Connectivism and its Critics: What Connectivism Is Not

Posted to the [CCK08 Blog](), September 10, 2008.

There are some arguments that argue, essentially, that the model we are demonstrating here would not work in a traditional academic environment.

- Lemire[109]
- Fitzpatrick[110]
- Kashdan[111]

These arguments, it seems to me, are circular. They defend the current practice by the current practice.

Yes, we know that in schools and universities students are led through a formalized and designed instructional process. We understand that some students prefer it that way, that some academics are more comfortable with the format, that most institutions require the practice.

But none of this proves that the current practice is *better* that what is being described and demonstrated here. Our argument, which will be unfolded through the twelve weeks of this course, is that connectivism is at least as well justified and well reasoned as current practice. And the practice, demonstrated through this course, shows that it works.

Right now we are engaged in the process of defining what connectivism is. Perhaps it may be relevant for a moment to say what it is not.

George Siemens offers a useful chart[112] comparing Connectivism with some other theories.

From this, we can see that, according to connectivism:

- learning occurs as a distributed process in a network, based on recognizing and interpreting patterns
- the learning process is influenced by the diversity of the network, strength of the ties
- memory consists of adaptive patterns of connectivity representative of current state
- transfer occurs through a process of connecting
- best for complex learning, learning in rapidly changing domains

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[109] Daniel Lemire. Comment to 'CCK08 First Impressions'. Stephen's Web, September 8, 2008. http://www.downes.ca/cgi-bin/page.cgi?post=46013

[110] Catherine Fitzpatrick. Comment to 'What Connectivism Is'. September 9, 2008. http://halfanhour.blogspot.com/2007/02/what-connectivism-is.html

[111] Kashdan. Comment to CCK08 Moodle Forum. No longer accessible. Original URL: http://ltc.umanitoba.ca:83/moodle/mod/forum/discuss.php?d=641

[112] George Siemens. What Is Connectivism. Google Docs. September 12, 2009. What is Connectivism?

Now I would add to or clarify each of these points (that would be another paper. For example, I would say that the learning process is influenced by the four elements of the semantic condition (diversity, autonomy, openness, connectedness), that while memory is adaptive, it is not (necessarily) representative, and that learning, on this theory, isn't 'transferred', but grown anew by each learner.)

But despite these clarifications, we can see pretty easily from this description what connectivism is not (and, more importantly, what it is not intended to be):

- learning it is not structured, controlled or processed. Learning is not produced (solely or reliably) through some set of pedagogical, behavioral, or cognitive processes.
- learners are not managed through some sort of motivating process, and the amount of learning is not (solely or reliably) influenced by motivating behaviours (such as reward and punishment, say, or social engagement)
- learners do not form memories through the storage of 'facts' or other propositional entities, and learning is not (solely or reliably) composed of mechanisms of 'remembering' or storing such facts
- learners do not 'acquire' of 'receive' knowledge; learning is not a process of 'transfer' at all, much less a transfer than can be caused or created by a single identifiable donor
- learning is not the acquisition of simple and durable 'truths'; learners are they are expected to be able to manage complex and rapidly changing environment

The reason I take some pains here to describe what connectivism is not is that it should now be clear that none of these constitutes an argument against connectivism.

In one critique, for example, we read "I think this open ended process can lead to some educational chaos and we need to be careful of that." (Kashan)

As we have seen in this course, the connectivist approach can pretty reliably lead to chaos. But this is because we believe that learning it is not structured, controlled or processed. And we expect students to be able to manage complex and rapidly changing environment – in other words, to be able to manage through just the sort of chaos we are creating.

Saying that "can lead to some educational chaos" is therefore not a criticism of connectivism.

To be sure, educational chaos does not work well in traditional learning and existing academic institutions. So much the worse (we say) for traditional learning and existing academic institutions.

One might ask, then, what we expect traditional learning and existing academic institutions to look like in a connectivist world. Well, some of that was touched on in my presentation to eFest[113] (to be posted later) this week.

The model of learning we have offered through this course intersects with the traditional model at least through the definition and provision of assignments for evaluation. These, which are

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113 Stephen Downes. MOOC and Mookies: The Connectivism & Connective Knowledge Online Course. Seminar presentation delivered to eFest, Auckland, New Zealand by Elluminate. Stephen's Web Presentations. September 10, 2008. http://www.downes.ca/presentation/197

openly defined (everybody can see them), are applied to students who have registered for the course for grading and credit.

We have already spoken with some students about applying the learning done in this course for credit elsewhere. If, say, a person in another country completes our assignments, and they are graded by a professor in some other institution, then that is just fine with us, and has served our interest of providing more open access to education.

There is no reason for the *delivery* of instruction (whatever form it may take) to be conjoined with the more formal and institutionally-based *assessment* of instruction. Which means that we can offer an open, potentially chaotic, potentially diverse, approach to learning, and at the same time employ such a process to support learning in traditional institutions.

As George has said, we are doing for the delivery of instruction what MIT OpenCourseWare has done for content. We have opened it up, and made it something that is not only not institutionally bound, but something that is, to a large degree, created and owned by the learners engaged in this instructional process.

There is nothing in traditional institutions – except, perhaps, policy – that prevents this model from working. The criticisms of this model that are based on pragmatics and practicality are not sound. They achieve their effectiveness only by assuming what they seek to prove.

Engagement with, and opposition to, the process described by connectivism will have to take place at a deeper level. Critics will need to show why a linear, orderly process is the only way to learn, to show why learners should be compelled, and then motivated, to follow a particular program of studies.

We are prepared to engage in such discussions.

But a discussion rooted in the traditional institution must allow and acknowledge that connectivism, if adopted, would change existing institutions, and to base its reasoning in the desirability or the effectiveness of such changes, and not merely the fact that they haven't happened yet.

Moncton, September 10, 2008

Connectivism and Transculturality

Transcript of my talk[114] delivered to Telefónica Foundation, Buenos Aires, Argentina.

One. Communities as Networks

As you can see we are broadcasting live to a worldwide audience of 27 people. We're just sort of messing around here. This is totally impromptu, I didn't advertise this or anything. This is the sort of concept I want to talk about today, doing this kind of thing.

Alejandro mentioned edupunk in his introduction. You know, it's this whole idea of "doing it yourself" and making it happen for yourself rather than depending on organizers or others to do it for you. And we sort of asked, a little bit, whether we were allowed to do this sort of thing, but we just found an ambient wireless connection in the room, I determined very quickly that it was a very good connection, I was very happy about that, and so consequently I figured, "Great! We'll live stream it. Why not?" And we'll record the video, and I'm also recording the audio, and we're recording the Spanish translation in the back of the room there, and so, we're creating learning objects on the fly.

And this is an important fundamental lesson, because, you know, the topic of the talk is culturality, and connectivism. I don't talk about culturality a lot, and I think maybe I should talk about it a bit more. But I think the first and most important less of culture is that it belongs to the people, it belongs to us, it is what we make it, and we have tools now more than ever than we did in the past to make culture.

When we think about culture and when we think about things like community or nationality or even language and linguistic groups like we do a lot in my own country we tend to think of these things as undivided wholes, of instances of commonality, where everybody is the same in some sort of central essential way. Think about the nationalism of being English or French or whatever, the idea is that all the English people have to share the same sort of English cultural values, all the French people share slightly different cultural values.

But you know, when you look at these elements of culture, and you study these elements of culture, you find that culture does not break down into this nice, neat set of groups and categories. Look at this network up here on the screen. This is a network of western European languages. And the main thing you should see, and this is something you know already, is that all these languages are related to each other and they all derive from versions of each other. This is only a very partial chart of these language, and really, if you were going to draw a full chart of these languages, this is just the derivation of different languages from their sources, but if you were to map the influence from one language to another language to another language you would get a very complex diagram.

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[114] Stephen Downes. Connectivism and Transculturality. Stephen's Weblog (presentations). Spanish translation available. Slides and audio available. May 7, 2010. http://www.downes.ca/presentation/251

And in fact, the culture of any individual person is composed not of metallic-like elemental forms of being indivisible and separate and pure. The culture of any individual, any person you care to name, all of you, myself, Alejandro, the people at the back of the room, the guy recording the video, this culture is a mixture of all cultures, each to a different degree, and all these cultures are related to each other the way the words in a language are related to each other. And this is true not just of language but of culture generally.

I love this diagram. This is one of my favourite diagrams in the entire world. It's almost impossible to read. On the slide it comes out a bit better. All of those dots, each dot represents a scholarly domain. Philosophy is there, we've got child psychology over here, we've got anthropology, archaeology, up there we've got electro-chemistry, polymers, organic chemistry, down here in the green we've got psychology - this is a map, on the screen (if you look at the slides later you'll see there are little white lines connecting all these dots) is a huge network, and this is an actual representation of papers in one discipline that cite or refer to papers in another discipline.

When we think of a domain or discipline like psychology, say, or geography, our first instinct is to think of it like a culture or a nationality, you know, like you or me, we're inclined to say, "Those geographers, they're a strange bunch." Or "Engineers can't be trusted." Right? But really, when you look at the composition of these disciplines, they are composed of links to the other.

So culture and discipline and a wide variety of social and community phenomena like that are based not in some sort of essential nature of being, but rather based in connections with other entities of a similar type. They're clusters located within a network rather than stand-along "we are all united" kind of groups. And it's an interesting picture, and I think it's an important picture, because this runs directly contrary to the sort of nationalism or regionalism or communitarianism that you might see depicted in your newspaper and used for not-so-savory political purposes. We are more alike than we are different from other cultures. And the things that divide us really can be defined through these links. If we understand that our culture, that our nationality, our language, that our domains or disciplines, are clusters in a network then we think of these things differently.

I have a diagram in Spanish, how about that? I'm not going to spend a whole lot of time on this, you can come back to the slides and find this, but this is a diagram I created in New Zealand and I originally created it in English and then it was kindly translated for me into Spanish (and also he made it look a lot nicer, the writing is a lot nicer). And what I want to do with this diagram is to draw what I think is a fundamental distinction. Now this distinction is not unique to me, I did not invent this distinction, I've just drawn it out, and tried to clarify it, for my own thinking. And it's not necessarily The Way of the World, it's just a way of looking at these sorts of issues.

On the left we have 'groups', and this is your traditional nationalistic "we are all the same" kind of definition of community, and on the right we have 'networks', and this is what I believe is a more appropriate, more reflective, more realistic description of culture and community. There are different dimensions across these, and I identify four major ones, which I'll talk about briefly in the next few slides.

Two. Four Dimensions of Networks

The first major dimension is diversity. And, one of the major things that I've inherited from my culture in Canada is a desire for diversity, and this is a value that has been deliberately shared and talked about and created and generated across Canada, and I've always felt and always believed that you need a mixture of materials, you need a collection of different perspectives, different points of view, in order to come to any new understanding.

Think of a conversation. Think of a discussion you have back and forth with your friends. And probably in that discussion you will create new knowledge, right? And that's the whole idea of having such a discussion. But suppose you knew exactly the same things as your friend. What would you and your friend talk about? You know all the same things. You think all the same things. You know, one person would say something, blah blah blah, "Yeah, I know that," blah blah blah, "Yeah, I knew that."

You need to have different perspectives and points of view even to have a conversation, much less to create a community or to create new knowledge. [Here I'm thinking of Dretske] Diversity is essential to community. So what's important about a community is not the way everybody is the same. What's important about a community is the way everybody is different, and able to connect to each other.

Good communities are open. Closed systems, closed communities become stagnant. [Here I'm thinking of Marquez] Imagine if nobody was allowed to come in or out of the city, even a big city like Buenos Aires. Eventually you would lock out or freeze up the source of new ideas. It would become like an echo chamber. The system becomes clogged with the "creative product" of its members.

Communities have to be open, they have to have some source of new material coming in, whether its raw material, resources, ideas, etc., and then they have to have some place where they can send their creative product, the things that they make, the ideas that they have. Openness is essential to community. But again, with this traditional kind of 'group identity' kind of description of culture, there's this inclination or desire to close off a culture from the rest of the world. When you do that, you become like North Korea. You become isolated, you become unable to cope with even your own internal society.

A third criterion that distinguishes a community defines as a network from a community defined as a group is autonomy. And what that means is that each of the members of that community are working toward their own sense of values, their own sense of purpose, their own goals or endeavours. Now that does not mean there cannot be a common purpose. People can choose to work together. What it does mean is that a common purpose or a common goal does not define the community.

And, you know, we have various people from corporations here, one of the first things corporations like to do is create a "vision statement" and then a strategic plan, etc., that everybody in the corporation will line up behind. But this is actually kind of an artificial reality, a fantasyland, because if we think about any corporation that we know of, all of the people at the

corporation are working at the corporation for different reasons. They're not all lined up behind the vision statement and strategic plan. I don't wake up in the morning thinking "I want to increase the effectiveness and foster productivity of the customer base." Nobody does that. It's like, "I need to get some milk." And that's why I got up today. And to get some milk I have to go work, I won't get milk, I won't get paid, otherwise. So, it's better to recognize that, better to understand that even a cohesive organization like a corporation is not united behind a single goal, but rather, is a collection of autonomous but cooperating individuals.

And that's the key. We talk, we hear a lot about collaboration. But I like to distinguish collaboration from cooperation. Cooperation is an exchange of mutual value between autonomous individuals, rather than collaboration, where the two individuals subsume themselves under a single common goal. Now, again, there is room for voluntary collaboration. I'm not eliminating it out the scope of the world. But collaboration, working together, does not define community. Community is based on each of us following our own way. As Star Trek would say it, "Infinite diversity in infinite combinations." Or as John Stuart Mill would say, "Each person pursuing his or her own good in his or her own way."

Finally, the fourth major dimension distinguishing a network-based community from a group-based community is interactivity. And this is a bit tricky. But this is a concept that's going to underlie a lot of the rest of this talk. So I want to draw it out a little bit.

Now, there are different ways we can think of the way ideas are created and spread through a community. One way is what we might call the 'broadcast method', and here's how it works: I have an idea, say, "the Earth is square" (it doesn't have to be a true idea, it can be any idea) and what I say is "the Earth is square" and then I say it to you, and so you in the front row, you all say it, and you agree, "the Earth is square", and you say it, and you pass it on, and soon, everybody in the room is saying "the Earth is square." So what is happening here is that the idea of one individual has been propagated through the group and has become part of the group's knowledge.

Now, you can see the limitation of that. It means that we, as a group, cannot know more than any individual can know. Right? Because the idea has to be formed in my head, in my mind first, or maybe in one of yours (it depends on how democratic we are), but still, it's the same kind of thing, it's formed in my head and then spread to each of you. In philosophy we would call this as well a 'fallacy of composition', making the properties of the group the same as the properties of the individual. The idea (had by) the group would be the idea (had by) one of the individuals.

This is how groups operate. This is how systems based on identity and conformity operate. But they have this upper structural limitation.

Now, imagine we wanted to have a really complex idea. A really complex kind of knowledge. Well, we can't do it the way I've just described because it's the sort of knowledge that's going to go beyond what I could have from my one perspective or my one point of view. It goes beyond what can be known by one person. I'll give an example: flying an airplane from Toronto to Buenos Aires. You might thing, "Oh yeah sure, that's no problem, anybody could do that, right?" Well, let's make it a big airplane. Let's make it a 747. That's a big airplane.

Think of that concept. Think of the knowledge it takes to do that. Could that knowledge be contained by any one individual? Clearly not. What we need to do is to create a mechanism where the knowledge is not contained by any one person but rather as they say 'emerges' from the interactions among the people. So we'll all have our own bit of knowledge, or own perspective, on how to fly this airplane. Somebody is the pilot, somebody is the co-pilot, somebody is the navigator, somebody is the flight attendant, somebody makes the tires the plane lands on, somebody builds the windscreen, somebody washes the windscreen, somebody serves vodka to the first class passengers, water to the rest, and somebody sits in the control tower and manages the plane traffic, and there's the guy who, when the plane's coming in, waves his hands and says "park here!" It takes all of these different perspectives, different bits of knowledge, to create the social knowledge of how to fly this airplane.

There's a wide variety of knowledge like that. And it's important to understand that it's not simply a joining of individual knowledge, it's rather new knowledge that did not exist and could not exist from many individual perspective. It's, as I said, emergent knowledge. I'll talk a little bit about that as the talk progresses. But essentially the idea of emergent knowledge is that it is the pattern that is created by a set of interconnected entities. So, this knowledge, because it is a pattern, does not exist 'in itself', it has to be recognized by a viewer.

Yesterday I was talking about how 'knowing' is 'recognizing'. This is what this is. Look at, for example, your television. Think about watching a program on your television. And you see a picture of Richard Nixon on your television. You all know who Richard Nixon is, right? Oh, it doesn't matter. Well - it does matter. Really, what you're looking at is a whole bunch of pixels. Little dots on the screen. The reason why you recognize a picture of Richard Nixon is because they're organized in a certain way. No individual pixel has a picture of Richard Nixon, in fact, it couldn't. Couldn't possibly. Because a pixel can only have three or four values of colour. And what is important is not only the organization, but you need to recognize that, yes, this is in fact Richard Nixon. If you did not know who Richard Nixon was then when you look at the pixels it's just some guy who looks a little nervous. And if you were an alien from outer space you might not even recognize that this is a human. So, this is the sort of thing. The image of Richard Nixon 'emerges' from the pixels. Our knowledge of how to fly a 747 'emerges' from individual knowledge. But this knowledge does not exist in itself; it has to be recognized as existing.

So that's what I mean by interactivity. When I say 'interactivity' I say the knowledge in the community is created by the interaction of the members of the community rather than created in one person and then spread through the community.

Three. Two Kinds of Knowledge

Now, the theory of connectivist teaching and learning is based on two ideas. First of all, the idea that the human brain is a network, just like the networks I've described. It's a whole bunch of individual entities, neurons, connected with each other. And knowledge in the human brain emerges from these connections. And then the second idea is that our communities, our sociality, our culturality, again is created through these connections. So the way we have cultural identity, the way we have language and science and research and reasoning in our

society generally is the same mechanism as the way we have knowledge individually or personally.

It's the same system, we're using the same system, the same logic, the same sort of idea. And when you think about it, that has to be the case. Think about a neuron, just for a second. Neurons are really stupid. All a neuron can do is receive an electrochemical potential and then decide whether or not it's going to fire, and, well, that's the life of a neuron. It doesn't know why it's firing, it has no idea about the world, or even the neurons next to it, all it knows is that if it gets enough signals coming in, it's going to fire. And, over time, depending on the signals that come in, it might form connections with other neurons. But it just does that because of physics and chemistry, it doesn't 'want' to form connections, it just does form connections, it's just a matter of biology, that's it.

So, neurons are really stupid. If all you could think of was what one of your neurons could contain, you could not even get out of bed in the morning. You'd be lying there in bed, "dut-dut-dut-dut... dut-dut-dut-dut." Because that's all a neuron can do. So our knowledge, our intelligence, must be based on something emergent from the connective activity of many individual neurons, can't be based on the content of a neuron, has to be based on the pattern of connectivity of these neurons.

We replicate that in connectivist teaching. We form a network in which individuals act as though they were neurons. And what they are trying to do in this network is to receive signals, process signals, send signals, and connect with other people. Very simple activities. That's the key. Because... well, anyhow... (it's really easy to get off track in one of these talks because there's always a reason, and I can follow the train of reasoning, and we go back to, like, you know, anyhow, "first there's a hydrogen atom", and you know, anyhow." [here I'm thinking of Minsky]

Here's what a connectivist course looks like. It's also what a personal learning environment looks like. A personal learning environment is the environment you would use to learn in a connectivist manner. Here's you, at the centre, it's represented in this case by Elgg because the people from Elgg created this diagram, it's a version of the diagram created by Scott Wilson, and then you at the centre are connected to all kinds of different things, different people, different applications online. You're connected to social networking, you're connected to communities, you're connected to your own files, to search, to weblogging, and so on. All kinds of different services.

You should think of it as you being connected to other people. And everything else is just physics and biology, mechanisms for you to send messages to other people and other people to send messages to you. It's a big communications network. That's what a connectivist course is.

Now, remember how I distinguished between groups and networks. There is a corresponding difference between two types of knowledge. There is the traditional type of knowledge that people have always tried to teach you in a classroom, and then there is this new, network type of knowledge that I have been talking about.

Think about the kind of knowledge that even today people think you should be learning in schools. It's static. They want to teach people basic first principles, foundational knowledge, stuff that doesn't change. "Two plus two equals four." Make that the knowledge that you learn. It's declarative. It's kind of a hard concept, but what I mean is, it is a set of propositions. Or, a set of statements of fact. So, the idea here of this kind of knowledge is that, when you learn, learning is the accumulation or collecting of a set of facts. As Wittegenstein in his earlier, incorrect, days, said, "The world is a totality of facts." And the educational version would be, "an education is a totality of facts." That's the old way of looking at education.

And then it's authority based. The idea is, the contents of one person's mind will be sent to other people. "I know that the world is a square, and I will teach you and you and you that 'the world is a square'." That's the old way of looking at knowledge. That's the way of looking at knowledge where the idea of teaching is to make everybody the same. But that's not productive of community. In fact, it's destructive of community. It makes communities stagnate and die rather than grow and prosper.

So, I'm more interested in another kind of knowledge, which is 'knowledge in the network'. Knowledge in the network has, well, many properties, but these three properties are pretty key.

First of all, it's dynamic. What we mean by that is, it's always changing. What was true yesterday may not be true tomorrow, what was true tomorrow may not be true the next day. Even if there are underlying facts of the matter, even if two plus two is always equal to four, it's not always relevant. It might not always matter. There are always facts out there in the world, the world may not be a totality of facts, but it has a lot of them, but these facts come in and out of relevance, come in and out of prominence. So even if there are unchanging parts of the world, our relationship to these things changes.

Knowledge is also what we call tacit. Or non-declarative. The idea of tacit knowledge is an idea from Michael Polanyi, and a way of describing it is, 'ineffable'. It's knowledge that quite literally cannot be represented in words. Because we do not have sentences in the brain. We may think in sentences, or we may think in the experience of reading or hearing sentences, but remember, we just agreed earlier, we have neurons in the brain, and that our knowledge is composed of connections between these neurons. These connections are not sentences. These connections are distributed across tens of thousands, millions, of neurons. And the kind of knowledge that we can have is much more complex, much more multi-faceted, much more - ah, I'm searching for a word - much more whatever than we can express in a sentence. (Voice: "Kaleidoscopic.") Kaleidoscopic. Yeah. That's a good word.

Think of - what was the example I had yesterday? - you can sit there all day and talk about how to do something and ... well, there's all kinds of examples. 'Riding a bicycle' is an example Polanyi used. I can sit here all day and describe to you how to ride a bicycle, but really, riding a bicycle is something you have to learn by getting on the bicycle and riding it. Because the language that I use to describe how to ride a bicycle does not completely describe how to ride a bicycle.

And then, finally, knowledge in the network is constructed. I should probably not say 'constructed' so much as 'grown'. Knowledge in the network results from the entities in the network interacting with each other and new connections being formed. In the human mind, knowledge is created when we create connections between neurons, one neuron to another. Socially, social knowledge, that is created when we connect individuals, one individual to another individual.

Four. Learning is not Social

So here we are, here's our personal learning environment, each one of these is one of these. So this - these things - are connected to one another in this network. We can also think of each one of these as a different person or we can also thing of each one of these as ways that you yourself are connecting to the network. It's complex, right? It's not simple.

But the main thing we have here is we have individuals that are connected to each other through a variety of technologies. That's the main thing to think of here. So, what happens when we think about teaching and learning in this sort of network is that the role of teachers and learners is to participate in the workings of this network. That is the activity that we are undertaking. And one of the things you should notice is almost in the way I'm describing this, the activity of teachers becomes the same as the activity of students. They're not two separate activities. They merge, they become one and the same activity.

OK, now, so I've mapped out this discussion. You've probably seen elements of this discussion in a lot of the other stuff that you've seen or read. The next step that most people take, including I might add George Siemens and others, is to say, "OK, we've described networks, we've described social networks, all learning is social, therefore we're going to talk about social learning. And so our theory of learning will be a description of learning in social networks."

Now this is a turn that I do not take. This is a way that my approach to learning in networks is different or distinct from other people's. Where other people go, at this point, is one of a number of different directions, and I've listed a few here:

- There's the old behaviourist or instructivist method of transmitting knowledge, Skinner and all of those guys, Gilbert Ryle 'The Concept of Mind', the whole host of them where learning is behaving. There was a comment in my blog just the other day, it begins, "Well we can agree that we know someone has learned when they are behaving a certain way," and I thought, "Oh yeah right, here we go again."

- Other people have become more advanced, and we have Moore, for example, M.G. Moore bases his theory of learning very much on information theory. It's interesting, my background is in philosophy and science, not educational theory, so I approach Moore late in life. I read Moore, and my reaction was, "this is a checksum network." This is sending a signal, sending back a confirmation, and so on. Moore's theory is actually based on a protocol for information and communication. It's pretty useful as far as that goes, but it's an externalist-based social learning kind of theory.

- Then you get more complex, more interesting forms of social learning, social constructivism from Vygotsky and others, problem-based learning [here I am thinking of David Jonassen] , and I could go on. These are all the fairly standard theories of learning that everybody learns when they study education or learn about pedagogy.

I do not go in this direction.

Let's think about this 'social learning'. Think about where the models of knowledge and learning are coming from. Well, we have externally based definitions or community-based definitions. Learning objectives will be defined by the community. What counts as a body of knowledge will be defined by the community. The processes are externally-based. The processes of learning are going to be defined by the community. They're all 'activities', 'conversations', 'interactions', 'communications'. Everything's happening external to the person. We have external systems. We define learning in terms of classes. Even in terms of networks, groups, collaborations. All kinds of things that are happening outside the individual person. And, of course, evaluation is by somebody external to you, an examiner or something like that.

It's as though the entire process of learning happens in the society, in the community, and nothing happens in your head. And that just seems wrong to me. Because throughout this talk I've been careful to distinguish between the knowledge in our head, that is formed by connections of neurons, and the knowledge in society, that is formed by connections of people. And the learning that happens in our head does not consist of connections between people. The connections between people is the learning society or a community as a whole does.

The learning that we do as individuals is different from that. It is the growing of connections in our own mind. Very different. Social knowledge - the knowledge of a society, the knowledge of a culture, the knowledge of a community - is not the same as personal knowledge. Social knowledge emerged from the connections created by many individual persons. Two distinct things. They're related. They're connected. But they're not the same.

So we have different kinds of learning, different kinds of knowledge management. 'Personal knowledge management' is 'learning', 'social knowledge management' might be 'research' or 'social learning' or something like that.

So the key thing that I want to underline here, that makes my approach to education a bit distinct from other people's is that the product of the educational system is not a social outcome. And it's interesting because when you think about how people define what the objectives of an educational system ought to be, they are so often social and cultural objectives. "We want everyone to know our underlying social values, we want everyone to know mathematics, we want everyone to be able to take part in the creation of a jumbo jet that flies from New York to Buenos Aires." They're all socially defined.

But learning is in fact a personal outcome, not a social outcome. It (defining learning as a social outcome) is like having the picture of Richard Nixon tell the pixels what they ought to be.

Five. Learning a Discipline

So how does this work? Here's the picture of connectivism my way (I think George (Siemens) is still working on this - I don't think he disagrees but I don't know if he agrees).

So, what have we got? We have a social network. We have a personal learning environment. We're all connected. We're having communications back and forth. We're receiving content, signals, input, we're manipulating it, we're creating it, we're sending messages to all the other people who are our friends, we're working in the social network.

But we're using the social network to create in ourselves a neural network. It's just like exercising with a bar-bell. [Picking up an object] Pretend this is a bar-bell, so I'm exercising - I don't want to become one of these (bar-bells), that would be ridiculous. But I use this in order to develop the muscle.

So I use something external to myself in order to develop an internal capacity. There needs to be some kind of consistency - a barbell has to be something I can lift and hold. The external properties - the gravity, the weight of the barbell, are important to the formation of the muscle. But they are not the same (as the muscle).

Personal knowledge consists of neural connections, not social connections. Very important. The reason why this is important is because when we understand personal knowledge as neural connections, then personal knowledge does not consist of the artifacts that we use to describe social knowledge. The artifact that we use to describe social knowledge might be 'a sentence', "Paris is the capital of France." But personally, in our own mind, in our own neural network, it might look like that (see diagram). And this is not simply the representation "Paris is the capital of France," it's also the representation "Cows are brown." And it's also the representation, "water is wet."

What's happening here, there are two things happening here. First, this is non-propositional, non-sentential, non-explicit. It's tacit. It's ineffable. There are no words here. Second, it is distributed. There's no particular place that corresponds to the knowledge that 'Paris is the capital of France.' And this knowledge is embedded with other knowledge that semantically is not even related to it.

It results in funny things. It means that, if I tell you, "My dog is white," your understanding of Paris changes a little bit. You wonder, "how does that make any sense," well, your understanding of 'dog' is in here, and your understanding of 'Paris' is in here, and if I change your understanding of dog, I change your understanding of Paris a bit.

That's what we mean by 'complex'. You can't do just the simple cause-effect kind of thing. When you have complex knowledge you have situations like this where you can't just get at one element of knowledge in isolation from all the rest (This makes a total mash - as an aside - a total mash of traditional education research).

It's the difference between 'knowing that' "Paris is the capital of France" or even 'knowing how' to do something, and what it feels like to know the capital of France. When you think about that -

you all know the capital of France, right? (Well you must, I've told it to you three or four times already; if you've forgotten it, now you're in deep trouble.) But there's a difference between 'knowing' this, as a fact, and knowing what it feels like to get the answer right when somebody asks you, "what is the capital of France?" And it's this feeling, this overall, this full-mind kind of sensation, that is the actual knowledge. The sentence "Paris is the capital of France" is just the social artifact that we produce. It's public knowledge, it's social knowledge, but it's not personal knowledge.

Learning a discipline, like geography, or psychology, or any of these things, is a total state. It's a transformation of the self from somebody who was not a geographer to somebody who is a geographer. It's not a collection of individual bits of knowledge, it's a process of becoming something. We grow our internal state in such a way that at the end of that growth we're able to say, "I'm a philosopher." Or a geographer. Or whatever.

The question is, how do we know? Typically, we give people tests. We ask them for social artifacts. We ask them for very simple propositional social artifacts. Write a sentence. Answer a question. Create an essay. (Solve a problem.) Real simple. And there's all kinds of ways for a person to correctly produce the social artifact without actually having become the thing that we're trying to become. People who are good on tests (can be) bad at a profession; I'm sure you've seen that.

Learning to become a geographer (or a philosopher, or whatever) occurs not by presenting people with a set of facts but by immersing themselves in the discipline. By joining the community of geographers or the community of philosophers and taking part in the wide range of interactions typical of that community. It's like learning a language. I can sit there and describe all the elements of learning Spanish but really to learn the language you need to get into the language community and actually speak the language. And that's how you learn the nuances of the language, the subtleties of pronunciation, the appropriateness of certain words at certain times, and so on.

It's expressed functionally, rather than cognitively. "Can you act as a geographer in a network of geographers?" Or you can start to ask the question, "If you were to stand there in a group of physicists and talk about physics to them, would you stand out as someone who didn't know what they were talking about? Or would they all accept you as a physicist?" It's that kind of thing. It's not, "Can you state a whole bunch of facts related to geography?" Or it's like teaching. "If you stood at the front of a room and started teaching, and other people who were teachers were watching you, would they accept that you knew what you were doing, or would they say, 'this person is not a teacher, they have no idea what they're doing?'"

You see how the community recognizes whether or not a person is a teacher, whether or not a person is a geographer. It's like seeing that pattern, that complex pattern of associated behaviours, actions, reactions, inclinations and all of the rest. They are recognized as being such-and-such a kind of person.

That's why, when it really becomes important that somebody know what they do, we don't just give them a test. Airline pilots, right? We don't give them a true-false quiz, and then let them fly

an airplane. We don't let them write an essay answer, and then fly an airplane. We put them in a simulator. We immerse them, and we actually put them in a real airplane, without passengers, and see if they can fly the airplane. Similarly with doctors. We don't just take a doctor straight from a test to the operating room. They have to go through a long internship where other doctors look at them, watch all the different things that they do, and recognize, "Yes, this person is a doctor."

In other words, we evaluate whether a person has developed the appropriate neural network, the appropriate personal knowledge, by their performance overall in a community, in a network. (Only a network can evaluate a network!) It's not the specific bits of performance - and this is one of the reasons why I'm worried about competencies, I'm worried about breaking things down into more and more precisely defined disciplines - it's not the little bits of knowledge that we might have, it's how they function when immersed into the environment.

How do you know that a person can swim? They can tell you everything they know about swimming, but you don't know that they can swim until you put them in the water and see whether they sink or not. That's the deciding factor. And when you put them in the water, anybody can tell, right? "Oh yeah, that person's swimming." Or, "oh yeah, that person's drowning." Doesn't matter whether they passed the test.

Personal knowledge is not social knowledge. It does not consist of social artifacts. It is not constructed the way we construct a sentence. It is not built the way we build a house. It is not organized the way we organize a society. It is grown the way we grow a muscle. And so the method, the activity of learning, is appropriate to that kind of knowledge.

Standing there, even like I'm doing here, and spouting a bunch of facts at people doesn't produce personal knowledge. It might produce little bits of social artifacts that they may or may not remember, but it's not going to produce the knowledge.

The very best you can do is to induce, or stimulate, some kind of thinking. I can't take a sentence and put it in your head. Not possible. Even though I may look like I'm really trying to do that right now, and you notice how I'm even leaning forward, and trying to push it into your head, it's not happening. You're all reacting in your own individual and unique way - some of you are smiling, some of you are laughing, some of you are at the back are shaking your head, you know, that's OK - and I can't put my knowledge in you, all I can do is give you various stimulations that get you thinking.

But it's just a part of your overall social experience, and it's your overall social experience that will produce the knowledge. What we're doing here is a part of the practice of a discipline as a whole, and by participating in that discipline we're becoming a little bit more able to work in that discipline.

So, the way to think of a personal learning environment, in this context, is as an exercise machine, a way to immerse yourself in a community and work with the community, to get yourself into the community and practising with the community. If you wanted to become a geographer you would use your personal learning environment and connect to the community of

geographers. You wouldn't sign up for a geography class - well, you might, but that wouldn't be your education - your education would be to start listening to and watching geographers, and then sort of tentatively at first, and then more and more, to practise doing the things that geographers do.

You could learn philosophy in the same way, and in fact, this is what we do in philosophy, that's why philosophy is so cool, in philosophy nobody spouts a bunch of facts at you and expects anyone to believe it. The whole act of philosophy is doubting what you're told. But what happens is that we as philosophers immerse ourselves in this environment and put ourselves into proximity with other philosophers and argue back and forth like crazy, usually over copious quantities of beer (because that's what philosophers do, which is why their lives are so short) and gradually, gradually, you become more and more capable of being a philosopher, more and more adept at the practices, the method of speaking, the language, the jargon, the world view, the way of thinking, all these things, of the community of philosophers.

And not only that, you will actually become through that process an empiricist, or a rationalist, or a realist. You'll actually become affiliated with a subdomain and become a part of a community, become a part of a culture or a society within philosophy by gradually developing a greater affinity for that group, rather than becoming more and more like members of that group. And it's not like they told you "You will be a realist." It's you determining your own path, your own direction, first, to become a philosopher, and then, to become a realist (which I would never do).

Six. The connectivist Course

Developing personal knowledge is like exercising. Much more like exercising that inputting, absorbing, remembering. Your personal growth, your exercise, develops as a consequence of interactions with the rest of the community. And so we have the connectivist course.

Quote-unquote. It's not really a course. In a connectivist course, like the course that George and I taught, Connectivism and Connective Knowledge, or like the course that I'm starting in June called Critical Literacies, we don't 'teach' information. We don't 'have content' that we want to pass along. Rather the 'content' of the course is created by the members of the course themselves.

That includes the instructors - it's not like constructivism where the instructor is the 'guide by the side'. None of that. It doesn't work unless the instructors take part too, because if you think about how community works, in a community, like a community of geographers, the alpha geographers are in there slugging it out, and arguing geography back and forth with other geographers, "I can draw better maps than you can, here look..." and then all the other geographers that are less alpha and are learning to be geographers, they're in the same community.

The instructors and the students are in the same place. They're creating the same content, they're working with the same content. In Critical Literacies, I'll be in there creating content, and I'm sure people will read the content I create, but students will be creating content as well. And

together, through our individual actions, we create this community, this society or this culture, around the idea of critical literacy.

We don't tell students to perform specific tasks. Rather, they are presented with the things that other people create and they do with them whatever they think is relevant.

Now, what will they do? Now that depends on their experience in the course. It depends on who they're watching, who they're following, who they're using as models or mentors, who they're trying to imitate, or whether they're trying to imitate at all, the idea is that they in their own unique way are working with the content and materials that constitute that discipline.

What will happen a lot of the time, most of the time if you're lucky, is, they will change the discipline. They will add something unique to the discipline that we've never seen before. And the discipline will grow and develop.

You know, a lot of people in different disciplines have their greatest ideas, their unique contributions to a discipline, they originally formed when they were students. All this network stuff that I do originally formed in my own mind when I was a student. I've pursued it ever since. It was as a student, instead of following the typical cognitivist "we have sentences in our brain" line, I went a different direction because I felt that was more appropriate, working with philosophers and educators gradually building my own perspective on the matter.

Typically in a connectivist course a student will do some sort of common activities: reading, posting comments, creating blogging, contributing content to a wiki. They don't have to do this, but empirically, what we observe is that a large number of them do do this. But also, what we have observed empirically through different offerings of connectivist-style courses, is that students will engage in a large and unpredictable set of activities. They may create a map of course participants, they may host a seminar in second life. In the Connectivism course we had three separate Spanish speaking subgroups formed in the course, including the 'Connectivitas', which I thought was kind of cool. And there was Second Life stuff. People created Google Groups, Yahoo Groups, translated stuff, created concept maps, and more.

This is the idea, when you're not located in any particular place, you're not set in any particular environment, when all you have to do to participate in a course is to connect to us, you can use any application, any location, any forum, any way of communicating or working with ideas, and it connects back to the whole, and it adds a uniqueness, your unique perspective, to the whole.

A connectivist course - very important - is not a bunch of people marching lockstep through the same activities. 'Learning Design' is anathema to connectivism. It's not everybody doing the same thing. In a connectivist course, everybody does different things.

And there even isn't a sense of 'everybody'. Sometimes people are in the course, sometimes they're not. They may start the course and not finish, they may finish the course without having started it. It doesn't matter.

It's understood, expected, that students will undertake different activities, of different kinds, that their learning will emerge as a product of these activities, and just as importantly, our social

understanding of the subject matter will also grow. Again, it's not a static set of course content. Our knowledge of the course content grows every time we offer the course.

So, a connectivist course basically has two major modes:

First of all, the creation of an environment. This is the personal learning environment, an environment that supports or fosters great diversity and autonomy in participation, an environment that is also open - very important, you cannot close a barrier to a connective course, it has to open so people and ideas can flow in and out. And it's based on the idea of interactions between people, and a large and undefinable body of materials.

And then, secondly, in this environment, people do their own things, create interactions with each other, and new and unexpected - typically unexpected - knowledge flows outward as a result.

And so that is the talk that I wanted to offer you today and I think we'll have time for comments and questions, and I hope you and the people who were online and on UStream enjoyed that. But we'll see, we'll see if there's anyone left. 161, yeah.

Buenos Aires, April 20, 2010

Theoretical Synergies

A reader asked:

> *I read an article that was published in March 2011 edition of IRRODL: "Proposing an Integral Research Framework for Connectivism: Utilising Theoretical Synergies", from B. Boitshwarelo (Botswana).[115]*
>
> *I found it very interesting. However, certain questions have arisen in regard to the analysis done by the author.*
>
> *1- Accordingly to Activity Theory (AT), learning is initiated by intention (p168): "learning as conscious processing, a transformational process that results from the reciprocal feedback between consciousness and activity". Is this true in connectivism? Connectivism says that learning is the ability to construct and traverse networks. Sometimes, this process may not be intentional. I mean, sometimes we learn without being aware that this is happening (as a child, for example). Does connectivism contradict AT?*

Does connectivism contradict AT?

No doubt different people have their own theories, but I have argued in the past that one of the major differences between connectivism and constructivist theories generally is that in connectivism learning is a property of the system, something that happens all the time, and is not therefore the subject of intentional activity. You don't decide to learn now, and maybe to not learn later, you are learning all the time, it's what the brain does, and the only choice you exert over the process is what you will do to affect the experiences leading to your learning. Watch TV all day and you'll learn about game shows and daytime dramas, practice medicine and you'll learn to be a doctor. Similarly, where constructivists say "you make meaning", I disagree with the expression, because the production (so-called) of meaning is organic, and not intentional.

> *2- (p 169) The author says that one feature of connectivism is that it recognizes the need to adapt to the ever-changing nature of information "in order to resolve the disharmony introduce by such change". My point is: does connectivism talk about this? Does connectivism aims to resolve these contradictions or is about to accept and learn to live with them? Are connectivist systems stable?*

Does connectivism aims to resolve these contradictions

There are of course no contradictions in nature. A contradiction is a linguistic artifact, the result of sentences believed to be true each entailing that the other is false. Because so much of

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[115] Bopelo Boitshwarelo. Proposing an Integrated Research Framework for Connectivism: Utilising Theoretical Synergies. The International Review of Research in Open and Distance Learning Volume 12, Number 3. March 2011.
http://www.irrodl.org/index.php/irrodl/article/view/881/1816

cognition is non-linguistic, it is probably not useful to speak of contradiction in this context, but rather to speak of harmony and disruption. (I say this almost off-the-cuff, but this would really be a significant change in our understanding of logic and reason).

All connectionist systems – i.e., all networks, as understood computationally - work through a process of 'settling' into a harmonious state. What counts as harmonious varies depending on the precise theory being implemented. For example:
- Hebbian associationist systems settle naturally into a state where neurons or entities with similar activation states become connected
- Back-propagation systems adjust according to feedback
- Boltzmann systems settle into a stable state as defined by thermodynamic principles

The 'disharmony caused by change' is best thought of as a new input that disrupts this settling process. The network responds to this change by reconfiguring the connections between entities as a result of this input. This is learning.

Whether we are able to address linguistic artifacts, such as contradiction, with a given learning experience, is open to question. There is no reason to expect a contradiction to be resolved, though were our linguistic artifacts based in experience, such a resolution would be a desirable, and expected, outcome.

> *3- (pp.171-172) Is it really necessary to use the theoretical concepts of other more consensual and tested theories to study and validate connectivism? Does connectivism have his own tools of analysis to do this? Does connectivism need to be feed by constructs of other theories? Doesn't this contradicts connectivism as new approach to learning in the digital age?*

Does connectivism need to be feed by constructs of other theories?

I think it's important to understand that connectivism is the adaptation of educational theory to these other theories, that it points to a theme underlying these other theories, and is not distinct from these theories.

Connectivism is, in my mind, a particular instance of a much broader theory of networks. Thus, evidence that informs us about the theory of networks generally also informs us about connectivism.

This is an important point. Constructive approaches to education (and most other things) place a special significance on the role of theory, and particularly the role that theory plays in providing a perspective or 'lens' through which a phenomenon is experienced. Hence we expect any given theory to provide a given 'stance', provide analytical 'tools', and beyond certain constraints (such as non-contradiction) no one theory is assumed to constitute a privileged stance. Theory-construction thus becomes an importance scientific and pedagogical activity, leading to a host of other constructs (such as, say, 'identity').

Connectivist learning is very different. It is not about creating cognitive constructs such as theories. Learning, according to connectivism, is a process of growth and development or

networks rather than a process of acquisition and creation of concepts. Networks are not concepts. Concepts are representational systems, they postulate a divide between what they are and what they represent, they therefor entail a theory of signs, or semiotics, and have linguistic properties (such as the law of non-contradiction). Networks are physical systems, not cognitive systems. Though they can be depicted as representing things (e.g., a brain state may be thought of as representing a physical state), this depiction is in itself an interpretation, and not a property of the network itself.

Now I think that network theory in general and connectivism in particular can provide a set of tools to analyze *other* phenomena - I describe these as six elements of critical literacies, but the exact nature is unimportant here - but it is rather akin to the way mathematics offers us tools for the evaluation of other phenomena - mathematics can define data and instrumentation, such as measurement, ratio and comparison, and bookkeeping - but it would not be reasonable to turn these phenomena around as a means of evaluative mathematics.

Networks, in other words, are what they are. Network theory is nothing more or less than a description of networks, and the application of that description to other phenomena, just as qualitative theory is a description of properties (such as colour, size, shape, position, relation) and quantitative theory is a description of number and ratios.

keith.hamon said...

Stephen, thanks for the fine clarification of the role of networks in thinking about education, knowledge, and so forth. You are correct to point out that Connectivism is a subset of the broader discussion about networks; however, I fail to follow your thinking on a couple of points.

First, you say that there are "no contradictions in nature. A contradiction is a linguistic artifact," which might suggest to some a divide between nature and its constructs and human constructs. I'm uncomfortable with this distinction, though I know it is the dominant view. I see it useful to consider linguistic structures as a part of nature: a complex layer of the total network emerging from a physical substrate, and perhaps having different rules than that substrate, but still dependent on that substrate. It seems to me best to think of language in all its variations as a part of the natural mix, part of what the Universe has created. Isn't it more useful to think that language and linguistic structures—even contradictions—have naturally emerged in nature, and are therefore natural?

This leads to the second statement that I don't quite follow: "Networks are physical systems, not cognitive systems." But aren't cognitive systems also usefully thought of in terms of networks? And aren't cognitive systems based on physical substrates, physical networks? Isn't it more useful to think of cognitive structures as just a different scale of the natural network? I agree here with Olaf Sporns that "cognition is a network phenomenon."

Again, I think I'm having trouble with what I sense in your statements as a separation between the physical and natural and the cognitive. Is this distinction necessary? Or have I missed the point of your argument? Thanks.

Downes said...

> *I'm uncomfortable with this distinction, though I know it is the dominant view. I see it useful to consider linguistic structures as a part of nature*

That's very much a minority view, and I think not one you can maintain consistently (or course, that may not be a problem foryou).

The thing is, the contradiction is not a part of the *physicality* of the expression. It arises only as a result of the *interpretation* we place on the symbol system, as a result of how we apply truth, meaning, and other abstract properties to the expression.

In the physical world itself (at least, according to the way we use words as they normally mean) it is not possible for something to be both P and not P. It can't be both a dog and not a dog. Yes, you can alter your linguistic system to allow contradiction - that's what your stance does - but you cannot successfully incorporate that stance into the physical world. That's a fallacy I call "the linguistic pull" - the belief that physical systems are governed by non-physical laws.

> *It seems to me best to think of language in all its variations as a part of the natural mix, part of what the Universe has created.*

But you recognize that it would be absurd to say "there are pink dragons," right? because someone imagined them to exist, believed them to exist, or uttered the statement "pink dragons exist."

The multiplicity of linguistic systems does not entail a multiplicity of physical systems.

> *But aren't cognitive systems also usefully thought of in terms of networks?*

This is a variation of what Dennett would call 'the intentional stance'. But it is also an example of what Paul Churchland would call 'folk psychology'.

Here's the dilemma:

If we use the word 'dog' in a relatively ordinary and unambiguous way, we can relatively easily create a mapping such that statements about 'dogs' are statements about a definable set of physical objects [dogs], such that what is true of 'dogs' is also true of [dogs].

For the intentional stance, or folk psychology, to be successful, then we need also to be also to do the same thing with common abstract concepts.

The problem is made most clear with a concept like belief. We can all use the word 'beliefs' and have some sense of what it means. But there is no set of objects [beliefs] such that we can map from 'beliefs' to [beliefs].

The same sort of problem exists with logico-linguistic terms such as 'truth' and 'meaning'. Again, there is no mapping from 'truth' to [truth] (the best attempt is Tarski's theory, which would be best represented here as "'snow is white' is true iff [snow is white] is 'true'.")

We know that there are human brains, and that they do things like think and evaluate and intend. But the terminology we use to describe what human brains is terribly imprecise. That's fine, *so long as we don't do what you do here* - so long as we don't infer from properties of the symbol system to properties of the physical system. The 'physical symbol system' hypothesis, in other words, is false.

So while cognition is indeed a network phenomenon, it is not governed by the principles and rules we have to this point characterized as cognitive phenomena.

Glen said...

It's an interesting post, thanks. If connectivism is the adaptation of something Educational, shouldn't there be more of a focus on maximizing learning and intentional learning, rather than just learning itself?

This seems to me a very big gap in connectivism. We can't simply connect, we have to connect in some way...be it through language or other representational systems. Although these systems are surely not the same thing as what they represent, they play an inseparable part in what learning will take place. Connectivism may be a description of potential learning, but the quality of actual learning needs too.

Downes said...

> *We can't simply connect, we have to connect in some way...be it through language or other representational systems.*

If I bonk you in the head with a thrown apple, we've connected - even though no language or representational system was used.

This is what's important about connectivism (and network approaches generally) - the connection itself, rather than any putative 'content' of that connection, is what's important.

Glen said...

If you bonk me in the head with an apple, you've connected by throwing an apple at me. That's much different than connecting by throwing a wrench, or connecting by making a phone call.

When you say "the connection itself", do you mean to say "connecting itself"? As I read most of it, you're not concerned with the connection itself.

I would say both are potentially equally important in connectivism (pipe and content), because it is applied to a field. Throwing a wrench at me, compared to a Nerf football is going to change whatever your intended message is in connecting with me, regardless of where that message originates.

Downes said...

> *That's much different than connecting by throwing a wrench*

Yes it is. But it does not follow that there is a representational difference, or that the difference constitutes a representation.

> *"the connection itself", do you mean to say "connecting itself"?*

No. Connecting is the act of forming a connection. A connection is the result of the act of connecting. But There are minor semantic differences ('connecting' is a success verb) that I don't want to mix in with what I'm saying here.

> *Throwing a wrench at me, compared to a Nerf football is going to change whatever your intended message is in connecting with me*

This assumes there is an intended 'message', i.e., some content in the connection. But it does not prove that there is content in the connection.

keith.hamon said...

Hmm … perhaps we are talking past each other. When I say that I *see it useful to consider linguistic structures as a part of nature*, I am saying that linguistic structures are built on, or *emerge* from, physical structures, and I fully recognize that the physical structures came first (I'm speaking in evolutionary time here). I also accept that physical structures and linguistic structures have different rules. I also accept that it's often advantageous for the linguistic structures to map as precisely as possible to the physical structures, especially if we're talking about physical structures.

I am, then, viewing linguistic structures as emergent from various physical substrates: neuronal patterns, vocal sounds, organized marks on stones, clay tablets, papyrus sheets, and computer screens. The principle of emergence is still contested in science, but it is not uncommon. In his article *Emergent Biological Principles and the Computational Properties of the Universe*, Paul Davies defines it as "the appearance of new properties that arise when a system exceeds a certain level of size or complexity, properties that are absent from the constituents of the system." My point is that linguistic structures, and consciousness in general, absolutely emerge from and depend upon physicality (or nature), and yet they also have properties that do not belong to the physical substrate from which they emerged. As you point out, linguistic constructs can contradict one another, whereas physical constructs cannot.

This orientation means that I would not likely make a couple of the statements that you make. For instance, you say that "contradiction is not a part of the physicality of the expression." I say that it **is** part and parcel of the physicality of the expression. I do not know how to form a contradiction *without* a physical expression. I am contradicting you now, but only as I'm typing these electro-mechanical symbols and as you are reading them. Of course, I contradicted you earlier (yesterday, in fact) as I was thinking through your comments, but even that contradiction absolutely depended upon my physical neuronal structures, among other things (I also think the coffee I had should be factored into this equation, but I won't pursue that just now). Thus, while

contradiction is a property of linguistic structures and *not* a property of its physical substrates, contradiction cannot exist without that physical substrate.

I am, of course, sympathetic to the distinction you make between the physicality of an expression and the abstract meaning of that expression when you say that, for instance, contradiction "arises only as a result of the interpretation we place on the symbol system, as a result of how we apply truth, meaning, and other abstract properties to the expression." However, I'll contradict you again. I don't think that *meaning* is some independent, abstract entity that "we place on the symbol system." Rather, meaning is what emerges as we spark networks of physical neurons and build networks of physical symbols and then move those symbols through larger networks to connect with and affect others. Thus, abstract meaning can do things that physical words cannot. Thus, I do not intend to "infer from properties of the symbol system to properties of the physical system." I do believe in what Davies calls *strong emergence*, in which "higher levels of complexity possess genuine causal powers that are absent from the constituent parts. That is, wholes may exhibit properties and principles that cannot be reduced, even in principle, to the cumulative effect of the properties and laws of the components." Thus, language can both do things that can't be done at the physical level and it can cause things to happen at the physical level that might not have happened otherwise, but it is still an emergent feature of the physical level and part of that level. I don't see how abstract meaning can exist without the physical, natural world. *Though I can certainly imagine such a thing*.

And this brings me to the last contradiction I'll make. You say that "it would be absurd to say 'there are pink dragons.'" Well, yes, but only in the narrow sense that you probably used the term *absurd* to indicate a cognitive construct that does not map with any rigor, regularity, or reliability to any physical construct. Yet, if I allow only language that passes your test of the *absurd*, then I eliminate much of both poetic and rhetoric, the twin pillars of my professional and personal interests. Fact is: pink dragons do exist in literature. Well, perhaps not pink ones, but certainly the common, everyday, brown or gray type of dragon—St. George's and Tolkein's. To my mind, it's absurd to say that dragons do not exist in imaginative literature, and it's equally absurd to say that imaginative literature does not exist in nature and is not absolutely dependent upon physicality.

Moving imaginative literature—or imagination in general—into the realm of the natural allows me to apply network principles to my study of imaginative literature. So far, I have found that very useful and productive.

Glen said...

@Stephen Throwing the apple represents your intention to get my attention. If you're doing it just for fun, then it represents your idea of humor. If, like you say, you do it for no reason then whatever it represents or not (geometric shape of the universe?) is beside the point here because it's not intentional...which Education is. This is the particular instance.

I think I get what you mean about the "connecting" definition. Although, I still find it confusing as it seems to include actual connections, not just potential ones.

Downes said...

> *throwing the apple represents your intention to get my attention*

No. This is just speculation on your part. I might just be practicing my aim. And that's my point. The attribution of 'a reason' or some 'meaning' to my action is something *you* are bringing to it, not something that was inherent in the act.

Downes said...

@Keith, I am happy to say that meaning is an emergent property of the communication or communicative act.

I've thought a lot about emergence over the years.

I think that one of the key things about emergence is that for us to say some phenomenon is emergent we have also to say that it is *recognized* as such.

For example, the Jesus face [116] on Mars is an emergent property of light and rock outcrops. But it becomes a 'Jesus face' only if we already know about Jesus. Otherwise, it's just random light and dark.

In other words, an emergent property is not inherent in the system producing it, but depends entirely on the perceiver being able to recognize it. (And this leads directly to a definition of knowledge - to 'know' is to be able to 'recognize').

Moncton, July 9, 2011

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[116] YouTube. A Jesus Face on Mars? Video. March 26, 2008. http://www.youtube.com/watch?v=_FDgvPJtKMo

A Truly Distributed Creative System

Posted to idc, October 11, 2007

John Hopkins wrote,[117] on idc:

> *You cannot have a truly distributed creative system without there being open channels between (all) nodes.*

I don't think this is true.

Imagine an idealized communications system, where links were created directly from person to person. If all channels were open at any given time, we would be communicating simultaneously with 6 billion people. We do not have the capacity to process this communication, so it has the net effect of being nothing but noise and static. Call this the congestion problem.

This point was first made to me by Francisco Valera in a talk at the University of Alberta Hospital in 1987 or so. He was describing the connectivity between elements of the immune system, and showed that most effective communication between nodes was obtained at less than maximal connection, a mid-way point between zero connectivity and total connectivity. Similarly, in human perception, we find that neurons are connected, not to every other neuron, but to a subset of neurons.

What this tells me is that what defines a "truly distributed creative system" is not the number of open channels (with 'all' being best) but rather the structure or configuration of those channels. And in this light, I contend that there are two major models to choose from:

- egalitarian configurations - each node has the same number of connections to other nodes
- inegalitarian configurations - nodes have unequal numbers of connections to other nodes

Now the 'scale free' networks described by Clay Shirky are inegalitarian configurations. The evidence of this is the 'power law' diagram that graphs the number of connections per member against the number of members having this number of connections. Very few members have a high number of connections, while very many members have a low number of connections - this is the 'long tail' described by Anderson.

The networks are scale free because, theoretically, there is no limit to the number of connections a member could have (a status Google appears to have achieved on the internet). [*] Other inegalitarian networks have practical limits imposed on them. The network of connections between airports, for example, is an inegalitarian configuration. Chicago is connected to many more places than Moncton. But the laws of physics impose a scale on this network. Chicago cannot handle a million times more connections than Moncton, because

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[117] John Hopkins. Re: Notworking online collaboration in science and education. The mailing list of the Institute for Distributed Creativity. October 11, 2008. http://permalink.gmane.org/gmane.culture.media.idc/395

airplanes take up a certain amount of space, and no airport could handle a million aircraft. This is another example of the congestion problem.

What distinguishes the inegalitarian system from the inegalitarian system is it's the number of 'hops' through connections required to travel from any given one member to another (this can be expressed as an average of all possible hops in the network). In a fully inegalitarian system, the maximum number of hops is '2' - from one member, who has one connection, to the central node, which is connected to every other node, to the target node. In a fully egalitarian system, the maximum number of hops can be much higher (this, again, is sensitive to configuration).

As the discussion above should have made clear, it should be apparent that fully inegalitarian systems suffer as much from congestion as fully connected systems, however, this congestion is suffered in only one node, the central node. No human, for example, could be the central node of communication for 6 billion people. This means that, while the number of hops to get from one point to another may be low, the probability of the message actually being communicated is also low. In effect, what happens is that the inegalitarian system becomes a 'broadcast' system - very few messages are actually sent, and they are received by everyone in one hop.

In other words - maximal connectivity can result in the *opposite* of a truly distributed creative system. It can result in a maximally centralized system.

I'm sure there's a reference from critical theory or media theory, but what would to me define a truly distributed creative system is 'voice' (sometimes called 'reach'). This could be understood in different ways: the number of people a person communicates with, the average number of people each person communicates with, the minimum number, etc. My own approach to 'voice' is to define it in terms of 'capacity'. In short, any message by any person *could* be received by all other people in the network. But it is also defined by control. In short, no message by any person is *necessarily* received by all other people in the network.

One way to talk about this is to talk about the entities in the network. When you look at Watts and Barabási, they talk about the probability that a message will be forwarded from one node to the next. This, obviously, is a property of both the message and the node. Suppose, for example, that the message is the ebola virus, and that the node is a human being. The virus is very contagious. If contracted to one person, it has a very high probability of being passed on to the next. But suppose the person is resistant. Then he or she won't contract the virus, and thus, has a very low probability of passing it on.

The other way to talk about this is to talk about the structure of the network. The probability of the virus being passed on increases with the number of connections. This means that in some circumstances - for example, a person with many friends - the probability of the virus being passed on is virtually certain. So in some network configurations, there is no way to stop a virus from sweeping through the membership. These networks are, specifically, networks that are highly inegalitarian - broadcast networks. Because the virus spreads so rapidly, there is no way to limit the spread of the message, either by quarantine (reducing the number of connections per carrier) or inoculation (increasing the resistance to the message).

In order to create the truly distributed creative system, therefore, you need to:

- limit the number of connections for any given node. This limit would be based on what might be thought of as the 'receptor capacity' of any given node, that is, the maximum number of messages it can receive without congestion, which in turn is, the maximum number of messages it can receive where each message has a non-zero chance of changing the state of the receptor node.

- maximize the number of connections, up to the limit, for any given node. This might be thought of as maximizing the voice of individual nodes. What this does is to give any message from any given node a good start - it has a high probability of propagating at least one step beyond its originator. It cannot progress too fast - because of the limit to the number of connections - but within that limit, it progresses as fast as it can.

- within these constraints, maximize the efficiency of the network - that is (assuming no congestion) to minimize the average number of hops required for a network to propagate to any other point in the network.

These conditions combine to give a message the best chance possible of permeating the entire network, and the network the best chance possible of blocking undesirable messages. For any given message, the greatest number of people possible are in a position to offer a countervailing message, and the network is permeable enough to allow the countervailing message the same chance of being propagated.

What sort of network does that look like? I have already argued that it is not a broadcast network. Let me take that one step further and argue that it is not a 'hub and spokes' network. Such networks are biased toward limiting the number of hops - at the expense of voice, and with the risk of congestion. That's why, in hub and spoke networks, the central networks become 'supernodes', capable of handling many more connections than individual nodes. But this increase in capacity comes with a trade-off - an increase in congestion. This becomes most evident when the supernode attempts to acquire a voice. A centralized node that does nothing but reroute messages may handle many messages efficiently, but then the same node is used to read those messages and (say) filter them for content, congestion quickly occurs, with a dramatic decrease in the node's capacity.

Rather, the sort of network that results is what may be called a 'community of communities' model. Nodes are highly connected in clusters. A cluster is defined simply as a set of nodes with multiple mutual connections. Nodes also connect - on a less frequent basis - to nodes outside the cluster. Indeed (to take this a step further) nodes typically belong to multiple clusters. They may be more or less connected to some clusters. The propagation of a message is essentially the propagation of the message from one community to the next. The number of steps is low - but for a message to pass from one step to the next, it needs to be 'approved' by a large number of nodes.

When we look at things like Wenger's communities of practice, we see, in part, the description of this sort of network. Rather than the school-and-teacher model of professional development

(which is a hub and spokes model) the community of practice maximizes the voice of each of its members. It can be called a cluster around a certain topic or area of interest, but the topic or area of interest does not *define* the community, it is rather an empirical description of the community (and thus, for example, we see people who came together as a hockey team in 1980 continue to be drinking buddies in 1990 and go on to form an investment club in 2000).

Maximally distributed creativity isn't about opening the channels of communication, at least, not directly. It is about each person having the potential to be a member of a receptive community, where there is a great deal of interactivity among the members of that community, and where the community, in turn, is a member of a wider community of communities. Each person thus is always heard by some, has the potential to be heard by all, and plays a role not only in the creation of new ideas, but also, as part of the community, in the evaluation and passing on of others' ideas.

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[*] I just want to amend my previous post slightly.

I wrote: "The networks are scale free because, theoretically, there is no limit to the number of connections a member could have..."

This should not be confused with the *definition* of a 'scale free network', which is specifically, that "a network that is scale-free will have the same properties no matter what the number of its nodes is."

But the relationship between my statement and the more formal definition should be clear. If there is a limit to the number of connections created by the physical properties of the nodes, then the mathematical formula that describes one instance of the network (a small instance) cannot be used to describe all instances of the same type of network.

Moncton, October 11, 2007

The Mind = Computer Myth

Responding to Norm Friesen:[118]

If you were to read all of my work (not that I would wish that on anyone) you would find a sustained attack on two major concepts:

1. The 'information-theoretic' or 'communications theoretic' theory of learning, and
2. The cognitivist 'information processing' physical symbol system model of the mind

These are precisely the two 'myths' that you are attacking, so I am sympathetic.

That said, I think you have the cause-and-effect a bit backwards. You are depicting these as technological theories. And they are, indeed, models of technology.

However, as models, these both precede the technology.

Both of these concepts are aspects of the same general philosophy of mind and epistemology. The idea that the human mind received content from the external world and processed this content in a linguistic rule-based way is at least as old as Descartes, though I would say that it has more of a recent history in the logical positivist theory of mind. Certainly, people like Russell, Carnap and even Quine would be very comfortable with the assumptions inherent in this approach.

Arguably - and I would argue - the design of computers followed from this theory. Computers began as binary processors - ways of manipulating ones and zeros. Little wonder that macro structures of these - logical statements - emulated the dominant theory of reasoning at the time. Computers were thought to emulate the black box of the human mind, because what else would that black box contain?

Now that said, it seems to me that there can't really be any denying that there is at least some transmission and reception happening. We know that human sensations result from external stimuli - sight from photons, hearing from waves of compression, and so on. We know that, once the sensation occurs, there is a propagation of signals from one neural layer to the next. Some of these propagations have been mapped out in detail.

It is reasonable to say that these signals contain information. Not information in the propositional sense. But information in the sense that the sensations are 'something' rather than 'something else'. Blue, say, rather than red. High pitched, say, rather than low pitched. And it has been a philosophical theory long before the advent of photography (it dates to people like Locke and Hume, minimally) that the impressions these perceptions create in the mind are reflections of the sensations that caused them - pictures, if you will, of the perception.

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[118] Norm Friesen. Myth 5: The Mind = Computer Myth. eHabitus (wweblog). March, 2007. http://www.downes.ca/post/39473 Website no longer extant. http://ehabitus.blogspot.com/2007/03/myth-5-mind-computer-myth_424.html

To say that 'the mind is like a photograph' is again an anticipation of the technology, rather than a reaction to it. We have the idea of creating photographs because it seems to us that we have similar sorts of entities in our mind. A picture of the experience we had.

In a similar manner, we will see future technologies increasingly modeled on newer theories of mind. The 'neural nets' of connectionist systems are exactly that. The presumption on the part of people like Minsky and Papert is that a computer network will in some sense be able to emulate some human cognition - and in particular things like pattern recognition. Even Quine was headed in that direction, realizing that, minimally, we embody a 'web of belief'.

For my own part, I was writing about networks and similarity and pattern recognition long before the internet was anything more than a gleam in my eye. The theory of technology that I have follows from my epistemology and philosophy of mind. This is why I got into trouble in my PhD years - because I was rejecting the cognitivism of Fodor, Dretske and Pylyshyn, and concordantly, rejecting the physical symbol system hypothesis advanced by people like Newell and Simon.

I am happy, therefore, to regard 'communication' as something other than 'transmission of information' - because, although a transmission of information does occur (we hear noises, we see marks on paper) the information transmitted does not map semantically into the propositions encoded in those transmissions. The information we receive when somebody talks to us is not the same as that contained in the sentence they said (otherwise, we could never misinterpret what it was that they said).

That's why I also reject interpretations, such as the idea of 'thought as dialogue' or communication as 'speech acts' or even something essentially understood as 'social interaction'. When we communicate, I would venture to say, we are reacting, we are behaving, way may even thing we are 'meaning' something - but this does not correspond to any (externally defined) propositional understanding of the action.

Moncton, March 14, 2007

What's The Number for Tech Support?

The article in Science Daily[119] is pretty misleading when it says "Human Brain Region Functions Like Digital Computer". To most people, to function like a computer is to function based on a series of instructions encoded into some (binary) language. This in turn leads to the idea that the brain is like a computer program.

This, of course, is precisely *not* what O'Reilly is saying in the article (unfortunately not available online, though you can find numerous others of his articles.[120] Probably the recent online article most corresponding to the Science article is Modeling Integration and Dissociation in Brain and Cognitive Development[121]).

In this article he is pretty specific about how the brain represents conceptual structures. "Instead of viewing brain areas as being specialized for specific representational content (e.g., color, shape, location, etc.), areas are specialized for specific computational functions by virtue of having different neural parameters... This 'functionalist' perspective has been instantiated in a number of neural network models of different brain areas, including posterior (perceptual) neocortex, hippocampus, and the prefrontal cortex/basal ganglia system... many aspects of these areas work in the same way (and on the same representational content), and in many respects the system can be considered to function as one big undifferentiated whole. For example, any given memory is encoded in synapses distributed throughout the entire system, and all areas participate in some way in representing most memories."

This is tricky, but can be broken down. Basically, what he is proposing is a functionalist architecture over distributed representation.

"**Functionalism**[122] in the philosophy of mind is the doctrine that what makes something a mental state of a particular type does not depend on its internal constitution, but rather on the way it functions, or the role it plays, in the system of which it is a part."

For example, when I say, "What makes something a learning object is how we *use* the learning object," I am asserting a functionalist approach to the definition of learning objects (people are so habituated to essentialist definitions that my definition does not even appear on lists of definitions of learning objects).

It's like asking, what makes a person a 'bus driver'? Is it the colour of his blood? The nature of his muscles? A particular mental state? No - according to functionalism, what makes him a 'bus driver' is the fact that he drives buses. He performs that *function*.

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[119] University of Colorado at Boulder (2006, October 5). Human Brain Region Functions Like Digital Computer. *ScienceDaily*. Retrieved April 1, 2012, from http://www.sciencedaily.com/releases/2006/10/061005222628.htm

[120] Randall C. O'Reilly. Online Publications. Website. Accessed October 7, 2006. http://psych.colorado.edu/~oreilly/pubs-online.html

[121] Randall C. O'Reilly. Modeling Integration and Dissociation in Brain and Cognitive Development. In Y. Munakata & M.H. Johnson (Eds) Processes of Change in Brain and Cognitive Development: Attention and Performance XXI. Oxford University Press. 2007. http://psych.colorado.edu/~oreilly/pubs-online.html

[122] Stanford Encyclopedia of Philosophy. Functionalism. First published Tue Aug 24, 2004; substantive revision Mon Apr 6, 2009. http://plato.stanford.edu/entries/functionalism/

"A **distributed representation**[123] is one in which meaning is not captured by a single symbolic unit, but rather arises from the interaction of a set of units, normally in a network of some sort."

As noted in the same article, "The concept of distributed representation is a product of joint developments in the neurosciences and in connectionist work on recognition tasks (Churchland and Sejnowski 1992[124]). Fundamentally, a distributed representation is one in which meaning is not captured by a single symbolic unit, but rather arises from the interaction of a set of units, normally in a network of some sort."

To illustrate this concept, I have been asking people to think of the concept 'Paris'. If 'Paris' were represented by a simple symbol set, we would all mean the same thing when we say 'Paris'. But in fact, we each mean a collection of different things, and none of our collections is the same. Therefore, in our own minds, the concept 'Paris' is a loose association of a whole bunch of different things, and hence the concept 'Paris' exists in no particular place in our minds, but rather, is scattered throughout our minds.

Now what the article is saying is that human brains *are* like computers - but not like the computers as described above, with symbols and programs and all that, but like computers when they are connected together in a network.

"The brain as a whole operates more like a social network than a digital computer... the computer-like features of the prefrontal cortex broaden the social networks, helping the brain become more flexible in processing novel and symbolic information." Understanding 'where the car is parked' is like understanding how one kind of function applies on the brain's distributed representation, while understanding 'the best place to park the car' is like how a *different* function applies to the *same* distributed representation.

The analogy with the network of computers is a good one (and people who develop social network software are sometimes operating with these concepts of neural mechanisms specifically in mind). The actual social network itself - a set of distributed and interlinked entities, usually people, as represented by websites or pages - constitutes a type of distributed representation. A 'meme' - like, say, the Friday Five[125]- is distributed across that network; it exists in no particular place.

Specific mental operations, therefore, are like thinking of functions applied to this social network. For example, if I were to want to find 'the most popular bloggers' I would need to apply a set of functions to that network. I would need to represent each entity as a 'linking' entity. I would need to cluster types of links (to eliminate self-referential links and spam). I would then need to apply my function (now my *own* view here, and possibly O'Reilly's, though I don't read it specifically in his article, is that to apply a function is to create *additional neural layers* that act as specialized

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[123] Distributed Representation. Washington University in St. Louis. Original Citation no longer extant. http://artsci.wustl.edu/~philos/MindDict/distributedrepresentation.html See instead the University of Waterloo, http://philosophy.uwaterloo.ca/MindDict/distributedrepresentation.html

[124] Patricia Smith Churchland and Terrence Joseph Sejnowski. The Computational Brain. MIT Press. 1992. http://books.google.ca/books/about/The_Computational_Brain.html?id=wVll6u0tzXoC&redir_esc=y

[125] Ariestess. The Friday Five. Website. Accessed October 7, 2006. http://thefridayfive.livejournal.com/

filters - this would contrast with, say, Technorati, which polls each individual entity and then applies an *algorithm* to it).

The last bit refers to how research is conducted in such environments. "Modeling the brain is not like a lot of science where you can go from one step to the next in a chain of reasoning, because you need to take into account so many levels of analysis... O'Reilly likens the process to weather modeling."

This is a very important point, because it shows that traditional research methodology, as employed *widely* in the field of e-learning, will not be successful. This becomes even more relevant with the recent emphasis on 'evidence-based' methodology, such as the Campbell Collaboration.[126] This methodology, like much of the same type, recommends double-blind tests measuring the impacted of individual variables in controlled environments. The PISA samples[127] are an example of this process in action.

The problem with this methodology is that if the brain (and hence learning) operates as described by O'Reilly (and there is ample evidence that it does) then concepts such as 'learning' are best understood as functions applied to a distributed representation, and hence, will operate in environments of numerous mutually dependent variables (the value of one variable impacts the value of a second, which impacts the value of a third, which in turn impacts the value of the first, and so on).

As I argue in papers like Public Policy, Research and Online Learning[128] and Understanding PISA[129] the traditional methodology fails in such environments. Holding one variable constant, for example, *impacts* the variable you are trying to measure. This is because you are not merely screening the impact of the second variable you are screening the impact of the first variable on itself (as transferred through the second variable). This means you are *incorrectly* measuring the first variable.

Environments with numerous mutually dependent variables are known collectively as chaotic systems.[130] Virtually all networks are chaotic systems. Classic examples of chaotic systems are the weather system and the ecology. In both cases, it is not possible to determine the long-term impact of a single variable. In both cases, trivial differences in initial conditions can result in significant long-term differences (the butterfly effect[131]).

This is a significant difference between computation and neural networks. In computation (and computational methodology, including traditional causal science) we look for specific and predictable results. Make intervention X and get result Y. Neural network and social network theory do not offer this. Make intervention X today and get result Y. Make intervention X tomorrow (even on the same subject) and get result Z.

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[126] The Campbell Collaboration. Website. http://www.campbellcollaboration.org/
[127] OECD. Programme for International Studetn Assessment (PISA). Website.
http://www.pisa.oecd.org/pages/0,2987,en_32252351_32235731_1_1_1_1_1,00.html
[128] Stephen Downes. Public Policy, Research and Online Learning. Stephen's Web (weblog). May 6, 2003. http://www.downes.ca/post/60
[129] Stephen Downes. Understanding PISA. Stephen's Web (weblog). November 30, 2004. http://www.downes.ca/post/17
[130] Larry Gladney. Chaotic Systems. The Interactive Textbook for Mathematics, Physics, and Chemistry. Accessed October 7, 2006, but no longer extant. http://www.physics.upenn.edu/courses/gladney/mathphys/subsection3_2_5.html
[131] Wikipedia. Butterfly Effect. Accessed October 7, 2006. http://en.wikipedia.org/wiki/Butterfly_effect

This does not mean that a 'science' of learning is impossible. Rather, it means that the science will be more like meteorology than like (classical) physics. It will be a science based on modelling and simulation, pattern recognition and interpretation, projection and uncertainty. One would think at first blush that this is *nothing* like computer science. But as the article takes pains to explain, it *is* like computer science - so long as we are studying *networks* of computers, like social networks.

Thanks Guy Levert for the email question that prompted the title and the remainder of this post.

Moncton, October 07, 2006

Informal Learning: All or Nothing

Responding to Jay Cross, All or Nothing.[132]

It makes me think of the strategy employed by the Republican right.

Most people prefer to be somewhere in the middle on a sliding scale, and political opinion is no different.

So what the Republicans did, through the use of extreme viewpoints like Rush Limbaugh, Anne Coulter and Pat Robertson, is to shift the scale off far to the right!

So now their former position - a hard right conservatism - now occupies the centre. And becomes the default choice. That's how we see 'balance' attained on talk shows by having two shades of right wing represented.

You (Jay Cross) are doing pretty much the same thing here. Take, for example, the scale between 'hours', '15 minutes', '3 minutes'. Well the centre and the right are both informal learning selections. Why not a scale that represents the choices I had as an instructor: '3 hours','1.5 hours', '50 minutes'?

What's interesting is that the other thing you're doing (and George Siemens does this too, and I just haven't found the words to express it) is that you are co-opting the *other* point of view as part of your point of view.

It's kind of like saying, "I support informal learning, except when I don't." George does the same thing when he describes Connectivism: "I don't care whether you call it social constructionism." I am not sure how to react - are you saying there is no fundamental difference between your position and the other position?

What is happening here is that an attempt is being made to made what is actually a fairly radical position seem moderate by saying something like, "Oh no, it's the same thing you were doing, it's just tweaking a few variables."

It's fostering the 'science as cumulative development' perspective where, most properly, it should be a 'science as paradigm shift perspective'. I don't think it's an accurate representation of the change that should be happening.

Company A wants employee B to take training course Z. Who makes the decision, the company or the employee? This is a binary switch - you can't say "they both make the decision" - that's corporate newspeak for saying "the company does".

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[132] Jay Cross. All or Nothing. Informal Learning Blog. February 9, 2007. http://informl.com/?p=702

The sliding scale disguises this by using the general term 'control'. But the point here is: either the employee is being told what to learn (some of the time, all of the time, whatever) or he or she is not. No sliding scale.

A lot of the scales are like that. They are very reassuring for managers (to whom you have to sell this stuff, because the employees have no power or control). You are telling the managers, "You don't have to relinquish control, it's OK, it will still be informal learning." But it won't be. It will just be formal learning, but in smaller increments.

In addition, the scales lock-in the wrong value-set. It's like presenting the students with the option: "what kind of classroom would you like, open-concept, tables and chairs, rows of desks?" It looks like a scale, but the student never gets the choice of abandoning the classroom entirely.

The 'time to develop' and the 'author' scales, for example, both imply some sort of 'learning content'. What sort? As determined by the 'content' scale. Something that is produced, and then consumed. It is manifestly not, for example, a conversation. It creates an entity, the 'resource', and highlights the importance of the resource.

The people who produce stuff will be relieved. Learning can still be about the production and consumption of learning content. They can still build full-length courses and call it 'informal learning'.

Everybody's happy. Everybody can now be a part of the 'informal learning' bandwagon.

What the slider scales analogy does is to completely mask the *value* of choosing one option or another. If you pick 'more bass' or 'more treble' there really isn't a right or wrong answer; it's just a matter of taste.

But if there is something to informal learning, then there should be a sense in which you can say it's better than the alternative. Otherwise, why tout it?

You might say, well it is better, but there's still those 20 percent of cases where we want formal learning.

Supposing that this is the case, then what we want is a delineation of the conditions under which formal learning is better and those under which informal learning is better. The slider scale allows an interpretation under which everything can be set to 'formal learning' and it's still OK.

To make my point, consider the criteria I consider to be definitive of successful network learning, specifically, that networks should be:

- decentralized
- distributed
- disintermediated
- disaggregated

- dis-integrated
- democratic
- dynamic
- desegregated

Now again, any of these parameters can be reduced to a sliding scale. 'Democratic' can even be reduced to four sliding scales:

- autonomy
- diversity
- openness
- connectedness

But the underpinnings of the theory select *these* criteria, rather than merely random criteria, because *these* specify what it is *better* to be.

'Autonomy' isn't simply a sliding scale. Rather, networks that promote more autonomy are *better*, because they are more *reliable.* If you opt for less autonomy, you are making the network less reliable. You aren't simply exercising a preference; you are *breaking* the network.

Now there will be cases - let's be blunt about it - where it will be preferable to have a broken network.

Those are cases where learning is *not* the priority. Where things like power and control are the priority. A person may opt to reduce autonomy because he doesn't *care* whether it produces reliable results.

There may be other cases where the choice of a less effective network is forced upon us by constraints. If it cost $100 million to develop a fully decentralized network, and $100,000 to develop a centralized network, many managers will opt for the less reliable network at a cheaper price.

But the point here is that there is no pretence that the non-autonomous centralized systems constitute some version of network learning simply because they are, say, dynamic. For one thing, the claim is implausible - the criteria for successful network are not independent variables but rather impact on each other. And for another thing, the reduction of any of the conditions weakens the system so much that it can no longer be called network learning.

It's kind of like democracy. Let's, for the same of argument, define 'democracy' as the set of rights in the charter of rights:

- freedom of speech
- freedom of the press
- freedom of conscience
- freedom of assembly, etc.

Take away one of them - freedom of speech, say. Do you still have democracy? What good is freedom of the press, or freedom of assembly, without freedom of speech?

Bottom line: If there is anything to the theory of informal learning, then the values it expresses are more than just preferences on a sliding scale.

Representing them that way serves a marketing objective, in that it makes people who are opposed to the theory more comfortable, because it suggests they won't really have to change anything.

But it is either inaccurate or dishonest, because it masks the *value* of selecting one thing over another, and because it suggests that you can jettison part of the theory without impacting the whole.

And in the case of the particular scales represented here, the selection locks people into a representation of the theory that is not actually characteristic of the theory. Specifically, it suggests that informal learning is just like formal learning in that it is all about the production and consumption of content.

And I think this whole discussion points to the dilemma that any proponent of a new theory faces: whether to stay true to the theory as conceived, or whether to water down the theory in order to make it more palatable to consumers and clients (some of whom my have a vested interest in seeing the theory watered down).

And it seems to me, the degree to which you accept the watering down if the theory, is the degree to which you do not have faith in it.

If informal leaning *really* about duration, content, timing and the rest? Probably not. But if not, then what is it about? What are the *values* expressed by the theory?

Moncton, February 10, 2007

Non-Web Connectivism

Responding to this thread...[133]

(One of the things I really dislike about Moodle is that I have to use the website to reply to a post - I get it in my email, I'd rather just reply in my email.) Anyhow...

It occurs to me on reading this that the assembly line can and should be considered a primitive form of connectivism. It embodies the knowledge required to build a complex piece of machinery, like a car. No individual member of the assembly line knows everything about the product. And it is based on a mechanism of communication, partially symbolic (through instructions and messages) and partially mechanical (as the cars move through the line).

The assembly line, of course, does not have some very important properties of connectivist networks, which means that it cannot adapt and learn. In particular, its constituent members are not autonomous. So members cannot choose to improve their component parts. And also, assembly line members must therefore rely on direction, increasing the risk they will be given bad instructions (hence: the repeated failures of Chrysler). Also, they are not open (though Japanese processes did increase the openness of suppliers a bit).

It is important to keep in mind, in general, that not just any network, and not just any distributed knowledge, qualifies as connectivist knowledge. The radio station example in particular troubles me. It is far too centralized and controlled. In a similar manner, your hard drive doesn't create an instance of connective knowledge. Yes, you store some information there. But your hard drive is not autonomous, it cannot opt to connect with other sources of knowledge, it cannot work without direction. It doesn't *add value* - and this is key in connectivist networks.

Response: Jeffrey Keefer

> *Stephen, when you said "But your hard drive is not autonomous, it cannot opt to connect with other sources of knowledge, it cannot work without direction. It doesn't add value - and this is key in connectivist networks," you seem to be speaking about people who have the freedom to act independently toward a goal, which is something that those on the assembly line in your earlier example are not necessarily free or encouraged to do. If they are directed and not free, it seems that they are more like independent pieces of knowledge or skills that strategically placed together make something else. If that can be considered connectivism, then what social human endeavor (from assembling food at a fast food restaurant to preparing a team-based class project to conducting a complex surgical procedure) would not be connectivist?*

Yeah, I was thinking that as I ended the post but didn't want to go back and rewrite the first paragraph.

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[133] Virginia Yongers. Context filter-Business and Workplace Education/Training. Online Connectivism Conference. February 2, 2007. http://ltc.umanitoba.ca/moodle/mod/forum/discuss.php?d=45

Insofar as connectivism can be defined as a set of features of successful networks (as I would assert) then it seems clear that things can be more or less connectivist. That it's not an off-on proposition.

An assembly line, a fast-food restaurant -- these may be connectivist, but just barely. Hardly at all. Because not having the autonomy really weakens them; the people may as well be drones, like your hard drive. Not much to learn in a fast food restaurant.

One of the things to always keep in mind is that connectivism shows that there is a *point* to things like diversity, autonomy, and the other elements of democracy. That these are values

because networks that embody them are more reliable, more stable, can be trusted. More likely to lead, if you will, to truth.

Karyn Romeis writes:

> *What I really am struggling with is this: "The radio station example in particular troubles me. It is far too centralized and controlled." Please, please tell me that you did not just say "Let them eat cake".*
>
> *I presume that the people who make those calls to the radio station do so because they have no means of connecting directly to the electronic resources themselves. Perhaps they do not even have access to electricity. In the light of this, they might be expected to remain ignorant of the resources available to them. However, they have made use of such technology as **is** available to them (the telephone) to plug into the network indirectly. They might not be very sophisticated nodes within the network, but they are there, surely? It might be clunky, but under the circumstances, it's what they have:*

connection to people who have connection to technology. Otherwise we're saying that only first world people with direct access to a network and/or the internet can aspire to connectivism. Surely there is space for a variety of networks?

What concerns me about the use of radio stations is the element of control. It is no doubt a simple fact that there are things listeners *cannot* ask about via the radio method. And because radio is subject to centralized control, it can be misused. What is described here is not a misuse of radio - it actually sounds like a very enlightened use of radio. But we have seen radio very badly misused, in Rwanda, for example.

You write, "Otherwise we're saying that only first world people with direct access to a network and/or the internet can aspire to connectivism. Surely there is space for a variety of networks?" I draw the connection between connectivism and democracy very deliberately, as in my mind the properties of the one are the properties of the other. So my response to the question is that connectivism *is* available to everyone, but in the way that democracy is available to everyone. And what that means is that, in practice, some people do not have access to connectivist networks. My observation of this fact is not an endorsement.

Yes, there is a space for a variety of networks. In fact, this discussion raises an interesting possibility. Thus far, the networks we have been talking about, such as the human neural network in the brain, or the electronic network that forms the internet, are *physical* networks. The structure of the network is embodied in the physical medium. But the radio network, as described above, may be depicted as a network. The physical medium - telephone calls and a radio station - are not *inherently*
a network, but they are being used as a network.

Virtual networks allow us to emulate the functioning of, and hence get the benefit of, a network. But because the continued functioning of the network depends on some very non-network conditions (the benevolence of the radio station owner, for example) it should be understood that such structures can very rapidly become non-networks.

I would like also in this context to raise another consideration. That is related to the size of the network. In the radio station example described, at best only a few hundred people participate directly. This is, in the nature of things, a very small network. The size of the network does matter, as various properties - diversity, for example - increase through size increases. As we can easily see, a network consisting of two people cannot embody as much knowledge as a network consisting of two thousand people, much less two million people.

In light of this, I would want to say that the radio station example, at best, is not the creation of a network, but rather, the creation of an *extension* of the network. If the people at the radio station could not look up the answers on Google, the effectiveness of the call-in service would be very different. So it seems clear here that physical networks can be extended using virtual networks.

This is somewhat like what George means when he says that he stores some of his knowledge in other people (though it is less clear to me that he intends it this way). His knowledge is stored in a physical network, his neural net, aka his brain. By accessing things like the internet, he is

able to expand the capacity of his brain - the internet becomes a *virtual extension* of the physical neural network.

Note that this is *not* the same as saying that the social network, composed of interconnected people, is the same as the neural network. They are two very different networks. But because they have the same structure, a part of one may act as a virtual extension of the other.

This, actually, resembles what McLuhan has to say about communications media. That these media are extensions of our capacities, extensions of our voices and extensions of our senses. We use a telescope to see what we could not see, we use a radio to hear what we could not hear. Thought of collectively, we can use these media to extend our thought processes themselves. By functioning as though it were a brain, part of the wider world, virtually, becomes part of our brain.

Responding to Glen Gatin, who wrote a longish post:

> *Jurgen Habermas talks about communicative action in the public sphere as an essential component of democracy. I see the process that we are using(and discussing) as a form of communicative action and discussion groups such as this are exemplars of the activity that Habermas championed. I hope someone more versed in sociological theory can clarify because it seems that some of the conditions that got Jurgen thinking are coming around again. (excellent Habemas interview video on YouTube)*
>
> *The other point picks up on Stephens comment about George' comment regarding storing knowledge or data in other people. Societies have always done that, from the guys that memorize entire holy texts, elders/hunters/ warriors in various societies as repositories of specialized wisdom.*
>
> *Society relies on implicit skills and knowledge, the kind that can't be written down. Julian Orr's fabulous thesis "Talking About Machines, An Ethnography of a Modern Job" describes the types of knowledge that can't be documented, must be stored in other people. He points out that you can read the company manual but knowledge doesn't come until coffee time (or the bar after work) when one of the old timers tells you what it really means. Narrative processes are key. Developing the appropriate, context- based skill sets for listening to the stories, to extract the wheat from the chaff, is a critical operation in informal learning.*
>
> *Storing knowledge is what Academia was partly about, storing the wisdom of western civilization in the minds of society's intellectuals and paying considerable amounts of public monies to have them process and extended our collective knowledge.*
>
> *All through, there are examples of the mechanisms necessary to access and participate in collective wisdom. You have to know the code, speak the language, use the proper forms of address, make the proper sacrifices, say the proper prayers, use APA format, enter the proper username and password. The internet expands the possibilities of this*

> *function as humans evolve toward a collective consciousness* a la *Teilhard de Chardin's noosphere. Welcome to Gaia.*

First, a lot of people have talked about the importance of discourse in democracy. We can think of Tocqueville, for example, discussing democracy in America. The protections of freedom of speech and freedom of assembly emphasize its importance.

And so, Habermas and I agree in the sense that we both support the sorts of conditions that would enable an enlightened discourse. openness and the ability to say whatever you want, for example. But from there we part company.

For Habermas, the *discourse* is what produces the knowledge, the process of *arguing* back and forth. Knowledge-production (and Habermas intended this process to produce moral universals) is therefore a product of our *use of language*. It is intentional. We build or construct (or, at least, find) these truths.

I don't believe anything like this (maybe George does, in which case we could argue over whether it constitutes a part of connectivism ;)). It is the *mere* process of communication, whether codified intentionally in a language of discourse or not, that creates knowledge. And the knowledge isn't somehow codified in the discourse, rather, it is *emergent*, it is, if you will, above the discourse.

Also, for Habermas, there must be some commonality of purpose, some sense of sharing or group identity. There are specific 'discourse ethics'. We need to free ourselves from our particular points of view. We need to evaluate propositions from a common perspective. All this to arrive at some sort of shared understanding.

Again, all this forms no part of what I think of connectivism. What makes the network work is *diversity*. We need to *keep* our individual prejudices and interests. We should certainly not subsume ourselves to the interests of the groups. If there are rules of arguing, they are arrived at only by mutual consent, and are in any case arbitrary and capricious, as likely as not to be jettisoned at any time. And if there is an emergent 'moral truth' that arises out of these interactions, it is in no way embodied in these interactions, and is indeed seen from a different perspective from each of the participants.

Now, also, "The other point picks up on Stephen's comment about George' comment regarding storing knowledge or data in other people. Societies have always done that, from the guys that memorize entire holy texts, elders/hunters/ warriors in various societies as repositories of specialized wisdom."

This sort of discourse suggests that there is an (autonomous?) entity, 'society', that uses something (distinct from itself?), an elder, say, to store part of its memory. As though this elder is in some sense what I characterized as a virtual extension of a society.

But of course, the elder in question is a physical part of the society. The physical constituents of society *just are* people ("Society green.... It's made of people!!") in the same way that the physical constituents of a brain network are individual neurons. So an elder who memorizes

texts is not an extension of society, he or she is a *part* of society. He or she isn't 'used' by society to think, he or she is 'society thinking'. (It's like the difference between saying "I use my neurons to think" and "my neurons think").

Again, "Society relies on implicit skills and knowledge, the kind that can't be written down. Julian Orr's fabulous thesis "Talking About Machines, An EthnograpGranovetterhy of a Modern Job" describes the types of knowledge that can't be documented, must be stored in other people."

This seems to imply that there is some entity, 'society', that is distinct from the people who make up that entity. But there is not. *We are society*. Society doesn't 'store knowledge in people', it stores knowledge in *itself* (and where else *would* it store knowledge?).

That's why this is just wrong: "the mechanisms necessary to to access and participate in collective wisdom. You have to know the code, speak the language, use the proper forms of address, make the proper sacrifices, say the proper prayers, use APA format, enter the proper username and password. The internet expands the possibilities of this function as humans evolve toward a collective consciousness ala Teilhard de Chardin's noosphere. Welcome to Gaia."

There are *no* mechanisms 'necessary' in order to access and participate in the collective wisdom. You connect how you connect. Some people (such as myself) access via writing posts. Other people (such as George) access via writing books. Other people (such as Clifford Olsen) access via mass murder. Now George and I (and the rest of us) don't *like* what Clifford Olsen did. But the very fact that we can refer to him proves that you can break every standard of civilized society and still be a part of the communicative network. Because networks are *open*.

A network isn't like some kind of club. No girls allowed. There's no code, language, proper form of address, format, username or password. These are things that characterize groups. The pervasive use of these things actually *breaks* the network. How, for example, can we think outside the domains of groupthink if we're restricted by vocabulary or format?

The network (or, as I would say, I well-functioning network) is exactly the *rejection* of codes and language, proper forms of address, formats, usernames and passwords. I have a tenuous connection (as Granovetter would say, 'weak ties') with other members of the network, formed on the flimsiest of pretexts, which *may* be based on some voluntary protocols. That's it.

From the perspective of the *network*, at least, nothing more wanted or desired (from our perspective as *humans*, there is an emotional need for strong ties and a sense of belonging as well, but this need is distinct and not a part of the knowledge-generating process).

To the extent that there is or will be a collective consciousness (and we may well be billions of entities short of a brain) there is no reason to suspect that it will resemble human consciousness and no reason to believe that such a collective consciousness will have any say (or interest) in the functioning of its entities. Do you stay awake at night wondering about the moral turpitude of each of your ten billion neurons? Do you even care (beyond massive numbers) whether they live or die?

Insofar as a *morality* can be derived from the functioning of the network, it is not that the network as a whole will deliver unto us some universal moral code. We're still stuck each fending for ourselves; no such code will be forthcoming.

At best, what the functioning of the network tells us about morality is that it defines that set of characteristics that help or hinder its functioning *as a network.* But you're still free to opt out; there's no moral imperative that forces you to help Gaia (there's no meaning of life otherwise, though, so you may as well - just go into it with your eyes open, this is a *choice*, not a condition). Be, it might be said, the best neuron you can be, even though the brain won't tell you how and doesn't care whether or not you are.

This is what characterizes the real cleave between myself and many (if not most) of these other theorists. They all seem to want to place the burden of learning, of meaning, if morality, of whatever, into society. As though society cares. As though society has an interest. As though society could express itself. The 'general will', as Rousseau characterized it, as though there could be some sort of human representation or instantiation of that will. We don't even know what society thinks (if anything) about what it *is* (again - ask yourself - how much does a single neuron know about Descartes?). Our very best guesses are just that -- and they are ineliminably representations in human terms of very non human phenomena.

Recall Nietzsche. The first thing the superman would do would be to eschew the so-called morality of society. Because he, after all, would have a much better view of what is essentially unknowable. The ease with we can switch from saying society requires something to saying society requires a different things demonstrates the extent to which our interpretations of what society has to say depend much more on what we are looking for than what is actually there.

Moncton, February 20, 2007

Meaning, Language and Metadata

Principles of Distributed Representation

This is the edited text of a talk delivered at the EDUCAUSE Seminars on Academic Computing, Snowmass, Colorado, August 9, 2005.

Introduction

Thank you. It's a pleasure to be here. I have my water. I need my water. You know, I feel a little bit out of my element here. I live at sea level and so I don't spend a whole lot of time at this altitude. So if I sit down part way through my talk...

And I'm also a bit out of my element because I'm kind of outside EDUCAUSE[134], I live in another country, three time zones away, and being a bit on the outside, I come here, I come here to a talk like this and it's almost like kind of coming to see the establishment. And I don't get a chance to talk to this particular group of people a whole lot, and so, what am I going to say?

And of course I'm here at this conference[135] in this beautiful location[136] - and thank you so much for inviting me - and thirty years of tradition, and I'm wondering, you know, how can I do anything different, be distinct, because you know I'm kind of an outsider, and I was thinking, yesterday, that maybe I should do something like quote some Che Guevara[137] or something like that, and I thought that, and I looked through but couldn't find any good quotes.

I did bring the book. So I figure, I'm probably the only person at this conference to wave a copy of Che Guevara[138] at the podium, and if not, then I'm probably in very good company.

OK, well I thought that was pretty funny. It took me a long time to come up with that.

Today's talk is 'Principles of Distributed Representation' and when you looked at the outline you were probably thinking to yourself, "Oh no, another metadata paper." And if you're like me you're probably tired of metadata papers. And today's talk is sort of about metadata, and I will talk about metadata because I did kind of promise that I would, and I've learned from hard hard experience that you really should talk about whatever's in the abstract.

But today's talk is also not about metadata. It's about knowledge, it's about the changing model or picture of learning that new technology brings to us, it talks about networks in specific, and then, near the end, I begin to apply this to metadata. Now, I'm going to talk a lot about things that aren't metadata, therefore, but as I go through this you should be thinking as I go along that each thing that I say is about metadata. I know that doesn't make a whole lot of sense, but it'll come a bit clearer, I hope it come's clearer.

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[134] EDUCAUSE. Website. Accessed August 9, 2005. http://www.educause.edu/
[135] Seminars on Academic Computing. August 7-10. EDUCAUSE. Conference website. http://www.educause.edu/DirectorsLeadershipSeminar/6222
[136] Snowmass Village. Website. http://www.snowmassvillage.com/
[137] Wikipedia. Che Guevara. Accessed August 13, 2005. http://en.wikipedia.org/wiki/Che_Guevara
[138] Guevara, Ernesto (Che). The Motorcycle Diaries : A Latin American Journey. Ocean Press (September 15, 2004). http://www.amazon.com/exec/obidos/tg/detail/-/1876175702/102-7570594-3413754?v=glance

Knowledge: The Traditional Theory

We begin with knowledge, and I have to begin with knowledge because my training is in philosophy, and if I don't begin with knowledge I'm kind of lost, like in a rowboat without a paddle, or whatever. This would be different here.

And we have this picture, don't we, of what knowledge is. And the picture - I've sort of caricatured it on the screen here - knowledge is like entities in the brain corresponding to sentences like, 'Paris is the capital of France.' And if somebody asks you, 'What is your knowledge like?', 'Paris is the capital of France,' you probably talk about the sentence, and the meanings of the words, and how the words go together, and the syntax and forms of grammar.

And there's a fairly established theory, and some of the more recent writers, people like Chomsky[139] and Fodor[140], talk about the, if you will, the writing in the brain. And we can think about that literally, people like Fodor think about that literally, or we can think about that metaphorically, but even so, that is kind of the picture of knowledge that we have.

It is what I sometimes think of as the 'information theoretic view' where communication involves getting a bit of knowledge, like that sentence, 'Paris is the capital of France,' from point A to point B. From professor to student. From speaker - me - to you - people in the audience.

And the whole theory of distance learning is wrapped up around this concept, so you get for example Moore's concept of transactional distance where you try to bridge this gap. You know, there's been so many conferences, 'bridging the gap'[141] between this and that, and we try to improve the communication and create interaction - when I read about interaction, I do have a background in computers, I think 'checksum'[142], oh yeah, he's invented checksums.

Moore,[143] transactional distance: "the physical separation that leads to a psychological and communications gap, a space of potential misunderstanding between the inputs of instructor and those of the learner." So it's communication theoretic, isn't it, and they're talking signals sent and signals received, noise, feedback, all of that sort of thing.

That's the traditional picture. In effect, knowledge is like sentences. Those of you who are familiar with RDF,[144] you're probably all familiar with RDF, the 'subject verb object' type of formation. Vocabulary in a language is unambiguous. The fact that you invited me from another country three time zones away, you presumed that when I used words, I'd probably use words much the same way you use words, and if I said the word 'Paris' you'd pretty much get what I meant. I depend on that sometimes, and I'm certainly depending on that at the moment, because otherwise it would be like that commercial where I'm talking Russian or something.

[139] Chomsky, Noam. Syntactic Structures. Walter De Gruyter Inc; Reprint edition (June, 1978). http://www.amazon.com/exec/obidos/tg/detail/-/3110154129/102-7570594-3413754?v=glance

[140] Fodor, Jerry A. The Language of Thought. Harvard University Press (January 1, 1980). http://www.amazon.com/exec/obidos/tg/detail/-/0674510305/102-7570594-3413754?v=glance

[141] Google. Search results. "Bridging the Gap" conference. August 13, 2005. http://www.google.ca/search?q=%22bridging+the+gap%22+conference

[142] Wikipedia. Checksum. Accessed August 13, 2005. http://en.wikipedia.org/wiki/Checksum

[143] Moore, Michael G. Distance Education Theory. The American Journal of Distance Education. Volume 5, Number 3, 1991. http://www.ajde.com/Contents/vol5_3.htm

[144] World Wide Web Consortium. Resource Description Framework (RDF). October 21, 2004. http://www.w3.org/RDF/

Description is pretty much concrete. This is a bottle of water. This has a blue lable. A 'horse' is a hourse (of course, of course). Ah, I couldn't resist. Yeah you get on a roll when you're typing these slides. And that has gotten me in trouble before. I don't always delete... anyhow.

Revising The Traditional Picture

But, none of this is true. And not only is it not true empirically, it can't be true. Because, if it were true, then context would have no effect on truth or meaning. But context sensitivity is everywhere. And I've sort of spewed a list of references there for you.

Wittgenstein[145]: meaning is use. Quine[146]: the indeterminacy of reference, the indeterminacy of language. When a native points to something and says 'gavagai' does he mean 'rabbit' or does he mean 'spirits of my ancestor'?

van Fraassen[147]: scientific explanation. 'A is the cause of B' can only be understood in the context of an alternative event, C. Why did the plants grow? Well the plants grow because we put seeds in the ground. As opposed to, the plants grow because I put fertilizer in the ground. As opposed to, the plants grow because, well, there's photosynthesis, and there's sunlight, and all of that. As opposed to, the plants grow because God wills it. The explanation depends on your context.

Hanson[148]: causation. What was the cause of the accident? Well, it was the brakes, it was the drunken driver, it was the bush at the side of the road. George Lakoff[149]: categorization. Different cultures organize the world different ways. There is indeed, says Lakoff, a culture out there that classifies 'women, fire and dangerous things' as one category, and everything else as another category.

Robert Stalnaker[150], David Lewis[151]: modality, the logics of necessity and possibility. They're based on the most similar possible world. But what makes a possible world the most similar? Well that depends on how you view the world that you're in.

[145] Wittgenstein, Ludwig. Philosophical Investigations. G.E.M. Anscombe, trans. Prentice Hall; 3rd edition (1999). http://www.amazon.com/exec/obidos/tg/detail/-/0024288101/102-7570594-3413754?v=glance
[146] Quine, W.V.O. Word and Object. The MIT Press (March 15, 1964). http://www.amazon.com/exec/obidos/tg/detail/-/0262670011/102-7570594-3413754?v=glance
[147] van Fraassen, Bas C. The Scientific Image. Oxford University Press (January 1, 1982). http://www.amazon.com/exec/obidos/tg/detail/-/0198244274/102-7570594-3413754?v=glance
[148] Hanson, Norwood Russell. Patterns of Discovery: An Inquiry into the Conceptual Foundations of Science. Cambridge University Press (January 1, 1958). http://www.amazon.com/exec/obidos/tg/detail/-/0521051975/102-7570594-3413754?v=glance
[149] Lakoff, George. Women, Fire, and Dangerous Things. University Of Chicago Press; Reprint edition (April 15, 1990). http://www.amazon.com/exec/obidos/tg/detail/-/0226468046/102-7570594-3413754?v=glance
[150] Stalnaker, Robert C. Inquiry. The MIT Press (March 13, 1987). http://www.amazon.com/exec/obidos/tg/detail/-/0262691132/ref=pd_sim_b_6/102-7570594-3413754?%5Fencoding=UTF8&v=glance
[151] Lewis, David K. Counterfactuals. Blackwell Publishers (December 1, 2000). http://www.amazon.com/exec/obidos/tg/detail/-/0631224254/ref=pd_sim_b_2/102-7570594-3413754?%5Fencoding=UTF8&v=glance
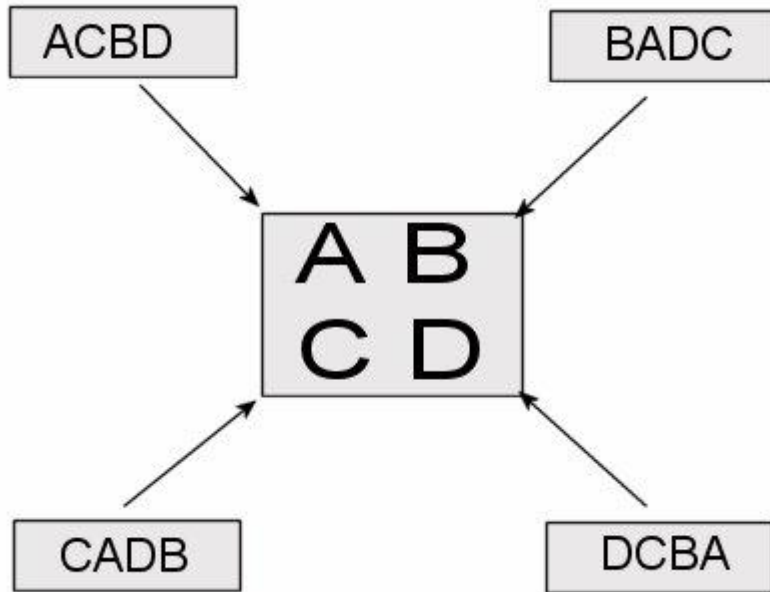
What we know, crucially, depends on our point of view. Now I tried to come up with a bit of a diagram here, this is a new one for me, but, in the centre there, that's reality, properly so-called, and then around the outside of that diagram we have four points of view and you can see that as we each look at reality from out different point of view our view of reality is slightly different, which I've represented by reorganizing the letters in the little boxes.

But in fact, all we have is our point of view, all we have are the things in the little boxes. And language, which is what we use to try to get at what's in the middle, is at best an approximation, and at worst a parody of what knowledge is actually there.
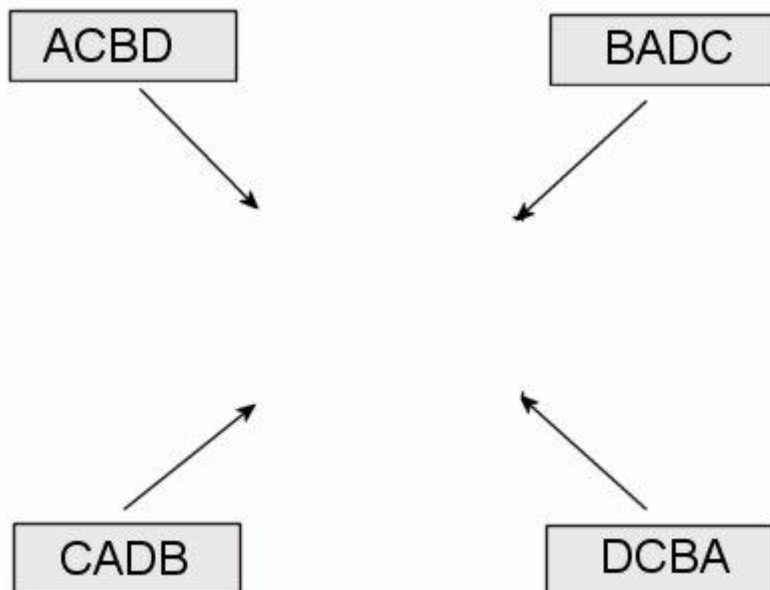
Now that's a hard concept. So I'm going to draw it out a bit. Some of the implications of this. And again, remember, I'm talking about knowledge, but I'm also talking about metadata.

Implications of the Revised Theory

1. Knowledge is subsymbolic. That is to say, what we know is not isomorphic with the words that express what we know. Another way of saying the same thing is, and those of you who are educators I'm sure have seen this in practice, the mere possession of the words is not the same as knowing something. The knowing of something depends not simply on the words but on the application of the words in the appropriate context.

And since I'm... I'll refer to Michael Polanyi[152] here as well, and point out that a lot of knowledge indeed cannot be expressed in words, personal knowledge, tacit knowledge, the skill of how to throw a dart. Believe me, if that knowledge could be expressed in words, I would be a good dart player.

2. Second, crucially, *knowledge is distributed.* There is no specific entity that constitutes the knowledge that 'Paris is the capital of France.' Now think about how that contrasts with the picture I drew at the beginning of this talk, where we have this thing in our mind that's the knowledge that Paris is the capital of France. Well that knowledge doesn't occupy a particular place in the mind. It's spread out, it's in billions of neurons.

But not only that, it's not even completely entirely contained in the mind. My knowledge that 'Paris is the capital of France' is, partially, contained in you. Because I need to know what the word 'Paris' means, what the concept of a 'capital' is, what the word 'is' is; the Oxford English Dictionary has, what, fifteen pages trying to define the word 'is'. There is no given person who has that particular paradigm bit of knowledge 'Paris is the capital of France'.

Now I know it sounds unintuitive, so let me give you a slightly more intuitive way, an intuitive way, of representing this. This morning, if you were awake, and I sincerely hope you weren't, we saw the space shuttle[153] come in for a landing. And it did in fact land. Rock and roll; we like that.

Where does the knowledge of how to launch, fly and land a shuttle reside? What person has this knowledge? And clearly, as soon as you reflect on that, you realize, nobody. Nobody could. There is so much involved in the launching, flying and landing of a shuttle that no one person could possibly have that knowledge. Some people know how to make shuttle tires. Other people know how to make shuttle tiles. Other people know how to do the launch sequence, somebody knows how to do that countdown, '10, 9, 8...' I guess it's a skill. Somebody in the shuttle knows how to go out of the shuttle and pull the little bit of paper out from in between the tiles. Somebody else knows... and you get the idea.

What I'm saying is that all knowledge is like that, not just the complicated stuff, because, again, this is, like, my background in philosophy, as soon as you begin pushing even the simple stuff,

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[152] Polanyi, Michael. Personal Knowledge: Towards a Post-Critical Philosophy. University Of Chicago Press (August 15, 1974).
http://www.amazon.com/exec/obidos/tg/detail/-/0226672883/102-7570594-3413754?v=glance
[153] Thom Patterson. 'Discovery is Home'. CNN. August 10, 2005. Accessed April 30, 2012.
http://www.cnn.com/2005/TECH/space/08/09/space.shuttle/

like 'Paris is the capital of France', it gets really complicated in a hurry. What do you mean by 'capital'? What do you mean by 'is'?

3. Knowledge is interconnected. This is very different from the traditional picture. The traditional picture, you have a sentence, 'Paris is the capital of France', that's it, you're done, you've got your knowledge. But 'Paris is the capital of France' - that bit of knowledge is actually a part of other bits of knowledge, and other bits of knowledge are part of the knowledge that 'Paris is the capital of France'.

The knowledge that 'countries have capitals' is part of that knowledge. The sentence 'Paris is the capital of France' wouldn't make any sense to you if countries didn't have capitals. And it's playing with these sorts of connections that is the basis for a whole lot of jokes. "What's the capital of France? About 23 dollars." That sort of thing, and you mess around with the preconceived understandings of the words.

Even sentences like 'ducks are animals' are related, in a complex chain, to the sentence 'Paris is the capital of France', it's like Quine says[154], it's a web.

4. Knowledge is personal. And you probably if you go to knowledge management conference you hear Polanyi Polanyi Polanyi and they talk about, oh let's extract all this tacit knowledge[155] and we'll put it in a database, and, if you read Polanyi, it's exactly what you can't do, because the knowledge that's in your head, it's embedded, it's personal, it's sitting there in a context. If you pull it out and put it up, it doesn't make sense any more.

Your belief that 'Paris is the capital of France' is quite literally - I don't mean this metaphorically - it's literally different from my belief that 'Paris is the capital of France'. And if you think about it, think about the word 'Paris'. All right. How many of you thought about the word 'plaster'? One, two? OK. How many of you thought about the word 'Hilton'?

Now, I've used two examples here, we got a few people raising their hands, and everyone else not raising their hands, and those are the first two things that come up in my mind, and I'm wondering - you know what I said, I'm out of my element here, right? - I say the word 'Paris' I have certain associations, you say 'Paris', you have different associations, and now I'm wondering what they are.

I have one set of thoughts when I think of 'Paris', you have (a) different set of thoughts, why aren't they the same? If knowledge is according to that traditional picture, they should be the same. If I mean 'Paris' I mean the same exact same thing as you. But it's clearly and evidently not the case.

5. Fifth. *Knowledge is emergent.* And, yeah, I know, we've got Steven Johnson[156] and others, and emergent this, and emergent that, it's the new buzzword. The knowledge that 'Paris is the

[154] Quine, W.V.O. and Ullian, J.S. The Web of Belief. McGraw-Hill Humanities/Social Sciences/Languages; 2nd edition (February 1, 1978). http://www.amazon.com/gp/product/0075536099/102-7570594-3413754?%5Fencoding=UTF8&v=glance
[155] Fergus, Paul, et.al. Capturing Tacit Knowledge in P2P Networks. PGNet 2003. Accessed April 30, 2012. http://www.cms.livjm.ac.uk/pgnet2003/submissions/Paper-27.pdf
[156] Johnson, Steven. Emergence: The Connected Lives of Ants, Brains, Cities, and Software. Scribner (September 19, 2001). http://www.amazon.com/exec/obidos/tg/detail/-/068486875X/qid=1123967137/sr=1-2/ref=sr_1_2/102-7570594-3413754?v=glance&s=books

capital of France', we have this kind of abstract idea that we share, the knowledge that 'Paris is the capital of France', the Platonic ideal almost that we're trying to get at, and what I'm saying here is that this concept is emergent from the many individual bits of knowledge inside all of yourselves that 'Paris is the capital of France'.

Now the thing about emergence, and I don't see people write about this, maybe it's me but I don't know, but maybe I'm just naive, emergence is not a causal phenomenon. Well, yeah, OK, it is a causal phenomenon, you go to the micro levels and bits and atoms and all of that, and draw a causal picture, but the causal picture is so complicated nobody could understand it, it's like the weather is a causal picture but who's going to draw the line from this to this to this and make an accurate prediction forty-three years from now? It's not going to happen.

But at the higher level, emergence is a phenomenon of recognition. You need a viewer. You need a perceiver. You don't get away without having one. Think about a picture of Richard Nixon on the television. You see the television, well, what you really see are all those little pixels. And you know this, you've heard this story before, you look at all those, and the way those pixels are all organized, the way those pixels are coloured, the picture of Richard Nixon emerges from the television.

But, if you had never heard of Richard Nixon you would not recognize that as a picture of Richard Nixon. At the very best it would be 'some guy'. And if you're an alien from another planet, you're visiting with the people on the space shuttle - I like to go with a theme - then you're not even sure whether it's a human or a rock formation, could be anything.

Emergence requires perception. It requires a perceiver. That is why it is context sensitive and that is why knowledge is context sensitive.

Knowledge Creation and Acquisition in Networks

Here's another buzzword: the wisdom of crowds[157]. What does that mean? Knowledge is distributed. Each one of us is a piece of the puzzle. And we don't acquire this piece, it's not like somebody comes to a podium and talks a piece and you're sitting there and OK you have it. It doesn't work that way.

As you sit there, indeed even as this talk is happening, you are not simply acquiring the words that I give you, and I sincerely hope not, though maybe I'll start reading some Che and see what happens... no, I'm kidding. Right? The stuff's coming in, but then it meshes and shmooshes with everything else that you've got going on, and what happens in your mind is you create something new out of it, and then that new thing becomes another piece of the puzzle, and it gets fed back in. And back and forth it goes. Back and forth over and over again.

Creation, on this model, is a process of acquisition, you get the input in, the talk, the website, the paper, the television show, the trip through the forest, you remix it, you take a bit here, a bit

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[157] Surowiecki, James. The Wisdom of Crowds: Why the Many Are Smarter Than the Few and How Collective Wisdom Shapes Business, Economies, Societies and Nations. Doubleday (May 25, 2004). http://www.amazon.com/exec/obidos/tg/detail/-/0385503865/102-7570594-3413754?v=glance

here, a bit here, a bit here, you put it together, and sometimes in a new arrangement, sometimes in an arrangement you're comfortable with, you repurpose it, you reshape it, you frame it according to your own background knowledge, your own beliefs, your own understandings of the words. This guy at the front of the room says the word 'Paris', you take that word, and shape that, fold that, into a place where it fits in your mind.

And then you feed it forward. You complain to the organizing committee after the talk. Just kidding. Or if Alan Levine's in here, he's probably blogging this. You pass it along. And this process happens over and over again. And each individual person does this, and it creates this network of meaning.

It's not simply a physical network. You read people like Barabási[158] or Watts[159] and they talk a lot about the structures and the structural properties of networks, but what's interesting and important are the semantical properties of networks, and the semantical properties are what is found, what are found, when we look at these concepts, as they're being molded, as they're being passed along, and what emerges from them.

Hence, for example, we've seen this before, in the literature, we'll go back to the 1970s, Thomas Kuhn, Structure of Scientific Revolutions[160]. What it is to know in, as he says, normal science, to know, to learn a science, to learn a discipline, says Kuhn, is not to know a whole bunch of facts, but to learn how to solve the problems at the back of the chapter. And as someone who's struggled with those problems at the back of the chapter, I can tell you, the stuff that you need to solve the problems isn't in the text that preceded the problems. I have analyzed this.

More modern: Etienne Wenger[161]. Learning is participation in a community of practice, and again, this is the same concept here, that's coming out. This instead of learning as being the acquisition of facts, rather, learning as immersion into an environment. Well your metadata should be like that too.

Properties of Successful Networks

Properties of successful networks. I like to adapt. And so yesterday we heard Charles Vest[162] talking about the three attributes of (a) successful university system, you had that nice list. Of course, I'm sitting there in the back, the very back of the room, sitting there, "yeah, but it's the Times of London, they have an agenda." Everything is context, right?

But anyhow, but the attributes, the attributes were important. The attributes that he identified were right. I think they're vital, and they're fundamental, and it's kind of neat, because I come in and think I'm going to do a talk on principles of representation, and I come in, and I pick up the

[158] Barabási, Alberto-Laszlo. Linked: The New Science of Networks. Perseus Books Group; 1st edition (May, 2002). http://www.amazon.com/exec/obidos/tg/detail/-/0738206679/102-7570594-3413754?v=glance
[159] Watts, Duncan J. Six Degrees: The Science of a Connected Age. W. W. Norton & Company (February, 2003). http://www.amazon.com/exec/obidos/tg/detail/-/0393041425/102-7570594-3413754?v=glance
[160] Kuhn, Thomas S. The Structure of Scientific Revolutions. University Of Chicago Press; 3rd edition (December 15, 1996). http://www.amazon.com/exec/obidos/tg/detail/-/0226458083/102-7570594-3413754?v=glance
[161] Wenger, Etienne. Communities of Practice: Learning, Meaning, and Identity. Cambridge University Press (December 1, 1999). http://www.amazon.com/exec/obidos/tg/detail/-/0521663636/qid=1123967868/sr=1-1/ref=sr_1_1/102-7570594-3413754?v=glance&s=books
[162] Vest, Charles M. Claire Maple Address: OpenCourseWare and the Emerging Global Meta University. Notes by Alan Levine. Seminars on Academic Computing, August 8, 2005. http://jade.mcli.dist.maricopa.edu/cdb/2005/08/08/opencourseware-sac2005

principles from the opening talk. But that's how this works. You thought, probably, you thought the talk was static, dynamic, something that existed before it actually happened, but that's not how it works. When the knowledge is in this network, in this flow, interacting back and forward, it quite literally changes from day to day.

Charles Vest, three key attributes.

Diversity. I kind of recast that as 'many objectives'. He was talking about the different types of institutions, you've got your land grants, you've got your publics, et cetera. All the different types of institutions, there were many.

Interwoven. For Charles Vest interwoven is teaching *and* research. (Note: I was trying a play from a Simpsons episode; "We play all kinds of music: country *and* western.") OK, that didn't come out quite right. But the idea is, you're not focused on a single thing, you're not doing just one thing.

And then crucially, and this is the core of course, behind MIT's Open Courseware[163], and the many other projects that he mentioned, it's open. The system is open. The network is open. It admits many minds, many points of view. And that openness is what enables the communication and the exchange of concepts and ideas to happen, that creates that network effect.
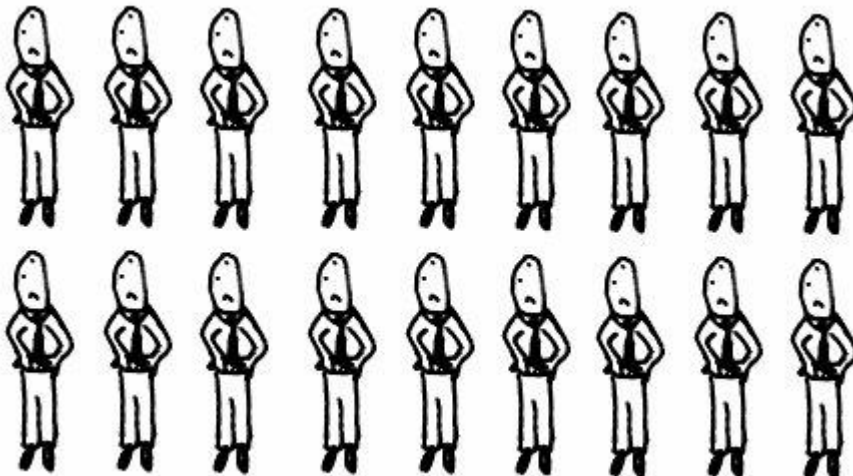
Diversity. That means, if diversity is true, diversity is a virtue, then its converse, is not. So the idea of making everything the same, making everything of anything the same, is fundamentally misguided. Now, many of you work on something called 'standards'. Standards is, by definition, the making of everything the same. So we have a tension here.

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[163] MIT OpenCourseWare. Website. Massachusetts Institute of Technology. August 13, 2005. http://ocw.mit.edu/index.html
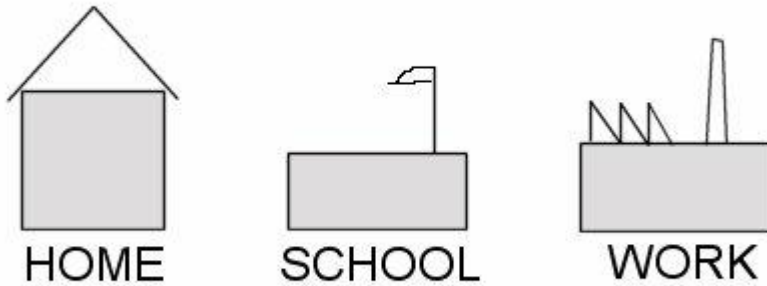
Interwoven. The idea that our different activities are distinct is fundamentally misguided. Those of you who took in the talk on what the next net generation expects of us will have caught the flavour of this.

There is no real distinction between home and work and school and hobbies; it's all part of a great tapestry, isn't it? And yet, look at not only how we've structured institutions, we've got entire buildings dedicated for 'school' only, and you sort of scratch your head. If school's not distinct from work, why is there a separate building for school? And it seems sort of odd.

Metadata, we have metadata that is like 'school' metadata, and then we have other metadata which is 'work' metadata, and they will never meet.
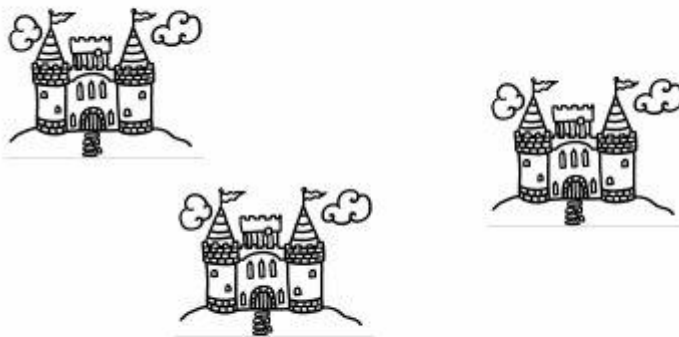
Open. The idea that we can store knowledge in closed repositories, and I'm thinking here specifically of things like Learning Content Management Systems (LCMSs), but more generally, of the whole range of institutional repositories that require passwords, authentication, IP checks and blood types in order to get access to - that idea is fundamentally misguided.

And to illustrate - and that's why I'm so pleased to come here to a conference like this and look at all the sessions on open source and open software, open content, and I'm beginning to think, it's great, people are beginning to get this - the argument, in my mind the argument in favour of open content and open software is really very simple: if you picture the network of knowledge as being like the network of neurons in the mind, then barriers, like copyright limitations, password access and all of that, that's like putting bloockages in the connections between the neurons in your mind. And if that happens to a person, if their neurons stop sending signals freely and openly to each other, we consider that to be very sick, fundamentally ill, in need of major care and treatment and support. It's not a healthy knowing mind at that point, is it? It certainly not a remembering mind.

The Properties Applied to Metadata

So anyhow, I did say I'd talk about metadata some time, so what about metadata? I'm going to shift gears a little bit here and take these properties and apply them specifically to metadata.

The properties, the three properties, that I've just described, are not merely properties of universities. Because after all, the basic unit of knowledge is not the university. It's... well, I was going to say, when I was writing this first was something much smaller, try to come down a little, well, what is the basic unit of knowledge, and I realized, uh oh, I've stumbled into philosophy again. So, I'll dither.

Idea A   Idea B
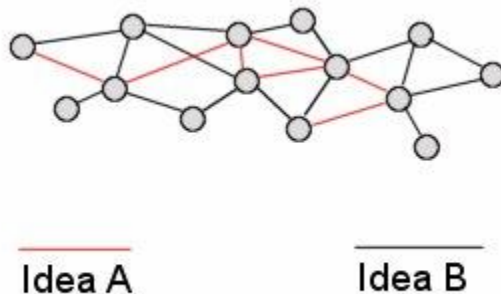
Here's the picture that I've been trying to draw so far, I don't know if the different colours come out clearly, but they're there. Those circles, they're not all actually the same, it's just, you try to do a graphic in five minutes, you go for the predefined circle. But think of those circles, they're all different, they're all diverse, they're all autonomous, they're all doing their own thing, and they're connected.

And the knowledge itself consists in the connections between the circles. I've got one set of black lines, that represents 'Idea A', and another set of red lines, that represents 'idea B'. That, that's our knowledge network.

The same picture applies at all levels. And I know I'm making a very strong claim here, but I believe, I don't have time to go into all of the detail here on that, I believe there is significant

empirical evidence to support this. The same principles that govern the interactions between bloggers[164] also cover the distribution of rivers[165] in a river valley, also cover the way crickets chirp[166] in unison. There's the picture.
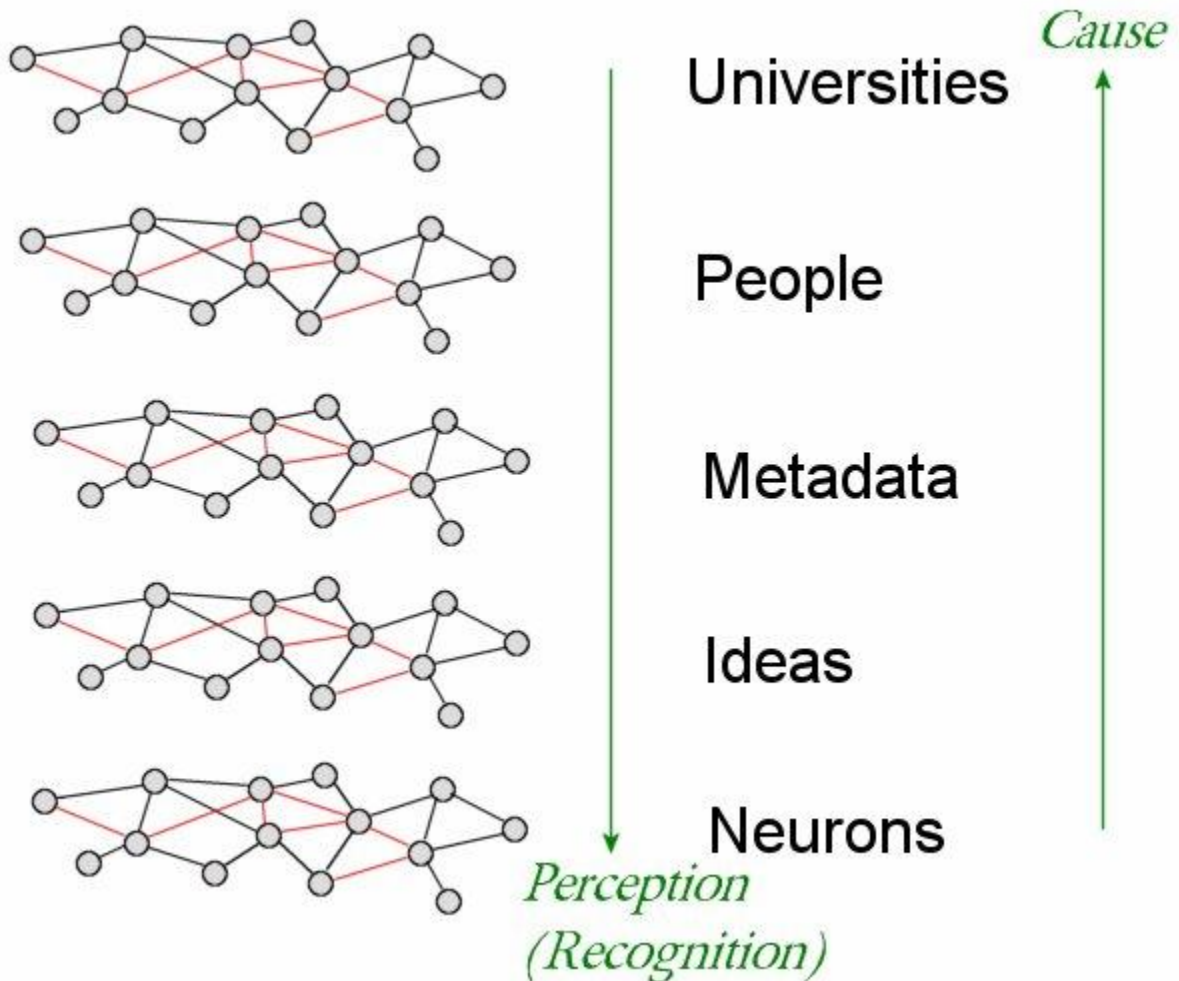
At the lowest level, if you will, there are neurons, but also the interconnection between ideas that I've been talking about, interconnection between metadata, interconnection between people, which these days has reached hype status under the heading of 'social networking', and then, of course, at the top, the interconnection between universities, the mechanism by which you develop an excellent university system.

And just for good measure, and I'm not going to linger on this, as you go from the smaller to the larger, you have your causal relationships, but equally importantly, as you go from the larger to the smaller you have your perceptual relationships, that's the being able to recognize the picture

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[164] Bryant, Lee. Smarter, Simpler Social: An introduction to online social software methodology. Headshift, April 18, 2003. No longer extant. Original URL: http://www.headshift.com/moments/archive/sss2.html

[165] Guimera, R., et.al. Self-similar community structure in a network of human interactions. Physical Review E, vol. 68, 065103(R), (2003).

[166] Buchanan, Mark. Nexus: Small Worlds and the Groundbreaking Theory of Networks. W. W. Norton & Company (June, 2003). http://www.amazon.com/exec/obidos/tg/detail/-/0393324427/102-7570594-3413754?v=glance

of Richard Nixon, as opposed to, say, having a picture of Richard Nixon be 'caused', the recognition of Richard Nixon be 'caused'.

Now, this is drawn in a nice neat line. It is not a nice neat line. I left out all kinds of... I left out crickets, for one thing. I wasn't sure I should put ideas above metadata or metadata above ideas. I don't want to convey the idea here that it's nice neat layers all the way up. It is not; it is a chaotic mess. But, if we abstract it, apply words to it, this is kind of what we get.

That's the background into which I approach metadata. Now thinking about metadata, and thinking about the way metadata ought to be organized and structured, I came up with the concept that I call 'resource profiles'[167], I wrote a paper on that a couple of years ago, a couple of people read it, which is nice. And in that paper I described three major features of metadata.

First of all there are different types of metadata. What very recently we would call microformats. I'll talk more about all of these. Second, the information in metadata is distributed. And then, third, any given perspective, any given point of view, any given context of recognition, is the result of aggregation, of bringing things in.

Now just last thing this morning, before I came here, as I was reviewing these, I realized, oh yeah, wait, these are the same principles that I just talked about, so: different types of metadata - diversity; information is distributed - interwoven; different perspective is aggregated - open. So there's a correspondence there, I'm not sure of the significance of that, but it's certainly matched, at least it matched at seven-thirty this morning.

Learning Object Metadata: Microformats

So let's look at learning object metadata[168] specifically. I am going to work from the assumption that you are all familiar with learning object metadata.

All right. Learning object metadata is one of your classic standardization exercises, and when I look at learning object metadata it is the oddest thing in the world to me to see every metadata record having exactly the same structure no matter what kind of learning object is described. That just seems wrong. And it seems to me that we lose a lot when we do that.

If you look at different types of resources, I've got a couple of examples here but you can multiply them yourselves, you've got a video resource and an audio resource. Now these are two very different types of resources. One will have a bitrate, that'll be the audio. Another will have a framerate, that'll be the video. And the video will have a size. And the audio, size makes no sense.

So, there are, or there ought to be, what we might call LOM microformats. If we have learning object metadata that describes an audio resource, then the metadata appropriate to audio resources ought to be a part of that learning object metadata. If, on the other hand, the resource is, say, an essay, in Microsoft Word, you use a different type of metadata. If it's a learning object

[167] Downes, Stephen. Resource Profiles. Journal of Interactive Media in Education, 2004 (5). http://www.downes.ca/files/resource_profiles.htm
[168] IEEE. Draft Standard for Learning Object Metadata. 1484.12.1-2002, 15 July 2002.
http://ltsc.ieee.org/wg12/files/LOM_1484_12_1_v1_Final_Draft.pdf

properly so-called, with learning outcomes and activities, the model, then you use different metadata. If the learning object is an opportunity for a one-on-one personal engagement with an online mentor, then you use different metadata. And the different metadata varies, so you have different technical metadata, you have different educational properties, and so on.

We think of learning object metadata as though it is just one big monolithic format. But in so doing, we, we, not only do we, we mis-shape the descriptions of the objects - look at the technical elements of metadata. Really, you don't learn anything. Well, you don't learn much about the technical properties of the resource you're describing, because we've tried to get one size fits all, and we've just sort of fudged it.

Look at rights. "Yes, yes, description." What kind of rights metadata is that? I mean, it doesn't work at all, but again, because we're trying to get one size fits all, we just wipe out the detail and just go for something, oh, you know, this will work for everyone, I guess that'll do.

Learning object metadata, too, it just seems odd to me, it's almost like it's in this world apart, like I said earlier, it's 'school' metadata. And when we're thinking of learning object metadata as metadata that could be constructed out of other types of metadata, that draws us to the conclusion that we should see learning object metadata as metadata that is situated in an environment where there are other types of metadata surrounding it. And learning object metadata and these other types of metadata interconnect, interact, and indeed, you would take, say, personal metadata, such as Friend of a Friend[169], and actually bring it in to the learning object metadata. Oh we got, we got vcards[170] instead. I've always been scratching my head over that one, why there's vcard metadata in learning object metadata.

Rights metadata: instead of "yes, yes, description" we have rich, expressive languages that could be used to express rights in learning objects. But we have to learn to stop seeing learning object metadata as something separate stand-alone, we have to invent it all from scratch.

When I think of metadata, I think of RSS[171]. RSS is beautiful. RSS: title, description, link. You're done. And then you just add other stuff to it as needed. And learning object metadata has even recreated title, description, link. It has its own special fields for it. Now there have been crosswalks built between learning object metadata and Dublin Core, but I sort of wonder, why didn't they just take the core of Dublin Core[172] and, "we'll use that." That's what RSS does. Need creator metadata? Dublin Core, dc:creator. And you're done, you didn't need a special RSS element for creator.

I want you to think about how limited our conception of what a learning resource could be has become because of the way we've shaped our metadata. Picture a learning object in your mind for a moment, of course it's all different pictures, and ask yourself, how do you represent an event in learning object metadata? Where is the field, 'start time'? What happens, I mean, you can make it work, well you're taking these standard fields and you kind of using them to your own purpose. You're ignoring the 'real meaning', properly so-called, of what that field means,

[169] Friend of a Friend. The foaf project. Website. August 13, 2005. http://www.foaf-project.org/
[170] Internet Mail Consortium. vCard: The Electronic Business Card. January 1, 1997. http://www.imc.org/pdi/vcardwhite.html
[171] Wikipedia. RSS (file format). August 13, 2005. http://en.wikipedia.org/wiki/RSS_(protocol)
[172] Dublin Core Metadata Initiative. Website. http://dublincore.org/

you'd probably stuff it in technical resources or something. Yeah, why not? If everybody else who's getting the metadata knows what you mean it doesn't really matter what the word said.

Learning object metadata, as it is structured now, actually collapses our view of what a learning resource can be into this static 'knowledge as something like a sentence' picture of learning. But if we break the constraints of vocabulary imposed on us by learning object metadata we also break the conceptual constraints of what a learning object can be. And then it can be a mentoring session. Then it can be a seminar. Then it can be an organization. Now what does an organization look like as a learning object? I don't know, but I'd like to be able to describe it.

Learning Object Metadata: Distributed Metadata

We have this thing, learning object repositories, metadata repositories, and we have this picture of the metadata being like the card catalogue[173]. How many times have you heard that analogy? The other one is the lable on the soup can[174]. But people love the card catalogue analogy. And so you have each individual record, each individual card describes a resource for us, so when we want to go locate a learning object, we're going to do just like we do in a library, we go search the card catalogue.

Most knowledge isn't organized this way. Think about how we would describe a person in metadata. Think of yourselves as a prospective employer of that person. So, what do you want? Well, you don't know the person, well, you're not supposed to anyways, so what you want is person metadata. Which these days is called the c.v. So the c.v.s come in, you've got this pile on your desk, that's all the metadata, now you're going to go through the search process and try to retrieve the records, the people, that you want for your position.

The question here is, as a potential employer, are you going to depend completely and exclusively on the c.v. in order to come to conclusions about the attributes of that person? I contend that you would be nuts to do so. And nobody would. At the very minimum, we have interviews so that we can get other data. But typically, we'd do thinks like, we'd run a reference check. I don't know how it works here, but in Canada we'd check and see if they have a criminal record, we'd run it through that sort of database. I don't think we do it in Canada, but they may do it here so I put it in, you may check their credit history, to make sure they're not a bad risk. If they give you a name and an address you might confirm that in a phone book.

The point here is, what we know about a person is not contained in a single metadata record, and indeed, it's not contained even in a single location. And that is crucial for our understanding of, our knowledge about, that person.

And of course, it's all point of view. A prospective employer is interested in one set of personal metadata, a prospective date is interested in a very different set of metadata. And because I couldn't resist, I diagrammed that.

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[173] Richards, Griff, et.al. The Evolution of Learning Object Repository Technologies: Portals for On-line Objects for Learning. Journal of Distance Education. Vol. 17, No 3, 67-79, 2003. http://cade.icaap.org/vol17.3/richards.pdf

[174] Landon, Bruce, and Robson, Robby. Technical Issues in Systems for WWW-Based Course Support. International Journal of Educational Telecommunications, 1999, 5(4), 437-453. http://www.eduworks.net/robby/papers/technical_issues.pdf
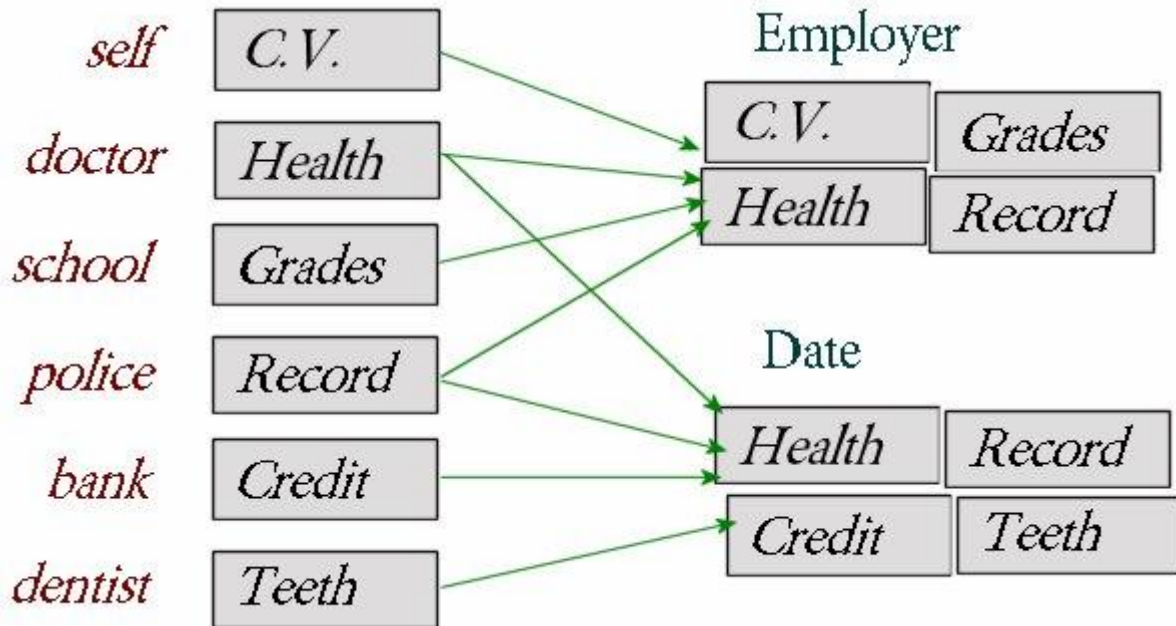
So we have different types of metadata, the classic c.v., which I consider bibliographic metadata, that's the stuff you were born with. Actually it doesn't even include name when you're born, unless your parents planned ahead and did ultrasound or whatever. When I grew up the name came after the birth. But, age, that's known right from Day One, stuff like that.

Then you'll have health metadata, which would be located in the doctor's office or in the hospital, or I guess down here they'd be, what are they, HMOs? Grades, which would be held at the school, because you're not going to trust the person to provide an accurate transcript of their grades, because if you did, everybody gets As. The police criminal record, again, you get that directly from the police. The bank, or I guess you have it here too, Equifax, you get the credit information, which is sometimes accurate, sometimes less so. Information about teeth from the dentist.

Now your employer is going to aggregate this information, bring it in, and remix it, and organize it, in order to form their own view, their own perspective. C.V., grades, health, criminal record. The date doesn't really care about the c.v., well, most dates don't. They're interested in health, criminal record, well they usually do care about that, credit, and so I'm told, teeth. And you could go on. I could make this list much longer and I could come up with different points of view.

Learning object metadata is the same thing. You have a resource. It is born, created, the fruits of creativity, you know what I mean. And it has a creation date, it has a parent or author, you'll give it a name, you'll say it's a nice learning object, it's about rockets, and so on. And then it goes out into the world, and as it's out there in the world, then it begins to acquire different properties. Fred Penner used it in a nature class. Joe Jackson thought it was really good and gave it a rating of 5. The Mennonite Central Committee had a look at it and gave it the approval for LDS classes. The Siskel and Ebert of e-learning gave it two thumbs up.

In general, we can identity three major types of metadata. First party metadata - metadata created by the author. Bibliographic metadata. Second party metadata. Metadata created by the user of a resource. Evaluation. Context of use. "I used this resource in a math class." Third party metadata. Metadata created by an observer of some sort. The Mennonite central Committee. The rights broker. The Siskel and Ebert of e-learning. First, second and third party metadata.

Learning object metadata of the future will be composed of these three types of metadata, and the microformats within these three types of metadata will be mixed and matched, mixed and matched according to the nature of the resource, but mixed and matched according to the perspective, point of view, or context of use of this metadata.

Learning Object Metadata: Referencing

Think about your metadata environment. Think about your personal metadata. Even think about your c.v., maybe think about it a bit more abstractly, because your c.v. is typically a paper document and has the limitations inherent in physical objects.

The metadata about you isn't simply the metadata about you. If you think about it. I live in a house, for example, it's a nice little house, it's on a quiet street in Moncton, New Brunswick, in eastern Canada. That house has metadata. That house is older than I am. It had metadata before I did. It has a creation date, which is approximately 80 years ago, it's not very reliable metadata because that was before they invented metadata. The house has an address, a street address, a lot description number and all of that. It has its its history of owners, its provenance and all of that.

That metadata describing my house actually exists separately from me, it's down at City Hall. I, when I give you my metadata, I refer you to my house metadata, typically I'll just refer you with an address. I'll simply refer you to where you can get more metadata.

Same with pets. I got a cat, and the cat came with papers. Cat had its own metadata. Cat's metadata isn't my metadata because cat might go away. And I continue. I might give the cat, with its associated metadata, to someone else. Cat might die, in which case I close the file and archive it. Your car, same sort of thing, car has papers.

An entity does not exist in isolation, it's not a sentence like 'Paris is the capital of France.' An entity is related to other entities. Inherently related. And we need to express this in metadata.

So I call this 'metadata referencing'. And other people call it other things, none of this is unique to me, but what it isn't is in LOM. Now metadata about a given resource is not stored in a single file. And, as you go though say some learning object metadata, from point to point as you refer to different types of resources, instead of embedding the metadata right in there, you simply point, or reference, an external metadata file.

I've proposed this on a number of fronts. I wrote a paper about expressing digital rights in metadata[175], and one way of doing it is you take your digital rights, your ODRL file, or your XrML file (I still have trouble saying MPEG-REL) and embed it, the 80 lines, in the description field of the learning object metadata, that's one way of doing it. And what that means is that if you have a million learning objects, then you have this rights information replicated a million times, and if you want to change your price, you're in trouble. But if you take your rights metadata and create a rights model, and you put that in a specific spot, I call it a rights broker, and then in your learning object metadata you simply point to the location of your rights metadata.

And that's what Creative Commons[176] does. Creative Commons, you have a web page, read through the web page, there's a little Creative Commons logo, and if you look at the source of the page, you'll see the rights metadata encoded in the page, but what that does is it's a pointer to the canonical definition of, say, 'non-commercial share-alike' on the Creative Commons website. And that's how it's done. Now, of course, learning object metadata, we've got "yes, yes, description".

It's not just that, the authors of resources, again, we refer to people about half a dozen times in learning object metadata and every time we've got this embedded vcard, and I sort of, I sit there and look at these learning object metadata files, and I say well what happens if the person changed jobs and got a new email address? Who's going to go out and change the 25,000 learning object metadata records to reflect this new information? That makes no sense.

But if a person had their own metadata record - Friend of a Friend is a popular format, not necessarily the definitive format - then in the learning object metadata you simply have a reference to that person's metadata, 'creator: where that person is'. Then a person can change their job, change their address, change their name, and they would not obsolete one learning object metadata file.

You see this already in RSS, or I should say more accurately, Atom, with the different link elements. atom allows you to have several links associated with a resource, one of the links will be the actual location of the resource, and another link will be a back-up location, and another link will be a resource that the current resource talks about, and so on, they're all defined in the Atom 1.0 specs[177]. And you're beginning to find them in web pages as well. I'll talk a bit about that shortly.

[175] Downes, Stephen, et.al. Distributed Digital Rights Management: The EduSource Approach to DRM. The Open Digital Rights Language Initiative - Workshop 2004. http://www.downes.ca/files/DDRM_19April2004.pdf

[176] Creative Commons. Website. Accessed August 14, 2005. http://creativecommons.org/

[177] Nottingham, M., and Sayre, R. The Atom Syndication Format. IETF, July 11, 2005. http://www.ietf.org/internet-drafts/draft-ietf-atompub-format-10.txt
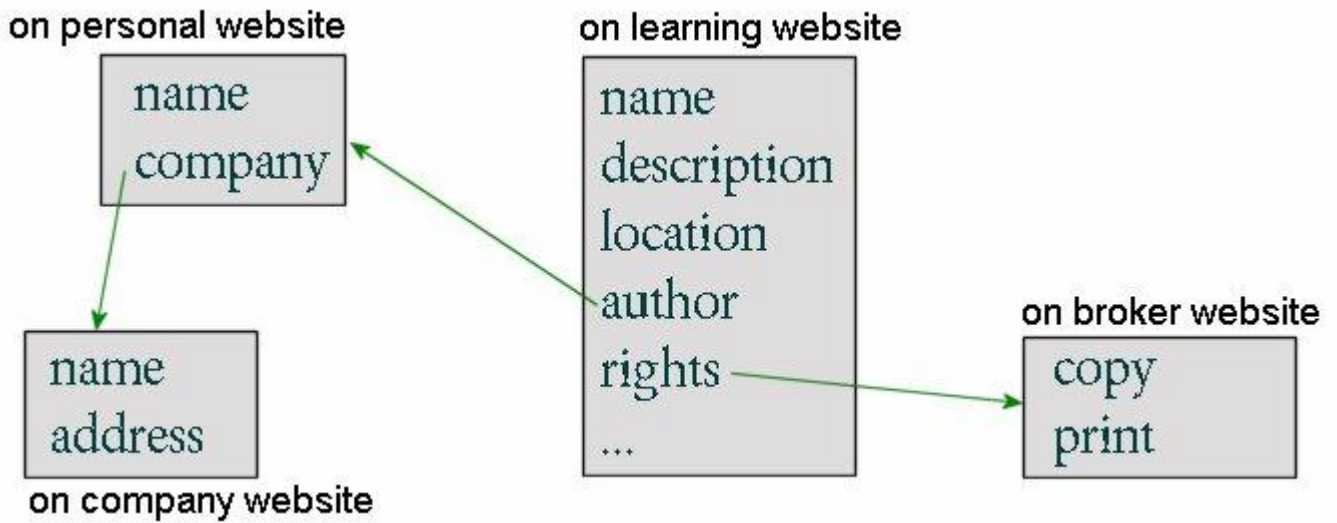
So here's the picture. So pretend that this is learning object metadata, I adapted the vocabulary for my own purposes, so on the learning object website, the name, the description, the location. The author, now the author isn't a string 'Stephen Downes', because that's not a good way to store that information, the author instead is a pointer to the author website. In my FOAF file. And indeed, I work for a company, biggest one in Canada - well I don't know if that's true - but the company, it doesn't just say 'National Research Council', it's a pointer to the company metadata, describing that company. If I change jobs, I just change that pointer. If my company changes names - it's a government entity, could happen - then they change their thing, I don't need to change anything on mine. The rights on the broker website. And so on, I've just picked a few things here, but we could expand this.

Two Principles of Distributed Metadata

This picture gives me two basic principles of distributed metadata. And those of you who are involved in database design should be thinking 'normalization'. Those of you who are not involved in database design may want to Google the concept; this is not original to me.

1. Metadata - and put in the caveat, where possible - metadata for any given entity should not be stored in more than one place. There should be one canonical location for my name. And that's on my website. Not your websites, those of you are university people. It's on my website, because it's my name. And that's the only place it's stored.

Now it can be mirrored, it can be reflected, because you're thinking about database design, you don't want to be doing lookups across the entire internet every time you go to see a record. So you pull this information in, you mirror it on your own site, sure, no problem.

But the canonical information is stored on my website and from time to time you aggregate my information, you bring it in, just to make sure that your information still coincides with my information. Now for mission critical information you'd be aggregating a lot, and for bibliographical information you might do it once a month.

And the reason for that simply is data integrity. You multiply the location of a piece of data, say, my name, you multiply the possibility for errors. My name is spelled 'Stephen Downes'. I can give you eight different ways of getting that wrong. And they're always got wrong. Steven with a v. Downs without my e. Sometimes they do both. I've had 'Stephe'. And so on. And some of them I do myself, typing my name in all these fields all the time.

2. The second principle, and this is the one that I think is most violated by LOM, metadata for a given entity should not (except as a mirror, cache or whatever) contain metadata for a second entity. We need to keep our entities straight and have separate metadata for the different entities. Now if you think about it, it's going to give us a lot more expressive power because it is going to allow us - how do I want to describe this? - it allows us to do, for example, much more finely grained searches.

I did a paper called The Semantic Social Network[178] where I talked about some of these principles, and the idea is, you have social networks which is, you have a person, they list all their friends, and then you have content metadata, like RSS where you describe all your blog posts or your essays or whatever, and right now these are two separate things. But if you merge them together, that puts friends together with content, as I put in my newsletter the other day, my social network is my content network, they're one and the same thing. They just have different types of entities.

So, I could in principle, if I was a better software author, do a search, 'Find all the papers written by people who are friends of David Wiley.' Now, why would I do this? Well, I don't know. What if I narrow it down? 'Find all the papers on learning objects written by people who are friends of David Wiley.' That is going to give me, I would bet, an authoritative collection of papers on learning objects, because I know David is an authority on learning objects. His friends are probably also authorities. At least those who write about learning objects.

So you get that kind of - I'm looking for the word there - multi-type entity search capacity. Trying to come up with a phrase off the top of my head, it's always a bit hard.

Web 2.0: The Principles More Widely Applied

What's important now, remember all my layers, these principles apply not just to metadata. They apply to learning resources themselves. We now have this picture of learning resources in our mind of, well, it is like a can of soup and you stick it in the back shelf and you pull it out when you want it. But it's not like that. The learning resource itself is distributed, itself brings in different types of entities.

It applies to applications themselves. Now I'm not talking, like, Java and all that sort of thing but I'm talking more along the lines of separate free-standing applications loosely connected through communication channels, not integrated into one large piece of enterprise software.

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[178] Downes, Stephen. The Semantic Social Network. Stephen's Web. February 14, 2004. http://www.downes.ca/post/46

The web is changing, and it's changing in this very direction. You may have heard the concept 'Web 2.0[179]'. That's not just a slogan. It's a shifting of the idea of the web from being a medium to the idea of the web as a platform, or if you will, an environment. It just is the shift from the idea of the web being communications, like in that old picture of knowledge, to an environment, or a network, or pick your own metaphor, where you're not just dealing with content, you're actually immersed in it, part of it. It becomes a place where you do things, it becomes even a place where you live.
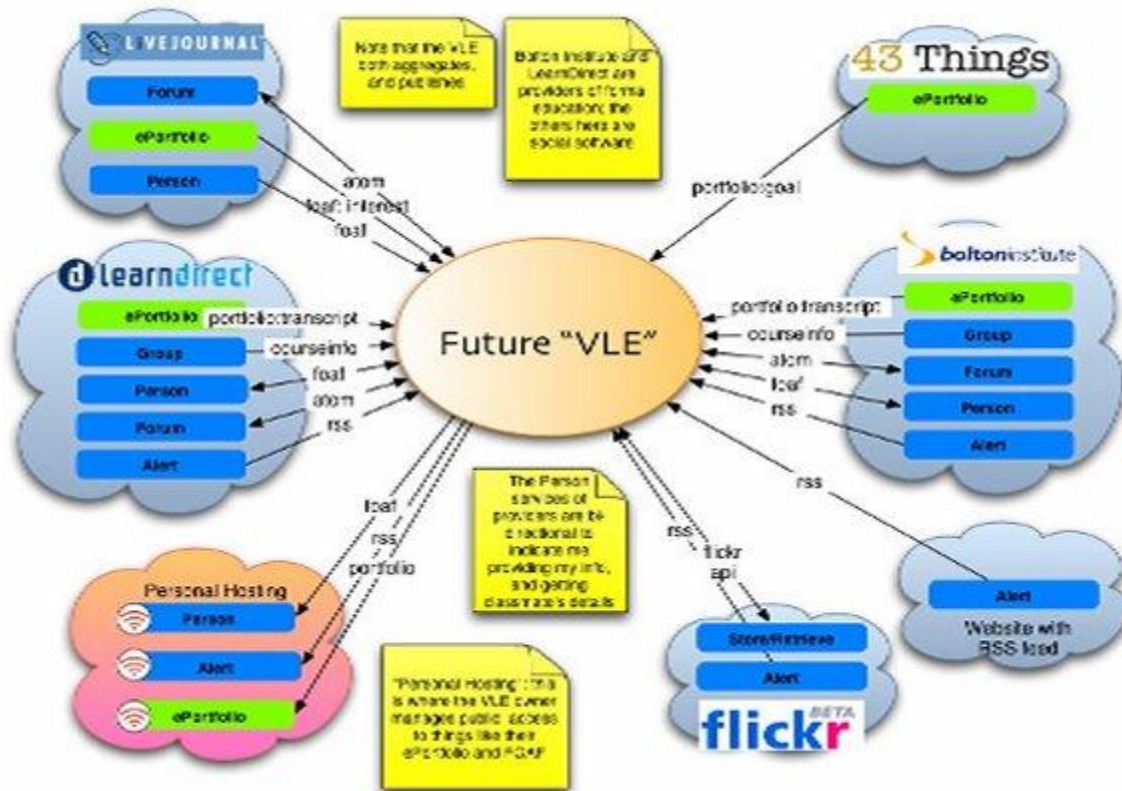
E-learning 2.0 - I've got a whole other slide show on e-learning 2.0[180]. Here's the picture. It isn't my picture, Scott Wilson[181] did the original and Dave Tosh[182] has done more. The idea of the future virtual learning environment, that's *your* space, and then, you are connected to all these applications, to all this content, to all this data, to all this metadata, around the web.

Those of you - because I've witnessed this - most of you, all of you, are working on university-centric systems. E-Learning 2.0 is not university-centric. E-learning 2.0 is where you're one of those bubbles, you're part of the student, the person's overall learning environment, and your metadata, and your interactions, your identity sign-ons, have to play nice with all of these other

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[179] Wikipedia. Web 2.0. Accessed August 14, 2005. http://en.wikipedia.org/wiki/Web_2.0
[180] Downes, Stephen. E-Learning 2.0 - Alberta Cut. ADETA, June 10, 2005. http://www.downes.ca/files/edmonton.ppt
[181] Wilson, Scott. Future VLE - The Visual Version. Scott's Workblog. January 25, 2005.
http://www.cetis.ac.uk/members/scott/entries/20050125170206
[182] Tosh, Dave. A concept diagram for the Personal Learning Landscape. ERADC. April 08, 2005. http://elgg.net/dtosh/weblog/398.html

applications, not just other universities, but newspapers, blogging sites, dating sites. Different points of view. Or as I've got here, Flickr[183] photo sites.

Learning becomes a network phenomenon. It becomes not just a place where we receive the service or the content of learning, but it becomes an interactive back and forward network environment, where everybody's receiving and everybody's creating, everybody's remixing. We see social networks and communities, and as I've talked about before, the semantic social network. Networks of interactions. The *personal* learning centre.

We're beginning to see this already in Web 2.0. There's a link there at the bottom, microformats.org[184], where these microformats are beginning to be developed for embedding in an XHTML file. So they;ve got things like hcalendar, hcard, rel license, a whole bunch of things. There's a new one just came in the other day for video[185]. And these microformats are embedded in web pages, or, but in the future, because this is just an XMTML initiative, but in the future they'll be embedded in RSS and other types of XML metadata as well.

The Web 2.0 checklist[186]. This is another take on the principles of distributed metadata. Structured microcontent, like I described. The data is outside. It comes in through the interactions. The bits of the network - it's not all one big monolithic piece of software like which is running on my computer, but different, small pieces of software that talk to each other in application-specific and resource-specific microformats and APIs. That's why you get the Flickr API[187]. That's why you get the Google Maps API[188]. And you use these APIs the way you use media-specific metadata. The single identity, the single placed for that personal thing that - I drafted a proposal[189] on that, it's at that URL there. User-generated, user-managed content, applications, network as a whole.

Michael Feldstein[190] yesterday wrote, and I quite agree with this, "We need a system that is optimized toward slotting in new pieces as they become available, not as an after-thought or an add-on, but as a fundamental characteristic of the system." Try doing that with Blackboard or WebCT.

Concluding Remarks

The take-away. And I am going to come in under time. Charles Vest talked yesterday about the meta-university. If I may be so audacious, this - what I've described here - is the information architecture for the meta-university. Now you might not agree with all of the details and everything, but it is going to be very much like that, and it is going to be very much like that because, really, that's the only way to do it. The key here is not large integrated systems but

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[183] Flickr. Website. Accessed August 14, 2005. http://www.flickr.com/

[184] microformats.org. Website. Accessed August 14, 2005. http://microformats.org/

[185] Rein, Lisa. Getting Started On A Harmonized Video Metadata Model. Microformats Wiki. August 6, 2005. http://microformats.org/wiki/video-metadata-model

[186] Leene, Arnaud. Web 2.0 checklist 2.0. Hovering Above. July 21, 2005. http://www.sivas.com/aleene/microcontent/index.php?id=P2205

[187] Flickr. Flickr API Documentation. Website. August 14, 2005. http://www.flickr.com/services/api/

[188] Google. Google Maps API. Website. August 14, 2005. http://www.google.com/apis/maps/

[189] Downes, Stephen. mIDm - Self-Identification the World Wide Web. Stephen's Web. May 4, 2005. http://www.downes.ca/idme.htm

[190] Feldstein, Michael. The Long Tail of Learning Applications. E-Literate. August 7, 2005. http://mfeldstein.com/index.php/the_long_tail_of_learning_applications

small flexible bits that are interconnected. And that's true of applications, it's true of content - like websites, pictures, images, graphics,sound - and it's true of metadata.

And that leads us to this. Learning object metadata will be rewritten. Or maybe bypassed entirely. That's a prediction. I'll stake my reputation as a pundit on it. It's going to be rewritten. And it's going to be rewritten because it has to be, because as we work with learning objevct metadata as it is currently incarnated, unless we're working within a large monolithic entity like the U.S. military, learning object metadata will be found to be too rigid, too inflexible, too narrowly defined, to do the sorts of things that we want to do with it.

And instead, we're going to get the type of learning object metadata that will be similar to - although, I know these committees, so it will be different from - the resource profiles that I've described here, where it will bring in the different types of microformats, where metadata will be distributed, will do things like harvest second-party and third-party metadata.

And that is my last slide, I thank you very much for inviting me, it has been a pleasure, and I really appreciate you staying for the whole talk. Thank you very much.

Snowmass, Colorado, August 12, 2005

When Words Lose Meaning

In which I explain what I meant by my comment to this post[191] from Doug Johnson. I commented, "If the word is not the thing, how do you evaluate the sentence 'Dragons are green?'"

It's probably foundational for semiotics that the word is a sign or symbol, and in some way stands for or represents something else. This separation allows us to meaningfully use words like 'red' without particularly worrying about the reality of whatever they represent.

But the question of whether essence implies existence shaped much of 20th century philosophy. What do you say about the meaning of words that represent or refer to things that don't exist? If the meaning of the word 'dragon' does not depend on representation of or reference to dragons - since there are no dragons - then where does it get its meaning?

You might say that 'dragon' is just a fictional example, that we don't need to worry about its meaning, it's just metaphorical. But what about a sentence like (to use Bertrand Russell's famous example) "Brakeless trains are dangerous." It's not fiction, it is, moreover, true, and known to be true, and yet (by virtue of that very fact!) there are no brakeless trains.

So, while it's simple and appealing to say, "The symbol is NOT the thing symbolized; the word is NOT the thing; the map is NOT the territory it stands for," there are important senses in which it's not true. In some important senses, the thing is the thing symbolized. When we talk about 'tiger' we are in fact talking about the concept 'tiger', which is just what is contained in the word 'tiger', and not about things in the world at all. When we talk about 'the tiger' we are (Russell would say) making two claims: that there is a thing that exists, and that it is an instance of this concept we call 'tiger'. All the referring happens in the word 'the', not the word 'tiger'.

You might think, this is all meaningless babble. Who cares? But it has a direct and immediate impact on how we think about learning. On the simple picture, you just show people some tigers (or trains, or dragons) and they learn about them. Or (since that's very inconvenient) you simply give them a series of propositions about tigers, trains and dragons ("dragons are green", "tigers are orange", etc.) and that teaches you about the world. Except - it doesn't. It teaches you about language. Most of what we learn about in school is language, not reality. Math - science - these are all disciplines of language.

In a very real sense, a traditional (text-based, languages lased) education is an education based on fiction. Very useful fiction, to be sure, since most other people are willing participants in that fiction, and it helps us do useful things. But it renders us unusually vulnerable to propaganda and media, since we can convince people of some reality merely through the use of words - actual evidence or experience is not required. We buy into beliefs like 'the world is described by

[191] Doug Johnson. When words lose meaning. The Blue Skunk Blog (weblog), January 21, 2011. http://doug-johnson.squarespace.com/blue-skunk-blog/2011/1/21/when-words-lose-meaning.html

numbers', 'if it can't be measured it can't be managed' and other variations on the old positivist principle of meaningfulness.

Most of the work in late 20th century philosophy goes to show that meaning and truth are embedded in the representational system - that, in other words, the word is the thing the word describes, the map is the terrain (if you don't believe me, try walking across an international border). van Fraassen on how explanations in science are descriptive mostly of our expectations. Derrida on how the meaning of the word is based largely on the range of alternative possible words that could be used. Quine on how translations are based on guesses (or what he called 'analytic hypotheses').

None of this implies that there is no reality, that there is no physical world, that there is no experience. Of course there is a great deal of all three. It's just that the supposedly privileged connection between word and reality - the one represented by 'The symbol is NOT the thing symbolized' - is an illusion. And that these representational and referential systems are elaborate fictions.

This is not new knowledge. It is very old knowledge. And as the Taoists used to say, knowing that these distinctions we find in language represent our interpretations of the world, represent our projections onto the world, is very powerful. Very enlightening. Because it frees us from the absolutes we believed ruled us with an iron grip. What people thought were right and wrong, for example (which is why we can make sense of how something that was once 'right' - slavery, say - is now 'wrong'). What people thought were plants or animals. Sentient or senseless. Planets or non-planets.

This is not an endorsement of relativism. It is merely the assertion that what is represented in language is fiction. If we rely solely on language - solely on what were told - then anything can be true. Look what happens to viewers of Fox News! What it tells us is that we cannot rely on words, on language, on mathematics, on representational systems. We have to, in our own lives, appeal to our own experiences, our own connection with the world itself. The Taoists would say we have to connect to 'The Way' - the ineffable reality behind human descriptions. But it's not an appeal to the mystical. It's an appeal to the world that lies beyond our descriptions of the world.

In an important sense, then, I want to say that semiotics is wrong. Not in the sense that it is descriptively false - for no doubt there is a truth (or, as experience shows, many, many truths) in semiotic accounts of meaning and representation. But rather, that semiotics as epistemology, or even ontology, are false. That there is no actual relation of reference or representation, only (within the referential or representative system) a fiction of one.

In a sense, we're at the same position today that Descartes was at in 1616 when he said, "I entirely abandoned the study of letters." At that time, knowledge, philosophy and science were in the hands of the Scholastics, who understood the world through finer and finer distinctions and relations between the categories. Descartes decided - and proved, through his sceptical argument - that theirs was a world of fiction, that we would not understand the nature of reality by dividing things over and over again into increasingly arbitrary categories. Descartes (and his

contemporaries, for this was a broad social movement) derived an analytical method of dividing the world into parts, and using mathematics, not qualities, to represent this fundamental nature.

Now we understand that mathematics is yet another kind of language. We understand that merely measuring the world is to produce a kind of fiction. Though, to be sure, there are many Scholastics in today's world who are like the doctors of medieval times, shuffling their figures in finer and finer dimensions to articulate very precisely one fiction after another. And now a lot of people are pointing to networks or connections (etc.) as the new underlying description of reality. But we ought to know by now that networks, too, are a form of fiction, that they are our imposition of this or that order on our perceptions, experiences and reality.

When we teach, while it is our job to ensure that our students are well versed in the fictions of the day, for they'll need them in order to socialize and make a living, it is our obligation to ensure that our students are not entrapped by these fictions, that they have it within themselves to touch their own reality, their own physicality, their own experience.

Moncton, January 24, 2011

Concepts and the Brain

Posted to IFETS, June 19, 2007.

From: Gary Woodill

> *One reference that supports that contention that concepts are instantiated in the brain is Manfred Spitzer's book The Mind within the Net: Models of Learning, Thinking, and Acting. Spitzer spells out how this takes place. For a brief review of this book see my April 10, 2007 blog entry entitled The Importance of Learning Slowly.[192]*

> *The Synaptic Self: How our brains become who we are by Joseph LeDoux covers much of the same ground. Nobel laureate Eric Kandel outlines a model of how learning is recorded in the brain in his easy to read In Search of Memory: the Emergence of a New Science of Man.*

I second these points and especially the recommendation of The Synaptic Self, which is a heady yet cogent description of the mind as (partially structured) neural network. Readers interested in the computational theory behind neural networks are recommended Rumelhart and McClelland's two volume Parallel Distributed Processing.

That said, the statement 'concepts are instantiated in the brain' depends crucially on what we take concepts to be. Typically we think of a concept as the idea expressed by a sentence, phrase, or proposition. But if so, then there are some concepts (argue opponents of connectionism) that cannot be instantiated in the brain (at least, not in a brain thought of as essentially (and only) neural networks).

For example, consider concepts expressing universal principles, such as 2+2=4. While we can represent the individual elements of this concept, and even the statement that expresses it, in a neural network, what we cannot express is what we know about this statement, that it is universally true, that it is true not only now and in the past and the future, but in all possible worlds, that it is a logical necessity. Neural networks acquire concepts through the mechanisms of association, but association only produces contingent, and not necessary, propositional knowledge.

There are two responses to this position. Either we can say that associationist mechanisms do enable the knowledge of universals, or the concepts that we traditionally depict as universals are not in fact as we depict them. The former response runs up against the problem of induction, and is (I would say) generally thought to be not solvable.

The latter response, and the response that I would mostly endorse, is that what we call 'universals' (and, indeed, a class of related concepts) are most properly thought of as fictions, that is to say, the sentences expressing the proposition are shorthand for masses of empirical

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[192] Gary Woodill. The Importance of Learning Slowly. Brandon Hall Blogs. April 10, 2007. http://www.garywoodill.com/2007/04/the-importance-of-learning-slowly/ Original link (no longer extant): http://www.brandon-hall.com/weblogs/garywoodill.htm

data, and do not actually represent what their words connote, do not actually represent universal or necessary truths. Such is the approach taken by David Hume, in his account of custom and habit, by John Stuart Mill, in his treatment of universals, even by Nelson Goodman, in his 'dissolution' of the problem of induction by means of 'projectability'.

If we regard the meanings of words as fixed and accurate, therefore, and if we regard concepts to be the idea expressed by those words, then concepts cannot be instantiated in the brain, at least, not in a brain thought of as a neural network. If we allow, however, that some words do not mean what we take them to mean, that they are in fact 'fictions' (even if sometimes taken to be 'fact') then concepts can be instantiated in neural networks.

Moncton, June 19, 2007

On Thinking Without Language

Responding to Dave Pollard:[193]

I have long written on the topic of subsymbolic communication and reasoning. So I think you strike a note here. But it could be more sharply hit:

You write, "What is important is that they are effective, workable, successful. Not necessarily the best decisions, but good decisions. These decisions are the result of intellectual, emotional, sensory/somatic (body) and intuitive knowledge (to use the Jungian model) and integrate the conscious and unconscious."

I think that decisions based on subsymbolic reasoning are the best, and not decisions that are merely good enough.

There is a mechanism that describes subsymbolic reasoning. You suggest that the mechanism is "the result of intellectual, emotional, sensory/somatic (body) and intuitive knowledge (to use the Jungian model)." I think you're flailing here.

Subsymbolic decisions and subsymbolic reasoning generally are the result of the experience of perceptual processes (which is where we get emotional, sensory and somatic influences).

In a nutshell, it is the association of these experiences with previous experiences. Any experience, any perception, is the activation of millions of neural cells. These activations may, depending on the experience, include characteristic patterns of activation. It is the matching of these patterns that constitutes the basis for reasoning.

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[193] Dave Pollard. Thinking Without Language. How to Save the World (weblog). January 9, 2007. http://howtosavetheworld.ca/2007/01/09/ Original link on Salon blogs (no longer extant): http://blogs.salon.com/0002007/2007/01/09.html#a1747

These patterns may reflect any sort of perception - sights and sounds, music, animals, forms and faces. We may associate characteristic sounds with them - these characteristic sounds - words - are also patterns. But for many of our habitual experiences, there are no words. They are ineffable.

Patterns are created from perception through a process of abstraction - we filter our perception, taking in some aspects, discarding the rest. Formal reasoning is this process taken to a great degree - it is abstraction of abstraction of abstraction. Eventually we arrive at 'pure' concepts - things like conjunction, entailment, existence, being - which form the basis for formal reasoning.

These concepts are extremely powerful, but their power is gained at the price if the abstraction. They express broad sweeping truths, but very little about the here and now.

The reasoning of the master is a subtle dance between these two extremes, between the concrete and the universal, a waltz through the layers of abstraction, drawing subtly on each as it applies to the situation at hand.

Moncton, January 10, 2007

Planets

When I was young I was told there were six colours in the spectrum (I even learned a little song that names them).

> *Red and orange, green and blue*
> *Shining yellow, purple too*
> *All the colours that you know*
> *Live up in a rainbow*

Now I'm told there are seven - they added indigo somewhere along the line.

I have refused to accept indigo. So far as I'm concerned, there are still six colours in the spectrum.

Now they are telling me that Pluto is not a planet. Again, I refuse to accept that. So far as I am concerned, Pluto is a planet (and so are Ceres, Xena and Sedna).

Sure, there are authorities that will tell me that there are seven colours in the spectrum and eight planets in the solar system. But on what basis am I required to accept their definition?

I have concluded: none. If I decide there are six colours, or twelve planets, that's up to me. And - my take is - there's no reason why society can't allow both.

It is the idea that there is only one distinct number of colours, or number of planets, that is wrong, and not any particular list of them.

Try it. Try thinking this way. It is incredibly, extraordinarily, liberating.

Moncton, August 26, 2006

Types of Meaning

I don't want to spend a whole lot of time on this, but I do want to take enough time to be clear that there are, unambiguously, numerous types of meaning.

Why is this important? When we talk about teaching and learning, we are often talking about meaning. Consider the classic constructivist activity of 'making meaning', for example. Or even the concept of 'content', which is (ostensibly) the 'meaning' of whatever it is that a student is being taught.

What are we to make of such theorizing in the light of the numerous ways that words, sentences, ideas and constructs can have meaning? What does 'making meaning' mean we we consider the range between logical, semantical, and functional meaning?

The idea - often so central to transmission and transactional theorists of learning, that a word or sentence can have a single meaning, or a 'shared meaning', is tested to the extreme by an examination of the nature and constitution of that putative meaning.

In any case, it is always better to show than to argue. Herewith, a bit of an account of some of the many different types of meaning:

Literal meaning - the sentence means what it says. Also known as 'utterance' meaning (Griffiths).

Logical meaning - the meaning of the sentence is determined by (is a part of) a set of logical inferences, such as composition, subordination, etc. Also called 'taxis'. (Kies)

Denotative meaning - the sentence means what it is about. The 'reference' of a sentence, as opposed to its 'sense'. (Frege)

Sematical meaning - meaning is truth (Tarski - 'snow is white' is true iff snow is white)

Positivist meaning - the sentence means what it says that can be empirically confirmed or falsified (Ayer, Carnap, Schlick)

Pragmatic meaning - the relationship between signs and their users. (Morris) Includes "identificational meaning, expressive meaning, associative meaning, social meaning, and imperative meaning." (Lunwen)

Intentional meaning - the sentence means what the author intended it to say. Also known as "sender's meaning" (Griffiths). - John Searle, often includes conversational implicatures

Connotative meaning - the sentence means what readers think about when they read it. Sometimes known as 'sense' (Frege). Also sometimes thought of as 'associative' meaning. (Morris) Includes 'reflected' meaning (what is communicated through association with another sense of the same expression, Leech) and collocative meaning (Leech)

Social meaning - "what is communicated of the social circumstances of language use" (from Leech; Lunwen)

Metaphorical meaning - the meaning is determined by metaphor, and not actual reference

Emotive meaning - related to connotative - the type of emotion the sentence invokes

Functional meaning - the sentence means what it is used for, what it does (Wittgenstein, meaning is use; Austin, speech acts). The 'mode' of a sentence is the function it plays in channeling communication - what degree of feedback it elicits, for example, of what degree of abstraction it considers. (Cope and Kalantzis)

Type meaning - the sentence's meaning is related to what it doesn't say, to the range of possible words or sentences that could be said instead (Derrida). Gillett writes, "Part of the meaning of a word is its 'register'. Which types of language is the word used in: letters or reports, spoken or written, biology or business etc?"

Deictic meaning - meaning is determined with reference to the situation or context in which the word is used. Griffiths writes, "Deixis is pervasive in languages." Common deixic frames include common understandings related to people)'the boss'), time ('tomorrow'), place ('nearby'), participants ('his'), even discourse itself ('this' article).

Relevance, significance or value - "what is the meaning of life?"

Accent - the manner in which the word is pronounced or emphasized can cnage its meaning.

Intralingual meaning - (Morris) intralingual meaning (the relationship between different signs; it includes phonological meaning, graphemic meaning, morphological or lexemic meaning, syntactic meaning, and discoursal or textual meaning).

Thematic meaning - "what is communicated by the way in which the message is organized in terms of order and emphasis" (Leech; Lunwen)

Some links:

Learning Vocabulary: Dealing With Meaning,[194] from Using English for Academic Purposes[195]
Andy Gillett, School of Combined Studies, University of Hertfordshire
Hatfield, UK.

An Introduction to English Semantics and Pragmatics[196] Patrick Griffiths.

Powers of Literacy[197] Bill Cope and Mary Kalantzis

Strange Attractors of Meaning,[198] Vladimir Dimitriv

The Grammatical Foundations of Style,[199] Daniel Kies, Department of English, College of DuPage

Foundations of the Theory of Signs,[200] Charles W. Morris

Seven Types of Meaning, Geoffrey Leech, in Semantics,[201] pp. 10-27.

Moncton, January 9, 2009

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[194] Andy Gillett. Learning vocabulary: Dealing with meaning. Using English for Academic Purposes. School of Combined Studies, University of Hertfordshire. Accessed January 9, 2009. http://www.uefap.com/vocab/learn/meaning.htm
[195] Andy Gillett. Using English for Academic Purposes. School of Combined Studies, University of Hertfordshire . Accessed January 9, 2009. http://www.uefap.com/index.htm
[196] Patrick Griffiths. Section 1.2: Types of Meaning. An Introduction to English Semantics and Pragmatics. Edinburgh University Press. August 22, 2006 http://bit.ly/H8XRLk
[197] Bill Cope and Mary Kalantzis. The Powers of Literacy. Page 144. The Falmer Press. 1993. http://bit.ly/HAua6G
[198] Vladimir Dimitrov. Strange Attractors of Meaning. Centre for Systemic Development, University of Western Sydney, Richmond. 2000. http://www.zulenet.com/VladimirDimitrov/pages/SAM.html
[199] Daniel Kies. The Grammatical Foundations of Style. Department of English, College of DuPage, 1995. http://papyr.com/hypertextbooks/grammar/style.htm
[200] Charles W. Morris. Foundations of the Theory of Signs (International Encyclopaedia of Unified Sciences). University of Chicago Press. December, 1938. http://www.amazon.co.uk/Foundations-International-Encyclopaedia-Unified-Sciences/dp/0226575772
[201] Geoffrey Leech. Seven Types of Meaning. In Geoffrey Leech, Semantics.Pelican. June 1, 1974. http://www.amazon.com/Semantics-Meaning-Pelican-Geoffrey-Leech/dp/0140216944

Naming Does Not Necessitate Existence

Responding to Learning is Scaffolded Construction[202] by Mark H. Bickhard.

OK, the core of the argument is here. Everything before it leads to it, and everything after follows from it:

> *Encoding models can tempt the presupposition of a passive mind: neither the wax nor the transducing retina need to be endogenously active. But there is no such temptation regarding interaction systems. The world could not impress a competent interaction system into a passive mind. Interaction systems must be constructed. Pragmatism forces constructivism.*

> *Furthermore, unless we assume that the organism already knows which constructions will succeed, these constructions must be tried out and removed or modified if they are not correct. Pragmatism forces a variation and selection constructivism: an evolutionary epistemology (Campbell, 1974).*

Now how could we get ourselves into such a situation? The answer lies in the presuppositions that led to this point. Specifically:

> *A theory of encoding is, therefore, what we need to complete the bridge between … semantics and the computational story about thinking. … [An account of] encoding [is] pie in the sky so far. … we haven't got a ghost of a Naturalistic theory about [encoding]. Fodor, 1987, pg. 81*

and

> *The right questions are: "How do mental representations represent?" and "How are we to reconcile atomism about the individuation of concepts with the holism of such key cognitive processes as inductive inference and the fixation of belief?" Pretty much all we know about the first question is that here Hume was, for once, wrong: mental representation doesn't reduce to mental imaging. Fodor, 1994, pg. 113*

In other words, the mind is depicted as a representational system. But there is a disconnect between representations and the things being represented. For example, some representations may be false; that is (to simplify) the state of affairs represented does not actually exist. Hence representations cannot be caused entirely by the phenomena that cause them. Rather, they must be constructed, through some process of interpretation of those phenomena.

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[202] Mark H. Bickhard. Learning is Scaffolded Construction. IT Forum.2006. http://it.coe.uga.edu/itforum/paper98/LearnScafCon.pdf

The problem with depending on Fodor to set up the state of affairs is that a reference to Fodor brings with it quite a bit of baggage. Fodor, like Chomsky, argues that the linguistic capacity is innate. Fodor calls this 'the language of thought' and argues, not only that grammar and syntax are innate, as Chomsky argues, but also that the semantics are innate, that we are both with (the capacity to represent) all the concepts we can express. How is it that we can use the term 'electric typewriter' in a sentence? because we were born with it.

But what if Fodor's theory, in particular, and the representational theory of mind, in general, are wrong? What if perception and cognition are **not** the result of a process of 'encoding'. What if the human mind is much more like Hume's version (very misleadingly described as a blob of wax)? What if semantic properties, such as 'truth' and 'falsehood' (and moral properties, such as 'right' and 'wrong') are more like sensations or emotions, instead of an account of some sort of correspondence between a proposition in the mind (as interpreted through a constructed mental representation) and a state of affairs in the world?

Because of Fodor's perspective, he wants you to believe that empiricism promotes certain corollaries:

1. The mind is a passive receiver of input and knowledge,
2. Learning is independent of prior state and of context,
3. The ideal form of learning is errorless learning.

It is certainly debatable whether Hume would believe any of these, and they are certainly false of modern empiricism. Much is made of the failures of causal theories of perception (which is why simple encoding fails, and why a representational theory is required in its place). But what if, as Hume says, cause is nothing more than the natural human inclination to ascribe a relation between two objects when the one frequently follows from the other? What if causation itself is something humans *bring to* the table? This is certainly not passive perception - humans, on Hume's theory, though 'custom and habit' interpret a perception as one thing or another.

These considerations constitute a response to the interaction theory proposed in this paper. Representations, on this theory, constitute 'interaction possibilities', that is, possible responses an agent may undertake in response to given stimuli (or perceptions). These have all of the properties of representations (truth values, content) but - by virtue of being implicit, do not suffer from the pitfalls of representationalism. We don't need to show how it was caused by this or that, because only the interaction possibility, not the representation itself, is caused by the phenomena. "Encoding models, in contrast, are not future oriented, but backward oriented, into the past, attempting to look back down the input stream."

Fair enough, and a spirited response to the myriad problems facing representational theories of mind (problems imposed from it more empiricist critics), but if Hume's position (as understood here, and not mangled by Fodor) stands, then this proposition does not follow: "The world could not impress a competent interaction system into a passive mind. Interaction systems must be constructed." And of course, if this does not follow, the need for scaffolding, and the attendant infrastructure required, does not follow.

And Hume's position stands. We are misled by the 'wax' analogy. Even the slightest inspection reveals that perceptions are not like metal stamps, nor are brains anything like lumps of wax. A brain is a complex entity, such that when a perception makes an impression on any bit of it (i.e., when a photon strikes a neural cell) the mind is not left with a resultant 'dent' but rather a myriad of disturbances and reflections, rather like the way water ripples when struck by a pebble or a raindrop. Some of these ripples and reflections have more or less permanent consequences; just as repeated waves form surface features, such as sandbars, that change the shape of subsequent waves, so also repeated perceptions form connections between neurons, that change the way the impact of a photon ripples through the neural network.

The world, therefore, *could* impress a competent interaction system (so-called) into a passive mind. And therefore (happily) interaction systems (so-called) need not be constructed, which is a good thing.

Why is it a good thing? Because if the interaction system (so-called - I am saying 'so-called' because the resulting neural structure *may* be described as an 'interaction system' or may be described as something else) is *constructed* then there must be some entity that does the constructing. And if this is the case, then there are only two possibilities:

Either, 1, the construction is accomplished by the learner him or her self, which raises the question of how the learner could attain a mental state sufficiently complex to be able to accomplish such constructions, or

2. an external agency must accomplish the construction, in which case the question is raised as to how the perceptions emanating from the external agent to the learning agent could be perceived in such a way as to accomplish that construction.

The pragmatist turn does not resolve the problem. Indeed, it makes the problem even *worse*. Bickhard writes, " Pragmatism forces a variation and selection constructivism: an evolutionary epistemology." This means even more constructions must be constructed, both those that survive the 'evolutionary trial' and those that don't.

Indeed, the use of 'evolutionary' terminology to describe the state of affairs here is very misleading.

The problem is, *any* representational theory - whether it employs virtual propositions or not - needs elements that are simply not found in nature. They need 'truth' and 'representation' and even (on most accounts) 'causality'. They need, in other words, precisely the sort of things an intelligent agent would bring to the table. They need *to be constructed* in order to give them these properties. They need, in other words, to be created.

Far from being an evolutionary theory of learning, this sort of theory is in fact a *creationist* theory of learning. It amounts to an assertion that the combination of a mind and some phenomena are not sufficient to accomplish learning, that some agency, either an intermediating external agency, or an internal homuncular agency, are needed. *But both such agencies presuppose the phenomenon they are adduced to explain.*

In general, the ascription of such intentional properties - truth, meaning, causation, desire, right, interaction - which are not present naturally in the human mind or the phenomena it perceives can only be accomplished through some such circular form of reasoning. Historically, the existence of these properties has been used in order to deduce some necessary entity - an innate idea of God, an innate knowledge of grammar or syntax, or scaffolded construction, among others (the putative existence of this entity is then used to explain the phenomena in question, to add circularity on circularity).

These properties, however, are *interpreted* properties. They constitute, at most, a way of describing something. They are *names* we use to describe various sets of phenomena, and do not exist in and of themselves. Consequently, *nothing follows* from them. Naming does not necessitate existence.

Bickhard's response:

> *It is difficult to reply to something with so many mis-readings, both of my own work and of others.*

> *I cite Fodor concerning encodings because even he, as one of the paramount exponents of such a position, acknowledges that we don't have any idea of how it could happen. Since the focus of all of my critical remarks is against such an encodingist position, it's not clear to me how I end up being grouped with Fodor. Certainly nothing actually written commits me to any kind of innatism - that too is one of my primary targets in my general work. In fact, one of the primary paths away from the arguments for innatism is an emergentist constructivism. (This, of course, requires a metaphysical account of emergence - see the several papers and chapters that I have on that issue.)*

> *I don't even know where to start regarding Hume, but there are some comments below as relevant to more specific issues.*

>> Representations, on this theory, constitute 'interaction possibilities', that is, possible responses an agent may undertake in response to given stimuli (or perceptions). These have all of the properties of representations (truth values, content) but - by virtue of being implicit, do not suffer from the pitfalls of representationalism. We don't need to show how it was caused by this or that, because only the interaction possibility, not the representation itself, is caused by the phenomena.

> *Representation is constituted, according to this model, by indications of interaction possibilities, not by interaction possibilities per se. And such indications are not caused, but, as attacked later, constructed.*

> *I fail to see how even the account of Hume given supports the claim:*

>> If Hume's position (as understood here, and not mangled by Fodor) stands, then this proposition does not follow: "The world could not impress a competent interaction system into a passive mind. Interaction systems must be constructed."

That is:

> But what if, as Hume says, cause is nothing more than the natural human inclination to ascribe a relation between two objects when the one frequently follows from the other? What if causation itself is something humans *bring to* the table? This is certainly not passive perception - humans, on Hume's theory, though 'custom and habit' interpret a perception as one thing or another.

First, I'm not addressing cause at all. Second, Hume explicitly said that he had no idea how perception worked, so the claims being made on his behalf here are rather difficult to fit with Hume's position. Third, interpretation, presumably based on custom and habit, is not necessarily passive, though Hume didn't have much of a model of activity beyond association. Fourth, such "interpretations" are not themselves caused, so they constitute a partial gesture in the direction of construction. I'm arguing that such constructions are of indications of interaction potentials, and that the basic properties of representation are emergent in such indications. Fifth, independent of all of that, how does any such interpretation of Hume undo the basic point that "the world could not impress a competent interaction system into a passive mind"? There appears to be a serious non-sequitur here. The comments about ripples and reflections would both seem to advert to cause in the mental realm, and how could that be rendered coherent given the other comments about cause, and do not address issues of interaction or interaction systems at all.

> if the interaction system (so-called - I am saying 'so-called' because the resulting neural structure *may* be described as an 'interaction system' or may be described as something else) is *constructed* then there must be some entity that does the constructing.

I fail to see this at all. By this reasoning, there must be some entity that does the constructing of life and organisms and the genome, etc. This truly does lead to creationism, but, if that is the position taken, then the path is pretty clear (it is as well pretty clear who takes such a position). On the other hand, the premise is clearly false. That is one of the central points of variation and selection constructivist models - things can be constructed, that fit particular selection criteria, without there being any external or teleological constructor. The possibility that the organism, mind, etc. does the constructing itself is dismissed with a question of how it becomes sufficiently complex to do that sort of thing. But the ensuing "discussion" seems to assume that there is no answer to this question. I have in fact addressed similar issues in multiple other places. And again, biological evolution itself is proof in principle of the possibilities of such "auto-construction".

> Bickhard writes, " Pragmatism forces a variation and selection constructivism: an evolutionary epistemology." This means even more constructions must be constructed, both those that survive the 'evolutionary trial' and those that don't.

Sorry about that, but if constructions are possible, then they are possible, and if the lack of foreknowledge requires that many constructions be made that are ultimately found to fail, then get used to it. I take it that the author is also greatly exercised about biological evolution, which similarly involves lots of errors along the way.

> The problem is, *any* representational theory - whether it employs virtual propositions or not - needs elements that are simply not found in nature. They need 'truth' and 'representation' and even (on most accounts) 'causality'. They need, in other words, precisely the sort of things an intelligent agent would bring to the table.

Are human beings not part of nature? Are frogs not part of nature? If they are part of nature, then "representation", "truth", and so on are also part of nature, and are in fact found in nature. The problem is to account for that, not to sneer at attempts to account for it. Or, if the preferred answer is that they are not part of nature, then that agenda should be made a little more clear, and we could debate naturalism versus anti-naturalism (dualism?) - or perhaps a simple physicalist materialism?

> Far from being an evolutionary theory of learning, this sort of theory is in fact a *creationist* theory of learning. It amounts to an assertion that the combination of a mind and some phenomena are not sufficient to accomplish learning, that some agency, either an intermediating external agency, or an internal homuncular agency, are needed. *But both such agencies presuppose the phenomenon they are adduced to explain.*

Since it is the author of these diatribes who rejected any kind of emergentist constructivism, it would seem that the epithet of "creationist" fits the other side. Certainly it does not fit the model I have outlined. Note also that the possibility of an agent doing his or her own construction is here rendered as "an internal homuncular agency". Where did that come from ("homuncular" was not in the earlier characterization of "auto" construction)? If constructions can generate emergents, then internal constructions can generate emergents, and, if those emergents are of the right kind, then what is to be explained is not at all presupposed. If anything legitimately follows from anything in this rant, it follows from the authors own assumptions, not from mine.

> In general, the ascription of such intentional properties - truth, meaning, causation, desire, right, interaction - which are not present naturally in the human mind or the phenomena it perceives can only be accomplished through some such circular form of reasoning. Historically, the existence of these properties has been used in order to deduce some necessary entity - an innate idea of God, an innate knowledge of grammar or syntax, or scaffolded construction, among others (the putative existence of this entity is then used to explain the phenomena in question, to add circularity on circularity).

Earlier, causation at least was located solely in the human mind. But I take it from this that intentionality is in toto supposed to be not a real class of phenomena; none of these

properties or phenomena actually exist - ?? If that is the position, then to what is the illusion of intentionality presented, or in what is the illusion of intentionality generated (constructed?). I cannot make enough sense of this to even criticize it. If what is being asked for (though not very politely) is an account of how such circularities regarding normative and intentional phenomena are to be avoided, then I would point to, for example:

Bickhard, M. H. (2006). Developmental Normativity and Normative Development. In L. Smith, J. Voneche (Eds.) Norms in Human Development. (57-76). Cambridge: Cambridge University Press.

Bickhard, M. H. (2005). Consciousness and Reflective Consciousness. Philosophical Psychology, 18(2), 205-218.

Bickhard, M. H. (2004). Process and Emergence: Normative Function and Representation. Axiomathes — An International Journal in Ontology and Cognitive Systems, 14, 135-169. Reprinted from: Bickhard, M. H. (2003). Process and Emergence: Normative Function and Representation. In: J. Seibt (Ed.) Process Theories: Crossdisciplinary Studies in Dynamic Categories. (121-155). Dordrecht: Kluwer Academic.

These properties, however, are interpreted properties. They constitute, at most, a way of describing something. They are names we use to describe various sets of phenomena, and do not exist in and of themselves. Consequently, nothing follows from them. Naming does not necessitate existence.

Since intentionality seems to have been denied, I fail to understand what "interpretation" or "naming" could possibly be. So, on his own account, these sentences seem to be meaningless - the basic terms in them have no referents (but, then, what is reference?).

I apologize for my paper having been the occasion for such mean spirited nugatory "discussion". I have tried to keep responses "in kind" to a minimum. I am not accustomed to such as this, though perhaps it constitutes a "learning experience".

My reply:

Mark H. Bickhard wrote:

> *It is difficult to reply to something with so many mis-readings, both of my own work and of others.*

I think this comment has as much to do with the other discussion as with this.

> *I cite Fodor concerning encodings because even he, as one of the paramount exponents of such a position, acknowledges that we don't have any idea of how it could happen. Since the focus of all of my critical remarks is against such an encodingist position, it's not clear to me how I end up being grouped with Fodor.*

One person can be against a person in one way, and grouped with him in another. A Protestant may be different from a Catholic, but this is not an argument against lumping them together as Christians. Similarly, though you disagree with Fodor on encoding, you nonetheless agree with him on mental contents (specifically, that they exist, that they have semantical properties, that they constitute representations, etc.). "Such indications of interaction possibilities," you write, "I will claim, constitute the emergence of a primitive form of representation." Moreover, "such indications of interactive potentiality have truth value. They can be true or false; the indicated possibilities can exist or not exist. The indications constitute implicit predications of the environment — this environment is one that will support this indicated kind of interaction — and those predications can be true or false."

Related: Clark Quinn asks, "Stephen, are you suggesting that there are no internal representations, and taking the connectionist viewpoint to a non-representational extreme?" Generally, yes. Though I wouldn't call it an "extreme". But let me be clear about this. I do not deny that there is a representationalist discourse about the mind (to deny this would be to deny the obvious). People certainly *talk* about mental contents. But it does not follow that mental contents *exist*. Just as, people may talk about unicorns, but it doesn't follow that unicorns exist. To me, saying 'there are representations' and saying 'there are interaction possibilities' is to make the same kind of move, specifically, to look at what might generally be called mental phenomena, and to claim to see in them something with representational and semantic properties. But since these properties do not exist in nature, it follows that they cannot be *seeing* them. Therefore, they are engaged in (as Hume might say) a *manner of speaking* about mental properties.

I am certainly not the first person to make this sort of observation. You could liken it to Dennett's 'intentional stance' if you like, though I would find a more apt analogy to be the assertion that you are engaging in a type of 'folk psychology' as described by people like Churchland and Stich. Yes, as Quinn suggests, a learning system can bootstrap itself. But there are limits. A learning system cannot bootstrap itself into omniscience, for example. As Quinn suggests, "the leap between neural networks and our level of discourse being fairly long." And in some cases, impossibly long - you can't get there from here. And my position is that the sort of system Bickhard proposes is one of those.

> *Certainly nothing actually written commits me to any kind of innatism - that too is one of my primary targets in my general work.*

I did not write that you are committed to innatism. I wrote that the position you take commits you to either innatism or external agency.

The reason is, if a mind (a neural network) cannot bootstrap itself into the type of representation you describe here, then the representation must come from some other source. And the only two sources are innate abilities (the move that Fodor and Chomsky take) or an external agency (the move creationists take). You can disagree with my primary assertion - you can say we can too get from there to here (though I don't see this as proven in your paper). But if my primary position is correct, then there is really no dispute that you are forced into one or the other alternative.

What you are *in fact* doing is giving us a story about external agency. This is evident, for example, when you say "It depends on whether or not the current environment is in fact one that would support the indicated kind of interaction." You want 'the environment' to be the external agent. But the environment works causally. And the environment does not (except via some form of creationism) work intentionally. It doesn't assert (*contra* the language you use) any sort of notion of 'true' or 'false'; it just *is*. What is happening is that you are giving the environment properties it does not have, specifically, counterfactuals, as in "one that *would* support the indicated kind of interaction." But there is no fact of the matter here. An environment's counterfactual properties depend on our theories about the world (that's why David Lewis takes the desperate move of arguing that possible worlds are *real*).

> *In fact, one of the primary paths away from the arguments for innatism is an emergentist constructivism. (This, of course, requires a metaphysical account of emergence - see the several papers and chapters that I have on that issue.)*

I have looked at what you have posted online.

> *I don't even know where to start regarding Hume, but there are some comments below as relevant to more specific issues.*

>> Representations, on this theory, constitute 'interaction possibilities', that is, possible responses an agent may undertake in response to given stimuli (or perceptions). These have all of the properties of representations (truth values, content) but - by virtue of being implicit, do not suffer from the pitfalls of representationalism. We don't need to show how it was caused by this or that, because only the interaction possibility, not the representation itself, is caused by the phenomena.

> *Representation is constituted, according to this model, by indications of interaction possibilities, not by interaction possibilities per se. And such indications are not caused, but, as attacked later, constructed.*

With all due respect, I consider this to be a sleight of hand.

Let's work through this level by level.

There are, shall we say, states of affairs - ways the world actually is.

Then there are representations - things that *stand for* the way the world actually is (the way you can use a pebble, for example, to stand for Kareem Abdul-Jabbar).

One type of representation (the type postulated by Fodor and company) is composed of sentences (more specifically, propositions). The difficulties with this position are spelled out in your paper. But another type of representation, postulated here, is composed of interactions.

Except that the interactions do not yet exist, because they are future events. Therefore, they exist only as potentials, or as you say (borrowing from Derrida?) "traces" of interactions.

Well, what can a 'trace' be if it is not an actual interaction?

It has to be exactly the same sort of thing Fodor is describing, but with a different name. It has to be some sort of counterfactual proposition. Only a counterfactual proposition can describe counterfactuals and stand in a semantic relation (ie., be true or false) to the world.

That's why I think this is just a sleight of hand.

> *I fail to see how even the account of Hume given supports the claim:*

>> If Hume's position (as understood here, and not mangled by Fodor) stands, then this proposition does not follow: "The world could not impress a competent interaction system into a passive mind. Interaction systems must be constructed."

> *That is:*

>> But what if, as Hume says, cause is nothing more than the natural human inclination to ascribe a relation between two objects when the one frequently follows from the other? What if causation itself is something humans bring to the table? This is certainly not passive perception - humans, on Hume's theory, though 'custom and habit' interpret a perception as one thing or another.

> *First, I'm not addressing cause at all.*

I'll give you this, but claim a chit, which I'll cash in below.

> *Second, Hume explicitly said that he had no idea how perception worked, so the claims being made on his behalf here are rather difficult to fit with Hume's position.*

Hume writes, "All the perceptions of the human mind resolve themselves into two distinct kinds, which I shall call IMPRESSIONS and IDEAS. The difference betwixt these consists in the degrees of force and liveliness, with which they strike upon the mind, and make their way into our thought or consciousness." And "There is another division of our perceptions, which it will be convenient to observe, and which extends itself both to our impressions and ideas. This division is into SIMPLE and COMPLEX." And "Having by these divisions given an order and arrangement to our objects, we may now apply ourselves to consider with the more accuracy their qualities and relations. This is from the *Treatise*, Book 1, Part 1, Section 1.[203]

Given that he then went on to compose three volumes based on the account of perceptions outlines here, I would say that he believed that he did indeed have a very clear idea of how perception works. What he does not claim to know, of course, is how perceptions are *caused*. But that is a very different matter.

For as to the specific claim about causation, "Cause is nothing more than the natural human inclination to ascribe a relation between two objects when the one frequently follows from the other," I turn to the *Enquiry: "*Suppose a person... to be brought on a sudden into this world... He

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[203] http://www.class.uidaho.edu/mickelsen/ToC/hume%20treatise%20ToC.htm

would not, at first, by any
reasoning, be able to reach the idea of cause and effect... Their conjunction may be arbitrary
and casual. There may be no reason to infer the existence of one from the appearance of the
other....Suppose, again, that he has acquired more experience, and has lived so long in the
world as to have observed familiar objects or events to be constantly conjoined together; what is
the consequence of this experience? He immediately infers the existence of one object from the
appearance of the other.... And though he should be convinced that his understanding has no
part in the operation, he would nevertheless continue in the same course of thinking. There is
some other principle which determines him to form such a conclusion...This principle is Custom
or Habit." *Enquiry* Section 5, Part 1, 35-36.[204]

I maintain that I have represented Hume correctly.

> *Third, interpretation, presumably based on custom and habit, is not necessarily passive,*
> *though Hume didn't have much of a model of activity beyond association.*

I was not the one to make that assertion. Hume is an empiricist, and it was you who cited the
principle that 'The mind is a passive receiver of input and knowledge'. As suggested, by 'custom
and habit' Hume doesn't mean much beyond association. I am willing to allow slightly more; for
example, I have in presentations asserted that beyond simple Hebbian association we can also
postulate activity such as Boltzmann 'settling' and 'annealing' along with, of course, some story
about back propagation (though, of course, *that* story involves past 'training' events, not
postulated traces of future training events).

I think that this seems to me to be non-controversial as a principle, that insofar as there is a
model of activity, this model of activity cannot ascribe to that activity forces other than the state
and nature of the brain itself, and stimulations of that brain (aka 'perceptions'). Specifically (and
this is where Clark Quinn calls me 'radical') I argue that it cannot include the postulation of
events or entities with semantical properties (aka 'mental contents', 'propositions',
'representations', and relevant to the current discussion, 'counterfactuals'). Because - though
you don't want me to lump you in with Fodor - the same sort of problems 'encodings' have are
shared by these other events or entities.

> *Fourth, such "interpretations" are not themselves caused, so they constitute a partial*
> *gesture in the direction of construction.*

I'll give you this - but claim the same chit I did above. We'll come back to this.

I'm arguing that such constructions are of indications of interaction potentials, and that the basic
properties of representation are emergent in such indications.

> *Fifth, independent of all of that, how does any such interpretation of Hume undo the*
> *basic point that "the world could not impress a competent interaction system into a*
> *passive mind"?*

[204] David Hume. An Enquiry Concerning Human Understanding. Section 5, Part 1, 35-36
http://darkwing.uoregon.edu/%7Erbear/hume/hume5.html

By "a competent interaction system into a passive mind" I mean the sort of entity you describe, that stands in a semantical relation to the world.

> *There appears to be a serious non-sequitur here. The comments about ripples and reflections would both seem to advert to cause in the mental realm, and how could that be rendered coherent given the other comments about cause, and do not address issues of interaction or interaction systems at all.*

> *... and yet does not advert to cause.*

The comment about ripples and reflections is a metaphor to suggest that the same kind of thing happens in the brain. 'Causation' is the theory used to explain both. My views on the nature of causation are similar to Hume's.

And - *just as* there is no 'truth' or 'representation' or 'indications of interaction potentials' in the ripples in the pond, nor either are there any such in the brain.

if the interaction system (so-called - I am saying 'so-called' because the resulting neural structure *may* be described as an 'interaction system' or may be described as something else) is *constructed* then there must be some entity that does the constructing.

> *I fail to see this at all. By this reasoning, there must be some entity that does the constructing of life and organisms and the genome, etc. This truly does lead to creationism, but, if that is the position taken, then the path is pretty clear (it is as well pretty clear who takes such a position). On the other hand, the premise is clearly false.*

OK, now I'm claiming my chit.

You are saying the following:

> *That is one of the central points of variation and selection constructivist models - things can be constructed, that fit particular selection criteria, without there being any external or teleological constructor.*

Now of course a "variation and selection model" is, essentially, evolution. In a thing that can be reproduced (such as, say, a gene) introduce some sort of variation (such as, say, a mutation) in various reproductions. Then, though some sort of test (such as, say, survival) select one of those variations to carry on the reproductive chain. It is, in other words, a fancy way of saying 'trial and error'.

Strictly speaking, "variation and selection constructivism" is a misnomer. The term 'construction' implies a deliberately formed entity with some goal or purpose in mind - in other words, an act of creation. It's like coming up with a theory of 'evolutionary creationism'.

Still, leaving the connotations aside, there is a story that can be told here. But there is a crucial difference between 'variation and selection' and what is being offered here.

An analogy: there is no sense to be made of the assertion that the species that remain, red in tooth and claw, after the ravages of natural selection, are 'true'. Nor indeed would anybody say that they 'represent' nature. It is even a stretch to say that they are the 'best'. They just happen to be what was left after repeated iterations of a natural process. There was no sense of truth, representation or morality in the process that created them, and hence there is no sense of truth, representation or morality in what was created. Even the phrase 'survival of the fittest' attributes an intentionality that is just not present. It could equally well be (given our world's experiences with comets and ice ages and humans) 'survival of the luckiest'. Certainly, the major attribute that explains the survival of, say, kangaroos, is 'living in Australia'.

So - *even if* a process of trial and error, or shall we say, variation and selection, results in a given mental state, from whence does it obtain its semantic properties? The state of affairs that produces a mental state could indeed produce any number of mental states (and has, so far, produced roughly ten billion of them through history). It would be a miracle that any of them, all by itself, would become *representative*, much less *true*.

The word 'construction' implies a 'construction worker' for a reason. The word 'construction' *suggests* semantic attributes. That is why it is no surprise to see Bickhard claim them in his essay.

So what is the difference between natural selection, which does not produce semantic properties, and variation and selection constructivism, which does?

It is this: the entities or events that do the selection in natural selection *actually exist*. They are *past entities* that could have actually informed the selection. The entities in the model postulated here, however, *do not exist* in the brain or the natural world. They are future events, counterfactuals, potentials or traces. They exist only insofar as they are postulated. But if they are postulated, we are begging the question of how they were created in the first place.

Natural selection makes a great scientific theory. It explains numerous phenomena, from the existence of alligators to the operation of the immune system. But natural selection makes a lousy semantic theory. The only way to introduce 'truth' or 'representation' or 'content' into such a system is to invent it, to introduce it surreptitiously using some sort of sleight of hand, as I have described above.

> The possibility that the organism, mind, etc. does the constructing itself is dismissed with a question of how it becomes sufficiently complex to do that sort of thing. But the ensuing "discussion" seems to assume that there is no answer to this question. I have in fact addressed similar issues in multiple other places. And again, biological evolution itself is proof in principle of the possibilities of such "auto-construction".

Biological evolution is proof of no such thing.

It is a mangling of the language to say that animals were 'constructed'.

There is, indeed, self-organization. I have referred to it myself many times. But it is not a process of 'construction'. It is not imbued of intentional properties. Mental states do not become

'true' or 'representational' because we evolve into them. We do not in any way 'select' them; *actual* phenomena (and not non-existing counterfactuals) strengthen one or another in our minds.

Bickhard writes, " Pragmatism forces a variation and selection constructivism: an evolutionary epistemology." This means even more constructions must be constructed, both those that survive the 'evolutionary trial' and those that don't.

> *Sorry about that, but if constructions are possible, then they are possible, and if the lack of foreknowledge requires that many constructions be made that are ultimately found to fail, then get used to it. I take it that the author is also greatly exercised about biological evolution, which similarly involves lots of errors along the way.*

Every iteration of a duck is slightly different from every other. I don't have a problem with that. I believe that the reproduction of ducks, of multiple diverse types of ducks, is a good thing.

But what I don't believe is that a reproduction of a duck can be described as a test of such-and-such a theory, that the natural variation of ducks produces some sort of 'true' duck or even an 'optimal' duck, much less a 'representational' duck. A duck is just a duck. It doesn't mean anything.

> > The problem is, any representational theory - whether it employs virtual propositions or not - needs elements that are simply not found in nature. They need 'truth' and 'representation' and even (on most accounts) 'causality'. They need, in other words, precisely the sort of things an intelligent agent would bring to the table.

> *Are human beings not part of nature? Are frogs not part of nature? If they are part of nature, then "representation", "truth", and so on are also part of nature, and are in fact found in nature. The problem is to account for that, not to sneer at attempts to account for it. Or, if the preferred answer is that they are not part of nature, then that agenda should be made a little more clear, and we could debate naturalism versus anti-naturalism (dualism?) - or perhaps a simple physicalist materialism?*

When you say things like "The problem is to account for that, not to sneer at attempts to account for it" you are making exactly the same move people like Chomsky and Fodor make (you may as well have said 'poverty of the stimulus' and quoted Chomsky directly).

We have, it is argued, the capacity to think of universals, such as 'all ducks quack'. But universals do not exist in nature (because they extend to non-existent future events). Therefore... what? Chomsky says they must exist in the mind. You say... what? That they are the result of trial and error? How would *that* work for these non-existing future events?

What is the case, in fact, is that what we think are universals, what we *call* universals, are not actually universals. They are summarizations, they are abstractions, they are something that *can* actually coexist with the stimuli, however impoverished.

You cannot *assume* representations in order to argue for a representational theory of mind.

> Far from being an evolutionary theory of learning, this sort of theory is in fact a creationist theory of learning. It amounts to an assertion that the combination of a mind and some phenomena are not sufficient to accomplish learning, that some agency, either an intermediating external agency, or an internal homuncular agency, are needed. But both such agencies presuppose the phenomenon they are adduced to explain.

> *Since it is the author of these diatribes who rejected any kind of emergentist constructivism, it would seem that the epithet of "creationist" fits the other side. Certainly it does not fit the model I have outlined. Note also that the possibility of an agent doing his or her own construction is here rendered as "an internal homuncular agency". Where did that come from ("homuncular" was not in the earlier characterization of "auto" construction)? If constructions can generate emergents, then internal constructions can generate emergents, and, if those emergents are of the right kind, then what is to be explained is not at all presupposed. If anything legitimately follows from anything in this rant, it follows from the authors own assumptions, not from mine.*

This really is a gloss of my position, and not a particularly kind one. I hope this version of it is clearer.

> In general, the ascription of such intentional properties - truth, meaning, causation, desire, right, interaction - which are not present naturally in the human mind or the phenomena it perceives can only be accomplished through some such circular form of reasoning. Historically, the existence of these properties has been used in order to deduce some necessary entity - an innate idea of God, an innate knowledge of grammar or syntax, or scaffolded construction, among others (the putative existence of this entity is then used to explain the phenomena in question, to add circularity on circularity).

> *Earlier, causation at least was located solely in the human mind. But I take it from this that intentionality is in toto supposed to be not a real class of phenomena; none of these properties or phenomena actually exist - ?? If that is the position, then to what is the illusion of intentionality presented, or in what is the illusion of intentionality generated (constructed?). I cannot make enough sense of this to even criticize it.*

Oh goodness, what an equivocation.

When I say that 'unicorns only exist in the mind' I am not in any way asserting that large (or I guess very tiny?) horned horses are prancing about the cerebral cortex.

> *If what is being asked for (though not very politely) is an account of how such circularities regarding normative and intentional phenomena are to be avoided, then I would point to, for example:*

Bickhard, M. H. (2006). Developmental Normativity and Normative Development. In L. Smith, J. Voneche (Eds.) Norms in Human Development. (57-76). Cambridge: Cambridge University Press.

Bickhard, M. H. (2005). Consciousness and Reflective Consciousness. Philosophical Psychology, 18(2), 205-218.

Bickhard, M. H. (2004). Process and Emergence: Normative Function and Representation. Axiomathes — An International Journal in Ontology and Cognitive Systems, 14, 135-169. Reprinted from: Bickhard, M. H. (2003). Process and Emergence: Normative Function and Representation. In: J. Seibt (Ed.) Process Theories: Crossdisciplinary Studies in Dynamic Categories. (121-155). Dordrecht: Kluwer Academic.

> These properties, however, are *interpreted* properties. They constitute, at most, a way of describing something. They are *names* we use to describe various sets of phenomena, and do not exist in and of themselves. Consequently, *nothing follows* from them. Naming does not necessitate existence.

Since intentionality seems to have been denied, I fail to understand what "interpretation" or "naming" could possibly be. So, on his own account, these sentences seem to be meaningless - the basic terms in them have no referents (but, then, what is reference?).

I apologize for my paper having been the occasion for such mean spirited nugatory "discussion". I have tried to keep responses "in kind" to a minimum. I am not accustomed to such as this, though perhaps it constitutes a "learning experience".

To take offense at my response is ridiculous. It was certainly not mean-spirited, rude, or anything else. Again, I think you are attributing the properties of some other discussion to this one. I cannot otherwise understand why you would object to my response.

Indeed, in the spirit of completeness, perhaps you can point to sentences in my previous response where I was *in fact* mean spirited, nugatory, rude, or anything else. What specific sentences did you find objectionable? I most certainly have no wish to cause offense, though I certainly do not take that to preclude the possibility of disagreeing with you.

I submit that I interpreted your position correctly, interpreted Hume correctly (among others), and have fairly and successfully criticized your presentation, and that I did so in an academically responsible manner.

(Update: 2011 – the moderator of ITForum refused to allow this response to be posted on the list, and to allow me to continue this discussion. I therefore retired from all further discussions on ITForum.)

Moncton, April 23, 2007

Connectivism, Peirce, and All That

I was asked:

> You drew a black box, and typed the words Black Box over it. You then started to talk about that more when I typed in the IM something about C.S. Peirce's triads, to which you responded vocally: "I'm trying to get away from that" (or words very much like that).
>
> I really need to understand why you are trying to get away from Peircian representations of the triadic relation between the signs and symbols we use for things in our knowledge bases.

Off the top of my head (so my wording may not be precise, recollections not exact, etc.)

From where I sit, the picture from word to object is fraught with difficulties.

- there is the case where the object does not exist, and yet the word continues to have meaning. For example, 'brakeless trains are dangerous', to borrow from Russell. The whole area of counterfactuals in general. Which, if we follow the inferential trail, would have us believing with David K. Lewis that possible worlds are real. So *minimally* the meaning of the word, with respect to the object, must take place with respect to a theory or theoretical tradition.

- there is the case of indeterminacy of translation. The meaning of the word, with respect to the object, may be for one person very different from that of another person. Quine: the word 'gavagai' may refer to the rabbit itself, or the rabbit-stage of adulthood, or something else. Our inferences regarding meaning must be based on 'analytic hypotheses', which are themselves tentative.

- the skeptical argument. Inferences based on words are underdetermined with respect to the reference of those words. Nelson Goodman, for example - the extension of 'green' is the same as 'grue', yet the next instance of an object is 'green' but not 'grue'. Therefore the meaning of 'green' and 'grue' are different, despite being established through the exact same set of experiences and/or objects in the world. This argument is similar to the private language argument as depicted by Kripke in his account of Wittgenstein's thesis of 'meaning is use'.

And so on..

So, the approach to meaning I have adopted and understand to be a better way of thinking about it:

- the meaning of the word does not lie in anything distinct from actual instances of the word (by analogy: the colour 'red' does not lie in anything distinct from instances of the colour 'red'; the quantity '1' does not lie in anything other than instances of the quantity '1').

- these instances occur in two separate environments, a personal environment, composed of neurons and connections, thoughts, perceptions, etc., and a public environment, composed of people, artifacts, architecture, other objects in the world, utterances, radio transmissions, etc.

- in each of these environments, instances of the word are embedded in a network of non-meaningful entities. In a person, thoughts (beliefs, memories, knowledge of, etc.) the word are contained in a network of neurons, no one of which (or identifiable set of which) comprises the word itself or the meaning of the word. Similarly, in the public environment, instances of a word appear in a wider network of non-meaningful entities (marks on paper, audio waves, digital data).

- our perception of the word itself, and of the meaning of the word (for that's what it is) is a form of pattern-recognition. Meaning is emergent from a substrate of non-meaningful, but connected, entities. In the personal environment, the meaning of the word is the perception of the word as an emergent phenomenon; in the social environment, the meaning of the word is the use of the word. (Thus, conversely, any emergent phenomenon, any artifact that is used, can have meaning, but again, the meaning is nothing more than the perception and use of that artifact). There is not a 'stands for' relationship; words are 9as they could say in database theory) 'content-addressable'.

Moncton, January 30, 2011

Brakeless Trains - My Take

(*Note to philosophers: this represents only my take on the brakeless trains[205] example, and is not intended to be a full and accurate depiction of Russell's argument [206] (and does not even mention Strawson's response).[207] [208] I am concerned here not for exegetical accuracy, but rather, a clear tracing of my thinking on the subject.*)

On 02/25/2011 2:26 PM, Savoie, Rod wrote, referring to 'Connectivism, Peirce and All That[209]:

"there is the case where the object does not exist, and yet the word continues to have meaning. For example, 'brakeless trains are dangerous', to borrow from Russell. The whole area of counterfactuals in general. Which, if we follow the inferential trail, would have us believing with David K. Lewis that possible worlds are real. So *minimally* the meaning of the word, with respect to the object, must take place with respect to a theory or theoretical tradition."

Is there a word in that sentence ("brakeless trains are dangerous") that continues to have meaning whereas the object does not exist?

I replied:

Yeah - there's no such thing as a 'brakeless train' - all trains, and all; trains that have ever existed, have had brakes. So there is nothing that the noun phrase 'brakeless trains' refers to.

When you combine symbols (brakeless & trains), it is more a logic problem than a symbol/object problem.

The quick answer is to say we can just combine the terms. But when we are trying to understand the meaning of the sentence, combining terms is insufficient.

Let me explain (again, loosely following Russell):

When we say "brakeless trains are dangerous", are we saying "there exists an x such that x is a brakeless train and x is dangerous"? Well, no, because we are not saying "there exists an x such that x is a brakeless train."

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[205] OK, Russell's actual example is "the present king of France is bald" – the 'brakeless trains' example has a much older history as an example of the existential fallacy. I probably got it from Richard Braithwaite, Scientific Explanation: A Study of the Function of Theory, Probability and Law in Science. Cambridge University Press. May 1, 1968. p. 305. But the point still holds – 'the present king of France' can be true or false even if there is no king of France (it's false, because there is no king of France).

[206] Bertrand Russell. On Denoting. *Mind*, New Series, Vol. 14, No. 56, pp. 479–493, October, 1905. http://cscs.umich.edu/~crshalizi/Russell/denoting/

[207] Strawson, P. F. (July 1950). "On Referring". Mind 59 (235): 327, July, 1950. http://www.jstor.org/discover/10.2307/2251176?uid=16783488&uid=3739416&uid=2&uid=3737720&uid=16732880&uid=3&uid=67&uid=62&sid=21100694093301

[208] Sveinbjorn Thordarson. Strawson's Critique of the Russellian Theory of Description. Website. October 31, 2005. http://sveinbjorn.org/strawson-russell

[209] Stephen Downes. Connectivism Peirce and All That. Half an Hour (weblog). February 4, 2011. http://halfanhour.blogspot.ca/2011/02/connectivism-peirce-and-all-that.html

So, how about, "there exists an x such that x is brakeless and x is a train and x is dangerous"? This is the 'combining terms' approach. But no, because we are not saying "there exists an x such that x is brakeless and x is a train."

Therefore, the statement "Brakeless trains are dangerous" cannot be rendered as an existential statement.

What we really mean by the statement is the counterfactual: "For all x, if x is a brakeless train, then x is dangerous." But what could we mean by such a statement? If meaning is what the statement refers to, or what makes the statement true, then the statement is essentially meaningless, because

"For all x, if x is a brakeless train, then x is dangerous."

is equivalent to

"For all x, x is not a brakeless train or x is dangerous."

which means that our meaning is satisfied by reference to all things that are not brakeless trains, that is to say, everything in the world. Which means that our statement has exactly the same meaning as "The present king of France is dangerous," as the two sentences refer to exactly the same set of entities.

Perhaps, you might think, what we are talking about is not a union of the two sets, but an intersection. But the intersection of the set of 'brakeless trains' and the set of 'things that are dangerous' is empty, because there are no brakeless trains. Creating a three-set Venn diagram does not help either, because the intersection of 'things that are brakeless', 'things that are trains', and 'things that are dangerous' is also empty.

But what does it mean to combine symbols, if it does not mean to create the intersection of sets of objects denoted by the separate symbols? This is especially the case for a philosophy in which all statements depend on reference to experience for their truth. But even if you allow that some statements do not depend on reference to experience for their truth, the problem nonetheless remains, because there is no apparent way to create an inference to the conclusion 'brakeless trains are dangerous' that is not derived from the empty set, ie., derived from a contradiction.

Symbols are not limited to physical objects (because you seem to make that inference in your argument, but I do know that you don't necessarily think that).

Quite so. Symbols are not limited to physical objects. But for those symbols that are not limited to physical objects, where do they get their meaning? In semiotics generally, it must be something that is not the symbol itself; it must be from whatever the symbol signifies. Because it is the state of affairs in whatever the symbol signifies that will, for example, allow us to determine whether a statement containing the symbol is true or false.

You can make stuff up. You can give 'nothingness' a sense. (Sartre) Or 'time'. (Heidegger) Or 'history' (Marx). Or 'spirit'. (Hegel). Or space-time. (Kant) Or the self. (Descartes) But to

philosophers who base their meaningfulness in experience, such as the positivists (and such as myself), the philosophies thus created are literally meaningless. What makes a statement involving one or the other of them true or false? The appeal is always to some necessity inherent in the concept. But necessities are tautologies, and from a tautology, nothing follows.

So what do symbols mean, if they do not refer to physical objects? This now becomes the basis for the issues modern philosophy. By far the primary contender is this: the symbols derive their meaning from a representation, where the representation may or may not have a direct grounding in the physical world.

For example, *i* - the square root of -1. It is clear that *i* does not refer to any number, because the square root of -1 does not exist. Nonetheless, the symbol *i* has a meaning - I just stated it - and this meaning is derived from the fact that it is postulated by, or embedded in, a representation of reality, ie., mathematics.

But what is the grounding for a representation? If we say "*i* has meaning in P', where does the representational system P obtain its meaning? It must have some, if only to distinguish it from being a 'castle in the air'. But more, if there is to be any commonality of representation, any communication between people using representational systems, then the representational system must in some way be externally grounded. Because, if *i* derives its meaning from its being embedded in the representational system, then, so does the symbol '1'. Because if you allow parts of your representation to have their meaning derived totally by reference to the physical world, you're right back where you've started, with essential elements of the system (like time, negation, self) without any external referent.

There are some options:

- picture (early Wittgenstein) - the representation is a picture or image of that which is represented
- coherence (Davidson) - it is the internal consistence of the representation itself that guarantees its truth
- cognitivism (Fodor) - the representation is innate
- possible worlds (Lewis) - the representation is grounded by reference to possible worlds
- pragmatism (James) - the representation is useful
- use, or pragmaticism (Peirce) - the effect of the meaning on action, or (later Wittgenstein) the use of the representation

In special cases, there are even more options. In probability theory, for example, there are three major interpretations:

- logical (Carnap) - the probability is the percent of the logical possibilities in which p is true
- frequency (Reichenbach) - the probability is the observed frequency in which p is true
- interpretive (Ramsey) - the percentage at which you would bet on p being true

As you can see, any of these could be applied to the statement that 'brakeless trains are dangerous' and we would have a story to tell, everything from the idea (from Davidson) that it is consistent and coherent with our understanding of trains, if not derived from it, that brakeless

trains are dangerous, to (James) the usefulness of posting a sign to that effect in a train factory, to (Ramsey) how much an insurance company would be willing to cover you for were you to ride on a brakeless trains.

Which of these is true? They all are. Or to be more precise: none of them are. There is no external reality to which any of these 'representations' needs to set itself against in order to be true (or effective, or useful, etc.). They are each, in their own way, a self-contained system. And each of our representations of the world is a combination of some, or all, of them. The meaning of any given term in a representation is distributed across the elements of that representation, and the meaning of the term consists in nothing over and above that.

The entities though so vital to the determination of truth in a representation - external objects, self, time, being, negation - are elements of the representation. The representation represents - no, is - the sum total of our mental contents.

So we come back to the initial question:

Is there a word in that sentence ("brakeless trains are dangerous") that continues to have meaning whereas the object does not exist?

And it follows that, if the phrase 'brakeless trains' does not refer to, or even represent, some external reality, none of the words in that sentence does. There are not special cases where some words refer and other words do not; all the words are, as it were, in the same boat. The case of 'brakeless trains' illustrates a case that applies to all words, even if it is only most evident in this particular example.

Moncton, February 4, 2011

Meaning as Medium

McLuhan's 'The medium is the message' has always been interpreted to mean discussion about the physical substrate. That allows people to talk about an electric light build as carrying a message. or to say things like 'the same content on television means something different than that content in a newspaper'. Etc.

But I thing there's another, more subtle, aspect to the slogan 'the medium is the message'. And that is this: that the 'meaning' of a message isn't the meaning of the words (say) contained in the message. That this content is the *carrier* for the message, which is (in a certain sense) subsymbolic. For example, when you say 'Get out of town' to a lawbreaker, you mean one thing, and when you say 'Get out of town' jokingly to a friend, you say something else. The 'message' - that is, the words 'Get out of town' - do not constitute the content of the message at all; the 'content' is actually the reaction produced in the receiver by the message (which is why an electric light bulb and a 300 page book can both be messages).

Now we can take this a step further (and this is what I think of 'the medium is the meaning'). The 'meaning' of the message, properly so-called, is constituted of the state of affairs described (referred to, represented by) the message. Thus, 'snow is white' means that snow is white. But this meaning is not the *content* of the message. You may be telling me that 'snow is white' but what you are actually *saying* depends on a wide range of factors - whether or not I had previously thought that snow was white, for example. On this view, again, you would think of the meaning as the *carrier* of the content.

But what is the message? It is a bit misleading to think of it as something that is actually 'carried'. Because, at best, it represents some *intent* on the part of the sender, and intent isn't something that can be carried in a message (it can be *expressed* in a message, but this is something very different). This is important because it breaks down the idea that there is some zone of shared meaning (or whatever it's called) between the two speakers. Even if there *is* a shared meaning, it's irrelevant, because the meaning is just the medium. It is simply the place where the interaction occurs. There is an interaction, but the interaction is not the transfer for some meaning. Rather, it is an attempt by a sender to express an *intent* - that is, to carry our some action (specifically, the action of causing (something like) a desired brain-state to occur in the listener).

The 'content', as McLuhan would say, is the receiver. More precisely, the content is the resulting brain state. The content is the change in belief, attitude, expression, etc., in the listener, that is a result of the transmitting of the message, the rest of the environment at the time, and the receiver's internal state. "What colour is the wall," asked the listener. You turn on the light bulb. "Ah, I see," he says.

This entire system is fraught with incompleteness and vagueness. The sender, for example, can only have a partial idea of the content he or she is actually sending with a message. There is the sender's intended content ('the wall colour is green') which - inescapably - becomes

entwined with a host of associated and unassociated content when encoded into those words. Because the set of words 'the wall is green' is inevitably a crude abstraction of the actual mental state the sender wishes to reproduce in the listener. The encoding itself encodes, *en passant*, a raft of cultural and situational baggage. It exposes the sender as an English speaker, who uses the system of six primary colours, who is referring to a terrestrial object (otherwise, it would be the 'bulkhead'), etc. The tone of voice, handwriting, etc., can contain a multitude. And the like. The actual transmission can best be seen only as a *scrap* - the barest hint, which will allow the receiver to build a complex mental picture, one which presumably accords with the one the sender had hoped to create.

The received receives the sentence 'the wall is green' and decodes the 'meaning' of the sentence, which is a reference to a colour of a wall. This may or may not have been accompanied by some sensory experience or action (the turning on of a light bulb, say). These all, depending on all the other factors, cause a new mental state to emerge in the user's mind. It may even be accompanied by some internal perceptions (such as mental talking to oneself). The receiver may think, on hearing the sentence, "he thinks I'm stupid." It should be clear that the 'content' of the message, as received, may have little to do with the content of the message as sent. Moreover, the sender *knows* this. The sender may *intentionally* cause the receiver to receive the insult. The expression of the intent may be *semantically unrelated* to the intent itself (just as the swinging of a bat is semantically unrelated to the hitting of a home run - it is only when viewed from a particular perspective that one can conjoin the one as an expression of the intent to do the other).

This isn't unique, of course. J.L. Austin spoke of 'speech acts' decades ago. John Searle talks about 'indirect' or 'illocutionary' speech acts. Max Weber talks about 'sense' and 'intention'. Wittgenstein's doctrine that 'meaning is use' could be considered an 'action theory of language'. Habermas talks about language as the vehicle for social action.

And there may not be any specific intent (not even of externality) in the sender's mind. "He talks just to hear the sound of his own voice." A lot of communication is just verbal flatulence. It nonetheless has content, because it nonetheless has an effect on the listener (however minimal). The actual effect may have little, if anything, to do with the intended effect. Semantics is distinct from cause; the sender's intention does not have causal powers, only his or her actions do (and intention underdetermines action, and action under-expresses intention). That said, we are sensitive as listeners to this intention, and have a means (mirror neurons, for example) of perceiving it.

Language is the vehicle we use to extend ourselves into the world. It is what we use to express our intent, and hence to manifest our thoughts as external realities.

Moncton, February 05, 2008

Patterns of Change

Submitted to the Critical Literacies course blog, June 7, 2010.

Change is with us every day. Life would not be possible without it. Change may seem chaotic and unpredictable, but most change occurs in patterns that we can see and recognize.

This post isn't an attempt to be the final word on patterns of change. Rather, it is an attempt to introduce the idea and encourage people to think systematically about it.

Linear Change

Think about a car driving along the highway. Its position is changing every minute, every second. If the driver stays at a constant speed, then its position changes at a steady pace.

Driving at 60 mph, for example, the car will travel at one mile per minute. After one minute, it has travelled one mile. After 10 minutes, 10 miles. After 60 minutes – one hour – 60 miles.

This is linear change. It is change that occurs at a static pace. If represented on a graph, it would look like this:
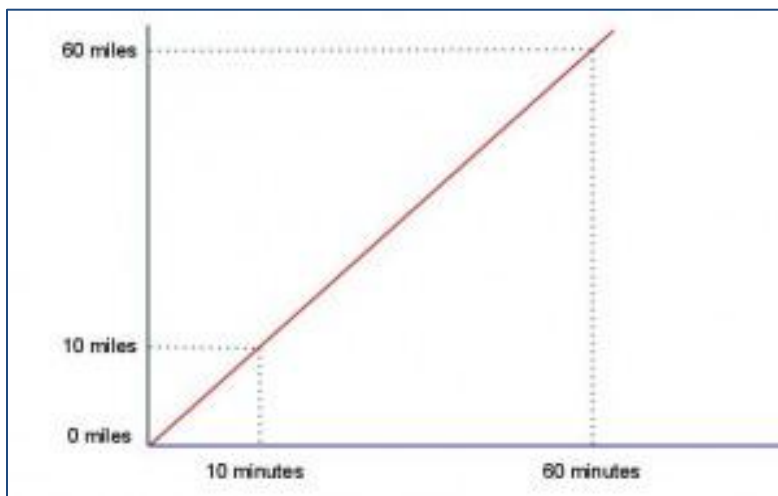
Linear Change

Notice that the graph is a straight line. That is why we call this linear change.

There are many examples of linear change in your everyday life. For example, if water runs steadily from a tap, the pot fills up at a constant rate. Or for example, if a new brick is added to a wall every 30 seconds, then the wall will grow at a linear rate.

A significant proportion of educational theory is based on some sort of linear change. Here's an example from a blog[210] I was reading today:

Personal Social Learning Continuum - source: aLearning Blog
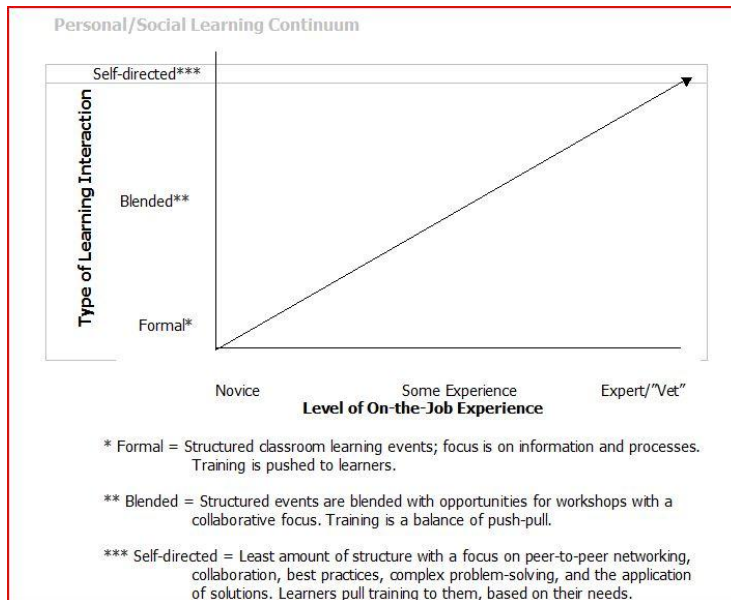
It is typical to think of student progress, or learning progress, or some other sort of progress, as happening in a straight line based on some factor or another. But it would be misleading.

Linear change is so common in our lives there is a temptation to think of all change as linear change. It's very easy to be lulled into this.

The stock market, for example, seems to rise at a fairly steady rate over a period of time. We come to expect this change, and to count on it. And then we're surprised when it suddenly falls.

Or, closer to home, the value of our house rises steadily, year after year. We come to expect this to continue indefinitely, and are not prepared for the day housing prices fall.

Or, you are sliding down a hill. This feels a lot like driving or riding a bicycle, so you expect your speed to be constant. But all of a sudden, you are going much faster than you intended. Your rate of change has increased, catching you by surprise.

Nothing lasts forever. Things that change at a steady pace may appear to be easy to predict, something you can count on, but eventually something changes – the road ends, your gas runs our, you hit a hill, the water stops running, something – and your linear change becomes something else.

A linear change can change in two ways:

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[210] Ellen Behrens. It Doesn't Have to Be That Hard. aLearning Blog. June 6, 2010. http://alearning.wordpress.com/2010/06/06/it-doesnt-have-to-be-that-hard/

Acceleration[211] or *speeding up* - the change can speed up. Something that appeared to change constantly can start changing faster and faster. If you press on the gas while driving a car, for example, your speed will accelerate.

Deceleration or *slowing down* – the change can slow down or even come to a stop. In extreme cases, it can even reverse. If you press on the brake (or hit a wall) while driving, your speed will decelerate.
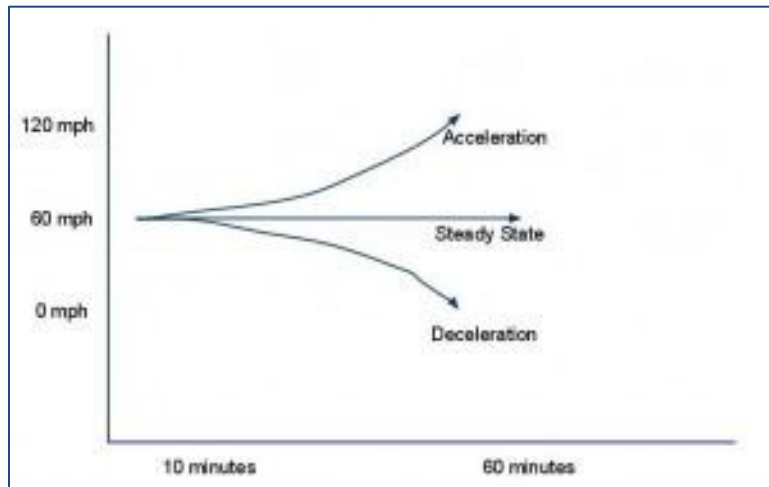
Acceleration and Deceleration

In general, you can use linear change to make *short term predictions*, but because linear change tends to change, you need to watch for signs of acceleration or deceleration. Any time a course of action depends on constant, linear change you need to have *contingency plans* – or *back-up plans* – for sudden changes.

That's why we have seatbelts in cars; it's a contingency, in case the car's speed suddenly slows. That's why we have blowout valves in oil wells; it's a contingency in case the flow of oil suddenly increases. Many of the devices that are restraints or governors of some sort are contingencies, devices intended to deal with unexpected acceleration or deceleration.

Exponential Change

Sometimes a change keeps in changing. If you keep your foot pressed on the accelerator you go faster and faster, for example. When you are falling, you fall faster and faster. The rabbit population in your back yard grows faster and faster every day.

This sort of change is called *exponential change*. It is change that does not progress at a steady rate, like linear change, but which occurs at a faster and faster rate.

To picture exponential change, you can construct a simple mental model by imagining what happens when bacteria cells multiply. A single bacteria cell might divide into two cells once

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[211] Wikipedia. Logarithmic Scale. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Logarithmic_scale

every 20 minutes, for example (this is actually how fast *e coli* multiplies). This is known as its *doubling rate*.

So, after 20 minutes, we have 2 *e coli* cells. After 40 minutes, each of those has divided into two, and we have four *e coli* cells. After an hour, they have divided again, and we have eight *e coli* cells. In another hour, we have 64 cells. And so on. We're not just adding *e coli* cells to the mix, we're *multiplying* them, so the number of cells increases at a faster and faster rate.

Here's what it looks like on a graph:
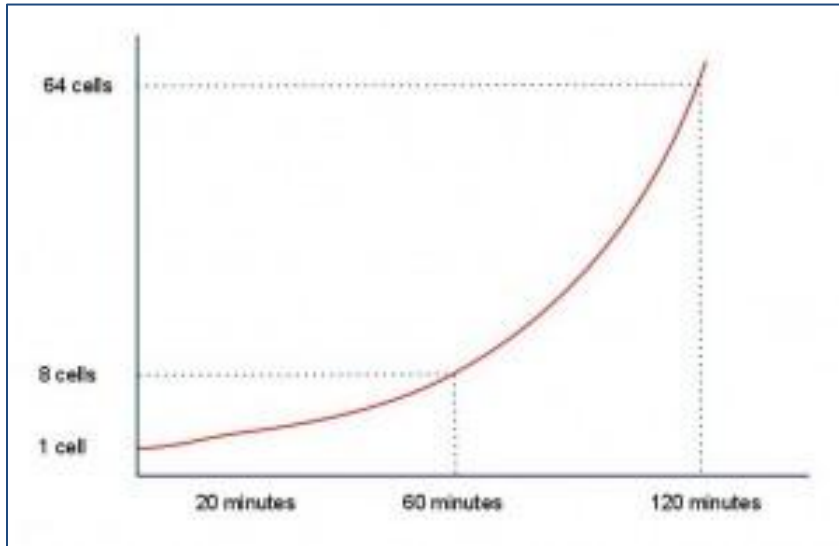
Exponential Change

Today you read a lot of people write that we are experiencing a time of exponential change in our society. This is because the rate of change of different things seems to be happening more and more quickly.

World population[212], for example, has been increasing exponentially. World population was 1 billion in 1800, 2 billion in 1920, 3 billion in 1960 (the year after I was born), 4 billion in 1965, and 6 billion in 2000.

The pace of technological change has also been exponential. Moore's Law[213] says that processor power will double once every 18 months. Because this is a *multiplier* we know that it produces exponential change.

Because exponential change can grow so rapidly, we sometimes use a different type of graph to represent it. Graphed, the pace of technology change would look much like the pace of *e coli* growth depicted above. But this would make it very difficult to represent.

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[212] Wikipedia. World Population. Accessed June 7, 2010. http://en.wikipedia.org/wiki/World_population
[213] Wikipedia. Moore's Law. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Moore%27s_law

So instead, we use that is called a *logarithmic*[214] graph. Here's a logarithmic graph of Moore's Law:
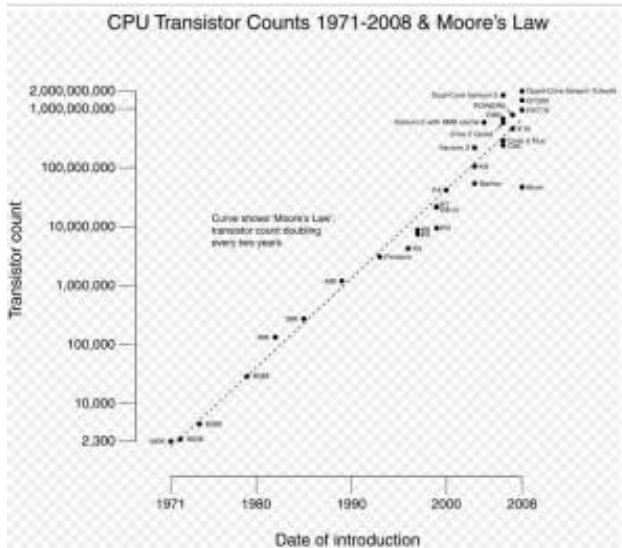
Moore's Law - Source, Wikipedia

Notice that on the left-hand axis (the *Y-Axis*, which runs up and down) we count the values not one by one but exponentially – 10, 100, 1000, 10000, and so on. In this type of graph, an exponential change looks like a straight line. This makes it easier for us to understand.

Models of progression typically invoke either linear change or exponential change. Consider, for example, the development of society[215] in human history. We progressed from the hunter-gatherer stage to agriculture to industrial and now an information-age society. The very concept of *progress*[216] has, embedded in it, some notion of constant linear change, whether at a steady rate or an ever-increasing rate.

There is a danger to this. As with static linear change, we can come to expect change to continue indefinitely. Consider, for example, the advancement of the stock market. This is what we saw in 2000:

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[214] Wikipedia. Logarithmic Scale. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Logarithmic_scale
[215] E. Wilma van der Veen. Patterns of Social Change. Social Change: SOC A405 (course website), University of Alaska, Anchorage. October 11, 2002 http://stmarys.ca/~evanderveen/wvdv/social_change/patterns_of_social_change.htm
[216] Wikipedia. Social Progress. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Social_progress
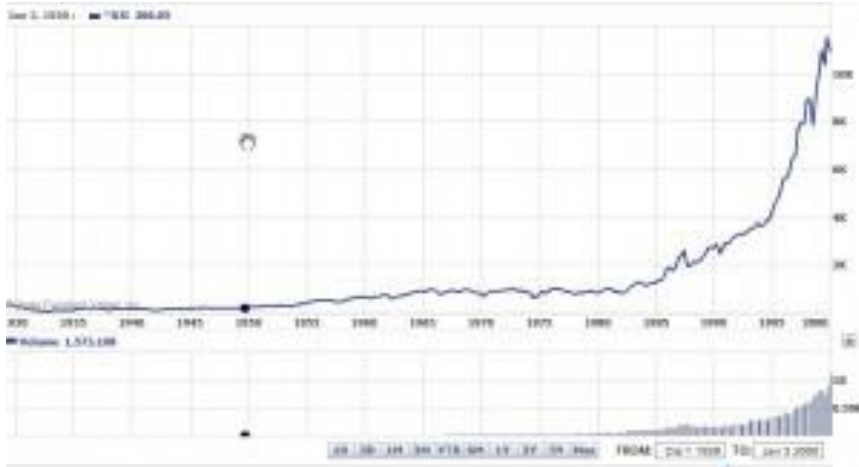
Dow Jones 1928-2000 - Source: Yahoo Finance

This has a few bumps, but it's pretty clearly an exponential change. It was on the basis of this long-term chart that investors were advices to "buy and hold" and "invest for the long term." The fluctuations were minor compared to the overall trend. And so we based the economics of everything from mortgages to retirement accounts to business plans on this sort of long-term growth.

But look at the same chart extended to 2010:
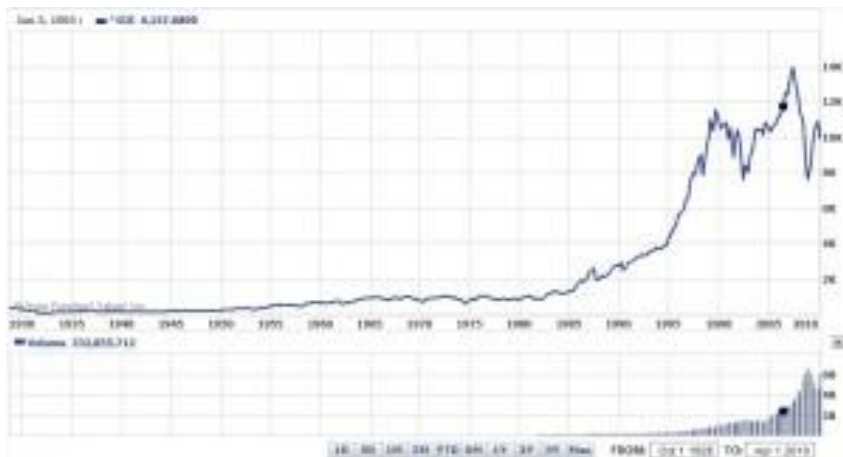
Dow Jones 1928-2010 - Source: Yahoo Finance

The exponential change has come to a dead halt. There was a crash after 9-11 and then another crash eight years later as the housing bubble burst. Overall, through the decade, there has been no growth in stock values at all. Other economic indicators have become similarly stagnant.

Exponential change can look inevitable when you're in the middle of it. But like linear change, there's always the possibility that the acceleration will decrease and even reverse. When this

happens, the results can be even more destructive, because we will have built systems based on constantly accelerating growth, not a steady state or even a decline.

Parabolic Change

There's an old saying: what goes up much come down. This is a principle we can rely on in many circumstances. Throw a baseball into the air – it will rise higher and higher for a certain time, but eventually it will fall back to earth.

This is parabolic change. It represents a situation that is limited in duration or extent, and where the changing factor will return to its origin. It looks like this on a graph.
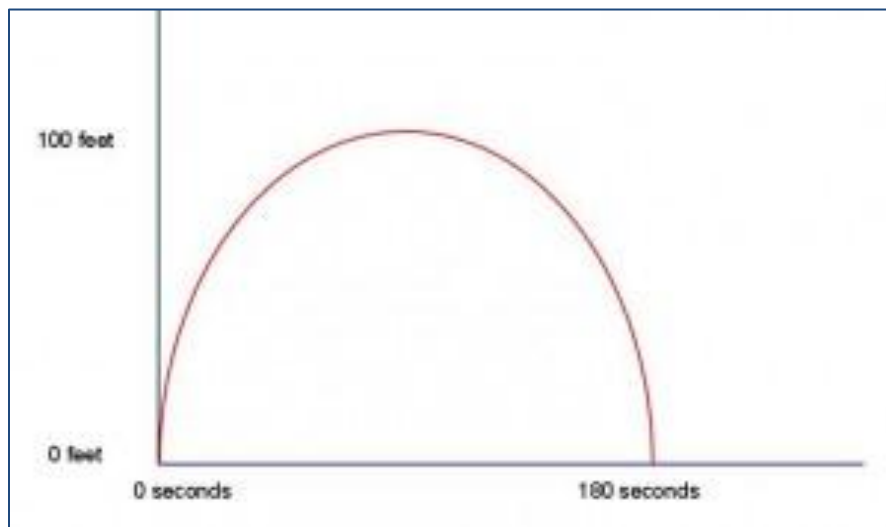
Parabolic Change

There are many examples of parabolic change. The consumption of a limited resource, such as oil, is a good example. Consumption rises for a while as oil is found and refined. However, at a certain point in time – *peak oil* – the supply begins to fall, and as a result, our consumption of it begins to slow. Eventually, once all the oil is gone, consumption returns to zero.

Another example – interestingly – is the human life. When we are born we have few capacities. Gradually we grow, and get stronger, more agile, and smarter. But this (despite the confidence of youth) does not continue indefinitely. As we age, we slow down, become weaker, and even lose of of our mental abilities. Finally we die, and our capacities return to what they were before we were born, to zero.

Arnold Toynbee[217] describes the arc of civilization in this way. Civilizations rise and fall, he writes[218], in a constant and predictable way. They expand in (more or less) a circular fashion

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[217] Wikipedia. Arnold J. Toynbee. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Arnold_J._Toynbee
[218] Nobs. A Study of History. Website. October 17, 1993. http://nobsword.blogspot.ca/1993_10_17_nobsword_archive.html (update: 2012 – I have no idea what I was thinking with this reference. Here's a proper reference: Arnold J. Toynbee. A Study of History. Oxford University Press, 1987 http://books.google.ca/books/about/A_Study_of_History.html)

until they grow too large for their infrastructure to support. Then, because of this, they begin to decline. "Things fall apart; the centre cannot hold."

Not all such changes need to be a perfect parabola. Things can rise very slowly and fall very quickly – "It takes years to build a good reputation, and only seconds to destroy it" – and an arc can rise and drop sharply.In drama, we sometimes talks about the *story arc*, and this is typically a type of parabolic change, but is not a nice smooth progression. Consider this arc[219] from *Buffy the Vampire Slayer*:
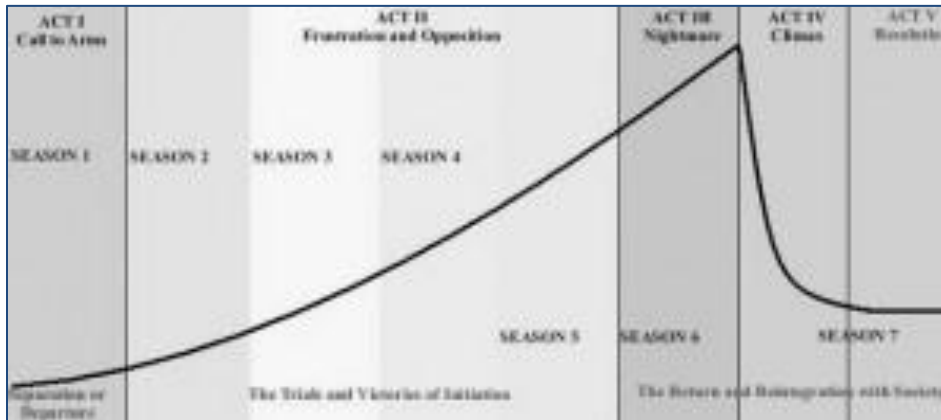
Buffy the Vampire Slayer Dramatic Arc - Source: Match-Cut.org

Arcs do not always have to return to their starting point either. Sometimes the rise and fall is itself a type of change. Consider this diagram, the Gartner Hype Cycle[220]:
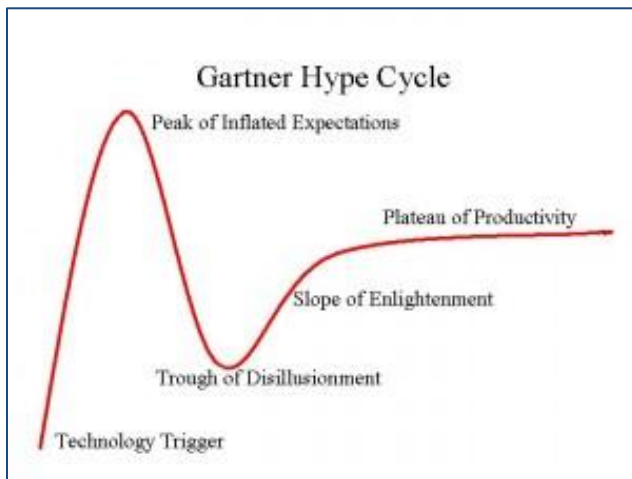
Gartner Hype Cycle - Source: Wikipedia

What this diagram makes clear is that arcs can be positive or negative – they can create *peaks* or *troughs*. And, as mentioned, they can result in a higher end-point than starting point. As such,

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[219] Mara. The Slayer's Journey: Buffy as Monomythic Hero. Match Cut (weblog). April 8, 2008. http://match-cut.org/showthread.php?t=757&highlight=buffy
[220] Wikipedia. Hype Cycle. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Hype_cycle

a change like this is – on the long run – effectively the same as a liner change. We could draw a straight line from the starting point to the end point. It's the same result, even if the journey to get there was a little more exciting.

Cycles

"The more things change, the more they stay the same." Sometimes it seems that, despite all the change in the world, things stay constant. It's like being on a merry-go-round – you might travel a lot, but all you've done is to go around in circles.

Cycles for a large part of many theories of change. "History repeats itself," we are told. "Those who do not learn from history are condemned to repeat it." From the perspective of a single civilization, there seems to be a rise and fall, but from the perspective of history, we see a succession of rise and fall, rise and fall – a great cycle of history.

We can, in fact, think of cycles as being like a series of parabolas or arcs. They may be positive or negative, depending on how you look at them. Like this:
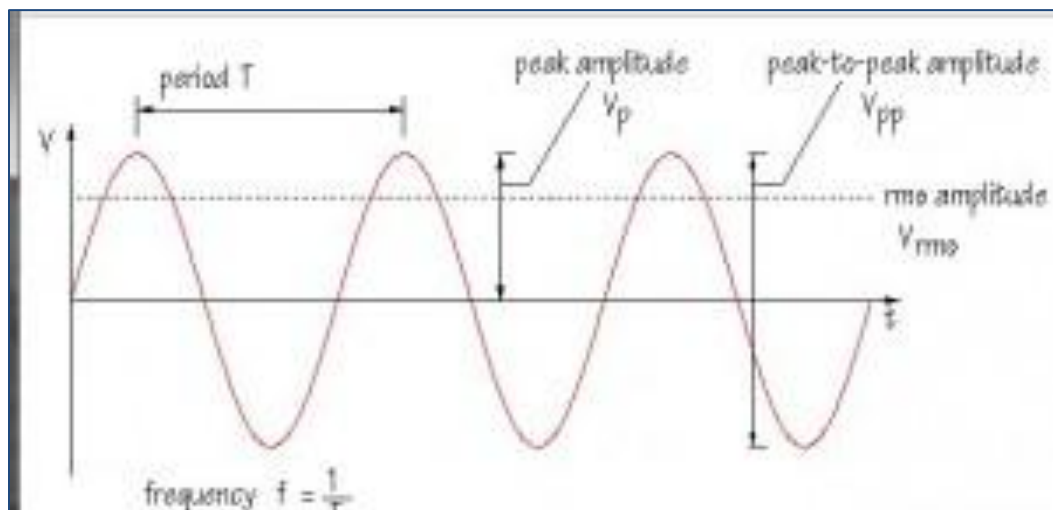
Cycles - Source: Doctronics

You may recognize this as a sine wave[221]. What a sine wave describes is the movement of a cycle. If you drew a chalk mark on a tire and rolled the tire, the sine wave would describe the motion of the chalk mark as it rotated around the axis, up and down, as the tire moved forward.

Our lives are full of cycles. We breathe in and breathe out. Out heart beats at a regular pace. We go to work and return home again. We wake and we sleep.

We can actually recognize cycles in sounds as well as by sight. All audio signals, in fact, are types of cycles. The sine wave depicted above, when implemented in electronics and broadcast though a speaker, becomes a musical note. Like this:

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[221] W.D. Phillips. Signals. Design Electronics (web book). Doctronics. 1998. http://www.doctronics.co.uk/signals.htm
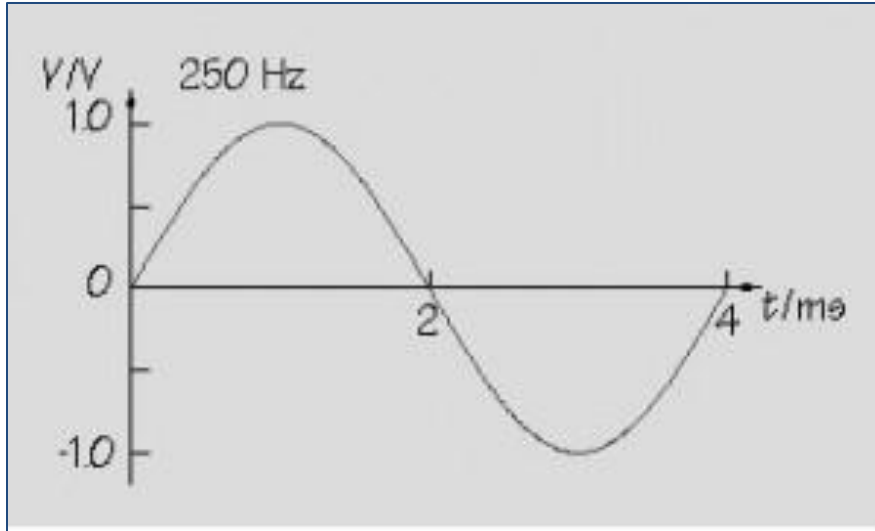
Pitch - Source: Doctronics

Play the sound associated with the wave form above: click here[222]

The *frequency* is the number of times the cycle repeats in a second; the *amplitude* is how high and low each arc goes. In music, the frequency is the same as the *pitch*, and the amplitude is the same as the *loudness*.

I wrote[223] last week about Soundation Studio[224] This is interesting because you can create your own types of waves to create different sounds. The sounds effects generator (the blue box, lower left) can be used to create different types of waves – sine waves, like we've seen above, sawtooth waves, square waves, noise, and more.

The point here is that we as humans are very sensitive to cycles. We create them, we repeat them, we have evolved an entire science of mathematics, electronics and music based on the manipulation of cycles. We are very prone to see them in the environment, and to expect to see the cycle repeat itself after a time.

And we are justified in this. Nature is filled with cycles, from the orbits of the planets to the rise and fall of the Sun to the flow of water through the ecosystem. Often, we draw the circle, instead of a sine wave, to represent some of these more complex cycles, such as the water cycle[225].

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[222] .wav sound. W.D. Phillips. Signals. Design Electronics (web book). Doctronics. 1998. www.doctronics.co.uk/sounds/250hz_l.wav
[223] Stephen Downes. Soundation Studio. May 31, 2010. OLDaily (weblog). http://www.downes.ca/post/52566
[224] Soundation Studio. Website. Accessed May 1, 2012. http://soundation.com/studio
[225] Water Cycle. Environment Canada. No longer extant.
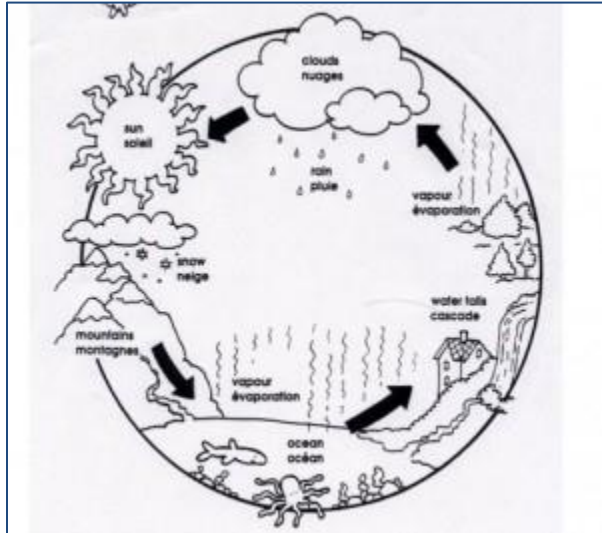
Water Cycle - Source: Environment Canada

Cycles are like linear changes – it is very easy to become used to them, to become comfortable with them. It is natural to assume that cycles are inherent in nature, that they are an inescapable part of life. We see society move to the left, and see as natural a movement back to the more conservative right.

While it is natural to think of a cycle as unending and unchanging, it would be a mistake. A cycle is a type of motion, whether it's a tire on a car, sound waves produced by electronics, or the flow of water through an ecosystem. And there's no such thing as perpetual motion. All motion requires some sort of impetus, some sort of energy to create and sustain it. Change the input, and you change the cycle.

The Dialectic

The concept of the dialectic has its origin in Hegel[226] and is basically the idea that in a cycle there is a motion forward. Hegel introduced us to the concept of *thesis* and *antithesis*[227] – which would be similar to the up and down of a chalk marking, or the back and forth between left wing and right wing in politics. These, together, produce what he called the *synthesis*, which is the product of their interaction.

As van der Veen[228] writes[229], the dialectic "contains elements of both cyclical and linear change, and thus change is spiral; significant change takes place as an attempt to resolve the accumulation of intolerable contradictions, the unravelling of stresses that are inherent in social life; short term repetitive change but with long term cumulative directional change; processes of change persist but the contents of the processes are changing."

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[226] Wikipedia. Georg Wilhelm Friedrich Hegel. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Georg_Wilhelm_Friedrich_Hegel
[227] Wikipedia. Thesis, antithesis, synthesis. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Thesis,_antithesis,_synthesis
[228] E. Wilma van der Veen. Website. Accessed May 1, 2012. http://stmarys.ca/~evanderveen/wvdv/index.htm
[229] E. Wilma van der Veen. Patterns of Social Change. Social Change: SOC A405 (course website), University of Alaska, Anchorage. October 11, 2002 http://stmarys.ca/~evanderveen/wvdv/social_change/patterns_of_social_change.htm

Here's a representation of that process:
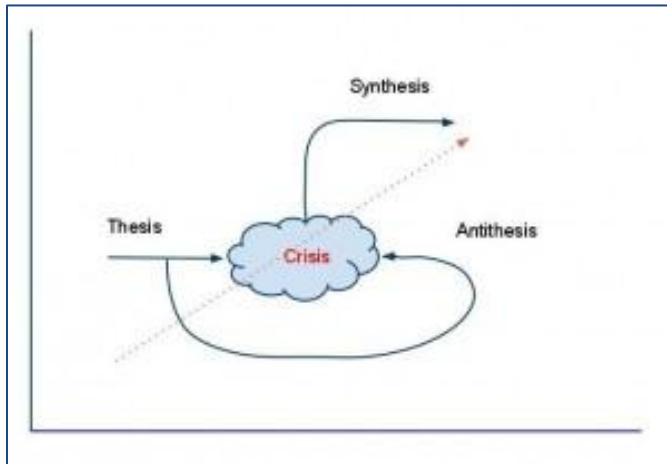
The Dialectic

This is the origin of the concept of the *paradigm shift*[230]. According to Thomas Kuhn[231], science does not progress in a linear fashion, but rather progresses through a series of jumps, called paradigms. Within a paradigm we have what is called 'normal science', but eventually, contradictions, unexplained experimental results, and other problems and questions force the science into a crisis point. Through this crisis, our view of the world is revised, and we adopt new scientific theories, terms and concepts.

Another way to depict the same process is to think of a series of parabolas – a cycle – creating a linear change. Like this:
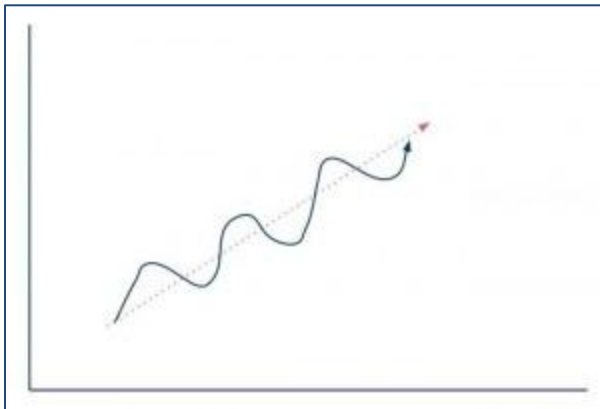
Dialectic Cycles

Viewed from a certain perspective, these aren't cycles any more but *spirals*. There is a movement around and around, but it is headed in some direction. The cycle may be progressing upward, or it may be progressing downward.

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[230] Wikipedia. Paradigm Shift. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Paradigm_shift
[231] Wikipedia. Thomas Kuhn. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Thomas_Kuhn

Stock market analysts have created mathematical models on forms of the dialectic to predict swings in share values. Here is an example[232] called the Elliott Wave Principle[233]:
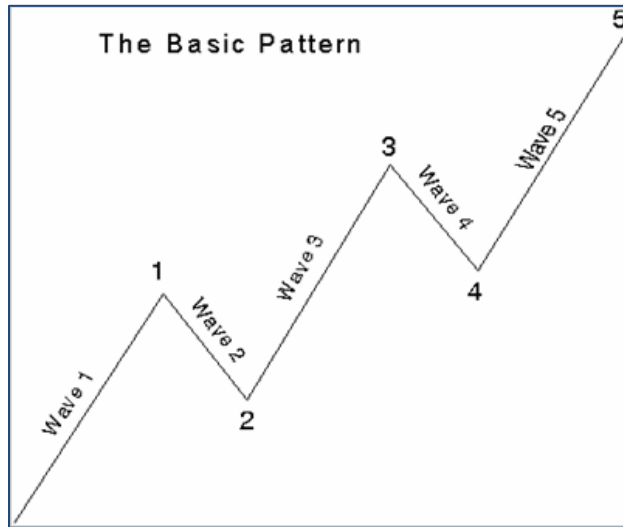
Elliott Wave Principle - Source: Forex

Here's another example. The author starts[234] with a basic wave pattern of change, the forming-norming model that has become quite popular:
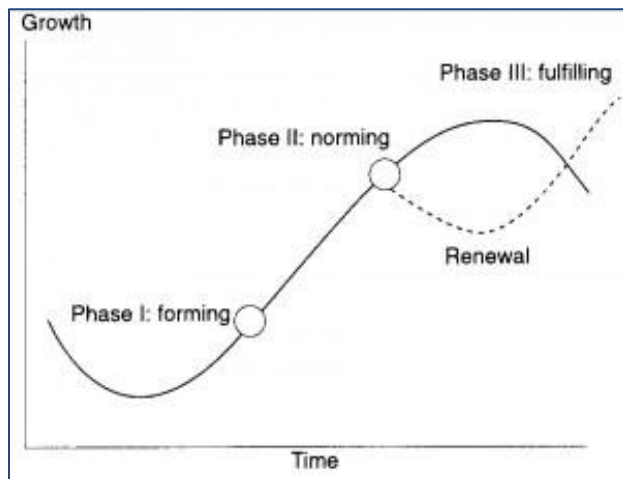
Forming Norming - Source: McNamee and McNamee

These are then joined to created a full dialectic:

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[232] ForexCycle. Elliott Wave. Forex Trading with Elliott Wave. April 19, 2008. http://www.forexcycle.com/elliott-wave/282-forex-trading-with-elliott-wave.html
[233] ForexCycle. Free Elliott Wave Tutorial from Elliott Wave International. Undated. http://www.forexcycle.com/elliott-wave-tutorial.html
[234] David McNamee, Thomas McNamee. The transformation of internal auditing. Managerial Auditing Journal, Vol. 10 Iss: 2, pp.34 – 37. 1995. http://www.emeraldinsight.com/journals.htm?articleid=868232&show=html
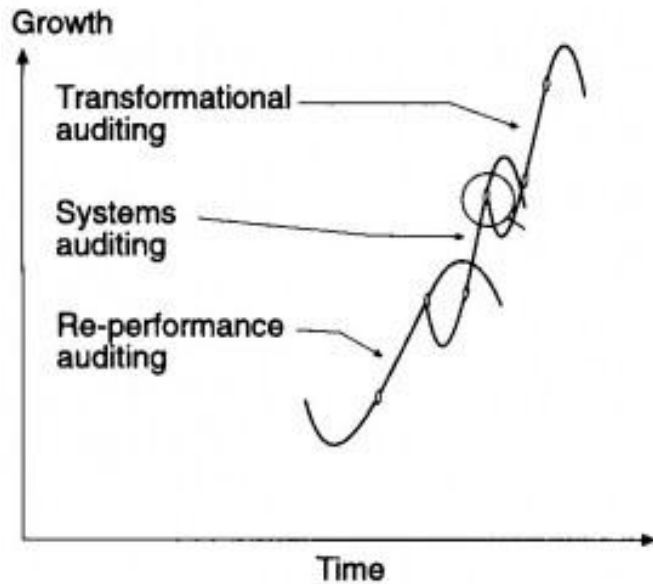
Auditing Dialectic - Source: McNeemee and McNeemee

This creates for us two distinct types of change, virtuous and vicious circles[235]. Wikipedia has pretty good examples of these:

Virtuous Circle – "Economic growth can be seen as a virtuous circle. It might start with an exogenous factor like technological innovation. As people get familiar with the new technology, there could be learning curve effects and economies of scale. This could lead to reduced costs and improved production efficiencies. In a competitive market structure, this will probably result in lower average prices."

Vicious Circle – "Hyperinflation is a spiral of inflation which causes even higher inflation. The initial exogenous event might be a sudden large increase in international interest rates or a massive increase in government debt due to excessive spendings. Whatever the cause, the government could pay down some of its debt by printing more money (called monetizing the debt). This increase in the money supply could increase the level of inflation."

Virtuous and vicious circles are the result of feedback loops[236]. What happens is that the result of one cycle feeds into the next cycle, accelerating its effects. The change is not merely linear, it can be exponential. How this happens, and what causes it to happen, varies. Hegel thought it was the result of the world spirit. Marx thought it was the force of history.

Today we explain such effects though principles such as the network effect[237] or the first mover advantage[238]. Vicious and virtual cycles occur in interconnected networks, where we have not

[235] Wikipedia. Virtuous circle and vicious circle. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Virtuous_circle_and_vicious_circle
[236] Wikipedia. Feedback. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Feedback
[237] Wikipedia. Network Effect. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Network_effect
[238] Wikipedia. First Mover Advantage. Accessed June 7, 2010. http://en.wikipedia.org/wiki/First-mover_advantage

only a circle much a much more interconnected web of entities. The result from one cycle feeds into the next cycle. In a network, such effect can result in cascade effects[239].

A disease sweeping through a society, a virus spreading through a computer network, a fashion fad sweeping the nation, an idea, word or meme occupying everyone's thoughts – these are examples of cascade effects. Everything can change, sometimes permanently, as a result of a cascade effect.

Cascade effects can be wild, sudden, and hard to predict. We may think that we are in a normal cycle, while behind the things a change is gradually accelerating. Global warming is like that – we experience the warmth of the day, the coolness of night, and the warmth of summer and the coolness of winter, and even the effects of 11-year sunspot cycles, and 30-year climactic cycles. But hidden behind these cycles is a gradual and slowly accelerating increase in the overall temperature, global warming. If we aren't looking for it, we won't notice it at all – until it suddenly and catastrophically spirals out of control.

Waves

When we think of change as happening to a wide area at once, then instead of cycles we sometimes think of change as happening in waves.

Probably the most famous example of this is Alvin Toffler's book The Third Wave[240]. According to Toffler, "The First Wave is the settled agricultural society which prevailed in much of the world… The Second Wave Society is industrial and based on mass… (and) The Third Wave is Post-Industrial Society."

It is not always clear what someone means when they talk of a wave. Toffler's waves, for example, have been depicted[241] as a form of exponential change

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[239] Wikipedia. Cascade Effect. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Cascade_effect
[240] Wikipedia. The Third Wave (book). Accessed June 7, 2010. http://en.wikipedia.org/wiki/The_Third_Wave_%28book%29
[241] Konrad M. Kressley. Riding the Third Wave. Harbinger (magazine). December 7, 2007. http://www.theharbinger.org/xvi/971209/future.html
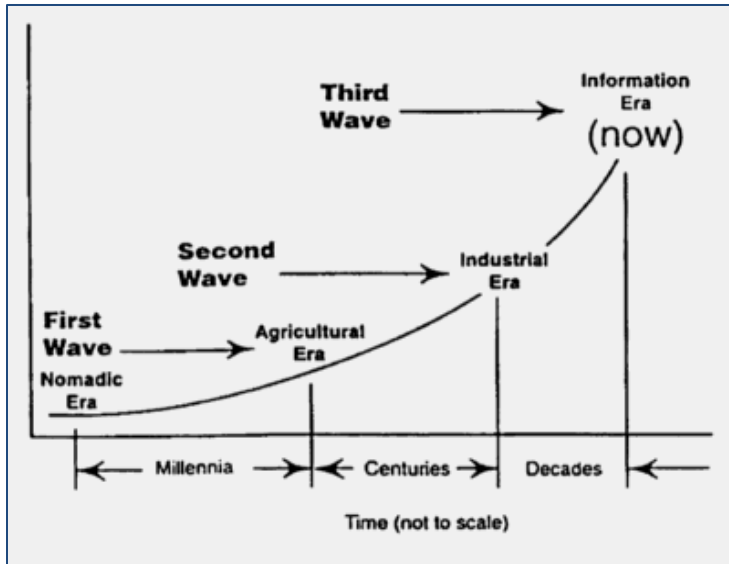
Third Wave - Exponential View - Source: Harbinger

and [as a type of](#)[242] dialectical change
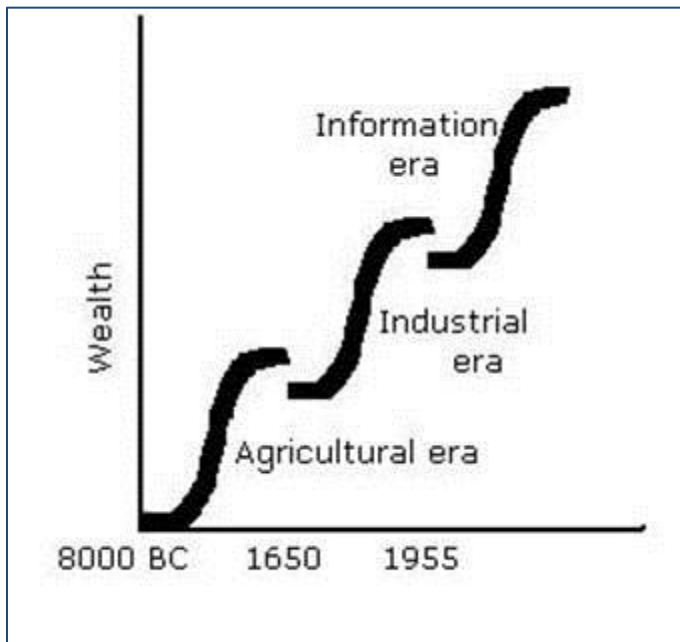
Toffler's Waves - Dialectic - Source: Maaw

The way waves behave can inform us about what to expect from a change, though. Consider how the tsunami spread through the Indian Ocean in 2004[243]:

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[242] R.K. Elliott. The third wave breaks on the shores of accounting. Accounting Horizons (June): 61-85. 1992.
http://maaw.info/ArticleSummaries/ArtSumElliott92.htm
[243] Wikipedia. 2004 Indian Ocean earthquake and tsunami. Accessed June 7, 2010. http://en.wikipedia.org/wiki/2004_Indian_Ocean_earthquake
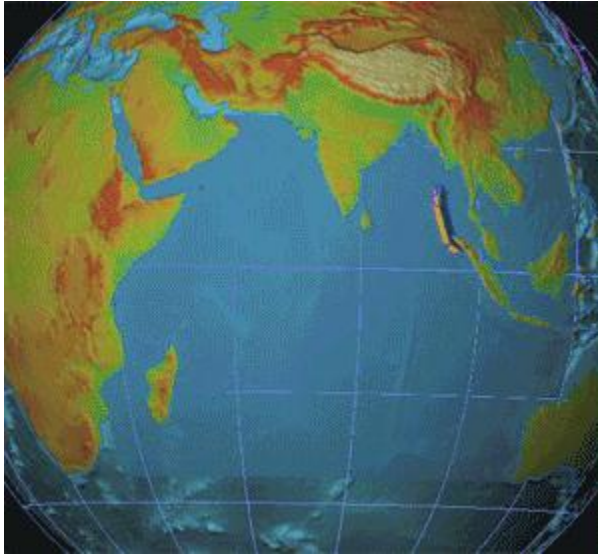
2004 Tsunami - Source: Wikipedia

Waves are not steady and linear. They interact with each other and with landforms around them. Understanding waves involves not only understanding how they propagate but also in understanding these interactions.

Consider, for example, how the intersection of two waves[244] can amplify or dampen the wave:
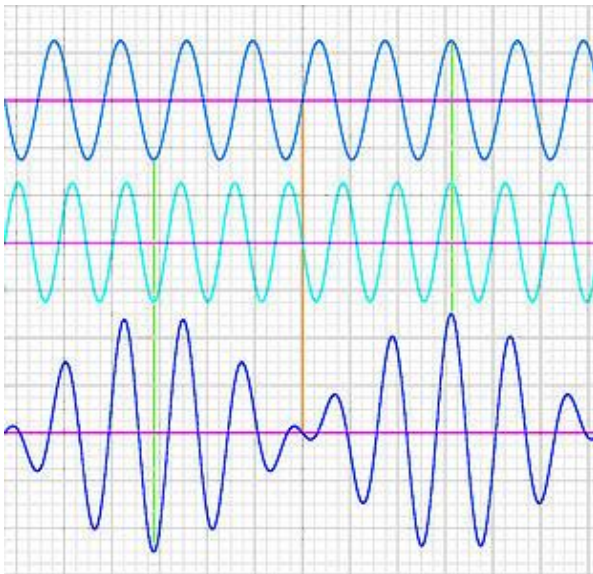
Beat Note - Source: Allan Watson III

Two waves at different frequencies – different pitches – applied on top of each other produce what is called a 'beat note'. This is the result of them amplifying when they are in phase and cancelling each other out when they are out of phase.

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[244] Allen Watson III. More About Nyquist. Web page. 2008. http://www.aw3rd.us/audif/moreNyquist.htm

The same effect happens in the world at large. We sometimes talk about the "stars being aligned" or "the right things coming together". The 60s "Summer of Love"[245] is sometimes described in such terms, as it represented the coincidence of widely available drugs, including the invention of LSD, the sexual revolution, made possible by the birth control pill, and the creation of a new form of music.

As you can easily see from the diagram, a confluence of factors can cause effects all out of proportion to what one might expect from the waves on their own.

Drivers and Attractors

One effect of the wave analogy is to represent change as something that is overwhelming and inevitable. No doubt this is part of the impression Toffler tried to convey with his title. The thought of change as something that cannot be resisted is a common theme in the literature.

In a sense, it's true. Change *is* inevitable. Without change, we would all be static, inert lumps of clay. Our lives and being depend on change. And change happens, every in the world, every minute of the day. As Isaac Asimov says[246], "It is change, continuing change, inevitable change, that is the dominant factor in society today. No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be."

Maybe so. But as noted above, no change occurs by itself. All change is a type of motion, and all motion has some sort of impetus or cause. Change does not occur in isolation; something makes it happen.

We sometimes represent these as *drivers* and *attractors.* These are a bit like *push* and *pull.* A driver is some force or energy behind the change, pushing it forward. An attractor is something in front of the change, pulling it forward.

You see references to drivers in a lot of political and economic literature. Drivers are often depicted as external forces that push economic or social behaviour in a certain direction. Consider this diagram[247], for example:

[245] Wikipedia. Summer of Love. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Summer_of_Love

[246] Richard Derwent Cooke. The Inevitability of Change. I-Change (weblog). July 30, 2009. http://www.i-change.biz/blog/?p=2594

[247] Alagse. The next global driver of change. Promoting Thought Leadership... (website). Undated. http://www.alagse.com/cm/cm2.php
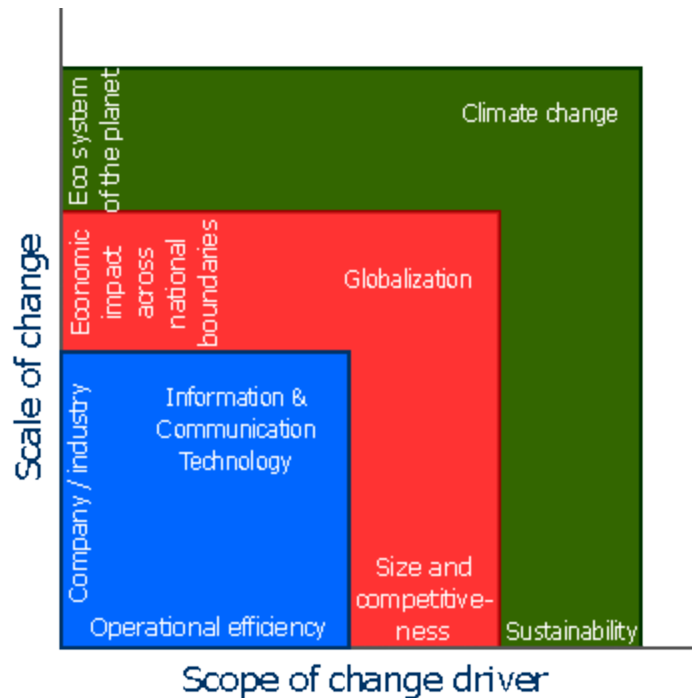
Drivers of Change - Source: Alagse

Here we see three major drivers depicted: ICTs, globalization, and climate change. We see that these drivers are pushing us toward operational; efficiency, size and competitiveness, and sustainability.

These drivers are depicted in a variety of ways. Here we have[248] sort of a flow chart:
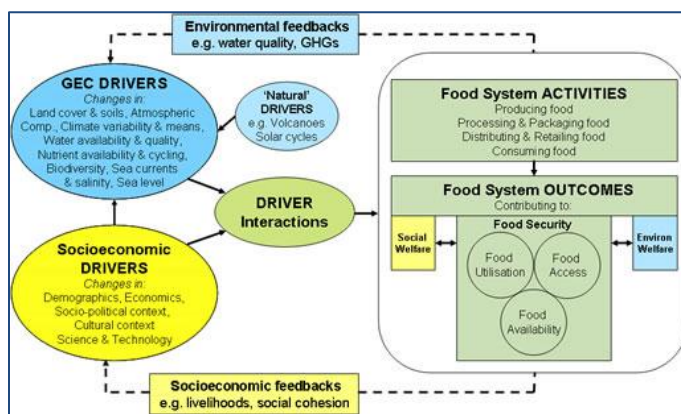
Driver Flow Chart - Source: Gecafs

Again, the use of drivers is as causes that almost force the outcome. It's as though the authors are intending to say, "Given these forces in the world, we cannot help but to change in such and such a way."

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[248] Gecafs. Why has GECAFS taken a "food systems" approach? Undated. http://www.gecafs.org/research/food_system.html

Attractors are a bit different. Attractors are like gravity: they pull us toward some sort of goal or destination. While drivers seem to force us toward some sort of linear change, attractors seem to pull us in cycles. The spiral-based change typically revolves around an attractor.

An attractor need not be physical, like gravity. It can also be an objective or goal. While such attractors can motivate change, they can't really be said to cause change – they require human agency for that. Here's an example[249] of such an attractor:
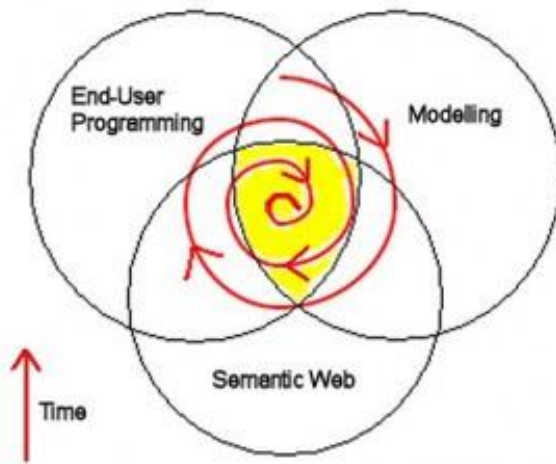
Semantic Attractor - Source: Peter Hale

In this case, the attractor is that sweet spot at the intersection of programming, modelling and the semantic web. Whatever it is that's in there is pulling in the programmer toward it over time.

Here's another example[250], depicting development toward some military objective. This time the spiral goes up:
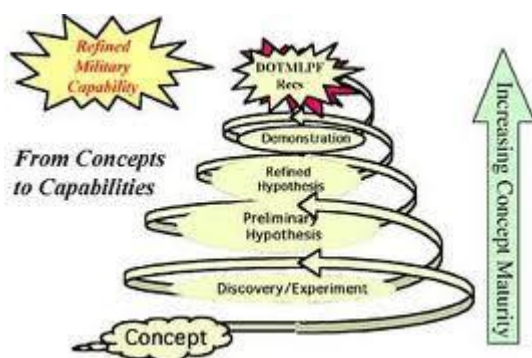
Military Attractor - Source: Mitre

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[249] Peter Hale. University of the West of England Home Page - Faculty Online Data (FOLD) http://www.cems.uwe.ac.uk/~phale/
[250] Mitre. Website note responding. http://www.mitre.org/news/the_edge/july_01/jackson2.html

Theories of change need to take into account the attractors as well as the drivers. Understanding what motivates people is as important as what urges and needs they have. An understanding of this would better inform educational theory.

In education, people are thought to learn according to different *learning styles*[251]. A person might learn better by reading, listening, looking at pictures, or working with his or her hands. But studies of educational outcomes based on learning styles are inconclusive. There doesn't seem to be an improvement in learning even if the teacher adapts to a student's learning style.

But in education, a student's motivation[252] is just as important. Teachers need to adapt not just how they push students toward learning, but how they attract them. A student has to be ready to learn, wanting to learn, and able to overcome the anxiety of learning. Different theories of motivation[253] attempt to explain what attracts people to certain kinds of change.

Design and Selection

In many kinds of change, the result of the change is defined not simply by a process but also by a *logic*[254]. The changing image on your computer screen, for example, is not the result of natural forces, but because of a specific design.

This is reflective of the impact *choice*[255] has on change. At any moment in time you and about 6 billion other people – not to mention billions of other animals and insects – are making choices about what to do or say next. Should I finish writing the paper? Stay up late? Drink a beer?

In computers, changes of state are represented by *flow charts*[256]. These charts describe the decisions the software makes – often based on user input – in order to produce a result. But flow charts need not only describe software decisions. They can describe human actions as well. For example, should you change the lamp?
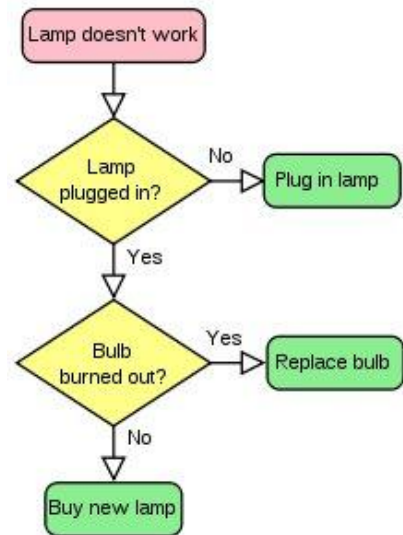
But how do people actually make decisions? In many cases, they are not rational – they do not compute results like a computer, but rather follow their own sometimes irrational beliefs and inclinations. A great deal of theory supposes that people are rational agents[257] – and this

[251] Wikipedia. Learning Styles. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Learning_styles
[252] Original link no longer extant. http://honolulu.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/motivate.htm
[253] Wikipedia. Maslow's hierarchy of needs. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Maslow%27s_hierarchy_of_needs
[254] Wikipedia. Logic. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Logic
[255] Wikipedia. Choice. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Choice
[256] Wikipedia. Flow Chart. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Flowchart
[257] Wikipedia. Rational Agents. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Rational_agent

supposition is often the cause of error. There are many types of rational behaviour[258], and not all are instrumentalist or goal-directed.

Moreover, not all choice is made by humans or rational agents. Animals, plants and even inanimate objects enter into points of decision. These choices may be bounded by the nature and situation of the chooser, but are in other cases quite random and impossible to predict. Will the deer on the highway veer right or left? Will the rock land on the road or roll off to the side. Will this uranium atom decay today or a dozen years from now?

Genetics, evolution, and similar natural processes are the result of these factors. This is not the place to discuss these in detail. But it is important to take into account that these do not stay the same and that they evolve and adapt as a result of forces such as natural selection. Expecting the bacterium to stay the same, expecting the opposing football team to play the same – these would be mistakes, based on a failure to recognize the influence of adaptation.

Finally, as suggested above, some changes are genuinely *chaotic*[259] and *random*[260]. The outcome cannot be predicted – it depends on factors that may be too small to be measured or simply unknown to science. In such a case, the graph of the future is not a line, but rather, splits up to define a probability space. This is the classic diagram of chaotic change:
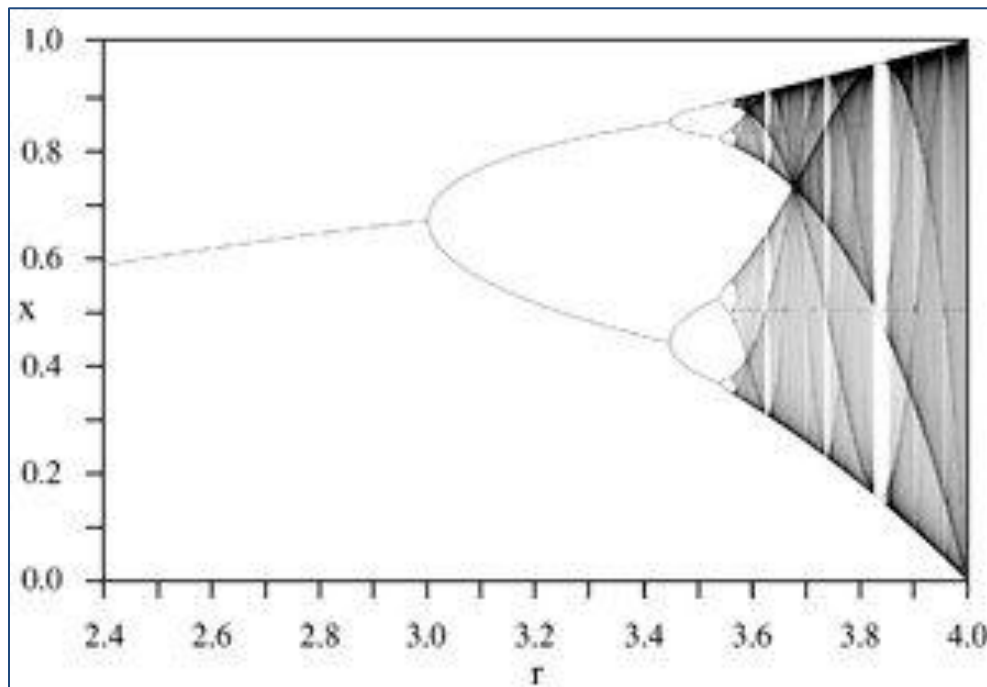
Chaos - Source: Wikipedia

Change progresses on a line for a period of time, then divides into two possibilities, then four, and then an almost infinite number. But note that even in a chaotic system, there is a range of

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[258] Milan Zafirovski. Human Rational Behavior and Economic Rationality. Electronic Journal of Sociology, Volume 7, Number 2. 2003. http://www.sociology.org/content/vol7.2/02_zafirovski.html
[259] Wikipedia. Chaos Theory. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Chaos_theory
[260] Wikipedia. Randomness. Accessed June 7, 2010. http://en.wikipedia.org/wiki/Randomness

possibilities. It's like predicting the weather – we might not be able to predict it exactly, but we know it will be warmer in the summer and colder in the winter.

Patterns of Change

This has been an overview of different types of change. It is by no means a complete description of change. At best, it is an introduction.

But the main intent of this post is not to describe and explain the different types of change. You can find more detailed and more authoritative treatments in mathematics texts, economics and business texts, and history texts. Indeed, almost any discipline will have its own treatment of change.

The purpose of this article has been to make it clear that it is possible to think systematically about change, and that it is fairly easy to recognize different types of change. Almost every theory you encounter in any discipline will appeal to one of the theories of change described above. Knowing that these theories have properties – and strengths, and weaknesses – in common helps you understand them and to criticize them.

Moncton, June 7, 2010

Speaking in LOLcats

Transcribed text of an address to the Educational Computing Organization of Ontario, Richmond Hill, Ontario, November 12, 2009. Audio and slides available at http://www.downes.ca/presentation/232

Thanks everyone, and people online you should be hearing me OK, if not just say something in the chat area. Your chat area is being viewed by an audience here in Richmond Hill, which I had never really heard of before I came here, so I'm kind of… that's good Christina, excellent.

Now some of the people in the room may be joining you and anything you say in the chat area can be viewed by people in the room. We're recording the Elluminate session – I'm not going to press my luck and try for video. Elluminate does support video and it supports it rather well, but I have to be standing right here the entire time because it would use the iSight monitor (I don't have a video camera hooked up) and I don't want to do the entire presentation like this, so I won't.

This is the second of two presentations today, and as I said in the first presentation, when you do two presentations in a day, there's a good one and a bad one – this is the good one. It's a fairly sweeping and ambitious presentation. It's probably not the sort of presentation you'll see in any of the other sessions. I'm trying to go someplace a bit different.

It's the first time I've tried this material, though I've tried bits and pieces of it, and it's something I've been thinking about for a long time. And basically the title sort of speaks for itself, *Speaking in LOLcats, What Literacy Means in teh Digital Era*, and no, that's not a typo, and the poor conference organizers trying to preserve that spelling through editing, [voice: I corrected it about six times] corrected about six times. This nice cat, this is my cat Bart by the way, and yes, he is the intellectual that he looks.

All right, so, let's roll. Let's look at some LOLcats. Because, when you put LOLcats in the title you kind of have an obligation to put tome LOLcats in the presentation. So, here's your classical (I wish this monitor were bigger) wait for it wait for it…

How many of you are familiar with LOLcats? Oh wow, this is new. If you go to the website Icanhascheezeburger.com[261] – the link is there on the slides; all the slides will be available on my website this evening, downes.ca[262] – and you'll see hundreds and hundreds of images like this. Now what a LOLcat is, it's an image usually not but necessarily consisting of a cat, with

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[261] I Can Has Cheezeburger? Website. http://icanhascheezburger.com/
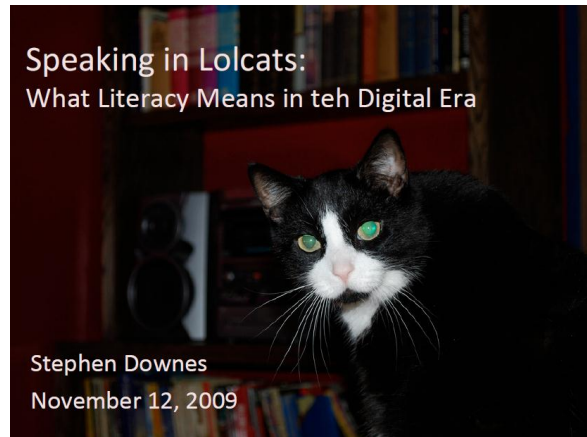
[262] Stephen Downes. Speaking in Lolcats: What Literacy Means in teh Digital Era. Stephen's Web (weblog) Presentations. November 12, 2009. http://www.downes.ca/presentation/232

some kind of funny phrase. Now the funniness varies and your reaction to the funniness will vary, that's ok, they don't have to be brilliant, although some of them are just a scream.

I thought this one was pretty good:

263

Now the thing with LOLcats is, they're not just pictures of cats with some text. You look at this one, you can't possibly read that (on the small screen), but, "Love," it says, "Nothing says 'I love you' like a paw in the eye."
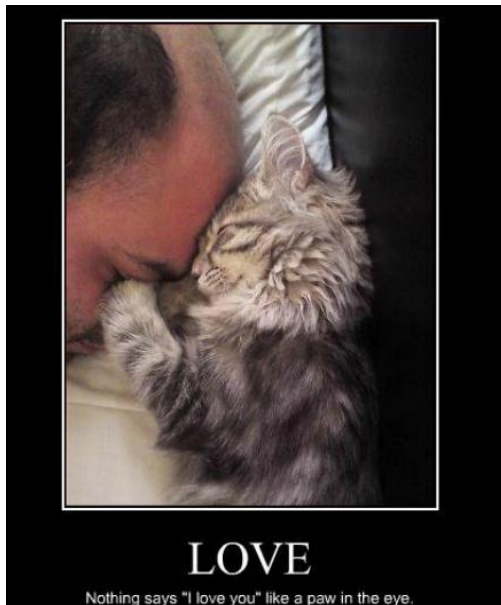
264

But of course this LOLcat is hitting you on a few levels: the paw in the eye is the obvious slapstick, but you will all recognize this form, the black border and the picture and the inspirational slogan. That form has been parodied like crazy; I just love some of the parodies. And of course that form is being used here in this particular LOLcat.

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263 Image from I Can Has Cheezeburger. November 11, 2009. http://icanhascheezburger.com/2009/11/11/funny-pictures-toes-passing-in-5-4-3/
264 Image from I Can Has Cheezeburger. November 11, 2009. http://icanhascheezburger.com/2009/11/11/funny-pictures-love/

That's typical of a LOLcat. It will pull some cultural association in on it. If you look at the previous one that we just looked at, when I said "wait for it, wait for it…" you can almost hear that "wait for it, wait for it…" in your mind. There's a cultural context there. There's this thing that you've heard and seen before that is being applied to this funny picture; that's what gives it the humour.

Here's another one:

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"Garfeild and John: the later years." (The lighting is so awful [voice: it's terrible], I wish we could kill – is there a way of killing those front lights? [voice: Not in this room. I going to go do that] OK – I'm sorry that we missed… it's completely washing out the picture. I thought I was so smart, because the morning presentation is all white, and then the afternoon presentation is all black, the two sides, the yin and yang, and all of that was to be silently in the background, so you'd feel that balance, but you wouldn't really notice why you felt that bal… well now I've given it all away.)

Anyhow. So here's Garfeild and John: the later years. And, you know, it's an old man and his cat. And so the LOLcat grabs things out of popular culture, but not necessarily popular culture, just culture. In this case it's popular culture, it's Garfield and Jon, right?[266] 'Jon' of course is misspelled. Actually so is 'Garfield'. (Again, it's kind of washed out. That's too bad. I wonder if… can I give you a bigger picture? It's just these things are so funny. Yeah… and the problem is, if I do this I can't advance the slide. [voice: I can advance the slide] You'll advance the slides in the Elluminate? [voice: you bet] All right. Excellent. Thank you. There, it's still kind of washed out, look.)

"I triangulatered…"

[265] Image from I Can Has Cheezeburger. November 10, 2009. http://icanhascheezburger.com/2009/11/10/funny-pictures-later-years/
[266] Jim Davis. Garfield. http://www.garfield.com/

267

Anyhow, it's kind of funny, because first of all it's a made-up word, and secondly, how often do you see cats in the shape of a triangle? But of course there's a bit of fun there going on because 'triangulated', 'triangularated', ... you know, you're supposed to see that association, and maybe not, maybe the person just didn't know how to spell 'triangulated'. The beauty of LOLcats is, you don't know. So you have to bring a lot of the humour to it.

The spelling mistakes in LOLcats are very interesting because LOLcats are very badly spelled, typically, but in a predictable way. So, here we go:

268

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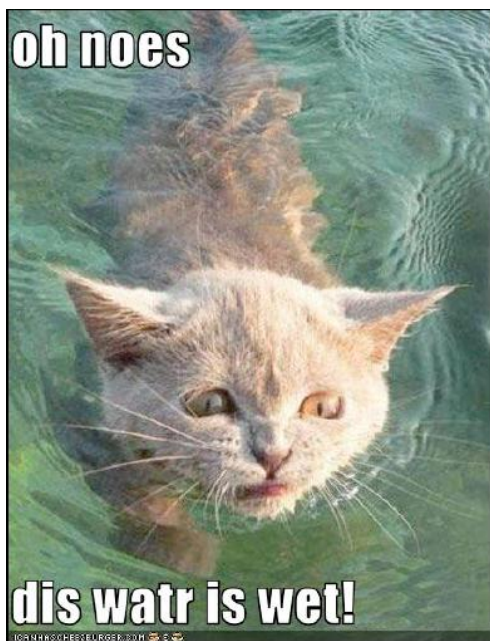
[267] Image from I Can Has Cheezeburger. November 9, 2009. http://icanhascheezburger.com/2009/11/09/funny-pictures-triangulatered/
[268] Image from I Can Has Cheezeburger. November 10, 2009. http://icanhascheezburger.com/2009/11/10/funny-pictures-dis-watr-is-wet/

"Oh noes. Dis watr is wet!" Again, the spelling has a characteristic – it's a characteristic spelling, it's a characteristic syntax, it's kind of a mockery of txtspeak (text speak), it's kind of a mockery of l337speak ('leet speak', or elite speak).

Txtspeak of course is the spelling people use when they're texting messages in SMS, l337speak is kind of a gibbled way of spelling hackers use to communicate with each other because – well, I don't know, it's not like nobody understands it, everybody understands it, but they use numbers for letters, threes instead of Es, and you get that from typing in your passwords oh-so cleverly. So your password is 'JasonAlexander', that's really easy, but then you put ampersands in for all the As, so you get 'J@s0n…', so anyhow, that's how you remember your password.

And of course they like to mock stereotypes, and the stereotype is the cat in the water (i.e., cats don't like water). There's another one with a very similar theme, "I'm in your tub mocking your stereotypes," is another phrasing for this particular sort of image.

Don't you love these? Can you see how these would become addictive? They're just incredible, I can't get over them. What really really *really* attracts me to the internet is that it is just chock-full of stuff like this. Forget about the Open Educational Resources. Forget about online learning. Forget about Twitter and social networking. The internet is full of stuff like this, and it's the stuff like this that just kills, and makes the internet what it is. That's why I love it.

And that's, really, what I'm talking about today.

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Of course cats don't actually drink coffee. That's the joke, right? But of course, that's not really a cat, that's *us* on the horrible horrible day we tried to drink decaf instead of caffeinated coffee *thinking* it would be good for us. Ha! What were we thinking?

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[269] Image from I Can Has Cheezeburger. November 10, 2009. http://icanhascheezburger.com/2009/11/10/funny-pictures-same-since-decaff/

LOLcats are a commentary on everyday life. The important word there is, they are a *commentary*. ([Listening to sound from outside] Fourteen. Let's see if he keeps counting. Yeah, I stop, he stops. I'll start talking… yeah, hrm. It is pretty funny.)

Now like I said, the internet's full of stuff like this. The internet – new media, properly so-called – this is the first thesis of this talk – *new media constitutes a vocabulary*. Or more accurately, perhaps ([To person outside] Hi, could you please stop counting dishes while I'm… [voice: oh I'm sorry]. He actually was counting… actually I think he was checking to make sure they were all clean. He looked like a manager. That's the degree of service – I *like* the fact that somebody was checking to make sure all the plates were clean… less enthused about where he was doing it – you go to where the plates are, right?)

OK. New media constitutes a vocabulary, constitutes a *language,* and that when people create artifacts they are quite literally speaking in LOLcats. Or, they might be speaking in Joan Harris cutout dolls:

[270]

You notice the same form, though, right? Commentary, popular culture… you know, it's not just LOLcats people are using to speak online using new media.

OK, you don't like that one. Maybe you've seen this one:

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[270] Dyna Moe's Photostream. Flickr. No longer extant. http://www.flickr.com/photos/nobodyssweetheart/40898054

Raw Video: Soccer Player Throws Fist, Pulls Hair
★ ★ ★ ★ ★

0:09 / 0:40

271

This is a YouTube meme and I've caught it sort of near the beginning there; it's a screen shot, not a real video (I didn't think I could pull off a real video streaming in here and on Elluminate all at the same time, so I put a link to it if you're curious). If you haven't seen it – how many of you have seen this? Oh man, you've got to get more plugged in! You're not speaking the language! If you go back to the school, whenever you go back, Monday, if you don't know this you've missed probably the big cultural event, online anyways.

Anyhow, there are two U.S. soccer players and the one in the red is grabbing the hair of the one in the white and as the stream goes you'll see her pull her by the hair and drop her to the ground, and the video consists of her doing similar sorts of acts through the course of a soccer game. This video has gone viral – I'm sure you've heard the expression "to go viral" – it's got millions of hits. And the question here isn't "what is in the video?" - because what is in the video is what I've just described, it's neither here nor there, it's some nasty play on the soccer pitch – but people consider this worth posting, embedding in their blogs, sharing, and the question is, "what are they saying?" For they certainly are – are they not? – saying something.

And I look at that and I say something like, this is people expressing a belief or a statement that this kind of behavior is unacceptable. That's my take on it. Of course, you know, different people, different messages, your mileage may vary. And you bring a lot to this yourself.

How many of you have heard of XKCD? Ah – more! These are a scream too. I love these. This one – there's no way you can read the writing so I'll do it:

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[271] Still from video. Associated Press. Raw Video: Soccer Player Throws Fist, Pulls Hair. YouTube. November 6, 2009. http://www.youtube.com/watch?v=FMAtxuCpsMU

272
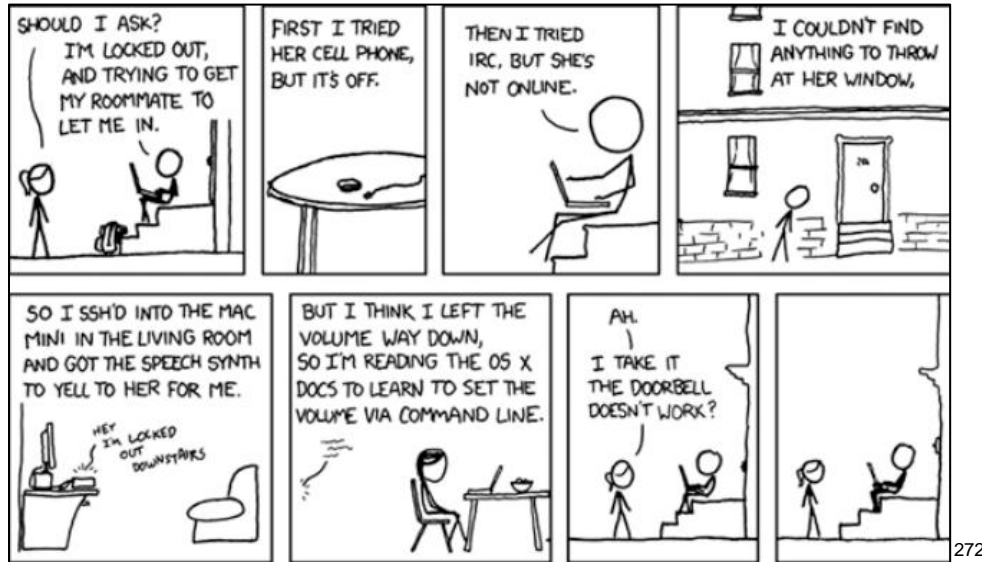
So the guy's saying "I'm locked out and trying to get my roommate to let me in. First I tried her cell phone, but it's off. Then I tried IRC, but she's not online." IRC's an old-style chat system. "I couldn't find anything to throw at her window." Of course. "So I SSHed into the Mac Mini in the living room and got the speech synth to yell at her for me. But I think I left the volume way down so I'm reading the OSX docs to learn how to set the volume via command line." And then the other person says, "Ah. I take it the doorbell doesn't work." Well – you have to read it – it's a lot funnier when you read it.

Now of course it's funny but the artist is using a cartoon – in the grand tradition of cartoonists – to say something that's not actually being said in the cartoon.

273
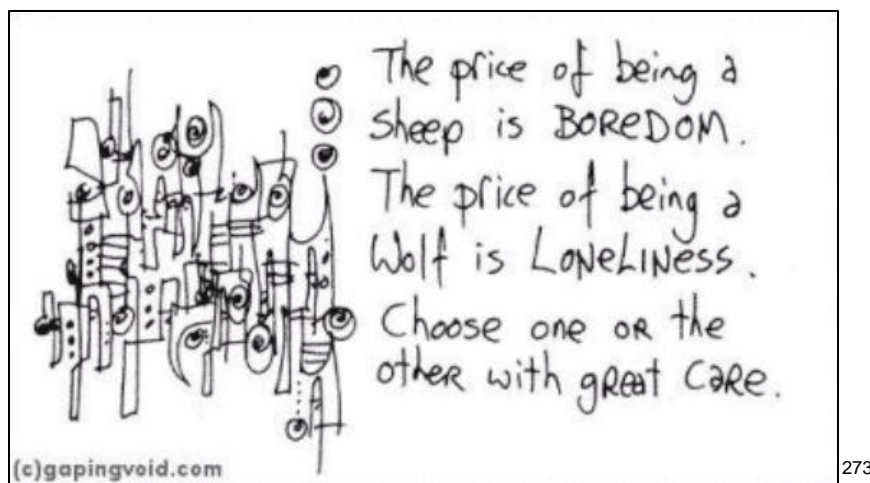
Gaping Void's another one – I'm less enthused with Gaping Void, probably because I'm less enthused with the overall message a hundred of his cartoons have combined to produce, but

272 Randall Munroe. I'm An Idiot. XKCD number 530. 2009. http://xkcd.com/530/
273 Hugh MacLeod. Gaping Void. http://gapingvoid.com/ Image via Adam Singer. Viral Images Part 2. Future Buzz. January 26, 2009. http://thefuturebuzz.com/2009/01/26/50viralimagesparttwo/

then a lot of people like it. "The price of being a sheep is boredom," he writes. "The price of being a wolf is loneliness. Choose one of the other with great care." I picked this one because this was the one that was kicking around when I was looking for a Gaping Void. But again the same sort of question comes up: what do you suppose the artist is saying? And again, people share these things, and we ask, what do you suppose people are saying when they share these things?

How many of you have seen 9-11 Tourist Guy?

 [274]

See…? You're missing the best part of the internet! If I have done nothing else for you guys here today I have pointed you to the existence of an entire internet that is not the internet that you know but that is the *real* internet. Because the internet isn't Twitter and Flickr and Facebook and all these. The *real* internet is all of this kind of silly stuff.

Now of course this is just a picture of some tourist, we know not who, and of course he's on top of the World Trade Center, and some wag has come along and photoshopped an airplane into it. And of course we have the picture, and then we have the backstory, "this camera was found in the rubble, blah blah blah, blah," and of course it's completely made up, because the shadows are all wrong, and there's a whole site devoted to explaining why it's completely made up because all the shadows are wrong.

But anyhow, you have Tourist Guy, and then you have Tourist Guy in front of the Hindenberg:

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[274] David Emery. The Tourist Guy of 9/11. About.com Urban Legends. Accessed November, 2009. http://urbanlegends.about.com/library/blphoto-wtc.htm

[275]

 And if you follow that link down there (http://urbanlegends.about.com/library/blphoto-wtc.htm) you'll find this tourist guy all over the place. The sinking of the Titanic. The eruption of Pompeii. The scene from Independence Day where they blow up the White House (I love that scene). And so on. And there's this who kind of theme coming out here, isn't there?

And if you think about it, again, there's a language being used, people are saying something, there's a structure to these things (you note they preserve the guy exactly), there's a logic to the images behind, and in fact it's a logic that people understand. It's not an accidental logic. People understand this logic. Enough, so that in light of recent events, they can actually point out this logic to people who don't know:
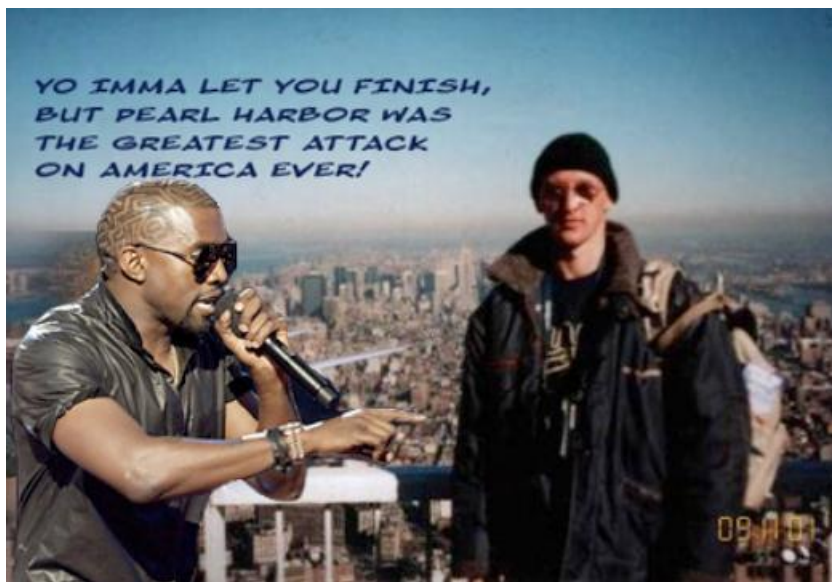
[276]

[275] David Emery. The Tourist Guy of 9/11. About.com Urban Legends. Accessed November, 2009. http://urbanlegends.about.com/library/blphoto-wtc.htm

And what this says is, "Yo, Imma let you finish, but Pearl Harbor was the greatest attack on America ever." Now you see what's happening here. The logic is, of course, you have spectacular disasters, and Tourist Guy now is a way of saying 9-11 belongs to that category of events. And now, we're taking that, and parodying that with a recent Kanye West interrupting (oh I've forgotten her name) [voices: Taylor Swift} Taylor Swift, yeah – you all know Taylor Swift [laughter]. It's interesting, you all know Taylor Swift, you don't know about the soccer player [voice: we don't know Taylor Swift but we know this event, the interruption]. Yeah. The best description I heard of it, "it was like stomping on a kitten."

This is analogy, metaphor, and I'm sure out there somewhere there's a picture of Kanye West stomping on a kitten. Again, you see, you follow the logic through. I've tried to find it. Go ahead. [Voice: most of these are made right after, the day after?] Oh yeah, in the Language Log discussion area as well[277]. He said "Yo. Imma let you finish." Now he means "I'm going to let you finish." "Imma let you finish…" – who speaks like that? And, well, nobody, it's just kind of the way it came out. But yeah, you're quite right, there was a whole site, and you've got Kanye West interrupting, well, "Yo, this is the best constitution in the world," etc.

Again, there's a style, there's a structure, there's a meaning, there's an intent, and people understand this, the people who create these things understand this. To more or less a degree. Again, some of the people making these things… ([Sound: beep beep beep] Something's backing up [laughter] it just kills me… never mind. It's funny more than anything because, you know, if I was a professional speaker this wouldn't distract me at all.)

All right. This first thesis is totally intended to be taken one hundred percent literally. I am not expressing a metaphor. New media *is* a language. The artifacts – the LOLcats, the images, the picture of a virus, are *words*.

And this is not surprising and this is not unusual and this is not a concept that we can't wrap our head around because we – those of us who grew up before LOLcats, and therefore speak in different words – understand this. We grew up learning about, for example, body language. Body language is a language. There are different things that are said. We can understand body language. If we get good at it we can actually speak in body language. Right? We can do it. Some of us do it better than others.

[276] David Emery. The Tourist Guy of 9/11. About.com Urban Legends. Accessed November, 2009.
http://urbanlegends.about.com/library/blphoto-wtc.htm
[277] Mark Liberman. I'm a? Language Log. September 9, 2009. http://languagelog.ldc.upenn.edu/nll/?p=1752

278 279

Clothing, uniforms, flags, drapes, there's all kinds of ways we use non-linguistic artifacts in order to express ourselves. And these non-linguistic artifacts have the properties of a language: grammar and syntax and all the rest of it. And we use them for the same purpose, to express ourselves.

Now, the expressions are non-linguistic. We don't know – we can't convert 'that dress' into a set of sentences. And it would be ridiculous for us to try. The best we can get is kind of a rough approximation. But we would certainly be wrong, or at the very least misleading, to say "oh they mean nothing by their dress." Of course they do! And every person in this room means *something* by the way they're dressed, and if we look at the different people and the different ways they're dressed, they're all saying different things. Now I won't point people out [nervous laughter] but you can all look around and… and you know, it's all in Carnegie's *How to Make Friends and Influence People*,[280] there's a whole section on dress in there, etc. And you say things with how you dress. And if you don't believe me, go watch *What Not To Wear*.[281]

How many of you watch *What Not to Wear*? That's it? Well – isn't that odd. Maybe it's just me. I don't follow any of the advice, but I watch it.

Another type of language, and again, it's a language that we're familiar with, and a language we use more or less well, is the language of maps, diagrams, graphics, etc. And here, this kind of language (it's sort of hard to see again), it's a fairly well-known graphic, it's the social network space expressed as a map, so you have the Gulf of YouTube, the Plains of MySpace, the Ocean of Subculture, little islands here, the big Wikipedia project, the blogpegalo, Noob Sea [voice: it's cold where Windows Live is there] it's cold where Windows Live is there? Where is Windows Live? Oh way up there, the icy north. Well, yeah, you go there, it's frozen. "Here be anthropomorphic dragons."

[278] Vicked Vicky. Body Language: Actions Do Speak Louder Than Words. ExciteFun. October 28, 2008. http://forum.xcitefun.net/body-language-actions-do-speak-louder-than-words-t13371.html
[279] Army Strong Stories. Arab Clothing. Undated. http://armystrongstories.com/blogAssets/wayne-wall/12 JUN Arab Clothing.jpg
[280] Dale Carnegie. How to Win Friends and Influence People. 1936. Simon & Schuster; Reissue edition. November 3, 2009. http://www.amazon.ca/How-Win-Friends-Influence-People/dp/0671723650
[281] The Learning Channel. What Not to Wear. Television Series. January 18, 2003 – present. http://tlc.howstuffworks.com/tv/what-not-to-wear

I love how Orkut and Live Journal and Facebook and Xanga, they all look like Southeast Asia. The Vietnam people, yeah. There's probably messages in there, messages in there the author had no intent of making, but again, you know, it's a language, it's a syntax, etc.

The second thesis I would like to propose, because we've had some fun and now I want to get obscure, because it's not one of my talks – at least, not one of my good talks – if it's not obscure a little bit: *we can understand these languages within a logical-semiotic framework.* that's going to take a little bit of explaining.

What I mean by that is that we can understand the language of LOLcats, the language of new media, with a framework that describes what we are saying, how we are saying it, how we come to know, how we come to believe things, in these languages. So the second part, this second part, of the presentation is intended to present that.

Now the same sort of thing, the same sort of framework, that underlies our languages (and this is part of the second thesis) also underlies information theory.

Now this diagram is a diagram of how light signals go through all this whole process and get to our visual cortex:

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[282] Randall Munroe. Online Communities. XKCD number 256. 2007. http://xkcd.com/256/

283

It's a way of understanding sensory perception as a type of information theory. There's a whole literature devoted to that, and I refer to *Knowledge and the Flow of Information* by Fred Dretske.[284] But again, it's the same kind of thing. If we go to the previous slide and we see this 'sender', 'sign vehicle', 'immediate object', 'recipient', that flow of communication, we have that flow of information, the same sort of thing underlies inference and belief.

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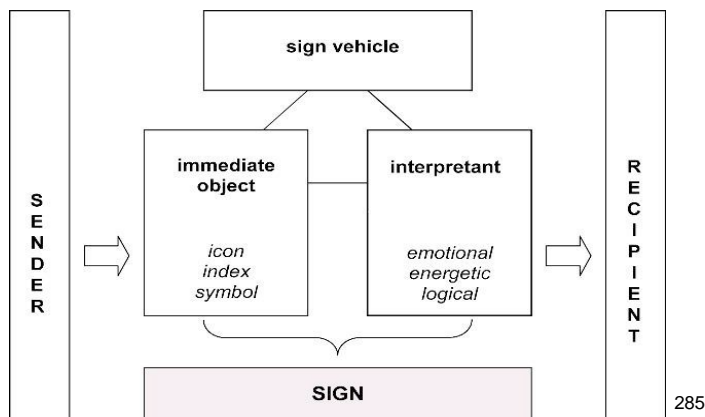
Now this picture, this is – I went to Australia in 2004 and I went there specifically in search of insights, and I got a few, which is really cool, because you pay to go all the way to Australia in search of insights and not get any. One of the ones I got was in a place called Kakadu.

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[283] Wikibooks. Consciousness Studies/The Philosophical Problem/Machine Consciousness. Undated; Accessed November 12, 2009. http://en.wikibooks.org/wiki/Consciousness_Studies/The_Philosophical_Problem/Machine_Consciousness

[284] Fred Dretske. Knowledge and the Flow of Information. The University of Chicago Press. 1999. http://www.press.uchicago.edu/ucp/books/book/distributed/K/bo3642299.html

[285] Lutz Goetzmann and Kyrill Schwegler. Semiotic aspects of the countertransference: Some observations on the concepts of the 'immediate object' and the 'interpretant' in the work of Charles S. Peirce. International Journal of Psycho-Analysis, 85:1423-1438. 2004. See also Jay Zeman, Pierce's Theory of Signs, http://www.clas.ufl.edu/users/jzeman/peirces_theory_of_signs.htm

Kakadu is a park at the north end of Australia, it's near Darwin, and there are these cave paintings on it from the Aboriginals ten thousand years ago or whatever. And what's interesting about these cave paintings is, they're very detailed. This is a fish, but if you look at it closely the fish has been cut open and these are fish guts.

And you might be thinking, well, why do Aboriginals have pictures of fish guts on cave walls? And the answer of course is, this is how they're communicating what they know about fish, and what parts of the fish to eat, and what you're going to find inside a fish if you cut it in half. There's a whole set of information transmitted. How do we know that? We study the symbol, the culture, we study the signs, and we make an inference.

And this is the same process that *they* go through, that the Aboriginals go through, in understanding their surroundings, and this is the same process that empirical scientists go through when they study the world around us. Science can be thought of, inference can be thought of, as a language as well, the language in which the participants in the conversation are yourself and the world. And just as the language has signs and symbols and underlying meanings and all of that, so does the world. And it's the same kind of thing, the same kind of flow, that gets us from observations to theory to what we would call scientific fact.

What I'm trying to say here is – as it says up there – science can be seen as language, learning as conversation, and knowledge as inference. These are all different ways of doing the same thing, and the medium in which we do this is the language of this new media, the language of LOLcats. And other things, because obviously scientists do not do their inferring in LOLcats. Although – they could. And that would be interesting.

What this means is we need to get beyond a fairly narrow language-based way of looking at not just communication (although certainly communication) but also this language-based way of looking at learning, this language-based way of looking at science.[286] Or thinking, or reasoning.

How many of you saw 'Leave Britney Alone'?

[287]

The same. Right. Again, it's more of this culture. And the thing is, all he says is "Leave Britney alone, leave Britney alone" – it's very repetitive – but of course there so much more in there, there's so much more being said in that video than just the words. And then of course, again, 25 million views, 25.5 million views, and the guy is just wailing. And the funny thing is, if I'm to judge by looking at the popular culture, it appears to have been successful. I think they are actually leaving Britney alone now. Not as much as he would like, but…

So, what sort of conceptions (should we move beyond)?

1. Well, the conceptions like "messages have a sender and a receiver." I sometimes think of that as 'the teleological theory of communication', the idea that communications have to come from someone, have to be directed to someone – sometimes there is no receiver, or no intended receiver.

2. Another (if you will) 'folk' linguistic theory, or 'folk' psychosemantic theory: "words get meaning from what they represent." To a large degree, when we look at this we see this is just simply not the case.

3. "Truth is based on the real world." Again, this is one of these language-based things that we need to let go of. If you examine closely what 'truth' is, truth is a property of a proposition. So the question as to "what truth is" is the question "what makes that

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[286] Note that by 'language-based' *here* I refer to the way of looking at learning and science as composed of *traditional* text-based language, i.e., sentences and words in English or Japanese, etc.
[287] Chris Cocker. Leave Britney Alone. YouTube. September 10, 2007. http://www.youtube.com/watch?v=kHmvkRoEowc

proposition true?" What makes that sentence 'true'? but *sentences* do not need to refer to things that are in the real world, and yet can still be true. I'll give you a classic example from Bertrand Russell: brakeless trains are dangerous. What makes that sentence true? You all agree it's true, right? But what makes it true? Certainly not the fact that there are brakeless trains that are dangerous. Because, in fact, there are no brakeless trains. The reason for that is, they're dangerous. We don't make them without brakes. So how do we know… and you can see we now go into a whole song and dance about what makes a statement like that, a counterfactual, true.[288]

4. Another conception that we need to throw away: "Events have a cause and these causes can be known." That's one of the most fundamental principles I think of common knowledge and common culture, but it's a principle that's deeply embedded in the linguistic origins of its original statement. And the reason why you can get a general statement like that is because language[289] is artificially precise and artificially general.

5. "Science is based on forming and testing hypotheses." That's the old deductive-nomological picture of science which you probably learned in science class – I won't speculate how many years ago – formulated by a guy called Cark Hempel and completely destroyed by people like Imre Lakatos and Larry Lauden and Thomas Kuhn and others in the 70s and 80s, around the time we were (some of us) getting out of science.

These pictures – these things, and others, there's a whole set of them – taken together constitute a world view, constitute a way of thinking about thinking and learning as static, linear (and) coherent. The world… (now they applauded, what time is it? [voice: you still have 20 minutes left, it's 25 after] so somebody really shot, really missed their… that's why I always worry about, what am I going to do if I… well, anyhow – I am *way* too easily distracted to be a speaker) – so it's this picture of the world as though it were text-based language, a picture of the world as though it were a book, a library. When we look at this logico-semiotic picture we see that we can see the world in many more ways.

So here's the frame:

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[288] OK, Russell's actual example is "the present king of France is bald" – the 'brakeless trains' example has a much older history as an example of the existential fallacy. I probably got it from Richard Braithwaite, Scientific Explanation: A Study of the Function of Theory, Probability and Law in Science. Cambridge University Press. May 1, 1968. p. 305. But the point still holds – 'the present king of France' can be true or false even if there is no king of France (it's false, because there is no king of France).
[289] I.e. traditional text-based language.

Syntax	Cognition
Semantics	Context
Pragmatics	Change

with a little Charles Morris, *Foundations for a Theory of Signs*,[290] a little Derrida and a little Lao Tzu. This is a bit arbitrary, it's an exercise in categorization, and like all exercises in categorization it is therefore an exercise in fiction. But it's also a picture of knowledge that I think is knowledge *as* conversation, knowledge *as* interactions in these languages. It's a bit more sophisticated a way of looking at learning and discovery and inference and the rest than say Bloom's taxonomy or whatever.

So, these are the six major elements: syntax, semantics, and pragmatics; that comes from Charles Morris. Cognition, that comes from a whole host of people. Context, Derrida, and change, from Lao Tzu with a little Marshall McLuhan. Each one of these gives us a whole set of questions that we can ask about new media.

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V:\WinBuilder\projects\pscProgs\reg2WBS\reg2WBSprg.exe          _ □ ×
reg2WBSprg program version 2.0.0
Copyright (C) 2007 Peter Schlang

Syntax: reg2WBSprg -i<input file> [-i<input file> ...] [-d<input directory>]
                  [-o<output file>] [-H] [<-SYS | -DFL | -SFT>] [-E] [-R<name>]
                  [-A[ -P<replace list>]
  <input file>: <<complete path> | <name only>>
    <name only> demands <input directory>
  no <output file>: output to console
  -H: Write RegHiveLoad and RegHiveUnload commands into file
  -SYS: Process setupreg.hiv hive lines only
  -DFL: Process default hive lines only
  -SFT: Process software hive lines only
  -E: Replace Environment variables values by ariables names
  -R: Build runnable section [name]
  -A: Use API style
  <replace list>: <replace>,<by>[;<replace>,<by>[;...]]

Click Execute to finish ...
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Syntax

Take a look at the syntax, for example. Syntax – we grew up thinking of syntax as rules. But syntax is really about how we organize, how we construct, how we create our creations. Remember the LOLcats, you know, there are unspoken rules for their construction, remember, the reference to culture, the way of spelling your words, these are all aspects of syntax. There

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[290] Charles W. Morris. Foundations of the theory of signs. International encyclopedia of unified science. The University of Chicago press. 1953. http://www.amazon.com/Foundations-Charles-International-encyclopedia-unified/dp/B00087C2PQ

are different ways of expressing syntax. Rules – a grammar, or a logical syntax – is just one way of doing it. But syntax can be expressed through archetypes. For those of you who like psychology, Carl Jung has your archetypes there, but archetypes can be thought of more broadly.

Archetypes can be thought of in terms of paradigms, archetypes can be thought of in terms of – I'm looking for another word, I'm looking for another word that means paradigms, but I don't need to say it, because I can't think of it. Or, they can be Platonic forms, they can be the ideal triangle, they can be the ideal circle, they can be the elements of Euclidean geometry. Etc. The medieval got very hung up on this, looking for the archetypical colour 'red' – 'which must exist somewhere and can't simply exist on somebody's shirt or on a flag or whatever.' So their whole thing up – Medieval philosophy is very strange.

There's a whole school of thought that looks at syntax in terms of operations. There's a whole school of mathematical logic called 'operationalism' where mathematics is thought of not as quantities and things like that but rather things that we *do*, ways that we make things happen. Of course, these can be extended to motor skills.

There's a diagram I didn't put into this slide where there's a whole chart of different motor skills, and all these motor skills correspond to actions on your computer screen, and there are characteristic things: a Windows user expects when they go like that [gesturing] and click, that the program will close. That's the motor skill and an expected outcome. That's a syntax. It's a syntax composed of an operation. Every application has a syntax. Understanding that every application has a syntax helps us understand applications.

And there's even a site out there – I saw it just a few days ago – that looks at (what was it?) sizing bars in Adobe software. Now you all know sizing bars. A sizing bar is a little bar with a little arrow and you click and hold on the arrow and you move up and down and that makes things bigger and smaller. It's an operation, we all understand that, a simple rule framework. But you look at Adobe's and in a single Adobe application – I think it was Photoshop Elements they were referring to – there were no fewer than six different ways of presenting sizing bars. This is a total syntactic fail, because if you want the same result in an application, you should have the same syntax. But they're all different. They look different, they have different information, they're shaped differently, etc.

Those of you who are in tune will have notice the way I expressed that. "Total syntax fail." Look up in Google something called "Fail Blog".[291] Fail blog is a blog that looks at syntactic fails and lables them "Fail!" It's a commercial enterprise and so what they've done very cleverly is to set up this blog and then create – I don't want to say a 'meme' because it's too soft to be a meme – but to create this kind of language form where people point to something really stupid and say "Fail!" So, "This is a syntax fail." So every time someone says "this is a syntax fail" it's actually an advertisement for Fail Blog.

Syntax at work. Isn't syntax wonderful?

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[291] Fail Blog. Weblog. http://failblog.org/

This is – oh well, predicting my conclusion, but – this is new media literacy. Understanding that little kind of logic. Patterns. Regularities. Substitutivity. Eggcorns. I've got a slide later on about eggcorns. Eggcorns are wonderful. And I'm almost certainly not going to get to it, but – what an eggcorn is is a substitution of a word – so you put in the wrong word in place of the right word, but the wrong word kind of makes sense. It comes from using the word 'egg corns' instead of 'acorns'. 'Egg corn' – it's kind of, yeah, you know, yeah, they look like corn, and it's an egg, for an oak tree, so ok, yeah, you get that.

You know, there's a – what's my favorite? – "on a different tact." t-a-c-t. Now of course the expression is "on a different tack" – t-a-c-k – and it's derived from sailing, you maneuver against the wind by tacking, you tack back and forth (I learned to sail once). But people say 'tact' as in 'tactic' and that kind of makes sense, but it's not the right expression. Anyhow, there's hundreds of them, and somebody out there has collected them and is still collecting them.[292] Because on the *real* internet people do stuff like that.

Similarities. I won't go into it. Oh, tropes, there's a site out there, Television Tropes.[293] Or Television and Movie Tropes, I forget exactly what the phrasing is, I couldn't find the blog (well I didn't look for it, I didn't have time) but there's a site that collects and categorizes every known television trope, and a trope is a characteristic plot or schema that drives a television show, and we all know the television tropes. I'm not going to try to think of one off-hand. But you know, the classic "Somebody said something that isn't quite true to protect somebody's feelings, the lie magnifies, the person is finally caught in a contradiction, and the show ends with his humiliating confession and everybody hugging because everybody knew it was…" That's the plot of every single *Three's Company*[294] show. Ever. Or "they finally find a way to get off the island but Gilligan does something stupid and at the end of the show they're stuck on the island." But there are tropes that are used over and over and over and over again.

Similarities, analogies, metaphors. There are rules, mechanisms, syntax for creating these. There's not just "blank as a blank". What is it that creates a similarity? A similarity is the set of – is the having of a set of properties in common. But not just any set of properties in common. They need to be properties that are relevant or salient. Having the right set of properties in common at the right time in such a way that these properties have an impact on the situation at hand. That's syntax. And that underlies similarity. And that's how we make metaphor work, and that's how a lot of these LOLcats work. They work through similarity.

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[292] Chris Waigl. The Eggcorn Database. Website. http://eggcorns.lascribe.net/
[293] Television Tropes and Idioms. Wiki web site. http://tvtropes.org/pmwiki/pmwiki.php/Main/HomePage
[294] IMDB. Three's Company. TV Series (1976-1984). http://www.imdb.com/title/tt0075596/
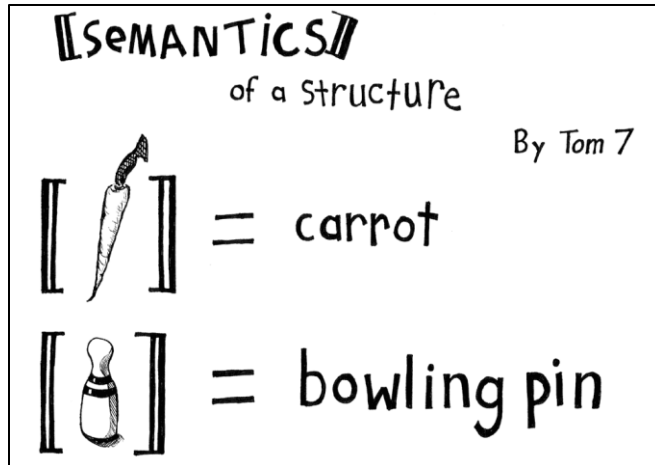
Semantics

Semantics. Is the second component of the frame. Semantics consists of theories of truth, meaning, purpose, goal. It's how we make sense out of things. This is the thing that everybody's keyed in on, so I'm not even going to linger too long on it, because *everybody's* all about sense-making. It's really a very small part of it. But everybody's on about sense-making. The sense, the reference - of a term or a proposition, the denotation of it, the connotation, or the implication, the thing that you're supposed to think about through some sort of process of association, and as I said, there's a whole syntax for that.

Or, another way of looking at semantics is through what may be called 'interpretations.' Probability theory, for example. You're all familiar with probability, right? "The probability that the Sun will go down today is, what, one!" OK, well, what did I *mean* when I said that? What I didn't mean is "The Sun will go down," because I cannot refer to a future event because it hasn't happened yet and therefore there is no referent for my reference. So, I must have meant *something* though, I didn't just utter empty words. Well, there are different *interpretations* of what I said.

Carnap, Rudolf Carnap for example, represents probability as expressing the number of instances in the logical set of all possible worlds – so, he doesn't say worlds – all possible descriptions, the number that corresponds with the description I have.[295] So basically Carnap divides the world into all the logical possibilities, your sentence is true in 'that many' of them, that's probability.

Hans Reichenbach, on the other hand, being more of a realist realizes we cannot know what the entire set of possibilities is, and so he gives us an interpretation based on frequency.[296] It's the old interpretation that we're pretty familiar with from inductive theory. "It happened, it happened, it happened, it happened, it happened, it happened a hundred times, therefore, year, it will probably happen again."

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[295] Rudolf Carnap. Logical Foundations of Probability. University of Chicago Press; 2nd edition. 1967. http://www.amazon.com/Logical-foundations-probability-Rudolf-Carnap/dp/B0006P9S8Y
[296] Hans Reichenbach. The Theory of Probability. University of California; Second Ed edition. 1949.
http://books.google.ca/books?id=WUm_2lAvj2cC&printsec=front_cover&redir_esc=y

Frank Ramsay – the radical – says probability has utterly nothing to do with any of that. The probability that something is true is measured in terms of how much money you would bet on it. [laughter] It's true! And you think this is -–this is why I'm expressing it, I want to stretch you out of your frames – there are people out there in the world, mostly involved in money markets, who define truth in exactly that way. That's what they believe truth is. It's what people will wager, it's what people will bet, it's what people will spend, that is – you know, markets determine all truths.

So there are different *ways* of looking at these things. So that's probability.

Association - I talked about association the logical structure, the semantical structure consists of the different ways of associating things, from similarities through contiguity (or being next to each other) though back-propagation (or feedback) or through Boltzmann mechanisms (association through harmony – "these things are associated because the world is just more harmonious if they are associated"). I'm glossing over something obviously that's a bit more complex.

Decisions, decision theory, voting, consensus, emergence – all of these are ways of getting at not just truth (although there's certainly ways of getting at truth) but also meaning, also purpose and goals.

All of these ways of looking at the world, of coming up with ways – ah, I hate starting a sentence without knowing how it's going to end, because sometimes it never ends – all of these are ways of coming up with meaning, truth, etc., in the world. And different languages, different statements in language, and different artifacts will express truth, meaning, etc., in different ways.

And your task in understanding these is not to simply assume – well, there's a literal way of understanding this, but –moving out beyond that, actually asking the question, "does it depend on an interpretation? a way of looking at the world? Does it depend on belief, wagering, etc.?"
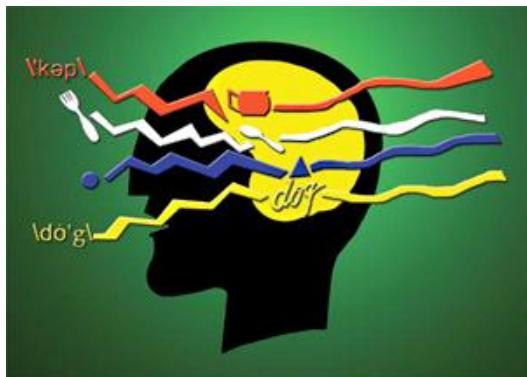
Pragmatics

Third frame (now I'm probably running out of time – five? Ah, I'm good). Pragmatics. Use, actions, impact – again, this is probably (and you know when I'm writing these slides, I'm

thinking "this is all stuff you know"). Pragmatics – the use of words (when we think of language in particular) but in our context the use of artifacts to do things.

And, you know, you can draw all kinds of things out. J.L. Austin used to talk about "speech acts"[297] and John Searle has his taxonomy of acts that we can do with words[298]:

- assertives – which is, you know, the plain ordinary asserting of something, but not just that
- directives
- commissives
- expressives
- declarations

But also, in the context of new media, harmful acts. Harassment, bullying, spamming, flaming. One of the things that I've had to do over the years is to be in charge of various discussion boards, and in various discussion boards, as I know you know, people flame, people bully, people do all kinds of really nasty stuff. And as soon as you begin to lean on them, they – especially if they're from south of the border – they go, "Freedom of speech! Freedom of speech!"

But of course what they're doing is imposing a semantical interpretation of language on you, that whatever they are doing with language, it must be to express a fact, a state of affairs about the world. But of course, that is not the case at all. There are all kinds of things you can do with language that have utterly nothing to do with expressing an opinion. If I yell "Fire!" in this room I am not uttering, "I am of the opinion that there is a fire." That is not my intent; that is not the expected outcome. The expected outcome is "everybody get out of the room now." Something like that. It's an action, not a statement.

An expression that is harassing, that is bullying, and there's the whole set of things that people do in discussion lists, fall under this category of harmful acts. I have interpreted large swaths of online conversation in these discussion areas and in these blogs, as not intentions of making a point, making an argument, whatever, but intentions of harming people, intentions of undermining them, making them feel uncertain, and if you think of language in that way, and if you think of the presentation of media in general in that way, that is also the case, is it not, in advertising.[299]

Advertising isn't intended to make a statement, or even to convince you, advertising is intended to commit an act, to do something, to make you do something, but not to reason your way to doing something, but it will make you do something by, well, as the studies show, undermining your confidence, making you feel inadequate, and all that. These are not propositional uses of language, these are speech acts.

[297] J.L. Austin. How to do Things with Words: The William James Lectures delivered at Harvard University in 1955. Ed. J. O. Urmson and Marina Sbisà, Oxford: Clarendon. 1962. http://www.amazon.com/How-Do-Things-Words-Lectures/dp/0674411528
[298] John Searle. Speech Acts: An Essay in the Philosophy of Language (1969). Cambridge University Press; New Ed edition. January 2, 1969. http://www.amazon.co.uk/Speech-Acts-Essay-Philosophy-Language/dp/052109626X
[299] Randall Munroe. Pickup Artist. XKCD number 1027. 2011. http://xkcd.com/1027/

There's more. We could be making points through interrogation – of course Heidegger has a whole discussion of that. We could be expressing meaning through use; there's again a whole – and I have not nearly enough time to talk about that – a whole doctrine about defining words through the use of those words. But this is only the third of six, so…
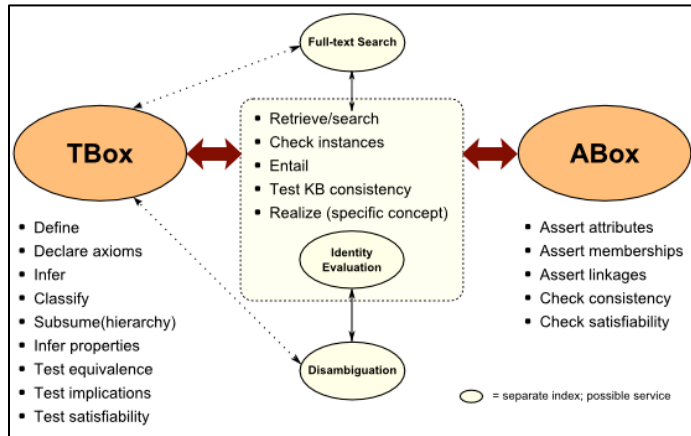
Cognition

The whole set of uses of language in order to reason, to infer, to explain – these are the scientific, the argumentative, the cognitive. And again, a lot of times when people are thinking of critical thinking they are thinking specifically of these kinds of uses of language.

There are four major categories, and I won't linger on them, they can all be looked up fairly easily:

- the plain ordinary description (the assertion that X) which may be a definite description (and we're back to Russell again), or allegory, metaphor, etc., there are all kinds of ways of describing something, or I can just point to it;

- definition (to say X is a Y) and again there's a whole list of different ways of defining things;

- to make an argument (X therefore Y) and there's a range of different kinds of arguments, and again you don't need to note these down, these will all be available after the talk;

- and then finally, to explain (X because of Y). This is a very common sort of thing.

And you look at these artifacts, and when you look at them *ask* yourself, "Could I interpret this as an explanation." And you realize, "Oh yeah. They are explaining something behind this. They're trying not simply to present or to describe but they're offering an explanation of why this is the case," and we come back to Kanye stomping on a kitty. Anyhow.
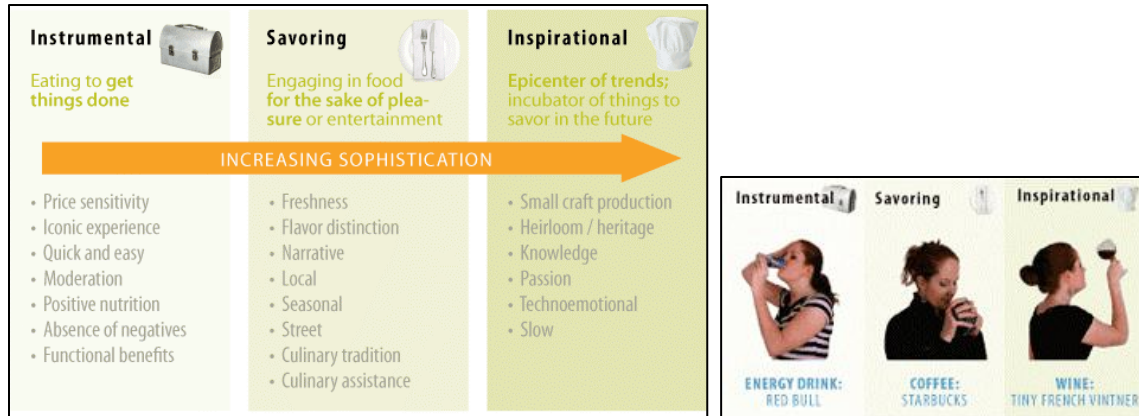
Context

The next one: context. This is – you can't read this and I know you can't read this and I put in this slide anyway because it's so compelling. This is 'occasion-based marketing'. And what I'm trying to draw out here is: people understand that different things say different things in different contexts or different occasions. So we look closely. There are three different occasions: the instrumental, the savoring and the inspirational. Now they totally make these up, but that's OK, they still work, right?

So, instrumental. Energy-drink. Red Bull. They're drinking for a purpose. Savoring. Coffee. And then mysteriously they put "Starbucks." Well, OK, some people are like that. I'm more of a, actually, my coffee drinking is more instrumental, which is why I go to Tim Horton's. And then inspirational, wine. The French vintner.

But now this logic of context gives us a whole set of tropes that will inform the content of the advertisement. Instrumental: price sensitivity, quick and easy, positive nutrition, blah blah blah. Savoring: freshness, flavor, narrative – who thought that narrative that informs coffee? But if you look at Starbucks advertising, narrative is part of the coffee. Inspirational: small craft production, right? Who wants to savour wine from a wine factory. Really. Though if you ask me: best wine, in a box. I acknowledge, that just offended the wine drinkers. Who have knowledge and passion about their wine.

Context permeates our logic and our language to an extent, I think, that most people are not aware of. Explanation, I like how Bas van Fraassen summed it up beautifully: explanations only make sense in the context of what could have happened instead.[300] So, why did the flowers grow beside the house? Because it was warm. If it were cold they would not have grown. Because Aunt Mae planted the bulbs. Because if she hadn't planted the bulbs… you see, you have different explanations based on your expectation of what might have happened instead.

This is the basis for so many jokes it's not funny. I can't go into them now, but… messing around with the explanatory context is a source of humour, and this humour can be found in many of these artifacts.

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[300] Bas C. van Fraassen. The Scientific Image. Clarendon Press. May 1, 1995. http://www.amazon.ca/Scientific-Image-Bas-van-Fraassen/dp/0198244274

Vocabulary – alternatives – the meaning of a word depends on what the alternative words could have been. What is the meaning of the word 'red'? Depends on what other colours you think there are. If you think there are only two colours in the world, 'red' and 'blue', the meaning of the word 'red' is very broad. [Voice: Stephen, you're just a few minutes over]
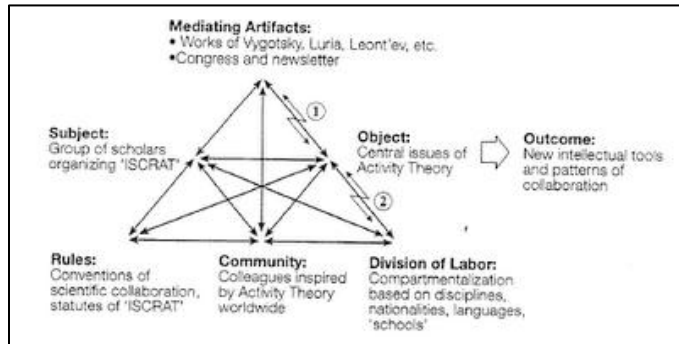
Change

Change is the last one, and there's aspects of change: flow, historicity, McLuhan's four questions to ask about change, and progression.[301] There's an analysis of games based on the structure of change in those games. Etc.

So those frames can be used to understand new media. The third thesis: *fluency in those languages constitutes 21st century learning*.

Now we hear lots of descriptions of 21st century learning, typically as descriptions of content and skills.[302] But my argument here, and I think I can make it stick, is that such descriptions are not adequate. Focusing on the tools – I love these tool things – is like focusing on pens, pencils and the printing press instead of the *Magna Carta* or the Gutenberg Bible. That's part one. Part two, though: Focusing on content is like focusing on what the *Magna Carta* or the Gutenberg Bible say instead of what people did with it. We need to go beyond skills, beyond content.

We go back to Papert, with whom many of you will be familiar, and the philosophy of constructionism: people constructing artifacts are creating media they use to think. Now how are they thinking with it? With those six frames that I just gave you.

So the questions we need to ask: how do we converse? How do we manage these media? Who is in charge of these media? What vocabulary's being used? What kind of sense are we making? What kind of languages do we model?

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[301] Marshall Soules. McLuhan Light and Dark. Wayback. 1996.
[302] Partnership for 21st Century Skills. http://www.p21.org/ November 1, 2009. Website not responding. www.21stcenturyskills.org/documents/MILE_Guide_091101.pdf

We come back to the CCK09 course, with which I started, and it's not about presenting content, or even skills, at all. It's about creating this space in which people will create artifacts as a conversation. Now what we're about is encouraging growth in their literacy, in this environment, rather than the acquisition of specific knowledge or specific skills. (This) so much to the point that we don't care – well, we do a little, but not much – what knowledge they get, we don't even care what tool they use. What we care about is that they participate in this conversation.

We want them to use the language of LOLcats to learn how to think – if you're wondering what this says, it says "Astrophysics made simple" – and then I have some examples which I won't be able to get into, but you can look at those and discuss those among yourselves, or not, as you will, in the days, weeks and months following this presentation.

So, that essentially is the presentation 'Speaking in LOLcats,' and I thank you for your patience and for staying in the room even though we were a little bit late. And I thank all of you, I assume you're still online, for staying online. Thank you very much.

Richmond Hill, Ontario, November 12, 2009

Knowledge and Knowing

Belief

Seb Fiedler asks himself[303] why he is increasingly alienated from the underlying ideology of modern education and concludes that it is the result of neo-liberal propaganda that has changed the concept of 'education' over the years. "I am sure," he writes, "some of the trusted, unquestioned ideas that guide the current discourse on reforming universities readily come to your mind: the holy market, competition, cost efficiency, tuition and fees, standardized evaluation, and so forth."

Placing his thoughts into context is a 1970 lecture from Gregory Bateson[304], *Ecology and Flexibiltiy in Urban Civilization.* Bateson writes, "the frequency of use of a given idea becomes determinant of its survival in that ecology of ideas which we call Mind; and beyond that the survival of a frequently used idea is further promoted by the fact that habit formation tends to remove the idea from the field of critical inspection."

Bateson's proposition should sound familiar to the student of philosophy. It is almost identical, in content and vocabulary, to that expressed by David Hume. "All belief of matter of fact or real existence," writes Hume in the Enquiry Concerning Human Understanding[305], "is derived merely from some object, present to the memory or senses, and a customary conjunction between that and some other object." How, for example, do we come to believe that one thing causes another? When one thing is often followed by another, we fall into the habit of expecting the second when we see the first, and as this habit becomes entrenched, we say that here is a connection between one and the other.

Ritual and repetition form an important component of belief. As Hume notes in the Treatise[306], "The devotees of that strange superstition usually plead in excuse of the mummeries, with which they are upbraided, that they feel the good effect of those external motions, and postures, and actions, in enlivening their devotion, and quickening their fervour, which otherwise would decay away, if directed entirely to distant and immaterial objects." By keeping the forms and icons representative of the faith firmly fixed in front of their followers, the fathers of the church ensure a lively and habitual representation of belief.

Why is this important? Part of it, certainly, is the explanation of how it is we came to associate the principles of economics to education. *A priori*, there is no reason to expect that the principles of one domain would work in another. Yet we see them repeatedly applied - a critic of mine recently argued against free educational content on the grounds that students would not value the learning that resulted. Why would we suppose that a monetary determination of value (a network semantics expressed as a willingness to pay) would apply in learning? But, as Fiedler notes, a century of conflict defined by competing economic systems has created an

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[303] Seb Fiedler. Blog post. No longer extant. April 10, 2005. Original URL: http://seblogging.cognitivearchitects.com/2005/04/10#a1533
[304] Ecology of Mind. Gregory Bateson. Web page. Accessed May 16, 2012. http://www.oikos.org/bateson/
[305] David Hume. An Enquiry Concerning Human Understanding. Harvard Classics Volume 37. Copyright 1910 P.F. Collier & Sonhttp://18th.eserver.org/hume-enquiry.html
[306] David Hume. A Treatise of Human Nature. http://socserv2.socsci.mcmaster.ca/~econ/ugcm/3ll3/hume/treatise1.html

environment in which it is natural, inevitable, to apply the basic principles (in our sphere, at least) of economic capitalism to all domains.

But the more significant part is that Hume's theory of belief is also a theory of learning, and a theory which, when examined, stands in opposition to what seems to be taken for granted as learning theory today. I have commented before on the paucity of the idea that knowledge is acquired like bits of capital and stored in the vault of our mind, opposed the idea that knowledge is cumulative, like acquisition. The theory of learning represented, say, in standardized tests or even such models as constructivism imply that knowledge is like a series of sentences, possibly related, that may be amassed in some sort of internal encyclopedia. In the lecture model of learning everyone caricatures, these sentences are delivered to you; in constructivism they are created by the students themselves.

Moncton, April 10, 2005
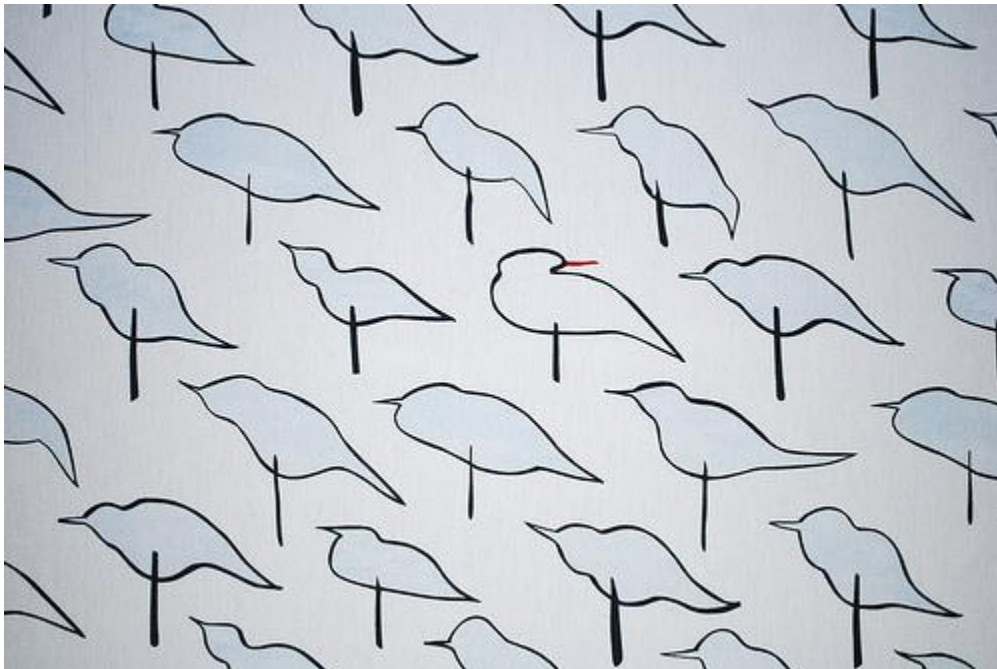
Confirming Theories

Responding to x28's New Blog.[307]

Interesting points. So we have three possible sources of the multiplicity of theories:
- belief one's own learning style is universal
- study bias
- pressure to publish

This is probably a good case, though it should indeed be supported observationally.

How would this be supported observationally? There are two approaches:

1. Conduct a study, asking people how they reach their theories, bolstered by redactive accounts of theories proposed in the literature. This is the usual method.

2. Put the idea out there, and ask whether it accords with other people's experience. In a network of sufficient breadth and diversity, if it reflects most people's experience, it may be said to be supported observationally.

I think that it is interesting that, if we follow the second approach to theory identification and confirmation, we are less likely to result in a multiplicity of theories, since the theories produced by the three possible sources will accord with only a small number of people's experiences, while deeper theories will be more universally experienced.

(p.s. this is obviously much too superficial an account of how we confirm theories, and is intended as an overview only)

Berlin, September 30, 2010

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[307] Matthias Melcher. #PLENK2010: Proliferation of Learning Theories. x28's new Blog, October 15, 2010. http://x28newblog.blog.uni-heidelberg.de/2010/10/08/plenk2010-proliferation-of-learning-theories/

The New Nature of Knowledge

I have written on various occasions in the past that the nature of knowledge is changing, a premise that is directly addressed - and challenged - by Tony Bates in his blog post, Does technology change the nature of knowledge?[308]

I want to go through his post more or less point by point, not to be annoying, but as necessary in order to unravel a thread of reasoning that, I would argue, leads him astray.

Because, right from the beginning, I think, Bates has an idea that there are different types of writing, and different types of knowledge. He writes, "*I should warn you that this is probably not a particularly suitable topic for a blog - an academic paper might be more appropriate to do the subject full justice.*"

One must ask, right off the bat, what can he *mean* by that? Because certainly it is not the placement of the body of reasoning into a printed paper and journal-bound form that renders it more appropriate. No, there is a supposition that the type of writing in an "academic paper" is a different *type* of writing from what he is offering here.

In what way? This begins to be a bit more difficult to pin down. Certainly it is not a matter of references or scholarly ability: Bates's article is filled with both. He is current on the academic literature - much more so than I - and covers his subject with an easy facility. At most, one can suppose it is some matter of the process of academic writing, then? The matter of reviewing and editing? Ah, but no; Bates's blog post could easily fit unedited into almost any journal one cares to name, unless it is a point *in principle* (and this I have seen) that he reference a particular body of literature that he is not covering here.

To Bates's argument, therefore, I must post this first challenge, that there is nothing *in principle* that distinguishes the content of a blog post from that of an academic article. The same content may very well be presented in either, and the difference lies only in how that content is treated: subject to secret review and editing in the one case, and open scrutiny in the other.

Ah - but then, one argues, his case is made: that there is no distinction between knowledge of the past and knowledge of today. No, this is not established: only that the distinction is not one between *academic* and non-academic writing. The barbarians are not at the gates; they arise from within as well as without.

Bates next captures very nicely the nature of the new sort of knowledge with some astute citation from relevant works in academia: Jane Gilbert, citing Manuel Castells, writes, "*knowledge is not an object but a series of networks and flows…the new knowledge is a process not a product…it is produced not in the minds of individuals but in the interactions between people*," and Jean-Francois Lyotard, "*the traditional idea that acquiring knowledge*

[308] Tony Bates. Does technology change the nature of knowledge? Online learning and distance education resources. March 12, 2009. http://www.tonybates.ca/2009/03/12/does-technology-change-the-nature-of-knowledge/

trains the mind would become obsolete, as would the idea of knowledge as a set of universal truths. Instead, there will be many truths, many knowledges and many forms of reason."

We see the result, that "*the boundaries between traditional disciplines are dissolving, traditional methods of representing knowledge (books, academic papers, and so on) are becoming less important, and the role of traditional academics or experts are undergoing major change*," in the graphs that represent the state of knowledge today:

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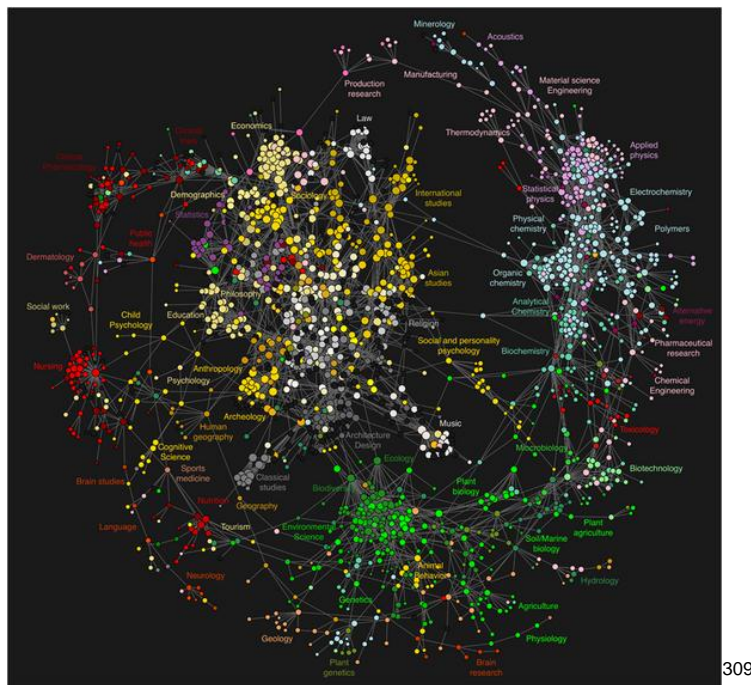
These are points that have been captured in a wide body of writings, from Gibson's depiction[310] of Cyberspace to the perceptron[311] of the 1950s and the connectionist literature[312] of the 1980s to populist works such as Rushkoff's *Cyberia*[313] and the widely popular *Cluetrain Manifesto.*[314] It is hard to know where this account originates; everybody (including the academics) writes as though they have discovered it for the first time.

What is important is not who came up with the theory (because we know that what I will say is that the theory is *emergent* from the works of numerous writers) but rather what the salient points are of the theory. From the work just cited, we can identify three major points (and those who care to look will find those points repeated throughout my own writing):

[309] Bollen J, Van de Sompel H, Hagberg A, Bettencourt L, Chute R, et al. (2009) Clickstream Data Yields High-Resolution Maps of Science. PLoS ONE 4(3): e4803. http://www.plosone.org/article/info:doi/10.1371/journal.pone.0004803
[310] Wikipedia. Neuromancer. Accessed March 20, 2009. http://en.wikipedia.org/wiki/Neuromancer
[311] Frank Rosenblatt. The Perceptron: A Probabilistic Model for Information Storage and Organization in the Brain. Psychological Review, 65(6). 1958. http://www.ncbi.nlm.nih.gov/pubmed/13602029
[312] James L. McClelland, David E. Rumelhart and the PDP Research Group. Parallel Distributed Processing: Explorations in the Microstructure of Cognition: Foundations. A Bradford Book. July 17, 1986. http://www.amazon.com/Parallel-Distributed-Processing-Vol-Foundations/dp/0262181207
[313] Douglas Rushkoff. Cyberia. HarperCollins. 1994. http://project.cyberpunk.ru/lib/cyberia/cyberia.pdf
[314] Rick Levine, Christopher Locke, Doc Searls and David Weinberger. The Cluetrain Manifesto. Website, 1999. http://www.cluetrain.com/

- knowledge is not an object, but a series of flows; it is a process, not a product
- it is produced not in the minds of people but in the interactions between people
- the idea of *acquiring* knowledge, as a series of truths, is obsolete

These point to a conception of knowledge dramatically from the Cartesian foundation or the Platonic form, a conception of knowledge that challenges even the Aristotelian category and the Newtonian law of nature. In particular, what seems to me to be relevant is that the knowledge thus produced is:

- non-propositional, that is, not sharp, definite, precise, expressible in language
- non-discrete, that is, not located in any given place or instantiated in any particular form
- non-objective, that is, independent of any given perspective, point of view, or experience

We can discuss - and many people have discussed, from people as varied as Wittgenstein and Derrida - *how* such knowledge assembles (as in a cluster or probability space), flows, inhabits, propagates, and the rest. I will refer to salient features of this type of knowledge in what follows; let's leave the account of it for now.

Bates identifies a singular feature of knowledge as discussed by Gilbert, Castells and Lyotard: "*All these authors agree that the 'new' knowledge in the knowledge society is about the commercialisation or commodification of knowledge.*"

We get to this conclusion through an odd route: "'*it is defined not through what it is, but through what it can do.' (Gilbert, p.35). 'The capacity to own, buy and sell knowledge has contributed, in major ways, to the development of the new, knowledge-based societies.' (p.39)*"

This is an oblique reference to what might be called a *functional* definition of knowledge, one that has its roots in the philosophical school of functionalism[315], "what makes something a mental state of a particular type does not depend on its internal constitution, but rather on the way it functions, or the role it plays, in the system of which it is a part, and this in turn perhaps derived from the Wittgensteinian doctrine of "meaning as use".[316].

But functionalism is very distinct from commercialism, and it is a great leap to infer from a 'definition' of knowledge based on "what you can do" to an assessment of knowledge as a "commodification" - a turn, indeed, that turns the new definition of knowledge on its head, and returns it to the status of *object*, and in particular, a medium of exchange. The retreat from some account of functionalism, which is more or less accurate, to one of commercialism, is an unjustified turn, and one which should not be accepted without significant dispute.

What would explain it? I would suggest by the fact that networks of knowledge resemble networks of commerce, that there is a similarity between the 'emergent knowledge' and 'the invisible hand of the marketplace', through to the overt endorsement of market logic we see in writers such as Surowiecki's The Wisdom of Crowds[317]. But one should not read into the

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[315] Stanford Encyclopedia of Philosophy. Functionalism. First published Tue Aug 24, 2004; substantive revision Mon Apr 6, 2009. http://plato.stanford.edu/entries/functionalism/
[316] Wikipedia. Philosophical Investigations. Accessed March 20, 2009. http://en.wikipedia.org/wiki/Philosophical_Investigations
[317] Wikipedia. The Wisdom of Crowds. Accessed March 20, 2009. http://en.wikipedia.org/wiki/The_Wisdom_of_Crowds

advocacy of a network theory of knowledge (as we have been describing) anything like a market theory of economics, at least (crucially) not to the degree of mistaking *a descriptive interpretation* with a *causal agent*.

Return to the definition of knowledge above. Knowledge is not an object (or objective), it is not discrete, it is not a causal agent. It is emergent, which means that it exists *only by virtue of a process of recognition*, as a matter of subjective interpretation. Mistaking a perception of value with 'value' as an objective driver is a classic mistake of market economics (in my view) and certainly a significant misinterpretation of network theories of knowledge.

But Bates has taken that road wholeheartedly: "*I have no argument with the point of view that knowledge is the driver of most modern economies, and that this represents a major shift from the 'old' industrial economy, where natural resources (coal, oil, iron), machinery and cheap manual labour were the predominant drivers. I do though challenge the idea that knowledge itself has undergone radical changes.*"

Let us be clear about the view of knowledge that Bates has explicitly endorsed: one in which knowledge has causal efficacy, one where it is a "driver", more similar to objects (like coal or iron) than ephemera (like attitudes and expectations).

Bates then sets up what we have to uncharitably (but regretfully) call the straw man. Skipping the story, we can read: "*in education academic knowledge has always been more highly valued in education than 'everyday' knowledge. However, in the 'real' world, all kinds of knowledge are valued, depending on the context. Thus while values regarding what constitutes 'important' knowledge may be changing, this does not mean that knowledge itself is changing.*"

To be more charitably, what we have here (I would say) is Bates distinguishing between the two types of knowledge according to the *different types of uses* to which they are put. This has the merit of being consistent with a form of functionalism, and at the same time allowing two different 'types' of knowledge to be (essentially) the same, but applied in different endeavours.

This, though, nonetheless commits two errors:

- first of all, while endorsing a functionalist definition of knowledge, it assumes an as yet undefended essentialist definition of knowledge (because, if functionalism were *true*, then two items of knowledge which were put to different uses would in fact be two *types* of knowledge, since *function* defines typology).
- second, the depiction of knowledge that I have been calling the network account of knowledge is *not* simply a functionalist theory of knowledge; it has an entirely different *ontology* in which the former objects, however defined, no longer exist, and something that is non-discrete and non-localized and non-specific is postulated as performing the function we formerly ascribed (mistakenly) to some sort of discrete entity.

Anyhow, having made the distinction between 'academic' and 'commercial' knowledge, Bates will (with reference to Gilbert) expand on the definition of 'academic' knowledge as "'*authoritative, objective, and universal knowledge. It is abstract, rigorous, timeless - and difficult. It is knowledge that goes beyond the here and now knowledge of everyday experience*

to a higher plane of understanding…..In contrast, applied knowledge is practical knowledge that is produced by putting academic knowledge into practice. It is gained through experience, by trying things out until they work in real-world situations.'"

In fact, this conflates two distinct types of knowledge:

- knowledge that is academic, and
- knowledge that is abstract, rigorous, timeless

No doubt there are many academics who would will that academic knowledge be abstract, rigorous and timeless, but in fact the argument is that *no knowledge* has these properties - we *thought it did* in the past, but this has in fact changed, and is no longer believed to be the case.

This is an important distinction to make because, first, the properties of being abstract, rigorous and timeless characterize what might be called common, practical, or 'folk' knowledge as much as the ever did academic knowledge, and second, what constitutes 'academic' knowledge is (as we see from the diagram near the head of this post) less and less abstract, rigorous and timeless.

This is what makes it possible to claim that the definition of academic knowledge is "too narrow" - much of what is represented as academic knowledge - "engineering, medicine, law, business" - apply academic knowledge, and academic knowledge (at least when well formulated) is "built on experience, traditional crafts, trail-and-error, and quality improvement through continuous minor change built on front-line worker experience."

There was, in the past, no significant distinction between 'academic' knowledge and 'practical' knowledge except where it was applied: and we could see 'abstract, rigorous, timeless' knowledge equally well in the church service, the farmer's field, or the grandmother's advice on weather. *Knowledge* was, in all cases, *timeless wisdom*. Such knowledge was *power* whether applied to engineering feats or to winning at three card brag.

Bates next considers the applicability of academic knowledge. It's a bit difficult to work with the argument now, since we are at such a fundamental divide, but let's consider the proposition: "*my other quibble is that 'academic knowledge' is implicitly seen in these arguments as not relevant to the knowledge society - it is only applied knowledge now that matters. However - and this is the critical point - it has been the explosion in academic knowledge that has formed the basis of the knowledge society.*"

This goes to the point that academic knowledge can be *used* in a practical - even commercial - context, and therefore must not be distinct even functionally. The *purpose* to which we formerly ascribed only practical knowledge is found to result from academic knowledge (almost to the point of exclusivity): "*It was academic development in sciences, medicine and engineering that led to the development of the Internet, biotechnology, digital financial services, computer software and telecommunication, etc. Indeed, it is no co-incidence that those countries most advanced in knowledge-based industries were those that have the highest participation rates in university education.*"

Leaving aside the question of whether these advances were in fact developed *in academia* or through some process we might call the *academic method*, let me focus on the question of the *nature* of these advances. In all these developments - the internet, biotechnology, and the rest - did academic contribute abstract, rigorous and timeless knowledge? Certainly, there was some point at which it did. Newton's three laws were classical instances of such. The laws of thermodynamics equally so. And even in the last century, Einstein contributed to the paradigm with E=mc[2]. But recently?

I would argue - and this is a matter for empirical investigation - that the research paradigm based on "abstract, rigorous, timeless" knowledge has *stalled*, and that what researchers have in fact been harvesting over the last few decades is something much more like *network* knowledge, as I have described it above. This is a distinct form of knowledge that is *not* based on simple causality, laws of nature, objective perspectives, and the rest. It is (in the words of Polanyi) *tacit* and *ineffable*.

The internet is a classic example. While there are protocols, no *law* governs how computers interact - this is strictly a matter of agreement and individual choice. In biotechnology scientists are looking at systems and networks in everything from immunology to ecology. Financial services proves to be based on, well, Ponzi schemes rather than anything that might be called 'timeless'. And telecommunications are based on laws that have been known for decades, depending more and more on protocol and agreement, rather than natural law, for improvements.

Indeed, the sorts of knowledge that Bates identifies as important resemble more and more dynamic, interpretive, chaotic types of phenomena - our capacity to, as Rushkoff said, not navigate or *surf* through a dynamic information field, as though it were a gigantic wave (or office block parking garage), rather than an attempt to capture and hold: "*it is not just knowledge - both pure and applied - that is important,*" he says, "*but also IT literacy, skills associated with lifelong learning, and attitudes/ethics and social behaviour.*" But the point is: these are types of knowledge - they are, indeed, the new literacy, 21st century literacy.

The problem is, Bates hasn't let go of the old account of knowledge, the one with abstract, rigorous and timeless truths, knowledge based on objects, the acquisition of content. He writes, "*My point is that it is not sufficient just to teach academic content (applied or not).*" No, it is not sufficient to teach this type of (old-style) knowledge. It is (arguably) not even necessary. Because what we want are the new skills, based on the new more formless type of knowledge, skills that allow people to get by when *nothing* is abstract, rigorous, timeless: "*the ability to know how to find, analyse, organise and apply information/content within their professional and personal activities, to take responsibility for their own learning, and to be flexible and adaptable in developing new knowledge and skills.*"

But Bates doesn't admit of this; he explicitly rejects it. "*These skills and attitudes may also be seen as knowledge, although I would prefer to distinguish between knowledge and education, and I would see these changes more as changes in education. What is changing then is not necessarily knowledge itself, but our views on what educators need to do to 'deliver' knowledge in ways that better serve the needs of society.*"

This may be the case if, as he suggests, we are simply facing an explosion of new knowledge. But while we are seeing an explosion of content, our stock of abstract, rigorous and timeless truths remains constant - indeed, arguably, it has been on the decline, as we realize more and more that the laws and principles of nature that we took for granted were at best approximations of reality and at worst projections of our own thoughts, values and beliefs on nature (how else does one explain an economic system based on the infinite expansion of capital?).

What we are experiencing a proliferation of is of *points of view*, and with each iteration of points of view it becomes apparent that the former world in which there was only one (authoritative, lawlike and Catholic) point of view is more and more misrepresentative. The new form of knowledge is a recognition that the propositions in our content, no matter how apparently abstract, rigorous and timeless, are *in fact* not knowledge, but merely more sea through which we must navigate.

This is why we must change our educational system, indeed, even as Bates says, "*moving away from a focus on teaching content, and instead on creating learning environments that enable learners to develop skills and networks within their area of study.*" Because, *contra* Bates, content is *not* still crucial (more, more accurately, no particular bit of content is crucial) and academic values that propel enquiry toward abstract, rigorous and timeless truths are not only obsolete, they are dangerous.

Indeed, I would argue even that what might (again) be called 'academic method' is itself under siege. Bates writes, "*we need to sustain the elements of academic knowledge, such as rigor, abstraction and generalization, empirical evidence, and rationalism.*" But these very principles misconstrue what it means to reason - the practices of abstraction and generalization, for example, ought to be understood not as mechanisms for finding more truth (as the old inductivist interpretations made out) but are rather *ad hoc* means of creating *less* (but more manageable) truth.

The very forms of reason and enquiry employed in the classroom must change. Instead of seeking facts and underlying principles, students need to be able to recognize patterns and use things in novel ways. Instead of systematic methodical enquiry, such as might be characterized by Hempel's Deductive-Nomological method, students need to learn active and participative forms of enquiry. Instead of deference to authority, students need to embrace diversity and recognize (and live with) multiple perspectives and points of view.

I think that there is a new type of knowledge, that we recognize it - and are forced to recognize it - only because new technologies have enabled many perspectives, many points of view, to be expressed, to interact, to forge new realities, and that this form of knowledge is emerged from our cooperative interactions with each other, and not found in the doctrines or dictates of any one of us.

Additional Comment

Hiya Lindsay, you ask,

> *is it actually the nature of knowledge that has changed, or it is the massive change in how knowledge is tangibly represented that makes it look like its nature has changed?*

I think what we need to understand is that 'knowledge' is an artifact; it is created by humans. There is not 'knowledge' out there in the world. The word 'knowledge' is used to describe a specific state of affairs or relation between people and putative) states of affairs.

As a consequence, what counts as knowledge has changed over the years, and continues to change depending on your particular perspective or world view. Generally, knowledge has been held to be either a certain privileged state of mind, or a certain privileged relation between a mental state and a world state. The former, for example, associates knowledge with a 'feeling of certainty' (Hume), an 'inability to doubt' (Descartes), or some such mental state. The latter describes knowledge variously as 'justified true belief' or the result of a 'truth-preserving causal sequence'.

In fact, of course, what 'knowledge' is (on my account) is some complex combination of all of these and more. In my own work I have depicted knowledge as being a state where you "can't not know", a state of "recognition", like when you see a face or find Waldo. But the other way in which knowledge has changed does not have to do with the definition of knowledge. This is important. Because while people have *defined* knowledge as above, there has been a parallel discussion about what *constitutes* knowledge.

And it has been taken for granted in recent years that knowledge is *constituted* of propositions - sentences in the brain. And that *knowing* is a process of being able to ascribe truth values to these sentences, in a reliable and formal manner.

And it is *this* where we are seeing a change in the nature of knowledge.

Alternatives to the sentence theory have always been with us, but have always been dismissed as metaphorical. When people advance, for example, the 'picture theory' of mental representation, nobody supposes (we are told) that there are actual pictures in the brain. Except that - there *are* actual pictures in the brain - more accurately, our mental representations (to now misleadingly use the word) are more like *patterns of perception* than they are like words.

This means that the depiction of knowledge as though it were composed of sentences or propositions *systematically misrepresents* mental states, and hence, systematically misrepresents knowledge itself.

It is in this characterization that our understanding (as opposed to the 'definition') of knowledge is changing (note even how the request for a 'definition' presupposes the old, sentence-based, version of knowledge).

When we move from a sentential, or code-based, story of mental states, and move toward a pattern-based story of mental states, then our account of knowledge changes in the way described by the authors cited in the story: concepts are no longer fixed, meaning and truth are distributed, and states of affairs vary according to one's perspective.

The idea of knowledge as interconnected 'memes' was a key theme of Vannevar Bush's work in the 1940's

Not to deny Bush's paramount importance in the field, but we need to draw an important distinction.

On the one hand, we can represent mental states as some sort of *systems theory*, with a series of interconnected entities, and with 'knowledge' as the stuff that flows between them. This picture allows us to think of 'knowledge' as something that flows, something that can be a commodity. Even if the 'stuff' is somewhat theoretical - even if it is 'information', for example, the essence is that it travels from one entity to the next.

This is a *transactional* theory of communication. It's the sort of thing we'll find in Dretske. It is one that characterizes traditional distance education (e.g., Moore) and even some forms of connectivism (a lot of George Siemens's stuff, for example, looks like a transactional theory).

Well, there is undeniably stuff that flows from one entity to another, whether in a system or a network. But what is arguable is whether what flows is *knowledge*. I argue it is not.

This sets up the alternative to systems theory, which may be referred to as *emergence theory*. The central tenet of emergence theory is that even if stuff flows from entity to entity, that stuff is *not* knowledge; knowledge, rather, is something that 'emerges' from the activity of the system as a whole.

We can look at the human brain as system to understand this. The brain is a network of neurons, the neurons are connected to each other, and they send signals in the form of electrical impulses, such that the signals cause activities (spikes) in the neurons.

But we would not say that a given electrical impulse sent from one neuron to the other constitutes 'knowledge'. Far from it. Knowledge results only from a large number of neural impulses; it is not *in* the impulses, but rather is what results from that.

What results from that may be represented in two ways, each of which is a suitable candidate for our new depiction of knowledge.

The one way is the set of interconnections that results from the activities of such a network. The activities, as has been described in numerous places, actually create or sever connections between the neurons. Hebbian associationism is an example of such a process. This results, at any given time, in a *network of connectivity* between these entities. This network - and subnets with the network (aka 'patterns of connectivity') - may be depicted as knowledge.

A second way of representing knowledge, and one that I embrace in addition to the first for a variety of reasons, is that patterns of connectivity can be *recognized* or interpreted as salient by a perceiver. A pattern is just a pattern until it is recognized as significant by some system typically, another network external to the original network.

academic knowledge

*Bates relies on the traditional distinction between 'academic' knowledge and 'practical'
knowledge, and he has a subtle and interesting account of this distinction, which as you
suggest he collapses.*

My own issues with respect to 'academic' knowledge as it is currently represented, by contrast,
have nothing to do with whether it is 'practical', and everything to do with whether it is
fundamentally sound, representative and reliable. It's not so much a question of the *use* of
academic knowledge (though it shades into this) as with the veracity of academic knowledge.

This is a rather trickier distinction to maintain than one might think, and makes it difficult to
criticize academic knowledge on my own grounds, without falling into some of the truisms I have
described above as characterizing traditional knowledge. This is necessarily the case, because
ultimately, academic knowledge can only be criticized on academic grounds, which means that I
need to show that, in the light of new forms of knowledge, academic knowledge *fails according
to its own merits.*

Thus, for example, we see (say) some instance of academic knowledge purporting to
instantiate, say, 'timeless truth' or 'universal principle'. Merely asserting that there are no
timeless truths does not convince a person who believes in them it needs to be shown that *this*
instance of academic knowledge does not support the claim of being a 'timeless truth', while at
the same time using only he mechanisms available within academic knowledge (words and
sentences, observation and experience, definition, inference and explanation) to do this.

This is a long and tedious process of limited value, because (in my world at least) there isn't
really any upside to convincing some academic (who won't be convinced that their entire world
view is wrong. So while I engage in such a process from time to time, it is for the purpose of
establishing at least a semblance of credibility in academic circles.

Most of my work - and most of the work of people working with the new understanding of
knowledge - occurs outside academic circles; some of this work may be practical, some of it
may be theoretical, and I think that we have the belief that what we are doing will *eventually*
become 'academic' - but not without a whole-scale change in the understanding of what it
means to be 'academic'.

And that, ultimately, is what 'change', from the perspective of Bates's presentation, comes to. It
comes as a cleave, between those who would argue that the *current* means and mechanisms
employed by academic, the 'academic method' as I have characterized it, can be productively
retained, and those who would argue, as I do, that academic method *systematically
misrepresents knowledge*, and must, therefore, the substantially altered.

Moncton, Friday, March 20, 2009

More on New Knowledge

Responding to Tony Bates, Bates and Downes on new knowledge: Round 3[318]

You say

> *However, I don't believe the distinction between 'academic' knowledge and 'applied' knowledge is particularly useful.*

Here we agree.

You say

> *What is useful is a distinction between academic and non-academic knowledge, as measured by the values or propositions that underpin each kind of knowledge.*

Here we disagree.

First, I'm not sure you can make the distinction stick.

Second, even if you make the distinction stick, then so much the worse for academic knowledge, because the values or propositions that underpin academic method are unsound.

You say academic method

> *AIMS for deep understanding, general principles, empirically-based theories, timelessness, etc*

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[318] Tony Bates. Bates and Downes on new knowledge: Round 3. Online learning and distance education resources. March 22, 2009. http://www.tonybates.ca/2009/03/22/bates-and-downes-on-new-knowledge-round-3/

Yes. But it shouldn't. That's my point.

You say

> *Academic knowledge is not perfect, but does have value because of the standards it requires.*

This is a statement deserving of more discussion, because I think that either academics have lost track of the standards, being devoted to process over rigor, or that the standards adhered are in fact no guarantor of worthwhile results.

You say

> *I also agree with Stephen that knowledge is not just 'stuff', as Jane Gilbert puts it, but is dynamic. However, I also believe that knowledge is also not just 'flow'.*

It is neither 'stuff' nor 'flow', in my view. I explicitly reject both views in my post and in the comment that follows.

As I wrote: "The central tenet of emergence theory is that even if stuff flows from entity to entity, that stuff is not knowledge; knowledge, rather, is something that 'emerges' from the activity of the system as a whole. This network - and subnets with the network (aka 'patterns of connectivity') - may be depicted as knowledge... A second way of representing knowledge, and one that I embrace in addition to the first for a variety of reasons, is that patterns of connectivity can be recognized or interpreted as salient by a perceiver."

The reason why this depiction is important is that knowledge, on this view, is *not* "deep understanding, general principles, empirically-based theories, timelessness, etc." So whatever it is that academic method is aiming for, it is not knowledge.

This is a key point of contention between us:

You write

> *at some point each person does settle, if only for a brief time, on what they think knowledge to be. At this point it does become 'stuff' or content. I still contend then that 'stuff' or content does matter, though recognising that what we do with the stuff is even more important.*

I disagree with this.

I do describe (following others) 'settling mechanisms' in the brain. We can say that we 'settle'. We can hypothesize, at least, a (thermodynamically) stable state of connections and activations in the brain. But the 'entities' in such a system (if we can call them that) that constitute 'knowledge' do NOT have the properties of 'stuff' or 'content'. This is the key and fundamental point of my argument:

-   Not 'stuff' - not discrete, not localized, not atomic

- Not 'content' - not semantical, not propositional, not symbolic

And that's my problem with academic method. It seeks out specifically propositions - symbolic or semantical - that are discrete, localized and atomic. Things that are *candidates* for deep understanding, general principles, empirically-based theories, timelessness.

I think that maybe if we can untangle the vocabulary we might come to agreement on this. After all, you say

> *this is likely to result in a shift in knowledge that may be very important, and it is in this area where I think Stephen and I may have some agreement.*

This encourages me.

Skipping ahead quite a bit... You write

> *My concern about much of the discussion of the 'new' knowledge is that it seems to depend on what I might call majority voting - it is the number of hits that matter, not the quality of the content.*

Quite so. Voting - and counting generally - record only the mass of a thing. They require some sort of identity (in order to identify that which is being counted). This is distinct from the type of knowledge I have been trying to describe, which depends not on the quantity of things assembled, but on the way those things are interconnected.

This is what I have tried to clarify with the distinction between 'groups' and 'networks'.[319] The properties found in the group are (to my way of seeing) just those embraced by what we have been calling the academic method. If you look at the diagram[320] you see typical academic values: unity (of purpose, of workers, of science), coordination, closed systems, distributive (expert-based) knowledge.

Knowledge based on networks is not based on counting - not on votes, on surveys, on mass, on category or type, etc. because knowledge is not the sort of thing that can be counted, not the sort of thing that can be generalized (as a mass).

The objection to voting *is* an objection to academic method.

The new knowledge is precisely *not* knowledge by counting, knowledge by popularity.

But it's not knowledge by experts ether. Because if we say that knowledge is based on experts and expertise, then we are saying that knowledge is the 'stuff' that's in people's heads that goes from place to place. Which - again - it isn't.

Now it is reasonable to disagree with my position on knowledge, but it's important to recognize that 'network knowledge' isn't based on counting or popularity - no matter how much this is emphasized by the (popular) media.

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[319] http://www.downes.ca/post/42521
[320] http://www.flickr.com/photos/stephen_downes/252157734/

Finally,

> *Lastly, Stephen was puzzled as to why I felt a blog was not the best way to discuss this issue. What I feel the topic needs is more space and time, and a critique from philosophers would also add to the discussion, I am sure, because I do not have specialist knowledge or training in epistemology. I would like to have had more time to review other writers on this topic, and more space to elaborate my views. I feel that I could do a better job that way.*

Well - take all the time and space you need. Neither are in short supply on blogs.

Indeed - and this is one thing I like - you can go back over again, return to the same point again, attack it from various angles - a whole range of things you can't really strive for in any other forum.

> *It was not because I needed the discussion to be academically reviewed in the way that journals are reviewed*

Good. because if we were restricted by reviewers, we could never be having this discussion. Which would be a pity.

Moncton, March 22, 2009

Knowledge Mobilization and Knowledge Translation

Posted to the SCoPE conference, May 21, 2008.[321]

One of the things I wanted to see Tom Carey explore in his talk today is the concept, suggested in this title, of *knowledge mobilization.*

From iisd,[322] "Knowledge mobilization addresses how external knowledge (outside of the organization) is sought out and combined with internal knowledge to create new knowledge that meets the needs of target users/clients."

They continue, "Knowledge mobilization emphasizes purpose (meeting the needs of clients) and looks to how one brings in the knowledge of others. It recognizes that organizing one's own intellectual capital does not necessarily lead to innovation or change; implicit in the concept is the need for working relationships with others."

Knowledge mobilization is closely related to a concept that is gaining currency in the medical education community, *knowledge translation*. Here you have a similar idea of how knowledge isn't simply 'managed' but is rather put into action some way.

IDRC, for example, defines knowledge translation as "the exchange, synthesis and ethically-sound application of research findings within a complex set of interactions among researchers and knowledge users."[323]

They continue, "In other words, knowledge translation can be seen as an acceleration of the knowledge cycle; an acceleration of the natural transformation of knowledge into use."

In both cases, it is clear that there is an interaction expected, that knowledge is not simply applied or transferred. From the IDRC paper again:

"There is a clear distinction between KT and *knowledge transfer* when the latter refers to a linear process through which research is first conceptualised and conducted, and the results are then handed over to the end-users. The unidirectional nature of knowledge transfer has often proved to be an ineffective way to ensure adoption and implementation of research results (Landry, Lamari and Amara, 2001)."[324]

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[321] Simon Fraser University. SCoPE Online Conference. May 21, 2008. Website no longer extant: http://scope.lidc.sfu.ca/mod/forum/discuss.php?d=1363#p8175

[322] International Institute for Sustainable Development. Knowledge Mobilization. Website. Accessed May 21, 2008. http://www.iisd.org/networks/coms/mobilization.asp

[323] International Development Research Centre. Research Matters Knowledge Translation Toolkit. Accessed May 21, 2008. New website: http://web.idrc.ca/en/ev-125530-201-1-DO_TOPIC.html or http://web.idrc.ca/en/ev-128908-201-1-DO_TOPIC.html Original website no longer extant: http://www.idrc.ca/research-matters/ev-90105-201-1-DO_TOPIC.html

[324] Réjean Landry, Moktar Lamari and Nabil Amara. Extent and Determinants of Utilization of University Research in Public Administration. Joint Conference of the Canadian Political Science Association and Société québécoise de science politique, Centre des congrès, Québec, QC, Canada, July 29-August 01. http://www.rqsi.ulaval.ca/fr/pdf/publication1.pdf

Also, "There is now a general trend towards increased interactions between researchers and users, and knowledge transfer strategies increasingly incorporate active processes and interactive engagement and exchange (Lavis et al., 2003)."[325]

Both the concept of knowledge mobilization and knowledge translation recognize that there is a relation between that practice and *knowledge brokering* where "knowledge brokering refers to the active process rather than to the general concept/idea."

There's a lot to be said for this approach, obviously. It is a far cry from the days when people thought that knowledge could be simply 'captured' and stored in 'knowledge bases' that people would search in to find what they needed to know (much like the unloved and unread corporate 'knowledge' on the shared drives).

And it is a genuine improvement on the idea that knowledge can be simply 'transferred' from the originator to the person to whom it supposedly has some application. I think that in learning we have pretty much abandoned the 'transfer' model (haven't we?) and we would probably want to adopt another approach with respect to research and its application as well.

But it's not clear that knowledge mobilization and knowledge translation are (for lack of a better word) *benign*. If knowledge is incorporated into practice, then there is, in a sense, a mechanism whereby the person generating the knowledge obtains a significant degree of input into the practice.

We see this at work with knowledge translation. Consider how the Canadian Institutes of Health Research talk about knowledge translation: "Knowledge Translation, Commercialization and Industry Collaboration are all aimed at engaging stakeholder communities in the funding and translation of research for effective and innovative changes in health policy, practice or products."[326]

On the other hand, knowledge translation initiatives can be useful and productive. The Atlantic Health Promotion Research Centre, for example, provides "a searchable database for KT-related resources (including information and resources about stroke and how organizational and health systems resources affect an organization's ability to absorb and apply research evidence)."[327]

Because knowledge translation initiatives can have such a significant impact on practice, the management of such initiatives is crucial. That's why lobbying organizations such as the Cochrane Collaboration[328] are interested in promoting knowledge translation efforts. By defining what counts as knowledge, and by embedding knowledge translation in the workplace, they have a direct link to practice, bypassing and circumventing policy-makers and social scrutiny.

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[325]Lavis, J. N., Robertson, D., Woodside, J. M., Mcleod, C. B., and Abelson, J. How can research organizations more effectively transfer research knowledge to decision makers? Milbank Quarterly, 81(2), 221—248. 2003.
http://www.lse.ac.uk/collections/LSEHealthAndSocialCare/pdf/DisucssionGroupFiles/ Knowledge transfer.pdf

[326] Canadian Institutes of Health Research. Knowledge Translation & Commercialization. Website. Accessed May 21, 2008. http://www.cihr-irsc.gc.ca/e/29529.html

[327] Dalhousie University. Atlantic Health Promotion Research Centre. Website. http://www.ahprc.dal.ca/ The database, accessed May 21, 2008, appears no longer to be extant. http://www.ahprc.dal.ca/kt/library.cfm

[328] The Cochrane Collaboration. Website. http://www.cochrane.org/ Original citation, accessed May 21, 2008, no longer extant. http://www.cochranemsk.org/professional/knowledge/default.asp?s=1

This, one suspects, is how the commercialization of our health and education systems is to be achieved.

On the other hand, if approached from a more open perspective, knowledge translation also has the potential to reform the decision-making process in a positive manner. Current research is aimed mostly at decision-makers and practitioners. Knowledge translation, by contrast, considers the sector as a whole.

As Davis, et.al. (2003) write, "knowledge translation... allows attention to be given to all possible participants in healthcare practices, including patients, consumers, and policy makers."[329] It focuses not on the needs and interests of the practitioners, but on the well-being of the wider community.

There is similarly a source of tension in the research model inherent in knowledge translation. Despite its emphasis on holism and interactivity, it represents the domain as linear and causal, as seen by the model that "works in closing the gap between evidence and practice," usually through an 'intervention' and measurement of results.

Though on one hand this may appear to be a collaborative process, the researcher, armed with 'evidence', in a certain sense 'knows' how the practitioner is deficient, and hence works not merely by increasing knowledge and skills, but by "promoting conducive conditions in the practice" and reinforcing the change in various ways.

Worse, the practice becomes some sort of club to be used against what might be effective - but less commercially profitable - technologies. Doherty (2005) cites an excellent example: "as with many interventions … the effectiveness of parachutes has not been subjected to rigorous evaluation using randomized controlled trials."[330]

The problem is, when you limit practice to what can be shown 'using the evidence', you limit practice in ways that are unproductive, and possibly dangerous. The 'evidence' may not exist to support a practice we know, via other means, is effective. The 'evidence' may prescribe a 'cookbook' approach, by necessity oversimplifying what are in fact complex problems.

And worst of all, Doherty notes, "The final and often most scathing criticism of EBM is that it is a means to serve cost-cutters and administrators, that it is following its own political agenda and has created its own profitable industry. Is EBM a means to serve administrators or is it an attempt to improve care?"

Knowledge Mobilization, though it has a different history, adopts the same gap-based analysis. In his paper on knowledge mobilization, Peter Keen (2006) writes "what happens when there is a fundamental gap between these provider intentions and user choices? The answer is that user choices win out. That means that it is essential to fuse the institutional supply/management side of innovation with the individual demand/mobilization side of the knowledge and information

[329] Dave Davis, et.al. The case for knowledge translation: shortening the journey from evidence to effect. BMJ 2003; 327 doi: 10.1136/bmj.327.7405.33. July 3, 2003. http://www.bmj.com/cgi/content/full/327/7405/33
[330] Steven Doherty. Evidence-based medicine: Arguments for and against. Emergency Medicine Australasia, Volume 17, Issue 4, pages 307–313. August 2005. http://onlinelibrary.wiley.com/doi/10.1111/j.1742-6723.2005.00753.x/abstract

investment/payoff equation."[331]

It's all very well to say that user choices win out - and Keen makes the convincing case with discussions of Napster (which people used) and the semantic web (which people didn't). But there is a danger in an analysis that supposes that there is some *fact of the matter* about user choices that can be identified through some process of research and applied, as though it were some sort of glue (or "fusion") in practice.

But it is arguable - and I would argue - that there was no 'fact of the matter' about user preferences for Napster before the launch of Napster. Numerous factors operating one way or another played into the consumers' final response (the same is true of the semantic web, which despite being a big dud so far, is one gee-whiz invention away from mainstream acceptance). We can't draw the linear cause-effect relation here, no more than we can in medicine.

To be fair, it seems clear that Keen recognizes these limitations. He draws a clear distinction between an academically oriented *knowledge regime* and a business-oriented knowledge regime (what Lakoff might call a frame[332]). And Keen writes, "from the perspective of user choice, the two different regimes of truth lead to two different domains of usefulness and awareness for information-seekers... *Whose* semantics should provide the base for the ontology and metadata choices?" Keen suggests we need to 'fuse' these different perspectives. I suggest they are incommensurable.

Another factor is important when one speaks of knowledge mobilization, and that is: he who controls the knowledge controls the mobilization.

Paul Capon, the president of the Canadian Council on Learning, for example, speaks of knowledge mobilization[333] as though it will inform - even dictate - practice. "What do I mean by knowledge mobilization? I mean that the research will be used in order to identify the issues we think we actually need to know in order to move learning forward in this country so it is action research, not academic research; not pure research."

We heard from the Canadian Council on Learning yesterday, as John Biss[334] presented. Concurrently was announced the release of a paper from CCL on international e-learning strategies.[335] But we also learn that the paper was two years old! Is *this* what is meant by 'mobilization' - the selective releasing and non-release of data in order to motivate and move a

[331] Keen, Peter G.W. (2006). Knowledge mobilization: The challenge for information professionals. In C. Khoo, D. Singh & A.S. Chaudhry (Eds.), Proceedings of the Asia-Pacific Conference on Library & Information Education & Practice 2006 (A-LIEP 2006), Singapore, 3-6 April 2006 (pp. 1-9). Singapore: School of Communication & Information, Nanyang Technological University.
http://www.blogger.com/dlist.sir.arizona.edu/1338/01/01.Peter_GW_Keen_pp1-9_.pdf
[332] George Lakoff. Simple Framing. originally published by George Lakoff of the Rockridge Institute on Tuesday February 14, 2006.
http://www.cognitivepolicyworks.com/resource-center/frame-analysis-framing-tutorials/simple-framing/ Original citation no longer extant:
http://www.rockridgeinstitute.org/projects/strategic/simple_framing
[333] Paul Cappon. Speech delivered November 25, 2004 at National Press Club
Ottawa, Ontario. Canadian Council On Learning. http://www.ccl-cca.ca/ccl/Newsroom/Speeches/25Nov2004.html
[334] *John Biss* and Erin Mills . E-learning: The Promise and the Potential. SCoPE Shaping Our Future conference, May 19, 2008.
http://scope.bccampus.ca/mod/forum/discuss.php?d=1358 Original link no longer extant:
http://scope.lidc.sfu.ca/calendar/view.php?view=day&course=56&cal_d=20& cal_m=5&cal_y=2008#event_453
[335] Stephen Downes. International E-Learning Strategies: Key Findings Relevant to the Canadian Context. OLDaily (weblog). May 20, 2008.
http://www.downes.ca/post/44628

sector toward a predetermined end? It is hard to draw any other conclusion from such a mismanagement of communication of research results.

The presumption that there is a privileged group that is in some way able to identify 'gaps' in the current state and some desired future state is, in my mind, flawed. It is flawed, not simply because any assessment of the current state depends on perspective, and is not therefore theory-neutral, and it is flawed not simply because there does not, and will never, in a complex system, exist a causal mechanism to move one from the original state across the gap to the desired state, but rather, because the articulation of the desired state, so crucial to the determination of action, is not an epistemological problem, but rather, one of power and authority.

And knowledge mobilization (and knowledge translation) is, in my mind, especially when practiced in an institutional setting, a legitimation of that authority, an authority that is just as likely based on the prejudices and desires of those in control, and not any objective, theory-neutral, or evidence-based statement of the desired outcome.

Moncton, May 21, 2008

Data

Responding to Cooperative Catalyst, *Metrics and "Success"*[336]

I think data is important (it's the only evidence we have!) but I think that people take a very narrow view of data, which is unfortunate.

- they think, for example, that data is just numbers, when in fact data can be found in the full range of perceptions, including observations of emotions, visceral reactions, likes and dislikes, and more

- they think the only way to work with data is to count things, while in fact data provide a rich range of possible interpretations - connections, patterns, flows, etc

- they think data is cumulative, suitable only for iterations, when (as Kuhn pointed out) the right sort of data shows a greater and greater need for quantuum leaps of scientific revolutions - data about anomalies, data that needs explaining, problems, unanswered questions, etc

- they think data should show you a single 'objective' perspective, when in fact different sets of data yield different perspectives, where these perspectives taken individually and together amount to more than the mass of data aggregated

The problem is not with the use of data to make decisions - the problem is with the simplistic one-dimensional use of data to make decisions. Instead of attacking the data - which leaves you with no ground to stand upon - it makes more sense to attack the simple-mindedness.

Change the grounds! It's not that their approach is 'data-driven' or 'evidence-based' and yours is not, it's that they have very carefully selected a subset of the evidence that will 'count', while you are using a much broader, richer, and ultimately more accurate base of evidence.

(p.s. on the term 'data' - sometimes I use it as a mass noun, and say things like 'data is important', and sometimes I use it as a plural, and say things like 'data provide'; there isn't a single 'correct' way to use the term; its conjugation travels as your usage travels).

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[336] mrsenorhill. Metrics and "success". Cooperative catalyst (weblog). January 9, 2012. http://coopcatalyst.wordpress.com/2012/01/09/metrics-and-success/

Content and Data

Responding to Seth Gottlieb, who argues that content is not data:[337]

Each of the four things you say content 'has' are external to the content:

- Content has a voice... the person who created the content may be trying to communicate something, but content is inert, and does not 'try' to do anything

- Content has ownership... ownership is a social convention and not inherent to content

- Content is intended for a human audience... same thing as the first point - the intention is in the human, not the content

- Content has context... everything has context, not just content. Context is the environment in which content finds itself, both historically and in the present moment. By definition, context is external to content.

Significantly, if the things that distinguish content from data are all external to content, it follows that content is not inherently distinct from data, but becomes distinct only through our attitudes toward it and the history of its use.

Seth says:

What's that? I can't hear you over the noise of all these servers!

Seriously, the point of this post is to get beyond the logical/physical storage aspects of content (which is what we tend to dwell on as technologists) and focus on what content means to users. Content is the *expression* and *communication* of information. This is significant because the tools that manage content need to be designed with an awareness that they will be used to intermediate in a conversation between human speakers and audiences about things that they care about.

The data (as in 010101011010) might be inert but the spirit that is captured and perceived hopefully isn't.

Downes says:

> Content is the expression and communication of information.

So are you saying 'content' is a verb? That doesn't make sense.

What's wrong with saying "content is data *used* for the expression and communication of information?"

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[337] Seth Gottlieb. Content is not Data. Content Here (weblog). May 21, 2008. http://www.contenthere.net/2008/05/content-is-not-data.html

Because – from what I'm reading here – content *is* data, just data used in a specific way.

Seth says:

I was just getting all revved up to write a response about the connotations of "data" (scientific, objective, dispassionate, quantitative, point-in-time, graph-able, irrefutable, etc.) but I lost steam because it appears that you and I are the only ones that care about this semantic distinction. I would rather argue whether the word is pronounced "day-tah" or "dah-tah" and I don't much want to do that either.

The purpose of the post was about building systems to help users manage the output of a creative process.

Moncton, May 23, 2008

Knowledge and Recognition

Responding to x28, 'Lower Levels of Connectivism'[338]

First, it is probably more accurate to speak of 'domains' of connectivity rather than layers. The use of 'layers' suggests some sort of ordering (from, eg., small to large) that isn't really a defining characteristic. Using 'domains' allows us to recognize that *any* network, appropriately constituted, can be a learning and knowing system.

Second, this usage, "knowledge is found in the connections between people with each other," was a bit loose. I should have said 'entities' instead of 'people', where 'entities' refers to *any* set of entities in a connective network, not just people in a social network. I used 'people' because it's more concrete, but it was a loose usage.

That said, there are two major issues raised in this post. First, how is the sense of 'knowledge' equivalent in one domain and another. And second, how does knowledge cross between domains.

The first raises a really interesting question: does knowledge have a phenomenal quality? And is the nature of this quality based in the physical properties of the network in which it is instantiated? I can easily imagine someone like Thomas Nagel ('What is it like to be a bat?') saying yes, that there is something that it 'feels like' for a neural network to 'know' something that (say) a computer network or a social network does not.

Related to this is the question of whether such a phenomenal 'feel' would be epiphenomenal or whether it would have a causal efficacy. Does what it feels like to 'know' have any influence on our (other) knowledge states? Of is the 'feel' of knowing something merely incidental to knowing?

What I want to say is that there is something in common in the 'knowing' experienced by a neural network and the 'knowing' experienced by a social network, that this something is described by the configuration of connections between entities, so that we can say that 'knowing' for each of these systems is the same 'kind' of thing in important respects, without also having to say that they are the 'same' thing.

Different mechanisms create connections between people with each other and between neurons with each other (and between crows with each other in a crown network, etc). People use artifacts - words, images, gestures, etc. - to communicate with each other, while neurons use electro-chemical signals to communicate with each other. Though the patterns of connectivity between the two systems may be the same, the physical constitution of that pattern is different. It's like a contrail in the sky and a ski trail in the snow - we can observe the sameness of the parallel lines, and make inferences about them (that they never meet, say),

[338] Matthias Melcher. Lower layers of connectivism? x28's New Blog (weblog). January 10, 2012. http://x28newblog.blog.uni-heidelberg.de/2012/01/10/change11-lower-layers-of-connectivism/

while at the same time observe that they have different causes, and that it 'feels' different to create a contrail than it does to create a ski trail.

The same is true of knowledge. We can make observations about the set of connections that constitutes 'knowing' (that it is a mesh, that it embodies a long tail, that a concept is distributed across nodes, etc) independently of reference to the physical nature of that network. And yet, 'knowing' will 'feel' differently to a bunch of neurons than to a bunch of people (indeed, we can hardly say we know how a society 'feels' at all, except by analogy with how a human feels, which may not be a very accurate metaphor).

The second comment concerns how knowledge is transferred between networks (to put the point *very* loosely). There are different senses to this point - how someone comes to know what society knows, how someone comes to know what someone else knows, how somebody comes to know what nobody knows.

In the first instance - and I think this is really key to the whole theory of connectivism - there is no sense in which knowledge is *transferred* between any of these entities.

This is most obvious in the latter case. Learning something nobody knows *cannot* be a case of knowledge transfer. The knowledge must therefore develop spontaneously as a result of input phenomena (i.e., experience) and the self-organizing nature of appropriately designed networks.

The organization that results from these conditions *is* the knowledge. The process of self-organizing *is* the process of learning. There are three major factors involved: the input phenomena, the learning mechanism, and the prior state of the network. There is a huge literature describing how such processes can occur.

In the case of one person learning from another, the major different is that the phenomena being experience consist not just of objects and events in nature, but of the deliberate actions of another person. These actions are typically designed in such a way as to induce an appropriate form of self-organization (and there is a supposition that it encourages a certain amount self-organization that one could not obtain by experience alone - the 'zone of proximal development').

What's important to recognize is that the learning is still taking place in the individual, that the other person is merely presenting a set of phenomena (typically a stream of artifacts) to be experienced, and that one's one learning mechanisms and prior state are crucial to any description of how that person learns.

One of the key elements I'd like to point to here is 'recognition'. This is a phenomenon whereby a partial pattern is presented as part of the phenomena, and where, through prior experience, the network behaves as though the full pattern were present. When we see half the letter 'E', for example, we read it as though the full letter 'E' were present.

To 'know' that 'A is B' is to 'recognize' that 'A is B', that is, when presented with 'A', one reacts as though being presented with a 'B'. Recognition lies at the core of communication, as it allows (for example) a symbol 'tiger' to suggest a phenomenon (a tiger).

What is important to understand here is that the recognition is something the *recipient* brings to the table. It is not inherent in the presentation of the phenomenon, and may not even be intended by the presenter (indeed, as likely as not, the presenter had something different in mind).

This also tells us how a piece of knowledge (so-called; there probably aren't really 'pieces' of knowledge) travels from one network to another network. Observe, for example, a murmuration of blackbirds. We humans (the neural networks) observe a flowing dynamic shape in the sky, like a big blob of liquid. We perceive the other network as a whole, and perceive it *as* something. We *recognize* a pattern in the other network.

When a human observes the behaviour of a social network, the human (ie, the neural network) can recognize and respond to patterns in that social network. The patterns are not actually 'created by' or even 'intended' by the social network; they are what we would call 'emergent properties' of the network, supervening on the network.

So: a person watches 14 other people use the word 'grue' in such and such a context; when the person sees artifacts corresponding to 'grue' he *recognizes* it as an instance of that context. That is to say, on presentation of the artifact representing 'grue', he assumes an active set of connections similar to what he would assume if presented with that particular context.

As a postscript, it's worth mentioning that there's no sense of 'collaboration' or 'shared goal' inherent in any of this. Indeed, I would argue that the use of such terminology makes assumptions that cannot really be justified.

When we say that 'society knows P', what do we mean? *Not* that a certain number of individuals in society know P. There is no *a priori* reason to assume that social knowledge is the same as individual knowledge, and indeed, it is arguable, and in some senses demonstrable, that what society knows is *different* from what an individual knows. Why? Because the prior state is different, because the learning mechanisms are different, and most importantly, the input phenomena are different.

A society does not, for example, perceive a forest in the same way a human does. A society cannot perceive a forest directly. A human perceives a forest by looking at it, smelling it, walking through it. A society has no such sensations.

A human does not, for example, perceive a neural activation in the same way a neuron does. A neuron receives a series of tiny electro-chemical signals. A human has no such sensations.

A human can only recognize a neural activation *as* something - a forest, say. A society can only recognize a perception *as* something - an economic unit, say, a tract, or something we don't even have a word for.

A human can experience neural activations only in the aggregate - only as a network - in which it may recognize various emergent properties. This set of network activations (this 'sensation') is associated with 'that' set of network activations (that 'knowledge'). The same with a society. It can never experience the forest through the perspective of only one individual - it can only experience the forest through the aggregate of individual perspectives.

The whole dialogue of 'collaboration' presumes that a set of humans can create a fictitious entity, and by each human obtaining the same knowledge (neural state, opinions and beliefs, etc.), can imbue this fictitious entity with that state. And by virtue of this action, the fictitious entity can then be assigned some semblance of agency analogous (but magnified) to a human agency.

Assuming that it makes sense to imagine such a creation (and there are many difficulties with it) such a construct does not have independent cognitive properties; it cannot 'learn' on its own, and it cannot 'know' more (or anything different) than any of its constituent human members.

William Gough said…

Religion fits the terms of 'collaboration' and 'fictitious entities'... (e.g. that pesky sled being tracked thru weather forecasts all over the world on Dec 24)... in the final paragraph. In a sub-set of religion, GOP politics, a simple word such as 'liberal' may engender profound reactions; the clenching of fists & the flushing of cheeks, as well as release of entrained word-chains. I've spotted as many liberals as I've noticed air-born sleds in my recent travels. However, as soon as the word is defined and co-related thru 'reality', much like providing the remaining letter 'E', why, speech ensues: Not sentences but little engines & cabooses of connected words on tracks of acculturated thought. I like the way you're describing & relating this process you're thinking thru & do believe that Schopenhauer has a very useful section in trashing Euclidian strings of

logic. It's in volume 1 of "The World as Will & Representation."[339] Lately I've been thinking about Monads (without the Religious nod that was enforced at the time) as interesting structures to communicate thought & the nature of the Individual & the 'group' Releasing the concept of Monads from the scaffold of Religious connection, frees it to go a-walking with hood removed & hands unbound. I'll read your full connected postings - but am enjoying what I'm reading.

Larry Cuffe said…

Some nice thoughts here. How organisations develop or how a traffic flow explores its environment, are phenomena where learning is a useful concept.

Once you take it up to social networks, and focus on the network interaction, we now have to ask what the networks knows and thinks, and just as a brain cell cannot understand a thought, perhaps there is a form of metacognition occurring which transcends our ability to appreciate it.

(I think Koonts explored this theme with the story "A mouse in the walls of the global village" in 1972 when the only credible network was the global telephone exchange, but that's another story)

Moncton, January 11, 2012

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[339] Arthur Schopenhauer. The World as Will & Representation. Translated by E.F. Payne. Dover Publications, 1969. Volume 1, pp. 62-83. http://www.scribd.com/doc/32288747/Schopenhauer-The-World-as-Will-and-Representation-v1

Pattern Recognition as Skill

Responding to John Martin[340] *"However I am not sure that it (pattern recognition) is an innate feature as opposed to a learned skill."*

It is both.

Human neurons naturally form connections. That is, in fact, their sole function. Any time they are presented with input (such as experience) they will react by strengthening or weakening connections. Because these connections are sensitive to input, they will reflect patterns in that input. This is not a conscious act; it is not the same as saying we are looking for patterns. It's more like the way you distinguish between red and blue. You just do it.

After a certain period of time, this process results in a base of pre-existing patterns of connectivity in the mind. The child, for example, has learned to identify objects. Slightly older children, for example, have learned to recognize faces. These pre-existing patterns now influence the recognition of patterns in perception.

There comes a point where the recognition of patterns in the environment will depend entirely on the influence of these pre-existing patterns. The distinction between subtle shades of red, for example, that the artist can make. The ability to identify a type of wine. The capacity to apply mathematical formulas to equations. In such cases, it would be correct to say that pattern recognition is entirely a learned ability.

Moncton, February 10, 2007

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[340] John Martin. Information – Knowledge – Learning. EdVentures in Technology (weblog). February 9, 2007. http://www.whitemountaintech.net/wordpress/2007/02/09/information-knowledge-learning/

Memory and Memorization

From my [post titled 'Wrong'](#):[341]

I get where Gary Stager is coming from. Learning is not the same as remembering. By the same token, I made myself [a set of flash cards](#) [342] this week as an aid to remember my past participles in French. So there's another side to it.

Comments:

Vicki A Davis, January 6, 2012

Gary missed the whole point of what I was saying in my piece for the New York Times. The flaw with adaptive learning is we have no feedback loop to parents. The fact is that this weekend I have to help my fourth grader learn all of the irregular verbs, his spelling words, and the states and capital review for all 50 stated. many theorists argue we shouldn't be doing rote memorization but the fact is our kids are in a system that rewards it. I find that apps help make the learning happen in less time and with less strain on my relationship with my child but there is no feedback loop to help me know if he is getting it or not. Whether we like it or not, there are times our kids have to memorize.

nboruett, January 7, 2012
Stephen writing from a bus heading to Dodoma Tanzania from daresaalaam a journey of six hours. Thank you for sharing the flash cards. I find the revised. Blooms taxonomy useful. You can not understand what you cannot remember. You then apply what you understand. The rest follow

My Response:

Vicki that's a fine comment for someone who was tired. :)

Here's my thinking: what we need to foster is not memorization, but remembering. However, in cases where we are unable to foster remembering, we need to turn to memorization.

Let me give an example from the perspective of cognitive load theory (I don't need the theory to make the example work, but it's more fun if I use it).

The traditional perspective is, we can remember only seven items at a time. So, I give you seven digits: 4 5 6 2 1 1 6 6 and that's what you can remember. If I give you more 3 2 1 1 3 4 9 4 3 2 you can't do it. Say.

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[341] Stephen Downes. Wrong. OLDaily. January 6, 2012. http://www.downes.ca/post/56968
[342] Stephen Downes. French Past Participles. FlashcardExchange.com January 5, 2012.
http://www.flashcardexchange.com/flashcards/view/2036000

But if you are good at remembering, you'll manage this with no problem because you'll chunk the numbers. 321 - 134 - 9432. Now we can remember it. It's a phone number. It's easy.

Moving beyond cognitive load theory, we are able to remember better if we are able to discover relations, threads, patterns or regularities between what we're trying to remember and something we already know. That's the (crude) purpose of menomics - we convert the long string of things to remember into a simple thing to remember and a rule to convert it into the long string.

This is what we're doing when we're theorizing (what educators like to misleadingly call 'making meaning'). What we're trying to do is to find the underlying thread that connects everything we're trying to remember. A theory. A perspective, or world view.

Sometimes you can't find these regularities overtly. Sometimes there's no rhyme nor reason, or its buried in complexity or antiquity. That's where practice and memorization comes in. By repeating and rote, your brain (which is a fantastic processing machine) will find the patterns you can't find cognitively, and you'll remember.

People who remember really well reach for these associations cognitively, and do the work required to produce them sub-cognitively. That's why, in learning my French verbs, I'm doing some memorization[343] of the stuff there's no rules for (past participles for the irregular verbs), using a mnemonic to remember a subset ('vandertramp'[344]), rules to understand verb-object agreement, and personal discovery to find the key *underlying* rule (that isn't in the book) that explains everything.

For those who are curious, here's the rule that underlies everything: the verb (extra 'e' for feminine, extra 's' for plural) always agrees with the direct object (You'll *never* see that stated in the French text, because *most of the language* is an exception - you see, you have to *know* what the direct object is, which means you have to have one, it has to be before the verb, and it is sometimes oneself, in which case you conjugate with *être* instead of *avoir*).

What you *want* is the underlying rule that explains everything (or, more accurately, a sense of what underlies everything, because often it can't be explained as a simple rule, but is just felt as a sense or a feeling (which is why cognitivism is wrong - you can't always 'make' this, you often have to *grow* it).

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[343] Stephen Downes. French Past Participles. FlashcardExchange.com January 5, 2012.
http://www.flashcardexchange.com/flashcards/view/2036000
[344] Laura K. Lawless. Être Verbs - Mnemonic Devices. Page 2. About.com (website). Accessed January 7, 2012.
http://french.about.com/od/grammar/a/etreverbs_2.htm

It's because when you have that underlying grasp of a thing, you are able to manifest expert behaviour - you can know what the thing should be without even thinking about it (which is a good thing, because when you add it all up, if you have a lot to think about).

So, to summarize: remembering *really* depends on understanding, which is why all the new-fangled progressive teaching methods work better, but understanding can't always be reliably created or scaffolded. It is better to teach students to *be able to* understand, but also to ensure that they know that sometimes the best and fastest way to understanding is a brute force process of practice and even memorization.

And I might add: this last bit is the *work ethic and expectations* part of it, and is the place where parents come in. A teacher is not typically in a position to instil the desire to undertake the effort required to practice and sometimes memorize, because this is something that is the result of socialization and culture - the product of a lifetime, not a one-hour-a-week class.

Moncton, January 7, 2012

A Simple Definition of Knowledge?

Responding to George Siemens's A Simple Definition of Knowledge.[345]

Um... no.

I don't want to be antagonistic, but this account is not satisfactory.

> *information is a node which can be connected*

So what, then, a neuron is information? No, that makes no sense - because then we would have the same information, unchanged, day in and day out, in our brains.

At the very least - information has to refer to a neural *state*. A nodal *state*. At its simplest, a neuron can be 'off' or 'on' (actual neurons have more complex states, of course). A given neural state might be a bit of information - a sequence of neural states or a collection of neural states 'information'.

Even then, we may want to restrict our attention to certain states, and not all states. Taking an information-theoretic approach, for example (cf. Dretske) we might want to limit our attention to neural states that are reflective of (caused by, representative of) states of affairs in the world. This is the distinction between 'signal' and 'noise'.

There's a lot more to be said here. Because now we might want to say that the information isn't the actual state, but rather, it is the (description of, proposition describing, etc.) state of affairs represented by the neural state. Because the actual neuron doesn't matter, does it? If we switched the current neuron out for a different one, it would still be the same information, wouldn't it?

> *When connected, it becomes knowledge (i.e. it possesses some type of context and is situated in relation to other elements).*

The traditional definition of knowledge is 'justified true belief'. There are many problems with that definition, but it does point to the fact that we think of 'knowledge' as being something broadly mental and propositional. Knowledge, in other words, is a macro phenomenon, like an entire set of connections, and not a micro phenomenon, like a single connection.

But there's also more at work here. Is knowledge the actual physical se of connections? Is it the pattern represented by the connections, that could be instantiated physically by any number of systems? Is it tantamount to the state of affairs that caused the set of connections to exist? Is the connective state representational? Referential?

Simply saying 'knowledge is a connection' answers none of these. It offers no account of the relation between the brain and the world, if any. It doesn't account for the relation between, say,

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[345] George Siemens. A Simple Definition of Knowledge. Knowing Knowledge Weblog. June, 2007. Original link no longer extant: http://knowingknowledge.com/2007/06/a_simple_definition_of_knowled.php

'knowledge' and 'belief'. I am sympathetic to the non-representational picture of knowledge suggested by the definition - but if knowledge is non-representational, then what is it? Saying that it's some physical thing, like a connection, is about as useful as saying that it is a brick.

understanding is an emergent property of the network

Which means... what?

To put this bluntly: is understanding an epistemological state - that is, is it some kind of super-knowledge, perhaps context-aware knowledge? Kind of like wisdom?

Or is it a perceptual state? Is 'understanding' what it *feels* like to know?

Is just *any* emergent property of a network an 'understanding'? We could imagine a digital video camera that records the 'face on Mars'. So we have some emergent property of the networks of sensors. Is this emergent property 'understanding'?

One would assume that there would be, at a minimum, some requirement of recognition. That is, it doesn't get to be 'understanding' unless it is 'recognized' as being the face of Jesus on Mars. But this means it's not just the emergent property - it's a relation between some emergent property and some perceptual system.

Additionally - there is not really a face of Jesus on Mars. It's just an illusion. Does it count as 'understanding' if it's an illusion, a mirage, or some other misperception? If not, what process distinguishes some recognitions of emergent properties from others?

I don't mean to be antagonistic here. I am sympathetic with the intent of this post. But it is so far from being an adequate account of these terms it was almost a duty, a responsibility, that I post this correction.

I understand that I owe an alternative account of these phenomena. I have attempted a beginning of such an account in my Connective Knowledge paper. But it is clear to me that I need to offer something that is both significantly clearer and significantly more detailed.

Moncton, June 07, 2007

How Do You Know?

I have just finished a presentation[346] to the British Council consisting of a video and a short discussion. I'm not happy with the result - partially because the process of producing the video seemed to be cursed (including one crash that wiped out hours of work - Camtasia has no autosave! who knew?) and partially because I didn't feel comfortable with the discourse.

The video production is one thing, and I can live with a more or less proficient video because it's part of the ongoing process of learning a new way to communicate. But I'm less sanguine about the discourse. I have a sense of what went wrong with it - I even talked about that a bit during the session - but still it nags at me with deeper issues still unresolved.

We weren't very far into the discussion when I made the comment that "if you're just presenting information, online is better than the traditional classroom." The point I was trying to make was that the unique advantage of the classroom is that it enables face-to-face interaction, and that it should be used for that, leaving other things to other people.

And so, of course, someone asked me, "How do you know?" Which stopped me - not because I don't know - but because of the utter impossibility of answering the question.

There are so many differences in community - the different vocabularies we use and the different assumptions we share, for example. For me to express point A in such a way that it will be understood the way I understand it, I need to work through a fair amount of background. But in a session like this - a 20 minute video and a few seconds of discussion - there was no way I was going to be able to accomplish that.

And this carries over to differences in epistemology. The question of 'How do you know' means different things to different people. In some cases, it's not even appropriate - if a football coach instructs a player, the player doesn't say "How do you know" because he knows that the coach isn't set up to answer questions of that sort (he'll say, "I depend on my experience" or some such thing, offering a statement that has no more credibility than the original assertion). In other cases, some sort of process or set of conditions is assumed - and this varies from discipline to discipline, community to community.

In this particular instance I was speaking at a conference on blended learning. So there's a certain perspective that has already been adopted, one that already says that the classroom should not be abandoned. Indeed, the classroom is like the baseline reference, and the role of ICT is to support by being what the classroom cannot be - being available at home, for example, or at midnight, or around the world. ICT is about *enhancing* learning, in the blended learning model. And this picture couldn't be further from my own model if it tried. For me, it felt like going to a prayer meeting and talking about the role atheism could play in the devotee's life.

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[346] Stephen Downes. Web 2.0 and Your Own Learning and Development. Stephen's Web. June 18, 2007. http://www.downes.ca/post/40533

You see, from where I sit, blended learning is a bit like intelligent design. It's a way for people to keep hold of their traditional beliefs, to maintain the primacy of the classroom, the primacy of authority in education, the primacy of the information-transfer model of learning, and at the same time (because it's *blended*, you see) to appear as advocates of new learning technologies, including (as was the subject of the conference) Web 2.0. It's faith pretending to be science. While in my world, there is basically no role for the classroom at all. It's irrelevant.

To their credit, they were willing to let me have that, giving me room to reinvent the face-to-face interaction (which I do believe in[347]) to allow full and proper play for Web 2.0 and ICT in general. But I am still faced with the fundamental questions: how do I explain what I mean, and how do I know (or show I know) it is true?

To take a case in point: I said "if you're just presenting information, online is better than the traditional classroom." What I thought I was making was a straight-forward assertion about the properties of the traditional classroom and the online presentation of information. I wanted to bring this out but found that I didn't have the words.

For example, information is transmitted online at much greater bandwidth than in a classroom. This is partially because a person standing at the front of the room can only speak at a certain speed. The words only come out so fast - and at a fraction of the speed they can be read (at least by most people). And in a classroom the instructor must attend to the needs of all students, which means there will be periods of 'dead air', where one student is being addressed at the expense of everyone else, who must sit and wait.

I wanted to say this, but I couldn't say this, because the audience must already *know* this - and yet, despite this knowledge, will *still* favour classroom delivery, which is why what I thought was a statement of fact - that "if you're just presenting information, online is better than the traditional classroom" - became a statement of opinion, that needed some sort of evidence. From *my* perspective, it was as though I had said "the sky is blue" and someone (who apparently believe there was no sky) asked me how I knew. How do you explain? How do you *argue*?

What could 'better' even *mean* in such a context?

Because my own statement - that "if you're just presenting information, online is better than the traditional classroom" - doesn't even make sense in the context of my own theory, because I do not support an information-transfer theory of education. I'm in the position where I'm trying to discuss the relative advantages of online and in-class learning, and trying to place myself into the context of the existing discussion, which works to a certain point, but which vaporizes when pressed in certain ways.

How do I know it is better? Well in this world there are certain outcomes to be expected, and means of measuring those outcomes, so that the relative efficacy of classroom instruction and online instruction could be compared, by conducting pretests and post-tests against standardized evaluations, using standardized curricula. And the best I could say, under such

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[347] Stephen Downes. How I Would Organize a Conference. Stephen's Web (weblog). January 30, 2007. http://www.downes.ca/post/38645

conditions, is that there is no difference,[348] based on 40 years of studies. Which they must know about, right?

All this is going through my mind as I seek to answer the question.

I consider the possibility that by 'better' he means 'more efficient'. Because here I could argue (with some caveats about production methods and delivery, the sort of things I outline in Learning Objects[349]) that the use of online delivery methods is much cheaper than the very labour-intensive methodology of the classroom. That we are paying, for example, research professors (who don't even *want* to teach) very high salaries to accomplish something that could be as well done using multimedia.

So I concluded that he was looking for evidence of the usual sort - studies that showed knowledge was more reliably transferred (or at the very least, implanted) using ICTs than in classroom instruction. Probably such studies exist (you can find a study to support almost anything these days). But I am again hitting the two-fold dilemma.

First, our conception of the task is different. I had just come from reading and writing about associative learning.[350] "The result in the brain is strengthening or weakening of a set of neural connections, a relatively slow process." It's not about content transfer, it's about repeated exposure (preferably where it is highly salient, as this impacts the strength of the neural connection). The classroom plays almost no role in this; at best it focuses the student's attention, so that subsequent exposure to a phenomenon will be more salient.

This is (as so often happens) abutted directly against corporate or institutional objectives. The fact that trainers and teachers have certain things that they need to teach their students, and that this is generally non-negotiable (to me, this is a lot like the Senate legislating that the value of Pi is 3, but I digress). That evidently, and by all evidence, these objectives *can* be accomplished using classroom instruction, and that moreover, they *might not be* using ICTs.

The evidence, of course, is the set of successful exam results. One would *think*, with the experience of No Child Left Behind behind us, that we would be sensitive to the numerous and multifarious means of manipulating[351] such results. I have written before[352] about how such tests can' be trusted. About how the proposition that there can be (so-called) evidence-based policy should not be believed[353] And I've linked to the misconceptions[354] people carry with them about this. But I can't shake[355] in people that belief that there is, after all is said and done, some way to measure whether one or the other is better.

[348] FAQ. The No Significant Difference Phenomenon. Website. Accessed June 19, 2007. Original link no longer extant. http://nosignificantdifference.wcet.info/faq.asp
[349] Stephen Downes. Learning Objects. Stephen's Web (weblog). May 5, 2000. http://www.downes.ca/files/Learning_Objects.htm
[350] Stephen Downes. Concepts and the Brain. Half an Hour (weblog). June 19, 2007. http://halfanhour.blogspot.ca/2007/06/concepts-and-brain.html
[351] Half Sigma. States are cheating on No Child Left Behind. Weblog. June 9, 2007. http://www.halfsigma.com/2007/06/states_are_chea.html
[352] Stephen Downes. Understanding PISA. Stephen's Web (weblog). November 30, 2004. http://www.downes.ca/post/17
[353] Stephen Downes. Public Policy, Research and Online Learning. Stephen's Web (weblog). May 6, 2003. http://www.downes.ca/post/60
[354] Stephen Downes. Understandable Hypocrisy. OLDaily (weblog). June 2, 2007. http://www.downes.ca/post/40349
[355] Stephen Downes. Measuring Your Blog'S Outcomes and Use of Other Social Media Tools. Stephen's Web (weblog). May 17, 2007. http://www.downes.ca/post/40205

The thing is, there is no definition of 'better' that we could define the parameters for such a measurement, and even if there were, the determinates of 'better' are multiple and complex. A person's score on a test, for example, is subject to multiple and mutually dependent factors, such that you cannot control for one variable while testing for the others. Any such measurement will build into its methodology the outcome it is looking for.

The problem is - according to everything we seem to know - unless there is some way of *measuring* the difference, there is no way to *know* the difference. Even if we don't believe that "if it can't be measured, it doesn't exist," it must be that measurements give us *some* sense of what is better and what is not - that they can at least approximate reality, if not nail it down precisely. I don't agree - the wrong measurement can suggest that you are succeeding, when you are failing. Sometimes these wrong measurements are deliberately constructed - the phenomenon of greenhouse gas intensity[356] is a case in point.

At a minimum, this position takes a good deal of background and analysis to establish. At worst, attempting to maintain such a position leaves open the charge of 'charlatan'. Responses like this:[357] "Each time I read a student's paper containing 'I think, I feel, I believe,' I am aggravated, acerbically critical, and given to outbursts of invective: 'Why do I care what you feel?' I write, roaring with claw-like red pen. 'This is not an emotional experience. Believe? Why would you think you can base an argument on unsubstantiated belief? You don't know enough to believe much of anything. Think? You don't think at all. This is mental masturbation. Without evidence you have said exactly nothing!'"

Am I a charlatan when I say things like "if you're just presenting information, online is better than the traditional classroom?" Even if I have nothing to personally gain from such statements, am I leading people down the garden path? It is very difficult, in the face of things like the British Council presentation, to suppose people are thinking anything else. "It's a nice line," they think to themselves as I stumble in front of them, attempting lamely to justify my lack of evidence, "but there's no reason I should believe it."

Which raises the question - why do *I* believe it?

I have made decisions in my own life. I have chosen this way of studying over that. I have chosen this way of communicating over that. I didn't conduct a study of which way to learn and which way to communicate. I operated by *feel*. There's no way of knowing whether I might not have been more successful if, say, I had stayed in the academic mainstream, published books and papers, assigned my copyrights to publishers, learned through classes and conferences and papers and lectures.

But, of course, *that* was never the decision I made. At no point did I sit down and say, I will eschew traditional academia, I will learn informally, through RSS and God-knows-what Web 2.0 technology, and (while I'm at it) I will embrace Creative Commons and lock publishers out of the loop. Indeed, I don't think I could have *imagined* all of that, were we to suppose some fateful

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[356] Center for Climate and Energy Solutions. Analysis of President Bush's Climate Change Plan. Website. Accessed June 19, 2007. http://www.pewclimate.org/policy_center/analyses/response_bushpolicy.cfm

[357] Stephen G. Sylvester. "I Just Think, I Just Feel, I Just Believe": Passivity, Irresponsibility, and the Death of Intellectual Freedom. The Montana Professor Volume 7, Number 3. Fall, 1997. http://mtprof.msun.edu/Fall1997/SYLV.html

day when such a decision would have been made. I made the decision one small step at a time, one small adjustment at a time, as though I were surfing a wave, cutting, chipping, driving forward, each decision a minute adjustment, each characterized not by measurement, not by adherence to principle, but by *feel*, by *reaction*, by *recognition*.

This is important. George Siemens says that *knowledge* is distributed across the network, and it is, but *how we know* is irreducibly personal.

What does that mean? Well, part of what it means is that when we are actually making decisions, we do not *in fact* consult principles, best practices, statistics or measurements. Indeed, it is even with some effort that we refrain from playing the hunch, in cases where we (cognitively) know that it's a bad bet (and we walk away (and I've had this feeling) saying, "I know the horse lost, but I still should have bet on the gray," as if that would have made the difference).

Malcolm Gladwell says, make snap decisions.[358] Trust our instincts. What this means is very precisely an abandonment of principle, an abandonment of measurement, in the making of decisions. It's the same sort of thing. My 'knowing' is the accumulation of a lifetime of such decisions. I have come to 'know' that "if you're just presenting information, online is better than the traditional classroom" in this way - even though the statement is, in the context of my own theories, counterfactual. I know it in the same way I know that 'brakeless trains are dangerous' - not by any principle, not my any evaluations of actual brakeless trains, but because I have come to *know*, to recognize, the nature (and danger) of brakeless trains.

We sometimes call this 'the weight of experience'. And this is why my 'knowledge' differs from yours. Not because one of us, or the other, has failed to take into account the evidence. But because the weight of our respective experiences differs.

This gets back to the question of why 'presenting information' will not be 'successful' (let alone 'better') in my view. Recall that I said that the wrong measurement can suggest that you are succeeding, when you are failing. We can present information, and then test students to see if the remember that information. If they are successful on the test, then we say that they 'know' that information.

My experiences with my presentations is different. I can make a presentation - such as, say, today to the British Council - and walk away feeling that while the audience heard me, and while they could probably pass a test (I am a good presenter, after all, even on my bad days, and they are smart people, with exceptional memories), I would not say that they 'know' what I taught them. Wittgenstein says, "Somebody demonstrates that he *knows* that the ice is safe, by walking on it." These participants may leave the conference being able to repeat the words, but scarce any of them will change their practice, eschew the classroom, embrace the world of Web 2.0.

How can I say that they *know* my position, if all they do (all they can do?) is repeat the words? If they 'knew' my position, they would change their practice - wouldn't they? If they had the same

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[358] Malcolm Gladwell. What is Blink about? Gladwell.com. Website. Accessed June 19, 2007. http://www.gladwell.com/blink/

knowledge I had - which would have the same weight of experience I had - they they would naturally, without the need for convincing (or even training) make the same decisions I did. Without needing even to think about it. That's what Dreyfus and Dreyfus call 'expert knowledge'.[359] "He does not solve problems. He does not even think. He just does what normally works and, of course, it normally works." And it can't be obtained by measurement, it can't be expressed in principles, it can't be taught as a body of knowledge, and it can't be measured by answers on a test.

A presentation such as the one I gave at British Council this morning (or at CADE a month ago) isn't a transfer of information. People may acquire some words and expressions from me, but they won't acquire knowledge, because even if my presentation were perfect, it could not perform the repetition of instances required in order to create a weight of experience on a certain subject. The best I could do is to repeat a word or phrase over and over, in different ways and slightly different contexts, the way advertising does, or the comedian that kept repeating 'Via' ("Veeeeeee.... ahhhhhhh").

A presentation is a performance. It is a demonstration of the presenter's expertise. The idea is that, through this modeling - through facility with the terminology, through demonstration of a methodology, through the definition of a domain of discourse (which will be reinforced by many other presentations on the same subject - if you hear Wittgenstein's name often enough, you come to believe he's a genius) - you learn what it is to be 'expert'.

A lecture won't impart new knowledge on older, more experienced listeners at all - it acquires the status of gossip, serving mainly to fill people in on who has been saying what recently, what are the latest 'in' theories or terms. The point of a talk on 'Web 2.0' is to allow people to talk about it, not to result in their 'knowing' it. With younger participants (interestingly the least represented at academic conferences, lest they be swayed by people other than their own

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[359] Hubert L. Dreyfus and Stuart E. Dreyfus. From Socrates to Expert Systems: The Limits and Dangers of Calculative Rationality. Department of Philosophy, University of California Berkeley. 2004. http://socrates.berkeley.edu/~hdreyfus/html/paper_socrates.html

professors) the inspiring demonstration of academic expertise serves as a point of departure for a lifetime of similar practices that will, in a generation, result in similar expertise (people did not become disciples of Wittgenstein because they *believed* him - it is very unlikely that they even *understood* him - but by the fact that he could (with a glance, it seemed) utterly demolish the giants in the field of mathematical philosophy).

I have spoken elsewhere about what sort of knowledge this is. It is - as I have characterized it elsewhere - *emergent knowledge*, which may be known by the fact that it is not *perceived* (ie., it is not sensory, the way 'red' or 'salty' are sensory) and it is not *measured*, but by the fact that it is *recognized*. It is a 'snapping to' of awareness, the way we see a duck[360] (or a rabbit) or suddenly discover Waldo[361].

'Recognition', in turn, amounts to the exciting of a set of connections, one that is (relevantly) similar to the current content of perception. It is a network phenomenon - the activation of a 'concept' (and its related and attendant expectations) given a certain (set of) input condition(s). When we present certain phenomena to the network, in the form of a set of activations at an 'input layer' of neurons, then based on the set of existing connections in the network, some neurons (and corresponding connections) are activated, while others remain silent; this present experience (sometimes) produces a response, and (in every case) contributes to the set of future connections (one connection is subtly strengthened, another subtly weakened).

When presented with a certain set of input phenomena, you can *remember* - to certain degree. If given sufficient motivation, you can associate certain noises (or certain shapes) with each other. On being told, I can remember that 'Paris' is the 'capital' of 'France', and even repeat that information on a test (and moreover, remember who said it to me, and when, and under what circumstances), but I cannot be said to *know* unless I demonstrate (a disposition?) that if I want to see the President of France, that then I go to Paris. And this is not the sort of thing that is on a test - it is a sort of thing that allows a person to have 'learned' that Sydney is in Australia, and even how to book an airline ticket to Sydney, and not notice that they are traveling to Canada.[362]

How do I know? Because - by virtue of my experiences with traditional and online settings - if I were trying to support *knowledge* in a person, I would not turn to the classroom, but rather, some sort of practice, and even if I were (because of policy or the demands of corporate managers) trying to support *remembering* in a person, I would contrive to have it presented to them, over and over, in the most efficient and ubiquitous means possible, which today is via ICTs.

How do *you* know whether to believe me?

You don't. Or, more accurately, there is nothing I can provide you that will convince you to believe me if you are not already predisposed to believe me. The best I can do is to suggest a course of action (i.e., a set of experiences that you can give yourself) such that, after these experiences, you will come to see the world in the same way I do. That is why my talk to the

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[360] Eye Site. Illusions - Duck/Rabbit. University of Illinois at Chicago Ophtalmology. Website. Accessed June 19, 2007. http://www.uic.edu/com/eye/LearningAboutVision/EyeSite/OpticalIllustions/DuckRabbit.shtml
[361] Wikipedia. Where's Wally. Accessed June 19, 2007. http://en.wikipedia.org/wiki/Where%27s_Waldo
[362] BBC News. Britons fly to 'wrong' Sydney. August 5, 2002. http://news.bbc.co.uk/2/hi/uk_news/2172858.stm

British Council (and to many other audiences) described just that, a set of *practices*, and not a set of theorems, or experimental results, or the like.

The practices I presented constitute (one way of describing) the practices I undertake in my own learning and development. The evidence, then, of whether these practices is in whether you believe that I have demonstrated my expertise. This, in turn, depends on your own sense of recognition - some people will recognize that I have achieved a certain degree of expertise, while others will leave the room with the verdict of 'charlatan'.

And what follows is a subtle dance - the connectivism[363] George Siemens talks about - where you demonstrate your expertise and I demonstrate mine - and where each of us adopts some of the practices of the others (or rejects them, as the case may be) and where the connections between people with similar practices is reinforced, and knowledge demonstrated in such a community not by what it says (hence the fate of critical theory) but by what it does. This is the process (and I have explained elsewhere[364] the properties of the network that will grant the process some degree of reliability).

Moncton, June 19, 2007

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[363] George Siemens. Connectivism: A Learning Theory for the Digital Age. Elearnspace (weblog). December 12, 2004. http://www.elearnspace.org/Articles/connectivism.htm

[364] Stephen Downes. The Form of Informal. Stephen's Web (weblog). December 5, 2006. http://www.downes.ca/post/38637

How Do You Know? (2)

These are hard questions.

What I described in my paper[365] is my best answer to the question 'how do I know', that is, it tries to explain how I (in fact) know things. It is therefore not a description of the criteria I should use to distinguish truth from falsity, nor how one person can convince another person of something.

Indeed, viewed as a system for determining the truth of something, the paper seems pretty ridiculous. Wealth of experience? Why should anyone trust that! Why is my wealth of experience any better than anyone else?

The problem is, the description of how we *in fact* learn things does not carry with it any sort of guarantee that what we've learned is true. But without such a guarantee, there can be no telling for ourselves what to believe or not to believe, no way to convince other people. It's like we're leaves blown about by the by the breeze, with no way to sway the natural forces that affect us.

Moreover, the problem is:
- the *is* no guarantee
- yet we *do* distinguish between true and false (and believe we have a method for doing so)
- and we *do* want to be able to sway other people

What complicates the matter - and the point where I deliberately stopped in the other paper - is that not everybody is honest about what they know and what they don't know. Sometimes there genuinely *are* charlatans, and they want to fool us. Sometimes they are simply mistaken.

There's not going to be a simple way to step through this.

I went immediately from the British Council talk, where I was trying to foster a point of view, to a session inside Second Life, where I played the role of the sceptic. Not that I think that the people promoting Second Life are charlatans. But I do think they are mistaken, and I do think some of the statements they make are false.

The fact is, even though there are no guarantees, we will nonetheless make judgments about truth and falsehood. It is these judgments - and the manner of making these judgments - that will sway the opinions of other people.

You can't *tell* people things, you can only *show* them.

Now even this statement needs to be understood carefully. It is true that we can tell people things, eg., that 'Paris is the capital of France' that they will remember - but it does not follow that they *know* this; they will need to see independent evidence (such as, say, newscasts from

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[365] Stephen Downes. How Do You Know. Half an Hour (weblog). June 19, 2007. http://halfanhour.blogspot.ca/2007/06/how-do-you-know.html

'the capital of France'). Telling produces memory. Showing (and experience-producing processes in general) produces belief.

But now - even this needs to be qualified. Because if you *tell* something to somebody enough times, it becomes a type of proxy experience. So - strictly speaking - you *can* produce belief by telling - but not by 'telling' as we ordinarily think of it, but by a repeated and constant telling.

Additionally, we can make 'telling' seem more like experience when we isolate the person from other experiences. When the 'telling' is the only experience a person has, it becomes the proxy for experience.

It is worth noting that we consider these to be illicit means of persuasion. The former is propaganda, the latter is indoctrination. Neither (admittedly) is a guaranteed way of changing a person's mind. But it is reliable enough, as a causal process, that it has been identified and described as an illicit means of persuasion.

Let me return now to how we distinguish truth from falsehood.

This is not the same as the process of coming to know, because this process has no such mechanism built into it. The way we come to know things is distinct from the way we distinguish between truth and falsehood.

This may seem counter-intuitive, but I've seen it a lot. I may be arguing with someone, for example, and they follow my argument. "I agree," they say, "Um hm, um hm." But then I get to the conclusion, and they look at me and say, "But no..." It's this phenomenon that gives people the feeling they've been tricked, that I've played some sort of semantic game.

So there are processes through which we distinguish truth and falsity. Processes through which we (if you will) construct the knowledge we have. We see the qualities of things. We count things. We recognize patterns in complex phenomena. These all lead us, through a cognitive process, to assert that this or that is true or false.

Usually, this cognitive process accords with our experience. For example, we say that the ball is red because we saw that the ball was red. We say that there were four lights because we saw four lights. It is close enough that we saw that we came to know that the statement was true *because* of the experience. But - again - the process of knowing is separate from the process of distinguishing truth from falsehood.

There are general principles of cognition. These are well known - the propositional logic, mathematics, categorical logic, the rest (and if you want to see the separation between 'knowing' and 'distinguishing truth from falsity' then look at some of these advanced forms of logic - deontic logic, for example. We can use some such process to say that some statement is true, but because the process is so arcane to us, the statement never becomes something we 'know' - we would certainly hesitate before acting on it, for example).

There are also well known fallacies of cognition. I have documented (many of) these on my fallacies site. It is interesting to note that these are for the most part fallacies of distraction. What

they do is focus your attention on something that has nothing to do with the proposition in question while suggesting that there is a cognitive link between the two. You come to 'know' something that isn't true, because you have had the experience.

Consider the fallacy: "If the plant was polluting the river, we would see the pollution. And look - we can see the pollution." We look, and we see the pollution. It becomes part of our experience. It becomes the reason we 'know' that the plant is polluting the river. No amount of argument - no amount of 'telling' (except, say, indoctrination) will convince us otherwise. We have to actually go to the plant and see that it is not polluting the river in order to understand - to *know* - that we were the victim of a fallacy.

There is a constant back-and-forth being waged in all of us, between what we 'know' and the things we say are 'true and false'.

That is why I say you can't 'tell' a person something. Merely convincing them (even if you can) to agree that 'this is true' is a long way from getting them to *know* it - getting them to believe it, to act on it, to make wagers on it.

So - convincing a person comes down to *showing* them something.

Often this 'showing' will be accompanied with a line of reasoning - a patter - designed to lead them to the 'truth' of what they are being shown. But the knowledge comes from the showing, not the patter.

Even with showing, there are no guarantees. 'You can lead a horse to water...' Even the experience may not be sufficient to convince a person. Any experience is being balanced against the combined weight of other experiences (perhaps the 'patter' is sufficient to sway people in some touch-and-go cases, by offering a coherence with other experiences - an easy path for belief to follow).

A great deal depends on the nature of the experience. Experiences can be vivid, can force themselves on us. They can be shocking or disturbing. Images of violence capture our attention; images having to do with sex capture our attention. Our attention, even, can be swayed by prior experiences - a person who has spent a lifetime around tame tigers will react very differently on seeing a tiger than a person who has only known them to be dangerous carnivores.

'Convincing' becomes a process of pointing, a process of showing. Sometimes what a person is told can direct a person where to look (in this piece of writing I am encouraging to look at how you come to have your own knowledge, to see how it is the result of a separate track from how you come to see things are true and false). Sometimes the experiences can be contrived - as, say, in a simulation - or the senses fooled. Some media - especially visual media - can stand as substitutes for experience.

We can have experiences of abstract things - the weight of experience just is a way of accomplishing this. The logical fallacies, for example - on being shown a sufficient number of fallacies, and on seeing the *fallaciousness* of them, we can come to have a knowledge of the

fallacies - such that, when we experience a similar phenomenon in the future, we experience it *as fallacious*.

Convincing becomes a matter of showing, showing not just states of affairs in the world, but processes of reason and inference. If I can show actual instances of inference, how a person comes to believe, comes to know, this or that, then it becomes *known*, and not merely believed, by the viewer. If I can show my reasoning *process*, then this process can be known (after being experienced and practiced any number of times) by the learner.

'Expert knowledge' is when a person not only remembers something, but when a person has come to know it, has come to know the processes surrounding a discipline.

Such knowledge is often ineffable - the knower can't even enumerate the (true or false) statements that constitute the knowledge, or that led to the knowledge. What a person *knows* is distinct from what a person *says* is true or false.

It is not truth that guarantees knowledge. It is knowledge that guarantees truth.

Moncton, June 22, 2007

An Introduction to Connective Knowledge

This paper provides an overview of connective knowledge. It is intended to be an introduction, expressed as non-technically as possible. It is intended to respond to writers like Chris Anderson who, like many other writers, describe connective forms of knowledge as probabilistic.[366]

These forms of knowledge, created by means of interactions among connected entities, are outlined in publications such as James Suroweicki's *The Wisdom of Crowds.*[367] They should not be thought of as probabilistic, but rather, as a distinct and new form of knowledge. The purpose of this paper is to introduce the reader to this new, connective, form of knowledge.

It should go without saying that these are my own thoughts, and this discussion should not therefore be considered an authoritative reference on the subject. Moreover, this is intended to be a brief overview, and not an academic treatise on the subject.

a. Types of Knowledge

You probably grew up learning that there are two major types of knowledge: qualitative and quantitative. These two types of knowledge have their origin in major schools of history and philosophy, the former in the works of the ancient Greeks, and the latter in Arabic and then later Renaissance philosophy.

Connective knowledge adds a third major category to this domain, knowledge that could be described as distributed, because it is spread across more than one entity. A property of one entity must lead to or become a property of another entity in order for them to be considered connected; the knowledge that results from such connections is connective knowledge.

This is more than just the existence of a relation between one entity and another; it implies interaction. A relation - such as 'taller than' or 'next to' - is a type of quality. It describes a property of the object in question, with reference to a second object. But the fact that I am, say, 'taller than' Fred tells us nothing about how Fred and I interact. That is something different.

This is why it is incorrect to represent distributed knowledge merely as a type of probabilistic knowledge. The logic of probability implies no connection between correlated events; it merely observes a distribution. A connected system may exhibit probabilistic characteristics, but it is not itself probabilistic.

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366 Chris Anderson. 2005. The Probabilistic Age. The Long Tail. December 18, 2005.
http://www.thelongtail.com/the_long_tail/2005/12/the_probabilist.html
367 Jim Suroweicki. 2005. *The Wisdom of Crowds*. Anchor.

Probabilistic knowledge is a type of quantitative knowledge. It is based on the counting of things (or events, or whatever) and of comparisons between one count and another (one needs only to read Carnap[368] to see this clearly). A poll, for example, gives us probabilistic information; it tells us how many people would vote today, and by inference, would vote tomorrow. But the fact that Janet would vote one way, and I would vote one way, tells us nothing about how Janet and I interact.

Connective knowledge requires an interaction. More to the point, connective knowledge is knowledge *of* the interaction. If Janet votes a certain way because I told her to, an interaction has taken place and a connection has been established. The knowledge thus observed consists not in how Janet and I will vote, nor in how many of us will vote, but rather, in the observation that there is this type of connection between myself and Janet. This knowledge may have nothing to do with voting at all. Rather, we may recognize it as part of a larger pattern of interaction between the two of us.

b. Interpretation

What we 'know' about the world is irreducibly interpretive. That is to say, we do not through our senses and cognition obtain any sort of *direct* knowledge about the world, but rather, interpret the sensations we receive. This is true not only of connective knowledge, but of all three types of knowledge.

Consider qualities, for example. We take it as basic or atomic (see people like Ayer[369] for example) that a statement like 'this apple is red' represents a pure and unadjusted fact. However, looking at this more closely tells us how much we have added to our original sensation in order to arrive at this fact:

First of all, the apple itself has no inherent colour. Colour is a property (specifically, the wavelength) of light reflecting off the apple. In different coloured light, the apple will appear to us differently - it appears white in red light, for example, or gray in diminished light. Yet we say the apple is 'red' - standardizing our colour descriptions to adapt to the natural light that surrounds us day to day.

Second, our perception of the apple as 'red' depends on our organizing light patterns in a certain way. When I was a child, the spectrum had six colours - red, orange, yellow, green, blue and purple. As an adult, I find that a seventh - indigo - has been added. It's not that a new colour came into existence when I was twenty, it's that our nomenclature changed. In a similar way, we can divide the colours of the spectrum in numerous ways: 'red', for example, can include shades as varied as 'crimson' and 'cherry'. Or '#ff0000'.

And third, when we say that 'the apple is red' we are drawing on our prior linguistic ability to use the words 'apple' and 'red' correctly and apply them to appropriate circumstances. Indeed, our prior knowledge often shapes our perceptions themselves: were you shown an apple in

368 Rudolf Carnap. 1967. *Logical foundations of probability*. University of Chicago Press, 2nd edition.
369 A.J. Ayer. 1952. *Language, Truth and Logic*. London: Gollancz. Dover Publications; 2nd edition.

diminished light, so that all you could see was gray, and asked what colour it was, you would still respond 'red' because of your prior expectations about apples and redness.

Less intuitively so, but equally clearly, interpretation applies to quantitative knowledge as well. It is easy to say that a sentence like 'there are twenty schoolchildren in the yard' is a basic fact, but this all depends on how you classify schoolchildren. Suppose, unknown to us all, one of the children had just been expelled; is our statement now false? Not obviously so. Perhaps one of them is over sixteen - is this person still a child (and hence, a schoolchild)? It depends on your point of view.

Quantification is essentially the enumeration of members of a category or set. Consequently, it depends crucially on how that set is defined. But membership in a set, in turn, is (typically) based on the properties or qualities of the entities in question. So such membership is based on interpretation, and hence, so is counting.

One might be tempted to say that even though applied instances of counting are based on interpretation, mathematics itself is not. But in my view, this too would be mistaken. For one thing, as people such as Mill and Kitcher argue[370], the rules of mathematics depend on empirical verification for their importance: we say that one plus one is two, not out of some innate sense of goodness, but because when we put one sheep together with another, we observe that there are two. Nothing but our observations prevents us from saying that one plus one is three, and in some contexts such a statement makes perfect sense.

c. Emergence

Emergence is a hard concept, but at this point I can gloss it with a simple characterization: emergence is interpretation applied to connections.

There are two (equally valid) ways of thinking about this:

First, we may perceive an actual set of connections linking a group of entities as a distinct whole. For example, when one domino topples another, and so on, in turn, and we observe this from a distance, we may observe what appears to be a wave moving through the dominoes. The wave that we observe can be said to be an 'emergent phenomenon' - it is not a property of the dominoes themselves, or even of the falling of the dominoes, but of the connectedness of the falling - because one domino causes the next to fall, we see a wave.

Second, we may perceive something as a distinct whole and interpret this as a set of connections. For example, when we look at the image of Richard Nixon on the television, we do not perceive the individual pixels, but rather, the image of a person. But our inference goes beyond merely the observation of the person; if asked, we would say that the appearances of the pixels are connected to each other, through the mechanism of having a common origin (Richard Nixon himself) and the mechanism of video broadcasting.

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370 Philip Kitcher. *1985. The Nature of Mathematical Knowledge*. Oxford University Press.

Emergence is fundamentally the result of interpretation. As mystics (and Spinoza) are fond of arguing, everything is connected. At a certain point, as the old saying goes, when a butterfly flaps its wings in China, the result is a thunderstorm in Halifax. But broadcasters in Halifax do not watch butterflies in China in order to predict the weather, because this connection will be of no use to them. Typically, they will look at more intermediate events, themselves emergent properties, such as waves of air moving through the atmosphere (known locally as 'cold fronts').

In the same way, the observation of sets of connections between entities depends a great deal on what we already believe. That is why we see swans in clouds or faces on Mars when, manifestly, there are none. We have brought our prior knowledge of connected entities to bear on our interpretations of these phenomena. As Hume would say, our 'perception' of a causal relationship between two events is more a matter of 'custom and habit' than it is of observation[371].

d. Physicality

We generally think of knowledge as being about facts, and about facts in turn as being grounded in an independent reality, a physical reality. Consequently, it is natural for us to say, for example, that when we see that something is red, that there is a physical basis for that statement, that even if we bring some interpretation to bear, there is some physical fact of the matter than makes the apple red, and not blue.

Certainly, were we not to think of things this way, we would be hard pressed to say anything about anything. Physicality provides us with a substrate on which to hang our interpretations. It is, as Kant would say, a necessary condition for the possibility of perception[372]. Physicality moreover offers us a means of sorting between what might be called 'correct' interpretations and 'misperceptions', between reality and a mirage.

All this may be the case, but nonetheless, there is nothing in our interpretations that is *inherently* based in physical reality, and hence, nothing that precludes our discussion of them without reference to this foundation. Indeed, this has been enormously useful in other domains. Despite, for example, the empirical basis of mathematics, it is much more productive and useful to refer to quantity without reference to the physical entities being counted, to (in other words) think of quantity in the abstract. The same is true of quality. Thinking of quality in the abstract leads to Aristotle's syllogisms[373] and is the basis of categorical reasoning.

Moreover, non-physical entities may have (or be attributed) properties that are themselves (on this theory) based in physical properties. In our ideas and dreams, we think of vivid colours and large numbers. And the ideas are transferable. Consider the concept of 'purple prose'[374] - an expression which if applied literally is in all cases either meaningless or false, yet of significant utility and meaning.

371 David Hume. 1999. *An Enquiry Concerning Human Understanding*. Tom L. Beauchamp, ed. Oxford.
372 Immanual Kant. 1999. *Critique of Pure Reason*. Paul Guyer and Allen W. Wood, eds. Cambridge University Press.
373 Garth Kemmerling. 2001. Categorical Syllogisms. *Philosophy Pages*. http://www.philosophypages.com/lg/e08a.htm
374 Deb Stover. 2007. The Purple Prose Eater. http://www.debstover.com/purple.html

What is to be learned from this? That the entities in the various categories of knowledge - be they properties or numbers - are themselves *not real*. When we talk about 'redness', we are not talking about something that has an independent, concrete existence in the world, but rather, in something that exists (insofar as it exists at all) only in our own minds. When we talk about the number 'four', we are not describing some Platonic entity[375], but rather, nothing more than our own thoughts or sensations.

That does not make them less 'real'. Our perception of the colour 'red' is as real as any phenomenon in the world. It is merely to distinguish between the perception, which results from a complex of factors, from the physical entity, which ostensibly caused it.

In a similar manner, our interpretations of connections is distinct from the actual set of interactions that may exist in the world. Consider, for example, conspiracy theories - the postulation of a complex and inter-related set of people and events leading to the conclusion that someone is out to get you. Such theories, notoriously, have no basis in the physical world. But they may nonetheless be contemplated, and discussed, and passed along, as though they were real. And the experience of a conspiracy theory may be, to the perceiver, every bit as real to the person having the experience.

There is a tendency on the part of readers, whether of talking about crickets, or of Shirky talking about power laws[376], to represent connections as something 'natural' and 'real' that is simply 'out there' - as though what is said about networks of connections represents some immutable law of nature. Quite the converse is the case; our understanding of the existence of connections, and the nature of the networks they form, is something we bring to the table, an interpretation of what we think is salient.

e. Salience and Inference

Our knowledge consists of interpretations of perceptions, which are in themselves distinct from any physical reality that may have caused them. In this sense, one might say that these interpretations are 'constructed' - that is, they are the result of some mental or cognitive process, rather than something that comes delivered to us already assembled.

Inference is, broadly speaking, the manipulation of these bits of knowledge, in the abstract, to produce new bits of knowledge. In our mind, for example, we can postulate that if a red light is added to a yellow light, the result will be an orange light. Or that two sheep added to two sheep will result in four sheep. Often, subsequent perceptions will confirm such predictions, thus leading us to rely more greatly on the manipulations that resulted in them (and less greatly on manipulations that did not result in them, though the human mind is notoriously fickle in this regard).

All such inferences, however, are the result of a complex process of selecting what might be called the most 'salient' data. The counting of sheep, for example, is of utility only to people who

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375 James Dye. 2003. Platonic Forms. http://www.niu.edu/~jdye/forms.html
376 Clay Shirky. 2003. Power Laws, Weblogs, and Inequality. *Clay Shirky's Writings About the Internet*, February 8, 2003.
http://www.shirky.com/writings/powerlaw_weblog.html

own sheep (or are reading philosophy papers). Normally, during the course of our everyday lives, we have little need to count sheep, and so for the most part we ignore the actual number of sheep present to us at any given time. In a similar manner, when we perceive an orange light, we do not typically view it as a confirmation of the idea that red and yellow make orange. Unless we are visual artists we see it merely as an instance of 'orange'.

Our inferences, therefore, are based on salience, where *salience* may be thought of as the importance, relevance or vivacity of some property or perception. We 'pick out' those perceptions that will be of use to us, and disregard the rest. This is not often even a conscious process; it is based in part on innate reactions (such as jumping when we hear a loud sound) and largely on prior expectations. Our past knowledge has led us to recognize that something that looks and sounds like a tiger is something we should pay attention to, and so our inference engine kicks into high gear.

In the same way, some connections are more salient than others. Think about your sense of place or location. It is centered on the city or town in which you are located, the streets spreading out from you in a pattern unique to your position. Change your location, and your map of the world changes with it; WalMart, which was once 'two blocks away', is now 'one block away'. Or consider your circle of friends: again, you are at the centre, with your closest associates at near proximity, with acquaintances more distance. Your friend, however, will count a different set of people as being most proximate, and others, including some you hold more close, as more distant.

Things become even more complex when considering the mind. We know that the mind is a massively connected set of neurons, but where is the point of view from which we regard these connections? While we can consider the bird's eye view in the abstract, and speak dispassionately about the hippocampus or the corpus callosum, we cannot adopt such a frame of reference with respect to our own thinking. And yet, it seems manifest that there *is* a point of view with which we regard our own mind; it is the essence of conscious thought, that we are aware of our mental processes at the same time we are having them.

Again, it is that which is most salient that comes to the fore here. You may have mental representations of hundreds or even thousands of people but, if you are enamoured, be thinking only about one. Your body consists of millions of nerve ends, but if you have a toothache, your attention is focused only on those few related to the tooth. In a similar manner, it is only your most active and your most consistent thoughts that intrude on your consciousness, and it is through the lens of those thoughts that you interpret phenomena (and through phenomena that you have those thoughts).

Inference is the observation of salient similarities among thoughts and perceptions. It is the recognition of common properties - qualities, quantities and connections - among varied perceptions, and the consequent drawing of connections between those entities, and between other properties of those entities. Seeing that two sheep and two sheep make four sheep, you are led (via the salience of quantity, and the newly found salience of cows) to contemplate the idea that two cows and two cows might make four cows.

f. Associationism

This process of inference has a history in philosophy under the heading of 'associationism', a type of reasoning associated with (until the advent of logical positivism) empirical philosophy and people such as Hume and Mill.

The central idea of associationism is this: two things that are relevantly similar become connected in the mind. This connection or association in turn allows knowledge about one to be inferred of the other. Thus, if we experience one tiger-like creature, and it tried to eat us, then if we see a relevantly similar tiger-like creature, we are led (as Hume would say, naturally and senselessly) to believe that it will try to eat us as well. Eventually, a complex of beliefs about tiger-like creatures is formed, and some indeed become strong enough to allow us to contemplate a new (and dangerous) category of entity, given the name 'tiger'.

Various types of associationism exist, from association of impressions postulated by Hume to the similarity of phenomena described by Tversky.[377] Two major types of associationism are relevant to us here:

The first is simple associationism, sometimes known as 'Hebbian associationism'[378], which is postulated to be (and probably is) foundational in the forming of neural connections in the mind (its applicability to the world outside the mind is much less evident). The principle, specifically, is that if two neurons fire at the same time, a connection will tend to be formed between them. This is, of course, an 'all else being equal' hypothesis: the neurons have to be the sort of neurons than can form connections, there needs to be some sort of proximity between them, and they need to be (computationally and physically) compatible with each other. A lot like a love story.

The second may be classified under the (inaccurate) heading of Boltzmann associationism.[379] Derived from the idea of the Boltzmann machine, this sort of associationism is an expression of (something like) thermodynamic forces. Think of it as the network attempting to settle into a 'balanced' or 'harmonious' state. The idea behind Boltzmann associationism is that a certain amount of energy applied to a system will create a certain amount of kinetics - in other words, your brain goes on thinking even though its not receiving input. In the absence of external influences to cause Hebbian connections, the brain settles into a (thermodynamically) stable configuration.

Whether such modes of associationism, or any other method of connection-forming, is at work within any particular system, is a question for empirical observation. Probably, in any given system, it will be a combination. And as before, in addition to specific connection-building

377 Amos Tversky. 2003. Preference, Belief, and Similarity: Selected Writings. MIT Press.
378 Pim Haselager. 1999. Neurodynamics and the Revival of Associationism in Cognitive Science. In A. Riegler, M. Peschl, & A. Von Stein (Eds.), Understanding Representation in the Cognitive Sciences. Kluwer Academic / Plenum Publ.
http://www.nici.kun.nl/~haselag/publications/NeuroAssoc99.pdf
379 G.E. Hinton and T.J. Sejnowski. 1989. Learning and Relearning in Boltzmann Machines. In David E. Rumelhart and James L. McClelland, Parallel Distributed Processing: Explorations in the Microstructure of Cognition, Volume 1. MIT Press.

mechanisms, there will be a requirement for enabling factors, such as proximity, and corrective factors, such as is described by back propagation.[380]

We understand similarity well enough with respect to quality and quantity. Things can be more or less alike - large, round and orange, say. And we can see how though this similarity how an association can be formed - our perception of (what we interpret to be) two different orange phenomena leads us to draw an association between them. Quantities, as well, are associated: we have never experienced a rainfall of six inches of milk, but we can easily imagine what it would be like, based on our experiences with six inches of water.

In the case of connections, the concept of similarity is less intuitive, but breaks into two major categories:

First, we can say that two entities are connectively similar if they share connections with the same set of entities. For example, Michael and I may be connectively similar, even if we have never met, if we share the same group of friends. Of course, such a similarity makes it more likely that a connection would form between us: but it is important to note the directionality here. The similarity precedes the connection.

Second, we can say that two entities are connectively similar if they share similar sets of connections. For example, Paul and Michelle may be political activists, but working for different political parties. In such a case, they will share the same *types* of connections, but with different sets of friends. Such sets of connections are (more of less) *isomorphic*. It is worth noting that this isomorphism will tend to lead to a connection between the two groups (political parties tend to interact with other political parties, but much less so with hockey teams) which in turn again leads to connections between the members.

g. Distribution

At this point we reach a central concept of connective knowledge, that of *distributed* knowledge.

In the previous section we looked, a bit glibly, at the possibility of political parties interacting with each other. And this is a concept we can intuitively grasp; we see it every day in political debates, in the legislature, and as represented in political polls and newspaper articles.

But a political party is not (*per se*) a self-contained entity: it is an assemblage of individual people where these people are connected through some sort of common process (usually but not always involving a commonality of belief and participation in a membership process, such as signing a membership card and paying five dollars, along with an organized and often guided set of interactions between the members, such as are evidenced through a primary process or political convention).

The political party is a distributed entity. What is important to note is that it is *more* than merely a collection of associated or even similar people. A group of people, even if they all hold the same

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380 D.E. Rumelhart, G.E. Hinton, and R.J.Williams. 1989. Learning Internal Representations by Error Propagation. In David E. Rumelhart and James L. McClelland, *Parallel Distributed Processing: Explorations in the Microstructure of Cognition*, Volume 1. MIT Press.

beliefs, and even if they all know each other, does not constitute a political party. Nor is it a question of quantity: a group of five people may constitute a (very unpopular) political party, while a very large group may not have any political existence at all. What makes a political party (and similar entities, such as corporations, hockey teams and university faculties) is the set of *connections* between its members, the existence of which is often manifest and recognized with special documents and legal standing.

It's a nebulous concept. The political party does not exist, is not contained, in any of its members, nor is it a mere aggregation of the properties or number of its members, but it would not exist without its members. The existence of the political party is *distributed* - there is no single place it could be said to be, but many places in which its existence could be said to be manifest. Each member forms a part of the political party, but they are not a miniature version of the party as a whole. The properties of the party are separate and distinct from those of the members.

We have here once again reached the concept of emergence, but from a different direction. Any property the political party may have is an emergent property. Consequently, it is a property that exists (in our minds) solely by virtue of it having been *recognized or interpreted* as such (which is why we have a formal process of 'recognizing' political parties). And yet, while this property depends on the constituent members, it is not in turn a property of the members (Davidson calls this supervenience[381]). The emergent properties of a distributed entity exist solely as a consequence of the *organization* of its parts, and not its membership, and specifically, from the fact that these parts are connected in a certain recognizable way.

Strictly speaking, every entity in the world is a distributed entity (save, perhaps, indivisible subatomic particles - and (in my view) these may exist only by virtue of a reverse distribution, consisting entirely of entities that are *larger* than they are, much like a point in a moire pattern- but this is *very* speculative). Every entity is composed of additional entities, and the properties of the entity in question are not all mere reflections of the smaller entities, but rather, unique properties, that come into existence because of the organization of those entities. Thus the same collection of carbon atoms may result in very soft charcoal or a very hard diamond.

When we speak of one of those properties, therefore - say, the hardness of a diamond - there is no *place* that we can point to where this property is located. There is no specific instance of the hardness of the diamond, save in our perception and interpretation that carbon atoms, when organized *this* way, are what we call 'hard'. The property of being hard, in addition to being distributed across the carbon atoms that constitute a diamond, in addition exists only as a result of our perception of it. Strictly speaking, were there no perceivers to recognize diamonds as being 'hard', there would be no 'hardness' for diamonds to have.

h. Meaning

Above, we discussed the possibility of considering properties separated from the physical entities that are instances of them. Thus, for example, we can think of 'red' without thinking of a

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381 Donald Davidson. 1980. *Actions and Events.* Clarendon Press.

'red thing'. At the time, we said that it does not follow that there is any specific entity such as 'redness'. But now we have to ask, in what does 'redness' consist. Because there is a sense in which 'redness' is real: it is something we all understand, a concept that is useful in our daily lives. The sentence, "This photo needs more redness" is not something we would immediately dismiss as nonsense.

The concept of 'redness' is an example of distributed meaning. There is no particular place we could point to where the 'meaning' of 'redness' is located. Indeed, that we have a concept such as 'redness' in our minds is in itself only something that we could know through interpretation of the myriad patterns presented in our consciousness and our behaviour. No doubt we have numerous other similar concepts, however, because they are not salient - because they never play a role in higher order cognitive behaviour - we do not recognize them. We are, in a sense, blind to them, until through some process (such as a Rorschach test) they are searched for and observed.

In a sense, having the concept of 'redness' in our own mind is similar to having 'liberal' as a description of a political party. Low-level subsymbolic concepts exist in our minds - collections of connected neurons that themselves do not have meaning we would recognize, but which in combination eventually form higher-order structures that do correspond with the meanings of words (or melodies, or icons, etc), such as 'redness'. Saying that we have the concept of 'redness' in our mind is to pick our a particularly salient set of collections of connected neurons.

We can understand intuitively how the meaning of a word is distributed in this way if we reflect on the meaning of a specific word. For example, consider the word 'Paris'. We would at first blush take this word to refer to - and be - something concrete and definite, a city in north-central France. But the use of the word 'Paris' conjures different associations for different people. For example, 'city', 'France' and 'Eiffel Tower'. And some people think of plaster, other people think of Hilton, other people think of the left bank, other people think of Kurt Vonnegut.

But more: when we say that the meaning of the word 'Paris' is distributed, what we mean in addition is that the meaning of the word is *constituted* in part out of the same elements that constitute the meanings of these other words. We might say (loosely) that the connection between subsymbolic entities A,B,and C constitute the meaning of 'Paris', while the connection between B,C and D gives us the meaning corresponding to 'plaster' (obviously this is a vast oversimplification). When the meanings of words are distributed, the basis of their meanings - the smaller subsymbolic entities that make up the meanings - are *intermingled*. In a certain sense, you *can't* understand what 'Paris' means unless you at the same time understand what a set of other words, and indeed, other concepts (such as 'naming') mean.

This may seem like a hard, even impossible, concept, but it is one that we work with and manage every day. One might ask, for example, "where is Edmonton?" The answer to that question does not exist as some sort of determinate, singular entity; it is mixed in with a variety of other concepts. "Edmonton is in Alberta," we might answer, which draws the concept of 'Alberta' into our understanding. "Edmonton is in the Palliser Triangle," a geographer might say, which in turn draws in another set of associations as part of the answer. Edmonton is at latitude 52 north, a cartographer might respond, involving in our understanding the nature and

employment of Cartesian geometry. The answer to the question 'where is Edmonton' and the meaning of the word 'redness' are of a similar nature, entrenched in a complex and interwoven networks of other meanings.

i. Shared Meaning

From the writings of people like Wittgenstein we get the idea that meanings, in the truest sense, exist only when they are shared by a community of speakers. Wittgenstein even went so far as to say there could be no private language, that meaning is possible only if it is shared publicly.[382]

This strikes many people as wrong because they think of meaning as reference or (following Kripke[383]) following a necessary order of things in the world. The Tarski definition of truth[384] - "'Snow is white' is true if and only if snow is white" strikes an intuitive chord with people, as it establishes an observable empirical basis in the meanings of words.

And indeed, it is our common experience of an independently existing physical world that also leads us to such intuitions. Never mind old folk tales like "The Eskimos have 22 words for 'snow," the fact remains that when an Inuit says 'snow' and when a Brazilian says 'snow' they mean the same physical entity, specifically, crystalline H_2O.

And yet - an Inuit would say 'snow' in Inuktitut, and a Brazilian in Portuguese, and the words in these two languages are different, and reflect different interpretations of reality. Languages are not isomorphic (Chomsky notwithstanding). The basis of English structure, for example, lies in the distinction between myself and the other, while in the French it is myself, my body, and the other. Neither is factually incorrect; snow is 'white' in each instance, and yet meaning diverges (or may diverge; as Quine says[385], we can't know for sure).

Meaning, for Wittgenstein, is established in the *act* of communicating. From the perspective of the current discussion, we would say something like this: the shared meaning of the word 'Paris' is an emergent property of the set of specific interactions between people involving the use of the word 'Paris' or of words associated with the word 'Paris'. Or as Wittgenstein said it, "Meaning is use."

It is important at this juncture to understand that this account of meaning does not contradict, nor even compete with, the account of meaning given above. Just as we can examine two different people to find different meanings of the word 'Paris', so also can we examine two distinct types of entity - a person and a society - in order to understand its meaning. Because there is no single and distinct entity which the meaning of the word 'Paris' must be. What connections are salient, what entities are salient, in our determination of the meaning of the word is a matter of context, a matter of interpretation.

382 Ludwig Wittgenstein. 1999. *Philosophical Investigations*. Sections 244-271. Prentice-Hall, 3rd Edition.
383 Saul Kripke. 1980. *Naming and Necessity*. Harvard University Press.
384 Alfred Tarski. 1944. The Semantic Conception of Truth and the Foundations of Semantics. *Philosophy and Phenomenological Research* 4.
385 W.V.O. Quine. 1964. *Word and Object*. MIT Press.

When Wittgenstein says that there can be no private language he is, strictly speaking, wrong. I have numerous private words (which I won't share here, for otherwise they wouldn't be private, and I wouldn't have an example any more) and could in principle have a private language. Because having a language is not a case of *knowing* the language, as Wittegenstein (on some interpretations[386]) argues. Having a language is being *organized* in a certain way. This organization is the 'black box' that gives us, as Ryle would say[387], "dispositions" to behave in certain ways, to (for example) utter the word 'Paris' when presented with a certain phenomena.

Indeed, to turn this around, 'knowing' anything is of a similar nature. To 'know' something is not to be possessed of a certain fact. There is no 'instance' of a piece of knowledge in our head. To 'know' is to be organized in a certain way, to have, if you will, a certain regularly occurring pattern of neural activity (and consequently, disposition to behave). Knowledge is, as Hume said, a 'habit of the mind'.

Indeed, if speaking a language, using a language, required 'knowing' a language (in the cognitive sense), then a child would not be able to speak a language, for a child employs linguistic constructions that he or she could not possibly identify or name (as a student of French, it is very frustrating to see a six year-old exercise more capacity in the language than I can). This is the sort of phenomenon that was perplexing to Chomsky[388]: how could someone speak a language without the mental capacity to 'know' it? But this is not sufficient reason to suppose Chomsky's syntactic structures are innate; it makes as much (if not more) sense to believe that they are (subsymbolic) organizations of neural connections.

None of this, though, should be interpreted to mean that language is *merely* a mental phenomenon. We remarked above that the meaning of the word 'Paris' could be understood both from a personal and social point of view. But additionally, it should now be noted, that the personal and the social do not operate independently of each other. It is, after all, no coincidence that children grow up speaking the same language as their parents. The experience of linguistic elements as perceptions leads to the formation of linguistic elements as neural and mental structures, and the interaction of these back and forth lead to their being associated, and over time, more similar. Use of the language influences the speaker; use of the language influences the language.

j. Organization

It may seem odd at this juncture to speak of a language as a social phenomenon, and a language as a mental phenomenon, in much the same terms, and indeed even, interchangeable.

But it is not odd, nor even unintuitive, when it is recognized that meaning, both socially and neurally, have the same origin: *meaning is an emergent phenomenon*, arising from the connections between underlying entities. Socially, the underlying entities are speakers of the

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386 Saul Kripke. 1982. *Wittgenstein on Rules and Private Language*. Harvard University Press.
387 Gilbert Ryle. 1949. *The Concept of Mind*. University of Chicago Press.
388 Noam Chomsky. 1980. *Rules and Representations*. Basil Blackwell.

language, while mentally, the underlying entities are neurons and subsymbolic neural structures.

How could these be the same? One might ask. But that's a bit like asking how a neural cell and a Popsicle could both be pink. Or a bit like asking how there could at the same time be a thousand neural cells in a layer and a thousand people in a market. What makes language, both social and personal, similar is that both are derived from the same set of principles. And, indeed, it is due to their following the same principles that makes language possible at all! If we could not in society replicate the same sort of things that happen in our own minds, there would be no means by which we could communicate at all. Consider rabbits, who have active (though rabbit-like) mental lives: without the capacity to share meaning though networks of organized interaction, they are utterly unable to form a language.

The principles of organized networks of connections have received much attention in recent years, and deservedly so. We understand a great deal about how such networks work and about their properties. Conceptually, they have been studied under the heading of graph theory. Concrete instances of networks have been studied in the words of Watts[389] and Barabasi[390], among others. Computationally, networks have been the locus of investigation by people like Minsky and Papert[391], Rumelhart and McClelland[392]. Social networks, and social networking software, have become a minor industry. And, of course, the internet itself has given us a large scale network to study up close and in detail.

Most work (to my observation) has been centered in two major areas: first, the properties of different types of networks (for example, random networks, loosely coupled networks, etc), and secondly, properties of the propagation of information through networks (as instanced in, for example, the 'six degrees' phenomenon). Additionally, though the investigation of dynamic networks, it has been shown how networks can grow naturally, with no intent or design, on the basis of a few very simple principles. Observation of these phenomena have explained such things as power laws, which describe disparate numbers of connections between nodes in the networks, and cascade phenomena, in the process of examining the propagation of ideas and diseases through a society (or through a human body).

Much less has been said about what is probably the most important implication of this work: if a human mind can come to 'know', and if a human mind is, essentially, a network, then any network can come to 'know', and for that matter, so can a society. Just as the meaning of a word can be both personally based and culturally based, so also can knowledge itself be both personally and culturally based. Moreover, because we know that people can learn, we can now also that societies can learn, and conversely, through the study of how a society can learn, we can understand more deeply how a person can learn.

k. Social Knowledge

389 Duncan J. Watts. 2003. *Six Degrees: The Science of a Connected Age*. W.W. Norton & Company.
390 Albert-Laszlo Barabasi. 2002. *Linked: The New Science of Networks*. Perseus Books.
391 Marvin Minsky and Seymour A. Papert. 1987. *Perceptrons – Expanded Edition: An Introduction to Computational Geometry*. MIT Press.
392 David E. Rumelhart and James L. McClelland. 1989. *Parallel Distributed Processing: Explorations in the Microstructure of Cognition*, Volume 1. MIT Press.

Social knowledge is to a society what personal knowledge is to a person. It is a result of the connections between the individual members of society, resident in no single one of them, but rather a property of the society working as a whole. Numerous instances of such connections occur; where certain of those connections become salient, and are frequently activated through use, they are recognized as forming a distinct entity, producing a distinct type of knowledge.

As an example, consider the knowledge of 'how to fly a person from England to Canada in a 747'. No single person possesses this knowledge, because it is the result of combining numerous instances of personal knowledge - from how to make tires to how to navigate a 747 to how to execute a landing while keeping the airplane intact. What makes these individual bits of knowledge combine to form an instance of social knowledge is that they are connected; knowing how to land an aircraft depends on, and makes sense, only in the context of knowing how to fly an aircraft, or to build an aircraft.

Though many instances of social knowledge go unobserved and unremarked, numerous examples may be adduced. For example, the knowledge of 'the value of wheat' at a given time is a type of social knowledge; it is the knowledge that results through the connections of millions of wheat buyers and wheat sellers in a marketplace. No individual has a grasp of 'the value of wheat' - they each make decisions to buy or to sell based on their own individual knowledge and needs. It is true that there is a 'market value' of wheat - but again, this is an *interpretation* of that social knowledge - not all instances of wheat-trading are taken into account, only those expressed in financial terms, and not all wheat-traders are considered (the child receiving wheat from her mother, for example).

Smith's 'invisible hand of the marketplace' is but *one* way of looking at particular types of social knowledge, specifically, those that may be expressed quantitatively, and on the basis of quantitative reasoning. Wheat may be valued non-quantitatively - by its taste, for example. Consider how society values chocolate, in comparison. The 'value of wheat', looked at from a connective perspective, is a consideration of the interaction between all statements concerning 'value' and all statements concerning 'wheat', and an interpretation of those statements. That we today express the value of wheat in economic terms says as much about the salience of financial value in today's society as it says about wheat.

Social knowledge has recently attained recognition (and value) under the heading of Surowiecki's 'wisdom of crowds'[393]. But it is worth noting that many of Surowiecki's examples are cases where individual guesses "aggregated and then averaged." While Surowiecki stresses (correctly) the autonomy of those guesses, he does not so stress the equally important fact that those guesses are not independent events - they are connected, in some key way, to each other (for example, the people guessing the temperature of a room have also the property of being in the same room; those estimating the weight of objects all see the same objects, and in the same way).

Social knowledge is not *merely* the aggregation and averaging of individual knowledge (as if there could be such a thing - consider how in guessing weights we use a medium as average,

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393 James Surowiecki. 2005. *The Wisdom of Crowds*. Anchor.

while in electing leaders we use a mode as average). That is why such aggregation is not necessarily reliable - an aggregation that is considered independently of the connections between entities is like a count that is considered independently of the membership of a set. Consider, for example, counting sheep without worrying about whether what is being counted is a sheep. It can work sometimes - in sheep-filled rooms, for example. But more often, it will mislead.

l. Power Laws and Inequalities

Much of the work in networks has been on what are called 'scale-free' networks. In a scale-free network (as people like Barabasi have shown) some entities in the network have a much higher degree of connectedness than others. True, in any, there will be a certain variance in distribution, but in a scale free network this variance can be extreme. Consider, for example, a network like the internet, where some sites, such as Google, have millions of visitors, while other sites have only one or even none.

A network of this sort forms through a *dynamic process* where the presence of one entity leads others to connect to it. For example, consider the act of creating links on a web page. In order to create a useful link, it is necessary to connect to a site that already exists. This means that, all other things being equal, a site that was created first will obtain the most links, because it will have been a candidate for linkage for all subsequent websites, while a site that was created last will have the fewest links, because it has never been a candidate for links.

This effect can be magnified when *preferential attraction* is considered. For when creating a link on a web page, a designer wants not merely to link to a random page, but to a *good* page. But how does one judge what counts as a good page? One way is to look at what other people are linking to. The probability that the first page created will be found is greater than that for any other page, which means that the first page will obtain even more links that it would receive through random chance. With this and similar drivers, some websites obtain millions more links than others.

What's interesting is that though a similar process leads to the formation of scale-free networks in other areas, not in all cases is such an extreme inequality reached. What happens is that in some cases a structural upper limit is reached. Consider, as Barabasi does, the cases of airports and the power grid. Both are developed according to similar principles (airlines want to land flights, for example, where other airlines land flights). And, not unexpectedly, a power-law distribution occurs. But there is an upper limit to the number of aircraft that can land in a single airport, and consequently, a limit to the size of the inequality that can occur.

Various writers (for example Shirky) write and speak as though the power law were an artifact of nature, something that develops of its own accord. And because it is natural, and because such systems produce knowledge (we will return to this point), it is argued that it would be a mistake to interfere with the network structure. This argument is remarkably similar to the argument posed by the beneficiaries of a similar inequality in financial markets. The rich get richer, benefiting from an unequal allocation of resources, but efforts to change this constitute

'interference' in a 'natural phenomenon', the invisible hand of the marketplace, intelligently allocating resources and determining priorities.

This may be true, if we think of networks as natural systems. But the absence of limits to the growth in the connectivity of some nodes should alert us that there is something else going on as well. And it is this: the networks we describe, and in some cases build (or through legislation, protect), are *interpretations* of the multifarious connections that exist in an environment or in a society. They depend, essentially, on a *point of view*. And, arguably, the inequalities of links on the web or money in society represent the prevalence of one point of view, or some points of view, over others. But to understand how this could be so, we need to look at networks, not as physical systems, but as semantical constructs, where the organization of links is determined as much by similarity and salience than by raw, epistemologically neutral, forces of nature.

m. Knowledge

What does it mean, even to say that a sentence has semantical import? To say, similarly, that we 'know' something? As suggested above, most of us remain committed to something like a Tarski semantics: we know something just in case what we know happens to be true. But of course, this fails to tell the whole story. The knowledge needs to be, in some way, in our mind (or in our society); it needs to be a 'belief'. And (so goes the argument) it needs to be in some way justified, through a process of verification, or at the very least, says Popper,[394] through the absence of falsification.

This view has its difficulties, as the Gettier counterexamples suggest[395]. But (in my view) its most significant difficulties emerge when we try to articulate what it is that we know. Consider, for example, 'snow is white'. Sure, one could check some snow in order to determine that it is white, but only of one first understood what is meant by 'snow' and 'white' (not to mention, as Clinton taught us, 'is'). But as discussed above, that constitutes *the* meaning of, say, 'snow', is far from clear. there is no such single entity. What it means is a matter of interpretation. So, for example, does enumerating what constitutes instance of snow. Does 'yellow snow' count? Does snow produced by artificial ice machines count?

The behaviourist response to such dilemmas is to define 'knowing' that snow is white as a disposition to utter the word 'white' when presented with the question, 'what colour is snow'. And while we most certainly employ such tactics in the evaluation of knowledge (measuring responses is, after all, the basis of testing and examinations), it remains unsatisfactory, because we need to know what puts the disposition to say 'white' into a student's mind in the first place. Is it the whiteness of snow? Is it the memorization of the sentence 'snow is white'? Is it a comprehensive understanding of the process of crystallizing H2O?

From the discussion above, it should be clear that on the account being given here, to 'know' that 'snow is white' is to be organized in a certain way (one that is evidenced by uttering 'snow' when asked). To be organized in such a way as to have neural and mental structures

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394 Karl Popper. 1963. *Conjectures and Refutations: The Growth of Scientific Knowledge*. Routledge.
395 Edmund L. Gettier. 1963. Is Justified True Belief Knowledge? Analysis 23 121-123.

corresponding to the words 'snow', 'is' and 'white', where those structures are such that the concept 'snow' is closely associated with (in certain contexts) the concept 'white' (obviously this is a gloss). Knowing that 'snow is white' is therefore being organized in a certain way, but not in some particular way (we couldn't examine one's neural organization and be able to say whether the person knows that snow is white).

This is a very different model of what it means to 'know' - for one thing, because it is based on organization and connectedness in the brain, the concept of justification and even of belief are nowhere present. What we 'know' is, if you will, a natural development that occurs in the mind, other things being equal, when presented with certain sets of phenomena; present the learner with different phenomena and they will learn different things. Like the Portuguese word for 'snow', for example. And whether something counts as 'knowledge' rather than, say, 'belief' or 'speculation', depends less on the state of the world, and more on the strength or degree of connectedness between the entities. To 'know' something is to not be able to not know. It's like finding Waldo, or looking at an abstract image. There may be a time when we don't know where Waldo is, or what the image represents, but once we have an interpretation, it is not possible to look without seeing Waldo, without seeing the image.

No wonder Dreyfus and Dreyfus[396] talk about 'levels' of knowledge, up to and including an almost intuitive 'expert' knowledge. As a particular organization, a particular set of connections, between neural structures is strengthened, as this structure becomes embedded in more and more of our other concepts and other knowledge, it changes its nature, changing from something that needs to be triggered by cue or association (or mental effort) into something that is natural as other things we 'know' deeply, like how to breathe, and how to walk, structures entrenched through years, decades, or successful practice. Contrast this to a cognitivist model of knowledge, where once justification is presented, something is 'known', and cannot in later life be 'more known'.

n. Public Knowledge

'Public knowledge' is the explicit representation of social knowledge in language or some other concrete form. Public knowledge is what most people think of as 'knowledge' *per se*, it is what we attempt to teach our children, it is what is embodied an a canon and passed on to successive generations.

There are things known only by myself (think again of Wittgenstein's private language argument), such as who I like and why, or where I last stubbed my toe, that society either cannot or has no desire to come to know as a part of social knowledge. Such knowledge, personal knowledge, does not externalize, because there is either no need or no mechanism with which to place it in the public domain.

Knowledge that is, for example, subsymbolic defies communication (it is not impossible to communicate, though - consider a shrug, a sigh, a knowing look). In order for private knowledge

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396 Hubert Dreyfus and Stuart Dreyfus. 2005. Expertise in real world contexts. *Organization Studies*, 26(5), 779-792.

to become public knowledge, it must have some means of connecting with everything else that is considered public knowledge - through commonly understood utterances or actions.

But the mere communication of private knowledge in the public domain does not thereby convert it to public knowledge. It must be interpreted as such, recognized as such, in the public domain. In order for this to happen, the set of utterances ('Paris is the capital of France', say) must form a part of of the communications, of the interactions, in the social network as a whole. Then this pattern of communication must in turn be *recognized* by some perceiver (or group of perceivers) as constituting a relevant underlying organization of communication informing (say) the behaviour of a society as a whole. Merely saying 'Paris is the capital of France' doesn't make it so; many other people must say it, and even then, the mere public utterance doesn't make it so; it be recognized as a constituent element of the body of knowledge possessed by a society.

It becomes evident that one's demonstration of having acquired 'knowledge' is very different in the case of public knowledge than it is for private knowledge, even when the instance known is the same. Knowing privately that 'Paris is the capital of France' may consist merely of writing the appropriate word on a piece of paper, but knowing the same thing publicly involves a complex of interactions and behaviours, consisting essentially of immersion (becoming a part of, and entity within the organization) in the knowing community, so that utterances of the word 'Paris' reflect, and are seen to reflect, an instance of the (generally recognized fact that) 'Paris is the capital of France'.

Knowing publicly is, as Kuhn said, knowing 'how to solve the problems at the end of the chapter'.[397] It involves being able not only to produce specific behaviours, but in providing evidence of sharing in the same network of associations and meanings as others in the community, sharing a language, methodologies, riverbed assumptions. Failure to personally know something creates only a personal risk - one might travel to Lieges looking for the French parliament instead of to Paris. Failure to know publicly carries a greater risk: that of not being considered to be a part of the knowing community, of being, therefore, excluded from its interactions, and of being misunderstood when attempting to communicate.

This is why writers such as Wenger find such importance in communities of practice[398], and more, see such involvement as a process of (as he says) personal becoming. Interaction in a community of practice is to a significant degree an alignment of (certain parts of) one's personal knowledge with public knowledge - immersion produces a salience of certain utterances, certain practices, and thus promotes the development of corresponding (but probably not isomorphic) structures in the mind. It exposes a person to instances of knowledge statements and practices which, if they are sufficiently similar to preexisting organizations of neural and mental structures, increase, through association, their strength and importance. Personal knowledge is distinct from public knowledge, but the two go hand in hand, and a person who is considered 'highly learned' is one who has internalized, to an expert degree, a great deal of public knowledge.

397 Thomas Kuhn. 1970. *The Structure of Scientific Revolutions*. University of Chicago Press.
398 Etienne Wenger. 1999. *Communities of Practice: Learning, Meaning and Identity*. Cambridge University Press.

o. Knowing and Not Knowing (Cascade Phenomena)

But on what do we base public knowledge? What is the process of interpretation and recognition by which we, say, accept the theory of gravity and reject stories about flying saucers? What makes some knowledge part of 'social knowledge' and other knowledge (merely?) personal knowledge? Why would a community accept some things as 'known' and not others?

Knowledge is a network phenomenon, to 'know' something is to be organized in a certain way, to exhibit patterns of connectivity. To 'learn' is to acquire certain patterns. This is as true for a community as it is for an individual. But it should be self-evident that mere organization is not the *only* determinate of what constitutes, if you will, 'good' knowledge as opposed to 'bad' (or 'false') knowledge.

Consider public knowledge. People form themselves into communities, develop common language and social bonds, and then proceed to invade Europe, or commit mass suicide, or starve themselves to death. Nor is personal knowledge any reliable counterbalance to this. People seem to be as inclined to internalize the dysfunctional as the utile, the self-destructive as the empowering.

These are examples of cascade phenomena. A signal propagates from one entity in the network to the next to the next, seemingly without restraint, until it reaches every entity in the network. Such phenomena exist in the natural world as well: the sweep of the plague through medieval society, the failure of one hydro plant after another in a blackout, the bubbles in the stock market. Cascade phenomena are in one sense difficult to explain, and in another sense deceptively simple.

The sense in which they are simple to explain is mathematical. If a signal has more than an even chance of being propagated from one entity in the network to the next, and if the network is fully connected, then the signal will eventually propagate to every entity in the network. The speed at which this process occurs is a property of the connectivity of the network. In (certain) random and scale free networks, it takes very few connections to jump from one side of the network to the other. Cascade phenomena sweep through densely connected networks very rapidly.

The sense in which they are hard to explain is related to the question of why they exist at all. Given the destructive nature of cascade phenomena, it would make more sense to leave entities in the network unconnected (much like Newton escaped the plague by isolating himself). Terminating all the connections would prevent cascade phenomena. However, it would also prevent any possibility of human knowledge, any possibility of a knowing society.

p. Structure and Process

Nothing guarantees truth. It is tempting to suppose that we could easily restrain the excesses of cascading communities through a simple application of qualitative or quantitative knowledge obtained through other domains, but in practice we gain no increased certainly or security.

Consider, for example, qualitative knowledge. We are as apt to be misled by the information given by our senses as by any wayward community. Descartes records simple examples, such as mirages, or the bending of a stick in water, to make the point[399]. Today's science can point to much deeper scepticism. Perception itself consists of selective filtering and interpretation. The mind supplies sensations that are not there. Even a cautiously aware and reflective perceiver can be misled.

Quantitative knowledge, the cathedral of the twentieth century, fares no better. Though errors in counting are rare, it is a fragile a process. *What* we count is as important as how we count, and on this, quantitative reasoning is silent. We can measure grades, but are grades the measure of learning? We can measure economic growth, but is an increase in the circulation of money a measure of progress? We can easily mislead ourselves with statistics, as Huff shows,[400] and in more esoteric realms, such as probability, our intuitions can be exactly wrong.

In the realms of observation and mathematics, we compensate for these weaknesses by recognizing that a single point of view is insufficient; we distribute what constitutes an 'observation' through a process of description and verification. If one person says he saw a zombie, we take such a claim sceptically; if a hundred people say they saw zombies, we take it more seriously, and if a process is described whereby anyone who is interested can see a zombie for themselves, the observation is accepted.

Even then, we demonstrated caution though an explicit recognition that in the process of seeing we are interpreting. An observation of a certain phenomenon may be labled the observation of 'zombies', but we consider alternative explanations. This is aided by ensuring that the observers of the phenomena have different sets of prior experiences, different world views, different ways they could interpret the phenomenon. Having every member of a religious sect report seeing zombies is less reliable than having members of different sects, scientists and sceptics report the same thing.

In quantitative reasoning, we take care to ensure that, in our measurements, we are measuring the same thing. Through processes such as double-blind experimentation, we additionally take care to ensure that our expectations do not influence the count. In statistical reasoning, we take care to ensure that we have a sufficiently random and representative sample, in order to ensure that we are measuring one phenomenon, and not a different, unexpected phenomenon. In both we employ what Carnap called the requirement of the total evidence[401]: we peer at something from all angles, all viewpoints, and if everybody (or the preponderance of observers) conclude that it's a duck, then it's a duck.

q. Reliable Networks

Connective knowledge is supported through similar mechanisms. It is important to recognize that a structure of connections is, at its heart, *artificial*, an *interpretation* of any reality there may be, and moreover, that our observations of emergent phenomena themselves as fragile and

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399 Rene Descartes. 1996. *Meditations on First Philosophy*. Revised Edition. John Cottingham, Ed. Cambridge University Press.
400 Darrell Huff. 1993. *How to Lie With Statistics*. W.W. Norton.
401 Rudolf Carnap., *op.cit*.

questionable as observations and measurements - these days, maybe more so, because we do not have a sound science of network semantics.

Where structures of connections (i.e., networks) differ from sets of observations or measurements is that there is in principle no external entity to which we can appeal in order to check our understanding. In a networked society, every person is a member of the network, and all things being equal, there is not some other networked society against which we can test our conclusions (prior to the days of global communications, societies did test themselves one against the other, but unfortunately though war and other conflict, a solution that was worse than the problem and which clouded their ability to interpret connections in a rational and dispassionate way).

We have already seen that there are different types of networks - different ways sets of connections between entities can be generated and organized. Where the mechanisms that support knowledge in other realms come into play in the world of networks is that these mechanisms become *properties* of the networks we rely upon to generate and contain knowledge.

In a network, a cascade phenomenon is akin to jumping to a conclusion about an observation. It is, in a sense, a rash and unthinking response to whatever phenomenon prompted it. The mechanisms that push a stock market into a bubble are skin to a person being convinced by looking at the same thing over and over again. A network in the throes of a cascade needs the internal equivalent to a 'second set of eyes' to act as the bearer of sober second thought.

This capacity is crucially dependent on the structure of the network. Just as a network with no connections has no capacity to generate knowledge, a fully connected network has no defense against jumping to conclusions. What is needed is to attain a middle point, where full connectivity is achieved, but where impulses in the network ebb and flow, where impulses generated by phenomena are checked against not one but a multitude of competing and even contradictory impulses.

This is what the human mind does naturally. It is constructed in such a way that no single impulse is able to overwhelm the network. A perception must be filtered through layers of intermediate (and (anthropomorphically) sceptical) neurons before influencing the formation of a concept.

For every organization of neurons that achieves an active state, there are countless alternative organizations ready to be activated by the same, or slightly different, phenomena (think of how even a seed of doubt can destabilize your certainty about something).

Knowledge in the mind is not a matter of mere numbers of neurons being activated by a certain phenomenon; it is an ocean of competing and conflicting possible organizations, each ebbing and subsiding with any new input (or even upon reflection). In such a diverse and demanding environment only patterns of organization genuinely successful in some important manner achieve salience, and even fewer become so important we cannot let them go.

r. Network Structure

It is with these considerations that we return to the consideration of scale-free networks.

As mentioned above, a scale free network is characterized by a small number of entities is numerous connections, and a large number of entities with much fewer connections. It is worth noting that such networks are very tightly connected - in a scale free network a piece of information can reach an entire network very quickly.

While the human brain exhibits some scale-free properties, it is nonetheless not as imbalanced as even things like the economic system or the World Wide Web. Some neurons (or neural clusters) play important and central roles in the brain, but they are not millions of times more connected than most of the others. The brain is densely connected, but the connections are more equitably distributed.

This is no doubt a result of the physical limitations of neurons. But even more importantly, reducing the scale of the inequality between neurons also slows the propagation of impulses through the brain. It allows sub-organizations to develop - the alternative interpretations we can experience when observing a Gestalt phenomenon, for example. Were the structure of human thought to be replicated at the social level, what we would see is essentially a community of communities - the part of us (society) that likes knitting, the part of us that is a hedonist, the part of us that enjoys a good novel.

Networks that exhibit extreme power law distributions are unstable. Because, though the mechanism of highly connected nodes, a single impulse can be broadcast and accepted by the entire network all at once, there is no constraint should the impulse prove to be destructive or dysfunctional. The extremes in human social behaviour, wrought on a smaller scale by chieftains and kings, and on a global scale by mass media, should serve as ample evidence of this. With nothing to counteract an irrational impulse, the characteristic of the one becomes the characteristic of the whole, and the society spirals into self-destruction.

Chieftains, kings and broadcast media are inventions. They are ways we represent, in physical form, the set of connections we perceive to be extant in a society. But as interpretations of a complex set of connections, they are subject to individual points of view, prior conceptions and prejudice. As Rousseau observed, when the mechanisms of the whole are put into the hands of the few, the very nature of the whole is interpreted in such a way as to serve the needs of the few.[402]

In order therefore to successfully counterbalance the tendency toward a cascade phenomenon in the realm of public knowledge, the excesses made possible by an unrestrained scale-free network need to be counterbalanced through either one of two mechanisms: either a reduction in the number of connections afforded by the very few, or an increase in the density of the local network for individual entities. Either of these approaches may be characterized under the same heading: *the fostering of diversity.*

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402 Jean-Jacques Rousseau. 1968. *The Social Contract*. Maurice Cranston, trans. Penguin Classics.

For, indeed, the mechanism for attaining the reliability of connective knowledge is fundamentally the same as that of attaining reliability in other areas; the promotion of diversity, through the *empowering of individual entities*, and the reduction in the influence of well-connected entities, is essentially a way of creating extra sets of eyes within the network.

s. Truth

Recently a series of discussions took place regarding the relative 'truth' of entries in Wikipedia, a collection of articles created through a process of collective authoring, and *Encyclopedia Britannia*, a collection of articles about similar topics written by a series of experts.[403]

Such discussions are difficult to resolve because, as we have seen, what constitutes the 'truth' of the matter is very much a matter of interpretation. Truth, as commonly conceived, is said to be based on facts (and mediated through 'truth-preserving' inference), but if even the simplest observation depends to a great degree on interpretation, then the foundation of truth itself is equally suspect.

And yet this post-modernist attitude to knowledge is difficult to reconcile with our intuitions. We do rely on facts, there is knowledge, and what counts as knowledge has the virtue of being true. And when a body of work such as Wikipedia is examined, some statements are regarded as, and universally acknowledged to be, true, while others (happily a much smaller set) are found to be 'not true'. This, indeed, was the basis on which the *Nature* comparison of the two encyclopedias was based.

What distinguishes Wikipedia from Britannica is not so much the account of truth it embraces as the process through which it arrives at truth. Wikipedia, much more so than Britannica, represents an instance of connective knowledge - it is an attempt to capture, as public knowledge, what can be observed via the interactions of numerous instances of private knowledge.

It should be clear and obvious at the outset that this is not some process whereby individual points of view are aggregated and averaged - such mechanisms are more evident in entities such as Google and Technorati and Digg. Rather, Wikipedia, through iterations of successive editing, captures the output of *interactions* between instances of private knowledge. The majority, typically, does not rule on Wikipedia; what matters is what is produced through the interaction.

In the case of Britannica, the same is the case. The authors, as experts, are typically those immersed in a knowledge community, who have in turn internalized the knowledge (both social and public) possessed by that community. The expert serves as a dedicated *interpreter* of that knowledge, an interpretation that is additionally subject to subsequent interactions with proof-readers and editors.

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403 Jim Giles. 2005. Internet encyclopedias go head to head. *Nature* 438 900-901.
http://www.nature.com/nature/journal/v438/n7070/full/438900a.html

A priori, each approach has an equally plausible claim to being an effective (and reliable) generator of knowledge, which raises the question of how we will resolve the truth of the matter when (inevitably) there exists a point at which one encyclopedia says a statement is true and the other says the opposite.

Truth, in such a case, will come to depend not so much on the facts of the matter, but rather, through an examination of the process through which various types of knowledge are accumulated and interpreted. Just as the reliability of an observation report depends on how the observation is made, so to will the proclamations of connected communities of knowers.

t. Knowing Networks

Arguably, the following criteria will determine the difference:

First, *diversity*. Did the process involve the widest possible spectrum of points of view? Did people who interpret the matter one way, and from one set of background assumptions, interact with with people who approach the matter from a different perspective?

Second, and related, *autonomy*. Were the individual knowers contributing to the interaction of their own accord, according to their own knowledge, values and decisions, or were they acting at the behest of some external agency seeking to magnify a certain point of view through quantity rather than reason and reflection?

Third, *interactivity*. Is the knowledge being produced the product of an interaction between the members, or is it a (mere) aggregation of the members' perspectives? A *different* type of knowledge is produced one way as opposed to the other. Just as the human mind does not determine what is seen in front of it by merely counting pixels, nor either does a process intended to create public knowledge.

Fourth, and again related, *openness*. Is there a mechanism that allows a given perspective to be entered into the system, to be heard and interacted with by others?

It is based on these criteria that we arrive at an account of a knowing network. The scale-free networks contemplated above constitute instances in which these criteria are violated: by concentrating the flow of knowledge through central and highly connected nodes, they reduce diversity and reduce interactivity. Even where such networks are open and allow autonomy (and they are often not), the members of such networks are constrained: only certain perspectives are presented to them for consideration, and only certain perspectives will be passed to the remainder of the network (namely, in both cases, the perspectives of those occupying the highly connected nodes).

Even where such networks are open and allow autonomy (and they are often not), the members of such networks are constrained: only certain perspectives are presented to them for consideration, and only certain perspectives will be passed to the remainder of the network (namely, in both cases, the perspectives of those occupying the highly connected nodes).

u. Remnants

This new knowledge is not inherently any more reliable than the old. A community that limits its diversity, that becomes closed, is as liable to err as a person who refuses to look around, refuses to take measure. A person, exposed only to limited points of view, with limited opportunities to interact, will be similarly bereft of insight.

It is, after all, a form of knowledge we have had all along, just as we have always have qualities, always had quantities.

Connective knowledge is no magic pill, no simple route to reliability. As the examples mentioned above (*part o*) demonstrate, a knowledge-forming community can be easily misled or deluded, just as as a person can suffer from delusions and misunderstandings.

Indeed, if anything, the sort of knowledge described here is perhaps even more liable to error, because it is so much more clearly dependent on interpretation. Knowledge derived from a pattern may be formed from a partial pattern; the perceiving mind fills in the gaps of perception. From these gaps spring the seeds of error.

Moreover, as we enter the connected age, we live with remnants of the previous eras, years when connectivity in society was limited, control over perspective maintained by the beneficiaries of scale-free communications networks. History is replete with examples of the mind of one man, or one group in power, distorting the mechanisms of media to their own ends.

The examples range from very large to very small, from the rise of totalitarianism to the propagation of genocide to gender stereotypes, mass media marketing, and propaganda. Practitioners vary from dictators to slave owners to misogynists. The history of repression walks hand in hand with the history of the distortion of connective knowledge.

The purpose of this paper is not to provide truth, but to point the way toward the correction of these errors, both in ourselves and in our society. To show that, through attention to the underlying framework informing social and public knowledge, we can find a new renaissance, not perfection, but perhaps, a world less filled with ignorance and superstition.

Freedom begins with living free, in sharing freely, in celebrating each other, and in letting others, too, to live free. Freedom begins when we understand of our own biases and our own prejudices; by embracing autonomy and diversity, interaction and openness, we break through the darkness, into the light.

Types of Knowledge and Connective Knowledge

*This is a presentation for Week Two[404] of the Connectivism and Connective Knowledge course. It expands on the ideas in Part **a** of my paper, An Introduction to Connective Knowledge.* [405]

1.

What can we know about an object? Historically, we have had two types of knowledge:

First, 'qualitative' knowledge. What colour the object is, for example. What the object is shaped like. What sort of sound it makes. Qualitative knowledge is knowledge typically derived from the senses. The things we see, the things we feel, the things we hear: these are the qualities of the object.

Second, 'quantitative' knowledge. How many things do we see, for example. How much do they weigh? What are their dimensions? Quantitative knowledge is derived from the practices of counting and measuring. Quantitative knowledge gives us a knowledge that is deeper than that gained merely from the senses. It gives us an insight into the nature of the objects through concepts like mass, atomic number, equations and calculus.

These two types of knowledge account for most of what we know about things that there are out there in the world. These two types of knowledge combine the best of human capacities: our ability to perceive, to sense the world, and our ability to calculate, to think about the world. They form the foundation for language, the foundation for logic, and the foundation for all of the sciences we have had up to today.

Empiricism and rationalism: these are the two great schools of philosophy that have shaped the world in modern times. Empiricism, the philosophy that all knowledge is derived from the senses. Rationalism, the philosophy that all knowledge is derived from calculation and realism. The two great schools of thought in our time.

In the 20th century, things changed. On the one hand, the great philosophers of the Vienna circle and their allies in Great Britain founded a philosophy that joined empiricism and rationalism. This philosophy, known as logical positivism, held that we begin with observations, and then use logic and reason to derive statements about the nature of the world. Any statement not derived in this way, they argued, was literally nonsense. It made no sense.

On the other hand, there was an undercurrent of scepticism about that grand enterprise. The American pragmatists - William James, Charles Sanders Pierce and John Dewey, argued that

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[404] Stephen Downes and George Siemens. Connectivism and Connective Knowledge. Website. 2008.
http://ltc.umanitoba.ca/wiki/Connectivism_2008#Week_2:_Rethinking_epistemology:_Connective_knowledge_.28September_15-21.29
[405] Stephen Downes. An Introduction to Connective Knowledge. Stephen's Web (weblog). December 22, 2005.
http://www.downes.ca/post/33034

there was a third, practical domain of knowledge. The test that something is known, they said, is that it works. In Europe, meanwhile, philosophers found it difficult to accept that all of religion, art and literature were reduced to nonsense.

There are different types of meaning, said some. Meaning is derived from the text, said people like Heidegger and Derrida. Meaning is use, said people like Wittgenstein. And there are different types of knowing. The logical positivists describe only our knowledge about things. But, argues Michael Polanyi, there is also 'knowing how'.

It seems clear, at the beginning of the 21st century, that there is a third type of knowledge, a type of knowledge that exists above and beyond the knowledge derived from the senses, and that exists above and beyond the calculations of logic and mathematics.

But though the existence of this knowledge seems to be beyond dispute, the characterization of this knowledge has been elusive. What is 'practical'? What is 'use'? What is 'literature'? What is 'knowing how'? What is 'ineffable knowledge'?

What is this knowledge? We are subjected to all kinds of theories, some that seem reasonable, some that are patent nonsense. Biorhythms. Astrology. Harmonic convergence. The 100th Monkey phenomenon. The music of the spheres. Intuition.

More to the point, such descriptions were importantly empty. It's one thing to say we should do whatever is practical, but quite another to figure out what the most practical thing is. Or when you say something is 'practical', for example, that it 'works', your description depends on what it was you wanted to do all along. If I don't want to do what you want to do, then what you know isn't what I know.

Connectivism is a theory that described this third type of knowledge. It is a theory that tells us what this third type of knowledge is, where it is, what produces it, how we learn it, and how it can be used.

Summary: Three types of knowledge
- of the senses (empirical)
- of quantity (rationalist)
- of connections (connective)

2.

As we have said earlier, connectivism is the thesis that knowledge is distributed across a network of connections. Let me expand on that a bit.

Think about what we know about a simple object, say, a lump of coal.

When we look at it, we can see that it is black in colour, and a bit shiny. It is a rough shape. It isn't that heavy. It is hard to the touch, but we can break it. That's the qualitative knowledge we have of the coal.

When we begin to measure it we can say more. We can say that it has a mass of 500 grams, say. We can say that it has a certain density. Our lump of coal is composed of some billions of individual carbon atoms. Under certain conditions, it combines with oxygen, producing a certain amount of heat and releasing a certain amount of smoke. It is values at 23 cents on the international market. That's the quantitative knowledge we have about coal.

Yet there is a third type of knowledge we have about coal. We can know how many carbon atoms we have. But what makes coal, coal, is not just the fact that it is made up of carbon, but also of the way these carbon atoms are connected together. Take exactly the same atoms and connect them differently and you have graphite. Take the very same atoms and connect them differently again and you have diamonds.

This is a very simple example. Carbon atoms are very simple entities. The connections are simple, and they don't vary very much. They are stable, not changing a whole lot with time. So we can find out about how the atoms are connected indirectly: coal has a particular colour, diamonds have a particular hardness, graphite has a particular weight. Still, knowing about the connections is to know more than to know about the qualities and quantity of the material involved.

So, connective knowledge is knowledge OF the connections that exist in the world. It is knowledge about how such connections are created, and what impact, or effect, such a system of connections has. It is knowledge about how we see such connections, how we observe them, and how we observe their results. It is a theory, in addition, about how we measure such connections, how we count them, what sort of measurable properties they have. This is important: connectivism is a new type of knowledge, but it is not independent of other types of knowledge. We need to be able to see connections, and we need to be able to count them, in order to talk about them.

But I also want to introduce a second aspect of connective knowledge: the idea of connections as a WAY of knowing. This is a bit trickier, but is essential to our understanding of what we know and how we know it.

A network is a set of connections between a collection of things. A diamond, for example, is basically a network: it is a collection of carbon atoms that are very tightly connected to each other. But these connections don't appear out of nowhere; they are not created by magic. If we ask, how did these carbon atoms come to be connected *this* way, we learn something about the history of those carbon atoms, that they were subjected to intense heat and pressure. So information about what happened in the past has been stored in these carbon atoms, in the way they are connected.

With *any* set of connected objects, we can ask how the connections came to be that way. Which means that *any* set of connected objects can contain information. What happened to the individual entities in the network, what sort of *input* did they have, to become connected in this way?

A network, therefore, is like a sense organ. A network is stimulated, it takes a certain shape. Stimulate a network of carbon atoms with intense heat and pressure, and the carbon atoms reorganize; they take the form of a diamond. This is what can happen in any network of connected objects. When you impact that network in some way, the connections between the objects in the network change. And this results in the storage of information.

So we have two types of connective knowledge, the knowledge that we have OF networks, that we obtain by looking at networks, and knowledge that is created and stored BY networks in the world.

Summary: Connective knowledge is both:
- knowledge OF networks in the world
- knowledge obtained BY networks

3.

There are many types of networks, and therefore, many types of connective knowledge. We will look at these in much more detail through this course. For now, though, it is important to identify some different ways of talking about networks.

As we discussed in the introduction to connectivism, there are several types of networks that involve humans. One network, for example, is the human brain. The brain is composed of a collection of neurons that are connected to each other. Another network is society itself. Society is composed of humans that are connected to each other.

Now when we are talking about connectivism it is pretty easy to slip back and forth between these networks without noticing. It's easy to get confused. So it is important to keep in mind one's perspective or point of view when talking about networks.

Let's take, as our starting point, a single person. This person is a part of a network. He or she is what we would call a 'node' in that network. As a node, he or she is connected to other people; it is this set of connections that make up what we can call a 'social network'.

At the same time, the person in question *has* a network. Or we might even say that the person *is* a network. This person is composed, at least in part, of a neural network, a brain, a complex organ for perceiving the world and storing those perceptions in the form of connections in a network of interconnected neurons.

These make up what may be thought of the person's 'active' participation in the network: the actual interactions that take place, the actual interactions that happen between this person and other people, the actual perceptions that reshape the person's neural network.

There is also a set of what may be called 'passive' or 'reflective' participations in the network. Consider society. Society is a network of collected individuals. A person can participate in society as a node within the network. But it is also possible, through a variety of mechanisms, to observe society as a whole. To, if you will, detach oneself from society and to study it as though

it were an collection of objects out there in the world. The same way you might study a lump of coal.

Similarly, we can (with more or less precision) reflect on our own neural network with some degree of detachment. We can observe, and feel, our sensation and passions, our thoughts, our ideas. We can study our own mind, through introspection. This process of reflection is a way of learning about ourselves.

When we are talking about connectivism and connective knowledge, we are talking about all four of these activities. And it is very easy to get caught up and mistake one for the other, to get confused by them. We need to get into the practice right from the very beginning of being clear about what sort of thing we are doing.

Now connectivism is sometimes characterizes a theory that emphasizes 'knowing who' over 'knowing what' and 'knowing how'. This may be, but only from a particular perspective. Only from a particular point of view. When you are looking to become a part of the network, to be and act as a node in the network, then you are most interested in 'knowing who'. You are interested in creating connections and using connections.

But it would be a mistake to characterize connectivism as a theory that is *only* about 'knowing who'. Understanding how networks work will help support our participation in them, but it will also help use create better networks - *knowing* networks - in ourselves and in our society, and it will help us better understand what we see when we *look* at networks.

Summary:

Active participation in the network:
- as a node in the network, by participating in society
- as a whole network, by perceiving with the brain (the neural network)
Reflective participation in the network:
- by observing society as a whole
- by reflecting on our mental states and processes

Comments

> *Just one addition to the 'carbon atoms can connect differently to yield different things' metaphor.*

There's value to that suggestion. In my own understanding of networks, we can add to the (admittedly very simple and static) connection of the carbon atom in a variety of ways:

- the entities are multi-state - unlike carbon atoms, that just sit there, the connected entities can be off/on, can be multi-valued, can be analog (think, e.g., electron potential, excess potassium, whatever - there's a variety of ways to have different states)
- the connection is stateful - what I mean by that is that a change of state in one entity can result in a change of state in the second entity

- the connection is communicative - that is, there is a way to interpret the connection as the transmission of a signal (sometimes, as in neurons, there is not a single thing sent from A to B... but you can see one thing cause another cause another, which could be interpreted as a signal)
- the connections can have different 'strengths' or 'weights'
- the set of connections between entities changes (this is known as neural 'plasticity) based on various factors such as input, proximity, back-propagation, thermodynamic (boltzmann) mechanisms

These together may give the organic feel that you're after, or you may have yet another type of dynamism in mind..

Peter Rock[406] said... "Societies can know things individuals don't. That's harder to see."

A society is an abstraction. It is very real, but an abstraction. That is, I can't literally go to one thing we call "society" and ask for its opinion or feedback. Society as one voice can't talk to me, only those who constitute what we call society can do this. However, we can aggregate feedback from many individuals and call *that* a snapshot of societal knowledge. Within that snapshot could lay knowledge (via connections) that individuals at first are not aware of...it has yet to be discovered at that level. And once they look at the aggregation, they might be able to pull knowledge from it (by discovering connections) and make it their own.

Is this sort of what you mean, Stephen? Or am I way off here?

Peter, your interpretation is subtle, but it is correct.

I have argued on numerous occasions that the patterns created by a network - such as those we see in society - are a matter of *perception* and *interpretation*. They must be *recognized* by a perceiver. They do not have some sort of inherent existence, and the only 'objective reality' about them describes the individual elements themselves, not the patterns.

This is important from the perspective of agency. Such a pattern could be said to 'cause' some effect - for example, a wave of green-sentiments in society could be said to 'cause' a lowering of gas consumption - but only through intermediaries. The 'wave of green sentiment' does not itself cause anything - it only has an effect insofar as it is perceived *as such* by people who, as a consequence, lower their gasoline purchases.

Peter Rock said...

Yeah that makes sense. One might say the wave is then a condition. If that condition is present and then the other condition of perception takes place, then cause may occur.That's probably a little simplistic and in fact, other key conditions (e.g. the veracity

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[406] http://gnuosphere.wordpress.com/

of the wave to begin with) may be identified, but I think I see what you are saying. What is also interesting is that the cause can then become another effect.

Moncton, September 14, 2008

Relativism and Science

I don't want this to be a long post, but Rose sent me this[407], which people should watch. Then I'll add some comments.

> My hostess throws me a glance,
>
> She, like my wife, knows there's a chance,
>
> I'll be off on one of my rare, but fun, rants.
>
> But, I shan't,
>
> My lips are sealed,
>
> I just want to enjoy the meal.

2:24 / 9:39   CC   360p
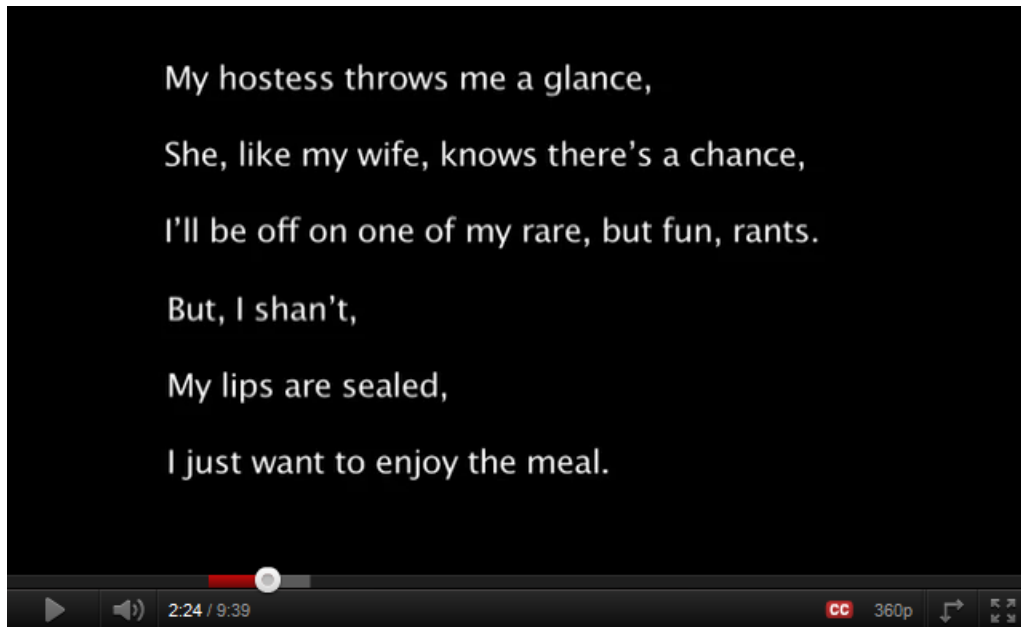
http://www.youtube.com/watch?v=UB_htqDCP-s

OK, I hope you enjoyed that.

So the question I want to address is, "How can you be a relativist?" Because, as the video says, there is knowledge. You don't walk out the second floor window, and we can extend our lifespans with medicine, and all that. It's not all a big mystery, and it's not all "anything goes."

Quite right. There is knowledge, and it's not all "anything goes." But it does not follow that relativism is false.

Listen to the video carefully. As it says, science is the willingness to *change our views* based on the evidence. If you can show us that homeopathy works, and how it works, says the author, I'll go running down the street shouting "It's a miracle."

To the scientists, to the empiricist, to the reasonable person, beliefs are based, through reason, on the evidence. It is precisely the mark of the unreasonable, of the unscientific, that they will not change their beliefs even in the face of evidence, that their 'knowledge' is constant, unchanging.

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[407] Tim Minchin . Storm. YouTube (video). February 4, 2009. http://www.youtube.com/watch?v=UB_htqDCP-s

One should ask, rather, how can someone be an empiricist, how can someone base their beliefs and knowledge on the evidence, and *not* be a relativist? If one's *own* beliefs and knowledge might change from time to time, why is it not reasonable to suppose that *others'* might as well?

Indeed, it is pretty evident that each of us has his or her own *distinct* set of experiences. A very *different* body of evidence on which to base their knowledge and beliefs. It would be a miracle were it to turn out that everyone's knowledge and beliefs were the same!

Yes, it may be argued that there is an element of commonality to people's knowledge, that the world is the same world for everyone, and that we go to great effort, through scientific method and repeatable, testable, experimentation, to ensure that people have the same experiences, and thus, the same knowledge and beliefs.

That's quite so, and for some big gross things - like the influence of gravity - it appears that we may be able to achieve some constancy, by carefully regulating our experiences to achieve precisely this result. But as the world is constantly changing, and as each of us is limited to our own direct limited point of view, our capacity to achieve constancy is limited, and always subject to question from the periphery, from personal experience.

Because people have different points of view, because people have different experiences, they come to mean slightly different things by their words, to develop slightly different principles of reason, to develop slightly different pictures of reality. Multiply this over a lifetime, and over seven billion people, and you have the recipe for relativism.

Our differences in knowledge and belief - our *legitimate* differences in knowledge and belief - lie precisely at those fault lines where our personal experiences differ. A person borne in injustice will come to have a different view of fairness than one born in a society of equality and right. A child raised in starvation will have a different view of food than one raised in plenty. Our beliefs - even our scientific beliefs - are ineliminably subject to our personal experiences. And that's a good thing, because in this is our capacity, as individuals, and as a society, to *learn*.

This view should not be confused with the view that it's all a big mystery and that "anything goes."

First of all, from the fact that your knowledge differs from another's, it does not follow that you cannot criticize, or have no grounds for criticizing, another's knowledge. One appeals to one's own experiences, one's own reason, and invites the other to consider similar experiences, to follow a similar reasoning, to explore and to experiment. Because we all have different experiences, our individual experience becomes a *basis* on which to criticize others' points of view.

And second, this does not grant any sort of license to someone who asserts some proposition on the basis of no experience, no reasoning, whatsoever. Such a person has produced exactly the opposite of knowledge, some set of statements that will *not* be revised, not *even* in the face of contradictory experience.

The fact that we each have different experiences, and hence, different knowledge, does not free us from the constraint of basing our knowledge on experience and reasoning, whatever they may be for each of us. That each of us has a slightly different basis for knowledge or belief does not legitimize the employment for *no* basis for knowledge or belief.

Relativism is the open-eyed recognition that knowledge and truth are empirically bound, and hence contingent and subject to change, not the uncritical acceptance of any proposition, no matter how poorly formed and supported.

Finally: one may ask, isn't this basis in 'experience' and 'reason' *itself* a common, non-relative article of knowledge? Yes, one could say such a thing - but such a sentence remains true only if it is not examined in any sort of detail. As we push the parameters, as we come to ask for a definition of 'knowledge', 'experience' and 'reason' we find that these concepts, and the logic that relates them, vary from person to person.

The proposition "knowledge is based in experience" *itself* varies slightly from person to person, and its expression in a language represents an abstraction of the actual belief, as instantiated in different people, but not the belief itself. Each person wears his or her experience differently, and part of the challenge (and the fascination) of life and interaction is to understand this.

Moncton, April 12, 2009

Cosmology and Economics

Responding to Lanny Arvan.[408]

Interesting ramble covering (as usual) a lot of ground.
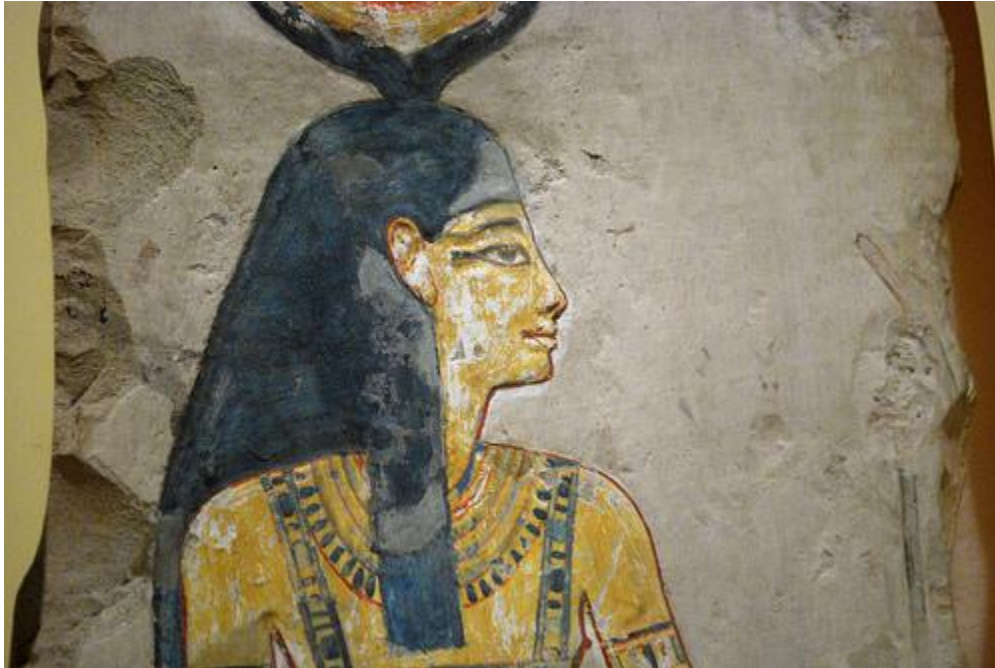
People who have studied the foundations of probability and the foundations of logic recognize a certain arbitrariness to those disciplines.

Probability, in particular, can be interpreted three major ways (characterized by Reichenbach, Carnap and Ramsay) resulting in three different semantics. When one says 'the world is improbable', does one mean, (a) as compared to all previous worlds, (b) as compared to all logically possible worlds, or (c) as compared to all the worlds we are willing to place money on?

My own perspective, in both cosmology and economics, is that research (properly so-called), calculation and measurement will only take you so far. A significant proportion of the cosmologists' or the economists' output is based, not on measurement, but on recognition. Sometimes we see this acknowledged with code-phrases ("this year's economy is similar to what we say in 1992") but more often is not explicitly acknowledged at all.

The thing with recognition is, there are no rules regarding domain. Everything is relevant, because the variables are so intertwined, there is no real saying what is salient and what is coincidental. The person who first noticed a sine wave (properly a property of electricity and

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[408] Lanny Arvan. Those Who Can't. Lanny on Learning Technology (weblog). January 19, 2008. http://lanny-on-learn-tech.blogspot.ca/2008/01/those-who-cant.html

oceans) in economic data was operating on the principle of recognition, as was Pascal when he said (with no real knowledge of the alternatives) that this is the "best of all possible worlds".

Teaching, I think, is more an art of recognition than of measurement, which is why the best teachers can identify the students with the most potential before even the first exam result comes in, and why teachers can learn more and more about their discipline even without doing 'research'. The acquisition of a capacity to 'recognize' is a function of the accumulation of experience, preferably as diverse and as difficult as possible.

Recognition, properly so-called, is a logical process, not magic or intuition. When you pick out the face of your spouse from a crowd of people at an airport, this is not some random event or happenstance, but a knowable and identifiable process of human cognition. We can understand that *some* process is taking place, even if we cannot measure that phenomenon except by the grossest of indicators.

I think that what we'll find, after enough investigation, is that measurement in both economics and education has been employment more for political purposes than for research purposes.

Which, of course, is what people with enough experience in both fields have long since recognized.

Moncton, January 20, 2008

Having Reasons

Semantics is the study of meaning, truth, purpose or goal in communication. It can be thought of loosely as an examination of what elements in communication 'stand for'.

Because human communication is so wonderfully varied and expressive, a study of semantics can very quickly become complex and obscure.

This is especially the case when we allow that meanings can be based not only in what the speaker intended, but what the listener understood, what the analyst finds, what the reasonable person expects, and what the words suggest.

In formal logic, semantics is the study of the conditions under which a proposition can be true. This can be based on states of affairs[409] in the world, the meanings of the terms, such as we find in a truth table,[410] or can be based on a model or representation[411] of the world or some part of it.

In computer science, there are well-established methods[412] of constructing models. These models form the basis for representations of data on which operations will be formed, and from which views will be generated.

David Chandler explains[413] why this study is important. "The study of signs is the study of the construction and maintenance of reality. To decline such a study is to leave to others the control of the world of meanings."

When you allow other people to define what the words *mean* and to state what makes them *true*, you are surrendering to them significant ground in a conversation or argument. These constitute what Lakoff calls a "frame"[414].

"Every word is defined relative to a conceptual framework. If you have something like 'revolt,' that implies a population that is being ruled unfairly, or assumes it is being ruled unfairly, and that they are throwing off their rulers, which would be considered a good thing. That's a frame."

It's easy and tempting to leave the task of defining meanings and truth conditions to others. Everyone tires of playing "semantical games" at some time or another. Yet understanding the tools and techniques of semantics gives a person tools to more deeply understand the world and to more clearly express him or her self.

Let me offer one simple example to make this point.

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[409] Internet Encyclopedia of Philosophy. Truth. Section 4, Tarski's Semantic Theory. Accessed June 18, 2010. http://www.iep.utm.edu/truth/#H4

[410] Wikipedia. Truth Table. Accessed June 18, 2010. http://en.wikipedia.org/wiki/Truth_table

[411] Stanford Encyclopedia of Science. Models in Science. Stanford University, February 27, 2006. Accessed June 18, 2010. http://plato.stanford.edu/entries/models-science/

[412] TrollTech. Model/View Programming. Website, 2006. Accessed June 18, 2010. http://doc.trolltech.com/4.1/model-view-programming.html

[413] Challis Hodge. Semiotics: A Primer for Designers. Boxes and Arrows (weblog), August 11, 2003. http://www.boxesandarrows.com/view/semiotics_a_primer_for_designers

[414] Bonnie Azab Powell. Framing the issues: UC Berkeley professor George Lakoff tells how conservatives use language to dominate politics. UC Berkeley News. October 27, 2003. http://berkeley.edu/news/media/releases/2003/10/27_lakoff.shtml

We often hear people express propositions as probabilities. Sometimes these are very precisely expressed, as in the form "there is a 40 percent probability of rain." Other times they are vague. "He probably eats lettuce for lunch." And other times, probabilities are expressed as 'odds'. "He has a one in three chance of winning."

The calculation of probability can be daunting. Probability can become complex[415] in a hurry. Understanding probability can require understanding a probability calculus.[416] And there is an endless supply of related concepts, such as Bayes Theorem[417] of prior probability.

But when we consider the *semantics* of probability, we are asking the question, "on what are all of these calculations based?" Because there's no simple answer to the question, "what makes a statement about probabilities true?" There is no such thing *in the world* that corresponds to a "40 percent chance" - it's either raining, or it's not raining.

A semantics of probability depends on an *interpretation* of probability theory. And there are some major interpretations[418] you can choose from, including:

1. The logical interpretation of probability. Described most fully in Rudolf Carnap's Logical Foundations of Probability[419] the idea at its heart is quite simple. Create 'state descriptions' consisting of all possible states of affairs in the world. These state descriptions are conjunctions of atomic sentences or their negations. The probability that one of these state sentences is 'true' is the percentage of state descriptions in which it is asserted. What is the possibility that a dice roll will be 'three'? There are six possible states, and 'three' occurs in one of them, therefore the probability is 1 in 6, or 16.6 percent.

2. The frequentist interpretation of probability. Articulated by Hans Reichenbach,[420] the idea is that all frequencies are subsets of larger frequencies. "Reichenbach attempts to provide a foundation for probability claims in terms of properties of sequences." This is the basis for inductive inference. What we have seen in the world in the past is part of a larger picture that will continue into the future. If you roll the dice enough times and observe the results, what you will discover (in fair dice) that the number 'three' appears 16.6 percent of the time. This is good grounds for expecting the dice to roll 'three' at that same percentage in the future.

3. The subjectivist interpretation of probability. Articulated by Frank Ramsay, the subjectivist theory[421] analyses probability in terms of degrees of belief. A crude version would simply identify the statement that something is probable with the statement that the speaker is more inclined to believe it than to disbelieve it." What is the probability that the dice will roll 'three'? Well, what

[415] Ion Saliu. Theory of Probability: Best Introduction, Formulae, Algorithms, Software. Website, undated. Accessed June 18, 2010. http://saliu.com/theory-of-probability.html
[416] Paul Dawkins. Calculus II – Notes. Paul's Online Math Notes. Website, undated. Accessed June 18, 2010. http://tutorial.math.lamar.edu/Classes/CalcII/Probability.aspx
[417] Eliezer S. Yudkowsky. An Intuitive Explanation of Bayes' Theorem. Website, undated. Accessed June 18, 2010. http://yudkowsky.net/rational/bayes
[418] Stanford Encyclopedia of Philosophy. Interpretations of Probability. Stanford University, October 21, 2002. Accessed June 18, 2010. http://plato.stanford.edu/entries/probability-interpret/
[419] Rudolf Carnap. Logical Foundations of Probability. The University of Chicago Press, 1950.
[420] Stanford Encyclopedia of Philosophy. Has Reichenbach. Section 2, Causality and Probability. Stanford University, August 24, 2008. Accessed June 18, 2010. http://plato.stanford.edu/entries/reichenbach/#ThePro193194
[421] Martin Sewell. Statistics FAQ, Part 8. Website, undated. Accessed June 18, 2010. http://www.stats.org.uk/probability/subjective.html

would we bet on it? Observers of these dice, and of dice in general, would bet one dollar to win six. Thus, the probability is 16.6 percent.

Each of these interpretations has its strengths and weaknesses. And each could be expanded into more and more detail. What counts, for example, as a 'property' in a state description? Or, what are we to make of irrational gamblers in the subjectivist interpretation?

But the main lesson to be drawn is two-fold:

- first, when somebody offers a statement about probabilities, there are different ways of looking at it, different ways it could be true, different meanings we could assign to it.

- and second, when such a statement has been offered, the person offering the statement *may well be assuming* one of these interpretations, and expects that you will too, even in cases where the interpretation may not be warranted.

What's important here is not so much a knowledge of the details of the different interpretations First of all, you probability couldn't learn all the details in a lifetime, and second, most people who make probability assertions do so without any knowledge of these details. What is important to know is simply *that they exist*, that there are different *foundations* of probability, and that any of them could come into play at any time.

What's more, these interpretations will come into play not only when you make statements about the probability of something happening, but when you make statements generally. What is the foundation of your belief?

How should we interpret what you've said? Is it based on your own analytical knowledge, your own experience of states of affairs, or of the degree of certainty that you hold? Each of these is a reasonable option, and knowing which of these motivates you will help you understand your own beliefs and how to argue for them.

Because, in the end, semantics *isn't* about what some communication 'stands for'. It is about, most precisely, what you believe words to mean, what you believe creates truth and falsehood, what makes a principle worth defending or an action worth carrying out.

It is what separates you from automatons or animals operating on instinct. It is the basis behind having reasons at all. It is what allows for the *possibility* of having reasons, and what allows you to regard your point of view, and that of others, from the perspective of those reasons, *even if* they are not clearly articulated or identified.

The whole concept of 'having reasons' is probably the deepest challenge there is for connectivism, or for any theory of learning. We don't want people to simply to react instinctively to events, we want them to react on a reasonable (and hopefully rational) basis. At the same

time, we are hoping to develop a degree of expertise[422] so natural and effortless that it seems intuitive.

Connectivist theory is essentially the idea that if we expose a network to appropriate stimuli, and have it interact with that stimuli, the result will be that the network is *trained* to react appropriately to that stimuli. The *model* suggests that exposure to stimuli - the conversation and practices of the discipline of chemistry, say - will result in the creation of a distributed *representation* of the knowledge embodied in that discipline, that we will literally *become* a chemist, having internalized *what it is to be* a chemist.

But the need to 'have reasons' suggests that there is more to becoming a chemist than simply developing the instincts of a chemist. Underlying that, and underlying that of any domain of knowledge, is the idea of being an *epistemic agent*, a knowing knower who knows, and not a mere perceiver, reactor, or doer. The having of reasons implies what Dennett calls the intentional stance[423] - an *interpretation* of physical systems or designs from the point of view or perspective of reasons, belief and knowledge.

We could discuss the details of having and giving reasons until the cows come home (or until the cows follow their pre-programmed instinct to follow paths leading to sources of food to a place designated by an external agent as 'home'). From the point of view of the learner, though, probably the most important point to stress is that they *can* have reasons, they *do* have reasons, and they should be reflective and consider the *source* of those reasons.

Owning your own reasons is probably the most critical starting point, and ending point, in personal learning and personal empowerment. To undertake personal learning is to undertake learning for your own reasons, whatever they may be, and the outcome is, ultimately, your being able to articulate, examine, and define those reasons.

Interesting discussion here.[424] My response:

Let me take a slightly different tack. I don't endorse all the concepts here, but use of them may make my intent clearer.

Let's say, for the sake of argument, that 'to have learned' something is to come to 'know something'.

Well, what is it to 'know something'. A widely held characterization is that knowledge is 'justified true belief'. There has been a lot of criticism of this characterization, but it will do for the present purposes.

So what is 'justified true belief'? We can roughly characterize it as follows:

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[422] Stan Lester. Novice to Expert: The Dreyfus Model of Skills Acquisition. Stan Lester Developments (website), 2005. Accessed June 18, 2010. http://www.sld.demon.co.uk/dreyfus.pdf

[423] Wikipedia. Intentional Stance. Accessed June 18, 2010. http://en.wikipedia.org/wiki/Intentional_stance

[424] Sui Fai John Mak. #CritLit2010 Connectivism as the Journey Continues. Learner Weblog, July 7, 2010. http://suifaijohnmak.wordpress.com/2010/07/07/critlit2010-connectivism-as-the-journey-continues/

- 'belief' means that there is a mental state (or a brain state) that amounts to the agreement that some proposition, P, is the case.

- 'true' means that P is, in fact, the case.

- 'justified' means that the belief that P and the fact that P are related through some reliable or dependable belief-forming process.

OK, like I say, there are all kinds of arguments surrounding these definitions that I need not get into. But the concept of 'having reasons' is related to the idea of justification.

Now – the great advantage (and disadvantage) of connectivism is that it suggests a set of mechanisms that enables the belief that P to be justified.

Specifically:

- we have perceptions of the world through our interactions with it.

- these perceptions, through definable principles of association, create a neural network.

- this neural network reliably reflects or mirrors (or 'encodes', if you're a cognitivist) states of affairs in the world

- hence, a mental state (the reflection or encoding) has been created – a belief. This belief is 'true', and it is 'true' precisely because there is a state of affairs (whatever caused the original perception) that reliably (through principles of association) creates the belief.

All very good. But of this is the total picture of belief-formation, then there is nothing in principle distinct from simple behaviourism. A stimulus (the perception) produces an effect (a brain state) that we would ultimately say is responsible for behaviour (such as a statement of belief).

But this picture is an inadequate picture of learning. Yes, it characterizes what might be thought of as rote training, but it seems that there is more to learning than this.

And what is that? The *having* of reasons. It's not just that the belief is justified. It's that we know it is justified. It's being able to say 'this belief is caused by these perceptions'.

(This is why I say that learning is both 'practice' and 'reflection' – we can become training through practice along, but learning requires reflection – so that we know why we have come to have the knowledge that we have).

Learning that 'the sky is blue', for example, combines both of these elements.

On the one hand, we have perceptions of the sky which lead to mental states that enable us to, when prompted, say that "the sky is blue."

At the same time, we would not be said to have 'learned' that the sky is blue unless we also had some (reasonable) story about how we have come to know that the sky is blue.

What I am after is an articulation of how we would come to be able to make such statements in a connectivist environment. How connectivism moves beyond being a 'mere' forming of associations, and allows for a having, and articulation, of reasons.

Postscripts

By 'expert' I mean precisely this, from the Dreyfus link:

> At this point you are not solving problems or making conscious decisions about things, you just "do" and it works. 'Optimal performance becomes second nature.' People may ask you why you decided to do things 'that way' and you may not know how to explain to them the 10 steps necessary to get from 'A' to 'B' because to you it was really just one step. Forcing an expert to detail the steps necessary before proceeding will often cause them to fail or second-guess. Here you think of grandma getting up at 6:00am and making biscuits from scratch for many, many years. She doesn't measure, time, or probably even think about baking – she just does it, and it works. Very few people will attain this level in a particular skill or domain. Some estimates say 10-15 years in a particular area is required.

An Expert has experience that 'is so vast that normally each specific situation immediately dictates an intuitively appropriate action.'"

…

Are you looking for connectivism to provide the answer to the question: How do we know that we know?

Yes. There needs to be a story here. We need some account of this. Otherwise there's a big black box in the middle of the theory, which would make it no better than all the other theories.... and, maybe a bit more accurately, there is a good story here (it is the content matter of the Critical Literacies course) and what we need to be able to state is how and where this fits into learning.

…

If you think I've simply been focused on tools, and not the hard sledding of theory, then you haven't been following my work. Why do you think we took this path, with a difficult course in in critical literacies, instead of a simple networking or how-to course?

I don't mind the TOOC name - but I think it's unfair to call Critical Literacies a failure. Size is not the objective - openness and interesting learning are the objectives, and we accomplished these.

…

If the aim is to reach highest level (Dreyfus model) I want to ask in which skills: connecting? making meaning? reasoning? empowering people?

In this particular instance (ie., the context of 'having reasons') the aim is to achieve expert status in the various literacies described in this course, and in the case of semantics particularly, in evaluating and assessing for truth, value, motive, or objective. For example: a person reads a newspaper article. In that article are various statements of fact and various inferences.

A person who is unskilled would be unable to distinguish facts from inferences, would be unable to assess the veracity or reliability of them, would be unable to form conclusions independently of what was presented. A person at the mid-level would be able to go through evaluative processes, such as testing for validity, assessing the reliability of evidence-claims, questioning the motives of speakers, etc. An expert would read the article and just 'see' whether it is reliable and trustworthy, through a complex understanding of analysis and assessment that has been internalized.

The four things you identify - "connecting? making meaning? reasoning? empowering people?" might be thought of as lesser included skills. For example, in order to assess a statement of fact, you need to be able to connect it with a wider set of descriptions, resolve the statement into some sort of proposition, engage in the inferences necessary to assess the claim, and have the capacity to express and act on the assessment.

The four things are shorthand for complex processes. These processes work with other processes to create the higher level skills. These higher level skills are what I have tried to express under the six headings - syntax, semantics, cognition, etc.

…

I think he questions your pretense of objectivity in search of validating hypotheses from "Connectivism".

Oh, I have no pretense of objectivity. I think I'm right. The 'objective' phase of my work ended a number of years ago. Now I am trying to develop and defend (or, more accurately, explain) a specific perspective. That does not mean I am not influenced by the evidence, or that I will never change my views when confronted with conflicting data. But I will regard such data from the perspective of my views.

…

Interesting learning, how do you determine whether that has occurred?

I've discussed this before[425]. In a nutshell, we established whether learning has occurred by observing the totality of the learners activities in a network. We could (I'm thinking aloud here) probably identify some metrics describing this activity that might give us an assessment profile:

- participation gap - the degree to which a person participates in the activity of the network, as opposed to merely observing it; participation would be measured not only as numbers of contributions but also engagement or response rate

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[425] Stephen Downes. Connectoivism and Transculturality, slide 23. Presentation. Stephen's Web, May 7, 2010. http://www.downes.ca/presentation/251

- dissonance - the degree to which a person uses works, phrases, etc., in a manner that does not create a lack of comprehension ('dissonance') on the part of other members of the network
- resolution - the number of positive contributions to the network - problems solved, disputes adjudicated, etc.

…

I have never claimed, and never will claim, to be certain. That would be foolishness. But not being certain is not grounds for not believing that I am right. No?

…

Why haven't you developed metrics?

Creating metrics doesn't make the uncertain any more certain. It just allows us to postulate a false precision, to draw out a meaningless abstraction and to make that stand for whatever it is that we're actually trying to achieve. Metrics don't interest me because they so often stand in as a substitute for what is being sought, and in so many minds, replace what is being sought.

If you're willing to go along with me and allow that what we seek is *not* some sort of pseudo-mathematical precision, then I am willing to adduce to some dimensions of the achievement being sought, some signs, if you will for the personal learning you think I treat so slightly. A lower participation gap, lower dissonance, greater resolution - these are all ways a person can contribute to a network, and are all surface indicators of the deeper learning that has taken place.

But the deeper learning is, precisely, the newly developed neural structures, the new pattern of connectivity that has grown in the brain. It would be absurd to say that there is one best instantiation of this, that there is a 'perfect' neural network against which individual achievement can be measured as a percentage. *Any* metric is arbitrary and unfair. At most we get an *indication*, and in the end, the person who determines whether the effort has been worthwhile is the learner.

You can puff that that's a *petitio principii* all you wish, but I think we both know it isn't.

…

You have concluded that 'interesting learning' has occurred without actually examining it, haven't you?

But I have. I've observed the discussions, aggregated blog posts, had discussions in the synchronous forum. So I've seen that personally. In addition, we (NRC) are conducting surveys of the course participants. So we will have additional evidence of learning.

…

The participation in the social network shows learning in the neural network because the neural network functions the same as the social network

No, that's not the inference. The inference is a lot simpler. It's basically, "In order to function as a physicist (eg. by participation in a social network) you have to have the knowledge of a physicist."

…

Have you changed from thinking you are right to believing you are right?

I've described what I think knowledge is on numerous occasions. I clearly said the 'justified true belief' was simply the employment of an expression to make a point. You shouldn't try to suggest that this is now my epistemology, not after I specifically said it wasn't.

…

You are conflicted over the terms belief and knowledge (justified true belief): you are willing to use them to make a point, but seem to be suggesting you don't 'believe' in them.

So? There's nothing wrong with that. It's like using terminology like 'the Sun rising' in order to describe when something happened. We know the Sun doesn't actually rise - it is the Earth turning, not the Sun moving - but the terminology is convenient.

…

The tree is a network. The river is a network. When I say the tree is non-contiguous with the river, all I'm saying is that the river isn't a part of the tree, and that the tree isn't part of the river. You don't need to imagine any sort of mind-body dualism here. When I say that the neural network in the brain is non-contiguous with the social network, I am simply saying they are different networks, the way a tree and a river are different. They are both physical. They can actually physically interact with each other. But saying they are not contiguous is the trivial observation that people in a social network are not neurons in a person's brain.

Question: Are neurons in a person's brain connected to the social network?

Everything is connected to everything. So this question is not sufficiently precise. When we talk of 'a network' we typically talk about a set of similar or related entities that are connected via a certain type of connection. For example, the 'neural network' is the network composed of various neurons, which are connected by means of axons (ie., neural connections).

When we say that something is not a part of the neural network, we are not saying it could never connect with it - there are certain types of neurons (sensory receptor neurons, for example) that support such connections. But these entities are not a *part* of the neural network, because (a) they are not neurons, and (b) they do not connect to neurons by means of axons.

Moncton, June 18, 2010

Groups and Networks

Community Blogging

My talk from the Northern Voice conference, February 19, 2005, Vancouver.

Thank you. My name is Stephen Downes. I come from the other coast of Canada, Moncton, New Brunswick. I work for the National Research Council[426], which means that I'm a government employee, which means that I don't own any of my own words, and I'm here to talk about community blogging.

Now I'm not going to talk about a bunch of people all getting together and blogging on the same website, as some people represent community blogging, because I don't really find that too interesting. What I'm going to look at is the relation between community and blogging, how blogging becomes a community, how a community becomes a group of bloggers.

Basically I have four sections. I'll talk a wee bit about what constitutes a community. I'm going to rant and rave against the concept of the long tail. I'm going to explore Wittgensteinian theories of meaning. I'm going to talk about distributed network semantics.

Now this may sound like it has nothing to do with community, but my intent here is to try to reframe your thoughts on what community is, what community on the web is, and what a community of bloggers is.

1.

So we ask what constitutes a community, and we look around in the real world, and we find communities pretty easily, we just look for a city, a town, a village, a neighborhood, and what creates a community, typically, in the real world, is proximity. We are part of a community because we live in pretty much the same place that other people live. So even though you may have nothing whatsoever to do with your neighbours, you are still part of their community.

And for a long time the concept of community online was based on the same concept. And we heard about it from people like Hegel and Armstrong[427], even Cliff Figallo[428], a bit, Howard Rheingold[429], a little bit. But the idea was that community was a place, just like a town or a

[426] National Research Council. Website. http://www.nrc.ca
[427] John Hagel III and Arthur G. Armstrong. Net Gain: Expanding Markets Through Virtual Communities. Harvard Business Review Press; First Printing edition. March 1, 1997. http://www.amazon.com/exec/obidos/ASIN/0875847595/002-9545241-5037653
[428] Cliff Figallo. Hosting Web Communities: Building Relationships, Increasing Customer Loyalty, and Maintaining A Competitive Edge. Wiley; 1 edition. September 2, 1998. http://www.amazon.com/exec/obidos/tg/detail/-/0471282936/002-9545241-5037653
[429] Howard Rheingold. The Virtual Community: Homesteading on the Electronic Frontier. The MIT Press; revised edition. November 1, 2000. http://www.amazon.com/exec/obidos/ASIN/0262681218/002-9545241-5037653

village. Online we would call it a website, or a portal, or these days, because we're so much more advanced, a social networking site.

And the model, as defined by Hegel and Armstrong, is, you set up this site, you give it a topic, you bring in some people, you give them a way to communicate, you retire to the Cayman Islands. It didn't work out that way.

Now my field of study is online learning. That's where my expertise lies, and I actually don't really know very much about social networks or blogs or things like that. In online learning... learning - schools, universities - they're almost the prototypical communities, aren't they? You gather all these people into one place, you organize them into classes, you get a bunch of subjects together, you slice and dice the range of knowledge that people are supposed to have in order to become productive and obedient members of society.

And online we see the same sort of thing. In online learning, we have this thing called the Learning Management System[430], or the new 2000 version, the Learning Content Management System[431], and again, it's a site, it's a place, you log on, you get your class, and your class has a bunch of lessons, and you go to the special room where you're allowed to talk to other people, and call that the chat area, or the discussion area.

And in social networking it's much the same thing, right? If you belong to Orkut[432], you log on to orkut.com, or orkut.org, whatever it is, I never remember, I just type 'orkut'. Or you log on to Friendster[433], or LinkedIn[434], or even Flickr[435], and being a community means going to that place, and being part of that community is to a large degree a matter of proximity. And in some cases persistence; I got an email the other day, "This is your fourth reminder that you have not responded to this LinkedIn invitation," and I'm sitting there, thinking, "Don't they have a clue yet?"

But I challenge the perception that these are communities, despite what it says on their home page. All they are is proximity; they're places where there are people in the same place. But I don't think that that's what defines a community.

A lot of people have written about community online, and I'm not going to rehash what they said, except on this slide. But look at it. Cliff Figello talks about the relationships and the exchange of commonly value things, among other things. Bock talks about common interests, frequent interaction, identification, and Paccagnella talks about articulated patterns of relationships,

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[430] Wikipedia. Virtual Learning Environment. Accessed April 30, 2012. http://en.wikipedia.org/wiki/Managed_learning_environment
[431] Shelley, R Robins. The evolution of the Learning Content Management Systems. Learning Circuits. April 2002. No longer extant; original URL: http://www.learningcircuits.org/2002/apr2002/robbins.html
[432] Orkut. Google. Website. Accessed April 30, 2012. http://www.orkut.com
[433] Friendster. Website. No longer extant. Original URL http://www.friendster.com
[434] LinkedIn. Website. http://www.linkedin.com
[435] Flickr. Website. http://www.flickr.com

roles, norms. And these accounts of community are pretty typical, they're pretty widespread, and you'll find them in most of the work that you read about online community.

Now I want to draw out from these descriptions two major elements that I think are probably definitive of community. First of all, the idea that there's a network. Now a lot of people capture that by saying people can interact, people communicate, there's a place for discussion. But the central thing here is that there is, in some sense, a relation among the people; it's not mere proximity. But they are connected in some way.

And the second thing, and the important thing, in my mind, is semantics, the idea that these relations are about something, that the people in the community share a common interest, common values, a set of beliefs, an affinity for cats, or beekeeping[436].

Now we have a pretty good understanding of networks; there's been a lot of work in the theories of networks. We have a much less refined sense of meaning. Fortunately, one of my other jobs is as a philosopher, so I spent many years studying meaning. I never thought that that would be useful. In fact there was a little sign on the wall where I took philosophy, it said, "You are not going to get a job. Give up now." They made us sign a little piece of paper, "I recognize that this will not prepare me for any future employment."

2.
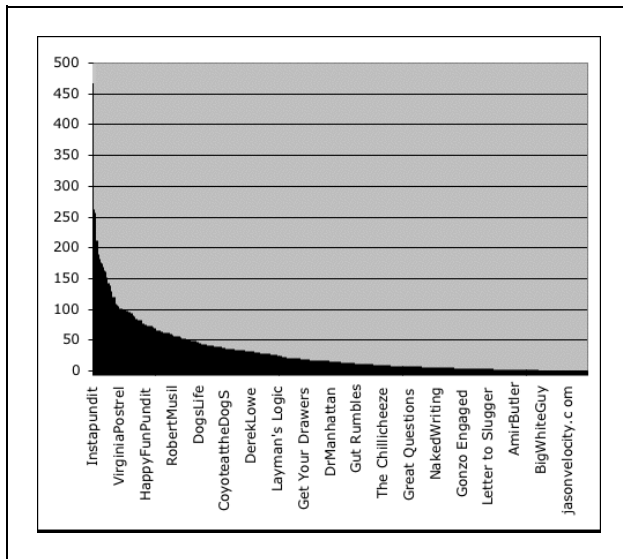
A power law curve, as described by Shirky.

So let's think about this a little bit. I'm going to come back to meaning but I want to rant and rave a little bit. Because the long tail, as we are told[437], repeatedly, is a property of networks, and in particular scale free networks, and the idea here is, you get a bunch of people and you start

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[436] Stephen Downes. Principles of Resource Sharing. Stephen's Web. September 2, 2004. http://www.downes.ca/post/25
[437] Clay Shirky. Power Laws, Weblogs, and Inequality. Clay Shirky's Writings About the Internet (weblog). February 8, 2003. http://www.shirky.com/writings/powerlaw_weblog.html

them linking to each other. And you can set this up randomly, and people start linking to whatever's handy, right? And if you do that you're going to create a set of links.

One of the neat things about this is that you get the phenomenon of six degrees[438], right? If you go from one person to another person to another person you can get anywhere in the network in just a few hops, and in a group this size, probably two or three hops. Now what happens in a network of this type is that some people get lots of links and other people get just a few links. If you look in the world of blogging, for example, and I'm sure you've seen this written about elsewhere, a site like Boing Boing[439] or Instapundit[440] or Scripting News[441], they'll get like thousands and thousands of links, and a site like NewsTrolls[442], which is a site that I run, gets, well, one. And so you get this curve, it's called a power law, and there's what it looks like, and on the one hand you have Instapundit with all those links and then you get the long tail with thousands and thousands of sites with one or two or fewer links each. Technorati[443]: zero links from zero sources[444].

Now what creates the power law phenomenon? Well there are two major things[445] that have been identified[446]. One thing is growth. The network grows over time. And the other thing is preferential attachment. Now what that means is, you're out there, you're looking for something to link to, because you're a blogger, and you've just listened to Tim Bray[447] and others, and they said "link often" and you think "OK, that's a good idea, I need something to link to now" and you go out and you look on the blogosphere, and what are you going to link to? Well, if you just go out looking on the blogosphere you are probably going to find Instapundit, or you're going to find Scripting News, or you'll find Scoble's site, or whatever, and, OK, it's better than the newspaper, so you link to them.

And so, two things are happening here, right? These people are getting linked to mostly because they were first. And because they were first, there was a time when they were the only things to link to, so people linked to them, and then as time went by they were the ones who had the most links and so consequently they were most likely to be found by new people. So it's like, you know, the way a tree grows[448], right? You have a trunk of a tree, and that's where all the action is, it's not because the trunk is better than any other part of the tree, it's just the trunk was the part that was first. And all the rest of the tree has to attach itself to the trunk because where else is it going to attach itself to?

So people talk, and people have talked a lot[449], about the long tail and they've said "Worship the long tail, mine the long tail, the long tail is where the action is." And all of these people who are

[438] Wikipedia. Small World Phenomenon. Accessed April 30, 2012. http://en.wikipedia.org/wiki/Small_world_phenomenon
[439] Boing Boing. Website. Accessed April 30, 2012. http://boingboing.net/
[440] Instapundit. Pyjama Network. Website. Accessed April 30, 2012. http://pjmedia.com/instapundit/
[441] Dave Winer. Scripting News (weblog). http://scripting.com/
[442] Stephen Downes, et.al. NewsTrolls (weblog). No longer extant. Original URL: http://www.newstrolls.com
[443] Technorati. Website. Accessed April 30, 2012. http://technorati.com/
[444] Stephen Downes. Zero Links From Zero Sources. OLDaily (weblog) special issue. August 1, 2004. http://www.downes.ca/archive/04/08_01_news_OLDaily.htm
[445] Wikipedia. Albert-László Barabási. Accessed April 30, 2012. http://en.wikipedia.org/wiki/Albert-Laszlo_Barabasi
[446] William J. Reed. A Brief Introduction to Scale-Free Networks. May 18, 2004. http://www.math.uvic.ca/faculty/reed/draft_1.pdf
[447] Tim Bray. Ongoing (weblog). http://www.tbray.org/ongoing/
[448] M.E.J. Newman. The structure and function of complex networks. Department of Physics, University of Michigan
[449] Ross Mayfield. The Long Tale. Ross Mayfield's Weblog. February 10, 2005. http://ross.typepad.com/blog/2005/02/the_long_tale.html

talking about the value and the virtue of the long tail have the unique quality of not being part of it. I live in the long tail. And I can say from my own personal perspective that people who are in the long tail would probably rather not be part of it. They simply want to be read.

You know, it's that old thing, it's a little off topic, but in Canada we have socialists and socialists always say, "We represent the working class" and that's kind of like the socio-economic way of saying "We represent the long tail." And they come out with these platforms and these policies that identify with the working people. Ask any of the working people, they don't want to be working people. And so, they're more likely to choose policies that support the rich people, because they all want to be rich, and when they're rich, they don't want to be pushed back into that long tail again. So I don't see a virtue in the long tail.
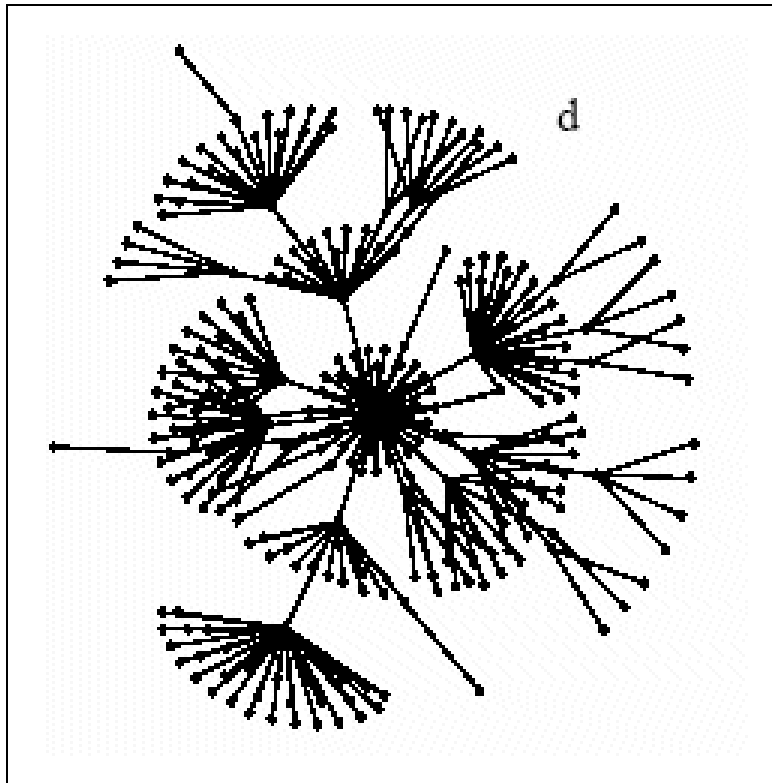
What the network looks like. From Valverde, Cancho and Solé.

Now when you have a long tail kind of network this is what it looks like. And there are different ways of representing this picture, I like this picture[450] because it kind of gives you the sense, and right in the centre, that's the Instapundits and the Scripting News, and that's where everything started and everything's going to grow out from there. And then you get this clustering and branching phenomenon. But what you should notice about a network that looks like this is not simply that it's root and branches, it's hierarchical, isn't it? And the really important things are at the centre and you go way out, you see that little one sticking way out there, well that's me. No, further on. Further on.

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[450] S. Valverde, R. Ferrer Cancho and R. V. Solé. Scale-free Networks from Optimal Design. Europhysics Letters Preprint, February, 2004. http://www.santafe.edu/media/workingpapers/02-04-019.pdf

But, thinking about how this comes to be. If everyone links to everyone there would of course be no long tail; we'd all be Instapundits. For good or bad. Preferential attachment occurs only because there is a shortage, and that's why we see the power laws existing in so many places. Why is there a power law in economic distribution in society? Well generally because there's a shortage of money. And if you want to make money you're attracted to the people who have money because that's the only place where you can get money. Online, it's a shortage of attention, of time. You do not have time to look at the links in four million or six million blogs. It's just not going to happen. Even Scoble can only handle a thousand blogs. He's got to be sitting there at night thinking, "God, I missed most of it."

So, you reach out to the closest thing you can find, but the other thing that creates a scale free network is that these attachments are, for all practical purposes, random. You reach out for what's available rather than what's good. And let me let my political stripes show a little bit, that's how Instapundit becomes Instapundit. He's available. He's easy to find.
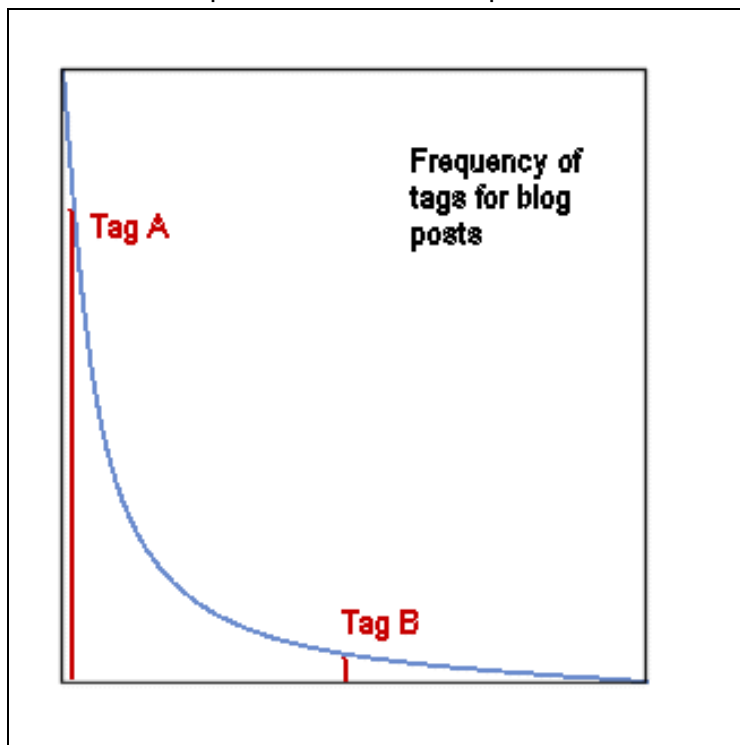
Frequency of tags for a given post

Now my approach to this, and the reason why I rant and rave against the long tail, is that networks, on my picture, are not defined as a set of random connections - which, when you think about it, is a pretty stupid way to do it - but as a set of semantically organized connections. Because community is based on meaning, not randomness. Community as proximity - you're part of a community, the same community that your neighbour is part of - that's random connections. And so that's how you find yourself in some meeting with someone who has a completely different political point of view, and you're sitting there arguing with them about how the street ought to be run, because you've been put together randomly.

But community as networks of semantic relations, that's where the connections between members of the community are based on the meaning of those members or of the entities in the network. In other words, in order to create community, rather than a power law, we don't simply pick the most popular or the most available, we pick the most salient connection.

3.

Well. What does that mean? How does something become the most salient connection? Well we need to analyze, or look at, at least for a moment, what a post means. Or what anything means. What a resource means. Now I say that, I'm saying, what does this post, or this person, or this resource, say about the world?

Meaning

Now one way, a very popular way, of trying to fix meaning to a blog post, is through tagging[451]. Tagging has been the rage. I'm also anti-tagging. Why am I anti-tagging? Well, take a post, any post, and ask yourself, what would a graph of all the possible tags for this post look like? You are going to get a power law. So you have a post - somebody's written something about the Prime Minister - and so, you know, you have 'Martin', very popular, that would be a very commonly used tag, 'tax break', that might be a commonly used tag, 'my goldfish', maybe once, by somebody who didn't get the concept of 'prime minister'. You're going to get a power law curve of tags.

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[451] Technorati.com. Tagging. http://technorati.com/tag/tagging

But the thing is, if you do it that way, then the meaning of the post becomes whatever tags are sitting there in the big spike. Right? So the post becomes, it means, that tag. But that tag contains only a part of the meaning of the post. It's a very narrow, one-dimensional look at something that might be a lot more complex.

Because the meaning of a post is not simply contained in the post. And this is where we have lots of trouble with meaning, because we all speak a language and we all understand words and sentences and paragraphs, and we think we've got a pretty good handle on how to say something about something else, and we have a pretty good handle on how to determine the meaning of a word. What does the word 'Paris' mean? Oh, no problem, right? 'Capital of France.' Right? But, you know, it might also be, 'Where I went last summer.' Or it might also be, 'Where they speak French.'
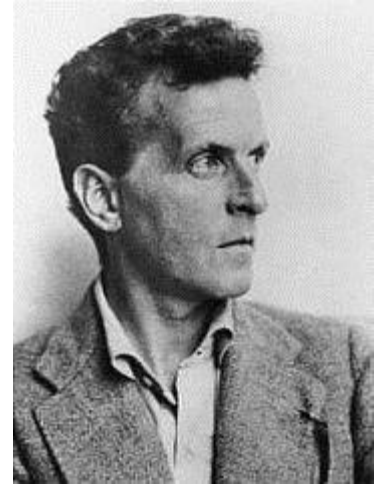
When we push what we think of as the meaning of a word, the concepts, the understanding that we have, falls apart pretty quickly. And the meaning of the word, or the meaning of a post, is not inherent in the word, or in the post, but is distributed. It consists not just of what the word or the post talks about but in the set of relations and connections[452] that this post has in its actual use, or as Ludwig Wittgenstein said, "Meaning is use[453]."

How do you know the meaning of a word? You look at how people use it, you look at the context, you look at who uses it, where they use it, what the environment is in which it has been used, what other words are around it, and if you define meaning in that way, then the meaning of a word can't be stated as a set of necessary and sufficient conditions. It becomes something very different, something that Wittgenstein called 'family resemblances'. Now I was looking at the word 'community' and looking for definitions of community, one of the posts, or one of the definitions that I read was, "Well, community is like pornography[454]. I don't know what it is but I recognize it when I see it." And it's that sort of sense of meaning inherent in a word, in a post, and indeed, in a person.

[452] Stephen Downes. Learning Objects in a Wider Context. Presented to CADE, June 10, 2003. Stephen's Web Presentations. http://www.downes.ca/post/5654

[453] Wikipedia. Philosophical Investigations. Accessed April 30, 2012. http://en.wikipedia.org/wiki/Philosophical_Investigations

[454] Steve Fortier. Building Community Within. New England Nonprofit Quarterly. 1998. Boston: Third Sector New England. (Summer) Vol. V, Issue 2. http://www.communiteam.org/cbinworkplace.pdf
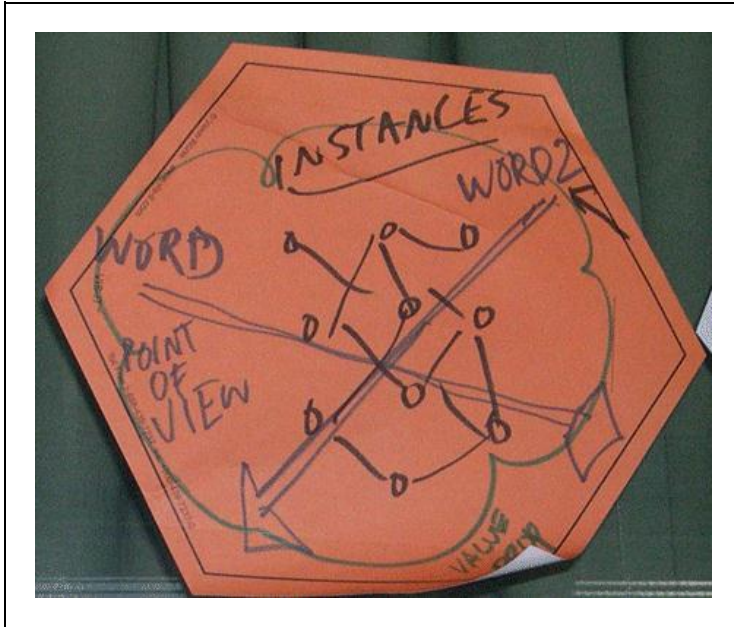
Two ways of looking at the world

Because there are two ways of looking at the world. One way is to look at the world from the point of view of words. And you try to describe things. Another way of looking at the world is to look at the patterns. And try to see what emerges out of them. If you look at the diagram there, that little messy bit of lines and dots is a concept. Could be any concept, could be a blog post, could be the word 'Paris', could be your self-identity. Now if you use words, you cut through that cluster like a knife and you get a one-dimensional partial representation, you get an abstraction, but if you look at it from the point of view of patterns, then the meaning of that concept emerges from that cluster of entities and relations.

Now, emergence is a hard concept. And I'm not going to be able to deal with it properly here. So I'll just give you the quick example and admit that I'm fudging it. Emergence is like when you recognize Richard Nixon on your television set. Now Richard Nixon is not really on your television set, obviously. In fact, what's on your television set is a whole bunch of little dots. But the thing is, those dots are organized in such a way that when you look at the television set you recognize that organization of dots as being similar in form to Richard Nixon. And indeed, for people like me, I've never met Richard Nixon, that's the only understanding of Richard Nixon that I have, is through this repeated pattern or organization of discrete entities.

Now what's important here is that the particular dots don't matter, the particular colour and the particular properties of the dots don't matter. Richard Nixon is not in the pixels. Richard Nixon is in the organization of the pixels. And so we say the image of Richard Nixon is emergent from the pixels. Now what's important here, in my mind, although it's a little bit peripheral, is, this doesn't happen without a perceiver, without the capacity to recognize this pattern as being Richard Nixon. Take somebody who has just been born recently, wasn't around during the 70s, doesn't know why scandals always have the word 'gate' attached to them, show them a picture

of Richard Nixon and "yeah, some guy. He's got a bit of a sweaty upper brow. But I don't know who it is." You have to have a context in which to recognize a pattern in a network.

When we use words, that warps it, because we're going after the big spike, and words actually distort because they pull the pattern into themselves, and people start thinking, 'well the word is the concept,' and 'the concept is the word.' Of course it isn't, but because we're focused on this big spike and because the meaning of the concept is being derived from the word, the meaning becomes the word.
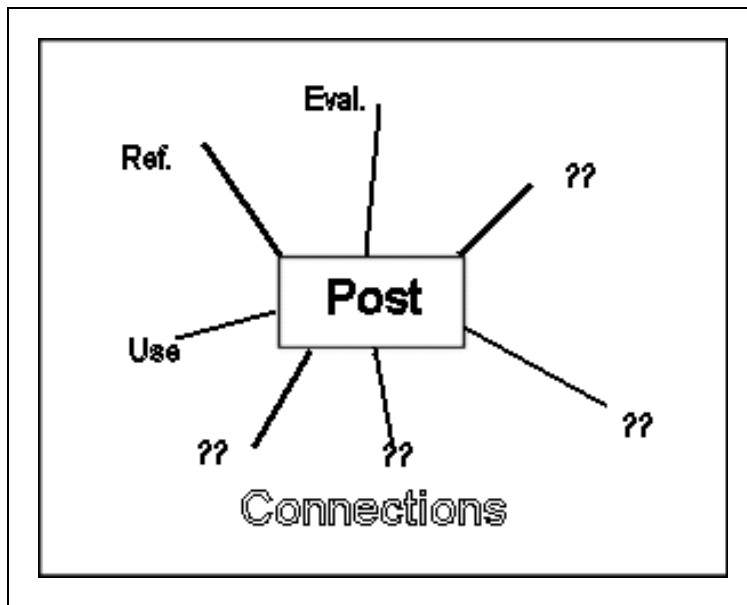
The meaning of a post

If we think of meaning as use then what is the meaning of a blog post? What does a blog post talk about? It's not contained in the post. Rather, it's contained in the network of relations in which the post finds itself. In the referrers. In the use. In the connections with other things. In evaluations of the post. A whole variety of different connections, different relations, are possible which could, and in my opinion will, be used to characterize an individual post.

So if we look at the two pictures of meaning of posts, on the one picture, if we think of meaning as inherent in the post and maybe describable in words we get an organization of meanings that looks very much like the network that's formed through random connections, because the word, when attached to a concept, a post, is more or less random. I was looking on the Northern Voice website and they said, "When you're tagging this, please use..." and then they give you your string. They could have used any string. They use, I forget what they used, 'northernvoice' or whatever. But they could have used 'qxdytz'. That would have worked just as well. It's random. And you end up with clustering that looks just like one of these scale free networks. But if meaning is thought of as distributed, as being derived from the relations and not just the content of the word, then you get a very different looking network, a very different pattern.

Now why does this matter? It matters this way. If we're deriving meaning and connections and communities in a random fashion everything flows from the big spike. Scoble was up here, saying, "My friend was saying, I want you to link to me." And, he said, "That's not how it works. Create something of value," he said. Right? "And I will decide whether it's worth linking to." That's the big spike telling the long tail what to do. Isn't it? That's what happens when meaning derives from the centre. And if you push it, that sort of organization and arrangement requires control. Look at Technorati Tags. Now, we've already gotten some tag spam[455], and we've already gotten some structured vocabulary[456] in Technorati Tags, and eventually somebody will come out and propose and ontology of Technorati Tags, a taxonomy, and they will say, "Everyone should do it this way." And anyone who doesn't, well, they're being chaotic, they're being disruptive.

But if the idea emerges from the pattern of connections between individuals there's no one in control. Scoble can't tell me what to write in my blog and it doesn't matter whether he links to me or I link to him. And the dynamics in such a network are completely different. This works if you have freedom. This works if nobody tells you how to tag. This creates order and relevance and meaning through diversity, not conformity. Two very different pictures of community.

4.

So how do we pull this off? How do we kill the big spike? How do we transform tagging from something that people can use to spam to something that can actually get us to the point where we have meaningful communities?

Well we come back to online learning. Because again, that's what I know about. And in online learning what's happening is -- and it's very slow and there's a lot of resistance because people who are part of the big spike don't want to let go, right, and the people in the online learning world who are part of the big spike are university presidents, they're publishers, and authors, the top researchers in the field, whoever, and they don't want to let go, in a classroom, if you have the teacher, that's the big spike, and you have all the little students there, the long tail -- but what's happening in online learning[457], very slowly, very reluctantly is a shift from centralized place-based networks into something more distributed. And we're getting to the point where learning resources are available not from a given place, not from a given authority, but from out there on the network. And what we're after, at least some of us, those of us who are in the long tail, what we're after is a way of being able to recognize - and something that doesn't require tagging six million items - the posts, the resources, that are salient to us, as individuals.

Now, people don't get that in the online world, and I don't think they get that in social networking, and so we always talk about, "Look, we got to standardize, we got to standardize, it's the only way the system will work is standardized," and I go to online learning conferences and I tell them, "Well, the most popular form of XML in the world today is RSS, there is no

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[455] Peter C. Technorati Tag Spam & NoFollow Sucks. PC4Media (weblog). January 20, 2005.
http://worcester.typepad.com/pc4media/2005/01/technorati_tag_.html
[456] Tags & Hierarchies. Preoccupations (weblog). September 9, 2004. http://www.preoccupations.org/2004/09/tags_hierarchie.html
[457] Stephen Downes. The Buntine Oration: Learning Networks. October 8, 2004.http://www.downes.ca/post/20

standard, in fact there are nine or so different varieties, according to Mark Pilgrim, and who knows what there will be tomorrow? But that's the thing that's working."

Educational communities the old way, nice neat topics and classes and so on, but this type of structure both in schools and in the blogosphere, where you have the flow coming from the top, is ripe for abuse. There's another one from J.D. Lasica just came out today, about "Influence Peddling in the Blogosphere[458]". And of course we heard mention earlier of Raging Cow[459] and the Lincoln Fries[460]. Eventually these companies are going to get good at this. Right now they're screamingly bad. But they are eventually going to become good. 43 Things had the entire blogosphere fooled for a couple of weeks. And, and it sort of fell apart. Eventually there will be things that don't fall apart. I look at the Wall Street Journal opinion columns, and they are defining from the top down. There's a whole bunch of people out there who echo the words that they see in these opinion columns. They don't know what they mean, because there is no context. They're just echoing the words. And it just becomes a way for the Wall Street Journal to broadcast.

Future learning environments place the individual at the centre - that's where it says 'Future VLE[461]' - and a range of resources that they bring in, or that they aggregate, from a wide variety of different sources. Notice he has 43 Things on there. That actually places that diagram at a precise moment in history. And if you look at community in this picture, then you're able to draw out a theory of community, where a community is defined by three major components. First, as a means of organizing input and experience. Second, as a means of putting that experience into context. What does it mean to you here now? And then third, and very importantly, as a means of taking what you've done, what you've remixed, what you're repurposed, and putting it out there so it can become part of someone else's meaning. Just imagine how the copyright barons look at this model of organization, right? Community is antithetical to copyright[462], and conversely.
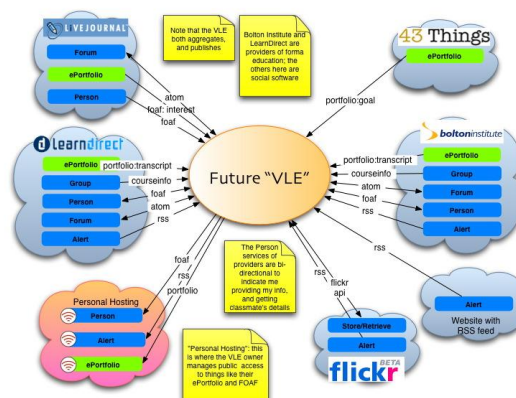
The idea here is that the community is defined as the relations between the members where the relations have semantical value, where that semantical value is defined by the relations. And I know it sounds like bootstrapping, but we've been doing that throughout history. People exist in relations to other people, to things, to resources, even to spaces.

[458] J.D. Lasica. The cost of ethics: Influence peddling in the blogosphere. Online Journalism Review.February 17, 2005. http://www.ojr.org/ojr/stories/050217lasica/

[459] Rob Walker. Blogging for Milk. Slate. April 14, 2003. http://www.slate.com/articles/business/ad_report_card/2003/04/blogging_for_milk.html

[460] Andy Lark. The Lincoln Fry Fracas Unfolds. Andy Lark's Blog. February 8, 2005. http://andylark.blogs.com/andylark/2005/02/the_lincoln_fry.html

[461] Scott Wilson. Future VLE – The Visual Version. Scott's Workblog. January 5, 2005. http://zope.cetis.ac.uk/members/scott/blogview?entry=20050125170206

[462] Robin Good. Education Needs To Open Up To Consumers As Producers Of Media. Weblog. September 9, 2004. http://www.masternewmedia.org/news/2004/09/09/education_needs_to_open_up.htm

So how do we pull this off? We can't just blast four million blogs, eight quadrillion blog posts, out there, and hope Technorati will do the job, because Technorati won't do the job, because Technorati represents the whole four million things and I'm not interested in three million nine hundred and ninety-nine of those. What has to happen is this mass of posts has to self-organize[463] in some way. Which means there has to be a process of filtering. But filtering that is not just random. And filtering that isn't like spam blocking. Filtering has to be a mechanism of determining what it is we want, because it's a lot easier to determine what we want than what we don't want.

So how do we do this? We create a representation of the connections between people and the connections between resources. The first pass at this I described in a paper a couple of years ago called "The Semantic Social Network[464]" and the idea, very simply, is we actually attach author information to RSS about blog posts. It kills me that this hasn't happened. Because this is a huge source of information. And all you need to do is, in the 'item', in, say, the 'dc:creator' tag, put a link to a FOAF[465] file. And all of a sudden we've connected people with resources, people with each other and therefore, resources with each other. And that gives me a mechanism for finding resources that is not based on taxonomies, is not based on existing knowledge and existing patterns, but is based on my placement within a community of like-minded individuals. Now Instapundit stuff probably isn't going to filter through to that, but really cool stuff, like Dave Pollard stuff, will.

Now that semantic social network is just a first pass at this. We want to create these connections on many levels. And so what we want is metadata, not simply created by the author of a post, but created by readers of posts. This is what I call 'third party metadata'. Third party metadata -- we're beginning to see some of this out there in the blogosphere, in a small, limited and usually site-based way, right? Links, references, readings, annotations, classifications, context of use. But it can't be site-based. Because that doesn't create a network. It might as well be random.

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[463] David Wiley and Erin K. Edwards. Online self-organizing social systems:
The decentralized future of online learning. http://opencontent.org Accessed April 30, 2012. http://opencontent.org/docs/ososs.pdf
[464] Stephen Downes. The Semantic Social Network. Stephen's Web (weblog). February 14, 2004. http://www.downes.ca/post/46
[465] The Friend-of-a-Friend Project. http://www.foaf-project.org/
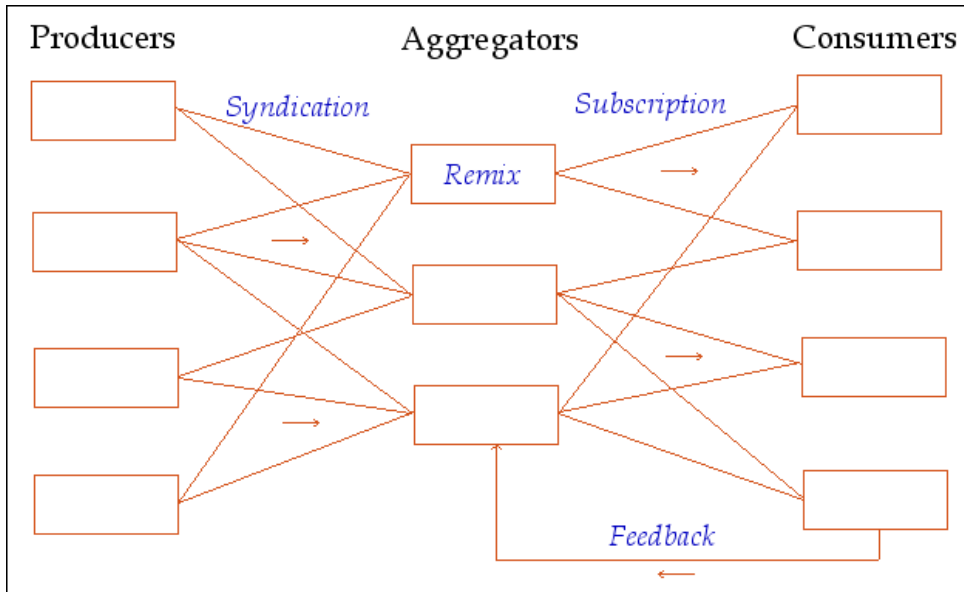
The network is the search

Now we've talked about this in the field of learning resources, because professors love ratings, but we could also do this in the blog world, with RSS. And it's very simple to do. You just create a tag, that looks just like any other 'item' tag, but you're not the author of that item, and you identify it in some way, usually through a link, and then you add your third party metadata. This is - the 'SSN' stands for 'Semantic Social Network', I made it up, 'commentary' is the type of third party metadata, I
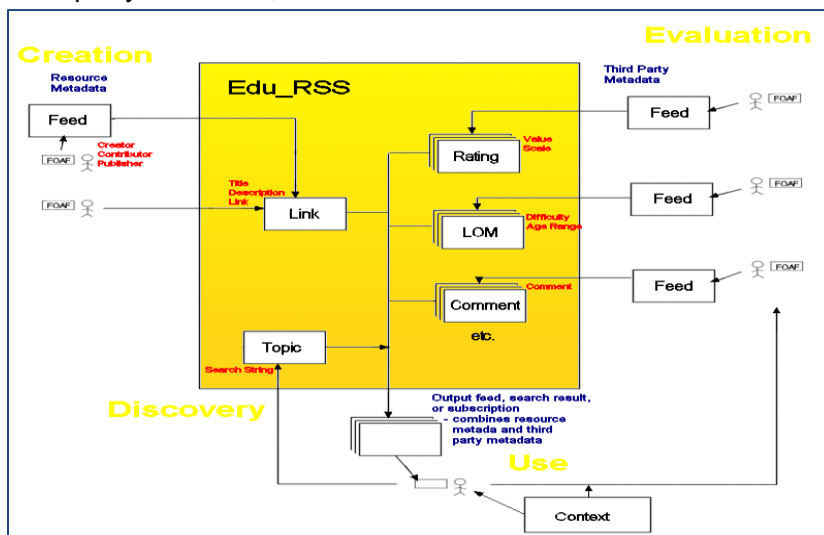
made it up, and then, who wrote it, and what
they had to say. And that becomes third party metadata. It becomes information about the resource.

Now the way this should work, and the way I've proposed[466] for this to work in the educational community, is that as much of this third party metadata as possible is created through automatic means. Now annotations aren't going to be created automatically. But a context of use will, right? If I look at a resource while I'm taking a physics class then the context of use of that resource is 'in physics'. And so I know, even if the resource is, like, a picture of a rabbit, I know that that picture is related to that subject, because I looked at that picture in that class. And the system that I'm using to look at that picture should note that, and log it. Now what's relevant? I looked at that picture. Now that attaches everything that anyone knows about me to that picture. And so we get enormously rich descriptions through very simple mechanisms of automatic classification.

My contention is that instead of the spike-based power-law-based Instapundit-based network, that when we get something like the semantic social network, and we will get something like the semantic social network, because it's very simple to do, patterns of organization will be created. In the field of neural networks and connectionism they use the term 'clusters', you get a cluster phenomenon where we're not creating communities around a specific word, or specific concept, but the community itself emerges as being created by and defined as that particularly dense set of connections.

I've set up a system called Edu_RSS which is a very primitive first pass at this, and the idea here, Edu_RSS is an aggregator, there should be many instances of Edu_RSS, in the ideal world everybody would have something like this on their desktop, and it pulls in the link metadata, but it also pulls in rating metadata, and it doesn't pull it in from the entire world, the way Technorati does or the way Blogdex does, it pulls it in from my community, my network of friends. And if you set up the network in this way you can actually stop worrying about searching, because the network itself becomes the search where you go through layers of linking and so what comes out the other end is stuff that will be of interest to you. And if you're finely grained enough at the output end then you can get a very precise set of inputs. But the thing is, this set of inputs comes from the entire blogosphere of four million people rather than the randomly chosen top one hundred.

The community is the network. There is no centralized place that constitutes community, there are only people, and resources, that are distributed, that are all acting on their own behalf and in their own interests - if you ever read Marvin Minsky's[467] "The Society of Mind[468]", it's like that - where the network consists of a set of self-selected relations using a variety of contextual information, that I've defined as third party metadata, to establish meaning, and where this meaning not only defines the community but emerges from the community.

And that's probably all of my time and I thank you very much for your patience.

Vancouver, February 24, 2005

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[466] Stephen Downes. Resource Profiles. Stephen's Web (weblog). November 22, 2003. http://www.downes.ca/post/41750
[467] Marvin Minsky. Website. MIT. Accessed April 30, 2012. http://web.media.mit.edu/~minsky/
[468] EMCParadigm Publishing. If Two Minds Are Better Than One, Then How About Two Thousand? A Review of Marvin Minsky's The Society of Mind. Undated. http://www.emcp.com/intro_pc/reading12.htm

Groups and Networks

It wasn't of any particular interest to the people at the conference in Auckland but this drawing represents my major take-away from the last week travelling (with a group) about this country. I drew it during the small group sessions, when I was left on my own. There is also a video.[469] The drawing depicts the often unnoticed assumptions that inform our understanding of groups, inform our sometimes slavish devotion to groups, and shows how these contrast with my own understanding of how interaction ought to occur, in networks. It's not just a web theory (though it is that), it is a theory about life and society in general.

Anyhow, I'm done with the travelling road show. I'm taking a bus to Wellington tomorrow - 11 hours, so there will be no newsletter, probably. I have a preconference session Wednesday and a keynote on Thursday. I have Friday off, and then on Saturday I fly home. I have a few talks in October and nothing booked after that. I don't think I'll be taking any more bookings, at least, not for a while. My intent now - which I actually formed in an airport waiting area in Joburg minus a ticket and passport - is to go home and, after I have dispensed my remaining speaking obligations, to (figuratively) go away and do some writing. I want to get some things down on paper, to do the writing that I always knew I'd do one day in my life.

[469] Stephen Downes. Groups and Networks. Google Video (video). September 25, 2006. http://video.google.com/videoplay?docid=-4126240905912531540&hl=en

Connectives and Collectives: Learning Alone, Together

Summary of George Siemens's opening keynote at the D2L Fusion conference in Memphis. It represents, in my view, a substantial development in his thought.

Some concepts:

box - Dabbawala - one who carries the box. This is a network of people who collect and distribute in excess of 200,000 meals a day in Mumbai.

encyclopedia - Wikipedia.

news site - Ohmynews.

marketplace - Seekers, solvers and a marketplace.

The MIT Center for Collective Intelligence asks: how can people be connected in order to work collectively? Don't fight the internet. Don't fight human nature.

In most collective and collaborative activities, human nature is overlooked. For example, 'WeAreSmarter' tried to get people to collaborate to write a textbook. But people don't want to be submerged in a project like that.

The basis of any collective activity is the self.

- the brain is physical and confined; but the mind is flexible, the mind is external (you rely on external thoughts, external reminders). The mind is social.

- The individual mind *must* communicate - to connect, to form relations.

- our ability to speak is in essence a way to externalize the self. Language is a tool to demystify myth - we make it clear and understand.

- at its core, language is a social function (Wittgenstein's box of beetles).

- symbols - 'carriers of previous patterns of reasoning' - reflective of how we thought at one time. Symbols, then, are things we use to externalize ourselves.

Technology as language?

Our concepts, then, are held at least partly externally. These are expressed socially, and as socially, are socially shaped. [Image of 'Formula of Concepts'] Example of how we understand the word 'right' in a context. As the context changed the collectively help viewpoint of language, our understanding changed.

Roy Pea: Intelligences are distributed across minds - but also across technologies. He cites the example of the Rubber hands, where we substitute touch sensation to the rubber hand we see, and bananas where when a monkey eats a banana, or watches another monkey eating a banana, the same area of neurons (mirror neurons) are firing.

Polysensory data: substituting video information with stimulations on the tongue - we can replace 'sight' with sensation. Hence the phenomenon of 'blindsight'. (Paul Bach-y-Rita) (SD: numerous examples showing the same sort of thing)

We can extend ourselves with tools, with technology, with language, with signals. The mind is enormously robust, enormously plastic.

BUT: our integration and extension of self involves a preservation of self. (*key point*)

Our notion of self is not just physical, but still also the way we extend ourselves. It isn't created through socialization, but it is shaped, and manifests itself socially.

Connectives maintain an autonomy of self. They create a mosaic. It's the difference between creating a blog and creating a wiki.

Collectives, however, involve a subsumption of self. There is a coercion of a sort. These all involve a complexity of activity that requires the inclusion of many people. Creating an LMS, for example. The identity of many people has been subsumed. In many cases, that's fine, but we need to look at where it's not. Because, after all, innovation is deviation.

We used to assign people's names to inventions. But with contemporary corporatization, we have removed the name from the invention. The iPod should be the 'wePod'. In 75 years, we have gone from naming the individual to naming the company to the network as the innovator.

But - this raises issues of freedom and control. At the heart of collaboration and mashups and the rest, you are playing with such issues.

Networks can result in complex tasks. Underlying all this is the idea of the network. And the network is based on the idea of the individual.

Look at the continuum of strength by connection: from individual (atoms) to groups (or what George is calling collectives here). Individuals create new ideas, novelty, are diverse. Groups require some sort of normalization, some sort of subsumption of identity.

We need the diversity of opinion. Scott Page: diverse people working together and capitalizing on their individuality outperform groups of like-minded people.

We say we like diversity, but diversity is a pain. It's the person who says "Wait a minute, what about...?" who is the pain.

Pedagogical implications:

There are a three areas of choice:

- degree of agent autonomy
- degree of complexity
- degree of task specialization

When we design learning (and other systems) we have to decide which element to stress. Flying a plane, for example - should we grant the pilot complete autonomy?

These are the three key elements we need to look at when we consider what degree of individual freedom we want. (SD - this is a great point)

Robert Calliou - we need to solve the problem of combining our thinking as individuals to solve the enormous problems - global warming, food shortages, etc...

The impact, then, starts to be seen in the design of technology. Neil Postman - technology has a 'give and take' element. Technology gives, but does it take? Plato: does writing impair our faculty of memory?

The technology we use is embedded with social and political artifacts. But does this hinder technology, or help? It creates a new medium for previously unconnected others to communicate. (Haythornewaite)

Downes: to know' something is to be organized in a certain way, to learn is to acquire these particular forms of organization.

So - is this learning?

- Core content? Our typical model.

- Core content that is co-created with external experts? That's better.

- Let's also bring in peripheral learners - list members, discussion group members, etc. Creates more diversity of input - we will likely have better quality content.

- Let's distribute the idea of 'faculty' among these diverse groups. Open , external experts, the rest. A very rich, very diverse learning experience.

We have a model where we say that:

- we recognize each learner has to have a unique stance, a unique identity
- we recognize that each learner needs to be connected to others

Vannevar Bush: notion of associative trails of content. They experience content not just how we as experts present it, but from numerous sources, where they jump from one source to another to another - they become critical thinkers.

And we want this, because it isn't the content that makes an education, but rather, the ability to continue to learn more.

Freedom of fragmentation: we used to have our world presented to us. A newspaper. A book. Today, we have a very fragmented world, where we get our information from many sources. That kind of fragmentation gives us new freedoms and opportunities.

For example: when learning from a teacher, I would typically listen, read sources recommended by, be tested according to, the ideas of the individual who has created the course. A very consolidated whole. But today we have fragmented sources. That allows us to repurpose the ideas.

There is:

- a freedom to fragmentation - to get fragments
- a freedom of fragmentation - to be a fragment - to fragment our own thought in numerous places, sources

  (SD: this needs to be clarified)

It's the end of the grand narrative, and the beginning of the personal narrative. We create narratives not just personally, but in particular contexts.

The downside of fragmentation: overload. Too many sources, too many ideas. Too fragmented, too distributed. So the challenge is now in how to pull things together. Some interesting technologies:

- Twitter - and simple social tools. Gossip and trivial talks is typically viewed as a distraction, but (see Zufecki (Dunbar) 2008 - these are in essence the human version of social grooming in primates.

So, the challenge is: how do we preserve the unique values of connectives and collectives. Eg. how do we retain our ability to focus when, say, reading a book? (I have a rule - read one journal article before reading email).

We need to:

- design for varying levels of connectedness

- value the collective effort (the contribution to the whole) - but - what is the role of the individual in that process? What is the role of the agent?

The need for human sociability outstrips the design of our courses, the design of our institutions. It outstrips the flow of information that goes top to bottom. We need to take into account how the mind can integrate all kinds of sources with great fluidity. Technology plays a similar role to that of language.

We can really improve the learning of our students if we use D2L effectively. If we encourage them to learn socially, they learn much more than they could from me as a faculty member.

We are now at a point where we need to say, we now understand enough about the social nature of learning (Vygotsky, Papert, Seely Brown, Wenger), and we also understand the idea of using technology to connect. We have that unique broth, and we just need to season it. Our institutions are barriers; the design of courses is a barrier.

a box - social and procedural nature of interaction

an encyclopedia - a storehouse

a news site - a flow

a marketplace - a forum of exchange

We need to recognize that 'collective intelligence' is not neutral in and of itself. All of them exist as a network in nature, as a node and a connection. But these all vary in strength and connectedness.

The nature of the connectedness we design into our courses is essentially a power relationship. It is a way of defining who will have what identity, and how. It's why you can't just slap down a wiki and say 'contribute'.

Memphis, July 21, 2008

Small Groups

Responding to Beth Kanter[470] who asked me for a comment, so...

Perhaps it works with your audience, but if it were me, my first reaction is: I hate small groups, I hate small groups, I hate small groups.

Although people say that small groups 'give everybody a chance to talk' what they *actually* do is serve to eliminate minority and dissenting opinion.

For example:

Suppose there are two options, (a) and (b). Suppose that 4 out of five people prefer (a), but on hearing (b) one of them will be convinced to switch to (b) (this is a *very* common situation).

You have 15 people. That means that at the start, 12 of them prefer option (a) and 3 prefer (b). After the discussion, 3 switch allegiance, so you have 9 people preferring option (a) and 6 preferring option (b). Almost an even split; certainly option (b) is a respectable alternative.

But imagine that instead we split into three groups of 5. Now in each group, four people prefer (a) and one prefers (b). Although one person is convinced, there's still 3 people that prefer (a). So the group moderator reports (a). The results come back from the groups: everybody prefers (a). The preference for (b) has been squelched out of existence.

But that's not all...

The division of people into small groups is almost never random. Often, group leader are assigned by the organizer. Even when groups form on their own, the group leader tends to be the person deemed most favorable to the organizer.

Now you have a situation where, even if more than half of the people have switched their allegiance to (b), the organizer, who is loyal to the original option of (a), will report (a). This completely subverts the will of those who preferred (b), and worse, leave the (b) supporters with no option, no access to the plenary floor (without 'causing a disruption').

I have seen small groups abused so regularly and so often I have some to conclude that when small groups are employed it is almost *always* about maintaining the power of the organizers rather than giving people a voice.

To me, 'giving people a voice' does not merely mean 'allowing them to speak' but also 'enabling them to be heard'. When somebody is shuffled off to the obscurity of a small group, that voice has been stifled, not empowered.

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[470] Beth Kanter. Some Thinking Outloud About Open Content for Nonprofits and Penguin Day Session. Beth's Blog: Nonprofits and Social Media. March 12, 2007. http://beth.typepad.com/beths_blog/2007/03/some_thinking_o.html

The use of small groups, rather than empowering people, instead elevates a few people - the 'representatives' - into super-voices, and by design silences all other voices (again, any dissent from the official report is 'disruptive').

There is yet another way in which small groups stifle dissent: and that is by the creation of an expectation of resolution.

I was at a meeting where a small group process was discussed just this week, that would take place in a school context. Like everything else in schools, the 'discussion' was being carefully regimented. Three hours were allotted, with the requirement that the groups "come to consensus" in that time.

In my experience, the only way to get people to arrive at a "consensus" on anything in three hours is to run roughshod over their right to voice their dissent. Perhaps a vote may be taken after three hours of discussion. But on nothing but the most trivial of issues should any group (of any sort of diversity) be expected to reach consensus.

What is happening, of course, is that a consensus will be 'declared' rather than reached. The time pressure and the peer pressure in the small groups (where supporters of a minority view will have been isolated from any others sharing that view) will force dissenters to 'go along'. In these exercises, to, there is nothing major at stake - why be a holdout, when the process appears to be so much more important than the result?

Finally, although it doesn't really come up here, I will point out that small groups are often used to ensure that a superiority of numbers conveys a strategic advantage. You see this at policy conferences, where concurrent sessions are held to discuss different issues. I often find myself wanting to comment on more than one subject, but find that because of the structure I can only address one thing.

I have nothing against games like this, other than a passing observation that they may feel a bit contrived. But I really dislike the small group process. Because the most disempowering thing you can do, in any setting, is to impose a structure that ensures that voices won't be heard.

Just my view.

Moncton, March 14, 2007

Connectivist Dynamics in Communities

I was asked, "if you could give me some orientation on how I could integrate some questions in the survey (or maybe in the Social Network Analysis) that explain or prove the existence of connectivist dynamics inside the community and if it's impact can be tested."

That question, in turn, begs the question of what exactly would constitute connectivist dynamics. On the one hand we could say simply that it's network dynamics, and that if we detect network properties (as revealed, say, in social network analysis) then we have connectivist dynamics. But I don't think that just any network constitutes a connectivist network. What distinguishes a connectivist network is that it produces connective knowledge. This is what makes it suitable for learning.

So what constitutes connective knowledge? In my paper An Introduction to Connective Knowledge[471] I describe a 'semantic condition' consisting of four major elements. These elements distinguish a knowledge-generating network from a mere set of connected elements. This, I would say that a test for these four elements would identify a connectivist dynamic within a community.

1. Autonomy - are the individual nodes of the networks autonomous. In a community, this means, do people make their own decisions about goals and objectives? Do they choose their own software, their own learning outcomes? If they are in the network, and function within the network, merely because they are managed - because they're told to be in the network and told what to do in the network - then they are merely proxies, and not autonomous agents. Proxies do not produce new knowledge. Autonomous agents, however, do.

2. Diversity - are the members of the network significantly different from each other. Do they have distinct sets of connections? Do they enter into different states, or have different physical properties? Are they at different locations? In a community, this means, do people speak different languages, come from different cultures, have different point of view, make different software selections, access different resources? If everybody does the same thing, then nothing new is generated by their interacting with each other; but if they are diverse, then their participation in the network produces new knowledge.

3. Openness - does communication flow freely within and without the network, is there ease of joining (and leaving) the network? In a community, this means, are people able to communicate with each other, are they easily able to join the community, are they easily able to participate in community activities? In practice, what one will observe of an open community is that there are no clear boundaries between membership and non-membership, that there are different ranges of participation, from core group interaction through to occasional posting to reading and lurking behaviour. If a community is open, then it sustains a sufficient flow of information to generate new knowledge, but if it is closed, this flow stagnates, and no new information is generated.

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[471] Stephen Downes. An Introduction to Connective Knowledge. Stephen's Web (weblog). December 22, 2005. http://www.downes.ca/post/33034

4. Interactivity and Connectedness - is the knowledge produced in the network produced as a result of the connectedness, as opposed to merely being propagated by the connectedness? If a signal is merely sent from one person to the next to the next, no new knowledge is generated. Rather, in a community that exhibits connectivist dynamics, knowledge is not merely distributed form one person to another, but is rather emergent from the communicative behaviour of the whole. The knowledge produced by the community is unique, it was possessed by no one person prior to the formation or interaction in the community. Such knowledge will very likely be complex, representing not simple statements of fact or principle, but rather, will reflect a community response to complex phenomena.

My contention is that, if these four dynamics are detected within a community, then a connectivist dynamic exists within that community, and (consequently) the probability of that community producing (new) connective knowledge is increased.

Moncton, February 24, 2009

Geese

This is a short clip from a comment that I didn't finish, [partially because I don't have the time, and partially because I would like to engage this topic from a different direction.

There's a lot going on here and I probably can't cover all of my disagreements in one post.

At the core, I think, is that you continue to assign agency to groups. You represent groups as doing things that (in my opinion) groups are not capable of doing. You are (again in my view) confusing between sentences that can be used descriptively and sentences that can assign agency.

For example: suppose we see a flock of geese come in for a landing on the lake. We would typically say, "the flock of geese landed on the lake." This is an accurate statement, because it describes what happened. But when we look at the same example, we might also be tempted to say, "the flock of geese decided to land on the lake." Now we have committed an error.

A flock of geese isn't the sort of thing that can 'decide'. The capacity to decide depends on having a mind, and a flock of geese does not have a mind. A flock of geese consists only of geese, and while it may be true that individual geese have minds, it does not follow that the flock has a mind. What in fact happened is that each individual goose decided to land. We observed this and interpreted it as the flock deciding to land.

In the same way: you say "I also feel that there is 'group knowledge' that is outside of the individual." And "there are at least two levels of "knowledge" in any group, the one that the group as a whole has constructed and the one the individual has constructed." Here again, you are moving from a description to an assignment of agency. When we say, "there is group knowledge", that is like saying, "the geese are landing". But when we say "the group constructs knowledge" that is like saying "the geese decided".

Moncton, March 16, 2007

Networks, Communities, Systems

I think this is a very interesting post.[472]

Yonkers writes, "I think most educators focus on teaching students networking so that students can then move into communities of practice that will turn into systems."

Except... they don't.

"Most educators are stuck in their own systems." Quite right. And that's where they try to put the students. Without all this networking nonsense at the front end.

I look at the sequence described - networks -> community -> system - and what I see is something that works breaking down into something that doesn't. I see an effective decision-making mechanism being subverted and employed in the service of a minority, usually to the detriment of the whole.

Yonkers writes, "At some point, however, a community is developed. This community connects on a social as well as cognitive level." I would write "emotional" rather than "social", but it's close enough.

"The community also begins to establish which knowledge is important to function within that community and there begins to be more group processing of the "community" knowledge in order to access the group knowledge that are within community members' networks."

No. This is a fallacy.

'The community' is not an agent. It does not have an independent existence (not even if we create fictions of such existence, such as the declaration that a 'corporation is a person').

Only *individuals* in a community have agency. Which means that we need to look very closely at what happens when someone says "the community begins to establish which knowledge is important." What this *means* is that some few members of the community undertake this action, and are then in some way able to impose this as a *directive* on the community as a whole.

We need to distinguish between two senses if 'becomes important' here:

1. The sense in which the phrase is descriptive, an emergent phenomenon, that we are able to identify after the fact, and

2. The sense in which the phrase is *normative*, an individual action, which becomes definitive of *membership* or *good conduct* in the community.

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[472] Virginia Yonkers. Context filter-Business and Workplace Education/Training. Online Connectivism Conference. February 2, 2007. http://ltc.umanitoba.ca/moodle/mod/forum/discuss.php?d=45#1070

The first is very easily established via a network. But the second requires a somewhat more cohesive and restrictive organization, which requires an injunction on individual freedom of action.

When somebody says a network "isn't sufficient" I always look to see what it is that the network is deemed to be insufficient *for*. And on analysis, it is always some stipulation - some custom, value, belief or law - that one person wants to *impose* on another.

To my mind, the only impositions that can be justified are those that are necessary to counteract other attempts to impose one person's will over another, those, in other words, that preserve autonomy, diversity, openness and interaction.

Moncton, March 14, 2007

The Cloud and Collaboration

Paper written as a contribution to the Ars Electronica[473] symposium on Cloud Intelligence.[474]

Let's take as a starting point the discussion of 'cloud intelligence' on the conference website:

> *In the cloud of connections, we each become social neurons, mimicking the biological human brain but on a giant scale. This collective knowledge is far beyond anything a single search engine could index and archive. Intelligence is spreading everywhere, every minute, and cloud computing can draw new links across new ideas.[475]*

This idea of the connected world as a global brain is not new, nor surprising. It seems clear that we can identify something like social intelligence in the community, and the analogy between humans and neurons is compelling.

Peter Russell's The Global Brain explicitly makes the connection.

> *We have already noted that there are, very approximately, the same number of nerve cells in a human brain as there are human minds on the planet. And there are also some interesting similarities between the way the human brain grows and the way in which humanity is evolving.[476]*

According to Russell, the brain develops in two phases. First, there is a massive explosion in the number of neurons. And second, isolated neural cells begin making connections with each other. A similar pattern, he argues, is observed in society.

Tom Stonier writes,

> *In principle, this process does not differ from the evolution of primitive nervous systems into advanced mammalian brains... each node, rather than being a neuron, is a person comprising trillions of neurons ... coupled ... to their personal computers... We are now dealing with the very top end of the known spectrum of intelligence.[477]*

As we read and hear more about the growing internet and the emerging cloud, we are also hearing more about the way in which we, as connected members of the cloud, work together. The conference website also addresses this point.

> *We think together but remain independent in our identity. If we could foster co-thinking to reach consensus about new solutions, we may be able to find a new direction for the future. Hope can emerge from new collaborative models based on a new paradigm;*

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[473] http://www.aec.at/index_en.php
[474] 80+1. (2008). Day 81: Ars Electronica Symposium Examines Cloud Intelligence. Retrieved from 80+1 http://www.80plus1.org/blog/day-81-ars-electronica-symposium-examines-cloud-intelligence
[475] 80+1. (2008).
[476] Russell, P. (2008). The Global Brain: The Awakening Earth in a New Century. Floris Books; 3rd edition.
[477] Hofkirchner, W. (2005). Beyond the Third Culture! Science in the Information Age. Salzburg.

science and art will act gracefully to match human nature, and to shape the future of humanity.[478]

This is a common refrain. It expresses the idea that the cloud enables us to work together, to collaborate, to forge a new consensus. The cloud, in other words, reinforces the ways with which we have attempted hitherto to organize ourselves. The divisiveness, the factionalism, the disputes and conflicts that have blocked our efforts in the past, we are told, can be effectively overcome using the new technology.

Dimitar Tchurovsky's Google knol titled the 'Global Virtual Brain and Mind Project' is a good example of this.[479] He cites the conflicts of interests, media manipulations, bribery and the influence industry as barriers to a genuine global consensus. The response is a "worldwide social network of self-selected people resembling human brain and mind, who will collaborate in attempt to solve social problems."

The associating of collaboration and global consciousness is natural, as collaboration is central to our concept of community, and the global mind can be seen as an extension of community. We see much the same language as that used to describe the global mind, for example, "people inspired to create healthy communities cross pollinate ideas, connect & exchange stories that harness our collective wisdom." (McCarthy)[480] These examples are typical; they could be multiplied almost indefinitely.

What is collaboration, though? Is it something that neurons in a human brain actually do? Can we describe the organization of our mind in the same terms we currently use to describe the organization of society?

The characteristics identified by the National Network for Collaboration[481] are typical:

- Accomplish shared vision and impact benchmarks
- Build interdependent system to address issues and opportunities
- Consensus used in shared decision making
- Roles, time and evaluation formalized
- Links are formal and written in work assignments
- Leadership high, trust level high, productivity high
- Ideas and decisions equally shared
- Highly developed communication

Collaboration, on this model, can be contrasted with looser forms of association such as networking, alliance-formation or cooperation.

What distinguishes collaboration from these other forms of organization is a commonality of understanding or purpose. This theme permeates writing on the subject. Schrage calls

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[478] (80+1, 2008)

[479] Tchurovsky, D. (2009). Global Virtual Brain and Mind Project. Retrieved from Google Knol: http://knol.google.com/k/dimitar-tchurovsky/global-virtual-brain-and-mind-project/mp8du5m8vcjb/4#

[480] McCarthy, M. (n.d.). Collaboration in Community. Retrieved from Ning: http://www.collaborationincommunity.com/

[481] The National Network for Collaboration. (1995). Collaboration Framework - Addressing Community Capacity. Retrieved from The National Network for Collaboration: http://crs.uvm.edu/nnco/collab/framework.html

collaboration "an act of shared creation and/or shared discovery."[482] Senge talks about the creation of a shared vision.[483]

In learning communities, as well, we see commonality or shared vision as central to the creation of a learning community. The idea that learning is social in nature has been a recurring theme in education, from Dewey to Brown & Duguid. Learning communities, write Kilpatrick, Barrett & Jones, "are operationalised through collaboration, cooperation, and/or partnerships. The shared goals are achieved through working together and potentially building or creating new knowledge."[484]

Or as Brown & Duguid write,

> *reciprocity is strong. People are able to affect one another and the group as a whole directly. Changes can propagate easily. Coordination is tight. Ideas and knowledge may be distributed across the group, not held individually. These groups allow for highly productive and creative work to develop collaboratively.*[485]

Or, as they write, forging a single group around a shared task, overlapping knowledge, blurred boundaries and a common working identity.[486]

Do neurons collaborate like this? Though there may be a sense to be made of vocabulary such as a 'common identity' and 'shared task' for a collection of neurons, it seems highly artificial, based on a certain perspective of their activities as a whole, and most significantly, of limited utility is describing the mechanisms that neurons employ to form a mind.

If we push the language a bit, we can see how awkward this characterization becomes. Does it make sense to say of two neurons that they have a "shared understanding"? Neurons are not the sort of things that can even have an understanding. Do neurons unite behind a 'common vision'? Do they 'reach a consensus' and 'share in decision-making'? Does one neuron 'trust' another neuron? The language begins to stretch credibility.

Equally, the forms and mechanisms of social organization, as we understand them in contemporary society, are completely alien to the functioning of neurons. There is no 'lead neuron' who articulates a vision for all to share. Neurons don't employ a mission statement, strategies or mechanisms in order to complete organizational tasks. Neurons are not client focused, results driven or process oriented. Neurons are not managed and there is no sense to be made of them belonging to a community in anything like a normal usage of the term.

What characterizes collaborative forms of organization is, in one sense or another, sameness in the people. Sometimes this sameness is a mental property - a sameness of vision, understanding or belief. Otherwise, this sameness may be of some aptitude or capacity - a shared vocabulary, shared skill set, shared comprehension. In other forms of community, a

[482] Schrage, M. (1990). Shared minds: The new technologies of collaboration. New York: Random House.

[483] Senge, P. (1994). The Fifth Discipline: The Art & Practice of the Learning Organization. Doubleday Business.

[484] Kilpatrick, S., Barrett, M., & Jones, T. (2003). Defining Learning Communities. International Education Research Conference. Association for Research in Education.

[485] Brown, J. S., & Duguid, P. (2000), p.143. The social life of information. Cambridge: Harvard Business School Press.

[486] Brown, J. S., & Duguid, P. (2000), p. 127.

more basic sameness is required: sameness of residency, of nationality, of language, or of religion.

By the same token, collaborative forms of organization are directed toward mental content. Communication consists of a transfer of information, with some process undertaken to ensure sameness of content in the receiver as was found in the sender. It is a model of learning and communication as diffusion. There are clear roles of knowledge production and knowledge reception. In collaboration, all members work on the same content (even if each has only a partial view of that content). There is a semantic consistency in their work.

Space precludes a detailed analysis of this phenomenon, however, it can be seen in a wide variety of models of learning and communication, from Moore's theory of transactional distance, to the concepts of knowledge translation or knowledge mobilization, to the power law model of online community, to "core knowledge" advocacy, to Vygotsky's concept of the zone of proximal development (of the latter, Cheyne and Tarulli write, "all of this is organized around the issue of control which, through ontogenesis, becomes transformed from that of an external agent over a subordinate to one of an internal agent over self and ultimately to a principle over an instance").[487]

This 'sameness of entity' thesis (as we may call it) may be distinguished from an alternative representation in which diversity among entities is expected and accepted. Such an alternative model can seem quite radical. Insofar as entities are diverse, so therefore also are their mental contents, which means that when one person says "Paris is the capital of France" he or she means something different from what another person means when uttering the same sentence.

Such approaches to communication have their grounding in "incommensurability" or "indeterminacy" theses of meaning; we see these reflected in Kuhn's theory of paradigm change and Quine's discussion of radical translation respectively. As Quine says, it's not simply that we can't say that two utterances have the same meaning; it's that there might not even be an objective meaning to be right about.[488] What underlies communication, what makes community possible, in such cases is not sameness of entity or shared meaning, but rather, our entering into a system of interaction with each other, into what Wittgenstein calls a "language game", the result of a negotiation calls and responses, where thinking is an activity, similar to, as he says in the Blue Book, a movement of the hand, the presumption of meaning being an ungrounded inference, a projection, or as Quine says, an "analytic hypothesis."[489]

When we are not concerned with sameness of entity, when we are not concerned with shared meaning, when we are not concerned with diffusion of content, then the mechanisms for community look very different. They do not resemble collaboration, as we have described it above, but rather, what we may style here as cooperation. For the purposes of the current discussion, 'cooperation' may be thought of as the sharing by entities of a common system of communication or infrastructure. Community, then, would be defined by the interactions or

[487] Cheyne, J., & Tarulli, D. (1999). Dialogue, difference, and the "third voice" in the zone of proximal development. Theory and Psychology , 9, 5-29.
[488] Quine, W. (1960), p. 73. Word and Object. Cambridge: MIT press.
[489] Wittgenstein, L. (1991), p. 16. Preliminary studies for the 'Philosophical investigations'. London: Wiley-Blackwell.

connections among those entities, and the process of the global brain described in terms of those interactions.

From the perspective of a human brain, there is a very good reason why we would want the structure of neural interaction to proceed in this way. If the creation of a neural community - a mind - depended on neurons achieving a commonality of meaning, then the mind as a whole would never be capable of entertaining more meaning than a single neuron. From the perspective of a mind, meaning is not something that is passed from one neuron to the next, but rather, something that emerges from the interaction of neurons. Whether or not one neuron means the same thing as another is completely irrelevant from the point of view of the mind.

The foundation of community understood as arising from the sharing of a common system of communication is not collaboration but is rather, as suggested above, cooperation. Cooperation, then, is formed through the creation or formation of links or connections among its entities, a negotiation of communications among them. Cooperation among entities implies a separation or distinctness of interests between them; we see game-theoretic models of cooperation, for example, in such scenarios as the prisoner's dilemma, where individual interests create the possibility of conflict or betrayal.[490] It is a mechanism similar to what we see in market economics; there is no presumption of shared objectives or goals, only a negotiation of a means of interaction.

There is no clear statement as to the exact mechanisms through which neurons connect with each other (though the biological and chemical processes are reasonably well understood[491] but for the purposes of this paper four major models of association can be described, each of which does appear to comprise at least a part of the overall process.

First of all, simple association, also known as Hebbian association, occurs when two neurons are activated at the same time and are not activated at the same time. If the patterns of activation and inactivation are sufficiently similar, Hebb postulated in 1949, a connection between those neurons is more likely to be created.[492] In human communities, Hebbian mechanisms can be seen in the connections that form between people who have similar interests; what creates the connection is not the interest itself, but rather, the fact that such people tend to read the same resources, comment on the same websites, and appear at the same events.

A second associative mechanism might be called 'association by proximity'. Neural cells may connect simply by virtue of being located in the same region of the brain. We see this, for example, in the clustering that takes place in the visual cortex, where contiguity of retinal cells is reflected in links among neurons at deeper layers. Rumelhart and McClelland describe how contiguous neurons may form inhibitory 'pools' of neurons, where the activation of one neuron actually inhibits the activation of the next.[493] In communities, contiguity is often the basis for association: neighbours get to know each other, and colleagues take part in social activities.

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[490] Mayberry, J. P., Harsanyi, J. F., Scarf, H. E., & Selten, R. (1992). Game-Theoretic Models of Cooperation and Conflict. Westview Press.
[491] LeDoux, J. (2002). Synaptic Self: How Our Brains Become Who We Are. Viking.
[492] Hebb, D. O. (2002). The Organization of Behavior: A Neuropsychological Theory. Lawrence Erlbaum Associates.
[493] Rumelhart, D. E., & McClelland, J. L. (1986), p. 28. Parallel Distribuuted Processing, Volume 1. Cambridge: MIT Press.

A third associative mechanism, competitive theory, is similar to the 'trial and error' pattern of learning familiar in pedagogical theory. In connectionism (the study of computational neural networks) this is described as 'back propagation'. Associative networks are formed and then fed input, from which, via their connections, they produce an output. This output is then corrected, and a signal is sent back through the network, on the basis of which the connections between neurons are modified.[494] The complex interactions that characterize dating, negotiations, and other iterative communications may be reflective of back propagation.

And a fourth associative mechanism, harmony theory, is based on the idea that systems of connected entities 'settle' into a state of least potential energy. This mechanism, referred to in connectionist circles as the 'Boltzmann Machine', employs the principles of thermodynamics to describe a settling function. In a Boltzmann machine, networks are repeatedly stimulated by increasing the probability that one neuron will be connected with another, then 'annealed' by gradually lowering this probability.[495] This is like the periodic staging of 'mixers' in which the frequency of interaction is greatly increased, followed by periods of time during which more close connections may be negotiated.

These four mechanisms (and there may be more) are distinct from the mechanisms we described above, under the heading of 'collaboration', in that there is no presumption of management or authority, no privileged nodes, and no hierarchy. The idea is that each entity is autonomous - a model most popularized in Marvin Minsky's The Society of Mind, where "each mind is made of many smaller processes" he calls "agents".[496] A (human) society of agents also sounds more like what we would want to describe as constituting a global mind, a society in which each individual is autonomous, performing his or her individual (and unique) function, forming an intelligence through interaction with the rest of society, rather than by conforming with it.

We hear, sometimes, the emerging structure of the web described as a 'new socialism'.[497] But there is a tendency to represent this new socialism as an economic theory, in terms of the creation and consumption of content. "They have already constructed a vast online repository of culture, knowledge, and tools. And we are just at the beginning of what's to come."[498] There is, it seems, a desire to represent this as a collaboration or type of collectivism, "Wikipedia, Flickr, and Twitter the 'vanguard of a cultural movement', an emerging 'global collectivist society.'" And concordantly, there seems to be an inclination to weight people according to the value of their contribution (and by extension, even, to value people by the number of their connections). The content-based 'new socialism' is the same as the authority-based power-law driven old capitalism.

In reality, the 'new socialism' that ought to be understood as emerging on the internet is not one dogged by the tired stereotypes that seem to characterize American descriptions of the term

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[494] Rumelhart, D. E., & McClelland, J. L. (1986), p. 328.
[495] Rumelhart, D. E., & McClelland, J. L. (1986), p. 282.
[496] Minsky, M. (1985), p. 17. The Society of Mind. New York: Simon & Shuster.
[497] Kelly, K. (2009, May 22). The New Socialism: Global Collectivist Society Is Coming Online. Retrieved from Wired: http://www.wired.com/culture/culturereviews/magazine/17-06/nep_newsocialism?currentPage=all
[498] Oso, E. (2009, June 12). Cloud Intelligence. Retrieved from el-oso.net: http://el-oso.net/blog/archives/2009/06/12/cloud-intelligence/

(Lawrence Lessig, for example, defining 'socialism as coercion'[499]) A more modern version of socialism may be found in the forms of 'democratic socialism' current around the world, forms of socialism as a form of personal empowerment, equality of opportunity, and association and interaction.

The concept echoes what Illich talks about as 'conviviality'. Illich's 'tools for conviviality' are appropriate and congenial alternatives to tools of domination, as convivial tools promote learning, sociality, community, 'autonomous and creative intercourse among persons, and the intercourse of persons with their environment'[500] These criteria, he felt, could guide reconstruction of education to serve the needs of varied communities, to promote democracy and social justice, and to redefine learning and work to promote creativity, community, and an ecological balance between people and the earth.[501]

If we are to think of the internet as a global mind, then the interpretation of the community created by such a network as characterized by cooperation, rather than collaboration, then we need to reframe some of the discussion regarding the attributes of that network, and reform our understanding of the processes and the technologies most appropriate for the creation of such a network.

Instead of attempting to identify thought-leaders, for example, and instead of attempting to identify and understand the content created on the web, the various activities of participants in the network are acts of interaction and communication. The semantics, the meaning, of interactions are not deducible from their contents; indeed, their contents are, from the larger perspective, irrelevant. Rather, we should treat them as contentless 'words' or 'signals' in a complex communication taking place among the entities. A web video created by a skateboarder: that's a word. A lolcat created in Photoshop: that's a word. This article: that's a word.

We communicate with each other with these words, and the important things are, first that we communicate, not the particular nature or content of our communication, and second, what we as a species do as a consequence of that communication, not in the sense of having common ideas or doctrines or philosophies, but rather in terms of global expressions or behaviours. In such a network there are no special, privileged, nodes; being a consumer is as important as being a creator, and indeed (as has often been noted) the roles of creator and consumer become indistinguishable, and more important, so to do the roles of master and servant.

Linz, June 16, 2009

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[499] Lessig, L. (2009, May 28). Et tu, KK? (aka, No, Kevin, this is not "socialism"). Retrieved from Lessig Blog: http://www.lessig.org/blog/2009/05/et_tu_kk_aka_no_kevin_this_is.html
[500] Illich, I. (1973), p. 27. Deschooling Society. http://www.ecotopia.com/webpress/deschooling.htm
[501] Kahn, R., & Kellner, D. (2007). Paulo Freire and Ivan Illich: technology, politics and the reconstruction of education. Policy Futures in Education , 5 (4).

You work in a community, not a company

Responding to Jay Cross.[502]

> *It doesn't work to take one from column A and one from column B, e.g. secrecy and transparency are opposites. Competition and collaboration are the same deal.*

Ah ha! I remember saying something like this on this very blog, not so long ago. :)

> *What should a person do if they find themselves in a non-believing, ice-age organization?*

Make your own rules, make your own job. Work not just in your organization but in your sector, your community. Carve out the appropriate niche for yourself no matter where you are employed. Move on if your employers don't recognize your value.

Look at anybody who is a leader is this space, or any space. It is not a person who did their job. It is a person who *changed* their job by either redefining their existing responsibilities or creating a new position (or company) entirely.

> *What's the most enlightened thing to do here? I'll post this issue to the Internet Time Community in case the discussion grows lengthy.*

Again - understand that while you may work for a company, your work environment isn't defined by - or limited by - the company. You work in a community, not a company. You may be paid by the company but your job is defined by the community and, if you're doing it well, you're serving the community.

Remember that you don't work for the company, you work for yourself. The company is merely your largest (and perhaps only) client. Keep in mind that the company will not hesitate to terminate your position, redefine your role, or do any number of things that will not be in your best interest. You have to watch out for yourself.

In the meantime, the company will watch out for itself. It doesn't need a whole lot from you, beyond what you've promised to deliver to it. What the company does is up to the company. You aren't going to change the company - it will have to change itself (that is, the owners or executives will have to reach their own change of heart and attitude on their own).

The best you can do is to show what your (newly defined) work and (personally defined) attitude can bring to the company. As publicly as possible, document and record, should you ever need it for a promotion case (or job interview).

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[502] Jay Cross. A world turned upside down. Internet Time Blog. June 28, 2007. http://www.internettime.com/2007/06/a-world-turned-upside-down/

Jay Cross reponds:

> When writing Informal Learning, I had a view similar to yours. Then reality entered in.
>
> I work for myself. I make my own rules. I change my job description at will. I do what I feel is right. And I'm not going to fire myself for doing so.
>
> Many other people work for organizations. Some organizations are abusive, but moving on is not always an option.
>
> Alternative work may not be available. If you act in the belief that "you don't work for the company, you work for yourself," the company may choose to disagree. In many a company, you can be terminated for sending personal email on company time or running a personal blog or mouthing off about a lousy political situation. Now if you're 55 years old, live in a depressed area, and have obsolete skills, your options are limited. Be your own person; you may lose your house. This isn't ideal or fair; this is reality.
>
> I don't understand "the company will watch out for itself. It doesn't need a whole lot from you, beyond what you've promised to deliver to it. What the company does is up to the company. You aren't going to change the company…."
>
> Last time I looked, companies were made up of people. As talent gets scarce, many companies bend over backwards to hold on to their people. Best management practice these days is to rely on the workers to help improve the company. I submit that Marx's view that owners = bad and workers = exploited may have been on the money 150 years ago but does not map to today's reality.

My reply:

One wonders what happened in the last few months to change your view.

You write,

> If you act in the belief that 'you don't work for the company, you work for yourself," the company may choose to disagree.

Quite so. Count on it.

> In many a company, you can be terminated for sending personal email on company time or running a personal blog or mouthing off about a lousy political situation.

So don't do that. Nowhere in the suggestion that 'you work for yourself' is the suggestion that you should be stupid.

In such an environment, it is even more important that you see yourself as working for yourself. If your employer is that abusive, then they are absolutely not looking out for your best interests - they don't even see you as a person.

Now if you're 55 years old, live in a depressed area, and have obsolete skills, your options are limited. Be your own person; you may lose your house. This isn't ideal or fair; this is reality.

My advice is intended to prevent you from finding yourself in such a situation. But if you are in such a situation, then again, you should be making your plans and conducting yourself with your benefit, not the company's, in mind.

What will you do, for example, when they sell the company and screw you out of your retirement benefits? Don't think it can happen? Examples abound.[503] Even if you can't use the eight (or more - unpaid overtime is rampant) hours a day to protect your own interests, because it's against company policy, you can use the remaining 16.

If you can't redefine your job, then you need to change it. If you can't change it, then you need to develop (or find - because if you're 55 you're probably good at something) the skills. If you're 55, keep in mind that you might well live another 45 years. So you can probably afford the four or five years it takes to make yourself economically independent.

> *Last time I looked, companies were made up of people. As talent gets scarce, many companies bend over backwards to hold on to their people.*

Companies are not made of people; indeed, the people are entirely interchangeable, which is why most companies respond to stock price pressures by shedding people and replacing the CEO. Companies are fictitious legal entities composed of 'assets' - these assets include stock holdings and investments, fixed capital infrastructure, market shares and intangibles like branding. Some companies may list some of their people (incorrectly, since you can't own or liquidate them) as 'assets'. Usually, though, that's just marketing, to improve the value of the brand.

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[503] David Kusnet. Pensions: The Trust Betrayed. The Multinational Monitor, Volume 8, Numbers 7 & 8. July/August, 1987. http://multinationalmonitor.org/hyper/issues/1987/07/kusnet.html

Best management practice these days is to rely on the workers to help improve the company.

I hear this, but every day in the news I read evidence to the contrary.

I submit that Marx's view that owners = bad and workers = exploited may have been on the money 150 years ago but does not map to today's reality.

What world are you living in? In the world I live in, companies continue to exploit their workers, and are diversifying by exploiting (and if that doesn't work, suing) their customers.

I mentioned the retirement benefits swindles above. And the unpaid overtime scam as well. You were the one to mention prohibitions against political expression and personal communication. I could add the overall erosion of compensation, the attacks on benefits (especially health care) and the shifting of the tax burden from the corporation to the individual. I could on top of that list dozens of cases of corporate wrongdoing, outright illegal actions, questionable political dealings, and more, all from the last few years.

If you put your future into the hands of these guys, you may as well kiss it good-bye. You know this; I know you know this. I would like to know what could possibly have happened to change your
perspective.

P.S.

More on the benevolence or corporations: from the Financial Post: "Canadian workers haven't had a real pay increase in three decades, despite the fact they are 50-per-cent more productive, according to a study by a left-leaning think-tank.

The Canadian Centre for Policy Alternatives said in a report released Thursday that if workers were paid for their increased productivity, they would on average be earning $10,000 a year more. That extra cash has instead flowed into record corporate profits, whose share of total income in the economy has grown while that of workers has shrunk, the report said."[504]

Moncton, June 28, 2007

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[504] Canwest News Service. Canadian workers haven't had real pay increase in 30 years: report. Financial Post. June 29, 2007. http://www.canada.com/nationalpost/financialpost/story.html?id=d0496ec7-79a3-4549-88af-838d8292ab5c&k=52941

That Group Feeling

I still remember Vacation Bible School,[505] at the Christian Reformed Church. I'd take an almost two hour bus ride each way, winding my way through the farm towns east of Ottawa until we arrived at the church[506] on Russell Road. The lessons and the songs were OK, but the best was reserved for the noonhour.

That was when we all gathered in the field outside – it was the middle of summer, after all – and worked on our football team. We were the Water Buffalos and we had our team chant, "Hort! Hort! Hort!" We never played any other team, but instead spent the two or three weeks of the school scrimmaging among ourselves.

It was because of the Water Buffalos that I wanted to return, and I was disappointed to find that I would not be welcome the following year. As I understood it, there was something about needing to actually be religious to go to VBS. It seemed unfair to me; I believed what I believed, and didn't believe what I didn't believe, and there wasn't much that was going to be done about that (my career as a Sunday School teacher met the same fate for the same reasons).

There were some intimations that were I to develop religion over the winter I would be welcome back, but they didn't press and I didn't change. I was about the age for summer camp by then, and soon the Water Buffalos were just a dim memory. But that group feeling never left me – nor the memory of the price I would have to pay to join.

It wasn't a big deal at the time, really. All through my school years I was in and out of religious denominations like a substitute running back. There was my time as an Anglican altar boy. My time as a Pentecostal evangelist (I even went to a church retreat in Peterborough with them, where I played – you guessed it – more football). I dabbled as a United and poked my head in the door of St. Catherine's. I still remember discussing the game with the priest as I was trick-or-treating one Halloween. "Football," he exclaimed. "It's the greatest game in the world." I didn't much like it, I said.

I never did pursue a football career but team sports remained for me – as they did for every Metcalfe boy, past and future, that ever lived – the cornerstone of my social life. Oh sure, there was the debating team and the chess club and the Reach For The Top[507] team and even the drama club, but the only teams of consequence were the sports teams. This is why, 25 years later, when I attended my high school reunion, I found my life there wiped from existence. The true stars of my school were the tall blond athletic Dutch kids, the Vriends.

The less said about my history with teams in Metcalfe, probably, the better. The soccer team was particularly brutal. I was placed on it because I finished 4th in the school-wide three mile run (and once ran a mile in under five minutes – too bad we never had a track team). Nobody

[505] Wikipedia. Vacation Bible School. Accessed October 5, 2006. http://en.wikipedia.org/wiki/Vacation_Bible_School
[506] Calvary Christian Reformed Church. Website. Accessed October 5, 2006. http://www.calvarycrc.ca/
[507] Reach for ther Top. The History of Reach for the Top. Website. http://www.reachforthetop.com/history.cfm Original link: http://www.reachforthetop.com/

ever thought to ask why I was such a good runner; I was placed on the team for two years, never played a single minute, and was regularly roughed up by the rest of the team (the details of the shorts incident are best left out of a family column). Because I was the weakling, the runt. Because I was different.

Amazing that I persisted. Amazing that I showed up for every practice, every game, for two years, even when my shorts were ripped to shreds and my shoes had huge gaping holes in them. It was that time of life, I suppose, when I would risk anything to belong. To risk anything for that team feeling.

Happily, life is not the battleground that characterizes high school locker rooms, and I did eventually find fellowship and spirit. With the computer operations team at GSI,[508] until new managers were imported from Texas and all our groups broken up. With radical leftist journalists[509] at university, until I graduated and was sent to Edmonton. With various executives at the Graduate Students' Association,[510] until the time came to move on. With, even, the e-learning group here in Moncton, until it was dismantled.

To belong. To move as one. To operate in synch, one purpose, one goal. I understand. I know, I have felt, the sense of belonging such a thing. The joining together. The feeling of being valued, of being vital. Part of the team. All for one and one for all. Oh I know, and honestly, still yearn for that team feeling. Despite the risks.

It's funny, though, how our emotions can cloud our other senses (I am told: first comes the thought, then come the emotions – but it's the emotions that spur to action, the emotions that give meaning and value – as Hume said, "Reason is, and ought to be, the slave of the passions"[511]).

While still a radical leftist journalist, I once did a fairly in depth exploration of a thing called the Hunger Project,[512] and consequently, Erhard Seminars Training (EST)[513]. This beame a longer look at cults (and a great feature article) and a nice compliment to my knowledge of the logical fallacies, which I was also developing at the time. And what I discovered there seems to be the most natural thing in the world: how the desire to belong to a group is manipulated in order to subsume one's sense of individual identity, individual well-being, and even one's rationality and reason, in order to join the group.

Recent years have been bad years for cults. The memory of Jim Jones in Guyana[514] was still fresh (and 'drinking the xxx Kool-Aid' has never left the lexicon). David Koresh[515] would take down his Branch Davidians in a hail of explosions and gunfire, echoed a couple of years later by

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[508] Wikipedia. Geophysical Service Inc. Accessed October 5, 2006. http://en.wikipedia.org/wiki/Geophysical_Service_Incorporated
[509] The Gauntlet, University of Calgary Student Newspaper. Website. Accessed October 5, 2006. http://thegauntlet.ca/ Original URL redirects: http://gauntlet.ucalgary.ca/
[510] Graduate Students' Association of the University of Alberta. Website. Accessed October 5, 2006. http://www.gsa.ualberta.ca/
[511] Garth Kemerling. Hume: Morality and Religion. Philosophy Pages. 1997. http://www.philosophypages.com/hy/4v.htm
[512] Wikipedia. The Hunger Project. Accessed October 5, 2006. http://en.wikipedia.org/wiki/The_Hunger_Project
[513] Wikipedia. Erhard Seminars Training. Accessed October 5, 2006. http://en.wikipedia.org/wiki/Erhard_Seminars_Training
[514] Wikipedia. Jim Jones. Accessed October 5, 2006. http://en.wikipedia.org/wiki/Jim_Jones
[515] Wikipedia. David Koresh. Accessed October 5, 2006. http://en.wikipedia.org/wiki/David_Koresh

Timothy McVeigh.[516] Then there were the Heaven's Gate suicides[517] who thought they were traveling to space.

But there is nothing new to what these cults have been doing. We've all seen the movies that begin with the military boot camp experience. "First you break 'em down, then you build 'em up." Sensory and sleep deprivation. Being constantly on the move. Recitation of the group mantra. The suffering of hardship together. These bind a few loosely connected humans into a group – it works nearly every time, and if there are some misfits that need to be dealt with harshly, well, that simply gives the group something to bond over.

I've seen it over and over. The 'pods' we had in grade five (me, Jane, Brenda and Chris – we were the best, the brightest, and even had charts on our desks to record test 'victories'). Various Cub and Boy Scout troops and events – I still remember the triumphant entrance made by the other group after the overnight at Camp Opemikon[518], the entrance of all six members of the group bearing a canoe that had been absolutely destroyed by the rapids. Lifelong memories, that.

We are – as critic after critic has reminded me since my 'network' talk – social animals. We are beings that not merely want, but need, to stick together. That is why we have families, religions, teams and nations.

And we are. For humans, being in a group is a survival tactic. Stand in the bush alone in the middle of the night (do it! I have) and you'll see what I mean. It's not simply that we feel isolated and vulnerable: we in fact *are* isolated and vulnerable. Most anything in that bush larger than a rabbit can both outrun and outfight us. Many things climb trees better than we do. And heaven help us should we run into hostile humans.

We need the group – we need it to survive, we need it at a deep and primitive level. And there's nothing wrong with that. Until…

There comes a certain point where our group identity becomes more of a burden than a blessing. Different people might draw this line at different points. Some draw the line at religious, ethnic and nationalist fanaticism, the sort of mass mania that can lead to fascism, war and mass murder. We all know the stories. Others draw the line at anti-social behaviour closer to home: the cults and the gangs, the terrorist organizations, the cartels and warlords, the motorcycle clubs.

So where is that dividing line? Where functional and healthy becomes dysfunctional, obviously. Somewhere between (most) football teams and the Symbionese Liberation Army.[519] Somewhere between family bonding and wiping out your neighbours with machetes.

In my books, that line is the line between reason and emotion. To put it most simply, groups are based on passion while networks are based on reason. Groups meet our need to belong and to

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[516] Wikipedia. Timothy McVeigh. Accessed October 5, 2006. http://en.wikipedia.org/wiki/Timothy_McVeigh

[517] Wikipedia. Heaven's Gate (religious group). Accessed October 5, 2006. http://en.wikipedia.org/wiki/Heaven's_Gate_(cult)

[518] Scouts Canada. Camp Opemikon (web page). Accessed October 5, 2006.
http://www2.scouts.ca/dnn/voy/CAMPS/CampOpemikon/tabid/1844/Default.aspx Original link now points elsewhere: http://opemikon.org/

[519] Wikipedia. Symbionese Liberation Army. Accessed October 5, 2006. http://en.wikipedia.org/wiki/Symbionese_Liberation_Army

survive, while networks meet our need to connect and learn and to know. In a group, passion drowns out reason, in a network, reason drowns out passion. In places where passion and emotion should not prevail – when building bridges, say, or launching space shuttles – groups should not prevail. In places where passion should prevail and is even an asset – in team sports, in family bonding - groups should prevail.

When we look at learning, therefore, and when we ask which model should prevail, the group model or the network model, we are asking fundamentally what the role of our educational system should be. Should it be to foster an emotional attachment to a group, be it a nation, religion, or system of wealth distribution?

This is not as straightforward a question as it may seem. Certainly, the attachment to a group plays a major role in religious education, whether the instruction be moderate or extreme. In the United States, students recite the Pledge of Allegiance,[520] an explicit affirmation of the role of schools in forming an affiliation to a national entity. Schools may form around family groups, community groups, ethnic groups. There is no shortage of people wanting schooling to fulfill not only a learning but also a socialization function.

And this, then, is where passion in schooling begins to subsume reason. This, then, is where the teaching becomes less a matter of cognitive function and more a matter of indoctrination. Or call it what you will. But when the fostering of allegiance to a group becomes a major, or primary, function of education, then the traditional agenda, thought of as learning, is left behind.

To those that believe schools should foster good citizens (or soldiers, or Muslims, or factory workers) what is more important on graduation is not that the student can think, reason, learn and know, but whether the student is relevantly the same as the rest. The offering of standardized tests, far from fostering learning (and it's worth noting that no amount of evidence on this front has swayed adherents even slightly), is intended to foster groups, group identity, and sameness – sameness of curriculum, sameness of the educational experience (if there are specifics to be learned, Disney, Fox and MSN can fill in the details later – what is important now is the receptivity).

The terrible danger of this is, as I allude above, that people will do anything, take any risk, in order to be part of the group. And those who for one reason or another fail to meet the group standard are dealt with harshly and sometimes brutally. How brutally? Well, consider the case of the homosexual in Wyoming, tortured and then hung on a fence, left to die.[521] Consider the gang of young girls in Vancouver ganging up on and killing[522] a member or their class. Consider the violence[523] exerted on students at Canadian residential school against First Nation students who dared to speak in their own language.

[520] Wikipedia. Pledge of Allegiance. Accessed October 5, 2006. http://en.wikipedia.org/wiki/Pledge_of_Allegiance
[521] James Brooke. Witnesses Trace Brutal Killing of Gay Student. New York Times. November 21, 1998. Accessed April 4, 2012 as a replacement link. http://www.nytimes.com/1998/11/21/us/witnesses-trace-brutal-killing-of-gay-student.html Original link no longer extant: http://www.geocities.com/WestHollywood/Stonewall/2878/vf1.html
[522] Wikipedia. Murder of Reena Virk. Accessed October 5, 2006. http://en.wikipedia.org/wiki/Warren_Glowatski
[523] Stephen Harper, Prime Minister of Canada. Statement of Apology. Aboriginal Affairs and Northern Development Canada. June 11, 2008. http://www.aadnc-aandc.gc.ca/eng/1100100015644 Replacement link for the original citation, which is no longer extant. http://www.turning-point.ca/index.php/article/view/274/1/31

There was a time, when wild animals were a genuine threat and when tribes would raid, enslave and kill each other, that this aspect of learning played an essential role. But today, it threatens us all.

We can no longer afford dogmatic tribalism. That is not to say we can no longer afford groups – we want to continue to have sports teams and families and friends. But in matters affecting economics and finance, environment, government and nations, we can no longer afford group-based tribalism. The implications of subsuming reason to emotion in a complex society should be apparent.

They should be apparent at a national and international level, where the prevalence of group identity has led to disasters like the second world war, the Cultural Revolution, and the genocide in Rwanda (to name only a few). Where the subsumption of reason to emotion and passion has led to widespread beliefs in fictions – the continued resistance to measures to combat global warming, the rise of religious fanaticism and terrorism, the sanctioning of torture by national governments. These are not political issues: they are a headlong clash between people who identify most strongly with their particular group, and people who look at society as a whole, between people shoes beliefs are based on emotion, and people whose beliefs are based on reason.

It seems clear to me that in endeavours where we, as a society, would prefer reason to prevail over emotions, we should prefer to organize ourselves as networks rather than as groups. It seems additionally to be clear to me that education is probably one of the most critical areas where this needs to be the case, as it will be necessary for citizens of the future to be able to respond to an increasing set of global crises from a ground of reason, rather than emotional attachment to a group.

I want groups to continue to exist. I want that feeling of unrestrainedly shouting "Hort! Hort! Hort!" in a suburban field, of forming a bond with a group of friends, of feeling the strength and support of my community and my family. But not at any cost. Not at the cost groups, unrestrained, can inflict on the outcast. Not at the cost that indoctrination, practiced as a theory of learning, can inflict on a society and on a planet. Not at the cost the tribe mentality, as exercised in the schoolyard, can inflict on an individual.

Moncton, October 05, 2006

Groups vs Networks: The Class Struggle Continues

This is the transcript for the talk I gave September 28, 2006, at e-Fest in Wellington, New Zealand. It's my first extended discussion of groups and networks. Slides and audio are also available.[524]

It's a genuine pleasure to be here in New Zealand. I've traveled all the way from Stewart Island up to Northland and this is an astonishingly beautiful country. I come from Canada. I don't say stuff like that lightly because we're pretty proud of our beauty in Canada, but this is a place that is relentlessly beautiful. I took the bus from Auckland to Wellington a couple of days ago and people sort of looked at me like I was nuts. But – New Zealand has a desert. I never knew that.

And, you know, I jumped the tour and took the bus and discovered a desert and that's sort of like a metaphor for life or something. And the people here, I've told other people this, the people here in New Zealand are just lovely, lovely people. They have been kind and generous and they all say, or most of them I guess, I don't know about all, but they say, "Hiya." And for those of you who read my email, I always begin my email with, "Hiya." And I've never actually heard people say that. It was so neat. You know, I'm there and I walked into a café and, you know, the woman behind the counter, she goes, "Hiya." And I was like, "Oh, I'm home."

As the introduction said, I have been on the road a long time. I started in Frankfurt after an overnight flight from Toronto, after a flight from Moncton, and I was there for their Saturday morning market and I was eating Bratwursts. And then I found myself in South Africa and I went to Lesotho, which is that little round country that's completely enclosed by South Africa.

And I saw what they call cattle-boys and what cattle-boys are, they're people who tend to their herd of cattle and the herd of cattle is 12, 15 cows and they sit on their horse. They always have a horse or a mule and they have a stick and they wear their blanket and they wear their hat. They used to wear their traditional Basotho hats, but now most often they wear something like a toque. They all have these blankets and toques. It's Africa. And they always have one dog or two dogs. And that's what they do. They tend their cattle.

And I was talking to people there about, you know, because they start this life when they're five years old, six years old and they go off – they go into the mountains and they're on their own and they're tending their cattle and, they feed themselves and they clothe themselves and all of that. And the government and other agencies try to offer them schooling, but the schooling would bring them down from the mountain and they don't want to come down from the mountain.

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[524] http://www.downes.ca/presentation/53

And, you know, having seen their mountains, I don't blame them. I wouldn't want to come down from that mountain either. I wouldn't want to leave my horse or my mule and my dogs, especially not my dogs. I wouldn't want to go to a school and have to not wear my blanket anymore or my hat or whatever and it's just – so I'm sort of thinking, well, how do you educate them? How do you provide an education and what do you do to that sort of society when you're offering that education? What does that change?

And I was in Johannesburg, which is where I lost my passport and my airline tickets. And I'm told Johannesburg isn't the place to do that. And I went to Kruger National Park. This was while I still didn't have a passport and airline tickets. I figured, well, I'll go on safari if I can't go overseas. And I saw zebras and no lions. I didn't see lions or more accurately, they didn't see me.

And I saw Cape Town and I was briefly in Australia and then of course here, from Stewart Island, Christchurch and Dunedin, Auckland, Whangarei. So, I'm overwhelmed. And I'll admit that I'm standing here before you right now overwhelmed, overwhelmed with sensory experience, overwhelmed with cross-cultural experience. I was thinking just as I was skipping the coffee that I was having information overload. And for other people, information overload is 1,500 emails. I deal with that, you know, pretty much every day. For me, information overload was like real life. The irony struck me.

So what this talk is: a long time ago, I was asked to write an outline and I really didn't know what I was going to talk about because I knew I was going to go through all of this and so this talk is some of the reflections that come out of all of that and those reflections as applied to the sorts of things that I have to say about learning technology, learning networks, e-learning and all of that stuff. This trip has probably done lots of things to me which I won't discover until months later, but what this trip has done to me now is have me see my own thinking in a different way, from a different perspective and that's always a good thing.

So, here's the setup. What we're seeing the emergence of the personalized web, the interactive web, web 2.0, or e learning 2.0. And the question that faces us typically is how should the learning sector, how should we respond. And the short version of that is very badly so far. I've been struck by the oddity because I've gone from place to place, college to college, school to school and I find that most of the technologies that I'm talking about and I want to demonstrate and show people are blocked. And I find that a very odd sort of thing.

And now, after all of this, I'm thinking of it as walls. It's just walls all around me. I want to talk to someone. There's a wall. I want to do a blog post. There's a wall. Mostly, schools, colleges, universities have been reacting to these new technologies by blocking them. And I know there are good reasons for that and I know there's security and all of that, but you know, I mean security is like walls.

The best of walls around your house isn't gonna keep people out. You know, the best security system isn't gonna block people. I'm reminded of the Microsoft Darknet paper[525], a very famous

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[525] Peter Biddle, Paul England, Marcus Peinado, and Bryan Willman. 2006. The Darknet and the Future of Content Distribution. Microsoft Corporation. 2002 ACM Workshop on Digital Rights Management. http://crypto.stanford.edu/DRM2002/darknet5.doc

paper written by some Microsoft technicians, and they're writing about digital rights management and their conclusion essentially is that no digital rights management system will succeed. Any way of locking down content will inevitably be broken. And Microsoft should know.

You know, they come out with a security system and three days later the crack comes out for it. I mean, I read just this morning[526] that Microsoft is suing the people who wrote software at the – what was it, a free WMV or something like that. It's software that cracks the security encryption on the Windows Media format. You can't build a society with walls.

I was at one of the technical universities in South Africa and they can have WiFi and have internet access and all of that, and of course, like all the other universities, they're locked down. You have to give you name, your address, your Mac address, your blood type, your mother's maiden name and then maybe, just maybe, they'll let you have it – and anyhow that system was hacked and so it was down while we were there.

In the longer term we have to do something more imaginative than blocking this technology. We need to live and teach and learn where the students live and teach and learn. That means that we have to stop blocking to their spaces and go to their spaces. So we explore their world. But, you know, there's the age-old danger of explorers that when we go to their world, we're going to want to colonize it. And we're going to want to make them like us. And we're going to want to take them from their mountains and put them in rooms and put walls around them and put locks on their doors and say, "This is civilization."

And that appears wrong to me and it appears wrong to me not just because I was recently in Africa. It has always appeared wrong to me. I mean, again, I'm from Canada. I'm most at home when I'm in a forest and there's nothing around me, there's no walls or no barriers. Maybe there's a river, but whatever. And so it just does seem wrong to me.

Now, how is this playing out? Dana Boyd wrote a brilliant paper on MySpace, Identity Production in a Networked Culture[527], about the way people use MySpace. And basically what she says in her analysis of MySpace and in the group – in the workshop yesterday[528] we actually went to MySpace and looked around at the sites. What she says is that MySpace is identity production playing itself out visibly. People creating and demonstrating their own identity in this online world. And I commented yesterday, 86 million people, they can do anything they want, they can express themselves and they come up with *that*? But that's MySpace.

We heard, especially in our traveling group here in New Zealand, we heard a lot about Second Life. Second Life to me is almost an old story and it's almost an old story because I actually came onto the internet sometime in the late 1980s as a participant or a player in what was called a 'multi user dungeon', or MUD. And I, in particular, played on a MUD called MUD Dog MUD. "Virtual reality at its best. Based at the University of Florida." I can still remember the title screen in my head. My online character was Labatt the Cat and I was a wizard. Actually, I was a

[526] Fulton, Scott. 2006. Microsoft Sues FairUse4WM Developers. Beta News, September 27, 2006. http://www.betanews.com/article/Microsoft_Sues_FairUse4WM_Developers/1159371255

[527] boyd, danah. 2006. Identity Production in a Networked Culture: Why Youth Heart MySpace. American Association for the Advancement of Science, St. Louis, MO. February 19. http://www.danah.org/papers/AAAS2006.html

[528] Downes, Stephen. 2006. Online World. eFest, September 27, 2006. http://www.downes.ca/presentation/54

senior wizard. I was very proud of that – more proud of that than my BA. And Sherry Turkle, again, examines the world of MUDS.[529] MUDS are like Second Life except without the graphics. Funny how you describe things – how that changes over time.

And again, and I saw this for myself, people playing in these MUDs are creating their own identity. They're trying on different hats. They're trying on different ways to live, different ways to interact and that's okay. I was going to say we don't say that this is good or this is bad, but of course we do say that this is good and this is bad. And then I wanted to say, "Well, we don't mean it." But of course we do mean it. But mostly what I want to say is this kind of diversity, including of opinion, is expected. A MUD is one of these wild free ranging places and that's also true of Second Life. Except with graphics.

All of this – you know, my background in MUDs and creating and recreating my own identity online and then I'm sure many of you have seen my own identity online in my web page and my other web page and the secret hidden webpage that nobody's allowed to see. It's not a very popular one.

And all of that, and my background, and then coming through New Zealand with the traveling group: all of that has put me in a position where I'm looking at the contrast ('contrast' is the word I'll use right now) between groups and networks. And I posted in my website a few days ago[530] that groups require unity and networks require diversity. Groups require coherence, networks require autonomy and so on.

And to put that into context right now historically. Those of you who've taken political science know that all of human history in political science is the division between the individual and the state. Right? The person and the group, right? And these are the two divides. And the whole purpose of politics is to find some sort of accommodation for them or if you're Ayn Rand, to favor the individual and ignore the group.

And it seems to me that networks offers that middle way. Networks offers that path that isn't the individual and isn't the group, doesn't force you to choose between the individual and the group. I am saying this because as soon as I came up with this "groups versus networks" people are looking at that and saying, "Well what's the middle way with that?" And I thought, "Wait a sec, this is the middle way.

So I drew this picture:

[529] Turkle, Sherry. 1997. Life on the Screen: Identity in the Age of the Internet. Simon & Schuster (September 4, 1997). http://web.mit.edu/sturkle/www/Life-on-the-Screen.html
[530] Downes, Stephen. 2006a. Groups and Networks. September 25, 2006. http://www.downes.ca/post/35866

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 I drew this in Auckland. Because I was talking like this and I wanted to draw out what I meant by that distinction between the group and the network. The rest of the talk is basically about this diagram.

Now if I was doing this diagram today instead of three or four days ago, it would be a bit different, but not a lot different because not a lot of time has passed. And these are not definitions. I don't do definitions. So I don't want somebody coming along like five years from now and saying, "Stephen Downes defines a network…" I'm just trying to give you some words to give you kind of a mental picture of what I think this is, and I won't be bound by these words.

But more or less, a group is a collection of entities or members according to their nature or their feature or their properties or whatever, their essential nature, maybe, their accidental nature, maybe, whatever, but according to their nature. What defines a group is the quality the members possess in common and then the number of members in that group. Groups are about nature, they're about quality, they're about mass. They're about number.

A network, by contrast, is an association – I use that word very precisely – an association of entities or members where this association is facilitated or created by a set of connections between those entities. And if you say, "Well what is a connection?" A connection is merely some conduit along which a signal can run. Well, that clarified it, didn't it? What defines a network is the nature and the extent of this connectivity. The nature and the extent to which

531 Stephen Downes. Groups and Networks. Flickr. September 25, 2006.
http://www.flickr.com/photos/stephen_downes/252157734/sizes/l/in/photostream/

these individuals are connected together. Now that may be perfectly fuzzy, but this is the overall view.

A group, in other words, is like a school, a school of thought or a school of fish or a class, a class of entity, a class of animals, a class in a genus and a species. A class act is kind of a group. Or to flip that around classes in schools, properly so called, the things that we all grew up in are groups because groups are classes in schools. And once that line of reason, I started looking at dictionary definitions and I started doing Google image searches on the word school. I bet I've never done that before.

And I'm asking can we even think of schools? Can we even think of classes without at the same time thinking about the attributes of groups? Can we separate in our head those two contexts or have they been irrevocably fused in our minds?

The discussion I've had since I've come up with this points more toward irrevocably fused, but I hope to shake that a little bit. So let's come back to the challenge, only rephrased with the date in Finnish (Stanley Frielick, kirjoitti 27.9.2006 kello 12:35) - because I wanted to include some Finnish in this presentation. "Education and authentic learning," he writes, "like freedom, is wrapped up with the notion of responsibility and accountability. We need to learn in groups because that's where we form our identities."[532] True or false? "Not in some vast, chaotic network where there's no responsibility, no authenticity." Fascinating how responsibility and authenticity and all of these things are joined together.

That last little bit harkens to Hubert Dreyfus who is basically – I don't want to say anti-internet because that would radically oversimplify his position, but Dreyfus says, basically, there is no genuine effects, no genuine cause and effect, no genuine consequence to your actions on the internet.[533] Now I grew up on MUDs. I know how false this is and the interactions that take place on the internet, contrary to Dreyfus, are real and as I said in the group yesterday, I read this somewhere, I forget where, 'real' is defined as "the effect continues to linger after you've turned off the computer." If that happens, it was real.

A group is elemental. Remember, a group is defined according to its class and the number and if you want to draw a mental picture, draw a mental picture of one of those ingots of pure gold or something like that. And the idea here is that all of the elements in that ingot are the same. They're all gold atoms. Right? And they're just all lined up together and what makes it more or less valuable is how many of those atoms there are and how pure that ingot of metal is.

Interestingly, democracy is a group phenomenon. Democracy is a bunch of people who are relevantly the same, they all voted Tory and what matter is how many of them there were. So, you know, so many people vote Tory, so many people vote liberal and those two sets – those two groups, that's how the government is defined according to how people voted. A network is different from that. And a network is – and other people have said this, I'm certainly not the first person to say this - a network is like an ecosystem where there is no requirement that all the

[532] Frielick, Stanley. 2006. FLNW:: Re: Networking groups in the diverse world. The Future of Learning in a Networked World, Google Groups, September 27, 2006. http://groups.google.com/group/futureoflearning/browse_thread/thread/291179a5508303ea/1a8cd266c4d6bd84? #1a8cd266c4d6bd84
[533] Downes, Stephen. 2002. Education and Embodiment. April 26, 2002. http://www.downes.ca/post/92

entities be the same, where the nature of the entity isn't specifically relevant, where the number of entities isn't specifically relevant.

(I once got a twenty out of ten, I was so proud, on a project. It was a bottle of water from the stream and it was tightly sealed and I called it "closed ecosystem project." And I reported on the slow death and decay of everything inside that bottle.)

So we hearken back to what Stanley said. We have a group or we don't and without the group, there's no responsibility, there's no order, there's nothing but chaos and mass anarchy. And the question is, can we have order, responsibility, identity, all of that good stuff, inside an ecosystem? Is the choice before us really order or anarchy? And I argue, no, that isn't the choice. I argue that not only can you have all of those good things inside an ecosystem, inside a network, but also that in many ways, they are relevantly better.

And, you know, it's funny – Solon was a Greek icon and is known, to say this briefly, known for bringing the concept of universal laws to Athens. If you think about how law is managed in the ancient societies, two people come before the king and they each plead their case and the king sort of goes, "Hmm, you. You win." And the problem is, for societies without laws, you do that enough times and then the king says, "Hmm, you're in my family. You win." And so that sort of problem was happening in Athens where justice was blatantly unfair and so what Solon did is he brought a system of laws that would apply for everybody. And so he brings the concept of universal law that applies equally and the same to everybody in Athens. And it's funny how that has survived as an essential and elemental concept in learning today.

I commented, and not purely in jest, when talking about assessment. I want to change the system of assessment in schools because right now we have tests and things like that that are scrupulously fair, particularly distance learning where we outline the objectives the performance metrics and the outcomes and all of that. I want to scrap that system. I want testing to be done by at random by comments from your peers and other people and strangers based on no criteria whatsoever and applied unequally and unfairly.

And people say, "Well, why would you want that?"

And I said, "Well, that's the way the world works."

But the point of that remark is to try to pull apart this idea of universality, everything being the same and learning. Do we need, as is suggested, do we need the iron hand of justice in our classrooms?

Groups – groups are defined by their unity. In fact, one of the first things you do in a group is you try to maintain its unity. A group need to be, in some sense, cohesive, united, "e pluribus unum". Or to keep this politically fair, "The people united will never be defeated," the "melting pot", the encouragement to be the same, the encouragement to have the same values, to follow the same vision, to be, in some relevant way, like the others because that's what the group is. Without that sameness, you don't have the group. You have anarchy.

And we have technologies specifically designed for the group, pre internet technologies appeal to the mass and you're familiar with these – mass broadcasts of television, of radio, newspapers, books. These are things that create the identity of the group and therefore, because the nature of the individual is the same as the nature of the group, it creates the identity of the group.

Think about, in your own country, have there been these moments that have defined the country captured on video and played over and over for your children? In Canada it was in 1972. We played a hockey series – Canada against the Soviet Union. They were evil. We won. It was great. Paul Henderson's goal, I can almost like hear and recite back the play by play announcer. I watched that game sitting in an open concept classroom in Metcalfe, Ontario, with about 50 other kids on one of those little TVs way up on the little rolling stand. And when Henderson scored that goal, we went nuts. And it defined our generation. Unity.

Online, we do pretty much the same thing. We have technologies that appeal to the mass and are used to create unity. All-staff emails – how many of you got an all staff emails? I was talking with Brandy before this talk, she got an all staff text message. An instant message sent to everybody in the 'buddy list', 200 people or whatever got the URL for the corporate website, the portal. These are "all" things, out of many, one. Out of all these staff and employees in your company or your university or whatever we're gonna have this website and this website will speak for all of us.

Networks are almost defined by the opposite, defined by their diversity. A network thrives on diversity. It wouldn't be a network without diversity. To each his own, so goes the saying, and I know it's not gender neutral, but it's a very old saying so I was faced with a choice. Do I quote the quote accurately or do I put it gender neutral? So I thought I'd quote the quote accurately and then apologize for 30 seconds.

Interestingly, when I grew up, and again I grew up in Metcalfe, Ontario, small farm town south of Ottawa, population 500, we were feral. We roamed the fields and the forests and if there were deer we would have chased deer, but there were cows, so we chased cows. And our teachers would teach to us that Canada was different from the United States. And much later on, I realized, oh, that is Canadian identity.

And the United States, like groups, constitutes a melting pot. In Canada, we were all taught, is a salad bowl where each entity, the lettuce, the tomato, the whatever, cucumber, I don't know what you put in salads. That's what we put in salads. All of these things maintain their distinctness and their identity and by maintaining their distinctness and identity, they create a whole that is something distinct and different from any individual entity and indeed, something that cannot be created without maintaining that distinctness and identity.

And the more I thought about this, you know, I struggle with myself all the time and I wonder, was it indoctrination or were they right? And after many years, I've come to the conclusion they were right.[534] And so there is this idea of the network, there is this idea of distinctness and

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[534] Downes, Stephen. 2003. My Canada. July 1, 2003. http://www.downes.ca/post/57

diversity in an environment where people are encouraged not to be the same, but to be different. I like to think I have fulfilled my teacher's expectation, having internalized the encouragement not to consume and to absorb the message from the mass media, but to create, to be that media, to be the artist, to be the writer, to be the videographer. Canada routinely wins awards for its documentaries. We are the nation of documentary makers. I even made a documentary recently.[535] Why? Because well, I'm Canadian. I had to. It's in the contract.

Network technology that includes diversity, encourages diversity, talking – talking is wonderful and talking is not a mass phenomenon – telephoning, writing letters, personal emails, do you see what characterizes these things? Right? They're not one-to-many, they're one-to-one, and sometimes in the internet age, they're also many-to-many.

But the idea here is that what defines these things is the set of connections between the individuals and not the content of what's going out. If you try to define what you mean by, say, telephoning or letter writing by the content of the messages, how would you do that? They're not even all in language, especially not with sending pictures and things like that.

Internet technology that encourages diversity rather than conformity includes things like personal home pages or these days, blogs. I should add to this slide MySpace profiles and things like that, your account on Flickr. All of these things that allows the individual to express themselves rather than the individual being part of some larger entity. It's funny, I have an email address, surprise. My email address is stephen@downes.ca.

And I'm just curious now, almost all of you will have email addresses. For all of you, how many of you have an email address based on your institution, college, universities or whatever address? In other words, you know, fred@somepolytechnic.edu or whatever? Where is your personal identity? Why the email? This is your email address. And yet your email address is your institutional address. How did that come to be? Imagine if your personal mail address, the mail that you get from your grandmother, came through your employer and had to be sent to your employer before it got to you. It just seems odd.

Groups require coordination. They require a leadership or a leader which is why we get all of this stuff on leadership. It's the funniest thing, all these things on leadership, because I read these and it's like everybody needs to be a leader, but my experience of groups is usually one leader and a bunch of followers and, you know, I want to see the new business book that says, "Everyone should be a follower." But no. I always look at these things from the point of view of the follower.

People think about groups and leadership and direction and responsibility and they usually mean "my leadership, my direction, responsibility to me." And I look at groups differently because they don't let me lead groups. I look at groups as somebody else's leadership, somebody else I'm responsible to. I have to follow his or her vision, as being "responsible" assumes that I'm under somebody. People picture groups, but they don't picture them in terms of their actual role in the group. They picture them in terms of the role they would like to play in the group. It's a philosophy of aspiration rather than a philosophy of reality.

[535] Downes, Stephen. 2006c. Bogota. September 15, 2006. http://www.downes.ca/post/38525

This is something that socialists need to look at because socialists appeal to groups. They appeal to the worker, but nobody wants to be a worker. That's why socialists, at least in my country, get like 16, 20 percent of the vote. You know? I'm surprised 16, 20 percent of the people identify, "Yeah, I'm a worker." But, you know, people don't want to be a worker. They want to be a manager or retired, one or the other. Socialists speak to neither of those.

A group is defined by its values. I said yesterday and I say it again today, the person who came up with the concept of the vision statement should be thrown out the window. Because think about it. You're in some institution. The powers that be from on high come down with a vision statement. You read the vision statement. How many of you go, "Yeah, that's my purpose in life?" And what follows is a long, protracted exercise to get you to replace whatever vision you had with the vision of the group. And it seems odd. Groups define standards. Groups define belonging.

In learning technology – most of learning technology is intended to support this picture – we have the learning management system. Managing learning. If you think about that, think about what that says to manage learning. What does that mean? It means there'll be a manager of learning. It means that there'll be one person responsible for the learning and everybody else will follow. Learning design, where the learning is organized, sliced, diced, flaked and formed and you follow in a row or you're not a learner. You're an anarchist. Learning object metadata, the 87 or whatever fields to describe a learning object, a learning object being something that can be assembled like a Lego, like individual entities in a group, and this is the one and only way to describe learning resources. And if it's not a learning object metadata, it doesn't exist.

Networks, by contrast, require autonomy. That is to say each individual in a network operates independently. That does not mean they operate alone. What that does mean is – because remember, it's a network, you're connected, you talk to people, they talk to you – it means you define your vision. It means you define what's going to be important to you, your values and interests. It means that when you go to work, the reason why you're at work is because you want to put food on your table, not the boss's table. The boss getting food on his or her table, that's just an accident. But that's not why you're there.

Interaction in a network isn't about leaders and followers. It's about, as I say here, a mutual exchange of value. And my employers don't like me that much because that's how I view myself as an employee. And I go into there and they say, "Well, we're gonna give you these orders now."

And I sort of say, "Well, what are you going to give me for doing that?"

And they say, "Well, we pay you."

I say, "Well you paid me before. You know, we already had an agreement and now you're changing the agreement and that's fine. You can change the agreement, but now I want some changes too." Because it doesn't work that way if this is a mutual exchange of value. You can't just change the condition. I hear so many people say all the time, it was even in my email this

morning, it was stuff about networks and that and people say, "Oh, but we're in this institutional environment. We have to do what we're told."

And my response is, "Who said so?" I mean, why? I mean the worst thing they could do is fire you and then you'd be free, but if you belong to a union (another group, right?) you can actually set one group against the other and not follow their orders and still manage to be able to eat and house yourself.

And it's a fascinating – when you reframe these things – you need to reframe these things. Think about the arrangement that they have set up for you. You will do what they say or you will be forced to be homeless and starve. What kind of bargain is that? Right? So this objection is, "we have to do what we do or they won't pay us." But the only people who can change that arrangement is you. Your bosses aren't going to change it. Trust me.

People don't follow, they don't do what they're told in a network. They interact. They make their own decisions, but not completely independently all on their own, not all by their lonesome. They interact with other people. But they make their own decisions.

It's like traveling from Auckland to Wellington. Right? There's different ways you can do it. I mean you can travel with a tour group or you can take the bus. Right? Taking the bus doesn't mean that you're traveling alone. It just means you're not traveling with the group, but you still interact. But your interaction is different. Now it's in a mutual exchange between you and the bus driver or you and the bus company. And I give them money and they said, "Yes we will take you to Wellington and we won't leave you in the desert." And I said, "Good, because it's a nice desert, but I don't want to be left there."

And you think about the technology now that encourages autonomy rather than conformance. E-portfolios is being touted as this sort of technology. The same with the personal learning environments (and you might not know what that is yet because they're new, but if you look that up on Google, you'll find stuff on personal learning environments) and that's the autonomous answer, the network answer to the learning management system. And it's based on a radical concept. Students can learn autonomously. Who would have believed?

But if you read and listen to all this pedagogical theory, it's like, "gee, if we don't take them by the hand and lead them through this, they'll be hopelessly lost and they'll never learn anything at all."[536] And if that were true, the internet never would have been built. There were no classes on how to build an internet before it was built. How did they learn? Well, they learned on their own, self-directed.

Groups are closed. This is the 'walls' part of it. They require a boundary that clearly defines the distinction between members and non-members, otherwise there wouldn't be a group. They would not even a mob, because a mob at least has a border. Groups have memberships. Membership has its privileges. They have logins and passwords and authentication and blood

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[536] Kirschner, P.A., Sweller, J. & Clark, R.E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry based teaching. Educational Psychologist, 41, 75-86. http://www.cogtech.usc.edu/publications/kirschner_Sweller_Clark.pdf

type passes. They have control of vocabularies and standards, jargon. They have in-jokes. You will use this technology. I'm a Mac person. I'm a PC person. Staying on message, he's a loose cannon, he's not part of the group. We speak as one. With one voice we speak. That's what a group is.

A group defines itself with very precise limits. Look at the limits. Look at the boundaries. Look at the walls that you have in your learning environment today, your learning technology environment, even your learning environment today. Look at the walls here right. We've managed to keep all the other people out. Right? And if somebody who was just walking on the street tried to come in here, sit down and listen, we would stop them. Think about that. That's our theory of learning. If somebody wants to come in and listen, we stop them.

Enterprise computing, federated search, federated search is a system whereby you search only accepted resources, resources that have been approved, qualified and typically are commercial and for sale. User IDs and passwords, copyrights, patents, you cannot use that shade of green it's owned by BP. You cannot use the word Coca Cola, not even to talk about Coca Cola because we own that. I can say 'elearning 2,0' I invented the concept web 2.0. You can have a conference, but you cannot call it web 2.0. I'm Blackboard, I invented the learning management system. We will put a wall around anyone else trying to do it.

And even whether or not it's true or not true, it doesn't matter. You build the wall and it becomes true. Assertions of exclusivity define groups. Networks are the opposite of that. Networks are open. Networks require that all entities in the network be able to both send and receive. To send and receive, first of all, in their own way, because they're diverse, and secondly, without being impeded. Well, oddly, that is a radical concept.

It's hard to believe that something like freedom of speech is a radical concept, but there it is. In their own ways, a person in a network should be able to send their message any way they want in their own language using their own computer encoding, using their Macintosh computers, using standards that are non-standards. I talk from time to time about RSS. RSS – sometimes people talk about RSS in the same breath they talk about learning object metadata 'cause they're both types of XML, but if you look at the history of RSS, it's a mess. There is not such thing as RSS or no individual thing as RSS. There's eight or nine or ten or we don't even know how many different types of RSS and some types of RSS aren't even called RSS. And yet it works. There are many, many hundreds of times more RSS feeds that there are learning object metadata feeds. In fact, I don't know if there are any learning object metadata feeds.

In networks we have communities of practices where a 'community' is defined as collections of individuals that exchange messages and ideas back and forth without being impeded. Copyright, trademarks, proprietary software, all of these things are barriers for the communication of thought and ideas. If you allow that using content, images, text, video is a way of speaking to each other, then copyright, trademark, all these things are ways of locking down our speech, saying, "I own the word such and such and you can't use it."

Imagine I invented radar and I decided I am going to own the word radar from now on and anybody who talks about radar has to get my approval before they can use that word. Can you

imagine how communication works in an environment where you have to get permission in order to use a word as simple as radar? But that's what's happening now with all of this copyright stuff. The network approach to this stuff is to open this up, create a license for works and content like GPL.

The network response to a meeting like this with four walls, a ceiling and happily a floor is this, the iRiver, in this case, which is recording this talk in MP3 After this talk, sometime, I'm going to do a radical act. I'm going to take the talk that I just gave and I'm going to put it on the internet and anyone can listen to it. And they won't even have to pay me. And even better, they can take this talk, they can put it on their own computer system, they can print it out on a CD and pass it around their village or farm or whatever.

They won't have to pay and if they think I've gone on too long (a lot of people think that) they can chop it up and just do little snippets, like, "A lot of people think that." And, you know, you hit a button, "A lot of people think that." And they can mix and mash and I want them to do this because I want part of my words, my thoughts, my thinking, my ideas to become part of the culture, part of the language, part of the dialogue. And it strikes me as – and the only way to do that is to no longer own it. The only way a word becomes a word is if you let go of it.

Groups are distributive – money, information, power, everything flows from the center, an authority, and it's distributed through the members.

Networks are distributed. In a network, there is no locus of knowledge. There is no place that knowledge and money and all of that flow from. Rather, the knowledge, the money, the information, anything that is exchanged in a network is distributed across the entities of a network. When an idea propagates to a network, it does not come from a centralized source, rather it comes from any given source in the network and then through a process of what they call propagation, it works its way through the network.

Think about diseases (yes, I came here and talked about diseases). You know, there's no central disease authority where we get all of our diseases from, happily. Some say the CIA, but that would be the group way of doing it. Diseases spring up anywhere. The flu comes from Hong Kong, Ebola comes from Ebola, you know, they can spring up anywhere and then what happens is they propagate person to person, contact to contact and there's a very specific logic of how diseases propagate from person to person, contact to contact and it's this whole social networking graph theory.

And the mathematics of that is actually very simple. If the probability that the disease will be passed on is greater than one, the disease will spread through the society. If the probability is less than one, it will be halted at some point. And then you work around the mechanics of all of that. So the network works that way. The network works where the idea, the money, the resources, whatever, may happen to be anywhere and then it propagates link by link through the entire network and then each entity working on its own will have a specific probability of passing this on. And if collectively the probabilities are, on average, greater than one, then the idea or the concept will become common throughout the network and not otherwise. And in practice, what you'll find is some parts of the network are such that the idea has been accepted

there, but for one reason or another, it didn't quite make it to the rest of the network. And so you get variety within the network itself.

There's been a lot of talk, and this is sort of just in the back of my mind while I was saying that last sentence, which is why that last sentence was a little confused. There's a lot of talk these days about something called a power law in networks and what a power law is a way of explaining the distribution of links in a network and it looks like this. So there's sort of a curve. Right?

And the idea is that some sites, like Google, have many, many links, links in from other people. Lots of people link to Google. And then you've got other sites like my site, you know, a few thousand people and then other sites, a dozen people and then many, many, many other sites, you know, just two or three people. So you have what they call that the 'long tail'. This is where the new economy is and all of that. It's the long tail and all of these individuals of just two or three links, but the thing is, you know, this message is being given to us mostly by people who are in what I call the big spike, the A-listers. And they're sitting there saying, "Look at this power law. We're out here. We're making a mint."

But the thing is, that power law of distribution is more characteristic of groups than it is of networks. A network, properly constructed, will not see that configuration where two percent of all the people own 80 percent of all the wealth. Rather, it becomes more distributed – the more evenly you distribute your links, the more evenly you distribute your wealth.

Why networks? Three major reasons.

First of all, the nature of the knower. Human beings resemble ecosystems more than they resemble lumps of metal.

Secondly and very importantly, the quality of the knowledge. Because the knowledge comes from the authority, from the center, even if there's consultation and all of that, the knowledge of groups is limited by the capacity of the leader to know things. This is why dictatorships are so bad; dictators, as smart as they are (and some of them are very smart) just simply aren't capable of running an entire country by themselves. Nobody can do it. It takes too much memory, too much perception.

And then finally, the nature of the knowledge itself – the knowledge in a group replicates the knowledge in the individuals and it's passed on simple in a transmission communication kind of way.

Those of you who are into learning theory think more about transaction theory, of communication theory. It goes from here to here to here to here. And consequently, that limits the type of knowledge that can be created and communicated. I characterized it here a bit badly as simple cause and effect, yes-no sorts of things. The sort of knowledge you can get looking at mass phenomena. The knowledge you can get by polls and things like that.

But in a network, the knowledge is emergent. The knowledge is not in any given individual, but it's a property of the network as a whole. Consequently, it's a knowledge that cannot, does not,

exist in any individual, but only in the network as a whole. It's emergent. It's more complex in the sense that it is able to capture and describe phenomena that are not simple like cause and effect, but complex like the nature of societies or the nature of the weather. That's a very loose characterization about it.

Thank you for your time. I really appreciate the invitation. I thank you so much for the opportunity to be here to speak to you. It's been a tremendous honor.

Wellington, September 21, 2006, Transcribed November 24, 2007

Groups

I wonder, if I wrote that the sky is blue, whether the dissenting opinion[537] would come from Finland.

"If we all are just individuals in a network we will soon all be the same." This is transparently false.

It took exactly 24 hours for someone to propose a "middle way" (this is what passes for innovation these days). "Could there be "middle way" or "third way"? Something that would be between the 'closed groups' and 'individuals in open networks'?"

It will soon be noticed that a person can be both an individual (and hence a member of a network) *and* a member of a group. That they can belong to many networks and many groups. That any number of 'middle ways' can be derived from variations on this theme.

More interesting would be to see some alternative 'middle way' in the form of some sort of an organizational principle that allows things to be both open and closed at the same time, that promotes both unity and diversity at the same time, that promotes both cohesion autonomy at the same time. Read up on your Hegel; you'll find it in *Philosophy of Right*[538]. Is that where were you headed, Teemu? We all know our history, right?

More interestingly: web 1.0 is about groups, web 2.0 is about networks. e-learning 1.0 is about groups, e-learning 2.0 is about networks. Someone will write an article about that in a few weeks, probably, carefully washing all sources.

The core of the issue is whether learning in general should be based on groups or networks. Everybody says, 'learning is social', and thus (no?) must be conducted in groups. But networks, too, are social. Learning can be social and not conducted in groups. Where to now, social construction?

Is learning about subsuming your identity, or growing and asserting your identity? Can we define ourselves by why we know and what we do, or must we define ourselves by what we are and what we belong to? Yes, of course you can do both at different times (I am 'Canadian' and 'I write') but when the two conflict, as they inevitably do in education, which prevails?

There's always two ways to read my proposals: the simple way, which sets them up as some sort of polarization (and therefore always open to a 'middle way'), and the accurate way, which enters the topic knowing that I am writing, using limited vocabulary (since language is inherently not sub-symbolic), about complex matters, and that the subtlety inherent in complexity should be understood as always forming a substrate.

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[537] Leigh Blackall, et.al. 2006. The Future of Learning in a Networked World. Discussion Group. Google Groups. 25 September, 2006. http://groups.google.com/group/futureoflearning/browse_thread/thread/291179a5508303ea/2eb859c910255998#2eb859c910255998 Link no longer extant; see Leigh Blackall. The Future of Learning in a Networked World. eBook. 2006. http://flnw.wikispaces.com/book+content
[538] Hegel, G.W. 1820. Elements of the Philosophy of Right. http://www.marxists.org/reference/archive/hegel/works/pr/index.htm (I referred to it as the 'Phenomenology of Right' in the original.

Grapes and bananas. Yes, one can always have both, but in sequence. Which first? It does not preclude the other, but it implies a choice. Lurking in the background is always the blender, and you can make a smoothie, even putting the two fruits in at the same time. But when you just want a bite to eat - which first? It depends, of course, on what you want to do, why you want to eat, and whether the economy of Ecuador matters to you.

Wellington, September 26, 2006
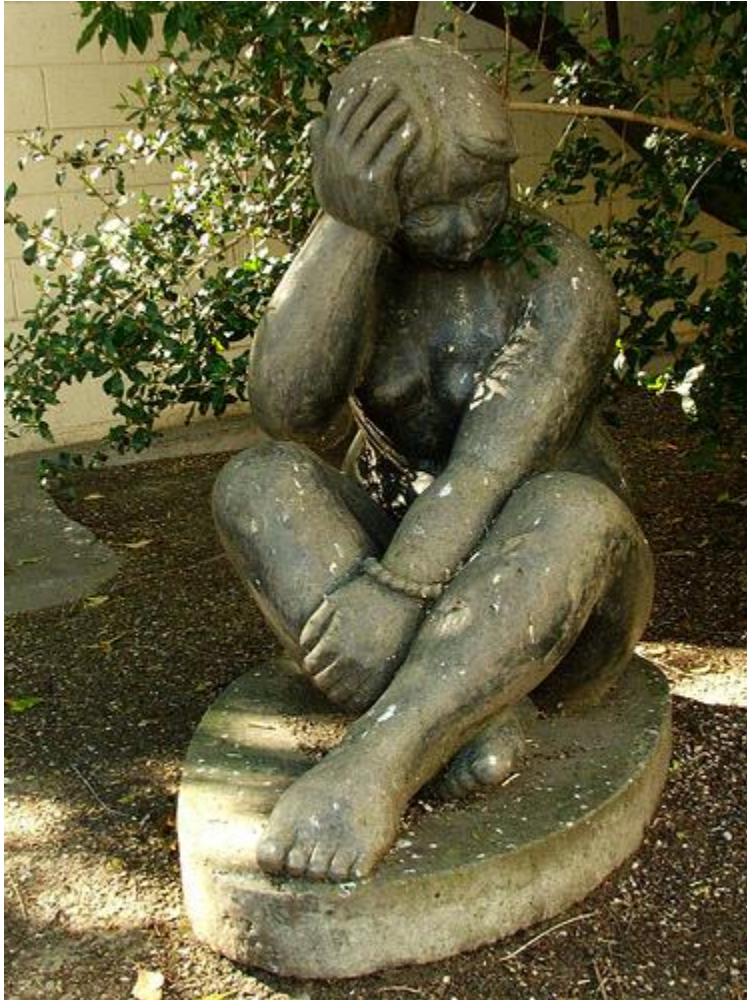
Walls

Responding to Danah Boyd[539]

There is a very big difference between our putting walls around our own space, and other people putting walls there.

When we build or buy (or rent) our own walls, we choose when they are open or closed - when the door is locked or unlocked, who we let in, whether the curtains are drawn or open, etc.

That's called a home.

When other people control the walls, they choose whether or not to open them (which is why the invasion of search engines in Friendster comes as a rude surprise), whether the door is locked or unlocked (which is why having your personal data owned by Fox is discomfiting), etc. When other people control the walls, you can't simply pack up your (digital) possessions and leave.

That's called a prison.

Of course even these generalizations are misleading.

Sometimes our own home is a trap. Sometimes we wall ourselves off from the rest of the world, keeping ourselves apart in ways that are not healthy. It's like when the emergency services can't get through your front door to respond to 911. Or when we hide in the basement and pretend the tsunami outside is not real.

And sometimes the prison is a sanctuary. When we cannot afford walls of our own, or when we are in danger of being pursued by predators, or we need a place for a large group of us to meet in private, then we want a place with high walls and guards around the perimeter.

Walls - like most other things - are ethically neutral. Neither good nor bad.

It's what we do with them that matters, and what other people do with them to us. If the walls increase both our security and our freedom, then (all else being equal) they are good. If they reduce our security and freedom, they are not so good.

From my perspective, the best wall is one with a door, and the best door is one with a key.

Moncton, February 06, 2007

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[539] Boyd, D. (2007) About those Walled Gardens. Apophenia. February 5, 2007.
http://www.zephoria.org/thoughts/archives/2007/02/05/about_those_wal.html

Inward Facing
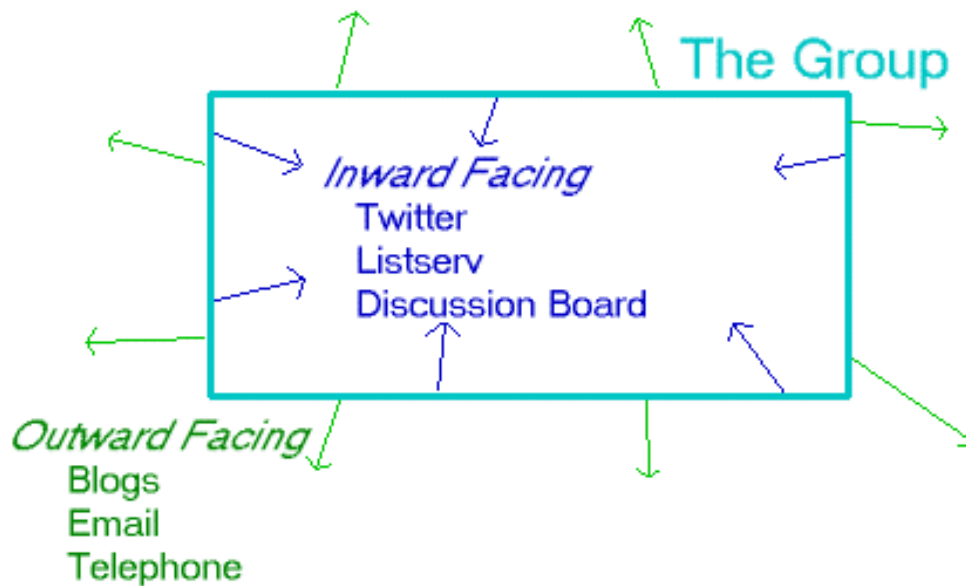
A technology like Twitter is, in my mind, 'inwards-facing', because it reinforces communication with the group - 'running with the herd,' as I commented on Noon's post, while I tend to favour 'outwards-facing' communications, those that look outside the group.

Moncton, April 01, 2008

Collabularies

Paul Anderson writes[540], " ...there is a distinction between a folksonomy (a collection of tags created by an individual for their own personal use) and a collabulary (a collective vocabulary)."

He expands, "We are also beginning to see compromise solutions known as collabulary in which a group of domain users and experts collaborate on a shared vocabulary with help of classification specialists."

Beth Kanter picks up on this and observes[541],"The... point makes we wonder about the difference in terms of behaviors and values in tagging communities versus crowd filtering communities (e.g digg)."

I noticed this as well and wondered about it.

It is important to distinguish between a network behaviour, such as the folksonomy as described above, and a group behaviour.

A collection of tags may be created in two very distinct ways:

1. people, working independently, just happen to use the same word to describe the same resource
2. people, working together, agree on a term that describes a given (type of) resource

Method number (1) is a folksonomy, and it is a network behaviour. It does not involve collaboration of any sort.

Method number (2) is not, strictly speaking, a folksonomy. It is a method more common to librarians and taxonomers.

We have seen, however, efforts made to organize tags (people will write, "Everybody tag this event 'OCC2007' or whatever).

This sort of organization is arguably no longer a folksonomy, as some people are using a privileged position to instruct other people how to tag (I discuss this in my paper here Community Blogging[542]).

I would not go so far as to use a word like 'collabulary' - that is a ridiculous word, and is not needed to describe something that we already have perfectly good words for a 'taxonomy' or a 'vocabulary'.

[540] Anderson, P (2007) What is Web 2.0? Ideas, technologies and implications for Education. JISC Technology and Standards Watch, February 2007. http://www.jisc.ac.uk/media/documents/techwatch/tsw0701b.pdf
[541] Kanter, B (2007) Collabulary, Not Folksonomy. Beth's Blog: Nonprofits and Social Media. March 6, 2007. http://beth.typepad.com/beths_blog/2007/03/collabulary_not.html
[542] Downes, S (2005). Community Blogging. Stephen's Web. February 24, 2005. http://www.downes.ca/post/14

And the author's suggestion that folksonomies ought to be recognized as 'collabularies' is, in my view, a mistake: it either misrepresents what a folksonomy is, or it uses a new word needlessly.

A community of individuals working independently, such as Digg users, is not *collaborating*. The rankings are not the result of group action. Rather, each person works independently.

Indeed, it is worth pointing out that when Digg members collaborate, the system is deemed to be *broken* and the reliability of the rankings cast in doubt. And interesting debate surrounds edge cases (such as the case where one person sees that another has Dug a resource, and, trusting the other person, Diggs the resource, not because it is good, but because people who Digg popular resources early are rated higher[543] than people who don't).

Moncton, March 07, 2007

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[543] 2007. Author unknown. Digg Removes Rank Completely. Neomeme. February 5, 2007. Article no longer extant; was at http://neomeme.wordpress.com/2007/02/05/digg-removes-rank-completely/

Networks, Power and Ethics

This is a few weeks ahead of when we will be looking at this in the course, but I wrote is as a response to a discussion post[544] today and so I'll post it here now.

> *Could we separate out some issues?*

OK, this post raises a number of great points. Let me work through them.

> *1. Is it not the case that if we respect: autonomy, diversity, openness and interactivity in any form or structure, it's difficult to misuse power, but that's the case by definition?*

It is so by definition only if the definition of 'power' is something like 'the limitation of autonomy, diversity, etc...' And I'm not sure people would want to *define* power that way. Usually power is defined not just as type of limiting behaviour, but also as a type of effective behaviour, that is, people wield their power to *cause* some sort of outcome.

Maybe it can be so by the definition of 'autonomy', 'diversity', etc? This isn't clear. Clearly not for diversity. The cells in a leaf or the atoms in a lump of lead are all the same, but not by virtue of some sort of power. So non-diversity does not entail power. Similarly with non-autonomy. A pilot fish follows a shark around, or a barnacle attaches to the hull of a ship and goes where the ship goes - this is non-autonomous behaviour, but not a power relationship.

Interestingly, I think that because we define 'power' as the capacity to some sort of intervention, we can't have 'power' without at least the *possibility* of autonomy, diversity, etc., if not the actual existence of them. The wielding of power is the *violation* of autonomy, diversity, etc., which means it is wielded in a situation where autonomy, diversity, etc., would normally be expected.

What, then, would make it *difficult* to wield power is not simply the existence of autonomy, diversity, etc., but rather, the degree to which they are entrenched - how stubbornly autonomous individual entities are by nature or temperament, how 'power-wielding' form of contact or interaction are available through the connections in a given network, the nature and inclination of given entities to wield power, etc., the number of connections (and therefore the extent of power) that may be forged, etc.

This gives us a way of describing different types of networks in term of the degree to which power may be wielded in those networks. For example:

- person-to-person network: communication is exercised by physical contact, power can be wielded as the direct application of force leading to injury and possible fatality, versus
- electronic network: communication is exercised by electronic message, power can be wielded only by means of changing opinions through rhetoric or reason

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[544] Downes, S (2008). Re: Power = [not] autonomy, so ? CCK08 Forum, October 19, 2008.
http://ltc.umanitoba.ca/moodle/mod/forum/discuss.php?d=1007#p6168

Or:

- person-to-person network: communication only to people who are physically proximate, and therefore limited to a maximum audience of several thousand (tens of thousands with voice amplification), versus
- broadcast (radio or television): communication to people with receiver, limited only by the number of people that exist

> *2. What is it particularly about networks that tends to enhance autonomy etc? Or is it the case that networks inevitably enhance autonomy etc?*

I don't think there's anything particularly about networks that tends to enhance autonomy, etc.

What it is about networks is that properties such as autonomy become *important* in a way they didn't before. This is why I distinguished networks from groups.

In groups, the properties of autonomy, diversity, etc. tend to be thought of as *inhibiting* the function of the group. Notice how the person who has a different point of view, or who has different objectives ("their own agenda") are depicted as obstacles to be overcome.

Nothing *inherently* in a network fosters autonomy, etc. and, depending on its make-up, a network can be used equally to promote or to eliminate autonomy. That is why it is possible for a network to effectively collapse into a group.

A reworking of this question would be, why are autonomy, etc., important? And I have tried to answer this in *An Introduction to Connective Knowledge*[545] and elsewhere. Networks in which these values are promoted are robust, dynamic, stable, reliable - they are good knowledge engines. We can rely on them (the way we rely on scientific explanation and induction, as methodological paradigms, tweaked and adjusted over time).

Another way of stating the same thing is that networks in which autonomy, etc., are abridged are effectively dying. The resonation of connections from entity to entity will gradually cease. The network gradually becomes inert. If all entities are the same, there is nothing for them to communicate to one another. The network is dead - a dead lump of coal (100% carbon) rather than a living, breathing plant or animal.

> *3. The internet allows, and enhances all sorts of behaviours: grooming for child pornography and abuse, and for the grooming of disabled adults for terrorism, just for starters. Giving a child, or a disabled adult the autonomy to connect to anyone else on the Internet, within diversity, openness and interactivity is clearly a disaster.*

I don't think any of this is an argument against either the internet or networks.

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[545] Downes, S (2007). An Introduction to Connective Knowledge in Hug, Theo (ed.) (2007): Media, Knowledge & Education - Exploring new Spaces, Relations and Dynamics in Digital Media Ecologies. Proceedings of the International Conference held on June 25-26, 2007. November 27, 2007. First posted December 22, 2005, to Stephen's Web. http://www.downes.ca/post/33034

First of all, the internet does not increase the possibility of exposure to these elements. Child abuse was common before electronic media - maybe even more common. The grooming of average civilians for military purposes was also common; witness the Crusades.

Second, internet technologies tend to make these things less dangerous, not more dangerous. Child abusers and terrorists cannot use the internet to impose direct control the way they can in person. You cannot kidnap a child or harm someone's relatives online - you have to do it in person.

Third, the best defense against the ills of society is not sheltering, but exposure. It is the things children (and adults) have never seen before that really hurt them or kill them. Children who have been exposed have a better chance of survival, and if this exposure happens in a safe environment, such as the internet, so much the better.

Fourth, exposing children to the diverse nature of society shows them how rare some of these phenomena are. While broadcast television hammers into them the incorrect notion that violent crimes are prevalent and increasing, exposure to actual people shows the wide diversity of (mostly nice) people.

All of this is, in essence, an argument to the effect that network responses are a better remedy to the ills outlined in the comment than group responses. One of the most striking images I have of my visit to South Africa was of the walls that are everywhere. But nowhere were people less safe. Huddling together with people of your own kind, keeping those you fear at bay with fences and security and police, makes you *less safe*. You have the illusion of control - but it's only an illusion.

> *4. So, can we distinguish:*

a. Generic affordances of networks

That's a good one. Autonomy, diversity, openness and connectedness are not properties of networks generically; they are properties of good networks.

I confess I don't have a systemic list of the generic affordances of networks. I would be inclined to put things like 'pattern creation' and 'emergent properties' as the generic affordances. But I would have to think about it.

b. Distortions and misuses of networks

This is where I would place non-autonomy, non-diversity, etc.

c. The ethics and memes of positive social networks, and the value systems within which we make those judgment calls?

This should be the subject of a much larger discussion. So I will only attempt a summary of my views here.

First, there is a significant distinction to be drawn between personal ethics and public ethics (analogous to the distinction between personal knowledge and public knowledge).

Personal ethics (aka personal morality) is an emergent property of your own self (your own brain, your own body, whatever). Personal morality is like a *sensation* - it is based in what we in this course have been calling the passions, it is a *feeling* for what is right and what is wrong. Though reason and argumentation can augment it, as Hume says, "reason is, and must be, the slave of the passions."[546] In morality especially, if you don't *feel* that something is good, it can never be believed by you to *be* good.

The arguments we see in ethical texts - from Kant's description of the categorical imperative to Mill's utilitarianism to Sidgwick's methods - are, to my mind, *rationalizations* of the ethical impulses we feel as individuals. They are attempts to explain and justify the ethical values we *already possess* - and it is worth noting that such writings are singularly unconvincing to people who do not feel the same way.

Such ethics can be taught, and a person's personal ethics are very often a reflection of their parents' ethics. But the manner of teaching is not to *tell* a child how to behave, but rather, to *model and demonstrate* ethical behaviour, which the child will practice, and reflect upon (forming ethical principles in his or her own mind as massive sets of connections between neurons formed via the principles of association).

Public ethics is the mechanism though which personal ethics are reflected in society as a whole. In essence, each person in a society is thought of as an *ethical agent* - an individualized sensor of ethical knowledge.

In terms of content, public ethics are whatever they are. What I mean by that is that they are the emergent ethical properties that are produced though the interactions of a viable social network. We may make various attempts to formulate them, but such attempts will be invariably limited by context and abstraction - they will be partial representations of a much richer phenomenon. The legal system is one such partial representation - it is an attempt to codify and prescribe punishments for serious ethical violations. Yet nobody would equate the legal system with the complete set of social ethics, and few people, if any, adopt the legal system as their own personal definition of ethics.

As such, and crucially, what constitutes ethical behaviour *with respect to the creation of the social ethic* is equivalent to whatever produces the best, most robust, richest, most reliable, and most reasonable social ethic. Behaviours that *promote* the development of such a social ethic are ethical, behaviours that inhibit it are unethical.

Another way of putting the same point is what while personal ethics govern how we conduct our lives as individuals, social (or public) ethics govern how we interact with each other. Our motivations for acting in one way or another can and will be very different; what a public ethic amounts to is (roughly) the *rules of engagement* with each other - or, as Wittgenstein might say, *the ethics game*, or as computer scientist might say, *protocols* for a network infrastructure (the

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[546] Hume, D (1739). A Treatise of Human Nature. Book 2: 3-3. http://ebooks.adelaide.edu.au/h/hume/david/h92t/B2.3.3.html

IETF and the W3C protocols are not standards, they are a set of protocols for ethical behaviour - that is, behaviour that best leads to the effective functioning of the internet, so far as we know).

What amounts to ethical behaviour, on such an account, is (very roughly) what amounts to *reasonable* or *polite* behaviour. In my own thinking, I identify different domains depending on the different types of interaction. For example:

- principles of *argumentation* - ethical behaviour is rational behaviour - we interact using reason, rather than attempting to intimidate with force, we argue clearly and honestly, rather than attempting to misrepresent or fool through trickery. These principles align with *qualitative* knowledge.

- principles of *explanation* - we favour theories and mechanisms that are testable, that are robust, that apply in a wide range of disciplines; we reject explanations and mechanisms based on incomplete or misrepresentative information; we favour simplicity. These principles align with *quantitative* knowledge.

- principles of *networking* - we favour networks in which the entities are autonomous; we promote networks of diverse entities; we prefer networks that are open and undefined; and we prefer networks that produce knowledge as an emergent property, rather than mere repetition of some property or state of an individual entity. These principles align with *connective* knowledge.

d. Appropriate ways of regulating networks - both socially and ethically appropriate, and network/CAST (complex adaptive systems theory) appropriate, assuming that regulation of complex systems is not the same as regulation of predictable systems (see Kurtz and Snowden).

The connotation of 'regulation' is that it is the moderation of behaviour through a projection of power.

My reaction to that is that I have never seen an effective regulation through projection of power.

That is not to say that projections of power cannot prevent particular instances of prohibited behaviour. That is not even to say that the application of a significant amount of power cannot prevent most instances of a prohibited behaviour. Police states, whatever their faults, result in less crime. For a time.

If you convert your network into a perfect group, you will have achieved group identity, and hence, perfect regulation. At the cost of killing the network.

Mechanisms based on projections of power are temporary and ineffective, and that they will fail in the long run.

Ethical behaviour cannot be *imposed*. It can be *enforced*, but cannot be *produced* through the use of force.

Only behaviour that is freely chosen can become ethical behaviour, because only such behaviour can be relied upon even in the absence of constraint or force. Only such behaviour

will survive the breakdown of social order. Only such behaviour will permit the *rebuilding* of a society in the event of disaster.

Such behaviour is not created by power, regulation or force, it is *taught*, and such behaviour is not taught by telling, it is taught by modeling and demonstrating ethical (read: 'reasonable') behaviour.

Regulations are a short-term mechanism intended to cope with a failure of teaching. Regulations are effective only for the perpetuation of a *status quo* while alternative teaching can effect long-term and substantial change.

All of that said - the practical question is, how should I, as an ethical actor, with an interest in promoting an ethical network, approach instances of unethical behaviour (defined for now as behaviour that would normally prompt calls for 'regulation').

And the answer, in a nutshell, is to *make ethical behaviour a condition for network interaction*. Ethical protocols are voluntary, and you can do something else if you want, but *nobody will talk to you* if you do not behave ethically.

This is something you cannot impose - you cannot effectively isolate a person from a network, because it has no boundaries. However, individual entities can refuse to connect with non-compliant entities. And this refusal to connect is something that *can* be modeled (and, more importantly, the conditions under which non-connection occurs) can be modeled.

That said, it should be understood that these are two gradations, not on-off absolutes. A person's behaviour can be more or less reasonable (as defined above) and a response to that behaviour can be more or less exclusionary. There is room for moderation of response, and moderation of response is encouraged. The network principle "be generous in what you accept, strict in what you send out" applies here: it is better to encourage reasonableness by demonstrating it, but the effectiveness of demonstrating it exists only if communications are undertaken, at least some times, with people who are more or less unreasonable.

(I use the word 'people' but I actually intend to refer to 'entities' more generally.)

Moncton, October 19, 2008

Networks, Neighbourhoods and Communities: A Reflection

1. Network Components

In Friday's CCK11 Elluminate session I highlighted some of the properties of networks in the following diagram:
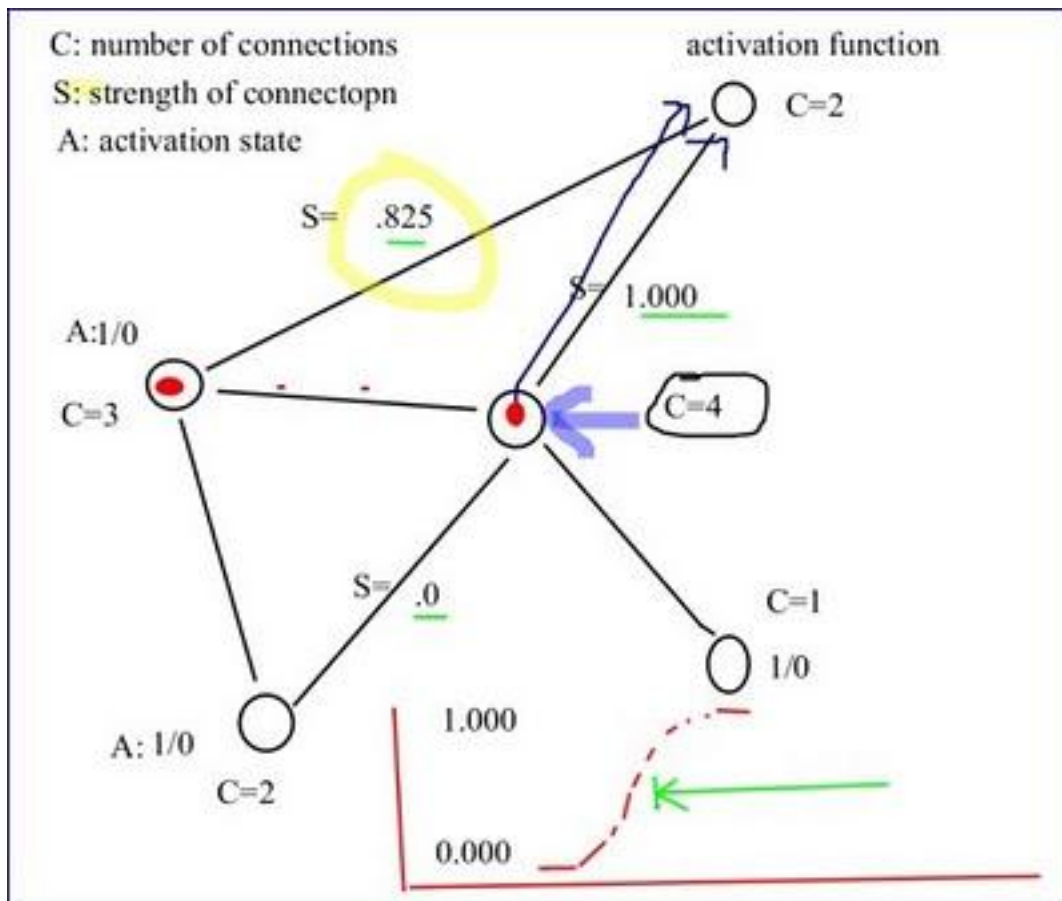
Now this isn't the most official diagram in the world, but it suffices to highlight some of the properties of networks we want to include in our discussions. First, there are the two major *parts* of a network:

- the *nodes* (also known as vertices, entities, units, etc.)
- the *links* (also known as edges, connections, etc.)

Within these collections there are various *properties* that parts of a network may possess. The *node*, for example, may have the following properties:

- the activation state - that is, the current state of the node, which may be off or on, 1 or 0, excited or at rest, etc. The activation state may be very simple, or may be a combination of a large number of factors, depending on the complexity of individual nodes.

- the number of connections (indicated by C in the diagram), or the list of the set of connections for a given node, etc.

- the *activation function*, that is, a description of what sort of combination or type of inputs is required in order to switch the node for (say) 'inactive' to 'active'. Activation functions may be expressed in terms of signal strength, the type of signal, or the number of signals being received. It may be an absolute value, a probability function, or some other type of function.

The *link*, meanwhile, may also have various properties:

- the *directionality* of the link, whether it is unidirectional from one node to another, or whether it is bidirectional (Twitter follows, for example, are unidirectional, while Facebook friends are bidirectional).

- the *strength* of the link, or the *breadth* of the link, which may be (for example) an indication of what proportion of a signal being sent will be received by the receiver. In formal networks, strength is clearly enumerated, but in less formal networks, we may use less formal terms ("he's a strong friend", "the strength of weak ties", etc.)

- the *type* of connection, for example, 'friend', 'neighbour, etc. or *nature* of the interaction

- the *number* of strands in the link, which may be seen as a combination of different types of links, of different intensities

2. Communities as Networks

From this perspective, we now turn to the analysis of communities as networks, and in particular, I'll turn to Barry Wellman and Barry Leighton's "Networks, Neighborhoods and Communities, from *Urban Affairs Quarterly*, 14 March, 1979[547] (thanks, George, for the suggestion).

What Wellman and Leighton are trying to show in this paper is that traditional network discourse would be more effective were it expressed in terms of networks. They cite a variety of literature that examines the nature of communities in urban settings, noting that these analyses have their own frames and vocabularies to describe these communities. And they identify three major types of arguments in the literature:

- the '*community lost*' argument - this is the argument that increasing urbanization has weakened communities. "Lost scholars have seen modern urbanites as alienated isolates who bear the brunt of transformed society on their own."

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[547] Barry Wellman and Barry Leighton. Networks, Neighborhoods, and Communities. *Urban Affairs Quarterly*, 14 March, 1979. https://docs.google.com/viewer?url=http%3A%2F%2Fwww.chass.utoronto.ca%2F~wellman%2Fpublications%2Fneighborhoods%2Fwellman%2C%2520leighton%2520-%2520NETWORKS%2C%2520NEIGHBORHOODS%2C%2520AND%2520COMMUNITIES.pdf

- the '*community saved*' argument - communities form regardless of the circumstances. Humans are fundamentally gregarious and "Densely knit, tightly bound communities are valued as structures particularly suited to the tenacious conservation of its internal resources, the maintenance of local autonomy and the social control of members.

- the '*community liberated*' argument - "people are seen as having a propensity to form primary ties... out of utilitarian ends." These ties may not be local or geographically based, but tight-knit communities nonetheless exist.

Now consider how Wellman and Leighton cast each of these three theories in network terms:

Community Lost
(a) Rather than being a full member of a solidary community, urbanites are now limited members (in terms of amount, intensity and commitment of interaction) of several social networks.

(b) Primary ties are narrowly defined; there are fewer strands in the relationship.

(c) The narrowly defined ties tend to be weak in intensity.

(d) Ties tend to be fragmented into isolated two-person relationships rather than being parts of extensive networks.

(e) Those networks that do exist tend to be sparsely knit (a low proportion of all potential links between members actually exists) rtaher than being densely knit (a high proportion of potential links exists).

(f) The networks are loosely bounded; there are few discrete clusters or primary groups.

(g) Sparse density, loose boundaries and narrowly defined ties provide little structural basis for solidary activities or sentiments.

(h) The narrowly defined ties dispersed among a number of networks create difficulties in mobilizing assistance from network members.

Community Saved
(a) Urbanites tend to be heavily involved members of a single neighborhood community, although this may combine with membership in other social networks.

(b) There are multiple strands of relationships between members of these neighborhood communities.

(c) While network ties vary in intensity, many of them are strong.

(d) Neighborhood ties tend to be organized into extensive networks.

(e) Networks tend to be densely knit.

(f) Neighborhood networks are tightly bounded, with few external linkages. Ties tend to loop back into the same cluster of network members.

(g) High density, tight boundaries, and multistranded ties provide a structural basis for a good deal of solidary activities and sentiments.

(h) The multistranded strong ties clustered in densely knit networks facilitate the mobilization of assistance for dealing with routine and emergency matters.

Community Liberated

(a) Urbanites now tend to be limited members of several social networks, possibly including one located in their neighborhood.

(b) There is variation in the breadth of the strands of relationships between network members; there are multistranded ties with some, single-stranded ties with many others, and relationships of intermediate breadth with the rest.

(c) The ties range in intensity; some of them are strong, while others are weak but nonetheless useful.

(d) An individual's ties tend to be organized into a series of networks with few connections between them.

(e) Networks tend to be sparsely knit although certain portions of the networks, such as those based on kinship, may be more densely knit.

(f) The networks are loosely bounded, ramifying structures, branching out extensively to form linkages to additional people and resources.

(g) Sparse density, loose boundaries, and narrowly defined ties provide little structural basis for solidary activities and sentiments in the overall networks of urbanites, although some solidary clusters are often present.

(h) Some network ties can be mobilized for general purpose or specific assistance in dealing with routine or emergency matters. The likelihood of mobilization depends more on the quality of the two-person tie than on the nature of the larger network.

Now what is important here is not whether one or another of these descriptions is true or accurate - this is a matter of empirical investigation. Rather, what is significant is that through the use of network terminology, we can precisely formulate these theories into a set of contrasting alternatives, the dimensions of which may be easily viewed and understood.

Note how each of these three descriptions is composed by stepping through a series of network properties: (a) membership in networks, (b) the number of strands in the links, (c) the strength of the links, (d) the number of connections an individual has, (e) the number of connections members in the networks have in general (ie., network density), (f) the coherence of the network, (g) individual activation function, and (h) network activation function.

3. Reflections

So much discussion in the field of education is based in loosely defined terminology and concepts. Take, for example, the advice to 'form community'. There are many things this advice could be manifest as, including any of the three accounts of community given above, and a wide variety of other permutations.

Typically, the advice to 'form community' is understood as advice to form solidary activities and sentiments - what I would in other works characterize as *groups* - but which here may be more precisely understood as actions undertaken in unison ('collaboration') and sentiments held in unison ('commonality'). But of course such exhortations are only one way communities can organize, and not even the most effective ways. But there is always no shortage of people - Larry Sanger,[548] Jaron Lanier,[549] Sherry Turkle,[550] to mention a few raised recently - ready to lament the 'lost community' or 'techno-groupthink' in technology-based education.

What do these criticisms mean? What is their validity? Rather than use prejudicial and imprecise vocabulary, we can examine what it is about technology-supported learning and its proponents that bothers these authors. Perhaps it's all about a sentiment of community lost, as defined above. In such a case, we can respond to it meaningfully, with clarity and precision.

Or take the discussion of 'interaction' in online learning. While more interaction is typically lauded as better, we tend to be sharply limited to narrowly defined notions of interaction - perhaps Moore's formulation[551] of learner-content, learner-instructor or learner-learner interaction. Or maybe Anderson's more sophisticated formulation[552] of the same idea.

But if we can approach the concept of 'interaction' from the network perspective, allowing for the existence of many types or strands of interaction, many degrees or strengths of interaction, various interactive media, and more (as I tried to explain in this series[553]). Again, the point is that we can use network terminology to explain much more clearly complex phenomena such as instruction, communities and interaction.

Wellman and Leighton's paper was written in 1979. It is well-worth anyone's while to look at more recent work [554] to appreciate the depth and utility of network analysis.

Scott Johnson said...

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[548] Larry Sanger. Individual Knowledge in the Internet Age. Educause Review, vol. 45, no. 2. March/April, 2010. http://www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume45/IndividualKnowledgeintheIntern/202336

[549] Jaron Lanier. You Are Note a Gadget. Frequently Asked Questions. Website. Accessed January 25, 2011. http://www.jaronlanier.com/gadgetcurrency.html

[550] Sherry Turkle. Alone Together: Why We Expect More From Technology and Less From Each Other. basic Books, 2011. http://isbn.nu/9780465010219

[551] Moore, M. (1989). Three types of interaction. *American Journal of Distance Education, 3*(2), 1 – 6. http://www.tandf.co.uk/journals/titles/08923647.asp#editorial

[552] Terry Anderson. Getting the Mix Right Again: An updated and theoretical rationale for interaction. The International Review of Research in Open and Distance Learning, Volume 4, Number 2, October, 2003. http://www.irrodl.org/index.php/irrodl/article/view/149/230

[553] Stephen Downes. Interactivity and Best Practices in Web Based Training. Stephen's Web (weblog). January 27, 1998. http://www.downes.ca/post/133

[554] Barry Wellman. Website. Accessed January 30, 2011. http://homes.chass.utoronto.ca/~wellman/

Stephen, Nice posting though I become more confused with the concepts behind networks by the day. Which, I suppose, is a good place to start.

On Sunday night while watching an Al-Jazeera video of demonstrators in Cairo pushing the police back into their barracks the commentator noted that closing the net and cell service seemed to have little effect in dampening the protests. The speculation was that without word from your friends to rely on for updates and locations of hot spots, protesters simply had to venture out on their own. As if news from friends actually dampened the urgency to "be there" by making it KNOWN and oddly less interesting. Or conversely increasing the anxiety level by creating a vacuum of information that could only be resolved by personal attendance.

I'm trying to understand if this is a dynamic of networks? To actually rush to the scene of silence, as if no-news was a more powerful attractor than full coverage. Of course, those used to an abundance of network activity may tag silence as a most extraordinary event which compels resolution by whatever means is available.

At first I was thinking this had something to do with the influence of weak interactions--as in the network conversation is weakened by being turned off. But it feels more like the power of a network to remain intact by adapting to changing conditions. Is it a characteristic of a network to seek equilibrium? If so, there must be some sort of shared identity that allows many individuals to collect and disburse. Can that be simple group membership? Or something different?

dustproduction said...

A more recent study, and arguably a more relevant one, is the RSA report, "Connected Communities." The whole report is found here.[555] It develops language such as social resources, social capital, and social networking analysis. Building on the information provided in the RSA's Social Brain Report, "For the last two decades, the model of the rational individual-'homo economicus'- that has underpinned our faith in democracy, reliance on the market, and trust in social institutions has been consistently undermined by social psychology, behavioural economics and neuroscience."

Sherry Turkle, who in her 1995 book "Life on the Screen" had high hopes for the positive aspects of the digital age, raises interesting concerns about the effects social media can have on social networks in her in book, "Alone Together". "We aren't "happy" anymore: we're simply a semicolon followed by a parenthesis." she laments. And this can apply to the on-line learning community as well, where discourse too often is reduced to words on a screen. But we need to be reminded that social media and the communities it forms, such as Facebook, are the same point computers were in the 1980's, in term of the evolutionary experience that may be afforded us in terms of moving beyond geographic community.

Moncton, January 25, 2011

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[555] Steve Broome. Connected Communities. RSA (website), 2008. http://www.thersa.org/projects/connected-communities

The Secreted Life of Bees

Responding to Thomas Seeley:[556]

By anthropomorphizing bees you are adding your own interpretations to what they do, and then making these interpretations the basis for their decision-making activities. This not only misrepresents bees, it creates a false picture of how bees (and networks in general) make decisions

> *1. Remind the group's members of their shared interests and foster mutual respect... There are no clashing curmudgeons in a bee swarm.*

I doubt that bees are capable of a higher-order function such as mutual respect. Certainly bees disagree with each other as each bee that finds a potential new home will advocate for that home. Any sense of 'shared interest' is purely implicit - a bee is not capable of comprehending shared interests.

No individual bee has a sense of what is in the hive or swarm's best interests. Each bee manages its own little bit of it, and the hive's interest is represented through the interactions among the bees. It is therefore not necessary to have a sense of shared vision or responsibility for community interests.

2. Explore diverse solutions to the problem, to maximize the group's likelihood of uncovering an excellent option. The scout bees search far and wide to discover a broad assortment of possible living quarters.

Each bee explores one solution to the problem. It is only when viewed as a collective that we see an exploration of diverse solutions to the problem. This is important, because it means that in a hive diversity is represented by the bees themselves being different from each other, and not being the same by embracing the same range of diversity.

> *3. Aggregate the group's knowledge through a frank debate. Use the power of a fair and open competition to distinguish good options from bad ones. The scout bees rely on a turbulent debate among groups supporting different options to identify a winner. Whichever group first attracts sufficient supporters wins the debate.*

Bees don't debate. They simply present what they know. A bee will present more or less vigorously depending on the suitability of the home. There is no sense on the part of the bee of

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[556] Thomas Seeley. The Five Habits of Highly Effective Hives. Harvard Business Review weblog, November 11, 2010. http://blogs.hbr.org/cs/2010/11/the_five_habits_of_highly_effe.html

being 'in competition' with the other bees. There's no sense of 'winning the debate' - what happens is that the best new home is selected, not that some bees convinced the other bees.

> *4. Minimize the leader's influence on the group's thinking. By functioning as an impartial moderator rather than a proselytizing boss, a leader enables his group to use its combined knowledge and brainpower. The scout bees have no dominating leader and so can take a broad and deep look at their options.*

Bees do not have leaders and there is no such thing as 'moderation' in bee debate. There is no sense of 'enabling his group' to use its knowledge and brainpower. Queen bees (not even remotely a 'his') function only as the reproductive element of a hive. Again, the hive as a whole - and not individual scouts - take a look at the different options.

> *5. Balance interdependence (information sharing) and independence (absence of peer pressure) among the group's members. Only if ideas are shared publicly but evaluated privately will the group be good at exploring its options and making good choices. Scout bees share freely the news of their finds, but each one makes her own, independent decision of whether or not to support a site.*

There is no such balance in a beehive. There is no peer pressure. Bees are completely independent from the perspective of how to behave, but completely interdependent from the perspective of producing the resources needed to survive.

The reason why these distinctions are important is that the author, by anthropomorphizing the hive behaviour, introduces the idea that the correct decision is the result somehow of appropriate group management on the part of the bees (or the putative 'head bee' who would ensure that all of these pieces of advice are followed) rather than built-in as structural components of the networks.

What is remarkable about bees - and similar sorts of network behaviours - is that they reach the correct conclusion with no cognitive activities at all. They don't need to be mindful of respecting the others group dynamics, or choosing from multiple options. The hive functions best when each bee attends to its own business.

Indeed, it is the element of persuasion, leadership, and group dynamics that introduces the likelihood of error into the mix. If a bee becomes attached to its own choice, and begins to lobby for it, possibly hoping to be selected head bee and to be rewarded with special privileges, the hive is more likely to be persuaded by the most personable bee, instead of the best choice.

In human society, if there is a lesson to be drawn from this, it is that the leader should play no role in leading the group at all. The only behaviour expected from the leader is to introduce new workers or drones into the mix. The workplace ought to be structured such that there is no extra reward for convincing people, no promotion to be obtained by subverting the group. It's not about competition at all, it's about cooperating - each person playing his or her own role and each benefiting from the success of the group as a whole.

flowney said...

"...the leader should play no role in leading the group at all." That's fine if everything were figured out and immutably true but we know that in human societies that just isn't so.

Downes said...

Why do things have to be figured out and immutably true?

Bees have to figure things out. There's a great deal of uncertainty facing a hive. Where is there honey? How best to get to it? Is the bee approaching friend or foe? How many workers should there be? Where should the next hive be located?

The point is, the hive as a whole figures these things out. The hive doesn't defer them to some head bee, who is somehow in possession of privileged knowledge. Through a distributed decision-making process, the hive can do without a leader. But it *still* makes decisions.

It's the same with human society. We tend to think that we need a leader in order to make decisions and figure things out. But we don't. We can do this on our own, without a leader.

Moncton, October 26, 2010

The Semantic Condition

Cascades and Connectivity

This article published as Cascades and Connectivity in eLearn Magazine December 5, 2004.

Michael Feldstein gave us a nice description of the cascade problem in networks in his last opinion column[557]. In cases of serial decision-making-one person decides to adopt Plan A, then another, and so on-people tend to rely on the decisions of those made before. Thus the result is that every person in a network has decided to adopt Plan A, based on the opinions of their predecessors, even though Plan B may be the optimum plan.

There are numerous instances where a cascade phenomenon is undesirable, and not simply in cases where Plan A is not the best plan. In many instances, following the leader is not the most viable strategy, for example, in cases when being the leader confers significant advantages. By being ahead of the pack, Amazon.com was able to create a sustainable business. But businesses that followed faced a problem Amazon did not-competition from the established leader in the field.

According to Feldstein, the problem of cascades in networks is caused by the nature of the network itself. Because a person relies on the opinions of someone else, their own knowledge is not taken into account, thus causing an "information loss." Communication from other people in the network overwhelms the information that a person might rely upon on his or her own, and that information therefore never informs the group as a whole.

Not surprisingly, Feldstein's response is to limit the information flow. "You can do that by simply not giving the participants the chance to hear other people's answers before they respond to a question." This prevents one person's opinion from influencing another, and hence forces the other to rely on local information, thus ensuring that it is entered into the network in the form of a decision to adopt Plan B.

Though Feldstein's solution would certainly solve the cascade problem, it does so at the cost of adding substantial overhead. "Informational cascades can be prevented but generally only with deliberate and specific intervention," he writes. But the cost of such intervention impairs the functioning of the network. For example, Feldstein suggests the employment of "active moderators who have the authority to direct the group's information-sharing activities." People would be, for example, stepped through a polling process such that they would decide simultaneously whether to adopt Plan A or Plan B, thus ensuring that no person is influenced by the choice of another.

The problem of coordination this raises is staggering. Suppose four people are ready to choose a plan but the fifth is not. Are the first four retarded in their progress, or is a hasty decision forced on the fifth? Moreover, it is not even clear that communications between the people can be managed in such a way-what prevents their use of backchannels (such as telephone calls or after-hours meetings) to circumvent the limitations imposed in the communications network? Further still, some activities are inherently serial. How could we conduct an ongoing activity such as stock-market purchases were all transactions required to be conducted at the same time?

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[557] Michael Feldstein. Informational cascades in online learning. eLearn Magazine, October 2004. http://elearnmag.acm.org/featured.cfm?aid=1029492

There is a tendency when a network produces less-than-desirable results to want to suggest that the solution may be found in imposing some sort of control or organization over the network as a whole. The presumption is that a centralized authority will be able to manage what are perceived to be coordination problems within the network, such as the timing of decisions made by individuals in the network. But beyond a very simple network, the difficulties involved in controlling the network become greater than the problems being addressed by the network. The likelihood of error is thus increased to the point where the benefits of the network are completely negated.

Though cascade phenomena are usually represented as 'groupthink' or 'herd mind' (decisions made by individuals based on the influence of other individuals), cascade phenomena are generally better represented as the likelihood of the majority of entities in a network entering into a certain state. Cascade phenomena in electricity networks, for example, have nothing to do with decisions or opinions-they are simply the case where one power station entering an "overload" state as a result of connected stations being in overload. Epidemics of disease are also cascade phenomena, where the cascade is defined as the majority of the entities in the network entering the state of 'being diseased' as a result of contact with another, contagious, diseased entity.

When viewed in this manner, the futility of central-state administration becomes apparent. It is simply not possible to direct all power stations to decide to go into overload (or not) at the same time. It is unreasonable to require that all people be exposed to a disease (or not) at the same time. No amount of central control can dictate the cost of wheat, the flow of power, the spread of disease-were it possible it would have been accomplished long ago (certainly, we have had enough authoritarian regimes that have tried, as they say, to make the trains run on time).

Ironically, the employment of a centralized management function exaggerates this, because it decreases the degree of connectedness between the members. Communication between the members is magnified, reinforced, made more direct. The existence of a centralized and controlling agent makes a cascade phenomenon more likely, because any intervention by the central authority is immediately broadcast to every entity and has a disproportionate influence on that entity. If the mechanism deployed in any way favors Plan A over Plan B, it becomes indistinguishable from a directive that Plan A, rather than Plan B, be employed. The presumption is that the central agent is neutral in such matters; such a presumption assumes a complete separation between mechanism and output that is impossible to attain.

If you have no friends, your choices will not be influenced by your friends. But if you have one friend then your friend will have a disproportionate influence on you (the centralized authority model). If you have 100 friends, however, the influence of one friend is once again reduced to the point where that one opinion, by itself, is unlikely to sway your decision. Cascade phenomena, therefore, are caused not simply because a network of connections exists, but because the network that exists is not connected enough.

As Duncan Watts said in "A simple model of global cascades on random networks," says, "When the network of interpersonal influences is sufficiently sparse, the propagation of cascades is limited by the global connectivity of the network; and when it is sufficiently dense, cascade propagation is limited by the stability of the individual nodes." Cascade phenomena occur, if you will, in a "sweet spot" where there is enough connectivity to permit influence and the propagation of an idea, but not enough connectivity to provide the stabilizing influence of dissenting opinions.

To return to the practical example set out by Feldstein, let's look at the case of various managers opting for Plan A or Plan B. In the example, where there is a small number of managers, the problem isn't simply that one manager is being influenced by the other, the problem is that the influence of the one has a disproportionate influence on the other. But instead of cutting off communication with the other manager-Feldstein's solution-a more robust response would be to increase the number of managers with whom the first interacts. Thus, when one manager opts for Plan A, it will not automatically cause the other manager to opt for Plan A; the other managers' inertia (or varied choices) counsels caution, and this allows for the influence of local knowledge to be felt.

When we look at phenomena like the Kerry nomination, we see that the structure of the communication network that conveyed voter intentions was more like the manager model and less like a densely connected network. Voters did not typically obtain information from each other; they obtained information from centralized sources, such as broadcast agencies. These broadcasters, themselves sharply limited in the number of sources of information they could receive (and receiving it mostly from each other) were very quick to exhibit cascade properties, and when transmitted to the population at large, exhibited a disproportionate influence. Were the broadcasters removed from the picture, however, and were voters made aware of each others' intentions directly, through bilateral rather than mediated communications, the influence of any one voice on the eventual vote would be minimized.

In a similar manner, when people complain about reading the same item over and over on the Web, it is because of the disproportionate influence of a small group of writers who, in essence, propagate ideas that are then replicated on numerous other sites. These influential bloggers are riding the top of what is called the "power curve" of connectivity; they are in the same position as the manager who opted for Plan A. By virtue of being first into the market they attracted the most readers, and their position of having the most readers only made it more likely that other people (all other things being equal) would read them. [All other things are not equal, of course-a power blogger can vault into this position by bringing reputation from other spheres, such as television (Wil Wheaton) or journalism (Andrew Sullivan) or connections (Ann Marie Cox).

Networks that develop dynamically tend to evolve into this formation naturally; power laws are typically limited only by physical constraints. Thus, although the hub airports of the United States have benefited from the tendency of flights to gravitate toward airports already used by other flights, the physical limitations of airport management have ensured that there is an upper limit to airline growth. Similarly, though some proteins exhibit hub behavior in the function of a cell, physical constraints create an upper limit on the number of interactions a protein molecule can undertake. To a certain degree, no such limits exist on the Web; hence a hub like Google exists that is connected to every other Web site, and blogs like Instapundit can have massive numbers of readers. Thus, while the connected nature of the web demonstrates a lesser tendency to cascade phenomena than the centralized model of mass media, the power law ultimately prevails even in this environment.

In my view, this will remain the case so long as access to content on the web is organized by Web site authors. Because of this, it remains difficult to find content on a particular topic, and readers will gravitate to a few sites that tend to cover topics in which they are interested rather than expend the time and effort to find items more precisely matching their interests. By drawing content from a wide variety of sites and organizing these contents into customized content feeds, the range of sites made available to a reader is much greater, decreasing the power law and reducing the probability of cascade phenomena. The shift from Web sites to blogs was, in

effect, this sort of transition; the development of specialized RSS feeds will be a significant move in this direction.

Stephen Downes works with the E-Learning Research group of NRC's Institute for Information Technology and is based in Moncton, New Brunswick, Canada. He spends his time working on learning object and related metadata, blogs and blogging, RSS and content syndication, and raising cats.

Moncton, November 29, 2004

Influence

Responding to David Armano:[558]

Here's a thought experiment:

Joe writes a blog, and it reaches a cadre of 100 Republicans, each of whom dutifully links back on the blogroll.

Jill writes a blog, and it reaches a network of 100 people worldwide, from diverse points of view, each of whom has linked to her blog in an article that discusses her point of view.

Who is more influential?

According to the post above, they have equal influence. However, common sense suggests that Jill will have more influence than Joe, because her ideas will reach into different circles of people, different communities.

Influence is not a function of linkage. It never has been, Technorati notwithstanding. Influence is a function of four properties (and people who have read my work before will be very familiar with these properties):

1. Diversity - a person who communicates with a diverse audience will be more influential than a person who communicates with a unifo0rm audience.

2. Autonomy - a person who is free to speak his or her own mind, and is not merely parroting some 'official view', will have more influence.

3. Openness - a person who writes in multiple languages, or who can be read on multiple platforms, or who is not limited to a single communications channel, will have more influence.

4. Connectivity - a person you can communicate with, and who will listen to your point of view, will have more influence than a person who does not.

The basis for this list is found in my paper 'An Introduction to Connective Knowledge'[559].

Moncton, August 26, 2006

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[558] David Armano. Levels of Influence. Logic+Emotion (weblog). August 25, 2006.
http://darmano.typepad.com/logic_emotion/2006/08/levels_of_influ.html
[559] Downes, S (2007). An Introduction to Connective Knowledge in Hug, Theo (ed.) (2007): Media, Knowledge & Education - Exploring new Spaces, Relations and Dynamics in Digital Media Ecologies. Proceedings of the International Conference held on June 25-26, 2007. November 27, 2007. First posted December 22, 2005, to Stephen's Web. http://www.downes.ca/post/33034

What Is Democracy In Education

Posted to the UNESCO OER discussion, October 26, 2010.

On Tue, 26 Oct 2010 15:01:28 +0200, "Kizito, Rita" wrote:

> *Dear Anuradha, I love your quote " Learning should be democratised in practice, there should be openness in the field of education!" The question is how do we begin getting to this point pragmatically without theorising too much around what needs to be done ?*

Democracy is typically represented as a system of voting and representation, or as instantiated through a set of rights, such as 'freedom of speech', etc. To my mind, though, these represent an emphasis on process rather than underlying principle.

At its core, democracy represents a fair and equitable distribution of power in society. A society is more democratic when a person has more power to govern his or her own life as he or she sees fit. Or as I say on my home page:

> a system of society and learning where each person is able to rise to his or her fullest potential without social or financial encumbrance, where they may express themselves fully and without reservation through art, writing, athletics, invention, or even through their avocations or lifestyle.

> Where they are able to form networks of meaningful and rewarding relationships with their peers, with people who share the same interests or hobbies, the same political or religious affiliations - or different interests or affiliations, as the case may be.

The answer to the practical question, "how do we begin getting to this point pragmatically," leads to a need to enumerate the principles and practices that will lead to this result. To my find, there are four such principles, each with wide-ranging and practical implications.

- Autonomy - the system of education and educational resources should be structured so as to maximize autonomy. Wherever possible, learners should be guided, and able to guide themselves, according to their own goals, purposes, objectives or values. It is a recognition that, insofar as a person shares values with other members of a community, and associates with those members, it is a sharing freely undertaken, of their own volition, based on the evidence, reason and beliefs they find appropriate.

- Diversity - the system of education and educational resources should be structured so as to maximize autonomy. The intent and design of such a system should not be to in some way make everybody the same, but rather to foster creativity and diversity among its members, so that each person in a society instantiates, and represents, a unique perspective, based on personal experience and insight, constituting a valuable contribution to the whole.

- Openness - the system of education and educational resources should be structured so as to maximize openness. People should be able to freely enter and leave the system, and there

ought to be a free flow of ideas and artifacts within the system. This is not to preclude the possibility of privacy, not to preclude the possibility that groups may wish to set themselves apart from the whole; openness works both ways, and one ought to be able to opt out as well as in. But it is rather to say that the structure of the system does not impede openness, and that people are not by some barrier shut out from the system as a whole.

- Interactivity - the system of education and educational resources should be structured so as to maximize interactivity. This is a recognition both that learning results from a process of immersion in a community or society, and second that the knowledge of that community or society, even that resulting from individual insight, is a product of the cumulative interactions of the society as a whole. Jut as a language represents the collective wisdom of a society, so also an insight represented in that language is based on that collective insight.

These four principles, in my mind, constitute a concrete guide to action. When faced with, for example, a software selection decision, these four principles enable a mechanism for deciding: does the software support individual autonomy, or must the individual 'see'; the world a certain way to use it; does the software foster diversity, or must the person use standardized operating systems, applications, or data formats; does the software foster openness, or is access locked down behind a series of logins and other restrictions; does the software promote interactivity, or do users work alone or depend on centralized facilities for communication?

In a similar manner, a consideration of pedagogies and educational strategies is also informed by these criteria. Comparing the lecture with a cooperative activity, for example, we see that the lecture tends to foster less autonomy (everyone must attend) and less diversity (everyone must watch and listen). But a lecture, under certain circumstances, may offer increased interactivity, and an open lecture (which people can leave!) enables autonomy. So we have a guide, not only as to whether to offer a lecture, but also how to improve lectures.

I hope these considerations are useful.

rlubensky said...

I think you are missing one thing. That is that (learning) networks need nurturing. You can't just connect and take. The model requires sharing and contribution. Learning is enhanced when you treat others as you would want and expect to be treated. In a civic republican model, this is called "responsibility". But your network model does not force us into the communitarian frame that you and many others are averse to.

Downes said...

Ron, I think you are overlaying a political philosophy on top of learning theory, and the two aren't a very good fit. Network theory itself is agnostic about 'responsibility'. It recognizes that, in order to be in a network at all, there must be at least the capacity, if not the overt action, to send and receive signals. Also, there is no overt, or even implicit, supposition of reciprocity. Outputs are often different in form, and directed toward different recipients, on quite different conditions.

The civic republican model is broken insofar as it attempts to ascribe the same sort of duties on all participants. From some participants in society we want ideas, from others inventions, from others, social change, and from others, nothing more than to act as a repository and progenitor of human genetic material.

The supposition of 'responsibility' is that some external agent (presumably an authority?) can assign some specific contribution to a person in society. But even welfare recipients who do nothing but have children are participating in the network. It's the form of participation you find objectionable, but the objection is based in ideology, not science.

The only person who is truly outside the community is a hermit who dies along with no progeny. And even then, society can tolerate a certain number of them, as even the idea of them plays a useful role in the rest of society.

Anonymous said...

Let's not forget that all the above-mentioned points for democracy in learning are dependent on learners being skilled in planning and managing their own learning. From our experience in Southern Africa, the mindset and attitude of the learner is a very important determinant of the principles to be effected in the learning process.

Downes said...

I do not deny that this approach requires some degree of focus, motivation and skill on the part of the learner.

But these are attributes required in a democracy in any case. Even if I represented democracy more traditionally - supporting free elections, freedom of speech, etc. - it is apparent that some degree of skill is required by the people in order for democracy to function.

My point is that we cannot advance democracy by suppressing the need for, and practice in, those skills. Having a pedagogy that requires those skills is the first step in the encouraging of their development.

Moncton, October 12, 2010

Autonomy

I think that people misunderstand what I mean by autonomy. It's like when I talk about learner-designed learning. People seem to assume I am talking about casting learners unaided into the sea to fend for themselves. As though they could never ask for advice. As though there would never be anyone willing to guide them or support them.

The same with autonomy. The presumption is that what I mean is a person who is an island, who does not depend in any way on others, who is ruggedly individualistic. Some sort of weird Ayn Rand fantasy of epistemological superhumans, a Nietzsche-inspired fantasy about people being able to completely determine, with no input from anyone or anything, what is true, what is right, what is good.

But that's not what I mean at all. Nothing close. That's why I have included *openness* and *connectedness* as additional criteria for epistemic goodness. That's why I talk about *communities* and *networks* at all. I do believe that the contributions of other people are important and essential. I am well aware how much external influences - yes, including media and advertising - can and should help determine our thoughts and beliefs. I would even draw you a picture depicting the causal relationships, how sensations effect neural states. Like this:
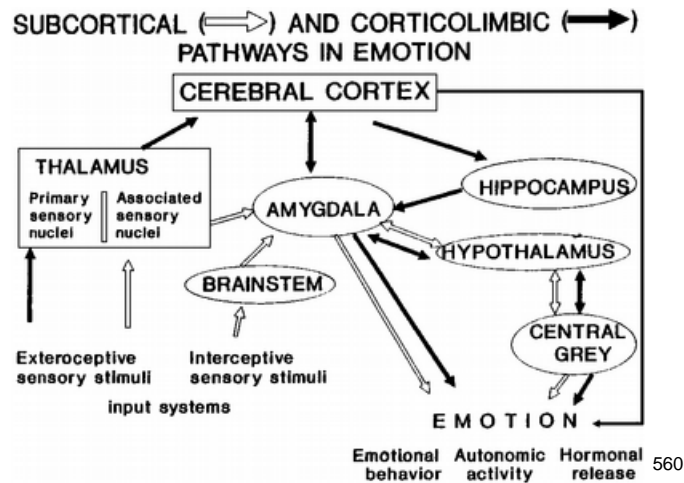
For one thing, maintaining an opposite point of view is irrational. Given what we know of human cognition, there are no belief states that are completely independent of our experiences. We are not born (*contra* Descartes and a whole school of misled Rationalists) with ideas burned into our brain, like some sort of mark of the Creator. What we come to believe is caused by what we

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[560] Izard, C.E. (1993). Four systems for emotion activation: Cognitive and noncognitive processes. Psychological Review, Vol 100(1), Jan 1993, 68-90. http://psycnet.apa.org/index.cfm?fa=buy.optionToBuy&id=1993-16375-001
This is not the image originally posted in this article; it was another, located at http://www.mb.jhu.edu/yoshioka/somato.asp but no longer discoverable.

experience. Our mental contents are reflections, perceptual echoes, the materials of our experiences playing back against each other, mixing and mashing and reforming.

In just the same way, contrasting autonomy with *determinism* is irrational. When I say that somebody's contribution to a network was 'not autonomous', I do not mean that they are under some sort of mind control, a robot at the whim of some Svengali. Yes, again, it is true that all mental states are caused by perceptions and experiences. But it does not follow (and should not be inferred) that all mental states are *determined* by these perceptions and experiences.

These sorts of extremes - complete independence, and complete dependence - are the result of what I might call a naive causal view of the world. This is the view (that all of us were taught as children) that the world operates like clockwork. That when you do something, there is a knowable and determinate effect. A causes B. And if there is a B, then there must be some determinate A that caused it. But the world isn't like that. Once events reach a certain level of complexity, the story about causation breaks down.

Consider, for example, a bolt of lightning. We have all (I presume) seen lightning, and know that it occurs during a thunderstorm. We are told that the cause of the lightning is the buildup of electrical charge in the thundercloud. The thundercloud, in turn, is caused by the buildup of water droplets in the air, condensation caused by the interaction of a warm and humid air mass with a cold front, this cold front in turn caused by the rotation of the Earth and the uneven heating of the Sun.

I remember once, one hot July night in Edmonton, returning home from the Power Plant, mad at the world and just wanting to get away, I saw the lightning flashing south of the city and jumped into my car to go chase it. A couple hours later I was out on the flat prairie, the lightning bolts shooting straight down, huge, towering, overwhelming bolts from the sky. I got out of my car and walked around the field, feeling the rain pelt against my face, watching the bolts streak down, one after the other, feeling so terrified by the storm I was at the same time one with it, part of it.

And I asked myself, had I been struck by lightning at that point, what would have been the cause of it? Would it have been the dismissive behaviour of those around me in the bar? Would it have been some irrational perception on my part? Would it have been my foolish walk around the field in a thunderstorm? Would it have been the buildup of an electrical charge in a cloud? Would it have been the uneven heating of the Earth by the Sun? What would have caused *that bolt* to have *that impact* at *that time*? And the answer is: nothing. That when we say *this thing caused that thing* we are placing an *interpretation,* based on some *gross oversimplification*, on the state of affairs.

There is no contradiction between saying that our thoughts and experiences are caused, and saying that we make choices. This becomes especially the case when we see that our choices in turn result in new thoughts and experiences. What *we* are is that entity (that amorphous assemblage of neural connections that, when thought of as a unit, can be seen as recognizing

input and creating output) that *recognizes* certain states of affairs *as* states of affairs - as things, as causes, as Herman from next door.

So when I am talking about one thing being autonomous from others, I am not talking about the one thing being free from the causal influence of others, but rather, I am telling a story about how it is that the input of that one thing to the network as a whole is determined, and more accurately, how it should be *seen* as determined, how it should be *regarded* as determined, how - were we building a network of some sort - it should be *enabled* or *permitted* to be determined. When I say something is 'determined' or 'not determined' I am talking about, not some essential state of nature, where all things are one of These or one of Those, but rather, how we should *consider* that thing to be.

What was the cause of the lightning? If it was determined, then something *made* it strike at that time in that place. If it was undetermined, then the storm *decided* to hurl a lightning bolt at that time (neither wording really satisfies - and yet these are the words we have to work with, because our bias toward a naive causal view of the world is built into the language). What I want us to do, with respect to humans, is to take the *attitude* that the storm decided to hurl the lightning bolt. Not as an uncaused completely indeterminate event (because obviously it's not) but rather, seen this way, as a grounded, meaningful event (indeed, the *source* of meaning).

What does that mean in practice? It means that we ascribe to ourselves the possibility of *choice* (in fact, Gestalt alternatives, oscillating ways of seeing the world, the decision to perceive a duck rather than a rabbit), that this *choice* will be ascribed as the cause of our external actions, including especially our contributions to the network, in the sense that "When I say 'A' it is *me* that is saying 'A', and not some other person saying 'A' through me." In other words, we are saying that we see the origin of 'A' as being located inside ourselves rather than external to ourselves. It would be like saying that the cause of the lightning bolt is in the storm - it isn't some direct consequence of warm and cold air masses, and it wasn't in some sense 'drawn out' by some foolish person walking in a field tempting fate.

What this means in practice is that there *ought not be* an identifiable dependence (that is, an explainable correlation) between what someone *else* says or does, and what you say or do.

Think of it as akin to the distinction between being *told* to do something, and having someone *suggest* that you do something. These two circumstances may be perceptually indistinct. In each case, a person leans over to you and says, say, "You should vote no." And then you utter the words, "I vote no." The difference between the two states is one of interpretation, one where we decide as observers or as participants to apply one frame to it, as opposed to another. The difference between thinking to ourselves, on hearing the words, 'I have no choice' as opposed to 'I have a choice'.

In order for it to be possible for a person to rationally say that 'I have a choice' there must, in fact, *be* a choice. It much be *possible* for the person to have uttered some statement other than the one that was suggested. This implies, first, that some sort of consideration or processing of

the suggestion occurs, and second, that as part of that consideration, alternative actions emerge as *genuine* possibilities. So that you *could*, as a rational person, see two possible and acceptable states of affairs, one where you said 'I vote no' and one where you said 'I vote yes' (and even one where you decline to vote at all).

What would prevent you from having that choice? First, your input might be in some way circumvented. For example, when somebody purports to express your vote for you, but substitutes their own point of view for yours. Second, your input might be coerced. For example, when the consequences of uttering 'I vote yes' are so horrible that it cannot be considered as a viable alternative. Third, you might fail to consider or process the request. For example, you way respond automatically because you have been conditioned or hypnotized in some way.

Now again, it is important to keep in mind, what these scenarios describe are *ways of seeing* a situation, as opposed to three ontologically distinct types of entities. This is not some sort of taxonomy that I am offering (I don't offer taxonomies). These are three vectors you can consider to be more or less the case such that, when the preponderance of the interpretation is in one direction, the choice was non-autonomous, and when the preponderance of the interpretation is in the other direction, we say the choice was autonomous.

And these vectors are very much matters of point of view. To take the most obvious case, what constitutes 'so horrible that it cannot be considered as a viable alternative'? This clearly will vary depending on the person's point of view. Some people may be prepared to tolerate anything but death or dismemberment. Others would not fear the same being done to themselves, but will fold at the thought of it happening to a loved one. Others would not consider expulsion or exclusion by a group to be tolerable. Being singled out as the lone dissenter might be unbearable for some. This circumstance - what counts as *too horrible* - is a matter of interpretation.

So when a person, acting as a node in a network, wishes to participate *autonomously* in a network, what this *means* is that this person would prefer that, on the whole, (a) their utterances be expressed to other members of the network accurately, (b) that there not be sanctions or punishments for making certain utterances, and (c) they be afforded the time and the capacity to consider matters in their own light before making an utterance.

So when a person, building or designing a network, wishes the participants to participate *autonomously*, what this means is that they would tend to (a) ensure each member's voice is communicated accurately and completely, (b) create a space or mechanism for that person such that they are shielded from sanctions or retributions, and (c) ensure they are presented with information in a timely manner and given the tools (including the education and the background knowledge necessary) to make informed decisions.

These considerations explain why I tend to disfavour small groups. See also Konrad Glogowski, To Ungroup a Class[561]. Small groups tend to fail on all three counts. First, when the decision of a group is reported, the view expressed is often the reporter's (and there are no *mechanisms* in place to prevent that). Second, for some people (namely, me) small groups create greater pressure to *conform* (especially when the group is given a task to perform or an outcome to produce). And third, the process is often constructed in such a way as to prevent consideration of the matter at hand - wither there is no time to present such considerations, or the considerations are overwhelmed by group members who have *not* taken the time to consider.

I haven't talked here about *why* autonomy is necessary in well-functioning networks. The long story is probably the subject for another day. But in a nutshell, the response is this: better decisions are made when more perspectives and more variables are taken into account. Each person in a network brings new perspectives and variables to the table. This, increasing the number of people in the network improves the functioning of the network. If, however, their participation is not autonomous, then the *impact* of those perspectives and variables are never brought into play. They are overridden by whatever entity is creating the non-autonomous behaviour. This weakens the network, because of the missing perspective, and worse, it *disguises* this weakening because the individual entity may be perceived as autonomous, even when not.

Moncton, October 15, 2006

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[561] Glogowski , K. 2006. To Ungroup a Class. Blog of Proximal Development. October 3, 2006. http://www.teachandlearn.ca/blog/2006/10/03/to-ungroup-a-class/

A Model of Autonomy

In his presentation[562] during week 10 of PLENK2010, Seb Fiedler challenged us to develop a concept of autonomy more precise than vague ascriptions of capacities of learners to choose their own course materials and subjects. It was a good criticism and led to worthwhile reflection around the topic.

Fiedler provided us with a model meta-structure, as follows:
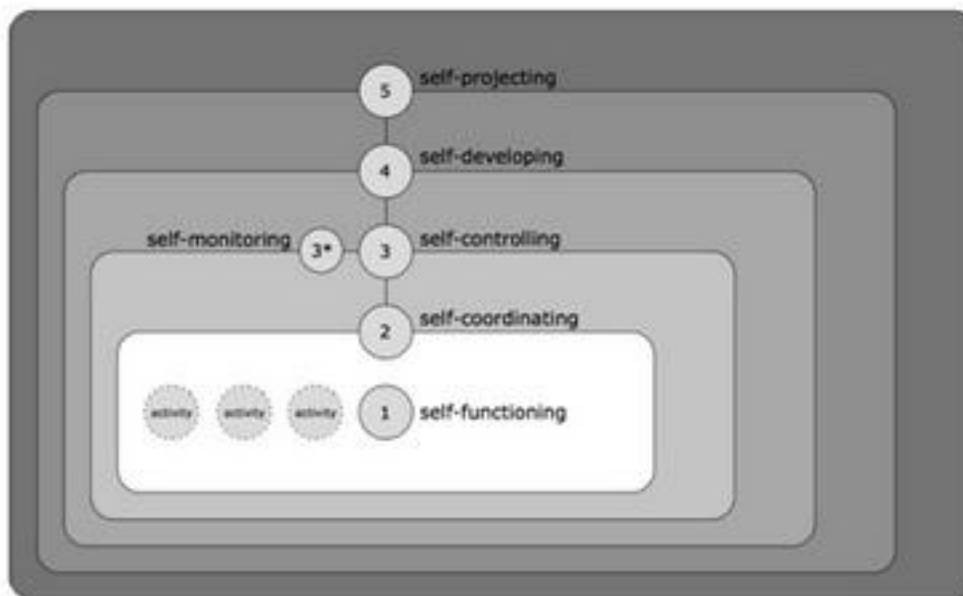
The personal (adult) learner model

This was helpful, but made it difficult to grasp where the *autonomy* came into the picture. It also seemed to centre autonomy on the person, or the individual, which Fiedler and others suggested is a limitation of the conception of autonomy we are employing. Quite so.

That said, a proper model of autonomy will reflect a proper theory of decision-making or theory of action in general. So it should at least reflect the range of factors that go into decision and action. At the very least, even a simple model like this:[563]

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[562] Sebastian Fiedler and Terje Väljataga. Modeling the personal adult learner: the concept of PLE re-interpreted. http://www.downes.ca/files/FiedlerValjataga.pdf Presented to PLENK 2010, November 17, 2010. http://connect.downes.ca/archive/10/11_17_thedaily.htm
[563] Francis M. Duffy. Paradigms, Mental Models, and Mindsets: Triple Barriers to Transformational Change in School Systems: PART 1. Connexions, June 29, 2009.   http://cnx.org/content/m26229/latest/

Figure 1: Nested Theories of Action
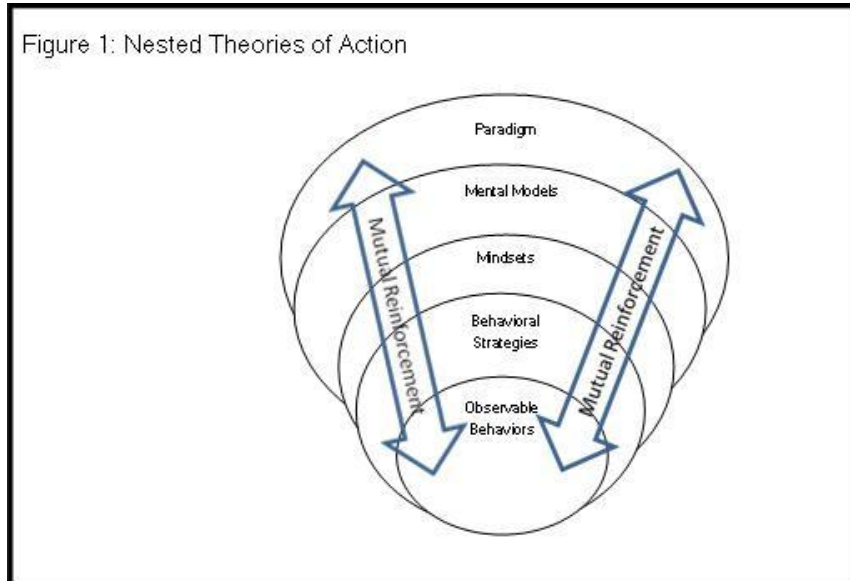
is more helpful than an unprincipled classification of autonomy into different categories such as found here.[564]

Here is the outline of a much more comprehensive and useful model of autonomy:

        A - Factors affecting epistemic states
          - empirical factors
              - external
                      - past experience and memory
                      - current experience
              - internal
                      - emotional state
                      - pain and suffering, etc
                      - fear
              - psychological
                      - traumas
                      - phobias
                      - philias or needs
          - cognitive factors
              - world view or belief set
                      - frames or traces - recognition of ranges of alternatives
                      - metaphors or underlying models
                      - causation, spirit, or other mechanisms
                      - morality, sense of agency, responsibility
              - reasoning mechanism (if any), including:
                      - logical capacities (including modal, probabilistic)
                      - mathematical capacities
                      - degree of certainty attained, required
              - language - languages learned, vocabulary

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[564] Paul Bouchard. Some Factors to Consider When Designing Semi‑Autonomous Learning Environments. The Electronic Journal of e-Learning, Volume 7, Issue 2, June, 2009. http://ejel.org/volume7/issue2/p93

- external factors
    - rewards and incentives
        - financial
        - intrinsic or non-financial
    - punishments, sanctions and threats
    - expectations
        - professional standards
        - organizational vision or strategy

B - Capacity to act on epistemic states
    - physical factors
        - mobility and location
        - perceptual (can you see, is there light?)
        - effective (can you project into the environment - do the buttons respond, do the pages turn, etc)
        - physical support - housing, health, nutrition, etc
        - time
    - social factors
        - laws, rules and regulations, including flexibility of these
        - peer pressure, mores, threat of sanctions
        - mode of collaboration - authoritarian, democratic, consensus, deliberative, etc
            - leadership - capacities, temprement, inclinations, etc
        - responsibility or authority
    - structural factors
        - predictability of the environment
        - complexity of the environment
        - barriers, locks, detours, traps, loops - eg.
http://tihane.files.wordpress.com/2010/01/motivationalbarriers_seci.jpg
    - resources
        - range and depth of resources available
            - medium of resources - staff, money, equipment
            - language and complexity of resources
            - quantity of resources (eg., finances)
        - mode of presentation of those resources
            - sequence of presentation
            - duration of presentation

C - Scope and Range of Autonomous Behaviour
    - expression
        - medium of expression
        - language of expression, word use
    - association and assembly
        - definition of size, scope of social network
        - directionality of communications
    - selection
        - of associates - can you choose your friends? Family?
        - communication options - do channels exist? Can they be open?
        - of tools, eg., of software, hardware
        - resource allocation - spending, delegating, assigning, etc
    - method
        - operating principle, methodology, pedagogy

- background - influence over environmental factors generally, including:
  - noise or music
  - colour scheme or visual appearance
  - lighting, air supply, mobility
- range
  - tolerance - allowed range of results or effects
  - quantity of choices available
  - quality of choices available (cf. Hobson's choice)

D - Effects of Autonomous Behaviour
- impact (ie., the degree or scope of the effect)
  - audience - range of persons affected by behavior
  - efficacy - amount of change potentially caused by behaviour
- improvement (ie., the nature of the effect)
  - internal
    - psychological - satisfaction, lessening of pain, lessening of fear, etc
    - cognitive - beliefs formed, knowledge acquired
  - external
    - material condition, employment, etc
    - capacities, rights, autonomy, etc
  - associative - improvements ascribed to others
  - social - improvements to society generally

Now there are many examples of models of autonomy in the literature that approximate the descriptive power and utility of the model given above.

For example, this[565] is a pretty good model:

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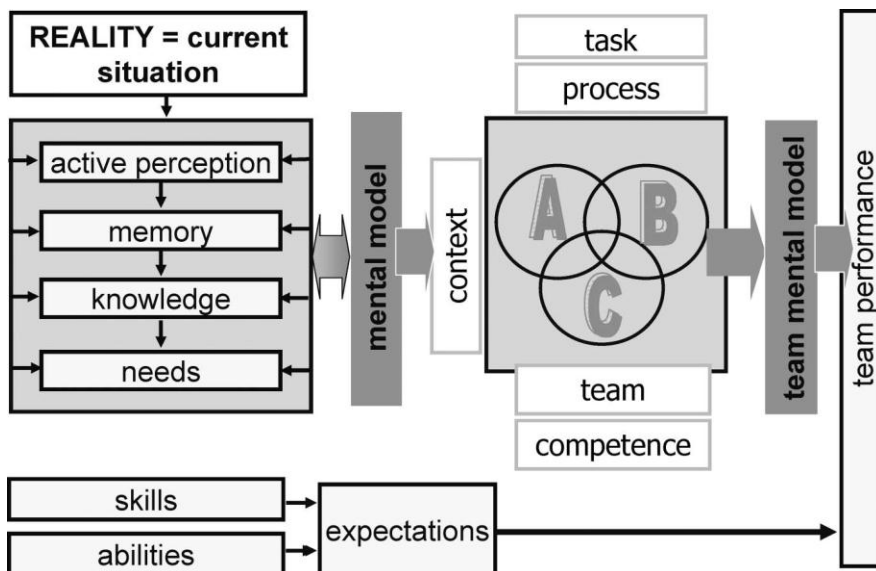
[565] Petra Badke-Schaub, Andre Neumann, Kristina Lauche and Susan Mohammed. Mental models in design teams: a valid approach to performance in design collaboration? CoDesign: International Journal of CoCreation in Design and the Arts, 3:1, 5-20, 2007.

Also, this[566] isn't bad, because it at least tries to account for the actual decision-making process:

External factors

Sociocultural factors — Academic culture

Learner factors

Largely acquired factors ←→ Largely innate factors

- Beliefs in learning
- Expectations about learning
- Learning habits
- Needs
- Affective factors
- Attitude
- Motivation

- Age
- Gender
- Intelligence
- Aptitude
- Personality
- Learning styles

Environmental Factors — Political Factors

Developmental cycles

Willingness to be autonomous in language learning — Capacity for learner autonomy

Lower level of learner autonomy — Higher level of learner autonomy

However I'm not sure how far I'd want to go in incorporating vague (so far as causal efficacy goes) factors as 'gender' or 'learning style'

Here's another[567] pretty good model that again identifies factors in the entire process of decision-making:

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[566] Shu-Hua (Vivien) Kao. Promoting learner autonomy in Taiwanese primary school learners of English. Independent Learning Association Conference, October 8, 2007. http://ila2007.blogspot.ca/2007/10/promoting-learner-autonomy-in-taiwanese.html

[567] Hayo Reinders. Do it yourself? A Learners' Perspective on Learner Autonomy and Self-Access Language Learning. Thesis, posted online, 2009. http://www.innovationinteaching.org/thesis_request.php

CONTROL

(political autonomy)

SELF-MOTIVATION

EXTERNAL MOTIVATION

TAKING RESPONSIBILITY

AFFECTIVE / SOCIAL FACTORS

AFFECTIVE & SOCIAL FACILITATION

CONSCIOUSNESS

EMPOWERMENT

TAKING RESPONSIBILITY

CONSCIOUSNESS

AWARENESS RAISING

EDUCATION

ABILITY

KNOWLEDGE

EDUCATION

AUTONOMOUS LEARNING EVENT

(psychological autonomy)
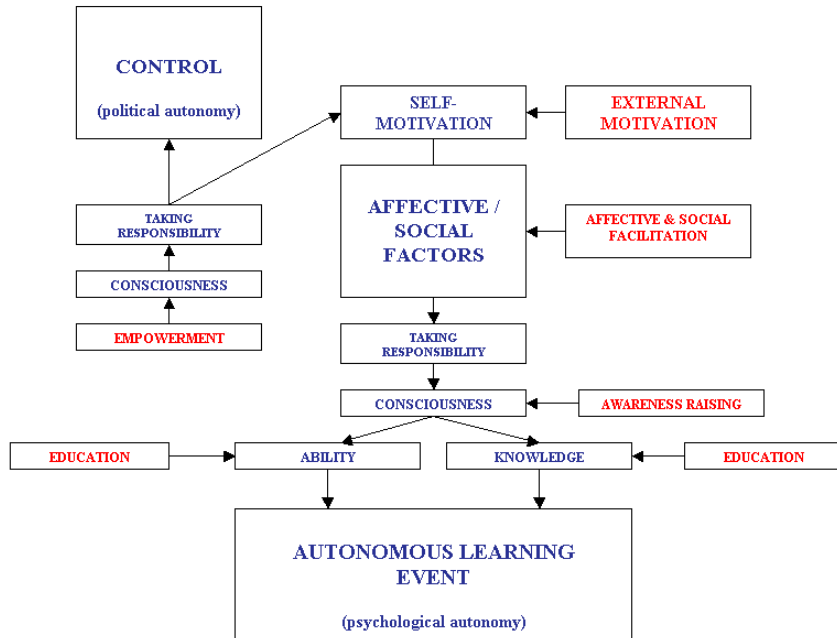
The idea of a model like this is that you can now make statements about autonomy. Specifically:

Given factors A and capacity B, decisions of type C have effect D
or
Provide capacity B, because in case A it is needed for behavior C to have effect D

Ie., the conceptual model that I've provided here would be used to create statements about function, thus generating a functional (or 'flow chart') model. The realization of these functions in physical systems would create the mechanical model. See, for example:[568]

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[568] Xabier Barandiaran. Animats in the Modelling Ecosystems (Response to Barbara Webb). Weblog, August 12, 2009.
http://xabierbarandiaran.wordpress.com/2009/08/12/animats-in-the-modelling-ecosystems-response-to-barbara-webb/

The Modelling Ecosystem
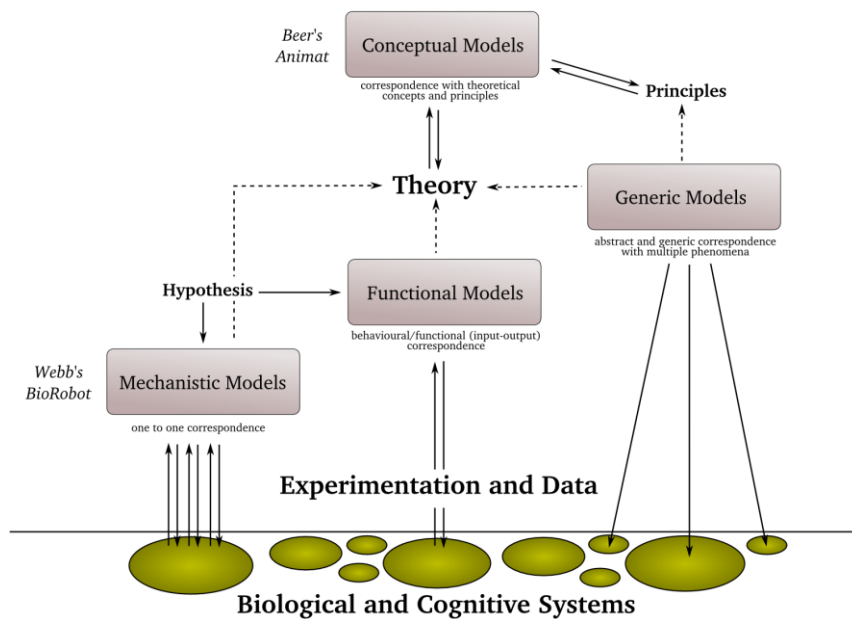
Here's[569] a pretty good functional model that incorporates many of the dimensions of autonomy described above.
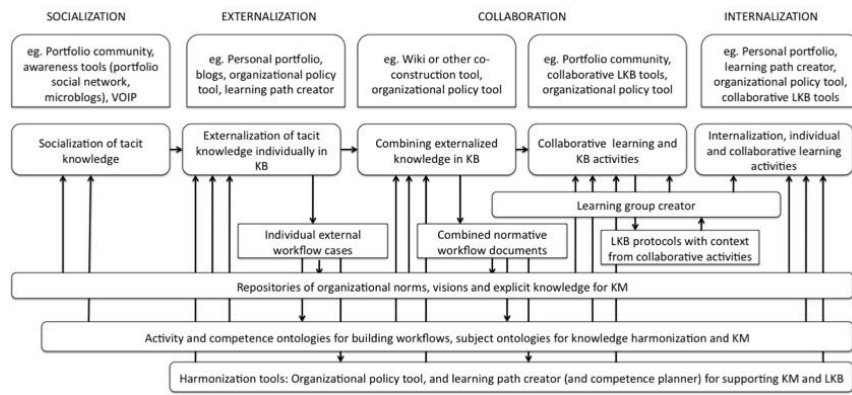
Here's another[570] functional model.

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[569] Kai Pata. Intelligent Learning Extended Organization (IntelLEO) project progress. Blog Post, June 4, 2009.
http://tihane.wordpress.com/2009/06/04/intelleo-project-progress/
[570] J S Carroll and A C Edmondson. Leading organisational learning in health care. Qual Saf Health Care 2002;11:51–56.

But notice how simple (even childish!) it appears, with muddled and unclear depictions of decision and action.

The purpose of a model or a diagram is to make the concept clearer. But creators of models do not have free reign to simply associate elements at random. As we see in the case of modelling autonomy, the model needs to support the set of inferences and processes related to the phenomenon we want to describe. That requires effectively analyzing the phenomenon, and making decisions regarding classifications and categories based on their functional, mechanical and conceptual role, not just convenience and intuition.

Jenny Mackness said...

Stephen - Where you have written: "Here is the outline of a much more comprehensive and useful model of autonomy:...." and outlined the model below - is this your own model? If not - could you tell me where it comes from?

Downes said...

Hiya Jenny - it's my own model.

Jenny Mackness said...

Thank you - still thinking - but trying to interpret your model from my perspective and experience and thinking about how it relates to other models and previous research and how useful it would be for eliciting learners' experiences of autonomy.

Downes said...

No problem. I didn't make any particular effort to relate to or build from previous models; the examples I offer in this post were found after the fact, and seemed to me to be illustrative of what I was after. I'm sure there's a rich discussion in the literature, which I've mostly ignored. Though it does seem to me that the other models are all attempts to create some sort of structure (as though it were a machine, with inputs, processes, and outputs) whereas I am treating it as something much more amorphous, with an undefined internal structure (which, if pressed, I would graph out as some sort of network process) subject to a variety of influences, factors and effects.

Jenny Mackness said...

Hi Stephen - still thinking about this. When you initially determined the principles of connectivism as being autonomy, diversity, openness and connectedness - I'm wondering why you chose the word 'autonomy' as opposed to say independence or self-direction.

Would be really interested to hear your thoughts on this.

Moncton, November 11, 2010

Uniqueness and Conformity

'Short Input' to International Monitoring Conference [571] *September 30, 2010*

It is interesting that Fritz Bohle immediately characterized the dilemma between 'stability and flexibilization' as 'management of uncertainty', and focused on the idea of science having as an enterprise the reduction of uncertainty. The reality is that, as he said, the uncertainties resist elimination. I will consider why this is.

Johannes Sauer writes, "In order to protect and extend Germany's capacity for innovation and competitiveness, the extension and organisation of learning cultures are of major significance within the process of transforming the industrial society into a knowledge society."

Unstated in this assertion, and in assertions like it, is that the nature of 'knowledge' itself is changing as society changes. So we should not interpret the phrase 'knowledge society' from our comfortable definitions of knowledge.

The fourth dilemma outlined in the International Monitoring discussion paper "describes the demand of individuals, organizations, networks and societies for safety of current and planability of future processes." It is possible that the depiction of society as a 'knowledge society' offers for some this safety and stability.

If knowledge is derived to any significant degree from experience, however, then as new technologies, social structures, and innovation are generating an increasing number of novel and unexpected experiences, the continuous state of knowledge itself is one of change, as what we know adapts to what we have experienced.

Consider the concept of 'knowledge processing', from the opening keynote – this treats knowledge as though it is some kind of resource or raw material, like iron or coal, that will be transferred, reformed, processed. This is a traditionalist perspective of knowledge, which is no longer appropriate today.

Where there is structural complexity and process complexity, there is also epistemic complexity. Fully realized, a state of total knowledge is indistinguishable from total complexity, or chaos. That which is 'static' or even 'dynamic' is nothing more than an interpretation, a pattern recognized and indeed imposed on the world.

They say knowledge is power. But in fact, power is knowledge. The only order in the world is that which is imposed, by those in power. In order to understand the changing nature and role of knowledge, we need to understand the changing nature of power. As we have evolved historically, from the power of the monarchy, to the power of the corporation, to something (which lies still in the future) a more decentralized power, so also knowledge evolves from a single, centralist concept, to the pluralism of corporatism, to the chaos of individualism.

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[571] International Monitoring Conferences. RTMW Aachen. Website.
http://www.internationalmonitoring.com/project_events/international_conference.html

In a chaotic environment, knowledge is nothing more than pattern recognition.

The challenge of commonality where there is no static underlying essence to unite us.

Mike Bullard, Canadian comedian, on the secret to stand-up comedy
- first, you establish something in common with the audience
- then you bring them around to your point of view
- then you get them to laugh at themselves

The point is – the joke doesn't first exist in the teller, and then appear in the listener. The joke exists entirely in the listener. The teller possesses only the mechanics of joke production, but not the actual humour. The comedian laughing at the audience is completely different from the audience laughing at themselves.

Knowledge works the same way.

The proposition from the keynote was, only companies that are unique are competitive. But knowledge is found in the recipient, not the company, which contains only the mechanism for knowledge production. If the company must be unique to achieve value, it must at the same time find a point of commonality in order to realize that value. That point of intersection is the critical point of innovation.

Management-union, social partnership, shared values – are artifacts of the older perspective.

Thinking of industry – manufacturing – the factory vs the artisan vs the individual… the industrial age created tools that could be wielded only by masses of individuals working in concert. But the post-industrial age has resized tools again. "The value of a tool in a man's hand has to be re-valuated."

The 'tools' of knowledge are the same.

The success of, say, electricity was based not on uniqueness but on commonality. The current that was sent was accessible, via a point of interaction, to every person in the world (the challenge to consumer power lies in this same point). But the semantics of electricity – the use to which it was put – was unique and determined by the individual.

Moncton, July 27, 2010

Homophily and Association

Responding to Artichoke:[572]

> *I've been trying to find posts of critical analysis on the ULearn07 conference many of our teachers attended in Auckland during the school holidays. I wanted to read any critique of the new learning on offer. So it was disconcerting to read through the 427 Ulearn07 Hitchhkr links [573] and find so little analysis and so much flocking sentiment. If I was reliant upon Hitchhkr alone for feedback on the conference I'd be tempted to conclude that ULearn07 attracted educators of such similar minds that they shared the same emotional response to all the experiences on offer - or perhaps I must conclude that blogging about an educational conference induces a Josie Fraser described homophily[574] in educators.*

What we are seeing in these communities is classic 'group' behaviour. Groups are characterized by emotional attachment to an idea or cause. Hence the 'me too' posts, as posts consisting of statements of loyalty to the group will be most valued by the group.

Group behaviour common accompanies homophily because groups are created - and defined by - similarity and identity. What's important in a group is that everybody be in some way relevantly the same. Thus it becomes important to obtain statements of conformity (in the case of hitchhkr tags) and to define boundaries.

(It is interesting to compare hitchhkr, which, because it used Technorati, demanded explicit affiliation to a group, with the conference feeds created by Edu_RSS, which, because it harvested RSS feeds directly, required no affiliation - in Edu_RSS you tend to get more criticisms and "outsiders'" perspectives).

What should be kept in mind is that homophily is only one of several means of creating associations between entities (and hence, clusters of those entities, aka 'communities').

Homophily[575] is, essentially, simply Hebbian associationism.[576] When neurons fire at the same time - that is, when they are stimulated by all and only the same sort of thing - they tend to become connected.

But there are other principles of association. I would like to list four (usually I list three, but I think that the fourth should become part of this picture). I'll give brief examples of each:

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[572] Artichoke. Bogong Moths in Sydney, Starlings in Rome and Edu_Bloggers at Conferences. Artichoke (weblog). October 11, 2007. http://artichoke.typepad.com/artichoke/2007/10/bogong-moths-in.html
[573] Hitchhkr (website). Ulearn07 (conference). 2007. Link not responding: http://hitchhikr.com/index.php?conf_id=262 Conference URL: http://centre4.core-ed.net/spaces/space.php?space_key=12482
[574] Josie Fraser. The limits of homophily. SocialTech. October 9, 2007. http://fraser.typepad.com/socialtech/2007/10/homophily.html
[575] Miller McPherson, Lynn Smith-Lovin, and James M Cook. Birds of a Feather: Homophily in Social Networks. Annual Review of Sociology Vol. 27: 415-444. August 2001.
[576] Donald Olding Hebb. Scholarpedia (website). Accessed April 3, 2012. http://www.scholarpedia.org/article/Donald_Olding_Hebb Original citation from this paper no longer extant: http://neuron-ai.tuke.sk/NCS/VOL1/P3_html/node14.html

1. Hebbian associationism. People are connected by common interests. Affinity groups, religions, communities of practice - these are all examples of similarity-based association.
2. Accidental, or proximity-based, associationism. People who are proximate (have fewer hops between them) are connected. You may have nothing to do with your neighbour, but you're connected. The mind associates cause and effect because one follows the other (Hume). Retinal cells that are beside each other become associated through common connections.
3. Back-propagation. Existing structures of association are modified through feedback. Complain about the 'me too' posts, for example, and they decline in number. Adversity creates connections.
4. Boltzmann Associationism. Connections are created which reflect the most naturally stable configuration. The way ripples in a pond smooth out. This is how opposites can attract - they are most comfortable with each other. Or, people making alliances of convenience.

Two of these forms are qualitative. They are based on direct experience. They are not critical or evaluative. They tend to lead to groups.

The other two - Back Propagation and Boltzmann associationism - are reflective. They are created through a process of interaction, and not simply through experience. They are critical or evaluative. They tend to lead to networks.

It has been said, by way of criticism of my other work on this subject, that we need the elements of both groups and networks. That may be true. But the problem is, they cancel each other out.

Groups are based on conformity, networks are created out of diversity. Groups are based on compliance, networks are based on autonomy. Groups are closed, networks are open. Groups communicate inwardly, networks communicate outwardly.

Most social networks to date have focused on groups (indeed, they are explicitly about creating groups) and hence, on Hebbian and Accidental association. It's easy to find similarities. But the similarities are so broad (as Fraser says, sex springs to mind) the groups thus defined are formless, and when you define the similarities more narrowly, the members of the group have nothing to say to each other (other than to chant the slogans back and forth at each other).

Finding reflective connections is more difficult. We do not have automated back-propagation and Boltzmann mechanisms on the internet - it's possible that we won't be able to. Right now, the only mechanisms we have are messy things like conferences and chat rooms and discussion lists and blogs. And the connections have to be made, not by machine, but by autonomous reflective individuals.

Moncton, October 11, 2007

More on Sameness

Responding to the enquiries posted to this blog post.[577] Originally intended as a comment, but Blogger very arbitrarily limits the size of comments, and I can't seem to change that.

I honestly don't think that most people think of the definition of 'group' when they use it, beyond the obvious connotations of 'more than one person'. When I've asked people, they typically talk about what the members have in common, rather than links between members. So I'm not sure whether my use is in fact an unusual definition of the word. It may be that when critics evaluate their definitions in the light of what I say, they find the same issues, but rather than abandon their use of the word 'group' they reconceptualize it. In any case, the fact of the matter regarding the common meaning of the word 'group' is a matter for empirical study. For myself, I am much less interested in pushing for some sort of commonly accepted definition of the word as I am in getting at the underlying concepts - 'associations based on sameness' versus 'associations based in interactivity'.

On the matter of convergence of vocabulary, I admit that this proposition was the one that gave me the most pause as I wrote the post above. Is progress generated by convergence on common vocabulary or method, etc.?

As with everything, it depends on what you mean by 'progress'. It seems to me that many people define 'progress' (if only implicitly, and at least in part) as 'convergence on method, vocabulary, etc.' In such a case the proposition becomes tautological - 'the generation of x results in P because P is x'. And as tautology, such a statement can be effectively removed from consideration.

Therefore, the underlying question is, "does the generation of x result in P for cases (or instances) where P is not x?" Does commonness of method or vocabulary result in progress where progress is *not* defined or composed in some way of commonality of vocabulary or method, etc.? That is a much harder case to be made, and my assertion in the post above is essentially the claim that the case cannot be made.

Why would I say this?

Well, let's look at what 'progress' is a property of, and let's look at what 'commonality' is a property of. 'Progress' is a network phenomenon - it refers to the success of the entire network in obtaining some result. In the case of a social network, 'progress' describes the advancement of society. In the case of a neural network, 'progress' describes the advancement of the person.

In the case of 'commonality', however, we are not talking about the property of the network as a whole, but rather, of the entities that compose the network. Consider, for example, the most oft-used expression of commonality, "convergence on common vocabulary/method etc." We are

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[577] Stephen Downes. Progress and Learning. Half an Hour (weblog), March 7, 2011. http://halfanhour.blogspot.ca/2011/03/progress-and-learning.html

talking about "use of vocabulary/method etc." by person A as compared to "use of vocabulary/method etc." In the case of neural networks, the terms 'vocabulary', 'method' barely apply (in my own mind, therefore, I adopt a much wider construal of terms like 'vocabulary' and 'method', but let's not go there). We are talking about commonality of neural states.

Now, being most precisely described, we can identify a clearer role for 'commonality', or as I'll more accurately describe it here, 'sameness'. There are two key roles:

1. 'Sameness' of neural state as regards learning theory. Instances of Hebbian associationism ("what fires together, wires together") imply that some aspect of a neural state must be the same for two neurons (ie., firing) in order for a connection to be formed. But note that this kind of sameness applies not to an internal sameness - it doesn't matter *what* caused the neuron to fire - but only external sameness.

2. 'Sameness' as regards physical substrate required for the possibility of communication. If entity A is a neuron and entity B is a donkey, they are not connecting with each other, because the one does not have the capacity to receive signals from the other. A *physical* compatibility is required for communications. But note that this is a very distinct type of commonality, requiring only *fit* and not identity. A lightbulb need not be the *same* as the socket to connect, only compatible. That said, there are some properties that are indeed the same - 'diameter' and 'thread size', in the case of a light bulb, for example. I've discussed this kind of sameness before. I call it "syntactic" sameness, as opposed to "semantic" sameness - a sameness that addresses only the structure, not the underlying meanings.
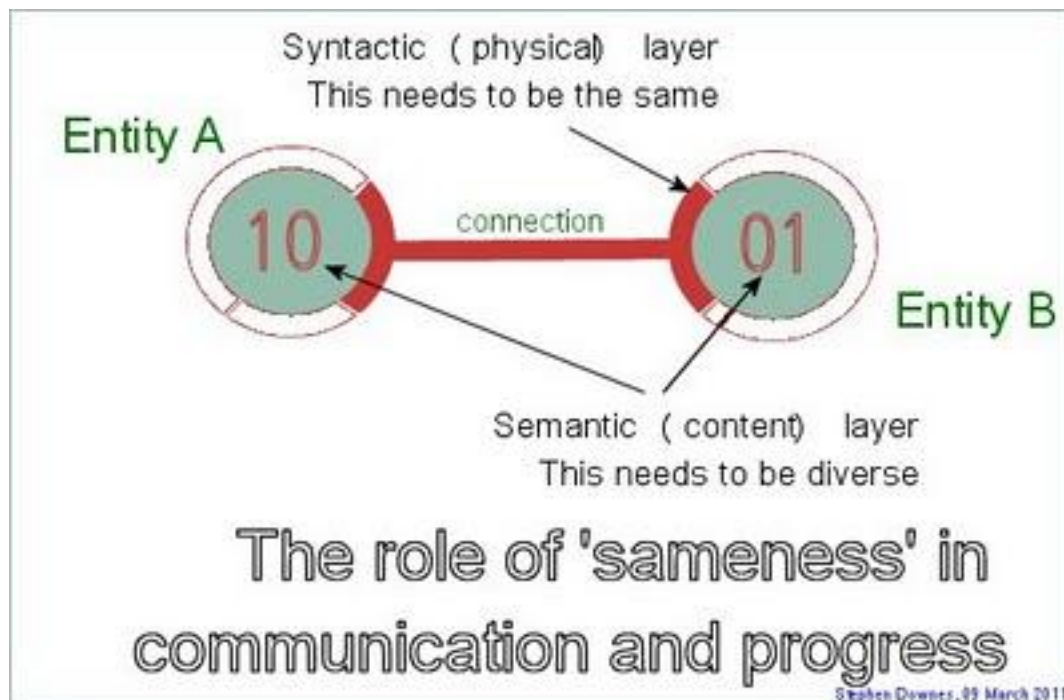
Applied to social networks, these two types of sameness amount to (1) expressions or external behaviour, and most significantly, productions of external artifacts. This sort of sameness is the

sort that allows for stigmergy. And (2) uses of the same physical medium - spoken word (and the shape and structure of those sounds), written forms, etc. Note that two people can 'communicate' even if they have different 'meanings' (or 'truth values', etc.) for two words, provided that (a) they behave the same way when the words are uttered (aka 'language games'), and (b) they use the same words.

All of this has led me to devalue what we think of as a 'common vocabulary', in any ordinary meaning of the term. If we do the same performance with the same entities, it doesn't matter what we think about those entities. You have your interpretation, I have mine, and the world goes merrily along until the inevitable divergence of performance.

Addenda

> *So are you saying, then, that the sameness of groups is in their ability to communicate, and their productions of external artifacts, but not necessarily in their internal states?*

No I am not saying that.

In (what I perceive to be) the typical use of the word 'group' people mean sameness of internal states - eg., sameness of beliefs, attitudes, values, etc. Against that, I am saying that in fact, the only sameness we need is 'syntactic' sameness. That is why I come out against 'groups' - people advocate for s 'sameness' that is not actually required for communication and progress, and actually works against them.

> *You are saying we only require syntactic sameness for the purpose of communication and progress.*

Yes, where 'communication' and 'progress' is not defined as 'sameness'. You have to be careful here.

> *The internal states referenced seem to be emotional-type states that are not required for communication and progress, but are observed in groups.*

No. I'm not talking about emotion here. I know I discuss it in another paper. But not here. Do not draw any conclusions about emotion from what I've written here. I do not mention it at all.

By 'internal state' I mean a property inherent to the entity being connected, as opposed to some attribute of the connection itself. E.g., the 'internal state' of a neuron is the chemical composition of the neuron and any electrical potential it may have. The 'internal state' of a human, by contrast, refers to what we call 'beliefs', 'opinions', 'thoughts', etc. (and which may be collections of neural activities).

> *Ok, remove the word emotion then, and repeat: The internal states referenced (beliefs, attitudes, values etc) seem to be states that are not required for communication and progress, but are observed in groups. Is this closer to what you are trying to say?*

Not exactly. It's this: groups are typically defined by reference sameness of internal states. That is, what makes a person a member of group X is that they have internal state Y. (We don't actually know whether people are the same in this way - it's not always observed - but it is held to be important that they are the same in this way in order to be a member of the group). But - I argue - this sameness is NOT necessary for communication and progress.

…

Don't get hung up on the idea that semantic properties are mental states. They are not. They are merely properties that are inherent to the entity, rather than the nature of the connection.

If we are talking about communication between humans with each other, then the following are semantic properties:
- the goals of the person
- the beliefs of the person
- the person's skin colour
- the person's nationality
- the person's beliefs
- the language spoken by the person

and the following would be syntactic properties:
- vocal utterances heard by the other person
- marks and words written and read by the other person
- artifacts created and seen/touched, etc. bythe other person
- telephone, telegraph, and other wires
- radio and television signals
- RFC 822 format for dates and times

So, again: semantic properties are properties of the *person*. They may be observed or unobserved, it doesn't matter. Syntactic properties are properties of the communication.

Moncton, March 5, 2011

What's Already Been Proven

Responding to David Wiley[578] who cites John Anderson and Lael Schooler's 1991 Reflections of the Environment in Memory.[579]

This is the same John R. Anderson who wrote 'Human Associative Memory' with Gordon Bower, which describes the associative structures fundamental to my own work and also to associationist reasoning generally[580] (another Canadian, too).

In other words, this sort of work *is* the "empirical work done to shore up the nascent theoretical framework called connectivism." I suppose more of it can be done; I cite it when I come across it. I can't speak for George, but it's not like I just made some stuff up and called it a theory.

Related to this, when you ask questions like, "what are the nodes that are connected in connectivism?" I refer you, not to hand-waving generalities, but to things like Boltzmann engines, which draw upon the thermodynamics inherent in the gradual build-up and release of electrical changes in neurons.[581] There's plenty of solid empirical research here, some solid mathematics, and even a spiritual dimension if you're so inclined (my various references to 'harmony through diversity' are directly grounded in the Boltzmann machine). The average human is more complex than the average neuron, of course, and different mechanics apply. But within some bounds, the same sort of descriptions that apply to neurons also apply to humans – the phenomenon of a 'propensity to respond after repeated stimuli', for example, can be observed in both.

That said, what seems to be important is the set of connections, rather more than the particular physical make-up of the nodes being connected. There is not any evidence that find that stipulates that only certain kinds or essences of nodes can be connected (Thomas Nagel notwithstanding). That said, there is a requirement that the entities be in some sense *physical*, because the nature of a connection (as I've often stated) is that a change of state in one results, via the connection, in a change of state in the other (that's why graph theory, nodes and edges, constitutes only a virtualization, and not an instantiation, of network learning).

For while I realize that good-old SR looks like paired associate learning, you can't substitute words, like 'Paris' or 'France', for two nodes. A word, in and of itself, has no causal property; only the tokening has a property. This is important because a word has no discrete token inside a human mind, and therefore, while we can *represent* an association between 'Paris' and 'France', we cannot *instantiate* it. *That* is why we prefer complex networks (and what accounts for the generally anti-cognitivist stance of my own work).

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[578] David Wiley. Thinking out loud about Connectivism. iterating toward openness (weblog). April 20, 2010. http://opencontent.org/blog/archives/1408
[579] John Anderson and Lael Schooler. Reflections of the environment in memory. *Psychological Science*, 2, 396-408, 1991. http://act-r.psy.cmu.edu/publications/pubinfo.php?id=37
[580] John R. Anderson Biography. American Psychologist, April, 1995. http://act-r.psy.cmu.edu/people/ja/ja_bio.html
[581] Wikipedia. Boltzmann Machine. Accessed 16 April, 2010. http://en.wikipedia.org/wiki/Boltzmann_machine

Now I am perfectly happy to talk about simple networks. One node, a connection (not merely an 'edge'), and another. We can represent nodes as simply as possible – on/off (though in reality many more states are possible).

We can represent different networks of this sort. A connection as simply as possible (on/off) such that if node A is on and connection is on, node B turns on (that's an excitatory (or Hebbian)connection). A connection as simply as possible (on/off) such that if node A is on and connection is on, node B turns if (that's an inhibitory connection). Etc. What are the mechanisms for these? Could be electric switches, could be chemical reactions, could be dominos. If you look at Rumelhart and McClelland's 'Jets and Sharks' experiment, you see we can create pooling and differentiation with these kinds of connections.

If the nodes aren't simply on/off, if the connection is represented with a probability function, etc., based on different properties, you get different types of networks.

All of this is known, old, well-proven. It doesn't need to be proven all over again, just for education. Quite the opposite. Education should, for once and at long last, learn from what has already been proven.

Moncton, April 16, 2010

The Role of Open Educational Resources in Personal Learning

Presented to the Best Practices in Upgrading Online, Calgary, via Adobe Connect, March 29, 2011. [Presentation slides and audio].[582]

The very first thing I want to do is to counter the disclaimer that frightened me as this session opened, it was very loud, and said all kinds of things about how this was all private and cannot be shared. You can share this presentation all you want. This presentation is mine and if you want to share it with people, go ahead and share it. No problem at all.

I should have probably put a Creative Commons license on it, although everything on my website is licensed under the Creative Commons license – attribution – non-commercial – share-alike license. So don't feel inhibited from sharing this stuff.

I do want to talk about the role of open educational resources in personal learning. I also want to talk about what they mean in personal learning. I have a challenging presentation ahead, one that I think will make you think, I hope will make you think, and *rethink* just what it is that we're *up to* when we take resources like this presentation, and the pictures and the words and all of that, and put them online or present them in a Connect workshop, what it is that's happening there, what it is that we're up to.

583

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[582] Stephen Downes. The Role of Open Educational Resources in Personal Learning. Stephen's Web (presentations). March 29, 2011. http://www.downes.ca/presentation/269

The Idea of Openness

Here's the argument in one slide, and the argument from my perspective really is very simple. Learning and cognition happen in a network. And I could go on and on and on about what that means, but basically, first of all, learning happens in your brain, your brain is composed of a network of interconnected neurons, and learning happens in a society, and society is composed of a bunch of interconnected people. We can depict both of those as networks. And, they *are* networks.

The second thing is, networks need to be open in order to function. If those connections between the nodes and the entities in the network are broken, are blocked, then that network ceases to function. In order to function, communication has to take place from node to node. And this communication needs to be unobstructed. If the communication is obstructed, this is a network failure.

So, the argument for open educational resources is simply: networks need openness in order to function. So we're all done. We can all go home now.

Well, nothing's that simple. What does it mean to say that our network is open? What is openness?

Well, there's Richard Stallman[584] and the traditional definition of open source as four elements (Stallman, 1994)[585]:

- Freedom to run the software
- Freedom to study the software
- Freedom to distribute the software
- Freedom to modify the software.

And this is a definition that has carried over into the open educational resources (OER) movement. And it's a definition I think that we need to challenge because we need to consider what the perspectives are on this freedom.

When people talk about open source software they talk about openness and freedom from the perspective of the person who already has the software, who already has it in their hands and

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[583] Clipcanvas. Animation of GFX graphics neural. Undated. Accessed March 29, 2011. http://www.clipcanvas.com/video-footage/gfx-graphics-neural-network-human-7728.html

[584] Richard Stallman. Free Software Song. YouTube (video). December 11, 2006. http://www.youtube.com/watch?v=9sJUDx7iEJw
[585] Richard Stallman. Why Software Should not Have Owners. GNU operating System (website). 1994. http://www.gnu.org/philosophy/why-free.html

wants to do things with it, like read it, share it, modify it, whatever. And anything that restricts what they *do* with it is considered an infringement on the freedom.

But what if you're a person who does not have the software, and needs the software? Now our definition of freedom begins to change a little bit because from the perspective of someone who does not have the software freedom would be open access *to* the software with no restrictions. Anything that infringes on that open access is a restriction on their freedom.

And the difference between these two models comes to a head when we talk about commercial use. If you own the software then you should be able to sell it, and if somebody says you can't sell it that's a restriction. But if you don't have the software somebody trying to sell it to you rather than actually giving it to you is creating a restriction.

You have different kinds of open depending on your perspective. So the question is, what is the correct perspective to be looking at, or looking at the issue from, in the context of learning, and online learning in particular.

David Wiley[586] has spoken about open educational resources for many years. He's one of the pioneers in the field. He came up with one of the first open licenses. He talks about openness and standards, and he is again one of the early pioneers in things like learning objects and learning object metadata. He talks about openness in software, and then he talks about openness in system, like open courses.

George Siemens and I, in our work offering online courses, have depicted the progression of openness in three major stages:

- First of all, openness in educational resources
- Secondly, open courses, and then
- Third, an as yet unrealized openness, openness in assessment.

There are other kinds of openness. I was reading something from Sir John Daniel, the former president of the United Kingdom's Open University, talking about openness as related to openness of access or admission to a university program, open resources, and then openness in being able to determine your own educational progression, your own course of studies.

So there are these different dimensions of openness we can talk about, different ways of describing the same concept.

I'm just going to go through those six.

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[586] David Wiley. Interview at the OER Hewlett Foundation grantees' meeting. YouTibe (video). March 10, 2009. http://www.youtube.com/watch?v=cxwtMXEhH0I

The Open Standards

I'm not going to linger on this because you could spend a lifetime talking about standards. In education there's a variety of standards intended to facilitate how we describe, how we discover, and how we reuse educational resources.

The grandfather of these is called learning object[587] metadata, or LOM, created originally by the Aviation Industry Computer-Based Training Committee (AICC)[588], and then passed on by Instructional Management Systems, or IMS, and then standardized under IEEE[589], and then really standardized under the ISO standards organizations.

But there are other standards as well: Learning Design, Common Cartridge, and Learning Tools Interoperability. The United States military, under the auspices of Advanced Distributed Learning (ADL)[590] came out with the Sharable Courseware Object Reference Model (SCORM), which is the standard in commercial online learning.

These standards have all had kind of a murky history, they're sort of open, they're sort of not open, they're sort of proprietary, they're sort of not proprietary. IMS, for example, supports itself with a membership system. If you pay them several thousands of dollars, more if you're bigger, then you have access to the standards ahead of time. It's about a year ahead of time. And so you can make all your products line up with the standards, and everybody else has to wait until IMS formally releases them.

IEEE by contrast will release the standards openly while they're still being discussed and decided upon, but once IEEE settles on the formal specification it then removes it from its website and you have to pay them for it. So openness is really murky, as I said, with respect to standards.

In my world the best kind of standards are ones that are completely open, without encumbrances, which is why, out of all of these, I have tended to favour none of them, and instead favoured things like RSS or even Dublin Core, which are much more open and much more freely used.

Open Source Software

Open Source Software has had a significant impact on online learning. I imagine most people are familiar with Moodle[591], which is a PHP-based open source learning management system is

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[587] faculty Center for Innovative Teaching. Take 5 - Learning Objects. Vimeo (video). December 7, 2010. http://vimeo.com/17570724
[588] Aviation Industry CBT Committee. Website. Accessed April 5, 2012. http://www.aicc.org/joomla/dev/
[589] Learning Resource Meta-data Specification. IMS Global Learning Consortium, Inc. Website. Accessed March 29, 2011. http://www.imsglobal.org/metadata/
[590] Advanced Distributed Learning (ADL). Website. Accessed March 29, 2011. http://www.adlnet.gov/
[591] Moodle. Website. Accessed March 29, 2011. http://moodle.org/

created originally by Martin Dougiamas and then thousands of volunteer programmers. Moodle is small, portable, and useful for colleges and schools.

Another learning management system that was developed as open source software, Sakai, is exactly *not* that. It's Java-based, it's enterprise, it was built by a consortium of universities as part of MIT's Open Knowledge Initiative. There's Elgg, which is an open source social network software for learning, Atutor, LAMS (Learning Activity Management System), and more types of software are available a Schoolforge.[592] And so on.

And all of these are released under one or another type of open source license. If you're not sure about open source licenses, really – and I'm going to over generalize here – that world breaks down into two kinds of worlds: one where the open source license allows commercial development, and the other, the GPL world, where it doesn't allow commercial development.

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Open Educational Resources

More specific to our agenda today are the open educational resource projects[594] themselves. Here I list just a few of them. One of the earlier ones, and certainly the most famous, most heavily promoted, is MIT's Open Courseware project (OCW). Something that's also received a lot of attention recently (because he appeared on the TED videos) is the Khan Academy, which is a whole series of YouTube videos on mathematics, physics, and similar science and technology subjects. MERLOT is a project that was created by a consortium of North American educational institutions.

[592] SchoolForge. Website. Accessed March 29, 2011. http://www.schoolforge.net/
[593] Khan Academy. Khan Academy Exercise Software. YouTube (video). February 9, 2011. http://www.youtube.com/watch?v=hw5k98GV7po
[594] Projects. OER Commons (wiki site). Accessed March 29, 2011. http://wiki.oercommons.org/mediawiki/index.php/Projects

And I could go on. There are dozens of projects that have been set up specifically to create educational materials for distribution for free (or some version of free) to people around the world.

The licensing of these resources, in order to make them available for use and reuse, used to be based on something called the GNU Free Documentation License (GFDL). That was the license that accompanied open source software originally. You'd have the software, which was licensed under GPL or some other open source license, and then the documentation that came along with the software had its own license.

More recently we've had Creative Commons[595], and Creative Commons is not the dominant mechanism for licensing open educational resources, for licensing open content of any sort. Creative Commons was devised by Lawrence Lessig and actually providers the licensor – the person who owns the material – with a series of choices. The person may apply some restriction to the license of the material.

For example,

- CC-by: that requires that the person who uses the content attribute the content to whomever wrote it in the first place. So if you use my content, and I've applied the 'by' condition, you have to say, "This content was created by Stephen Downes."
- 'Share Alike' means that if you share the content, you must share it under the same license that you got the content.
- 'Non-commercial' mans that you cannot use the content to make money (and we could talk about that in more detail)
- 'Non-derivatives' means that you have to use the content as it was created; you can't take the content and make changes to it and effectively create derivative materials from it.

By far the most popular form of Creative Commons license is the one that I use, "Creative Commons By Non-Commercial Share-Alike," which means that I want to be attributed, I don't want the content to be used commercially, and I want it to be shared under the same license that it was obtained under.

Making Things Unfree

A lot of people in the open educational resource community say that the non-commercial condition means that the content isn't really free, because, if it were really free then you should be able to charge money for it. But this is the perspective issue again. If I don't have the content, and want the content, and some guy's charging money for it, it's not free, it's not free in any sense of the word. It's not free in the sense that I don't have to pay for it, but it's also not free in the sense that I can't use it if I don't have the money, I just don't have access to it.

The response from the defenders of commercial use has always been that the content's always available for free somewhere. So it doesn't matter if, say, Penguin sells a copy of *Beowulf*

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[595] Creative Commons. Website. Accessed March 29, 2011. http://creativecommons.org/

because *Beowulf* is in the public domain and you can always get it for free somewhere else. But in fact, in my opinion, it's not so simple as that. When there is commercial use of free resources there are all kinds of motivation to prohibit or prevent the free use of these resources. So even if theoretically it is the case that there could be free copies of *Beowulf* hanging around, the commercial publishers of *Beowulf* the $4.95 version have all kinds of ways of making sure you just can't get at it. And this creates an entire infrastructure for creating open content and then managing somehow to charge for open content, which to be goes entirely against the whole concept.

I did a study in 2006[596] on models of sustainable open educational resources and what I found was that most of the projects that produce open educational resources are publishing projects. The resources are coming out of either commercial publishing houses, or universities that traditionally feed materials into commercial publishing houses, or foundations. And the different models for the sustainability of open educational resources were all based around that paradigm.

So for example you have the endowment model. This model is used by the Stanford Encyclopedia of Philosophy. You take a big chunk of money and put it aside, you get interest on that money every year, and you use the interest on the money to publish the resource. Which worked really well until the stock market crashed.[597]

Then there's the membership model, and that's the model I described earlier for IMS, where you charge memberships, and people can join your consortium and participate in the creation of the resource. But when people pay for memberships they usually expect privileges, and that typically means some sort of privileged access.

Another model is the donation model. We see Wikipedia using the donation model. National Public Radio uses the donation model. And again, it's based on this idea that there will be some organization that does some publishing.

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[596] Stephen Downes. Models for Sustainable Open Educational Resources. Interdisciplinary Journal of Knowledge and Learning Objects. Volume 3, 2007. http://ijello.org/Volume3/IJKLOv3p029-044Downes.pdf
[597] RSA Animate. Changing Education Paradigms. Based on a speech by Sir Ken Robinson. YouTibe (video). October 14, 2010. http://www.youtube.com/watch?v=zDZFcDGpL4U

But even if you have these free resources hanging around commercial publishers still manage to get you to pay for them.[598] And there's a variety of ways they do this:

- Lock-in, for example – if they lock you into a certain technology, such as, say, iTunes, or the Kindle, then the material which would normally be available for free is, within that environment, only available at a price.

- Another way of making it very difficult to get free materials is to set what might be called a 'high bar' for free content. You pose conditions, for example, learning object metadata, which has 87 or so fields which *must* be filled in for it to be registered. The commercial publisher can afford to hire some guy to sit there and fill metadata fields, but free content providers don't have that kind of resource, and so the requirement that content have metadata attached to it creates this 'high bar' that free content can't get over, and so the only version of the content you're going to get is the version where somebody paid somebody create metadata.

- Another way of making you access the commercial content rather than the free content is 'flooding'. This is what Starbucks does. When they want to move into a community they look at the downtown area, three of four square blocks, and they put 25 stores in there. You might say no area needs 25 Starbucks, and it's true, but when they put 25 Starbucks in, that drives out all the other competition. Nobody can compete, and once Starbucks has the *only* coffee stores in the area, now they can start closing stores, raising prices, kicking people out if they're hanging around on the nice sofas, etc. In the world of software, once example is with the commercial versions of Wikipedia. Wikipedia has one of these licenses where you can make a commercial version of it. There are these commercial versions of Wikipedia, and what they do is they take Wikipedia content, put it in a little tiny content window in the middle of the screen, and surround it by advertising, the more flashing and annoying the better. It used to be the case – it's not now because Google stepped in – that if you did a search for a topic that is covered by Wikipedia, you couldn't find the Wikipedia article. All you'd hit were these commercial versions, because they can afford to pay for search engine optimization and Wikipedia can't. Now over time Google stepped in and like the hand of God reaching down elevated Wikipedia up in the search rank, so this doesn't work anymore. For Wikipedia. But it still works for all the other kinds of free content that Google doesn't elevate. You don't notice that. But if you go the next time you do a search at Google and look at the listings, ask yourself how it is that these five are at the top of the list. They've been search-engine optimized. And they're almost certainly, if they're not Wikipedia, they're almost certainly going to be commercial content of some sort.

- There's also 'conversion'. That's where you give somebody a free resource, and then you convert it to a commercial resource, and then get them to pay for it, because they've become so addicted to your free resource that they can't bear to be without it.

So you can see – and you can disagree with the details of this – but you can see that there's this whole economy of free, of commercial, of publishing, of subscriptions, this whole infrastructure which is surrounding the idea of putatively open educational content. It's open educational content "to a degree, with restrictions, if circumstances permit, using certain

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[598] Stephen Downes. Reusable Media, Social Software and Openness in Education. Stephen's Web (weblog). September 7, 2004. http://www.downes.ca/post/7804

technologies." Otherwise we're strangled in the whole – well, as the picture goes, the interests of industrialization, work, images, etc.

And that's the story of open educational resources.

599

The Language of LOLcats

Now I'm going to change gears, and I'm going to change gears really dramatically. What I want to propose to you is that on the internet now the new media that people use - and there's a whole range, everything from little cartoons to videos to animations to those Flash games to the memes that go around to Twitter hashtags and all of that – all of these new media constitute a vocabulary, and that when people create artifacts in this new media they are, quite literally, "speaking in LOLcats."

A 'LOLcat' is – LOL stands for 'Laugh Out Loud' – is typically a photograph, a digital photograph, preferably of a cat, with a funny saying on it. The original is a picture of a cat smiling, looking very smug, looking up at you, and saying "I can has cheezburger?" And there's a whole ethos that goes into LOLcats. There's the bad grammar, there's tying into contemporary memes, there's contemporary ideas, Cheshire Cat, and any of you who have spent any amount of time online know about these, especially these days, the YouTube videos are almost the dominant memes. Even if you don't spend time online, if you watch CTV news, the weather reporter (Jeff Hutcheson) does this "I watch video so you don't have to" segment with these cute videos.

All of these are instances of people, if you will, speaking in LOLcats. LOLcats, or any of these media, are far more than just the image and the words. Here we have a cartoon, one of my

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599 Dyna Moe. Joan Paper Doll - Season 3. Flickr (photo website). November 9, 2009.
http://www.flickr.com/photos/nobodyssweetheart/4089805461

favourites, it's XKCD[600], and it's a neat little story about all of the tech things a person does to contact somebody who is inside the locked room, and of course you can read the punch line for yourself. But is that all the comic is saying? What are the messages? What are the meanings behind the comic?

The price of being a sheep is BOREDOM. The price of being a Wolf is LONELINESS. Choose one or the other with great care.
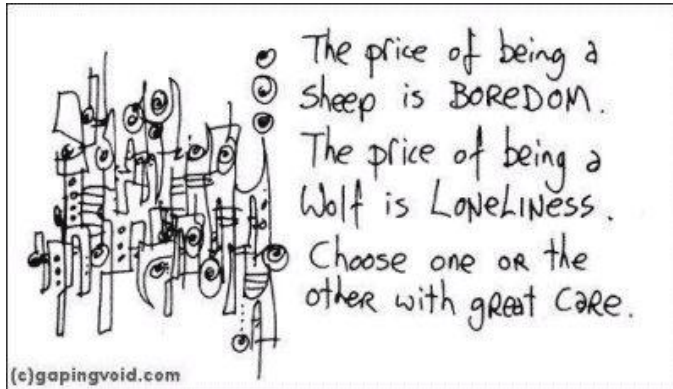
(c)gapingvoid.com

Here's an instance of something capped Gaping Void.[601] This guy made a name for himself drawing little cartoons on the back of business cards. They don't always mean a whole lot, but then he started putting them up online and they started getting shared a lot, and they're very interesting. So with each one of these we can ask, what is the person saying?[602] What is a person saying when they take one of *his* little business cards and put it on their own website?

Here's something that was popular not long after 9-11. Some said too soon. As you can see it's the guy now known as 'Tourist Guy'[603] – because they often get generic names like that –

photographed on top of the World Trade Center and you can see the airplane in the background. And this is characteristic of this sort of media manipulation where you take two photos, one of an airplane and one of a guy on top of the World Trade Center, and put them together to create some sort of odd statement.

And of course once one of these things gets going it really gets going – there's Tourist Guy in front of the Hindenburg[604], and there's Tourist Guy, and the plane is still there, but now you have Kanye West jumping in to say that "Pearl Harbor was the greatest attack." And you can see here how the memes, the concepts, the ideas, the images merge, remerge, fold over each other, shape and create new kinds of meaning. And then people share them, and when they share them, they're creating some kind of meaning out of that too. Aren't they? Because they don't do it for no reason, it's not rational to suppose that they do it for no reason.

[600] Randall Munroe. I'm an Idiot. XKCD (website). Number 530. Accessed March 29, 2011. http://xkcd.com/530/

[601] Gaping Void. Website. Access March 29, 2011. http://www.gapingvoid.com/

[602] Adam Singer. 50 Viral Images Take 2. The Future Buzz (website). January 26, 2009. http://thefuturebuzz.com/2009/01/26/50-viral-images-part-two/

[603] David Emery. The Tourist Guy of 9/11. About.com Urban Legends (website). September 11, 2011. http://urbanlegends.about.com/library/blphoto-wtc.htm

[604] David Emery. Oh, the Humanity. About.com Urban Legends (website). September 11, 2011. http://urbanlegends.about.com/od/mishapsdisasters/ig/Tourist-Guy/hindenburg.htm

These are languages. This sharing of the resource is the expression of meaning in a language. And there are all kinds of languages. These digital photographs, these videos and that, are just a few of the many many languages we use in day-to-day discourse.

Body language, for example. Everybody reads body language, some better than others. Me, I'm practically illiterate in body language. People have their strengths. Clothing, uniforms, flags – we've been watching the Libya thing, one of the very first things they did was to revive the old Libyan flag, the red green and black flag with the crescent and star symbol on it. These things have meanings. The hats, the headgarb that people wear, they have meanings. The drapery in the back of the room has meaning. How many people belong to the jeans and t-shirt set? That's almost a uniform.

Maps, diagrams and graphics have meaning, and they don't necessarily have literal meaning. Here we have a graph of the social network environment from 2007 and what it's doing is using the language of maps in order to talk about something that is very much not mappable. Except that it is mappable, because here's a map of it.

What I'm saying is that this sort of thing underlies our thought processes in general. This is a picture on this slide of a drawing on a cave wall in Kakadu National park[605]. I took this photograph in 2004, and if you look at it really closely it's a fish and fish guts. You might ask, why would an aboriginal draw a painting of fish guts on a cave wall. And the answer of course is

that he – I assume it's a he – wanted to communicate something about fish guts to other people and this was the mechanism for doing it. It was probably a description of what you'll find inside a fish, what you can eat, what you can't eat. Etc. Whatever was important about fish to them.

And we do this in general. We use these – I don't want to say 'representations' because that's too strong a word – but we use these drawings to communicate with each other. The LOLcats, the YouTube videos, the cave paintings on the wall, the body language, the maps – all of these are functioning in the same way. This means that when we're talking about media, and we're talking about communication, we have to get beyond the way we talk about text and books and chapters and papers and publications. We have to get beyond that very narrow discussion because when we talk about ways we communicate as being very simply text and books and publishers and things like that we talking only about a very small narrow segment of it.

What is this kind of talk that we need to get away from? Think about the assumptions that you may have had not only about educational resources but about communications in general. Something like, "messages have a sender and a receiver." In the world of the internet that

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[605] Stephen Downes. The Buntine Oration: Learning Networks. Stephen's Web (weblog). October 8, 2004. http://www.downes.ca/post/20

makes no sense. It really doesn't. "Why did you publish that picture of a cat with a hot on it?" "Because I could." "Who did you send it to?" "Well I don't know."

Or conceptions like "words get meaning from what they represent." Not so. Words – anything – get meaning from pretty much anything. Or "truth is based on the real world." Or "events have a cause and causes can be known." "Science is based on forming and testing hypotheses." All of these are things that are true in this static, linear, coherent, text-based semiotic-based picture of the world, but it's a picture that, even if it was once correct, is no longer correct. The world is just no longer like that.

And this very point, this very distinction is the distinction between what we might say are old and new depictions of open educational resources, or educational resources generally.

The picture that I presented top you earlier of open educational resources as things that are published, things that are presented by publishers in a very formal manner, probably charged-for and commercial, that's the old static coherent linear picture of the world. It's not the model that we want to use for open educational resources.

We need to think about open educational resources not as content but as language. We need to stop treating open educational resources or online resources generally as though they were content like books, magazines, articles, etc., because the people who actually use them – the students and very often the creators – have moved far beyond that. Each one of these things is a word, if you will, in this very large post-linguistic vocabulary. They are now language. They are not composed of language, they *are* language.

And that's why they need to be open.[606]

Think about it for a second. Suppose that everyday words that you wanted to use like, say, 'cat' – to pick a word at random – were *owned* by, say, Coca-Cola. Now we have allowed a certain limited ownership of words in our society, but by and large you can't own words. You can't own the use of words to create expression. And even more particularly, imagine if you had to pay royalties to use certain letters. So you could only use the letter 'o' if you paid money to Ford. You could only use the letter 'i' if you paid money to Apple. The effectiveness of language would be significantly impaired.

And the thesis here is that the effectiveness of language would be impaired in exactly the same way the effectiveness of communication would be impaired, in exactly the same way the effectiveness of a network is impaired if you break down or block the links between entities.

[606] Chris Cocker. Leave Brittney Alone. YouTube (video). September 10, 2007. http://www.youtube.com/watch?v=kHmvkRoEowc

So how do we understand this new media? What – I don't want to say 'skills' – what do we need to know in order to know how to deal with these open educational resources, with these online resources generally? Because, if it's a language, there are going to be linguistic elements.

Syntax	Cognition
Semantics	Context
Pragmatics	Change
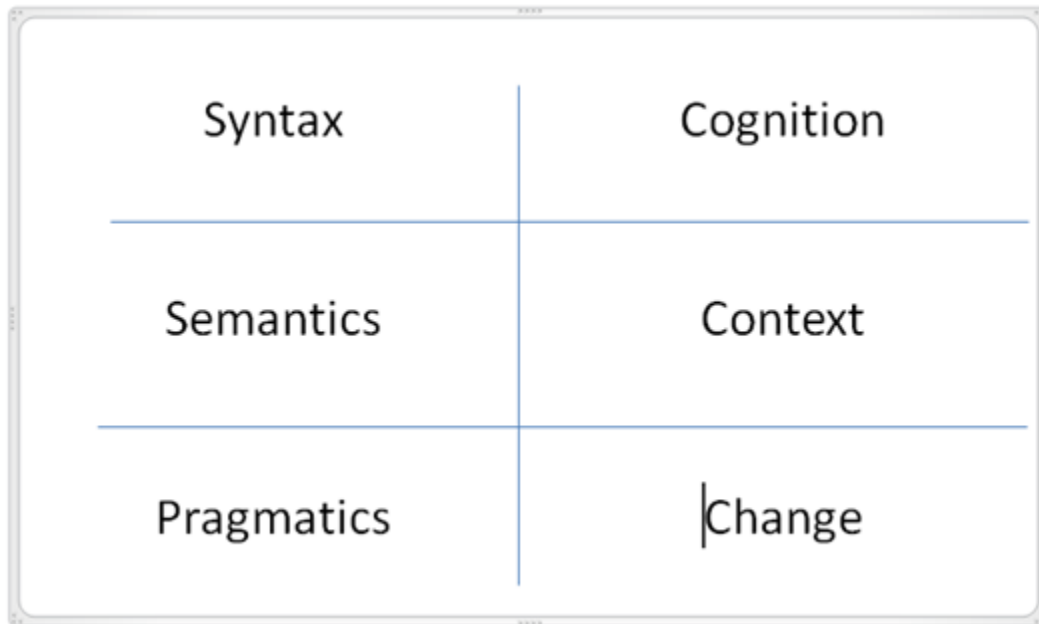
I've come up with this frame, it borrows from Charles Morris, who gives us syntax, semantics and pragmatics, Derrida a little bit, Lao Tzu a little bit.

Syntax is basically our understanding of the shapes that things can take. It's not just rules and grammar. Rules and grammar is a way of talking about language and linguistic expression, text-based expression. Syntax can be archetypes, can be Platonic ideals, can be grammar, logical syntax, procedures, motor skills, operations, patterns, regularities, substitutivity, eggcorns and tropes, etc. Any of those words is well worth looking up.

We think of rules of language – and it's funny because we think that the rule tells us what to do, but the rule really is just a pattern and has come to be a rule because we've observed it over and over and over. Cause and effect is like that. And the skill here is in seeing and recognizing these patterns. Recognizing them and then being able to manipulate them.

A guy called Saul Alinsky wrote a book called *Rulebook for Radicals*. One of the things he said was, "use their own rules against them." Because the established order has ways of doing things, and if you follow the ways of doing things you can actually subvert the established order. The trick here is to see what those rules actually are. And then to be able to manipulate those rules to your own advantage.

Semantics. Not just theories of truth, because the minute you get into theories of truth you get into all kinds of things, all kinds of issues: what makes a sentence true? What makes a picture true? What makes a cartoon true? I look at Family Circus and I nod to myself and say, "true." And I know that the characters depicted in Family Circus are completely fictional. It's not just thta, though. What is the meaning, the purpose or the goal of a communications artifact? The

connotation or implication of what was said? Or if I send you a picture of a very large turkey, I'm not telling you to go get a turkey. I might not even be calling you a turkey. But depending on our context, there might be some shared meaning between us on that. Three strikes in a row – bowling reference, maybe.

Semantics may be based on interpretation, it may be based on frequency, it may be based on what we're willing to bet. Frank Ramsay came up with a theory of probability based on how much you're willing to wager. Probability P is '4' if you're willing to wager 4 dollars to get 1 dollar back.

And more: forms of association, contiguity, back-propagation. Meaning, semantics and networks. Decisions and decision theory – you talk to the political scientists and economists and they will time and time again go back to a world view based on decisions and decision theory.

Pragmatics. Which means use, actions, impact. J.L. Austin wrote a book called *How to do Things with Words*. When people talk about freedom of speech, usually they mean 'freedom of expression', not 'freedom of doing'. But there's so much with speech that we actually *do* – you stand at the altar and you say "I do", you're not just making a statement but you're actually committing an act. If you ask a question, you're not simply uttering some words, but you're creating an expectation of a response. Wittgenstein said meaning itself is based on use.

Cognition. This is another element of this framework. I've defined cognition in four major areas; other people may do it differently, which is fine. Description, definition, argument and explanation. And basically what cognition means the way we transition from one thing to another thing to another thing in our language. It's about the inferences that we make, the explanations that we make, how we go beyond a mere statement of "what is" to a statement of "what must be", to "what could be", "what may be", "what we ought to do", "what we ought to think", etc.

Context. This has to do with environment, placement, localization, language, culture, reference. A lot of late 20th century philosophy was based on discovering the contextual sensitivity to everyday things. Explanation, for example, explored by people like Hansen and van Fraassen. If you say "the roses have grown well," or if you ask, "why have the roses grown well?" what you mean is "why have the roses grown well instead of growing poorly?" Or "why have the roses grown well instead of tulips?" Or "why have the roses grown well instead of aliens landing from outer space?" The answer we get when we ask for an explanation depends on what we though the alternatives were. And that's context.

Same thing with meaning. Willard van Orman Quine explores the question of meaning, the possible range of translations that could take place if we encounter a new language for the first time. Derrida explores the alternatives in a vocabulary space. Frames, as described by George Lakoff. Etc. All of these constitute an understanding of context.

And then finally, *change*. There are many different ways of depicting change ranging from old Taoism, the I Ching, logical relation, to flow, the idea of change as being directional, change as being manifest in history, Marshall McLuhan examining the four aspects of change. Logic is a

study of change. Gaming theory, simulations, and that sort of thing, is a theory of change. Scheduling, time-tabling, activity theory, learning as a network, all of that is looking at things as based in change.

So we take all of this together, wrap this all up – we typically think of knowing, learning, if we don't think of it as retaining content (and I think most people don't any more) we think of it as acquiring skills. Henry Jenkins describes skills like 'performance', 'simulation', 'appropriation'. But these things are all actually languages and should be understood in these six dimensions. Any of the things that we're trying to teach people, *any* of the things – science, mathematics, social studies, Egyptian philosophy, whatever – should be understood as one of these languages.

So here's an example of one of those frames using Jenkins's skills, so we have 'performance', 'simulation', 'appropriation', and in 'performance' we have the elements of syntax, semantics, pragmatics, context, cognition and change. And then for each one of these boxes we can analyze what the details are of that aspect of that language. So what is the syntax of performance, for example? There are the different forms, patterns, rule systems, operations and similarities in performance. From something very simple as "knowing your lines" to presentation acting, method acting, Stanislavski's system, ritual performance, all of these different ways of formalizing performance. And that constitutes ways of understanding performance.

The (Open) Language of Learning

This reaches the third and final thesis: fluency in these languages constitutes 21st century learning. Being able to speak and write and perform and act and share and whatever these different languages constitutes learning in the 21st century. We use to think there was just acquiring content and we use to think there was just acquiring skill but it's much more involved than that. Actually being fluent in these languages, where being fluent means mastering or being capable in the semantics, the syntax, the pragmatics, the context etc., of these different languages.

And that brings us back to what we want to think about in open educational resources. Open Educational Resources are a network – no, I don't even way to say it that way, that trivializes it - Open Educational Resources are individually the words that we use in whatever vocabulary we're using to conduct whatever activity it is that we're doing or that we're undertaking. They are the signals that we send to each other in our network.

If that is so, then what openness means in the context of open educational resources is whatever is meant by openness in a network, where we think of openness in a network as the sending of these signals back and forth, the sending of these resources back and forth.

When I think of openness in a network I come up with four major dimensions. There may be others. I don't pretend to be authoritative on this, or even original, but these are the ones that I see:

- Autonomy – each entity in the network is self-governing
- Diversity – the entities in the network are encouraged to have different states, to be different things, have different opinions, say different things
- Openness – in the sense that signals can be sent freely from one entity to another, and entities have access to signals that are sent from one entity to another, that membership in the network itself is open and fluid, and then finally
- Interactivity – that what is learned by the network is not constituted in the signals that are sent back and forth but rather what is created by the network as a whole that is emergent from the activities that the entities in the network undertake.[607]

What I mean by that is that what is learned by a brain, for example, is not a bunch of electrical impulses. That doesn't make sense! What is learned by a brain is what emerges when these impulses are sent back and forth between ten or a hundred billion neurons.

What is learned is greater than the content of the individual messages. And that is key and crucial to understanding open educational resources. The resources are not content we expect people to assimilate. The content of these resources is not the learning. The learning is what happens when you take these resources and start interacting with them in a network.
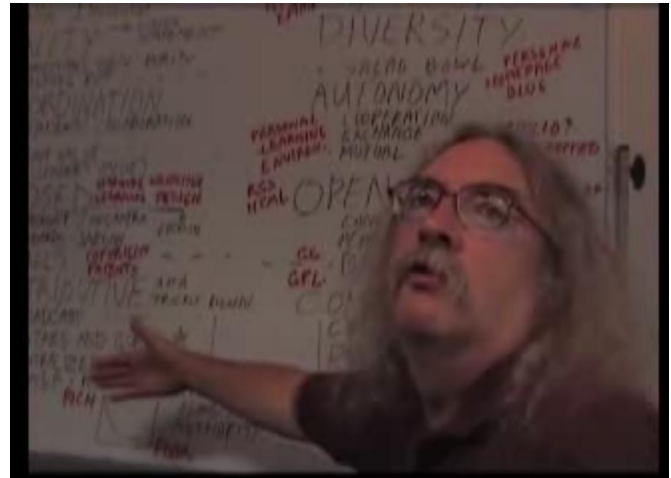
That's the basis that George Siemens and I used to create the massive open online courses. The idea of these courses was that, and is that, we provide as much material for conversation as possible and set up this conversational network where the exchange of this material can take place. So the course itself becomes a network, the open educational resources are the concepts, the words, the vocabulary that people in this network use to communicate with each other. And that's in fact exactly what happens.

Somebody signs up for the course, they start reading stuff being sent by other people, so the idea is we create this network, enable people to communicate using these open educational resources within this network, and the learning people undertake is not the content of these

[607] Stephen Downes. Networks. Filmed by Leigh Blackall. Google Video (video). October 1, 2006. http://video.google.com/videoplay?docid=-4126240905912531540#

resources, but whatever they learn as a consequence of interacting with other people in this network using these resources.

So I've described a process, and again it's one of these things where there are four easy steps: aggregate, remix, repurpose, feed forward. So this is the process that we recommend to people – nothing is required in one of these courses, but this is what we recommend as the four major steps of working with the resources. You gather the resources, you remix them, join them together, mash them up, repurpose them, localize them, adapt them, mark them up, tag them, review them, lipdub them, do whatever with them, and then send them forward, communicate them to other people in the network.

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That's where we stand now with open educational resources and open learning. And there's a whole world ahead. Our capacity for languages has greatly expanded in the last 20 years and in the next 20 years is going to expand again. We haven't even touched in a serious way on the internet the whole idea of Big Data, the Web of Data, sensor networks. We may have two billion people online. Imagine adding to the internet 20 billion sensors, machines, and other things that can send signals.

There's the whole way of representing information from the semantic web – RSS, geography, Friend-of-a-Friend, so on, a whole open learning ecosystem and not just a smallish network, still waiting to be grown. People are using more and more complex 'words' in this new language and we're finding that we don't need the publishers, we don't even need the academics in many cases, to create these resources.

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608 YouTube Video. No longer extant. Viewed March 29, 2011. http://www.youtube.com/watch?v=FPEuu5mpC4s

And insofar as the academics and the publishers create these resources in the old linear static linguistic traditional manner they're speaking at cross-purposes in any case to the new form of learning that's happening now. The idea of using these resources to learn has as much to do with creating these resources as consuming these resources and it's in the creation of these resources that we acquire the greater capacities and skills that we need in order to function in this environment.

And that's where I leave it now. It's a story unfinished, it's a story of communities still finding themselves and forming themselves, languages half-written, unwritten, undeveloped, partially developed, an ecosystem beginning to grow, and a challenge ahead.

Moncton, November 06, 2011

Network Equity (1) - Selective Attraction

You are probably one of those who believe that people become rich or famous or powerful because they deserve to be rich or famous or powerful.

Though there may be some minimal conditions (you have to be at least literate, for example, and you may, like George W. Bush, need to be at least a 'C' student) this assertion is for the most part false.

In fact, aside from any unfair advantage an individual may gain (as a result of already being rich, or being related to someone who is already famous, say) the most crucial condition is luck. Being in the right place at the right time.

To illustrate this, let's look at your iPod or MP3 player. You have, say, 1000 songs on your player. If you choose 'shuffle' the player will choose which song to play. And the player also counts how often you've played each song.

If it's all completely random, then if you play 10000 songs, then each song should have played about 10 times. Chance and probability means they won't work out to exactly 10 plays each, but there won't be a lot of variability. Play a million songs, and each song will play a thousand times each, give or take a few dozen.

If we ordered the songs by how often they were played, and mapped out how frequently they were played, our chart would look like this:
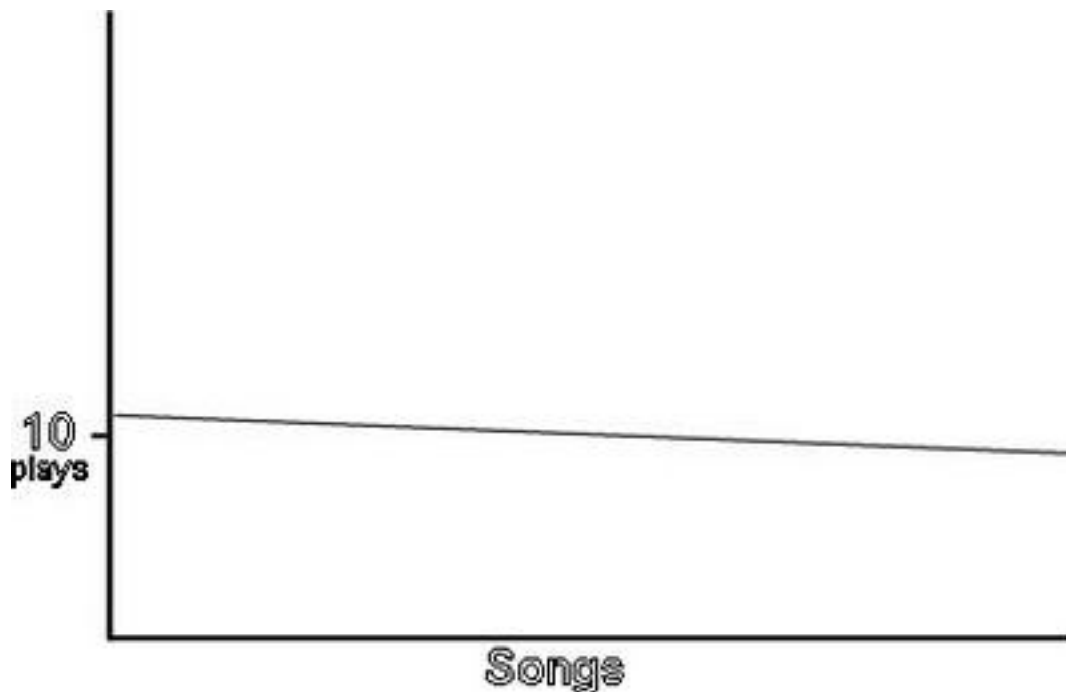
Of course, it won't look exactly like that. You might choose to listen to your favorite songs a few times more. And, if you're like me, there are some songs you just want to skip past. So there will be a bit of a head and a bit of a tail to our graph.
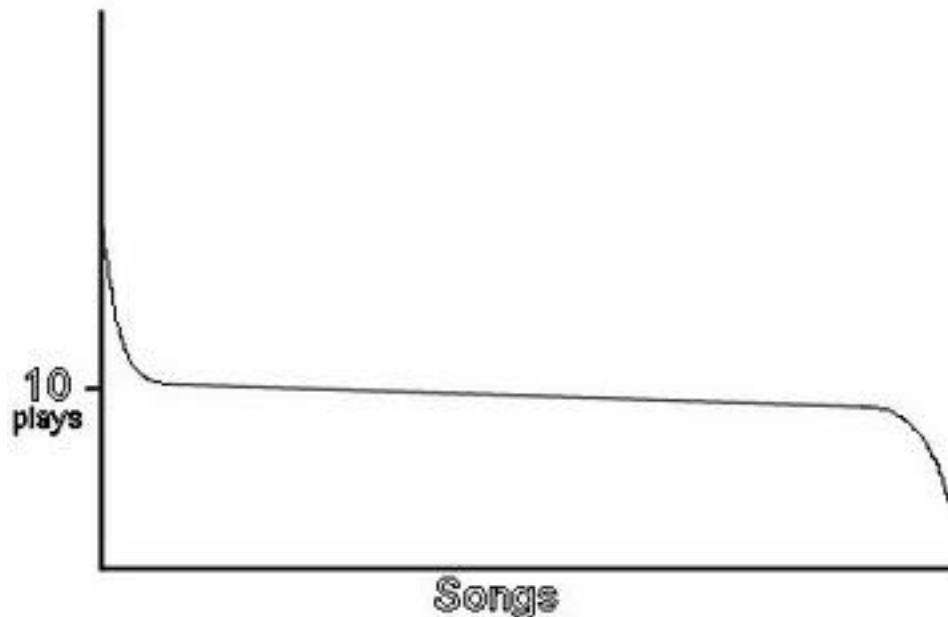
Still, overall, things are pretty balanced. Which is what you would expect - and what you would *want*, of your random song selection.

Suppose, however, you want to tilt the playing field a bit. Instead of selecting completely randomly, suppose you include a slight preference to songs you've already played. To, say, a song would have a 10 percent greater chance of being selected if a song were played 10 times more than another.

Sounds great, right? The best songs will play more frequently, and the duds will never be played at all. Right?

Well, no - not unless you have already seeded all the 'song play' values first. Otherwise, if you let your new 'tilted' random song selector to operate on its own, a funny thing will happen.

The first few songs - whatever they are - will receive a slight benefit. This slight benefit will multiply, bit by bit, as the song selector picks them over other songs. It will grow and grow and grow until the selector is playing almost nothing but the first few songs. Any song not lucky enough to have been selected first will not be selected at all.

If we create the same graph we did before, we get what is known as a 'power law' graph, where the few that are played frequently create a big spike, and the remainder, that are played rarely, if at all, form a long tail.
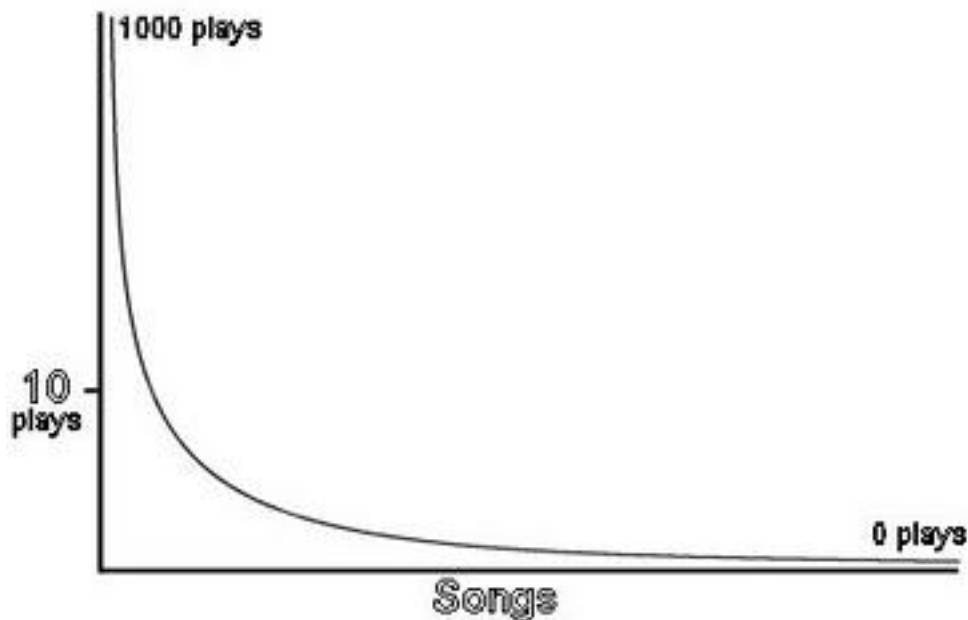
Well, no problem, right? This is exactly what happens with popular songs, well-known websites, the distribution of wealth, and many more things in society. It's the most natural thing in the world.

Sure. But - crucially - what would happen if you tried the same experiment on your iPod a second time, you would get exactly the same spike, but with *different songs.* Do it again, and you get *different songs again*.

This system will always select a favorite and promote it to the top of the big spike, but this selection is purely random; it has nothing to do with the song itself. Even if you're selecting a song yourself to listen to from time to time, the preferential selection will still promote song after random song to the top of the heap.

What would you say, then, about the song at the top of the big spike? That it 'deserved' to be there? That it had the greatest 'merit' of any of the songs? No, of course not. You can't say anything about the song, except for the fact that, once it got a bit of an advantage, it was able to take off.

Even if you seed the selections with some favoured songs, the results will be all out of proportion over the preference. The longer the selective attractor runs, the greater these songs will be favoured. You might not want to listen to the same ten songs over and over - they're not *that* much better - but that's what will happen if the system is allowed to run long enough.

In fact, that's exactly what happens on popular radio. People tend to prefer to listen to a song that's familiar. This system, allowed to propagate long enough - over three decades, say - produces a global preference for a small set of 'classic' songs - and thus is born 'classic rock radio', which is almost all that can be found in some markets.

Are these songs so much better than all others that they should be played almost exclusively? No, of course not. Go to Indie or free music sites like Jamendo[609] and you'll find some songs you like just as much as your classic rock favorites (at least, they will be, once you've listened to them a few times).

This is a phenomenon that can exist in networks generally. Yes, it is a natural phenomenon. As writers like Albert-László Barabási show[610] we see these in many places, from the formation of river systems to the distribution of limbs in a tree to the distribution of trails and roads.

But these effects do not exist because one option is *better* than the other. They exist because one option was lucky enough to be first, to be in the right place at the right time.

Whether it is the popularity of a politician, the influence of a song, the number of links received by a website, the viewership of a viral video, the wealth of a corporate tycoon, or any of a hundred other power law phenomena, the predominate characteristic of these is not greater quality or virtue or value, but a simple multiplier effect that could just as easily have chosen something else.

Don't equate wealth with knowledge, fame with insight. Don't equate the accidental properties of a network phenomenon to intrinsic worth or value. The differences between us are far slighter than the disparities in wealth, power or fame would indicate. We are all much more similar than we are dissimilar.

Moncton, April 12, 2010

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[609] Jamendo. Website. Accessed 12 April 2010. http://www.jamendo.com/en/
[610] Wikipedia. Barabási–Albert model. Accessed 12 April 2010. http://en.wikipedia.org/wiki/Barab%C3%A1si%E2%80%93Albert_model

Collaboration and Cooperation

I was asked, by email:[611] *I was very interested in your distinction Groups vs Networks. Can we say it has a direct parallelism with the distinction Collaboration vs Cooperation? In terms of enabling student's freedom, how would you describe each one?*

I believe that you can draw a connection between the two distinctions. Collaboration belongs to groups, while cooperation is typical of a network. The significant difference is that, in the former, the individual is subsumed under the whole, and becomes a part of the whole, which is created by conjoining a collection of largely identical members, while in the latter, the individual retains his or her individuality, while the whole is an emergent property of the collection of individuals.

I have identified four major dimensions distinguishing the role of the individual in collaboration from the role of the individual in cooperation:

- Autonomy - in the case of collaboration, the actions of the individual are determined with reference to the needs and interests of the group, and are typically directed by a leader or some sort of group decision-making process. Groups often have a 'common vision' to which each member is expected to subscribe. In a cooperative enterprise, each individual participates out of his or her own volition, and acts according to individually defined values or principles.

- Diversity - in the case of collaboration, diversity of aim or objective is not desired. While individuals may engage in different activities, each is understood only in terms of the common end or goal, as in the production of a car on an assembly line. It is important that people speak the same language, sing from the same songbook, or otherwise exhibit some sort of identity with other members. In the case of cooperation, there is no common element uniting the group; rather, each individual engages in a completely unique set of interactions based on his or her own needs and preferences. There is no expectation even of a common language or world view.

- Openness - in the case of collaboration there is a strong sense of group identity, a clear boundary between who is a member and who is not, often to the point of excluding non-members and even hiding large parts of the group's activities from view. In a network, by contrast, there is not a clear boundary or even a recognized set of members. While membership in a group is an all-or-nothing thing, membership in a network may be tenuous, drifting in and out, like a lurker at the edge of a conversation.

- Interactivity - in the case of collaboration, information typically diffuses from the centre to the periphery as people receive their 'marching orders'. A 'broadcast network' is more common of a collaborative organization. Management, structure and hierarchy govern the connections and flow of information. Group communication dynamics are characterized by a 'big spike', whether or not there is a long tail; that is, a few members will have an influence disproportionate to the

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[611] Maria Leal. 1 Question Interview – Stephen Downes. Maria @ UAb (weblog). April 12, 2010. http://lealmaria.wordpress.com/2010/04/12/1-question-interview-stephen-downes/

rest, and will use their positions to define the 'common' or 'shared' values that will be held by the rest of the group. In a cooperative enterprise, by contrast, there is a relative equality of communications and connectivity; there will be no big spike or single centre of influence.

In general, the properties describing those of collaborative relate to mass. The creation of movements, whether nationalistic, religious or political, are based on amassing large numbers of people united under the same sign, set of beliefs or statement of principles. These mass activities are often instantiated in the figure of one person, a leader or inspiration. The same belief is held by each of the members, who will also share a certain language or jargon, and this belief propagates from one person to another through a process of diffusion, conversion or enrollment into the case.

The properties describing a cooperative, by contract, relate to organization. The creation of networks, whether they be economic or commodity marketplaces, infrastructure or communication systems, ecologies or ecosystems, social networks, local communities, and the like, is based on sets of interactions between members where these interactions form, as a whole, a unique, distinct and recognizable entity note based in the individual actions, beliefs or values of any, or even all, of the individuals, but rather exhibiting its own logic based on is organization.

It is interesting no note how the traditional 'process' freedoms relate almost entirely to the formation of groups or collaborations. They are not individual freedoms so much as a set of mechanisms that allow the creation and formation of new groups (which was a stunning advance for its time, an era when typically only one group at a time would be allowed to legitimately exist). Consider how 'freedom of assembly', 'freedom of the press' and even 'freedom of speech' allows people to create new groups, while 'freedom of opinion or religion' allows a person to join new groups.

In terms of freedom, it is my belief that a cooperative network engenders greater freedom. This is because, even though process freedoms (freedom of the press, freedom of assembly, etc.) may be the same in the two models, and indeed, essential for each of the two models, the network model allows more freedoms in other dimensions. In particular, an individual working cooperatively has greater empowerment; not merely the right to freedom of expression, but a channel to connect to others, and the means to live according to the beliefs expressed. And the individual in a network is free from a variety of pressures, pressures to conform, pressures to stipulate to a belief or creed, language requirements, nationality requirements, and the rest.

Moncton, April 1, 2010

Surveys Are Not Connective Knowledge

Responding to Steve Covello[612] who asserts "the collective opinion based on crowdsourced data collection means nothing more than a statistical point of interest... In a "data happy" world, we are inclined to reflexively respond to patterns and trends in information – the so-called emergence phenomenon mentioned by Stephen Downes and Connectivists in general – rather than the inherent validity of the basis for the data trends."

Gross mass-based phenomena such as yes-no votes are not emergent phenomena and are not what is meant by 'collective intelligence'.

That would be like attempting to analyze the meaning of a set of pixels by counting how many are 'off' versus 'on', instead of looking at the organization and recognizing in that a picture of Richard Nixon.

The fruit of collective intelligence, which I (and others) have described as an emergent phenomenon, results from the linkages and connections between individuals, and not a counting of properties (such as survey results) of those individuals.

This emergent knowledge is not intended to compete with, or replace, qualitative or quantitative knowledge. The assessment of whether Obama is a Muslim is not the subject of collective intelligence, no more than the assessment how many children he has would be based on what colour jacket he is wearing. Just as we should not confuse qualitative and quantitative data, we should not confuse either of those with data describing connections and relations.

As to whether observation of emergent phenomena based on linkages or relations is based on "inherent validity", or "objective measure, evidence of intellectual virtue, rational thinking, or consideration of viable alternatives", depends on "reliability and validity of information", and demonstrates "smart, correct, educated, having wisdom, having valid experience in an area of knowledge or skill", such data - just like assessments of quality or quantity - are and ought to be subject to assessments of reliability, and not accepted as fact uncritically.

Just as nobody would accept a claim like "Obama is purple" or "Obama is really two people" uncritically, and without corroboration or verification, nor either should we uncritically accept statement like "Obama is a Muslim" or even "this arrangement of pixels depicts Richard Nixon" uncritically, without corroboration or verification.

The idea of emergent properties, or collective intelligence, or (as I would call it) connective knowledge, is not inherently opposed even to the strong realism assumed in the assessment above. It is not inconsistent to assert that "there are facts of the matter" and "these facts are expressed as connective knowledge".

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[612] Steve Covello. Critique of various articles on Online Instruction – part 1. On Instructional Design (weblog). 31 March 2010. http://www.apescience.com/id/blog/critique-of-various-articles-on-online-instruction

The point of an assertion that there *is* connective knowledge is to assert that "this domain of facts is not exhausted by observing qualities and counting entities or their properties; there is a distinct set of facts represented by the *connections* between these entities." This is a proposition, even when granting the naive sort of realism assumed above, that is difficult to refute, and is not refuted by assertions such as "a large quantity of people express the belief that Obama is Muslim."

If we wanted to learn about Obama's religion - which is not a simple observable or countable property - then we would not sample what people unconnected to him express as beliefs. That's like determining the colour of grass by counting pebbles on the beach. Rather, we would amass and collect the set of Obama's *connections* and *interactions* with other people and things, and determine whether this constitutes a set of patterns that more typically resembles a person we typically call a "Muslim".

Does Obama go to Muslim assemblies, such as Mosques, or does he typically assemble with and interact with Christians? Does he regularly consult Islamic texts, or would his readings be more typical of work read by Christians? Can connections in his thought be drawn to Islamic Law, or does an analysis of his texts demonstrate a stronger affinity with Christian thought? Do the utterances and texts of people connected to Obama describe him in terms typical of those describing Muslims, or do they tend to connect him to terms typical of those describing Christians?

Asserting that "Obama is a Muslim" based on a poll would be irresponsible, and no person advocating any form of collective intelligence or connective knowledge would assert otherwise.

But asserting that there is some simple observable property that verifies or confirms that "Obama is not a Muslim" is equally irresponsible. Naive realism does not refute connective knowledge when the reality being described is complex, when there is no simple observable or countable fact of the matter.

Connective knowledge, in other words, does not refute or overturn existing knowledge; rather, it offers us a *new* type of knowledge, that *cannot* be confirmed or refuted by simple observation of data; the employment of connective knowledge *is* to assess and evaluate such assertions *is* a demonstration of being "smart, correct, educated, having wisdom, having valid experience in an area of knowledge or skill".

Update: Steve Covello has responded with detailed commentary.[613]

Moncton, March 17, 2010

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[613] Steve Covello. Response to Mr. Downes' Comments. March 31, 2010. http://www.apescience.com/id/blog/response-to-mr-downes-comments

Three Models of Knowledge Production

Harold Jarche weighs[614] in with a much improved version of the model describing personal knowledge management, which now has these as intermediate stages between gathering and distributing:

- Filtering (separating signal from noise, based on some criteria)
- Validation (ensuring that information is reliable, current or supported by research)
- Synthesis (describing patterns, trends or flows in large amounts of information)
- Presentation (making information understandable through visualization or logical presentation)
  Customization (describing information in context)
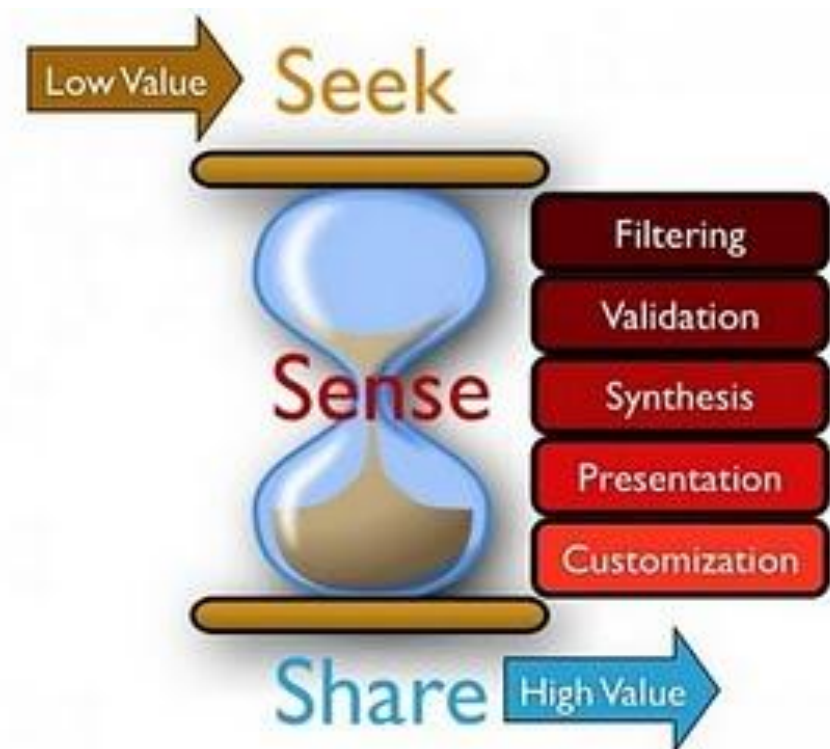
That said, while this is a much better model than this[615] I think it stays true to the original 'filtering' vision, where you go from data to wisdom[616] through successive filtering processes. And while there are different ways[617] to think of knowledge - processed, procedural, propositional - this model I think adheres to a more basic view.

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[614] Harold Jarche. Sense-Making. 17 March 2010. http://www.jarche.com/2010/03/sense-making/
[615] Harold Jarche. PKM: aggregate, filer, connect. 25 January 2010. http://www.jarche.com/2010/01/pkm-aggregate-filter-connect/
[616] Knowledge Management. data. 18 November 2007. http://www.durantlaw.info/category/knowledge-management/data
[617] Wikipedia. DIKW. Accessed 17 February 2010. http://en.wikipedia.org/wiki/DIKW
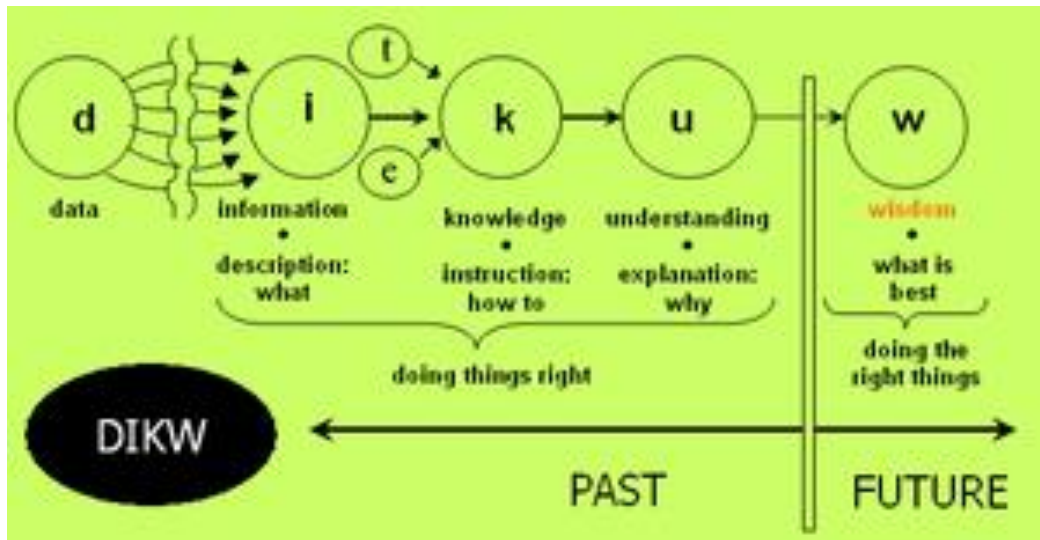
Here's what I think. The picture being presented by Jarche and his colleagues adhere to a 'mining' model of knowledge management (from which we get phrases like 'data mining'). But it's just one perspective, and arguably not the best. It should be contrasted with some alternatives:

1. **knowledge production as mining** - on this view, data is like a raw material that is searched for and retrieved. It can be filtered, assessed and remixed, but is elemental. You add value by creating more and more refined metals, alloys, compounds and materials out of what was there, but you can never create anything that is different in nature from what was there in the first place, but you can be very sure of what you have, and the value is derived in the reliability of the process and the difficulty of obtaining such pure resources. The model is like the mining of ore to create gold to make jewellery. This is the Jarche / PKM view, at least as described thus far.

2. **knowledge production as construction** - on this view, data is like a raw material, but you work with it with your hands, and create something new out of what you have been given. While you cannot add material over and above what you have been given, you add value to it by giving it form and function. Knowledge construction gives you the ability to create abstractions, to treat raw materials as signs and symbols, and to make meaning out of data. the model is like the mining of clay to make bricks to build houses.

3. **knowledge production as growth** - on this view, data is like a raw material that serves as a nutrient or growth medium. It is absorbed into the system - a plant or animal - and integrated into an existing organism. The raw material isn't itself transformed or reshaped into something new, but rather nourishes and contributes to the growth of the organism, which in turn creates something new and unexpected. The model is like soil that grows a plant that in turn produces a flower.

The different approaches each stress different aspects of knowledge (or, arguably, are the result of different stresses).

The mining approach stresses accuracy and purity. Getting the right data, getting accurate data and validating data are of critical importance. It is an approach that is going to focus of 'best' - as in "best practices" - or on demonstrated reliability.

The construction approach, by contrast, is focused on sameness and identity. Because the construction approach combines material with form to satisfy purpose, the elements being worked stand in a representational relation to the world. They mean something. And this meaning must be consistent, must be the same, from instance to instance. Standards-based, meaning-based and representational systems, such as the Semantic Web, are illustrative of construction approaches.

Finally, the growth approach is focused on creation and creativity. The 'knowledge' produced from the input is contained in the state of the system as it grows and produces. The flower that absorbs water and nutrients from the soil, carbon from the air and genetic information from the seed produces new knowledge in the form of a flower that reflects all three of those inputs as they are organized into complex and interactive living systems.

The organic model is the only one of the three in which knowledge and wisdom are not 'outputs' of the process, the only one in which knowledge and wisdom remain as properties of the knowing system. The flower is not the 'knowledge' of the flower, it is an artifact that serves a purpose - to attract bees, to assist propagation, to beautify a house, to feed a cow - and from which the knowledge that is contained in the plant can only be inferred.

The organic model is also the only model in which there are not 'consumers' and 'producers' of knowledge and wisdom. In the mining and construction models, the output of the system is some sort of refined or constructed product, which is then in turn consumed by some knowledge-seeking agent. However, according to the organic model, each agent is the sole source of its own knowledge, and it cannot pass along that knowledge per se, but rather, passes along artifacts, such as flowers or seeds, which can become the raw material for other entities in the system to create their own knowledge.

By contrast, the first two approaches will focus much more on information and literacy skills. Because the process of producing knowledge and wisdom from data is essentially transformative and evaluative, an emphasis on those capacities is required. As Brodie and Brodie[618] argue, citing Laurillard, "the more enduring qualities are the skills, attitudes and ways of thinking derived from the course."

In the case of human knowledge, of course, elements of all three models are present. We filter and refine, we build and represent, and we grow and create. And aspects of each inform elements of the other.

Filtering, for example, is not merely a matter of selecting the best and purest. It is also a matter of selecting the most salient, the most relevant and the most important. We filter naturally, as when the senses ignore extraneous information to present us with a world of objects, sounds

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[618] I. Brodie and L. Brodie. A knowledge-information-data concept codel for engineering education. Australiasian Journal of Engineering Education, Volume 15, Number 3. Institution of Engineers Australia, 2009.
http://www.engineersmedia.com.au/journals/aaee/pdf/AJEE_15_3_Brodie.pdf

and shadows. And we filter deliberately, when doubting a testimony or refusing to be fooled by a mirage. Filtering and refining are matters of growth and learning, which is why a vintner can detect differences in wine that would elude a casual wine-taster.

Constructing and representing depend not only on our natural ability to associate one object with another in our minds, but on our ability to filter and select those properties worth representing. The logic of semantics allows for infinite was of describing the world, but in fact we agree upon roughly consistent sets of properties and objects, with words and phrases to describe them. Semantic ability, again, while manifest in the artifacts, such as words and descriptions we share with the world, is actually located in the brain (some even say innate in the brain).

Growth and creativity, meanwhile, would be futile without some means of selecting and filtering resources, and meaningless without some way of creating representations and constructing meaning. Even the flower, which attracts the bee, acts in a representative manner; the flower, to the bee, means nectar. The association present in the bee's memory is what makes the representation possible, but the plant, too, depends on that representation in order to attract the bee to help it spread pollen. A creative act is never a random act, never a pointless act; it is always informed with a sense of refinement and purpose.

Moncton, February 17, 2010

Massive Open Online Courses

How This Course Works

Originally posted to the Critical Literacies course blog, June 1, 2010. A revised version was posted for PLENK2010[619].

Welcome to Critical Literacies 2010, the course about thinking. We are your facilitators, Rita Kop and Stephen Downes.

Login and Password

When you signed up for this course, you received a login and a password. This login should would anywhere in the course (please contact us if you have problems).

If you have forgotten your password, please go to this page to retrieve it:

http://connect.downes.ca/cgi-bin/login.cgi?action=Email

The course home page is: http://ple.elg.ca/course

How this Course Works

Critical Literacies is an unusual course. It does not consist of a body of content you are supposed to remember. Rather, the learning in the course results from the activities you undertake, and will be different for each person.

In addition, this course is not conducted in a single place or environment. It is distributed across the web. We will provide some facilities. But we expect your activities to take place all over the internet. We will ask you to visit other people's web pages, and even to create some of your own.

This type of course is called a 'connectivist' course and is based on four major types of activity:

1. Aggregate

We will give you access to a wide variety of things to read, watch or play with. There will be a LOT of content associated with this course, everything from relatively basic instruction to arguments and discussions to high-level interviews with experts in the field.

Every day you will receive an edition of 'The Daily', which will highlight some of this content. Normally it will arrive first thing in the morning (if you are in North or South America), but not always. The Daily is created fresh each day – it is not prepared content. So delivery may vary

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[619] Stephen Downes. How This Course Works. PLENK 2010 (online course). http://connect.downes.ca/how.htm

You are NOT expected to read and watch everything. Even we, the facilitators, cannot do that. Instead, what you should do is PICK AND CHOOSE content that looks interesting to you and is appropriate for you. If it looks too complicated, don't read it. If it looks boring, move on to the next item.

2. Remix

Once you've read or watched or listened to some content, your next step is to keep track of that somewhere. How you do this will be up to you.

You can keep a document on your own computer listing all the things you've accessed. Or, better yet, you can keep a record online somewhere. That way you will be able to share your content with other people.

Here are some suggestions:

- create a blog with Blogger. Go to http://www.blogger.com and create a new blog. Or, if you already have a blog, you can use your existing blog. You can also use Wordpress (http://www.wordpress.com) or any other blogging service. Each time you access some content, create a blog

- create an account with del.icio.us and create a new entry for each piece of content you access. You can access del.icio.us at http://del.icio.us

- take part in a Moodle discussion. We have set up an instance of Moodle you can use. Your user ID and login will work in Moodle. Once you login you will find discussions related to the course and you can post about the content you've accessed. Access it here: http://ple.elg.ca/course/moodle/course/view.php?id=2

- tweet about the item in Twitter. If you have a Twitter account, post something about the content you've accessed.

- anything else: you can use any other service on the internet – Flickr, Second Life, Yahoo Groups, Facebook, YouTube, anything! use your existing accounts if you want or create a new one especially for this course. The choice is completely yours.

3. Repurpose

We don't want you simply to repeat what other people have said. We want you to create something of your own. This is probably the hardest part of the process.

Remember that you are not starting from scratch. Nobody every creates something from nothing. That's why we call this section 'repurpose' instead of 'create'. We want to emphasize that you are working with materials, that you are not starting from scratch.

What materials? Why, the materials you have aggregated and remixed online. These materials are the bricks and mortar you can use to compose your own thoughts and understanding of the material.

What thoughts? What understanding? Well – that is the subject of this course. This whole course will be about how to read or watch, understand, and work with the content other people create, and how to create your own new understanding and knowledge out of them.

In a sense, the critical literacies we will describe in this course are the TOOLS you will use to create your own content.

Your job isn't to memorize a whole bunch of stuff about the tools. Rather, your job is to USE TE TOOLS and just practice with them. We will show you the tool, give examples, use the tools ourselves, and talk about them in depth. You watch what we do, then practice using them yourself.

Think of every bit of content you create not simply as content, but as practice using the tool. The content almost doesn't even matter – what matters is that you apply the tool.

This will seem awkward at first, as any tool does. But with practice you'll become an accomplished creator and critic of ideas and knowledge. And that is the purpose of this course!

4. Feed Forward

We want you to share your work with other people in the course, and with the world at large.

Now to be clear: you don't have to share. You can work completely in private, not showing anything to anybody. Sharing is and will always be YOUR CHOICE.

And we know, sharing in public is harder. People can see your mistakes. People can see you try things you're not comfortable with. It's hard, and it's sometimes embarrassing.

But it's better. You'll try harder. You'll think more about what you're doing. And you'll get a greater reward – people will see what you've created and connect on it. Sometimes critically, but often (much more often) with support, help and praise.

People really appreciate it when you share. After all, what you're doing when you share is to create material that other people can learn from. Your sharing creates more content for this course. people appreciate that, you will probably appreciate the content other people in the course share with you.

So, how do you share?

First, use the Critical Literacies tag in anything you create. Our course tag is: #CritLit2010

It is especially important to use this tag in del.icio.us and in Twitter. That is how we will recognize content related to this course. We will aggregate this content and display it in our newsletter. Yes – your content will be displayed in the Daily. That's how other people will find it.

Second, if you are using a blog, Flickr, or a discussion group, share the RSS feed. We will offer a separate post on how to find your RSS feed if you don't know how. But if you know how, please tell us your feed address.

You can use the form here: http://connect.downes.ca/new_feed.htm

Then, when you post something to your blog or forum, use the #CritLit2010 tag. That is how we will recognize that the post is related to this course, and not about your cat or mountain climbing in the Himalayas.

You can either place the tag in your post, of you can use it as the post category. Either way works for us.

If you're doing something completely different, send us some email. stephen@downes.ca We'll figure out how to add it to the mix.

We'll do the rest. We have aggregators standing by, ready to bring in your content and your work to everyone else in the course. Join in. Take part! Read the daily, remix and repurpose, and tag it so we can feed it forward.

When a connectivist course is working really well, we see this greate cycle of content and creativity begin to feed on itself, people in the course reading, collecting, creating and sharing. It's a wonderful experience you won't want to stop when the course is done.

And – because you can share anywhere – you won't have to. This course can last as long as you want it to. And when we offer CritLit 2011 you'll be welcome to come back and join in the fun again.

Moncton, June 10, 2010

Principles of Resource Sharing

This article is a summary of the presentation by Erin Brewer[620] at the ITI conference in Logan, Utah.

This very enjoyable presentation looked at informal learning, as exemplified in places like Yahoo Groups, from the perspective of self-organizing systems. What results is some very useful documentation of the fact that learning, a lot of learning, does occur in these groups, and that it is managed without a central authority or even a school.

A lot of learning goes on in online groups. I wanted to see if there were things going on in these groups that we could port to more formal instruction. So we ask, how do members of these groups provide peer to peer support for learning.

Some of the literature I looked at studied self-organizing systems in biology, self-organizing systems, small worlds networks (Duncan Watts) and social capital. I also looked at how resources are used to support learning.

Looking at symbiosis. Basically, it's about resource sharing. So maybe there were principles that could be brought into learning. Symbiosis is a continuum from parasitism to mutualism. Parasitic systems tend to move toward mutualistic systems over time - this is different from the typical Darwinian view of competition. It's like dining from the same table.

In order for there to be mutualistic relationships, the combined need needs to be smaller than their cumulative individual needs. Redundant functions can be eliminated and specialized functions developed. They work together and are able to do twice as much. Also, different resources can be utilized. There is a fungus, for example, that can break down resources and deliver them to the network where the network would not be able to access them. New resources can be created.

In an online group, one member may have a need, and another member may combine two resources together to meet that need. This sort of thing also happens in nature.

Self-organizing systems occur when local factors at the decision-making level form global systems. We look at them, and assume there must be a hierarchy - that the queen bee or the queen ant is making the decisions. But what is happening is that each member makes decisions independently, and information is shared. This also happens in physics, when there is a form shift, say, from liquid or solid. The 'decisions' are made at the molecular level, and once one molecule shifts, it quickly spreads to all the other molecules.

In online communities, individuals may feel they don't have that much influence, but one person making a decision may influence a much larger group.

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[620] Erin Brewer. Resource Sharing in Online Self-Organizing Systems. Thesis Abstract. http://gradworks.umi.com/31/51/3151797.html

There are lots of solutions to any given problem. We tend to assume there is one best solution, but - Herbert Simon - there are many solutions, depending on various factors, such as cost, for example.

Small world networks happen naturally. Watts again. It's a lot of individuals that are hooked together, and there are some hubs. This is the six degrees of separation concept. These networks are 'scale free' - they can grow essentially without limitation. They make resource sharing very effective.

If you look at online groups, because the membership is so high, there's a pretty good chance that people will have the resource that you want. It's basically 100% - if you have 100 people or more, if the resource exists, you can get it.

The idea of social capital - there are people who spend huge amounts of time finding, explaining and discussing resources. People do this (some say) in order to build social capital. There is also some research into the concept of mavenship, through marketing.

Finally, looking at resource use to support learning. If you look at learning, it's about using resources.

After the lit review, I came up with the concept of an Online Self Organizing Social System (OSOSS). They provide access to resources, transform resources, nurture members, provide access to multiple communities. There is no central authority, but they provide an effective system of communication.

Looking at some specific OSOOS - for my study, they had to be viable, they had to have high activity levels (certain numbers of posts), large membership, have public access, and have archives. I wanted a uniform infrastructure because the infrastructure could influence the outcome - so I chose Yahoo Groups. I avoided technology topics, because we had looked at that before. I wanted to make sure there was actually dialogue. And some groups - mostly about money and banking - had odd posts, solicitation, etc., and I didn't want to wade through all that.

To study the group, I read all the posts (for a year), followed up outside resources (books, websites), and did resource identification, via a rubric for types of resources. I did a summary of activities for the threads, developing a rubric as I went. Finally, I carried out the analysis. The groups selected for case studies were organic beekeepers, microbiology, vegetarian recipe exchange, and bathtub brewers.

Vegetarians - a number of unsolicited resources were offered that met an unstated need. They tended to post very specific needs. Most resources shared were personal experience, and there was a great deal of negotiation of resources - try this, have you ever tried this, etc. And people very frequently posted appreciation for resources.

Microbiology - requests for resources were asked to be sent directly to the poster (send it to my email, not the group) - this happened a lot, and a recommendation that I make is that if you're in a group, send it to the group. There was a great deal of mentoring. People were more likely to express decontextualized needs - people would simply ask - this tended to promote negotiation

of need - "well what do you need thta for?" Needs were usually questions of practice, and sometimes outrageously general requests. Threads tended to involve only two or three members.

Brewers - posts tended to related to community practices. There was a sense that there is this whole community of bathtub brewers, which really surprised me. There was mentoring to amazing detail in this - people would follow-up questions a month later. There were unsolicited resources posted, as in the vegetarian group. The brewers loved to change the name of the thread - it seemed that every iteration created a name change - so I suggested that people keep thread names the same for a topic, because they're hard to follow otherwise.

Beekeepers - would keep the name of the thread long after it had transformed into another topic. The opposite extreme. Discussions were often about proper practice - what is organic beekeeping, for example. Relied heavily upon opinion and encouragement. Information was often presented as fact, even though it was opinion or based on personal experience. There was a lot of negotiation of need, and the request often changed. Quoted messages were used a lot, which made it really easy to follow. Extremely long threads - I thought, how do these people have the time to respond as they do - how did they find the time to produce the list of resources?

Major types of resources (taxonomy) included personal experience (anecdotes and stories), substantialities (copied materials), referrals, opinions, offers for future assistance, and encouragement (the brewers were great at that)/

So the pedagogy of peer to peer process, we get the concept of 'regotiation' - is a term that captures this process of posting a need, responding to a need, posting a resource, etc, the iterative process that meets the need. Also, there was the issue of 'macro learning' - how do I learn to learn (in this environment) - how to post a question, etc. And then, finally, content learning - they were learning about how to make beer, keep bees, etc.

The principles I (Erin Brewer) came up with:

- Resources are more easily accessible in an OSOSS - that's why they're part of the group. If they can get the need on their own, they probably won't post to the group. A plant that gets everything it needs tends not to form symbiotic relationships.

- Resource transformation - one resource can be used multiple ways. People would report different ways of using them.
- Individuals often need the aid of others to identify the 'real' need. I think I need a car. But what I really need is an easier way to get to work.
- OSOOS is a structured place to give people a place to meet, identify needs, and to share and store resources.
- They don't need to be complicated - if you have email, forwarding, and attachments, that's enough.

- Resource sharing should take place within the network rather than offline or in private spaces. I noticed that groups that tended not to be as viable tended to encourage people to post resources in another spot. It discouraged people from contextualizing resources.
- The resources posted are useful both to the community members, but also to the broader internet community. Finding them through Google, for example. Sometimes the context is clear, other times its difficult.
- The more diverse the community, the more stable it tends to be. Boundary members are especially important - creates links with other groups. Before it blossoms into a large group, the initial members need to be more active. But ionce it's established, the workload drops dramatically.

A comment from earlier talked about pooled ignorance - I am glad to be able to say that wasn't the case.

I want to look in the future about why some OSOSS die. What made them fail? Also, I wasn't able to study interactions that took place outside the OSOSS. Also, the study looked at the how but not the why. I'm really interested in the role of the maven within the group. Groups seemed to have 'cheerleaders' - I want to look at that more. I want to understand why some needs get addressed and others don't. And I want to think about applying the results to structured, formal learning environments. (SD - why?)

Comment - on the second point - why not do research on the jerks? I know some groups, one guy, destroyed three or four groups. People argue about whether to shut him down or call him names. It destroys the group. yeah, I only met this once, there was an animal rights activist, and there was an off-topic debate. But I'm not sure I'd want to be the one researching that.

(Asked for a URL - none available yet). SD - relation between openness and diversity, stability and usefulness? By diverse, I mean members coming from lots of different places. The stability of the group was helped by having diverse membership - it was a question of boundary membership - of someone has a need, I can go to another group and pass the question along. It's the strength of weak ties. People in your circle - they know what you know. Someone from, maybe, Georgia, or Indiana, or Zimbabwe, will have access to different resources, ways of thinking.

"We sometimes want to come up with a universal theor of instructional design, but we need to understand, certain things fork in different places."

Logan, Utah, September 2, 2004

Creating the Connectivist Course

Originally posted in One Change a Day,[621] January 3

When George Siemens and I created the first MOOC[622] in 2008 we were not setting out to create a MOOC. So the form was not something we designed and implemented, at least, not explicitly so. But we had very clear ideas of where we wanted to go, and I would argue that it was those clear ideas that led to the definition of the MOOC as it exists today.

There were two major influences. One was the beginning of open online courses. We had both seen them in operation in the past, and had most recently been influenced by Alec Couros's online graduate course[623] and David Wiley's wiki-based course.[624] What made these courses important was that they invoked the idea of including outsiders into university courses in some way. The course was no longer bounded by the institution.

The other major influence was the emergence of massive online conferences. George had run a major conference on Connectivism,[625] in which I was a participant. This was just the latest in a series of such conferences. Again, what made the format work was that the conference was open. And it was the success of the conference that made it worth considering a longer and more involved enterprise.

We set up Connectivism and Connective Knowledge 2008[626] (CCK08) as credit course in Manitoba's Certificate in Adult Education[627] (CAE), offered by the University of Manitoba. It was a bit of Old Home Week for me, as Manitoba's first-ever online course was also offered through the CAE program, Introduction to Instruction,[628] designed by Conrad Albertson and myself, and offered by Shirley Chapman.

What made CCK08 different was that we both decided at the outset that it would be designed along explicitly connectivist[629] lines, whatever those were. Which was great in theory, but then we began almost immediately to accommodate the demands of a formal course offered by a traditional institution.[630] The course would have a start date and an end date, and a series of dates in between, which would constitute a course schedule. Students would be able to sign up

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[621] Jenny Ankenbauer, et.al. One Change a Day. Weblog. http://moocblogcalendar.wordpress.com/

[622] Wikipedia. Massive Open Online Course. Accessed January 3, 2012. http://en.wikipedia.org/wiki/Massive_open_online_course

[623] Alec Couros. EC&I 831: Social Media & Open Education. Website. September 13, 2010.

[624] David Wiley. INST 7150 Introduction to Open Education, Fall 2007. Website. http://opencontent.org/wiki/index.php?title=Intro_Open_Ed_Syllabus

[625] George Siemens. Connectivism Conference. Connectivism (weblog). February 9, 2007. http://www.connectivism.ca/?p=82

[626] Stephen Downes and George Siemens. Connectivism and Connective Knowledge 2008. Website. http://ltc.umanitoba.ca/wiki/Connectivism_2008

[627] Red River College. Certificate in Adult Education. Accessed January 3, 2012. http://me.rrc.mb.ca/Catalogue/ProgramInfo.aspx?ProgCode=CERAP-CT&RegionCode=WPG

[628] Stephen Downes, Conrad Albertson, and Shirley Chapman. Introduction to Instruction. Website. 1996. http://www.downes.ca/archive/1996/cae/welcome.htm

[629] George Siemens. Connectivism: A Learning Theory for the Digital Age. eLearnSpace. (weblog). December 12, 2004. http://www.elearnspace.org/Articles/connectivism.htm

[630] George Siemens. Connectivism and Connective Knowledge. Youtube (video). July 30, 2009. http://www.youtube.com/watch?v=a5-Wk2cwb68

for credit, but if they did, they would have assignments that would be marked (by George; I had no interest in marking).

But beyond that, the course was non-traditional. Because when you make a claim like the central claim[631] of connectivism, that the knowledge is found in the connections between people with each other and that learning is the development and traversal of those connections, then you can't just offer a body of content in an LMS and call it a course. Had we simply presented the 'theory of connectivism'[632] as a body of content to be learned by participants, we would have undercut the central thesis of connectivism.

This seems to entail offering a course without content – how do you offer a course without content? The answer is that the course is *not* without content, but rather, that the content does not define the course. That there is no *core* of content that everyone must learn does not entail that there is zero content. Quite the opposite. It entails that there is a surplus of content. When you don't select a certain set of canonical contents, *everything* becomes potential content, and as we saw in practice, we ended up with a *lot* of content.

Running the course over fourteen weeks, with each week devoted to a different topic, actually helped us out. It allowed us to mitigate to some degree the effects an undifferentiated torrent of content would produce. It allowed us to say to ourselves that we'll look at 'this' first and 'that' later. It was a minimal structure, but one that seemed to be a minimal requirement for any sort of coherence at all.

Even so, as it was, participants complained that there was too much information. This led to the articulation of exactly what connectivism meant in a networked information environment, and resulted in the definition of a key feature of MOOCs. Learning in a MOOC, we advised,[633] is in the first instance a matter of learning how to *select* content.

By navigating the content environment, and selecting content that is relevant to your own personal preferences and context, you are creating an individual view or perspective. So you are first creating connections between contents with each other and with your own background and experience. And working with content in a connectivist course does not involve learning or remembering the content. Rather, it is to engage in a process of creation and sharing. Each person in the course, speaking from his or her unique perspective, participates in a conversation that brings these perspectives together.

Why not learn content? Why not assemble a body of information that people would know in common? The particular circumstances of CCK08 make the answer clear, but we can also see how it generalizes. In the case of CCK08, there *is* no core body of knowledge. Connectivism is a theory in development (many argued that it isn't even a theory)[634], and the development of connective knowledge even more so. We were hesitant to teach people something definitive when even we did not know what that would be.

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[631] Stephen Downes. What Connectivism Is. Stephen's Web (weblog). February 5, 2007. http://www.downes.ca/post/38653
[632] George Siemens. Knowing Knowledge. eBook. 2006. http://www.elearnspace.org/KnowingKnowledge_LowRes.pdf
[633] Stephen Downes. How This Course Works. Critical Literacies Online Course blog. June 1, 2010. http://ple.elg.ca/course/?p=18
[634] Rita Kop and Adrian Hill. Connectivism: Learning theory of the future or vestige of the past? The International Review of Research in Open and Distance Learning, Volume 9, Number 3. October, 2008. http://www.irrodl.org/index.php/irrodl/article/view/523/1103

Even more importantly, identifying and highlighting some core principles of connectivism would undermine what it was we thought connectivism was. It's not a simple set of principles or equations you apply mechanically to obtain a result. Sure, there are primitive elements – the component of a connection, for example – but you move very quickly into a realm where any articulation of the theory, any abstraction of the principles, distorts it. The fuzzy reality is what we want to teach, but you can't teach that merely by assembling content and having people remember it.

So in order to teach connectivism, we found it necessary for people to immerse themselves in a connectivist teaching environment. The content itself could have been anything – we have since run courses in critical literacies,[635] learning analytics,[636] and personal learning environments.[637] The content is the material that we *work with,* that forms the creative clay we use to communicate with each other as we develop the actual learning, the finely grained and nuanced understanding of learning in a network environment that develops as a result of our working within a networked environment.

In order to support this aspect of the learning, we decided to make the course as much of a *network*[638] as possible, and therefore, as little like an ordered, structured and centralized presentation as possible. Drawing on work we'd done previously, we set up a system whereby people would use their own environments, whatever they were, and make connections between each other (and each other's content) in these environments.

To do this, we encouraged each person to create his or her own online presence; these would be their *nodes* in the course networks. We collected RSS feeds from these and aggregated them into a single thread, which became the course newsletter. We emphasized further that this thread was only one of any number of possible ways of looking at the course contents, and we encouraged participants to connect in any other way they deemed appropriate.

This part of the course was a significant success. Of the 2200 people who signed up for CCK08, 170 of them created their own blogs, the feeds of which were aggregated a tool I created, called gRSShopper,[639] and the contents delivered by email to a total of 1870 subscribers (this number remained constant for the duration of the course). Students also participated in a Moodle discussion forum, in a Google Groups forum, in three separate Second Life communities, and in other ways we didn't know about.

The idea was that in addition to gaining experience making connections between people and ideas, participants were making connections between different systems and places. What we wanted people to experience was that connectivism functions not as a cognitive theory – not as a theory about how ideas are created and transmitted – but as a theory describing how we live

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[635] Stephen Downes and Rita Kop. Crritical Literacies. Website. July, 2010. http://ple.elg.ca/course/
[636] George Siemens. Learning Analytics. Website. September, 2011. http://www.learninganalytics.net/
[637] Stephen Downes, Rita Kop, George Siemens and Dave Cormier. Personal Learning Environments, Networks and Knowledge. Website. September, 2010. http://connect.downes.ca/
[638] Stephen Downes. Learning Networks: Theory and Practice. Lecture presentation delivered to International Conference on Methods and Technologies for Learning, Palermo, Italy. March 8, 2005. http://www.downes.ca/presentation/32
[639] Stephen Downes. gRSShopper. Website. 2008. http://grsshopper.downes.ca/

and grow together. We learn, in connectivism, not by acquiring knowledge as though it were so many bricks or puzzle pieces, but by *becoming* the sort of person we want to be.

In this, in the offering of a course such as CCK08, and in the offering of various courses after, and in the experience of other people offering courses as varied as MobiMOOC[640] and ds106[641] and eduMOOC,[642] we see directly the growth of individuals *into* the theory (which they take and mold in their own way) as well as the growth of the community of connected technologies, individuals and ideas. And it is in what we learn in this way that the challenge to more traditional theories becomes evident.

What we've learned – at least to me – is that cooperation is better than collaboration, that diversity is better than sameness, that harmony is better than competition, that openness is better than exclusivity, and that understanding complexity is better than reduction to simplicity. These are, to my mind, the *opposite* of the bases on which traditional education is designed. Does that make connectivism a theory? In a real sense, that question is irrelevant. 'Theory' implies principles and abstraction; connectivism is, in practice, the opposite of that.

If that all we've learned, that's enough. But I think, as we read what follows in this series, that the learning is just beginning.

Moncton, January 6, 2012

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[640] Inge de Waard. MobiMOOC. Website. September, 2011. http://mobimooc.wikispaces.com/a+MobiMOOC+hello!
[641] Jim Groom. DS106. Website. September, 2010. http://ds106.us/
[642] Ray Schroeder. eduMOOC. Website. September, 2011. http://sites.google.com/site/edumooc/

What a MOOC Does

Clark Quinn is asking[643] where the further developments in MOOCs will come from, suggesting "he courses really require effective self-learners", and I see today that Tony Bates continues[644] this line of questioning:

> To what extent do MOOCs really change the nature of the game, and to what extent are they more an extension and development of what has gone before – and hence should aim to incorporate previous best practices? Or will that destroy them?

I'm generally pretty reluctant to compare MOOCs with what went before, and I'm generally pretty reluctant to suggest how MOOCs improve on the previous model, because what we're trying to do with MOOCs is really something very different from what was attempted before. The best practices that previously existed, insofar as they were best practices at all, were best practices for doing something else.

MOOCs don't change the nature of the game; they're playing a different game entirely.

Let's take the whole motivation issue Clark Quinn raises. As he explains in a comment on another post[645],

> I pointed out MOOCs require motivated students because many formal learning experiences don't assume it, and provide support for motivation. Not near enough, mind you. Lots of other potential learning experiences don't, as you suggest.

The *presumption* - and it is a presumption - is that a MOOC would contain unmotivated students, just like a regular course would, and would have to deal with that in some way. It is even suggested we provide some sort of answer for this sort of problem: "These courses assume that through the process, learners will develop learning skills."

All this is to regard the MOOC through the perspective of the traditional course. This may be our fault, since we offer MOOCs as 'courses'. Better terminology might have avoided this problem.

One *big* difference between a MOOC and a traditional course is that a MOOC is completely voluntary. You decide that you want to participate, you decide how to participate, then you participate. If you're not motivated, then *you're not in the MOOC*.

Similarly with the 'learning skills' question. Just what are these supposed to be? Probably, when Quinn is talking about learning skills, he's talking about some set of skills devoted specifically to learning - I'm not sure exactly what they would be (it varies depending on who you ask) but they'd be comprehension skills, analytical skills, memory skills, and the like.

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[643] Clark Quinn. MOOC Reflections. Learnlets (weblog), February 29, 2012. http://blog.learnlets.com/?p=2562
[644] Tony Bates. Some critical reflections on MOOCs. Online learning and distance education resources (weblog). March 1, 2012. http://www.tonybates.ca/2012/03/01/some-critical-reflections-on-moocs/
[645] Stephen Downes. Hello Slide.com: This time, reading slides is actually a good thing. OLDaily (weblog), February 29, 2012. http://www.downes.ca/post/57427

First of all, I don't think it's reasonable to expect all of a person's educational experiences to be embodied in a single MOOC. We don't criticize a grade 12 geography course because the course authors did not first teach participants how to speak English. We expect that they will enter with a certain amount of preparation.

But second, what's different, I think, is that MOOCs expect that their participants *will be motivated* and *will have learned how to learn*.

It seems to me indicative of the failure of traditional education that students in university-level courses still have to be motivated and still have to be taught how to learn. Quinn is quite right - most courses still attend to both. What he doesn't say is that they *utterly fail at it* which is why it must be done over and over and over again.

By starting out with a *presumption* of a different set of skills, MOOCs explicitly foster and value these skills. So while students who have grown up with the typical command-mode style of learning, it is not unreasonable to assume that students raised on MOOCs will have mastered the different set of skills. Students are adept at learning to follow orders when they are given a steady diet of orders; it is reasonable to assume they will learn to take responsibility when they are given responsibilities.

The other side of the question is whether these skills can be bootstrapped; that is, whether traditional instruction is the *only* way to teach people how to be self-motivated, how to learn, and all the rest of it. We did explore this a bit with the Critical Literacies course - we tried to see whether a MOOC devoted to learning to be analytical would be successful.

But again - it isn't about *teaching* these skills in a MOOC. Suggesting that this is or ought to be the function of a MOOC is to misunderstand it.

What we are trying to do with a MOOC is to *create an environment* where people who are more advanced reasoners, thinkers, motivators, arguers, and educators can practice their skills in a public way by interacting with each other. In such an environment, people can learn by watching and joining in. This is not an 'assumption' that this happens; it is an *observation*.

If we can get past the idea that the purpose of a MOOC is to 'teach people stuff' then we can begin to talk about what benefits they bring. But so long as we just think of them as another way of doing the same old thing, we'll be misunderstanding them.

Moncton, February 27, 2012

How to Participate in the MOOC

This short post is intended to help you participate in the Massive Open Online Course, of MOOC. It won't cover everything, but it should be enough to get you started. Note that how don't have to participate this way; it's just recommended as a good place to start.

1. Read the Newsletters

Every weekday, another newsletter will arrive in your email inbox. The best way to start participating in the course is to read these newsletters. Each newsletter will have the following common sections:

- announcements from the course administrators - these will include links to resources, announcements of online events, and other important information

- highlighted posts - these will be posts selected by the administrators that we have either written ourselves or for some reason really want to highlight

- your contributions - these will include your comments, blog posts, Twitter tweets, and related content; there can be quite a lot of this content

NOTE: if you miss the daily newsletter or do not want to receive it by email, no problem. You can read today's newsletter[646] on the website, and you can read previous newsletters in the newsletter archive.[647]

2. Pick and Choose

You will notice quickly that there is far too much information being posted in the course for any one person to consume. We tried to start slowly with just a few resources, but it quickly turns into a deluge.

You will be provided with summaries and links to dozens, maybe hundreds, maybe even thousands of web posts, articles from journals and magazines, videos and lectures, audio recordings, live online sessions, discussion groups, and more. Very quickly, you may feel overwhelmed.

Don't let it intimidate you. Think of it as being like a grocery store or marketplace. Nobody is expected to sample and try everything. Rather, the purpose is to provide a wide selection to allow you to pick and choose what's of interest to you.

This is an important part of the connectivist model being used in this course. The idea is that there is no one central curriculum that every person follows. The learning takes place through

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[646] Daily Newsletter. Change11. http://change.mooc.ca/newsletter.htm
[647] Daily Newsletter Archives. Change 11. http://change.mooc.ca/cgi-bin/archive.cgi?page=newsletter.htm

the interaction with resources and course participants, not through memorizing content. By selecting your own materials, you create your own *unique perspective* on the subject matter.

It is the interaction between these unique perspectives that makes a connectivist course interesting. Each person brings something new to the conversation. So you learn by interacting rather than by merely consuming.

3. Comment

If you want to review the contributions of course participants in a leisurely manner, you can view them in the course Viewer. Access the viewer here. [648]This will be the same contents you find in the newsletter, but in a format much more accessible for browsing.

At the beginning of the course the Viewer will look pretty empty. This will change rapidly as new content starts to pour into the course.

The Viewer has very simple commands. You can move 'up' or 'down' through the list of posts - 'up' will take you to newer or more recent posts, while 'down' will take you to older posts. Use the 'up' and 'down' arrow controls at the top left and right corners of the Viewer.

If you see something that moves you to respond, you can add a comment by clicking on the 'comment' button at the top of the page. This will take you to a simple comment editing screen where you can submit and edit your comment.

The first person to comment on a post seen in the viewer (or seen in the Newsletter) creates a new Thread. The thread consists of the post, and all comments on the post. *Note that commenting on a post is the only way to create a thread.* This means that all threads are about some blog post or another that has been displayed in the newsletter or the Viewer. It's our way of linking things together.

You can view all of the discussion threads to see the comments make by other people (the comments will also appear in the viewer, below the original blog post). You can view the Thread list here.[649]

4. Create Your Own Contributions

You may find that commenting on posts isn't really the best way to participate. Sure, the comments will show up in the newsletter and in the Viewer, but they're not as visible as the posts. And you can't start a new topic by commenting, you can only react to comments other people have posted.

If you want to engage more actively in the course, the best way is to create your own contributions online. You are not required to do this, but you may well find yourself more engaged in the process if you do.

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[648] Content Viewer. Change 11. http://change.mooc.ca/cgi-bin/page.cgi?action=viewer
[649] All Discussion Threads. Change 11. http://change.mooc.ca/threads.htm

The simplest and easiest way to create your own content online is to create your own blog or use a blog you have already created. You can use Blogger[650], Wordpress[651], Tumblr[652], or any other service you want. What you write about and how you phrase it are completely up to you! We recommend you link to other resources and other blogs, but again, that's up to you.

Another way to create your own online content is to have conversations on Twitter. You should feel free to comment about the course or its contents with anyone else online. Alternatively, you may use any online service, such as Delicious[653] bookmarks, Flickr[654] photos, or YouTube[655] videos. Or you could create a Facebook, or join one - like this #change11 Facebook group[656] - that someone else has created.

So how do we know one of your blog posts or videos is intended for this course? Easy. You should use the #change11 tag somewhere in the title or body of your content, or use it as a category. To use the tag, type the string #change11 somewhere in the content. We will look at all your content, and if we see anything tagged #change11, we will take that content and link to it in the newsletter and show it in the viewer. Then other people will be able to read and comment on *your* contribution.

In another post, we will cover how you can create a content site and tell us where to look for content. So don't worry about that just yet. For now, though, begin thinking about where you might want to create your contributions, and what sort of contributions they might be.

NOTE on contributing feeds: we will cover that in another post. If you have already submitted your feed and haven't seen it yet, don't worry. *All feeds are reviewed* before they are displayed in the course. This is to ensure we've got the right URLs and to keep out unwanted advertising. It also takes some time for posts to be aggregated. Aggregation does not start until feeds have been approved, and then are staggered, to reduce the load on the server.

5. Follow Course Content on the Internet

You may be used to other courses, where all the action happens inside the learning management system. While our course website may be an interesting place, we do not want it to be the only place this course happens.

Because participants are using a course tag, #change11, you do not need to depend on us to find content. You can do it yourself by searching for the tag. Here are some sample searches:

- #change11 Twitter search[657]
- #change11 Google search[658]

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[650] Blogger. Website. http://www.blogger.com
[651] Wordpress. Website. http://wordpress.com/
[652] Tumblr. Website. https://www.tumblr.com/
[653] Delicious. Website. http://www.delicious.com/
[654] Flickr. Website. http://www.flickr.com/
[655] YouTube. Website. http://www.youtube.com/
[656] Change 11. Facebook group. Facebook website. http://www.facebook.com/groups/234584909925454/
[657] Change 11. Twitter Search. Twitter. https://twitter.com/#!/search/%23change11?q=%23change11
[658] Change 11. Google Search. Google. https://www.google.ca/search?q=%2B%22%23change11%22

- #change11 search on Delicious[659]

Notice that you can just bookmark these links and be able to search for new content whenever you want with the click of a button. You can also create alerts, such as a Google Alert[660], which will send new content to you by email. Later, we will also show you how to subscribe to all the course blogs, you you can read them directly in a feed reader.

The idea of this course is that we are not creating one single point of contact on the web, but rather, are creating a cluster of related websites, joined together by common links facilitated by the use of a tag like #change11. It is not necessary to use the http://change.mooc.ca website at all!

Just remember - *we don't control content on the internet*. There are no 'official' #change11 Facebook groups, Google Groups, Second Life islands, or whatever - these are all created by course participants, who own them. We couldn't control it even if we wanted to - it always belongs to someone else, typically whoever authored the content. The good side of that is that you can write or say whatever you want about the course, or anything else. But you may have to accept the possibility of unwanted content on the open internet. That's why we provide the alternative of the http://change.mooc.ca website.

6. Join Us in the Online Sessions

Every week, we will have at least one online conference or course session. Very often, we will be talking with the featured author for the week. Sometimes, we will be talking among ourselves.

We will send out advance notice of these sessions in the Daily Newsletter. Be sure to check the posted time against your own time zone (we always include a link to a time zone calculator). You may need to support Flash to attend the session, and you will have to have speakers or audio enabled.

We will also broadcast these sessions on web radio[661] and save archives, so you can always play the online session back, just like any resource, should you happen to miss it. But it's usually more fun to join the live event, chat with other participants, and perhaps even join us in the live discussion yourself.

OK, that's all for today. Here's my tag: #change11

Enjoy. :)

Moncton, September 13, 2012

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[659] Change 11. Delicious search. Delicious. http://www.delicious.com/search?p=%23change11

[660] Google Alerts. Google (web site). http://www.google.com/alerts

[661] Stephen Downes. Ed Radio (web site). http://www.downes.ca/edradio.htm

How to Participate in the MOOC - 2

Today it's all about setting up your social web.

Remember from yesterday[662] that if you want to engage more actively in the course, the best way is to create your own contributions online. You are not required to do this, but you may well find yourself more engaged in the process if you do.

Here's what the social web involves in this course:

- Your own personal information and email
- Your social network identities
- Your blog and other RSS feeds
- Your newsletter subscription
- OpenID

Logging In

Before dealing with any of these on the change.mooc.ca[663] website, it is necessary to log in. You created a login ID and a password when you first signed up for the course. You might even still be logged in! If you have not yet signed up for the course, you'll need to register[664]. This will also log you in.

Check any page on the change.mooc.ca website and look to the upper right - there you will find the login dialog, right below the navigation. It will either say "You are not logged in" or it will say "You are logged in as so-and-so." If you are not logged in, you'll have to click the login[665] link and log in.

Don't panic if you've forgotten your UserID and your password. Almost everybody forgets them. It's not just you. To recover your login details, you can go to the password recovery page[666] and enter your information, usually your email address. The system will email you your login information.

NOTE: this login only works on the change.mooc.ca website - don't expect it to work on other social networks, groups, online conferences, or anything else.

Your Options

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[662] Stephen Downes. How to Participate nin the MOOC. Half an Hour (weblog). September 13, 2011. http://halfanhour.blogspot.ca/2011/09/how-to-participate-in-mooc.html
[663] Stephen Downes, George Siemens and Dave Cormier. Change 11 (website). http://change.mooc.ca/
[664] Registration and Newsletter Subscription. Change 11. http://change.mooc.ca/cgi-bin/login.cgi?refer=http://change.mooc.ca/&action=Register
[665] Login. Change11. http://change.mooc.ca/cgi-bin/login.cgi?refer=http://change.mooc.ca
[666] Email Password. Change 11. http://change.mooc.ca/cgi-bin/login.cgi?refer=http://change.mooc.ca/&action=Email

Once you are logged in, you will see the Options[667] link in the upper right hand corner. Clicking on this takes you to your options page, where you can manage your online presence in change.mooc.ca

At the top of the options page you'll see your personal information - name, location, email address, and the like. Don't worry, we're not showing this to anyone else - there's a link that allows you to see your public profile (at the moment, *very* minimal). There's a link that allows you to edit your personal details.[668] Use this page to change your password or email address.

It would be really nice if you added your name and a short personal description we can show publicly; we'd like to have personal pages people can view if they follow your name (we'll do this instead of the ubiquitous 1500-entry long 'welcome' thread you see in other courses). Don't add information you don't want to share. No website is invulnerable. Even if you opt not to display some information, if may become public one day.

Your Social Network Identities

This is something new for these courses - we are asking participants to contribute their social network identities. You will find a screen where you can edit social network[669] information. Use the drop-down to select a social network name, and then put your member name in the next column. Check the box if you want this identity shared, or not if you don't.

Do not enter your social network password. We will *never* ask you for your password, whether it's your Twitter password, Facebook password, or whatever.

What will we use this information for? Well, we're not totally sure, but we have some ideas:

- it would be nice to include your @twitter name with your comments. This will allow us to do that.
- we'd like to be able to allow you to publish on your social network site from this website. Then, for example, you could comment on a comment here, and tweet the URL from your account, or post a copy of your comment in Tumblr, or whatever. Now none of this exists yet, but we're hopeful.
- we'd like to be able to compare networks before and after the course. If we know (say) your Twitter name, we can use your list of followers - and those of other people signed up in the course - to create a 'graph' of the course.

There's probably a lot more we could do - we'll be open to ideas for the entire year. If you want to take part, add your information here. If not, no problem, you can still enjoy all aspects of the course.

Your blog or RSS Feeds

As mentioned yesterday, we'd like you to add your blog URL and RSS feed to the feed list. We will aggregate the posts you write over the year, and if you use the *#change11* tag in the title,

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[667] Options. Change11. http://change.mooc.ca/cgi-bin/login.cgi?action=Options
[668] Stephen Downes. Change Email and Personal Info. Change11. http://change.mooc.ca/cgi-bin/login.cgi?action=Options
[669] Edit Social Network Info. Change11. http://change.mooc.ca/cgi-bin/login.cgi?action=form_socialnet

body or category of your post, we'll be able to link to it in the course newsletter[670] and make it available in the content viewer.[671]

You can see a list of your feeds in your Options page, with a little coloured dot to indicate its status. Orange means it's pending approval - we review all feeds to make sure the URL is correct and that their contents are not full of unwanted material. Green means that it has been approved and is being harvested - and you should be able to see what content we are displaying by clicking on the 'view' link.

To submit your feed, click on the Add a New Feed[672] link. This will take you to a form where you can add your feed information.

While many of you may have created blogs and found feeds, this may be new to many of you. If you need more detailed instructions, you can view one of the videos we've produced describing the process for other courses:

- Here it is for the PLENK course[673]
- Here it is for the Critical Literacies course[674]

The only difference between this course and the other courses is in (a) where to add a new feed, and (b) the course tag.

Once you start seeing articles from other blogs appear in the newsletter, you'll see how powerful this form of interaction can be. We know you'll enjoy it a lot more than just another threaded course discussion forum.

Your Newsletter Subscription

If you're reading this, you've probably already subscribed to the newsletter. This section lets you manage that subscription.

You receive your email every weekday at the email address specified in your personal information. At the bottom of that newsletter is an unsubscribe link. Click the link, and you're unsubscribed. No questions, no logins, nothing else at all!

So, sometimes people unsubscribe by accident. Or for some reason they can't read the unsubscribe link. So then you go to your Manage Subscriptions[675] page - you'll see a list of the newsletters in the course (currently there's only one). Check the box to subscribe, uncheck it to unsubscribe.

You can use this as often as you want. Uncheck to take a break from the course, and when you're ready, come back, check the box, and pick up right where you left off.

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[670] Daily Newsletter Archives. Change11. http://change.mooc.ca/cgi-bin/archive.cgi?page=newsletter.htm

[671] Content Viewer. Change11. http://change.mooc.ca/cgi-bin/page.cgi?action=viewer

[672] Add a New Feed. Change11. http://change.mooc.ca/new_feed.htm

[673] Stephen Downes. How to add an RSS Feed to PLENK 2010. Blip (video). September 10, 2010. http://blip.tv/downes/how-to-add-an-rss-feed-to-plenk2010-4124023

[674] Stephen Downes. How to Add an RSS Feed to CritLit2010. Blip (video). June 8, 2010. http://blip.tv/downes/how-to-add-an-rss-feed-to-critlit2010-3748540

[675] Manage subscriptions. Change11. http://change.mooc.ca/cgi-bin/login.cgi?action=Subscribe

OpenID

OpenID is currently broken. We don't know why. We're working on it.

Web-Based Activities

We want to encourage all course participants to create whatever sort of interesting activity, interaction, content or service you want. This is your course as much as it is ours!

Let me provide some examples of the things that have been done so far:

- someone has set up a Change11 Facebook group
- another person is planning a weekly teleconference

etc.

We would like you to tell us what you are doing - we can advertise the activity or event in the newsletter, and we'll list all the off-site contributions in the Web-based Activities[676] page.

If you are a participant in the course, we encourage you to check out these activities. They won't all be for you - again, you have to pick and choose - but some of them may suit you a lot better than the activities we're hosting here. Again, what you take part in is up to you. Create your own custom experience of the course.

Moncton, September 14, 2012

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[676] Web-based Activities. Change11. http://change.mooc.ca/webbased.htm

That's Week One in the Record Books

It's Friday evening, I've just sent out OLWeekly, and I can reflect on the first week of the course.[677]

I know that George can probably claim to have had the busier week, since he was on the road in England all week. But I think I had my own share of business as well, with a couple of on-line presentations sandwiched between a trip to Fredericton and some other writing.

Much of my week was taken up getting The Daily up and running. I decided, at the last minute, to adapt gRSShopper[678] for the task. The software, which I use to run my personal website and newsletter, wasn't really designed for a course, so I had to make some changes.

First, I needed to create a screen to allow people to submit their feeds. This is usually an admin task. The only thing readers do on my site is submit comments. So I added a screen - but had to turn off the spam-filtering mechanism in order to accept the feeds. Within a day, I was knee-deep in spam. I spent a *lot* of time this week deleting spam messages - not here, but on my home website.

I also had to set up the system to allow me to mass-import a whole bunch of names and to subscribe them to the newsletter. This actually went pretty well. I also had top adjust the archive system to allow different pages to be viewed, something I would have had to do anyways. And I had to create the templates for the various pages and displays. It wasn't a huge pile of work - probably only a couple of days - but it came at a bad time.

This weekend, I'll be attending to the feed harvesting. For some reason, my feed authorization system isn't working on the connect.downes.ca site (this allows administrators to 'approve' feeds before harvesting starts - otherwise I'd be harvesting spam every day). And I want to finish the submission form, so people will edit (right now, they back up and try again, which results in multiple submissions). Then a small bit of work to get the posts into the newsletter - this bit is already tested, so I know it works.

So that's the mechanics of it - what about the course?

Well, I'll say right off that I think i allowed myself to be pulled into the Moodle discussion too much. It's seductive - the system defaults to sending you these emails, and you start reading them with the best of intentions, and then, *someone was wrong on the internet* and, of course, must be corrected immediately. This happens once or twice on the first day, a dozen times on day five. Ack!

The course elements have kept me busy. There are three major things to do - the Monday presentation (I did a video, George did a doc), the Wednesday Elluminate (two sessions because of time zone issues) and the Friday UStream. That's four hours right there. And I

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[677] Stephen Downes and George Siemens. Connectivism and Connective Knowledge 2008. http://ltc.umanitoba.ca/wiki/Connectivism_2008
[678] Stephen Downes. gRSShopper. Web site. 2008. http://grsshopper.downes.ca/

haven't had to set any of that up - George did the wiki, Moodle and website, along with the Elluminate site, and Dave Cormier and Jeff Lebow set up the Skype-UStream set-up. This really is a group effort, even if it doesn't appear that wai - Alec Couros is helping, Helene Fournier has set up a survey, and I'd really like to get someone to manage the documentation (Leigh....?) Not to mention the people who set up Google Groups, Second Life sites, translations, and all the rest.

It was funny to read some criticism part way through the week about this being a course - if we were really practicing what we preached, we wouldn't be offering a course! Funny, first of all, because I've been practicing what I preach for many years - more than seven years of OLDaily, for example. And funny because the course elements of this are the *hardest* bits to pull off, the bit6s that feel the least natural, the bits that create the most needless complexity.

Having everybody descend on the thing at once, for example. Not that the 2152 people currently signed up aren't welcome. But it has felt, at times, like people wanted to cover the *entire* subject in the first five days. It's a lot easier if we can have people join more gradually, if we can ease our way into a discussion of various subjects. This instant pressure will lessen as the course progresses.

The nature of the subject has also contributed. If it were a course in logic and critical thinking (which I'm thinking of doing in the same style sometime in the future) there would not have been the same rush. Most people in this course didn't even know what connectivism was when they started, and those that did know weren't sure they believed it. A less controversial subject would have a different type of discussion.

Also, connectivism is a really difficult topic to introduce. Normally, when you introduce a topic, you can do so with relatively common and widely understood concepts. Even something difficult like calculus, for example, is introduced using the vocabulary and tenets of mathematics. We aren't so luck in education. The foundational tenets of our discipline are almost uniformly in dispute. The ontology of the study - the nature and purpose of the things being studied - is in dispute. We say in our discussion this week that we could not even agree on what a *theory* is.

Next week will help, if we can get away from the arguments debunking connectivism long enough to study the underlying precepts of connectionist knowledge. I have found myself running around in circles this week, trying to respond to criticisms while at the same time trying to explain these underlying concepts.

I need to be careful - again - not to be drawn into this. Because, while I am happy to describe the theory, I really don't want to be drawn into arguments about the defense of it. Because these are disputes that will not be resolved by argument. If you think connectivism is fundamentally wrong, then noting I say is going to change your mind. I don't mind criticism - that is what advances thought. But I will attempt to draw a line for myself when it comes to trying to convince the critics.

What I've seen thus far is that the criticisms have come from two directions. This reflects the strength of the theory, but also underlines its fundamental challenge. On the one hand, we are

accused by some of collectivism and even some form of communism. And yet, on the other hand, we are accused by others of rampant individualism. (There are other dichotomies like this in the discussion; this is just the most vivid).

I believe that this is because the theory is *neither* collectivist *nor* individualist. It doesn't argue that people (students, whatever) should subsume themselves under some sort of general will. At the same time, it doesn't suppose that people live their lives as lone wolves, responsible for and to only themselves. There is a middle ground between these two extremes, a half-way point between joining and not joining, which (we believe) may be found in the network. Oh, b ut to get to this point, which doesn't come up until week 5!

Well - George is on a train in England right now, and I'm relaxing at home on a Friday night. Time to rest for a bit - I have some programming to do this weekend, then another video to record. I want to move slowly, certainly, through the basic ideas, not arguing for them so much as letting the idea make their own case for themselves. We'll see. This is a fun and extraordinarily fascinating process, yet not without its challenges.

Moncton, September 12, 2008

Response to Fitzpatrick

Here is my response to Catherine Fitzpatrick's lengthy critique of What Connectivism Is. Her comments are in italics.

> *Here's my problem with your ideology, Stephen, which appears to me to be even more radical than constructivism and tries not only to describe or defend a new epistemology, but appears to disrupt social systems as well, in the name of some putative technocommunism that will reign supreme on the Internet with everybody working for nothing and getting everything for free and living happily ever after.*

The theory explicitly attempts to define a new epistemology, that I've described in detail elsewhere.

As for the labels - well, the problem with lables is that they are vague. There are some elements of the theory that you may associate with communism, or radicality. But to infer based on that similarity that the theory *is* a type of communism, or a type of *radicalism*, is to substitute nomenclature for argument. It's a shallow form of criticism.

> *If that seems extreme or a caricature, I can only say that I can read out into the logic of your statements to see how you are destroying the idea of the university established through the ages.*

I don't see how it forms the heart of either communism or radicalism to "destroy the idea of the university". But, again, as I've stated elsewhere, I believe that these traditional structures ought to be reformed. I have no difficulty admitting this, and do not consider it to be an objection to my position.

> *1. The theory might explain *some* types of learning *about some subjects* in *some situations* -- like opensource groups hacking around together on software. But that doesn't mean you can globalize it and make it apply to every single human endeavour. You can't.*

This is unclear - is it the job of the theory to explain or is it something that we have to make apply to (all of) human endeavours?

Connectivism is, in the first instance, an epistemology and a description of human cognition (that is why we attach 'connective knowledge' to the title of the course). While I think we both would agree that there is an almost infinite variety to human reasoning, it is arguable (and I so argue) that the basic mechanisms are common to all humans.

It would be hard to assert otherwise. Cognition - in every human who has ever lived - takes place in the brain, and the brain is composed of an interconnected set of neurons. Neuroscience has explored the nature of the neurons and their connections and described the functioning of the brain in a manner consistent with our theory. That's the global part. But both George and I

would also argue that, within that framework, there is also a great deal of diversity. This diversity also forms an important part of the theory.

A similar pattern applies to our theory understood as a theory of education and learning (the 'Connectivism' part of the course title). We argue that learning occurs in networks, and therefore, that the properties of successful networks are also the properties of successful learning environments. We don't 'apply' this in any strict sense - we would never force people to be connectivist. Indeed, within the learning environment, we believe there should be diversity; we believe people should be free to choose their own form of learning.

It's kind of like you are saying we are trying to *make freedom* apply in the educational process. But freedom isn't something one person makes, or applies, to another. It is something each person grasps for him or her self, given the opportunity and the circumstances. We seek only to provide the opportunity and the circumstances.

> *a. I still have to pay a college some tuition if I want a degree -- you might think credentialing is all I buy, but I buy knowledge, too, which is not somehow withheld in some grasping and greedy capitalist manner, but simply requires *paying human beings who know, because teaching is work*. Don't you, as a professor, wish to get paid? Maybe tuitions are inflated; maybe more has to be made free -- these are social policies decided in a democratic society, not by technocrats welding theories into "disruptive technologies".*

I has responded to the 'existing institutional structure' argument elsewhere.

But I would point out that neither George nor I expect professors (or whatever form instructors take in the future) to go unpaid. We are not arguing for free labour, insofar as labour is required.

But neither do we think that the professor or instructor figure ought to be doing everything that is currently done, and we are not in favour of an educational model that matches one expert to a small, select number of students. We believe that learning should be open, which means changing the nature of professorial work.

If George and I can successfully teach 1900 students, then we should be paid. But we should probably not be paid at the same per-student rate of current professors. Not that either of us couldn't use the million dollars.

> *b. Certain teaching has to occur with certain life situations that aren't endlessly accessible from people who aren't endlessly available on a 24/7 Internet that is itself a reduced form of connection, whatever its marvels. Let's take nursing a baby, for example, which few realize until they've learned it that it is learned behaviour for both mother and child. There's no substitute for having your mother, or more likely, a very well trained and capable lactation nurse, sit with you and the baby and impart the techniques by demonstration and interaction. It is not merely a job of connection, or "proper connection", latching on. It has to do with experience, storage of concepts and "lore," memorizing technique, many elements that only a literalist and reductivist would parse into endless "connectivity".*

I am not an expert in the pedagogy of nursing practices, nor would I claim to be so. But it seems to me that the majority of mothers learned to nurse their children outside a formal educational institution.

And this just is part of the core idea of connectivism. We certainly agree that some types of learning involve close personal connections between individuals. We encourage that. What we disagree with is the idea that only formal learning environments and qualified professionals can offer such connections. Learning, as often as not, takes place on a person to person basis, on a student to student basis. The person with some experience - the mother - shows the person with no experience - the daughter.

As to the *theory* of learning that is advanced here - "*experience, storage of concepts and "lore," memorizing technique, many elements that only a literalist and reductivist would parse into endless "connectivity"* - we respectfully disagree (at least I do; George will make his own statement).

From my perspective, statements like "storage of concepts" are in important ways fundamentally misleading. It is not a case of me being a literalist or a reductivist - a better description would be to call me an 'eliminativist'. I simply don't think that the phrase "storage of concepts" has any correspondence with what actually happens.

> *2. Not content to merely describe how *some* learning *might* be going on in the Internet context (which mainly applies *to technology itself* but not to the content that can fill those new means of communication), you now manufacture a pedagogy out of this. It now has to become a learning doctrine inflicted on our kids in the schools, although they've already been dumbed down and impaired by the constructivist ideologues for the last decade or more -- and by other variously rewarmed and recycled Ilich or whatever they read in the 1970s to make everything meaningless, relative, and dependent only on child-centric operations that lead nowhere, as they can't fill with content or demand any standard.*

It is not clear to me that it is constructivism that has dumbed down (to use your phrase) education. Countries such as Canada and Finland score very well on international tests (imperfect measurements though they are) and yet widely use constructivist techniques.

Indeed, it seems to me, from where I sit, that as education in the U.S. turns more and more 'back to basics', with rote and drill test preparation, the resulting education is more and more (to use your phrase) "dumbed down." The place where education is failing the most seems to be the place most resistant to constructivist and modern 'progressive' educational methodology.

That said, this is not a defense of constructivism, which has its own able adherents.

I would certainly resist the suggestion that connectivism in any respect resembles a "dumbing down" of education. Indeed, one of the more frequent criticisms we hear is that students are not capable of learning this way, that it sets the standards too high, that they need far more instruction, guidance and direction than we propose.

Indeed, read the *rest* of your criticism, and you see this type of argument frequently repeated. How can you say we are offering a dumbing down when we are passing so much responsibility on to the learner?

As for people like Illich and Friere - we openly admit our debt to these thinkers. That does not mean we are mere Illich and Friere clones. But when they suggest that there is a connection between traditional forms of education and oppression, we agree (at least, I do; George again can make his position known).

> *3. There's a lot that seems not to be captured by this doctrine. I'm with Tony when he says "Connectivism should still address the hard struggle within of deep thinking, of creating understanding. This is more than the process of making connections."*

Again, it's not clear what is being required here.

The difficulty and depth of connectivist learning should be obvious to anyone who looks at this course; again, the complexity is one of the most oft-cited concerns.

Probably the suggestion is that there is not an instance of 'deep thinking' in any *particular* instance of content. That we have not, for example, subjected students to a long and extended argument built on sustained chain of reasoning.

Well - I may well teach a course one day where *Principia Mathmatica* is part of the curriculum. But that said, I simply do not think that *that* sort of structure (particularly) constitutes 'deep thinking'.

When you analyse the structure of such treatises, the reasoning is very clear and evident, formed of relatively simple types of inference - propositional and predicate calculus, modal and deontic logic, probability, mathematics (if it's advanced), Boolean logic, and maybe (if it is advanced) inductive reasoning, metaphor and analogy.

These forms of inference, being in the main linguistically and syntactically based, can be assembled into a relatively long and complex chain without a lot of difficulty (at least, by someone who has mastered the basic forms).

Rather more difficulty occurs when the reader seeks to look beyond what is said, to analyse the terminology employed against a background set of beliefs, to expose the inconsistencies and ill-formed inferences, to find the empty and vapid concepts, to distil the clutter of rhetorical device, to identify the assumptions, the presuppositions, the linguistic traces of theory and unstated inference, to expose what is manifestly the *emptiness* of much traditionally 'deep' literature.

To me, *far more* complex - and insightful - forms of reasoning are being created through the interplay among thousands, or millions, of individual content elements. Where each content element may by itself appear to be *simple*, it is the interconnections between them that create a much more complex, deep, and *rich* tapestry of meaning, *far more* than could be created merely using linguistic devices.

That's why Polanyi describes much of our knowledge as *tacit* - as subsymbolic. It is too complex and too detailed to be rendered as mere text.

To complain that the form of reasoning we would encourage students to take part in as *shallow* is a gross misrepresentation.

It is substantially *harder* to work with the disorder and complexity we see within a connectivist network. Because linguistic (syntactic and semantic) descriptions of the concepts and entities in such a network just barely touch the surface, and students must therefore immerse themselves in the process of reasoning in such a system, rather than merely reading about it.

> *The process of "enlightenment," if you will, for lack of a better term ("recognition" isn't adequate), isn't just connecting dots; it's a process of intelligence -- human intelligence making sense of the myriad connections, and you cannot reduce intelligence to connections -- comprehension, awareness, memory -- these faculties are all about something higher than mere connections that does indeed depend on three things that constructivists seem to destroy or deny:*

Goodness, I would never say that 'recognition' is merely a process of connecting dots.

Recognition is a physical process in which an already existing and relevantly similar pattern of connectivity in a neural network is activated through an interplay the corresponding sensory stimuli. To be able to do this is to have first grown the relevant pattern connectivity, a long and involved process.

That said, this - "*you cannot reduce intelligence to connections -- comprehension, awareness, memory -- these faculties are all about something higher than mere connections*" - remains a proposition yet to be proven. And - again - I am not proposing to *reduce* such folk-psychological terms as comprehension, awareness or memory. I am rather challenging their capacity to explain anything at all, and questioning whether a theory formed of such concepts can ever work at all.

> *a. Created cultural and knowledge context -- institutions. Hey, they aren't evil. They work. They are not "all broken" as the "personal democracy" networkers imagine.*

Institutions, as they say, tend to 'work well' for the people they favour.

We have just finished a century wracked with world war and atomic destruction, and we live in a world that is dying environmentally, perpetuates poverty and misery for a large number of its citizens, and continues to tolerate armed conflict as a means of resolving international differences.

Even in relatively stable societies governed almost entirely by institutions, poverty runs rampant, millions get by without health care, crime is rife, the economy is teetering and the country is on the verge of being plunged into a credit crisis while the government borrows its way into oblivion in order to fund an illegal and immoral war.

Your definition of 'working' is very different from mine.

> *b. Authority -- established by actual practice, experience, being proven right etc. Again, not inherently evil, but necessary in a democratic society to prevent the endless tyranny of a zillion subjectivities claiming decentralized or nodic "authority" just by showing up.*

Most authority in our world is obtained through the barrel of a gun or purchased with unearned (and often stolen) wealth.

The phrase "*tyranny of a zillion subjectivities"* is literally nonsensical.

The sentiment expressed in this paragraph is classically Hobbes - his justification for the right of the monarch is that without such a central authority the lives of the mass of men would be "solitary, poore, nasty, brutish and short."

The justification of order and authority in contemporary society is more subtle, based on the (oft ill-used) 'consent of the governed'. Such 'social contract' theories, ranging from Locke to Rawls, are based on some sort of fiction that, were we given the choice, we would opt for the government we have. After all - to quote Locke - if we don't like it, we could always leave.

I certainly don't think that anything like a majority would have opted for what we actually have as a society. The governance of society has essentially been handed over to an elite, and, as Rousseau says, an elite, when it governs, governs solely in its own interest.

'Authority' - properly so-called - is typically the representation of the will of this elite. And it is only the illogic of such an elite that can depict the freeing of a population from this will as some sort of imposition or tyranny.

> *c. Tradition -- while opensourceniks imagine they have utterly escaped anything that seems oppressive and old-fashioned or "Luddite," in fact they create even more rigid doctrines and rituals. Tradition does help create a knowledge context and means of conveyance that does work.*

Actually, we call such 'traditions' things like 'standards' and 'protocols' - and the major difference between our interpretation of tradition and that of the previously existing regime is that we believe that such are the result of voluntary cooperation rather than imposition from a centralized voice of authority.

This is a long argument and I'll return to it only if it comes up again.

> *You try to reduce all learning and intelligent comprehension to mere connections by denying intentionality or implying recognition is merely linkage of connections. And yet without intent and will to apply to what is indeed discrete bits of knowledge relayed by others, you won't learn.*

Again, connectivism isn't (to my understanding) a reductivist position. It is an eliminativist position.

> *If Connectivism were true, merely exposing children to the facts scattered around on the vasty Internet or on a whiteboard or Smartboard would be enough. It isn't.*

There is evidence to the contrary.

> *4. I don't believe that each learner is reconstructing reality, either, so I don't suffer from the problems which Connectivism is trying to solve with its even more radical critique of Constructivism. Connectivism is borrowing from and relying on the same destructive deconstructivism of Constructivism that says each constructs a thing anew.*

Each bit of learning is created (I would say 'grown' rather than 'constructed') but I do not think that we 'suffer' from this.

> *5. I sense in the "pixie dust" remarks an inability to be content with any mystery of the universe that isn't reduced by the reductivist mind -- which isn't the same thing as the eternally curious scientific mind. I'm going to have to insist on the magic of cognition just to derail your reductivism because it's incomplete.*

Again, connectivism isn't a reductivist theory.

As for "magic of cognition" - well, that's your phrase - but I am not prepared to base a theory of learning on magic.

Moncton, September 10, 2008

Engagement and Motivation in MOOCs

From Col[679]- see also Beer, Clark, Jones, Indicators of Engagement,[680] which has much of the same content:

Most of the research into measuring student engagement prior to the widespread adoption of online, or web based classes, has concentrated on the simple measure of attendance (Douglas & Alemanne, 2007). "Stovall (2003) suggests that engagement is defined by a combination of students' time on task and their willingness to participate in activities. Krause and Coates (2008) say that engagement is the quality of effort students themselves devote to educationally purposeful activities that contribute directly to desired outcomes."

"Additionally, Chen, Gonyea and Kuh (2008) say that engagement is the degree to which learners are engaged with their educational activities and that engagement is positively linked to a host of desired outcomes, including high grades, student satisfaction, and perseverance. Other studies define engagement in terms of interest, effort, motivation, time-on-task and suggest that there is a causal relationship between engaged time, that is, the period of time in which students are completely focused on and participating in the learning task, and academic achievement (Bulger et al., 2008)."

"A basic tenet of the research into engagement is that students' activity, involvement and effort in their learning tasks is related to their academic achievement. While there does not appear to be a single definition for engagement, the following definition represents an aggregation of the literature. Engagement is seen to comprise active and collaborative learning, participation in challenging academic activities, formative communication with academic staff, involvement in enriching educational experiences, and feeling legitimated and supported by university learning communities (Coates, 2007, p. 122)."

From Vicki Trowler, Student Engagement Literature Review[681]

"Coates (2007, 122) describes engagement as "a broad construct intended to encompass salient academic as well as certain non-academic aspects of the student experience", comprising the following:

- active and collaborative learning;
- participation in challenging academic activities;
- formative communication with academic staff;
- involvement in enriching educational experiences;
- feeling legitimated and supported by university learning communities."

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[679] Colin Beer. Online Student Engagement. Col's Weblog. March 9, 2010. http://beerc.wordpress.com/2010/03/09/online-student-engagement/
[680] Colin Beer, Ken Clark and David Jones. Indicators of Engagement. Ascilite 2010 Sydney.
http://www.ascilite.org.au/conferences/sydney10/procs/Beer-full.pdf
[681] Vicki Twowler. Student Engagement Literature Review. The Higher Education Academy. November, 2010.
http://www.heacademy.ac.uk/assets/documents/studentengagement/StudentEngagementLiteratureReview.pdf

See also: Examples of positive and negative engagement (p.6)

Table 1. Alignment of Coates' (2007) definition of engagement and Chickering and Gamson's seven principles of good practice in undergraduate education

Element of Coates' (2007) definition of engagement	Chickering and Gamson's (1987) seven principles of good practice in undergraduate education
Active and collaborative learning	2. Develops reciprocity and cooperation among students.3. Uses active learning techniques.
Formative communication with academic staff.	1. Encourages contacts between students and faculty.
Involvement in enriching educational experiences	5. Emphasizes time on task.6. Communicates high expectations
Feeling legitimated and supported by university learning communities	1. Encourages contact between students and faculty.2. Develops reciprocity and cooperation among students. 4. Gives prompt feedback.

Michael Heise - Director of Distance Learning, Onondaga Community College, Be Aware of Student Engagement[682] - basis in Bloom's Taxonomy

On-campus engagement may be very different from online engagement. Typical types of engagement, from this report:[683]

- conversation with faculty
- taking notes / reading notes
- collaboration
- serious conversations

Esther Wojcicki: Student Engagement is Key[684]

- why do students drop out? because they don't see the curriculum as relevant

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[682] Michael Heise. Be Aware of Student Engagement. YouTube (video). May 3, 2011. http://www.youtube.com/watch?v=ytNIwvgvEaE
[683] National Survey of Student Engagement. (2011). Fostering student engagement campuswide—annual results 2011. Bloomington, IN: Indiana University Center for Postsecondary Research. http://nsse.iub.edu/NSSE_2011_Results/pdf/NSSE_2011_AnnualResults.pdf#page=22
[684] Esther Wojcicki. Student Engagement is Key. Vimeo (video). February 4, 2010. http://vimeo.com/9216308

- what skills are relevant? 21st century skills - blogging, reading ads
- need to get school districts to change - students are in 'airplane mode' - students need input, education that serves their interests
- need creative teachers

Teacher Tube - What is Student Engagement?[685]

- 10 seconds - multiplication rap
- students choose field, become experts in the field, then they teach the other students
- 1:50 - nice definition - looking, thinking, engaging, talking... "doing something"
- think-pair-share, looking at test results & evaluating errors, peer editing, we choose what we measure...

Factors Affecting Engagement?

Colin Beer, Ken Clark and David Jones, The Indicators Project[686]

"It has given early indication that a different LMS or different social system can influence the level of feature adoption. The paper has identified a number of patterns that seem to indicate that the relationship between LMS activity and final student grade may be moderated by a number of factors including type of student and the level of staff interaction. The paper has offered some indication that the level of staff interaction on a course site might be an important factor. It has established that instructional design input may also be important. The paper has also reinforced the point that the analysis of LMS usage data is only useful in identifying potential interesting patterns of effective or not effective learning and needs to be supplemented with other methods, data and knowledge."

Engagement - how?

Col: "Chickering and Gamson's (1987) seven principles of good practice in undergraduate education have been referred to as a guiding light for quality undergraduate education and represents a philosophy of student engagement (Puzziferr-Schnitzer, 2005)."

Arthur W. Chickering and Zelda F. Gamson

Good practice in undergraduate education:

1. encourages contact between students and faculty,
2. develops reciprocity and cooperation among students,
3. encourages active learning,
4. gives prompt feedback,
5. emphasizes time on task,
6. communicates high expectations, and
7. respects diverse talents and ways of learning.

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[685] Buzztech. What is Student Engagement? TeacherTube. (video) February 4, 2009.
http://www.teachertube.com/viewVideo.php?title=What_is_Student_Engagement_&video_id=78203
[686] Colin Beer, Ken Clark and David Jones. The Indicators Project. Website. October 9, 2009.
http://indicatorsproject.wordpress.com/2009/10/09/the-indicators-project-identifying-effective-learning-adoption-activity-grades-and-external-factors/

Also TeacherTube - Work on the Work Making Student Engagement Central[687] eg - student teamwork, discussing the work with them – interaction

Student Engagement in Dawson Creek - video[688]

- project-based learning, real-life learning, eg., CSI project
- all our subjects are incorporated
- if we can teach effort

But the presumption of a MOOC is that participants have self-selected, that they're already interested and motivated.

Student engagement through Use of Music[689]

- goal-setting, plan - "What's your plan to get an A in my classroom?"

Twitter use?[690]

- found that twitter users had higher engagement - 4:40

Teemu Leinonen

- MOOC isn't focusing[691] enough on what motivates people

"In a good course students should have the opportunity to practice leadership, gain knowledge, and be autonomous. Students should be provided ways to get social attention and opportunities to play and compete with each other. But this is not enough. Students should have the opportunity to make connections to deep philosophical issues, too: to obey moral codes, improve society and have connections to past and upcoming generations. Students should feel safe and secure and opportunities to take part in rituals, organize themselves, eat and express themselves as sexual beings. Finally, according to Reiss, we also have a desire to exercise muscles. Maybe the idea of school children gymnastics and the Bauhaus'[692] practice to begin lessons with exercises is not that bad idea (I have tried the morning exercises, stretching, yoga, etc. in my lessons)."

This leads us to the second issue: what constitutes motivation?

[687] Sinnet. Work on the Work Making Student Engagement Central. TeacherTube (video). March 24, 2009. http://www.teachertube.com/viewVideo.php?title=Work_on_the_Work_Making_Student_Engagement_Central_eg&video_id=91405

[688] Province of BC. Student Engagement in Dawson Creek. YouTube (video). June 29, 2011. http://www.youtube.com/watch?v=z4oth-E5DR4

[689] TeacherTube. Student Engagement through use of music. Blinkx (video). February 4, 2011. http://www.blinkx.com/watch-video/student-engagement-through-use-of-music/Heg_iCEy1tUmAjWVoqVNRg

[690] Rey Junco. Academic Excellence in 140 Characters. YouTube (video). November 1, 2010. http://www.youtube.com/watch?v=SVOY2x81_bg

[691] Teemu Leinonen. The Wisdom of Motivated Crowds. FLOSSE Posse (weblog). November 22, 2011. http://flosse.blogging.fi/2011/11/22/wisdom-of-motivated-crowds/

[692] Wikipedia. Bauhaus. Accessed November 22, 2011. http://en.wikipedia.org/wiki/Bauhaus

Steven Reiss[693] has proposed a theory with basic desires that explain human behaviour. In the article *Multifaceted Nature of Intrinsic Motivation: The Theory of 16 Basic Desires*[694] Reiss describe the motives behind the desires. These are:

- Desire to influence (including leadership; related to mastery),
- Desire for knowledge,
- Desire to be autonomous,
- Desire for social standing (including desire for attention),
- Desire for peer companionship (desire to play),
- Desire to get even (including desire to compete, to win),
- Desire to obey a traditional moral code,
- Desire to improve society (including altruism, justice),
- Desire to exercise muscles,
- Desire for sex (including courting),
- Desire to raise own children,
- Desire to organize (including desire for ritual),
- Desire to eat,
- Desire for approval,
- Desire to avoid anxiety, fear,
- Desire to collect, value of frugality

Video on[695] Creating a culture of engagement and motivation in a classroom

- from part 1, structure and consistency
- engagement and motivation:
    - getting to know the student
    - don't set them up for failure
    - reach out to the family
    - confidence / reputation / expectations - higher expectations are the norm (3:40)
    - ultimately, give choices (3:15 or so)
- know what the outcomes are - what will they be able to do? Make expectations clear
- interaction - work, feedback, etc - check for understanding
- choice: how to critically engage with the content, and how to be evaluated on that engagement ('open canvas')

Joseph Pate video, Student Engagement through Choice, Curiosity, and Interest[696]: The Implicit Connections of Learning

- reference to Ken Robinson, divergent thinkers (not just critical thinkers)
- "we should be waking them up" (4:40 or so)
- has to be a committment by the person who starts the class to follow through
- expectations (again)
- deep engagement - service learning
- Four orientations:

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[693] The Ohio State University, Department of Psychology. Steven Reiss. Faculty web page. Accessed November 22, 2011. http://faculty.psy.ohio-state.edu/reiss/

[694] Steven Reiss. Multifaceted Nature of Intrinsic Motivation: The Theory of 16 Basic Desires. Review of General Psychology, Vol 8(3), Sep 2004, 179-193. doi: 10.1037/1089-2680.8.3.179 http://psycnet.apa.org/journals/gpr/8/3/179/

[695] Smartatmath. Student Engagement & Motivation Strategies & Tips. YouTube (video). June 11, 2011. http://www.youtube.com/watch?v=s9yOOwGYYfU

[696] Joseph Pate. Student Engagement. YouTube (video). February 5, 2011. http://www.youtube.com/watch?v=1m_ejjoPRkw

- eyes of a child - natural inclination to learn
- answers lie within students and their connections to the world
- learning is not always comfortable
- evaluation should be collaborative and formative, not reductionistic and summative

Content, connection, community and collaboration - as a grading matrix

- activity in the community beyond the classroom

EDUCAUSE converstaion on student engagement[697] (and part two[698])

- students are more engaged, by talking with each other, by participation in their own learning
- the mode of interaction makes it possible for them to speak up more
  (part two) - new ways of submitting materials - "they will invite you to join their group"

Where is the *challenge* in a MOOC?

Measuring Engagement

Using Flow as a measure of student engagement[699]

TED talk from Mihaly Czikszentmihalyi

The characteristics of "Flow" according to Czikszentmihalyi[700] are:

1. Completely involved, focused, concentrating – with this either due to innate curiosity or as the result of training
2. Sense of ecstasy – of being outside everyday reality
3. Great inner clarity – knowing what needs to be done and how well it is going
4. Knowing the activity is doable – that the skills are adequate, and neither anxious or bored
5. Sense of serenity
6. Timeliness – thoroughly focused on present, don't notice time passing
7. Intrinsic motivation – whatever produces "flow" becomes its own reward

Beer, Clark, Jones, Indicators of Engagement[701]

- LMS - "a general correlation between the number of clicks by students within each LMS and their resulting grade across a large sample size consisting of 91284 online

[697] EDUCAUSE. EDUCAUSE In Conversation: Student Engagement. YouTube (video). July 20, 2010.
http://www.youtube.com/watch?v=bahqUQq54xc&feature=related
[698] EDUCAUSE. EDUCAUSE In Conversation: Student Engagement pt. 2. YouTube (video). July 26, 2010.
http://www.youtube.com/watch?v=77brYmCui0w&feature=relmfu
[699] Jackie Gerstein. Flow – A Measure of Student Engagement. User Generated Education (weblog). January 12, 2011.
http://usergeneratededucation.wordpress.com/2011/01/12/flow-a-measure-of-student-engagement/
[700] Mihály Csíkszentmihályi. Optimal experience: psychological studies of flow in consciousness. Cambridge, UK: Cambridge University Press.
1988. http://books.google.ca/books/about/Optimal_Experience.html?id=lNt6bdfoyxQC&redir_esc=y
[701] Colin Beer, Ken Clark and David Jones. Indicators of Engagement. Ascilite 2010 Sydney.
http://www.ascilite.org.au/conferences/sydney10/procs/Beer-full.pdf

undergraduate students for Blackboard and 1515 for Moodle. However, there is also a high standard deviation for each grade group on both systems that is indicative of the degree of variance or volatility in the mean result."

- academic analytics - an LMS hosted learning environment enables every mouse click by every student within the system to be automatically tracked for analysis at a later date. - but this isn't available in a distributed environment

Jackie Gerstein, Flipped Classroom example[702]

"Experiential Engagement: The Activity: The cycle often begins with an experiential exercise. This is an authentic, often hands-on learning activity that fully engages the student.   It is a concrete experience that calls for attention by most, if not all, the senses"

Also: Student Produced Viral Videos[703]

T4LT - Online Student Engagement Tips and Strategies[704]

- call them or text them
- require them to blog
- find out who's not logging in
- make assignments relevant and meaningful
- explain expectations
- pre-assess students' readiness
- include a time-management activity, because online learners often struggle
- assignment variety and ownership
- add a regular webinar to the course - not canned, culture of communication and study
- communicate personally

TED, Gabe Zichermann: How games make kids smarter[705]

Game Thinking - game mechanisms to engage audiences

- speed camera lottery (11:00 or so)

Features:

- faster pace
- rewards everywhere
- extensive collaborative play
- global world

[702] Jackie Gerstein. Flipped Classroom Full Picture: An Example Lesson. User Generated Education (weblog). Nobvember 20, 2011. http://usergeneratededucation.wordpress.com/2011/11/20/flipped-classroom-full-picture-an-example-lesson/
[703] Jackie Gerstein. An Instructional Activity: Student-Produced Viral Videos. User Generated Education (weblog). October 26, 2011. http://usergeneratededucation.wordpress.com/2011/10/26/an-instructional-activity-student-produced-viral-videos/
[704] T4LT. Online Student Engagement Tips and Strategies. YouTube (video). February 23, 2011. http://www.youtube.com/watch?v=WPEW2birta0
[705] Gabe Zichermann. How games make kids smarter. TED (video). June, 2011. http://www.ted.com/talks/gabe_zichermann_how_games_make_kids_smarter.html

Judith Borreson Caruso, EDUCAUSE, Measuring Student Experiences With Course Management Systems[706]- LMS measures - features used, tool use, perceived value

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[706] Judith Borreson Caruso. Measuring Student Experiences With Course Management Systems. EDUCAUSE Research Bulletin. Volume 2006, Issue 19. September 12, 2006. http://net.educause.edu/ir/library/pdf/ERB0619.pdf

The Right Mix

My response to Jon Dron, And so it ends...[707]

Interesting reflections and I appreciate the comments and the participation. It's easy enough technically to implement some sort of collaborative filtering or reputation management system, but the result would conflict with the objectives of the design of the MOOC. To over-generalize, things that pull out one (best post, most reputable writer, etc) out of many are exactly the sort of things I wish to avoid. I think you sense this - you write "A single view of any course is always going to be a compromise that suits some and not others" - but my response is to attempt to avoid the single view.

This makes the parcelling or highlighting problem an order of magnitude more difficult. Basically, it amounts to wanting a way to do it for each participant, but also to provide each participant maximal choice, and a reasonable but not excessive amount of homophily. I think a tag system is an excellent alternative, but simple keyword tagging is clumsy and ineffective - it depends far too much on what you are calling soft technologies (and specifically, the act of applying the tag) and means the only resources available are self-selected materials.

I do have a 'topics' system that preserves the best of tags but greatly automates the process, but I've been frustrated by some technical difficulties. It requires a lot of caching, and my cache system has its issues (if comments haven't been appearing when you make them on posts, it's because I'm still trying to make the topic system work). I don't think a parcelling system will be by itself sufficient, however. I'm not even sure it's necessary. I think that the problem of participation lies elsewhere. Because we could send a post with only a small number of resources to people, which would be easily manageable, and participation would still decrease.

That's why, in my talk on engagement[708] this week, I tried to explore the various things that would cause people to commit to doing things. I don't think any of the formulae are quite right yet. And nothing will be perfect - people take these courses in their spare time, which means they may stop for any reason at any time.

I don't think the answer will be a _simple_ thing, like badges, levels, competition, rewards, etc. - I expect it means getting the basic design (open, connected, interactive) right, plus providing focus (attractors, parcelation, personalization), and then stimulating actions (signs and symbols, loyalty, campaigns, progress indicators, etc).

Moncton, November 27, 2011

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[707] Jon Dron. And so it ends… Athabasca Landing (weblog). November 25, 2011. https://landing.athabascau.ca/pg/blog/read/91481/and-so-it-ends
[708] Stephen Downes. Engagement and Motivation in MOOCs. P resentation delivered to CQU OLT Educational Technology, Online to Queensland, via WebX. http://www.downes.ca/presentation/288

MOOCs and the OPAL Quality Clearinghouse

I have submitted the following responses about #change11 and MOOCs in general to the Open Education Quality Initiative (OPAL)[709] survey of OER practices (I love how the email said it would take five minutes to complete the survey). I would also encourage others involved in MOOCs to participate in the survey,[710] as my responses represent my own perspective only.

> *Please describe your practice*
>
> *Please be specific. Describe how you managed to achieve greater openness in educational practices, policies or other fields. What were the challenges you encountered to start with? What works in your view? Were there particular phases you had to go through to achieve the result? How can others best learn from your experience? Please upload additional material, or give a link to a helpful resource, tool, description, website, etc.*

The Massive Open Online Course (MOOC) is a concept developed by Stephen Downes, George Siemens (University of Manitoba, Athabasca University) and Dave Cormier (UPEI) in 2008.

The practice consists of hosting a traditional college or university course in an open environment, supported by technology that facilitates massive participation.

A series of MOOCs have been hosted by various organizations since (please see http://en.wikipedia.org/wiki/Massive_open_online_course for examples).

MOOCs are instances of a connectivist pedagogy. The essential element is to foster and support connections between participants and learning resources. Participants in MOOCs are encouraged to use their own platform (blog, photo account, social network site) to create and/or share resources.

Typically, a MOOC will be supported with technology that facilitates this sharing. A number of MOOCs have used gRSShopper, an application that harvests RSS feeds created by participant platforms, organizes the material, and redistributes it as a daily email newsletter and RSS feed.

The principle of connectivist learning is that the learning takes place not as a result of absorbing the course content, but rather in using course content as the basis for conversation and the creation of additional materials.

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[709] Open Educational Quality Initiative (OPAL). Website. Accessed November 20, 2011. http://www.oer-quality.org/
[710] Submit an OER Best Practice. Open Educational Quality Initiative. Accessed November 20, 2011. http://www.oer-quality.org/clearinghouse/submit-a-best-practice/

Typically in a MOOC more content is produced than learners can consume; they are encouraged to select content that is relevant to their own circumstance and by so doing create an individual perspective or point of view on the domain of discourse.

Conversation is also often seeded by the hosting of online sessions with guest participants, typically experts in the field. While these live sessions are attended by a smaller percentage of participants, they result in the production of artifacts that prompt additional discussion.

> *Quality - OER/OEP*

> *How does the institution approach quality in OER? Is there any current indication of a quality concept or process? Does the institution perceive quality from the perspective of the quality of open educational resources or the quality of open educational practice? How does the institution show quality through OEP versus quality of OEP? What methods, concepts and practices are used to enhance the quality of OEP?*

There is no filtering or other mechanism directly addressing quality in a MOOC. The design is such that quality materials will be discovered and highlighted by course participants. Quality, in other words, is not determined by experts, it is crowdsourced.

This is an important feature of MOOCs. There is not the presumption that (a) there is a single type of quality that applies to all participants, and (b) that this quality could be recognized by course facilitators. Accordingly, what we observe in a MOOC is that participants will cluster around different types of materials or media - for example, they may cluster around a discussion board, social network site, or virtual world. Quality is then indicated in different ways specific to those environment s(such as the 'Like' button in Facebook).

Additionally, course facilitators do not participated as dispassionate observers or 'coaches'. Rather, they participate as though they were students, creating resources on an ad hoc basis, highlighting materials they find interesting or useful, and in other ways modeling the practice of quality contributions.

'Quality' in a MOOC is defined not as the exceptional nature of published materials, but rather the richness and utility of conversation and discussions mediated by those artifacts and other activities. Hence, quality is determined post-publication, and even post-distribution, as an emergent property, and not an inherent property of the resource itself.

The most overt quality mechanism is the review of participant feeds. Each feed is reviewed by a facilitator prior to being added to the list of aggregated feeds, as follows:
- to ensure the URI submitted for the feed RSS (or Atom, or other supported format) is correct
- to ensure the content encoding is correct, and can be understood by the aggregator
- to ensure the content is not spam, or irrelevant to course materials

Participants also select by overt action the content they want included in the course through the embedding of a course tag (for the current 'Change' MOOC the tag is '#change11') in the title, description or category fields.

Innovation

How can OER/OEP innovate educational practices? What current innovative practices are there in the institution? Please do not regard innovation from just a technology perspective!

The MOOC is as a whole an innovative educational practice. For example, the following:

- a course need not be offered by a specific institution; while one institution may 'seed' the course, other institutions may use the MOOC as the basis for courses of their own, which they evaluate and and credential in their own way.

- all aspects of course function are open; in addition to open educational resources, planning documents are open (and may be edited by participants), online class sessions are open (and recorded, the recordings posted), materials contributed by participants are open (though participants may form their own closed groups; we don't force anyone to contribute), and any evaluative materials are open.

- the principles of learning by conversation and creation of artifacts are not in themselves new - we are reminded of Papert's constructionism, for example - the conduct of these activities in a massive open online environment is new

Policy

What are the current OER/OEP policy arrangements at institutional and national level across Europe/the World?

MOOCs are mostly characterized by a lack of policy.

Course materials themselves are licensed under CC-By-NC-SA (though there is no particular requirement for this). Contributors own and manage their own IP.

It is important to note that contents are never actually acquired by the institution or merged in any way. This frees the participating organizations from most policy requirements governing IPR, quality, accessibility and hosting conditions. Materials are accessed in situ by course participants, and are only linked to or referenced by the course management system.

There are certain policy implications that could be recommended by the model, such as:

- public support for MOOC applications and environments, such as content aggregation software, online synchronous meeting software, etc.

- public support for open educational resources that may be used by the MOOC application - this supports the authoring and hosting of content deemed important from a public policy perspective

Actors

What actors are involved in OER/OEP? Is there any evidence to show that OER actors do not always promote OEP but "only" access to OER?

Actors in the MOOC include:
- course facilitators, and often volunteers helping the facilitators
- course participants, both 'for-credit' participants at one or more institutions, and non-credit participants
- guest experts or session hosts
- the rest of the world, in the form of people who create resources that may be accessed by course participants

OER actors produce whatever they want; there is no effort made to police their production, and this would in fact be counterproductive to the objectives of the MOOC.

Initiatives

What OER/OEP initiatives can be evidenced? Is there any evidence to show that OER initiatives do not always promote OEP but "only" access to OER?

Not applicable, except in the sense that the course itself produces a series of artifacts (such as synchronous session recordings) and these are stored online. A website http://www.mooc.ca has been established to store archived MOOCs.

Open Educational Practices

Can you identify some case studies/ descriptions which form the illustrative base for a more general model of OEP?

The more general model of open educational practices is to consider openness to be the default, rather than the exception. As a consequence, aspects of the course production that are closed are done so only as a last resort, with good justification.

For example:

- the course participant list is closed, and not shared with anyone. This is to prevent the course list from being used for spam. Participation in general may be anonymous. A privacy and security policy is employed: http://change.mooc.ca/privacy.htm This policy is specific to the course, but could be modified and standardized as a common practice.

- access to the gRSShopper administration functions are closed, in order to prevent access to course participant information, and to prevent unauthorized use of the emailing function or page publication functions

- individual student records related to course grading policies at specific institutions are closed, for privacy reasons

- and as mentioned elsewhere, participants at any time have the *option* to create closed discussions or groups; these are not 'official' parts of the course (there are no 'official' parts of the course, though those organized by facilitators tend to have a higher status among participants)

Tools and Repositories

What tools and repositories are being used to deliver OER/OEP? For example GLOW, Connexions. Are there any other special tools for OER/OEP? e.g. Cloudworks, in which practices can be discussed and validated? Are there any tools for Visualisation? e.g. CompendiumLD? Are there any tools for Argumentation? e.g. Cohere

The primary tool for the Downes/Siemens/Cormier MOOCs has been gRSShopper (http://grsshopper.downes.ca), a purpose-built application supporting the aggregation, remixing and distribution of references to OERs.

Strategies

Can you identify any strategies for organisations to use OER/OEP? Can you identify any business models that promote OER/OEP?

There are no strategies that specifically encourage the use of OERs; rather, there is instead a lack of strategies requiring the use of proprietary materials.

When participants are not required to use proprietary materials, they gravitate toward OERs on their own. Many will rely on the listing provided by course RSS feeds and emails, while many others will find or produce materials of their own, contributing them to the course.

No business model is needed in order to stimulate the production of these resources, over and above the business model that supports the offering of a course in the first place.

Current barriers and enablers

What are the barriers to the use of OER/OEP? Is there any evidence to how these barriers have been overcome? What are the enablers to the use of OER/OEP?

Not applicable in the current context. The MOOC assumes that constraints are not placed on the production and distribution of relevant materials.

Moncton, November 20, 2011

Education as Platform: The MOOC Experience and what we can do to make it better

Presentation to EdgeX, Delhi, India.[711]

My name is Stephen Downes, I'm from Moncton, New Brunswick, Canada. New Brunswick is a small province on the eastern side of Canada, near the Atlantic Ocean. The entire province has about 800,000 people in it. The city where I live has about 140,000 people in it. So my experience of the world is a bit different from yours.

My experience of the world is very filled with birds and trees and trails and water and things like that, and it gives me a bit of a different perspective, and one that I enjoy. And it's a perspective I look at the world from when I travel, and I come to places like this, and I'm looking for what's familiar to me. I'm also looking for what's new. And I'm looking for ways of interacting, means of interacting, and mechanisms of interacting.

That's not what this talk is about but that's the frame or the perspective from which I'm speaking at the moment.

What this talk is about - it's called "Education as Platform" - is the idea of exploring some of the experiences we've had with massive open online learning, and exploring some of the criticisms that we've experienced, some of the criticisms that we've seen, and trying to understand what elements of the design are working and what elements of the design are not working, and to use this understanding to try to advance our perspective on the way online learning is proceeding and should proceed.

Now, a couple of caveats, and they're not in the slides, but I do want to bring these out, because George (Siemens) mentioned them a bit. One of the caveats is the idea of education as solving mobility problems, social problems, employment problems, poverty problems, and I think it works the other way around. I don't see education as being the means to solve these problems. I don't think it's an automatic thing. I know it's a really good selling point for education generally and online learning in particular, but I don't think that the root of social problems lies in a lack of education, and I don't think that the solution will be there.

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[711] Stephen Downes. Education as Platform: The MOOC Experience and what we can do to make it better. Keynote presentation delivered to EdgeX, Delhi, India. March 14, 2012. Slides and audio available. http://www.downes.ca/presentation/293

If we look at the actual literature, there's a very strong correlation between poverty and educational outcomes. Solving poverty solves the problem of education, not the other way around. And that's my experience.

That said, education has a role, and a significant role, in the quality of life that people who are educated can have. A person can be out of poverty and uneducated and have a very poor quality of life, but I think it's very difficult to be educated and to have a poor quality of life. I think education creates ways of seeing, ways of doing, ways of becoming that are not possible otherwise. And these are the things that make a life worth living and make a person willing to work more diligently and more forcefully toward having that life.

I raise these considerations because the idea of the Massive Open Online Course, and the theory of connectivism that George coined the title for and that George and I and Dave (Cormier) and a whole pile of other people have worked together to create, is largely about self-education, is largely about how we create our own learning. And I think a big part of that has to be why we create our own learning, why we educate ourselves, what are the motivations here.

There's this thing about education being what is needed in order to get jobs. As though there's enough jobs at the end of it. And I think that's a fallacy. People respond - and this happens in our country - they respond to the doctor shortage by educating more doctors. They say, "this will solve the problem!" But they don't create new doctor positions. And so we've educated a hundred doctors and still have a doctor shortage after because nobody's paying for doctors.

And George mentioned robots. I love robots. I think robots are really cool. But I'll tell you: robots take jobs. And more and more we are in an environment where the machines are the productive entities in society. And that's true not just in Canada; it's also true here. And it's true not just in manufacturing but across the board: in agriculture, in education, in government.

George talked about learning analytics. Learning analytics is using machines to count numbers instead of using people as we used to. So we have to come to grasp, as educators, with the

reality that education is not going to change that. And that if we are educating people for jobs that don't exist, then we're not being honest with our students. And that the problem of wealth and distribution in society isn't going to be solved simply by educating.

George made some interesting comments about disruption in education and was saying that some of the new programs, the new initiatives like Khan Academy, Udacity, Coursera, and others, are not disruptive enough. I think he's got that right. And what we've tried to create with the massive open online course is something that is, as he said, transformative, something that takes what we know of as education, sets it aside, and rebuilds it for a world that is dramatically changed, complex, changing, difficult to understand, difficult to comprehend, difficult to work in. And what we've created is called the MOOC, the Massive Open Online Course.

There's been a number of MOOCs over the years. We claim - and I think it's a good claim - to have created the first MOOC, Connectivism and Connective Knowledge 2008. And it was very recursive because the topic of the course was how to create courses that are about that course kind of topic. So it was a course that studied itself. And that's the perfect kind of course, for some things.

There has been a variety of other MOOCs. Rita Kop and I did a MOOC on critical literacies. Jim Groom has done a MOOC on digital storytelling; he's done that a few times. Dave, George and I (and Rita) have done Personal Learning Environments, Networks and Knowledge. Right now we're going the Change Online MOOC, where each week we introduce participants to a leading figure in educational technology. There have been the MOOCs by Stanford University on artificial intelligence.

What's characterized these MOOCs most of all has been the large number of participants, and that's something that makes it very interesting. In an environment where you need 60, 160, whatever it is, new universities, being able to offer an education to thousands of people at the same time using relatively straightforward technology is something that's very attractive.

Probably the major defining feature of the MOOC, and certainly the place where we started, is the fact that it is open. Anybody can enter a MOOC. Well, OK, I have to be a bit careful here: anybody with a computer and an internet connection, or access to one, can enter a MOOC. These are types of online learning. I'm going to emphasize this a little bit later as well, but what we built is a type of online learning. And it requires a certain infrastructure.

It takes advantage of that infrastructure to do things that we could not formerly do without the infrastructure. You might say, and you'd be very reasonable in saying, well what if you don't have that infrastructure? Well then probably you're not going to want to do a MOOC, because it's going to be a lot more difficult. Openness also means that novices and experienced people are able to merge together in the same space and communicate and interact with each other. And this is one of these things that you can do online that you can't really do offline. Online, the Prime Minister of a country can have a conversation with people from all over the place; offline, that's a lot more difficult, because the Prime Minister's always surrounded by advisors, and then media, and then other media, and then a crowd of people, and that prevents the Prime Minister

from talking to people directly. It is this directness, this immediacy of communication, that you can do online that allows a MOOC to be open, that is one of its defining features.

The MOOC is structured as a network. And again, this is the sort of thing you can't really do offline. But online - I see people laughing at the diagram[712], that's a creative representation of a MOOC, by one of our students in a MOOC - and the idea here of a MOOC is that it's not one central entity that everybody goes to, it's not like a school or a classroom or a book where everybody would go to this one thing. It's distributed. There's a bit here, there's a bit here, there's a bit here, there's a bit here - there's my website, there's George's website, there's Dave's website, there's Rita's website, there's Helene's website, there's Nancy White's website, Grainne's website even (it was only created recently), and it's the website of this student, this student, this student, it's the website of a person in Spain, a person in Brazil, a person in India, a person in Canada, the United States, wherever.[713]
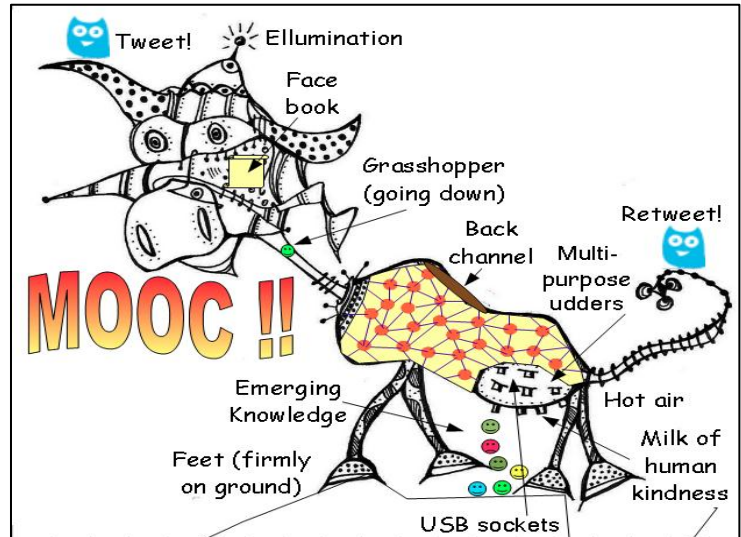
And all of these websites are connected through the mechanisms of the MOOC. As George said, it looks like the web. It is the web. And we use different technologies to bridge the gap between these individual websites. And the way we conduct a MOOC, the way we conduct learning in a MOOC, is through interactions in this web. The first - simple - iteration of this is, you send a message to me, I send a message to you, you send a message to you, I post a blog, you comment on it, and the messages go back and forth.

Now that's different, and I want you to understand how substantially different that is. Look what we're doing here. This (indicating the conference room) is not a network. This is one guy at the front who through luck and happenstance got the podium, not that he deserved it, and is broadcasting. One person talks, everybody listens. And that's the only way we could do it, because if everybody were talking we wouldn't have an educational event, we'd have a party or something like that, and nobody could follow what's going on. But online, when we draw these connections together, we can create a learning experience out of it, and we know that because we've done it.

The MOOC is also about aggregating or bringing things together. Not to unite them into being one single unified thing, it's like George said with the crowds, right? We don't want 100 people

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[712] Gordon Lockhart. CCK11: Man! This MOOC is Something Else! Connection not Content. March 8, 2011. http://gbl55.wordpress.com/2011/03/08/cck11-man-this-mooc-is-something-else/ Based on José Bogado. 'la vaca de los sinvaca'. http://www.flickr.com/photos/transientes/3029314280/

[713] Osvaldo Rodriguez. Two distinct course formats in the delivery of MOOCs. Weblog, March 9, 2012. http://cor-ar.blogspot.in/2012/03/two-distinct-course-formats-in-delivery.html

in the room to all come to the same belief, but we do want the 100 people in the room to each come up with their own beliefs, but then bring them all together.

The MOOCs that we've run have used software that I've written called gRSShopper, and what gRSShopper does is it goes to your site, your site, your site, your site, your site, and brings everything together, organizes it - it analyzes the content, extracts links - creates a web, and then creates a variety of ways of looking at that web, for example, a daily newsletter that we send to every member, and that allows people to work as individuals, to communicate one-to-one with other people, but also to feel connected to the MOOC as a whole.

The newsletter is probably the single most defining feature of a MOOC. A MOOC is characterized by an abundance of content and that has challenged people because when we approach a subject we basically give then access to - well, not all, but as much of we can think of - the content in that field. Volumes and volumes of content.

Our current MOOC, Change11, has right now 2600 participants. When you have 2600 participants, if every person writes a blog post, that's 2600 blog posts. Nobody can read that. Nobody should try. And we don't want them to. And people say, "well what am I supposed to do?" And it's really hard to get people to stand back from that and say "I don't need to absorb all of this."

That's the old way, right? That's school the way it used to be, where the authority at the front of the room will present you with the content you must have and then you absorb it and remember it. But what this is like is an entire society talking together. And you would not expect to absorb all of that.

And I have some metaphors up here to help people grasp how they should understand this. Football. Following football. There must be some football fans here; I've heard it's popular. And there are teams all over the world. How many of you follow the South American leagues? What, nobody? Some of you may follow the European leagues, Manchester United, yeah? How many of you follow Australian football; have you been following what Brisbane's been doing lately? No! Well how can you be a football fan if you're not following all of these? Aren't you tearing out your hair? You just can't keep up? Of course not. You are a football fan by choosing those football games, those teams, those associations that are interesting to you. And you know that there are ten-year olds playing football in the back yard, but you don't feel compelled to go out and watch just because it's football. You learn to let it go.

Or, recipes. There's a lot of food in the world. More food than any person could possibly eat. But, because of that, we don't give up eating. That would be absurd. There are mechanisms both external to ourselves and internal that have us focus on the food that we can access and that we want. We choose what to eat. There are more recipes that we could ever possibly make. There are thousands of recipes for bread. There are more kinds of bread than you could possibly sample. That doesn't mean we give up eating bread. It just means we pick and choose the types of bread that we eat. You get the idea?

Similarly, places to visit. There are more places in the world than you could possibly visit, but that doesn't mean you stop traveling. It just means you pick and choose the places where you're going to go.

 So the Massive Open Online Course has a different attitude with respect to content. You're not expected to absorb and ingest the content. You're not expected to remember stuff and repeat it back. The content is the medium that we use in order to do the actual learning but it is not the stuff that we learn. I'll talk more about that as we go on.

The MOOC sets up this contrast, and it's an interesting contrast, and Clark Quinn, who's here, maybe in this room even, maybe in the first row, wrote a post the other day[714] talking about the distinction or the pull between the solo approach to learning and the social approach to learning. And he talked about the Stanford AI course, which really is a bunch of videos, some online interactive exercises, and some tests that you do, as being predominately solo. Predominately you working by yourself with the material. And he contrasted that with the social kind of course that we see in Connectivism and Connective Knowledge, or the MOOCs that George, Dave and I have put on, where the action of the course is predominately interaction with each other.

And I think it's an interesting divide, but I think we need to be careful not to represent the world as two polarities, social and solo. The group or the individual. Because there's a midway point that I've characterized as the network, and it's this midway point that we want to get at. And I'll talk about that as well. But there is this aspect of the Massive Open Online Course that involves not just you and the material but you working with other people. And that's crucial to the definition of the Massive Open Online Course.

Dave Cormier, who might also be in the room - he's in the back doing his hallelujah wave - has done a number of really nice videos about what a MOOC is and how to be successful, and again, it's like I said before, success in a MOOC isn't just remembering content. Success is very much what you define success to be, and that sounds a little anti-intuitive. How can you get a job if success is what you define it to be? Then again, that comes back to the purpose of this in the first place. What is success in a MOOC? Dave defines five steps[715]:

- orient (figure out where stuff is),

- declare (and what that means is, setting up a place for yourself, setting up an identity for yourself, even, a little but, using course tags to identify that part of your material that you're contributing as part of the course),

[714] Clark Quinn. MOOC Reflections. Learnlets (weblog). February 29, 2012. http://blog.learnlets.com/?p=2562
[715] Dave Cormier. Success in a MOOC. YouTube (video). December 1, 2010. http://www.youtube.com/watch?v=r8avYQ5ZqM0

- and then network (because once you set up your space and write some posts nothing happens; it's when you begin to connect with other people),

- and as you network you begin to find people you have affinity with (not necessarily people who are the same as you, but people who you can talk to, people who have an interest in a subject that corresponds with your interests),

FIVE STEPS TO SUCCEED IN A MOOC

1 ORIENT
2 DECLARE
3 NETWORK
4 CLUSTER
5 FOCUS

- and then finally and most interestingly, find a purpose for the work that you are doing (why are you in this educational experience, where are you going to apply it).

And I was looking at that, and it says 'success in a MOOC', and it seemed to me that it's success in life as well. You know, a MOOC is like the web, and the web is like society, and society is like life, and it's not about remembering stuff.

Tony Bates did a criticism of us recently[716], and we make the claim that we're not just disruptive, we're transformative, and Bates says, "well, yeah, but on the other hand, MOOCs follow in this tradition - and we certainly acknowledge this tradition, people like Ivan Illich or Paulo Freire - of self-education and education as empowerment, education as being able to determine your own life. I think of it in terms of self-governance, as opposed to self-interest. And he's representing it as this great socialist struggle. I certainly don't see it in exactly that frame at all. But I think there is an element about personal development and personal learning that is central to a MOOC.

One of the first things people ask me is, "how can I apply this to my classroom?" And I respond, "you weren't listening." You can't apply this to the classroom. And then people ask, "well what use is it to me?" And my answer is, "This isn't about how you can go out and be better teachers. It's about how you can learn." And you begin learning this way yourself, you begin learning by connecting yourself, and eventually later on it becomes relevant to your classroom. And it doesn't become relevant in a way that I can say and you can remember, it becomes relevant in a way that you can understand you can apply because it's your experience and your context.

Knowledge isn't something that is given. It isn't something that is acquired. It isn't something that is poured into you like you were an empty vessel or written onto a blank slate like you were a blackboard. It is - you. It is your self. It is what you become. It is how your brain shapes itself as a result of the experiences that you have.

And this is really crucial to understanding what learning is. This is a bit of an aside - people talk about how great the traditional university was - Oxford and Cambridge, they had the best professors and the best content - and they had really smart people there, no question about it. But what made these universities great was not the content (often it was wrong, you go back 50

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[716] Tony Bates. More reflections on MOOCs and MITx. Online learning and distance education resources (weblog). March 3, 2012. http://www.tonybates.ca/2012/03/03/more-reflections-on-moocs-and-mitx/

or 100 years, what they were teaching was pure… wrong; we know a lot more now than we did then) but it was the exposure of the students to the minds of these great thinkers and how they thought and how they reasoned and how they inferred. What these universities produced was not people who had a lot of knowledge, it was people who were very good learners, very good perceivers, who could recognize things, who could perceive patterns, find trends, make their way in society even if it changed. Not because they remembered a bunch of stuff.

That is the core of the MOOC. That is what we're after in these courses.

And we're not completely successful. And I'll be the first to say that. And I see George in the back kind of grinning at that because I think he knows too. There are criticisms of the MOOCs and they are good criticisms and I want to take these seriously because it's easy to get up here and say "knowledge is stuff you grow" and "you form connections" and la-di-la-di-da and everybody comes out of it and still nobody is employed.

Well. What are these? Tony Bates again, I'm going to quote from his post ,

> MOOCs themselves are highly dependent, as Stephen acknowledges, on students already having a high level of understanding and an ability to learn independently, and to think critically. This is exactly what good quality formal education should be doing: developing and fostering such abilities so that learners can participate meaningfully in MOOCs and other forms of self-learning.

So what he's saying is, MOOCs are good if you're already educated. But if you want to become educated, you've got to go to a traditional school.

I think that's a pretty serious criticism, because if the whole point of a MOOC is to provide an education, then it needs to be useful, the form needs to be useful, for people who are not already educated. Now, against Tony Bates, I think our standards aren't quite as high as he suggests. But nonetheless I think we need to address head on the bootstrapping problem.

Other people have trouble with navigation. One critic writes[717], "We often found navigating the MOOC waters frustrating. Once we got started it was not difficult to find the course materials and a few other participants, but where was everything else?" And so on. The navigation issue -

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[717] Lisa Chamberlin and Tracy Parish. MOOCs: Massive Open Online Courses or Massive and Often Obtuse Courses? eLearn Magazine. August 2011. http://elearnmag.acm.org/featured.cfm?aid=2016017

finding stuff, finding content, et cetera - they say, "if you don't use Twitter you can miss a vital discussion or a thread." And just - there are no vital discussions and threads.

And you see, here, the problem here, the navigation problem, isn't a problem of navigation, it's that we have not been successful in explaining to people that half the process of learning in a MOOC is learning how to explore, is being an explorer. And that it doesn't work if you already know where everything is, because you're not going to learn how to explore if we tell you where everything is.

She writes, "There's a lot of missed connections, synchronous forums are also prone to limited participation, while many blog posts lack comments," and then "the problems with architecture and tools often subvert the promise of connectedness that MOOCs should provide." And that one I totally agree with. The connectedness isn't there. And I don't think it's a navigation problem as she says, but I do think it's a connection problem.

I think that in the MOOCs that we've done, to some degree, and in the MOOCs that others have done, to a much larger degree, too much of the interactivity has been focused around the facilitators. In the Stanford AI MOOC, it's all about the facilitators, who are famous names in Artificial Intelligence. That's not networking. And in our MOOCs as well people line up to - well they don't really line up - they gather in small clusters to listen to George and Dave and myself and it's hard to get them to gather in small clusters to communicate among themselves. So it all becomes centrally focused, and if you can't find that centre you become lost.

Another problem: the size. And again, it's the same sort of thing. People feel for some reason that they need to make a personal connection with all 2000 people in the MOOC. And then they worry that they can't. And they worry that they're missing out on the important people. As though there are important people. And the larger the MOOC gets the more difficult this becomes.

We would like to see this model apply not just to 2000 but to 10,000 or 100,000 people, but if people go into it with the expectation that they have to develop a personal relationship with 100,000 people it's not going to work.

Again, we need this middle point between the solo and the social. We need this middle point - maybe aimed at Dunbar's number of getting to know 150 people - a middle point that allows us to network without necessarily becoming a part of this whole crowd of 100,000 people.

There's the accusation of elitism. That began with Connectivism 2008 with some nasty criticisms, but Tony Bates cites an anonymous academic, a university administrator, who says, and I quote:

Those who will not reach the academic level set by the organizers will remain lurkers who can only profit in discussing with the those in the crowd that can argue at the same level. But they cannot increase their skills…

Again, that's a constant refrain with these criticisms.

What's that good for? The courses silently separate the elite from the mass. It looks like democracy but is quite the opposite of [real] teaching. Education normally tries to help people to enhance their understanding and make up their minds. MOOCs don't take care of this. They are a non-educational approach. The new freedom and openness is a freedom for nothing.

That's a direct quote from, as I say, an unnamed administrator, and it's something I take very seriously because I'm the least elite person around. I think. And it strikes to the core when someone says "what you set up is for the elite." But - it's accurate. That's what really stings about that criticism, is the MOOCs as we've set up, again, foster this clustering of people around the central core, and those in the central core are going to define the themes.

I criticized DS106 recently - that's Jim Groom's course - and I actually criticized Alan Levine because he was going on, "DS106 forever!" and creating chants and posters, and the whole idea of these projects in that course was that people would begin to identify with DS106. And it became like a political cult. And I know they're just playing at this, and I understand that, and I know it's just in good fun, but when the structure of the course comes to be about this central concept or content, then the actual intent of the MOOC to distribute and democratize learning has been subverted. So, this is a serious criticism to me.

The other concern - and I need to address it squarely - is effectiveness. I say constantly to everyone who will listen to me, "learning isn't about the content." And usually people ask me, "well what is learning then if it isn't about the content?" And if it's not about the content how do you even know that you've learned? And I think that's a serious question as well. I mean, people take our MOOCs, they come out of our MOOCs, they have no credential, no certificate (mostly, if you sign up and pay for a University of Manitoba you might get a certificate credential, but most of the people don't). And even if they did, other people would assume, "oh yeah, they've learned a certain body of content," which they haven't. And we don't want them to. So it really does raise the whole question of, "what is it they're learning at all?"

So on the one hand we have critics saying "they don't support learning," which is kind of true, and on the other hand, there is no learning, which is also kind of true, and it really makes one question the effectiveness, the entire purpose, of having these things. Maybe it's just so Stephen and George and Dave can have a nice career.

Well I don't think that's true. I really don't. But I think that we can only grasp the solutions to these questions if we grasp the concept of what a MOOC is, and I address that as much to ourselves - because we drift away from it - as I address it to the external critics. I can live with the external critics but I can't live with getting the model wrong.

So what does it mean? Let's reconceptualize.

MOOCs are open. What does 'open' mean? Open means that everybody can participate. But not simply that. There are many ways to participate. And I identify a couple here, because I think these are important. Open means, not simply 'doing', but being able to watch while other people do. Open means being able to participate, not just at the expert level, but at your own level.

It's kind of like carpentry, right? You don't have to build the Taj Mahal in order to enjoy carpentry. You can build a little bookshelf. That's all I've ever built. I liked it.

Open means participating or doing things publicly so other people can watch. You hear a lot of talk about education creating this "safe" place. What that really means is education creating a place where you can do things where nobody else is watching. But if nobody else is watching nobody else is learning, and nobody else can learn. Openness means doing things openly, publicly, sharing them, watching them, and being able to be watched. It's a hard concept. It takes a little courage.

Online - it's the third letter in MOOC and it does mean that it's connective and it's online, as I said before. And that poses a challenge in societies where not everybody is online, not everybody has access to a computer, and we need to understand that. But it also means you can't take a MOOC and put it on a DVD. You can't take a MOOC and apply it in a classroom. There are limits to what you can do with this form.

But on the other hand, it's not about the fact that all the communications are in digital bits or electronic signals and fibre-optic fibres or whatever. The MOOC is about the process. And the process is greatly aided by being online. In fact it is aided so much it's really difficult to think of doing it offline. But conceptually you could.

Online, a lot of the tasks - like gathering content from around the world - can be done fairly easily. Online, I can communicate with somebody in Spain instantly, not a problem. Online, I can access more data about more people, I can count links, I can draw charts a lot more easily than I can do it offline. It's not that it has to be online, it's just that if it's not online it's going to be really slow and really cumbersome, and not nearly as good a learning experience.

The third essential point is that a MOOC is connective. And I think where we are failing is that we're losing this point. To the extent that a MOOC is about content, the MOOC fails. And the more our MOOCs are about the content that's in them, the more our MOOCs are failing. And I think our MOOCs have been drifting that way.

It's like, as the slide says there, it's like confusing the learning of the game, or the playing of the game, with the memorization of all the rules of the game. It's like we have a MOOC for football and more and more our MOOC is drifting toward talking about the rules of football. Well who cares? After a certain point. There's a ball, there's a net, you kick the ball at the net. And everything else is details. But we get caught up in trying to get everybody to remember the rules as though that's football.

It's like confusing enjoyment of food and knowing how to cook with the memorization of recipes. It's like confusing the experience of travel with knowing where things are on the map. There's the different between the (remembering) and the doing and the MOOC is about the doing. But as our MOOCs focus more on content they become less and less about doing, and that has been a weakness of them.

Our MOOCs - including Change, including Connectivism, not to mention the artificial intelligence MOOCs and MITx and the rest of them - are insufficiently connective and they're tending to slip toward an emphasis on content. And that's where they stop being effective.

And there are some reasons for this. When you sit down and analyze this, well why is this? and (you see) our MOOCs are based almost entirely on conversation. And there are reasons for that, there are good historical reasons for that, there's the whole Cluetrain Manifesto "markets are conversations" etc. etc., which is a really bad analogy on a certain level. And the more our MOOCs become about conversations the more they become about content, and this distracts us.

What we need to be doing is looking for other ways to connect. DS106 connects brilliantly with artwork. I wish I could take that further. We've tried to have activities or projects in our MOOCs, but our follow-through has been pretty minimal. Honestly. They've been very poorly defined.

So we need to rediscover our process. We need to rediscover the connective aspect of MOOCs, because the further we drift away from process, the further our courses, the more our courses, become like traditional courses, and if they're traditional courses online they fail. Because all they do is get people to remember content. And it's not that we don't scaffold learning enough, it's rather, we don't give people in our courses enough opportunity to participate, or to play.

So - I want to say, "MOOC, meet game." And on the other side, "Game, meet MOOC." You're both about the same thing. In fact, I think it was Viplav (Baxi) asked me, "what would a MOOC be for a 10-year old?" And I said, "It would be a game." And I want to take that seriously. Not that I'm saying "all games are MOOCs, all MOOCs are games." But there is an intersection here that is very illuminating, and one both sides can learn from.

I talked Viplav's ear off the other day about chess. And he assured me that, yes, people do play chess here. I thought that was encouraging. Think about chess. Think about how people learn chess. Think about how we recognize learning in chess. Now, the rules are pretty simple, but memorizing rules is not 'learning chess'. You could memorize chess openings, but that's not the same either.

Well, I thought, let's go searching for 'chess net'. And see what the world of chess has done online. And I found "chess.net"[718] - it's a commercial online service - you have to pay then $4 per month, you have to log on, and they'll set you up with chess opponents. OK, not really what I had in mind.

 "Chess world."[719] This is a "dedicated correspondence style" site. So it supports emailing moves back and forth. I used to play that way - in fact, I got kicked off one of the world's largest

computers in 1980 - it was like a multi-million dollar computer system owned by Texas Instruments and communicated with other computers around the world for seismic processing, and I played chess by message back and forth with people in Australia, and they kicked me off. I can't understand why. So this is chess by correspondence - pretty good, but not what I had in mind.

Then I found "net chess".[720] And again this is correspondence chess with time controls and everything on the site is free, and the design looks it.

Then I found something more along the lines of what I was looking for, "Babas Chess".[721] Now this is interesting. Instead of sending you to a 'chess world', it's a client you have on your own

[718] Chess.net. Website. Accessed March 12, 2012. http://chess.net
[719] Chess World. Website. Accessed March 12, 2012. http://www.chessworld.net/
[720] Net Chess. Website. Accessed March 12, 2012. http://net-chess.com
[721] Babas Chess. Website. Accessed March 12, 2012. http://www.babaschess.net/

computer that will take care of connecting to other people. You're still playing with people all around the world, but the client's on your computer. Now that's more along the lines of what I'm thinking about.

Now, let's think about chess again. Chess is open; anybody can play. It's very accessible. You can learn the rules, but that isn't having learned chess. In fact, the measurement of your skill at chess has nothing to do with tests, or anything like that, but is entirely due to your playing other people at chess. That's your measurement. But it's not just a count of the number of games that you've won or lost. Because then you could become an expert simply by playing your little brother over and over and over, and not let him quit. That's what I did. I thought I was becoming a chess expert, but I wasn't.

Chess has rankings; rankings are based on the skill level of your opponent. And yourself. And if you're just beating lower skilled opponents over and over you don't advance. You have to beat better opponents in order to advance. And - well - and that's it.

Chess is connective. Chess is learning in the way that I've been describing. And we have a type of learning that is based on interaction with other people, that's measured this way, that isn't measured with tests, that isn't traditional learning, and might even have (there have been studies) applicability outside your domain.

I also looked at budget games.[722] [723] [724] [725] Same sort of thing; I don't have time to linger on these. But you can have, instead of chess games, budget games. But you need to be careful with these games, because a lot of these games try to 'teach' a certain subject rather than just be a game. And as soon as the game begins to be about the content, it begins to fail.

I looked at a really interesting interview by Henry Jenkins of Kurt Squire[726] and Squire talks like a programmer but if you get past that - he's talking about this one game about rehabilitating a lake, and he says "we show you the bad lake, and we show you the things you need to do, and the people you need to lobby, and da-da da-da da-da, and we hope that a whole mass of people will learn about how to fix lakes and will go out and do it."

That's exactly wrong. And it's exactly wrong because it converts a game from being a form of interacting with other people to being a form of propaganda. And propaganda isn't learning. Propaganda is getting people to memorize stuff you want them to memorize. Two very different things.

[722] The Committee for a Responsible Federal Budget. Stabilize the U.S. Debt. Website. Accessed March 12, 2012. http://crfb.org/stabilizethedebt/

[723] Budget Simulator. Website. Accessed March 12, 2012. http://www.budgetsimulator.com/info/

[724] Budget Simulator. Website. Accessed March 12, 2012. http://www.budgetsimulator.com/brightonandhove

[725] New York Times. You Fix the Budget. November 13, 2010. Accessed March 12, 2012.
http://www.nytimes.com/interactive/2010/11/13/weekinreview/deficits-graphic.html

[726] Henry Jenkins. What We've Learned About Games and Learning: An Interview with Kurt Squire. Confessions of an Aca/Fan (weblog). March 7, 2012. http://henryjenkins.org/2012/03/what_weve_learned_about_games.html

But there are ways we can think of interactions online as game-like, as supported by interfaces like the personal learning environment, where we're not trying to build content, where the skills and the attributes come as a result of playing these games or having these conversations or whatever, that aren't the content of them.

And so when we think about these connective courses we should be thinking about the connectors. in chess, it's the chess game. In football, it's the football game. In cooking, it's the recipe book. Or the restaurant. Third party services, plug-ins - whatever these connectors are, these are the mechanisms that foster the learning. And that's what we're missing in these connective courses - the connectors. Blogs and discussion lists are not sufficient. But again, the connector isn't about teaching people a certain subject, it's about giving them a field, or an environment, on which they can play their own games in their own way for their own purposes, and they will learn in that way.

Language games - I could do a whole one-hour talk on this. Understanding games as the languages people use to communicate back and forth with each other. Understanding MOOCs in terms of those same languages.

And our assessments? Well it's not like chess, because in chess there's just one game and there's a ladder, but we can picture or imagine in our mind multiple ladders, multiple dimensions, and it's a bit of a leap, but think of a network as a multi-dimensional ladder where your position is your closeness to other people in the network. I'm sorry I don't have time to talk about that in any detail, but there is a concept there, trust me.

Badges are not sufficient, analytics are not sufficient, it's the interactivity, it's the relative position with everybody else in the network, that represents learning in this sort of environment.

That's all the content I have. That's all the time I have, plus a little bit, I'm sorry Viplav. And I certainly thank you for your patience and I'd be more than happy to address any aspect of this with any of you. Thank you so much.

(Applause)

Q. These connectors, are they similar to social objects?

A. That's a darn good question! I have to think about that. I really do. I mean, the functions are very similar, but there's a difference between a connector and a social object in that a social object is defined functionally and a connector not necessarily. A connector is defined functionally but in terms of a different function. But - yeah, great question, really great question. I have to think about that. Certainly you can go a long way with that analogy or that metaphor, no question about it.

Q. Do you think a MOOC will devalue minority opinions?

A. Yeah, a MOOC poorly done will be very hard on minority opinions. This is the sort of concern that I raised with respect to DS106. What happens to the one person in DS106 who objects to the propagandizing of DS106? Well as it turns out, they jump on him and exhibit a great degree

of hostility. This is something we see in society as well sometimes. Properly constructed that shouldn't happen because there shouldn't be a centre core defined by a majority. A MOOC should not be about a majority. It's not like - well, with chess, right? You don't become the best chess player in the world just because the majority votes for you. It's independent of that. And so you can play with an unorthodox style and that will still stand.

Q. Do you think moderation is required as well?

A. The problem with moderation is it's labour intensive. I'd rather define it structurally. Look at chess, right? Or look at football. This is what kills me, right? The entire nation of India knows how to play football - that would take a massive education project. And yet, they did it. I don't know how many people play chess, but again, you can imagine the entire nation learning how to play chess. Or learning how to speak a language. So, it can be done. But not with human mediation. So you need structural elements that serve in this way. Again it comes back to the social object thing. The purpose of the structural elements is not to shape the discussion or lead the discussion a certain way, but it's to offer this channel, this semantic-free interface between people, a structured interface, but meaning-free. That was a little awkwardly expressed, but you're nodding so I think you kind of got it.

Delhi, March 12, 2012

Personal Learning Environments

Presentation to Hämeenlinna, Finland, by Video, April 22, 2010

Hi, I'm Stephen Downes. You probably heard about the volcano that has affected northern Europe. That volcano's the reason why I'm not able to visit you in person today, although I would very much have liked to. I hope that this video will serve as a substitute and I hope to see you some time in the future.

Today I want to talk about the personal learning environment. You know, sometimes I have to justify these talks to my manager. I need to explain to them how it is that I'm learning things when I'm presenting things to people like you in Finland. But, what I need to tell them is that I need to be able to talk to educators, and not just that, to talk to people in the community, to find out what they do, how they learn things, how they make a living, how they get by in their day to day lives.

Now this is the central part to me of what a personal learning environment is, is learning through community, and how we learn through a community. The PLE is a technological tool, but it is simply a tool that allows us to do the sorts of things that we've done since prehistory in order to learn, in order to become a part of our community.

The PLE itself is something that has come out of community interaction. This is one of the many diagrams created around the PLE. As you can see, the idea here is to embed a person – indicated through 'ELGG' in this case – into the community of different services.
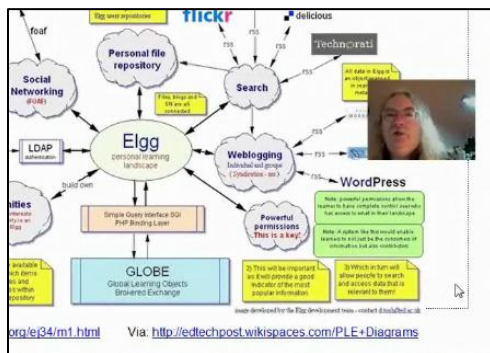
What we're trying to do is create a different kind of knowledge. Knowledge in the VLE – in the typical learning management system – is typically static, declarative, authority-based. Like books. Like a lecture. Knowledge in the personal learning environment is dynamic, tacit, not declared, not explicit, created by people who are working inside the personal learning environment.

I've created my own personal learning environment over the years. It's called gRSShopper. Inside my administration I have the major functions of a PLE. For example, I have a list of feeds that I subscribe to. When I view these feeds I can harvest the content of the feed, and as you can see, the content comes in, it's analyzed, and put in to my database.

Once I have the content, then I start creating my own content inside my aggregator. I do this with my 'post creator'. These posts are the content that I create and I send out to people on the

internet. Here's an example of a post that I sent out yesterday. It's a link to content, to an article in the Washington Post. I've written my own information about it, I've categorized it, and then I update the record and it's set to go.

Finally I have ways of publishing or sending my content to people out there in the world. The main way I do this is with my newsletter. My newsletter software takes the content, assembles it, and then puts it together into a newsletter. gRSShopper can also provide content syndication in the form of RSS feeds and other types of feeds, text content, web pages, and I'm working on other ways of syndicating the data as I speak.

George Siemens and I used gRSShopper as a major component in the online connectivism course that we taught in 2008 and 2009. This course advertised and delivered as a massive open online course. It was offered for university credit, but if you didn't want to pay the tuition fee, we didn't mind, you could sign up for the course anyways. We have 2200 people in the first year, and about 700 people in the second year.

The idea of this course is that there wasn't any centralized curriculum, there wasn't any set of required readings, there wasn't a set of classes that we marched through, but rather, people learned in their own way at their own time and what the course did is it offered a locus for them communicate and connect with each other, to share what they had learned on their own, and to create new learnings out of that sharing.

The idea here is that the learning wasn't something that we provided from ourselves to them, rather, the learning is something that they each gained on their own through their participation in the community.

In the connectivism course we used gRSShopper as a central application, but it was by far not the only application that we used. We had students creating blogs in Blogger or Wordpress, using Facebook accounts, Second Life areas, and even more, all kinds of things, all connected through gRSShopper. The idea of this course was that people would organize themselves into a network, and there would be different kinds of personal learning environments, whether they be web, mobile, person-to-person, widgets, or whatever, connected through different applications.

Now typically when people start talking in this way they start talking about social networks. They start talking about learning in social networks. That's not quite the approach that we want to take. We are using the social network, but the learning that we create through personal learning

environments still happens in their selves. We are using one of these – a personal learning network – in order to create one of these – a neural network.

Learning isn't just the acquisition of facts, it isn't the acquisition of data, it's the creation of a new set of neural connections in the mind. That's the difference between learning in a personal learning environment and learning in a traditional manner. It's the difference between simple

We are using one of these

Figure 1. Biological Neuron

To create one of these
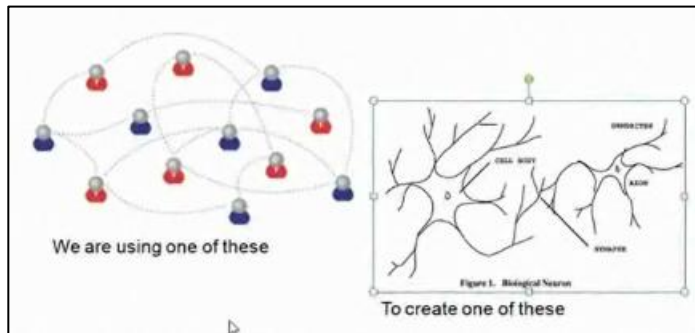
and complex. 'Simple' is learning a fact. 'Complex' is learning a fact in the context of a network and learning not just the fact but all the associated situations around that fact. It's the difference between knowing that 'Paris is the capital of France' and even some sort of knowing how, and knowing what it *feels like* to have geographic knowledge, what it feels like to be a speaker of the language.

Learning a discipline is not learning a collection of facts, it is a total state. And when we're looking at learning outcomes, because it is a total state, it's obtained through an immersion into an environment, rather than in an acquisition of particular entities. It's expressed functionally. "Can you perform as a geographer?" rather than cognitively "Can you state geography facts?"

That's why we need to not just provide learning in a different way, we need to evaluate learning in a different way. We *recognize* when somebody has acquired that certain neural state, that way of being that is "being a geographer" by the way they perform in the network of geographers.

We call that "narrowing the participation gap." When a person is first exposed to a network of geographers, they're probably not going to have a lot to contribute. But as they learn more, as they learn how to use the words, how to do the things that geographers do, how to act, think and actually *feel* like a geographer, they become more and more engaged in that

Figure 1. Biological Neuron

We recognize this

By perfomance in this

community. They reduce the participation gap. Learning to be a geographer is reducing the participation gap in the geographers' community.
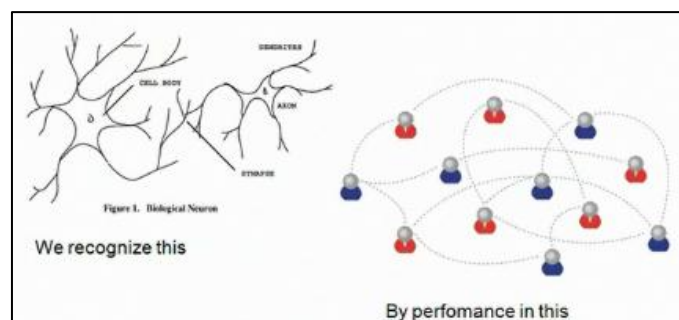
In the last few years we've moved from beyond gRSShopper to a new personal learning environment project that we're calling Plearn. In Plearn we've identified six major components. In the rest of this talk I'll talk about the six major components. But first I want to talk a little bit about some of the thinking behind them.

Before talking about personal learning environments specifically I want to talk about the environment which we find them. This is an environment which is which in different data types. We're not just talking about large types of data like movies or books or even academic articles or blog posts. We're talking of data which is very specific, very discrete, and spread out across the internet.


This data is managed through a system we call 'resource profiles' and the idea here is that, for any object, you get data from many different places, and pull it together to create a 'picture' or a 'profile' of the object. The people creating these profiles each have their own personal identity, and each profile belongs to a specific person. Personal identity is managed in many different ways on the web, and it's important to be able to accommodate that and build that into our system.
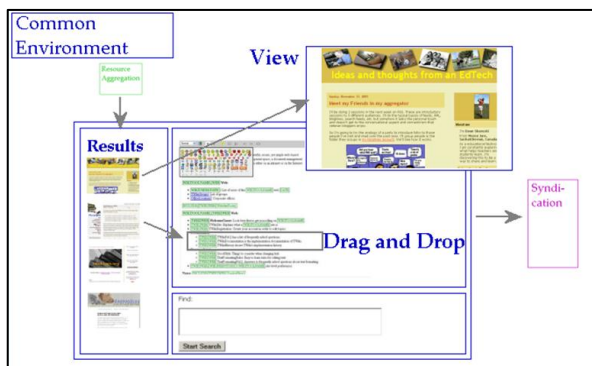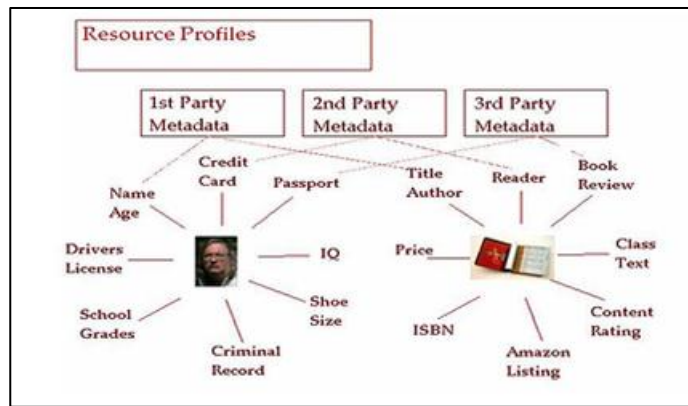
This is necessary in order to create communities. Communities exchange these data items back and forth and together create a combined description of the object. You see how this happens, right? Different people have different perspectives on the same thing. They create their own information about that thing. And then the community, by talking amongst itself, is able to create the wider picture.

The technology behind this is called a resource aggregator. On the web there are many kinds of resource aggregators. More recently we've talked mostly about things like RSS aggregators, or Atom aggregators, that bring together things like blog posts. But in fact we want to have a wide variety of resource aggregators in a personal learning environment. These aggregators will typically tap into repositories of downloaded data. In the educational space, we've had repositories for things like learning objects and open archives initiative repositories, DSpace, or CORDRA repositories. But again, we are going to have to thing much more widely than just educational metadata and educational repositories.

We also need to incorporate into our system a mechanism for resource production. This can be something as simple as a Flickr for the uploading of photographs to online video editing tools to complex multi-user collaborative authoring tools or environments. I'm working on one of those right now called SunergiC3 with a number of other
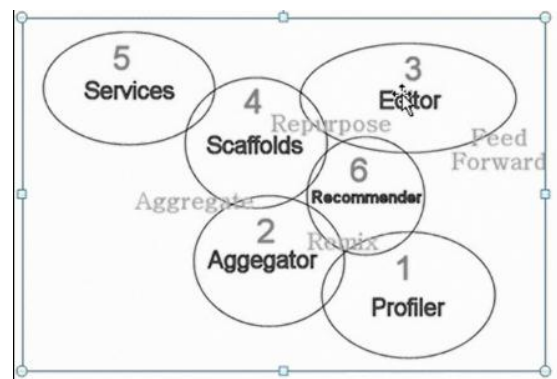
people at NRC.

The personal learning environment itself is what I've called a 'common environment' in the past. The idea here is that you're bringing in different things into the same user environment: the results from your aggregation, the editing area where you're going to create new content built from material from the aggregation, and then a way to forward that content to a publishing system of some sort.

Rights will need to be managed intuitively and hopefully completely behind the scenes. And when we're finished we'll syndicate our content. We'll send it just like gRSShopper does, in email, in RSS, and in a wide variety of ways. All of this has to operate in the environment that we find ourselves today, not only big clunky desktop computers but in all manner of mobile devices, embedded devices, and the rest.

This is the environment in which we're trying to build the personal learning environment. Now let's look at the personal learning environment itself. What does it need to contain?

In Plearn, we've identified six major components, and they are as follows: the personal profiler, the aggregator, the content editor, something we call 'scaffolds', third party services, and the recommender.

The personal profiler is pretty much what you would expect it to be: a place to store your personal information and to connect you to your personal information on other sites. In order for the personal profiler to work, it needs to work on a lot of websites, much like the example shared taken from web20formula.com

The idea here is that you're creating an account in one application that can be used in another application. Here you see YouTube being connected to Google Reader. In the personal learning

environment our application's going to have to connect a large number of external applications in this way. Using personal identity in as standardized format as possible.

Next the personal learning environment application is going to have to manage the aggregation of resources from across the web. This is going to include much more than just your standard RSS or Atom feed. This Tun3r application, for example, I have on my iPod, and it aggregated information from local radio stations.

Music, video, data, personal information, organizational information, email, any data you can think of will need to be aggregated by our aggregator.

Next we need something to record content with, something to work with it, something to create content with, and also a mechanism to take this content and distribute it on the web, publish it, not just in feeds to our friends, but to online storage services like Flickr, Blogger, YouTube, and many other of these content storage sites.

You're probably pretty familiar already with the online editing tools that are available. What you see is what you get, or WYSIWYG tools, like this one being demonstrated here, a person can edit content, add pictures, videos, and other objects. Most online services support these. Blogging sites such as Blogger or WordPress, content management systems such as Drupal or Joomla, and a wide variety of other services.

This in the first instance is what we're talking about for content input. But we need more than just a WYSIWYG in a personal learning environment. This is especially the case for an educational environment. We want to be able to do more than just create text content. We want to make all kinds of content. And we want to do it in an educational way. We want to be able to scaffold that content creation with a variety of different helps and services.

You see examples of this all over the internet. This bit of of software, for example, helps people create adventure rooms and online adventure games, not just rooms, but messages, objects, characters, responses, crypts, vocabularies, and a whole host of other things. It's a very specialized tool. This is the sort of thing that I'm thinking of when we start talking about scaffolds: a specialized tool that helps you make your own kind of content your own way.
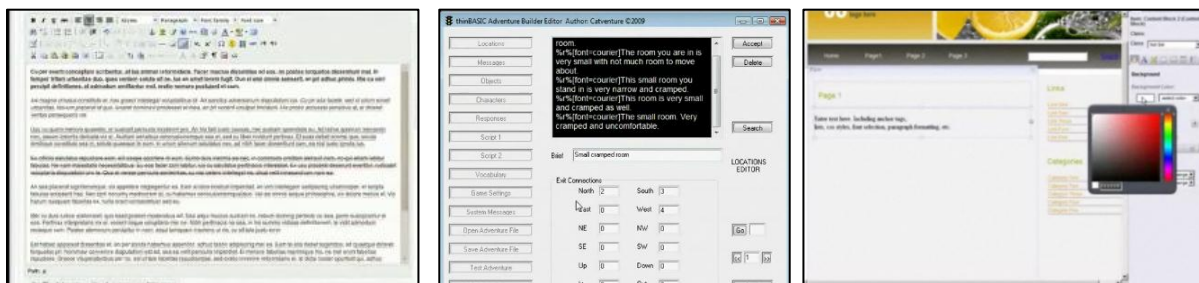

Here's another example, completely different data: this is CSS script for web pages, but still the same sort of concept. The application here is helping a person create their own content, in this case, the stylesheet for a website. The way it's working is the editor is input on one side or the other, and the changes are reflected on the web page itself. Again, it's sort of a what you see is what you get, but for style sheets.

This is the idea of a content scaffold. You're learning about how to create content through an interface that works with the data you want to work with. You get a wide variety of interfaces for many many different kinds of data and this allows you to be creative in many ways across multiple dimensions.

You see what's happening here, right? We're really talking about two different kinds of content that are available through the personal learning environment. The first kind of content is the data itself, what we typically call the educational content: the facts, the information, the video, the audio – the content. The second kind of content isn't really content at all, it's ways of

manipulating the content. It's the shell that surrounds the content, or what we've called the 'scaffold' for that content.

What's happening in a personal learning environment is these two kinds of content are being merged. That's why getting the content representation right at the beginning is so important. That's why resource profiles is so important. If we represent our content broken down and distributed we're able to represent our scaffolds as ways of working with that content. And this allows us to take our work a step further.
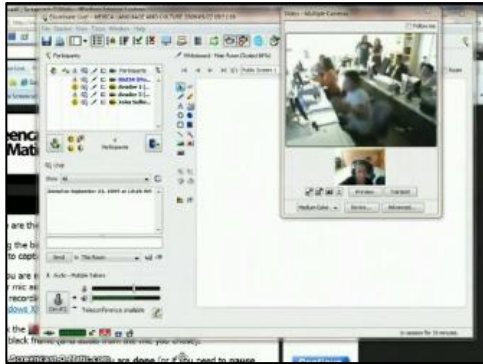
This should look familiar. It's an Elluminate session. And the logical next step to scaffold is to set up interfaces to third party conversation sessions. These third party services are what connect one PLE to another PLE. When we talk about having people work collaboratively, usually what we're talking about is having them go to a third party environment and work together in that environment. This saves us from the need to try to program all kinds of different possible collaboration into our own application. By distributing the function we greatly increase the ways in that third party collaboration can be supported by different kinds or projects, different kinds of services on the internet.

The last of the six elements of the personal learning environment is the recommendation system. I don't have a nice video for the recommendation system because most of happens behind the scenes. But you get the idea what can happen with a system like this, right? We've got all kinds of people being connected together, we've got all kinds of content being connected together, and we even have ways of representing that content and ways of setting up collaborations with other people, all in the same system. A recommender system now watches all the data from that system and is able to make recommendations based on the work that you have been doing and the work that you're likely to do based on what you have been doing.

This basically is my presentation on personal learning environments. I wish I had had more time, and I wish I had had the time to be there, to be able to talk to you in person. I thank you for your time, and as I said before, I do hope to have the chance to visit Finland some time in the future. Thank you very much.

For audio and video see http://www.downes.ca/presentation/245

*April 22, 2010, Hämeenlinna, Finland, by Video*

Content and Assessment

Review: The Edupunks' Guide, by Anya Kamenetz

I have now had the chance to read *The Edupunks' Guide*[727] and can now form some opinions based on what I've seen. And if I were forced to summarize my critique in a nutshell, it would be this. Edupunk, as described by the putative subculture, is the idea of 'learning by doing it yourself'. The Edupunks' Guide, however, describes 'do-it-yourself learning'. The failure to appreciate the difference is a significant weakness of the booklet.

Let me explain. Suppose a person wanted to learn Thai cooking. Following the Edupunks' Guide, she would find some recipes using Google, perhaps find a Khan-style course, and if very lucky, a Thai cooking Google group. I would recommend the Vegan Black Metal Chef[728] series - good tunes, and good food.
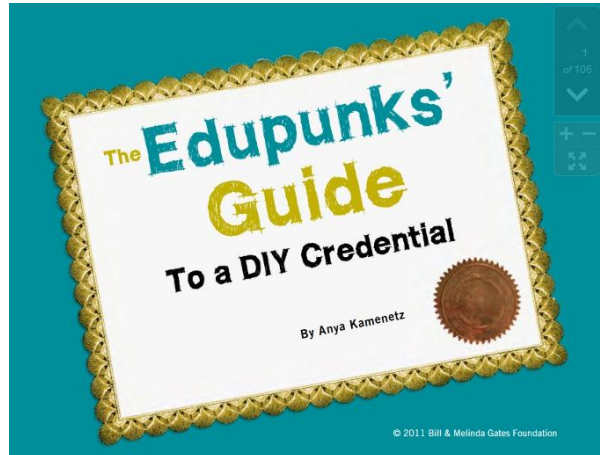
By contrast, the edupunk way is to cook Thai food, and in so doing, learn how to be a good chef. There's no right or wrong way to go about it - the main thing is to get one's hands dirty and actually learn from the experience. In so doing, a person might take a course, search for recipes, ask for help, or - in the style of the underrated film 'The Raman Girl'[729] or that overrated film 'The Karate Kid'[730] - find a mentor to show you how to steam noodles.

Now based on the discussion that has already taken place in this iDC forum, I would expect Anya Kamemetz's first response to be something along the lines of "I know that; I do encourage learning by doing." And no doubt that's what was intended, but that is not in fact what the booklet does. The structure and focus of the booklet is entirely toward the 'do-it-yourself learning' model. Here's Anya Kamenetz on learning to cook:

> *A simple example is learning to make pizza. A few years ago, you may have had to take a class or at least buy a cookbook. Today you can put "how to make a pizza" into YouTube and within minutes, you're watching a video that shows you how to fling the dough! (p. 2)*

But watching a video instead of watching a person (or taking a class) isn't what makes something edupunk. It's the act of taking matters into your own hands, and making pizza for yourself, instead of buying frozen or ordering delivery. And it's more than that: it's growing your

[727] Anya Kamenetz. The Edupunks' Guide. eBook. Scribd. Bill & Melinda Gates Foundation. August 4, 2011. http://www.scribd.com/doc/60954896/EdupunksGuide
[728] Vegan Black Metal Chef. Episode 1 Pad Thai. YouTube (video). May 9, 2011. http://www.youtube.com/watch?v=CeZlih4DDNg
[729] The Ramen Girl. 2008. Internet Movie Database. http://www.imdb.com/title/tt0806165/
[730] The Karate Kid. 1984. Internet Movie Database. http://www.imdb.com/title/tt0087538/

own wheat, grinding your own flower, growing mushrooms and peppers, and grinding your own pepperoni. None of this is suggested anywhere in the guide. Which is unfortunate, because it's misrepresenting what has overall been a pretty good movement.

Kamenetz has what may only be described as a very naive understanding of education (including online education). Here's her representation:

What DO we mean by education, exactly? There are three big buckets of benefit that an educational institution, like a college, historically provides.
- Content - the skills and knowledge. The subjects, the majors. You could think of this as the "what" of education.
- Socialization - learning about yourself, developing your potential, forming relationships with peers and mentors. The "how."
- Accreditation - earning that diploma or other proof that will allow you to signal your achievement to the world, and with luck get a better job. The "why." (p.3)

Notice how 'what we mean' by an education becomes the 'three big buckets of benefit' provided by educational institutions. The idea here is that if you can just provide these benefits for yourself, you'll be educated. And that, in turn, is what defines the overall structure of the booklet - section A focuses on the content, skills and knowledge; section B focuses on degrees and credentials; and section C focuses on networks, peers and mentors. And preceding these, the 'DIY Educational Manual' offers seven 'how-to' guides to learning online.

The section of the book that comes closest to what we are discussing here, and what could have been the most valuable contribution, is the section on what the DIY movement is, exactly. This, for example, is great

> *DIY, or Do-It-Yourself, is a movement about self-reliance and empowerment. DIY communities help each other get the knowledge and tools they need to solve problems and accomplish goals on their own without being told how to act or being forced to spend a lot of money. That can mean growing your own food, fixing your own car, publishing your own writing or putting on your own rock show. (p.3)*

That's very good. Not perfect, but very good. I wouldn't say the reason people embrace DIY is to save money. Often, doing things yourself can end up being a lot more expensive - just ask anyone who has built his own car. And it's not about not being told how to act. Most DIYers will take direction willingly, if it accords with what they are trying to do. But DIY is about self-reliance and empowerment, and more, it is about a passion for the thing, a desire to know, a desire to create or to control, a desire to get behind the surface appearance of things.

That's why it is so disappointing to read this:

> In the case of DIY education, it means getting the knowledge you need at the time you need it, with enough guidance so you don't get lost, but without unnecessary restrictions. DIY doesn't mean that you do it all alone. It means that the resources are in your hands and you're driving the process. (p.3)

Kamenetz simply doesn't understand what 'the process' is, which is why she is so mistaken about what it means to say 'you're driving the process'. Education isn't about 'getting the knowledge'. It's not about 'getting' anything, except maybe a degree (about which we'll talk below). It's about becoming something - whether that something is a painter, carpenter, computer programmer or physicist. And becoming something is so much more than getting the 'big buckets of benefits' from educational institutions.

Now if your interest is in DIY education - that is, an interest in the educational process itself - then the logical next step is to do what edupunks have in fact done: to create and experiment with the design of courses online, to create their own courses. This is what Jim Groom (who coined the term, 'edupunk') has done with digital storytelling (ds106)[731] - he has taken the idea of a traditional university course, disassembled it, and then inserted his students into the story telling process. His second version of the course - the 'summer of Oblivion' - had his student weave narratives in and around the narrative about 'Dr. Oblivion' he created to teach the course.[732]

And this is what George Siemens, Rita Kop, Dave Cormier and I have done over a series of six or so Massive Open Online Courses (MOOCs)[733] since 2008. Again, we have disassembled the educational process, put the tools into the hands of the course participants, and then invited them to recreate the course along 'connectivist' principles. In offering learning this way we are *being* edupunk, as are the course participants who created Second Life environments, Google groups, concept maps and illustrations, Twitter hashtags, online forums, in-person meetings, and more. We in these courses don't learn by reading, we don't learn by accessing course materials or watching

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[731] Jim Groom. Digital Storytelling 106 (DS106). Mary Washington University. Website. Accessed August 8, 2011. http://ds106.us/
[732] Missing Persons Poster for Dr. Oblivion ds106#4. Janabazar (weblog). November 30, 2011.
[733] Stephen Downes and George Siemens. Connectivism and Connective Knowledge 2011. Website. Accessed August 8, 2011. http://cck11.mooc.ca/

videos, we learn by doing, by actually *creating* the distributed network that eventually became these courses.

Now of course, not everybody wants to learn storytelling or how to create an online course. People are interested in every discipline under the sun, and the way of approaching and learning in each discipline is unique to that discipline. People interested in carpentry build spice racks, then bookshelves, then cabins, and learn about mitre joints and toe-rails as they go along. People who want to be philosophers read a lot, and try tentative arguments in fan forums, gradually over time finding out about and being admitted to the insider circles where Fodor and Searle and Pylyshyn (for example) play.

It's *hard* to learn this way; in fact, it's *harder* than going to college. The educational system as it is currently structured is intended to offer a set of short cuts - access to qualified practitioners, creation of custom peer networks, guided and scaffolded practice - for a certain price. The system isn't (as suggested in Kamenetz's booklet) about imposing sets of restrictions and making things more expensive. It's about offering the greatest reach in the shortest time. It allows those willing and able to invest themselves full-time to master the basics of a discipline relatively quickly, so they can obtain employment and begin the real learning they will need to undertake in order to become expert.

And this is what Kamenetz simply misunderstands about traditional learning - that the greatest of the 'bucket of benefits' isn't provided by the college at all, but by the student. It is this full-time *immersion* into a discipline that helps someone *become* the sort of person who can, over time, be an expert in that discipline. You can't just get the 'benefits' offered by a college and somehow 'acquire' an education without that commitment, without that immersion, without that dedication. Kamenetz's version of DIY education depicts it as a quick and inexpensive short-cut -- the exact opposite of what it actually is.

Oh, and how. The seven how-to guides are each capsule examples of what I have been saying.

Take the first section, how to "do research online" (p.7). It becomes pretty apparent from the advice (which begins "start with Google" and continues through search terms and hashtags) that by "research" Kamenetz means something like "find stuff." As a guide to web-search, the page might offer reasonable novice-level instruction (which would be quickly superseded by practice). As a guide to "research" it is dangerously misleading.

What is research, anyways? An education in the disciplines that actually do research (which is, in fact, most of them) would suggest that it a structured method employed in order to identify causes or offer explanations of things. The historical researcher isn't interested simply in the fact that Napoleon invaded Russia in 1812, she wants to know *why* he launched such a dangerous undertaking, what happened, what were the causes of its failure, and what the experience teaches us about the French, the Russians, and the nature of empires in general. And that is why Tolstoy's War and Peace is such a remarkable work. He doesn't just tell a story, he offers a thesis about the great events of the time, a thesis that has been expounded and studied by researchers of literature.

Where is any of this in Kamenetz's guide? Where is the understanding that research needs to have a plan and a method, that it needs to ask questions, and set criteria for what would constitute answers to those questions? Where is the distinction between different types of research, such as experimental research, say, and literature reviews? Shouldn't Kamenetz have advised people who want to research online to first learn how to research, and maybe suggested some examples of successful research, and places where people could practice their own research? No, instead we get "A successful online research session will leave you with 20 open tabs or windows at the top of your screen." (p.7) That's not advice; that's a travesty of advice.

Or consider the second how-to section, "write a personal learning plan." Having a plan is good; having several is even better (I cannot count the number of times my back-up plan has become my plan!). What we are given here are not plans. Consider these "goals" offered as examples:

"I want steady professional employment in the field of sustainability."
"I want to start a business that feeds my love of jewellery."
"I want to combine teaching English with travel." (p.8)

These barely - if at all - count as goals. Kamenetz may as well have quoted six-year olds and given as examples "I want to ride a rocket ship" or "I want to be a fireman." A goal is something concrete, with a clear indicator of success, typically with a time frame, and described in terms of the effort being undertaken.

Attempting to clarify the first of the three goals given above would reveal, for example, that there is no such thing as 'the field of sustainability'. It would be necessary to describe employment as an environmental scientist, climate researcher, alternative energy engineer, or some such thing. So we would expect a goal to read something like "I want to qualify and obtain employment as a solar power designer by 2020."

Ah, but don't take my advice here. There's a lot of good material on identifying and setting goals, both online and off. This guide refers to none of it. It's as though Kamenetz is just making this up as she goes along. Or maybe depending on people like Weezie Yancey-Siegel[734], whose 'learning goal' Kamenetz cites as follows:

> *To try out more of a self-designed, experiential approach to learning. Along the way, I hope to create something new and spark further social change in the area of education, social media, global citizenship, and general do-gooding. (p. 10)*

Her 'plan' consists of watching TED videos, reading some books, meditating, watching 'fictional films', and the like. We don't know why, for example, she supposes reading 'Zen and the Art of Motorcycle Maintenance' will help here, except that it was (maybe) recommended by Amazon. We don't know why she recommends viewing Nathan Myhrvold on shooting mosquitoes out of the sky with lasers. Her 'plan' is what most of us would call 'a year off'.

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[734] Weezie Yancey-Siegel. About Me. The Eduventurist.Accessed April 5, 2012. http://eduventurist.org/about/

And in fact, she is taking a year off her very traditional studies as a sophomore undergrad at Pitzer College in Southern California, majoring in International/Intercultural Studies. And her *actual* plan[735] is to "create a new popular resource that I have realized does not exist at the moment. My hope is that my book and the varied profiles of bold 'eduventurists' will inspire other young people like myself to take their own leap into the unknown world of experiential, alternative learning."

Should I go on? How about 'how-to' number three, "teach yourself online", where step number 1 and step number 4 are both "ask a question", step number 3 is "do some serious reading", and step number 2 is "zero in on unfamiliar words, phrases, symbols or expressions." Yes, there's a sidebar that says "the process wouldn't be complete until he tried to do it himself" - but there's no sense of learning from example, learning from experience, iterative and scaffolded practice, experimentation, documentation and note-taking - all the usual accoutrements of do-it-yourself learning.

Take a popular do-it-yourself instance, for example, learning to program online. Thousands - maybe millions - of people has taught themselves how to write software. The way *they* learned (the way *I* learned) does not in any way resemble the advice Kamenetz gives. Aspiring programmers look at what other programmers have done and read the explanations (at this point Kamanetz should gave Google-searched for 'worked examples', but she didn't). They experiment with the code, changing variables, adding functions, to learn how what they do creates new outcomes. They start with something simple (print "Hello world") move on to something more complex ("bubble sort") and engaging ("game of life") long before they, say, write their own word processor or database software.

They begin as apprentices, debugging and proposing fixes on other open source projects, forking and extending when they get their legs, always trying out and sharing their work in the public forum, critiquing and accepting criticism. This doesn't just teach them programming, it teaches them how to think like a programmer, how to measure success, how to define the optimal. None of this is in the programming books - it's what Polanyi would call 'tacit knowledge' or Kuhn would call 'knowing how to solve the problems at the end of the chapter'. All of which Kamenetz would know, if she had *researched* instead of just performing some Google searches.

It's as though Kamentetz has read *about* do-it-yourself learning, online or otherwise, but has never *done* it, much less tried to facilitate it. The remaining how-to guides (there's no need to deconstruct them all) are equally superficial and misleading.

Defending her work in the iDC discussion list, Kamenetz has turned to a general defense of the idea of DIY learning, and suggested that her critics are entrenched academics with their own interests to protect.

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[735] Weezie Yancey-Siegel. The Project. The Eduventurist (website). Accessed August 8, 2011. http://eduventurist.org/the-eduventurist-project/

"So who's really uncomfortable with what I'm saying and how I'm saying it?" she asks.[736] "A small subset of academics. People whose paychecks are currently signed by the academy. People for whom the transformation of education is a matter of academic interest in the narrow sense--you may be interested in informal, uncodable and untranslatable forms of self-learning, Marco, but there is no indication on RateMyProfessor.com that you refuse to give grades or credits."

Of the names I have cited above - Groom, Cormier, Siemens, Kop - only one (Groom) is employed as a university professor. The rest of us - myself included - are employed in other endeavours (and yes, we are employed - there's no law saying edupunks have to be penniless bums). And of the other people I could cite in the same context, some are professors but the majority are practitioners of one sort or another - technologists, designers, consultants, researchers, programmers, etc. It is ironic - and typical - that Kamenetz would join an academics' mailing list, and then complain that all the members are academics.

But let's look more seriously at what she is describing in these posts as edupunk. It appears to be, "how to get a degree quickly." The 'why' from above. She writes (ibid), "For a large proportion of people right now--as for a large proportion, if not the entirety, of the people on this list--that journey will include earning a credential from a recognized institution." She observes "the American Association of State Colleges and Universities, and some people in the Department of Ed, and not a few community college leaders across the country, have been quite friendly to what I'm saying." And "Government cuts to higher education are the reality of the world we live in, and DIY approaches can help maximize the resources that remain."

She is free to hold her views, but that's not edupunk - it's not punk of any sort. It's establishment thinking combined with a good dose of offloading costs. Maybe it's good educational advice (it's not... but I digress) but it is definitely not edupunk. It's not even a good - or particularly informed - discussion of learning in the 21st century.

I don't want to conclude by recommending my own work, but I will, because Kamenetz is obviously not familiar with any of the ideas and trends characterizing edupunk, do-it-yourself, informal, online, or community-based learning. Accordingly, I offer 'The Future of Online Learning - Ten Years On'[737] as a comprehensive summary and insight into the technologies and trends she is trying to describe.

Moncton, August 8, 2011

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[736] Anya Kamenetz. [iDC] Discussion: The Edupunks' Guide. Institute for Distributed Creativity (discussion list). August 7, 2011. https://lists.thing.net/pipermail/idc/2011-August/004680.html
[737] Stephen Downes. The Future of Online Learning: Ten Years On. Half an Hour (weblog). November 16, 2008. http://halfanhour.blogspot.ca/2008/11/future-of-online-learning-ten-years-on_16.html

Serialized Feeds

Originally posted on Half an Hour, February 5, 2009.

A *serialized feed* is one in which posts are arranged in a linear order and where subscribers always begin with the first post, no matter when they subscribe to the feed. This contrasts with an ordinary RSS feed, in which a subscriber will begin with *today's* post, no matter when the feed started.

The idea of serialized feeds has been around for a while. This page from 2005[738], for example, allows you to read Cory Doctorow's novel *Someone comes to Town, Someone leaves Town[739]* by RSS. And Russell Beattie offers serialized books via his Mobdex[740] serialized feeds system. In 2006, a company called FeedCycle[741] offered what it called cyclic feeds[742]. "For example, if you were to take *Moby Dick* and divide it into 100 parts, and publish them all in one huge RSS feed, that would be a cyclic RSS feed." Feed cycles[743], as they have come to be called, have also been used for podcasts. Tony Hirst has written[744] about serialized feeds, demonstrating the concept with services like OpenLearn Daily.[745]

There is no academic literature discussing the use of serialized feeds to support online learning, though the subject of paced online learning has been discussed. Anderson, Annand and Wark[746] examine the question of pacing from the perspective of student interactions. "Increased peer interaction can boost participation and completion rates, and result in learning outcome gains in distance education courses." But the use of serialized feeds does not automatically increase interactions. It is also arguable that pacing itself improves learning outcome.

Serialized Feeds: Basic Approach

A serialized feed is basically a personalized feed, because each person begins at a different time. Personalized we data is typically managed by CGI or some other server process which gathers relevant information about the user (such as the time he or she subscribed to the feed) and generating the resulting feed. This feed is then typically identified with a serial number, which is processed when the RSS feed is requested by an aggregator.

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[738] RSS for Serialized Content. Surfarama (weblog). 2005. http://www.surfarama.com/rss-for-serialized-content/
[739] Cory Doctorow. Someone comes to Town, Someone leaves Town. 2005. http://craphound.com/someone/
[740] Russell Beattie. Serialized eBooks via RSS. Weblog. January 4, 2005. http://www.russellbeattie.com/blog/1008220
[741] Blake Robinson. FeedCycle: Smarter Serialized Stories. TechCrunch. November 26, 2006. http://techcrunch.com/2006/11/26/feedcycle-smarter-serialized-stories/
[742] ResearchBuzz. Service for Publishing Cyclic RSS Feeds. Weblog post. November 20, 2006. http://researchbuzz.me/2006/11/20/service-for-publishing-cyclic-rss-feeds/
[743] James Lewin. FeedCycle Intros Cyclic RSS Feed Service. New media Update (weblog). November 2, 2006. http://www.podcastingnews.com/content/2006/11/feedcycle-intros-cyclic-rss-feed-service/
[744] Tony Hirst. Delivering Personally Scheduled Web Feeds. OUseful Info (weblog). January 20, 2007. http://ouseful.open.ac.uk/blogarchive/009213.html
[745] OpenLearn Daily. Website. http://ouseful.open.ac.uk/openlearndaily/
[746] Terry Anderson, David Annand and Norine Wark. The search for learning community in learner paced distance education: Or, 'Having your cake and eating it, too!' Australasian Journal of Educational Technology 2005, 21(2), 222-241. http://www.ascilite.org.au/ajet/ajet21/anderson.html

This approach, however, raises some concerns:

- First, it creates a scalability issue. RSS feed readers typically access a web site once an hour. If a CGI process is run for each feed, then each user results in 24 CGI requests a day. Even if the frequency is scaled back, having large numbers of users can place a considerable load on server processing.

- Second, it creates a coordination issue. If each feed is personalized then in order for interaction to occur there needs to be some mechanism created to identify users of relevantly similar feeds.

These problems were addressed by adopting a *cohort system* for serialized feeds. But first, some discussion on the structure of a serialized feed.

In order so simplify coding, the gRSShopper framework was used. This allowed courses to be constructed out of two basic elements: the *page* and the *post*.

The *page* corresponds to a given course. It consists of typical page elements, such as page title, content and, where appropriate, a file location, along with default templates and project information. Page content defined RSS header content. Pages are identified with a page ID number. The page also has a creation date, which establishes its start date, set by default to the exact time and date the page was created.

The *post* corresponds to an individual RSS feed item. While a person subscribed to an RSS feed as a whole (corresponding to a page), he or she receives individual *posts* as RSS posts over time. A course thus consists basically of a page and a series of posts. Posts are identified by post ID numbers. Posts are associated with pages with a *thread* value corresponding to the ID number of the page.

Serialized Feeds: Pacing

Pacing is managed through two basic elements.

First, each page defined an *cohort* number. This number establishes the *size of the cohort*, in days. Thus, is a page offset number is '7', then a new edition of the course will start every 7 days. In the gRSShopper serialized feeds system, a new, *serialized*, page is created for each cohort. This page is identified by (a) the ID number of the original master page, and (b) the offset from that page, in total number of days, from the start date of the master page. These serialized pages are stored as records in the database.

Second, each *post* is assigned an offset number. This number defines the number of days after the start of the course that the post is to appear in the RSS feed. For example, suppose the course starts March 10. Suppose the post has an offset number of 6. Then the post should appear in the RSS feed on March 16.

This creates everything we need to create a serialized feed. To begin, we have a master page and series of associated posts:

- Page Master (time t days, cohort size c)
  - Post 1 (t+o days)
  - Post 2 (t+o days)
  - etc.

The page also has a set of serialized pages, created as needed, each corresponding to an individual cohort:

- Page Master (time t days)
  - Serialized Page 1 (t+(cr*1)days)
  - Serialized Page 2 (t+(c*2)days)
  - etc.

Each serialized page has a start date d, which is t+(c*2)days, and by comparing the interval i between the current date and the start date, we can determine which post should be posted in its RSS feed - it will be the post or posts with an offset value of i.

- Page Master (time t days)
  - Serialized Page 1 (t+(c*1)days)
    - Post i1
  - Serialized Page 2 (t+(c*2)days)
    - Post i2
  - etc.

Serialized Feeds: Processes

Processing to produce the serialized feed occurs in three stages:

- First, the author *creates a master* or edited. This creates database records for the master page and for each of the posts associated with the master page.

- Second, the script *creates a series* of pages for a given cohort. This occurs when a potential subscriber invokes the subscribe script. Essentially, the script creates the RSS feed content for each day the course runs. These are stored in the database and identified with a cohort number and a publish date.

- Third, a nightly cron job *prints the daily page* for each cohort for each course. The idea here is that the script creates a *static page* that may be accessed any number of times without creating a CGI process. Static pages are stored in a standardized location: base directory/course ID number/cohort offset number

Subscribing to a serialized feed this becomes nothing more than a matter of pointing a browser to the appropriate page. For example, pointing the browser to http://course.downes.ca/course/127/17.xml allows the learner to subscribe to course number

127 (the Fallacies course), cohort number 17 (the cohort that started 17 days after the course was first created). This link is created and displayed by the subscribe script.

This process has several advantages. First, fixes the content of the course to what is currently defined when the student signs up to the course; the course may be edited for subsequent users without changing what was originally defined for previous users. Second, processing time is minimized and front-loaded, allowing the system to scale massively. Third, and most significantly, multiple users are served by the same RSS file. Not only does this save significantly on processing, it also sets up an environment where interaction may be facilitated.

Moncton, February 5, 2009

Where the Future Lies

Responding to Durff's Blog[747]

In a post today[748] I summarized Bill Cushard in Mindflash as follows: If I had to summarize the best advice I could give to e-learning developers, it would be this: "here are two key lessons for learning professionals:
1. Adapt to the on-demand world.
2. Embed learning into the context of people's work."

I also pointed to the resistance against these two trends common in the industry. I would suggest that some of the sentiments expressed in this post are the cause of such resistance. We hear time and time again comments like "s collaboration is important because it emphasizes skills, team-building, and creativity that will be necessary in any student's future." But it's hard to make such an argument stick when the nature of collaboration itself is changing.

Collaboration brings people together, usually at a set place and/or time. It focuses them on a common objective. It emphasizes conformity and uniformity, orchestration and management, pulling as one" and "all singing from the same songbook." These are precisely the trends we are seeing erode in the future of on-demand and as-needed learning.

people often talk as though the alternative to collaboration is working completely on one's own. But this is not true. We still have to communicate and interact. But we can do so while remaining independent and autonomous. This mode of working together is called 'cooperation'. Online learning of the future will be based around a cooperative model, not a collaborative one.

That's the basis behind network learning (though you have to look at it a bit more deeply than surface observations (following Cluetrain) that 'learning is a conversation'. Understanding learning as a language sees each learner as an autonomous actor comprehending and creating communicative acts.

This has nothing to do with "respond to accelerating global competition," etc., Kanuka notwithstanding. Connectivism and network learning are about augmenting individual empowerment, not accelerating the old commodity-based and management-based economy. It's not some sort of modern free trade that homogenizes us all in a single environment. It is a fostering of diversity, a flowering of individuality.

Where this ties into the workplace is two-fold, both related to individual autonomy and diversity. First, it enables custom workplace support, where the performance support system is tailored to your interests and your resources. This in turn allows each individual to make a *unique*

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[747] Lisa Durff. Erasing Distance and Time - EDUC 8842 Module Two. Durff's Blog. December 26, 2011.
http://durffsblog.blogspot.ca/2011/12/erasing-distance-and-time-educ-8842.html
[748] Stephen Downes. On-Demand is the Future of Online Learning. OLDaily (weblog). December 27, 2011. http://www.downes.ca/post/56888

contribution to the production or value chain - people cease being interchangeable parts and begin becoming essential individual elements of the ecosystem.

So much of the writing I see about e-learning, whether present systems or future trends, seems to be focused on some sort of 'business reality' that the proponents seem to believe will prevail. That's probably why most of the pundits, even Siemens, write what are essentially 'business' books.

But the more they are pulled into the old language of 'competition', 'reducing barriers', 'productivity', 'collaboration', and other management-style ideology, the more they miss the actual revolutionary potential of these new systems, both for work and for learning.

p.s. the more I see blog posts citing 'traditional literature' to the exclusion of all else, the more disappointed I become. Don't be led down this garden path into believing that only academic literature is worthwhile. If you want to write about connectivism and network learning, the most important (not to mention original) work lies outside academia, not within.

Moncton, December 27, 2011
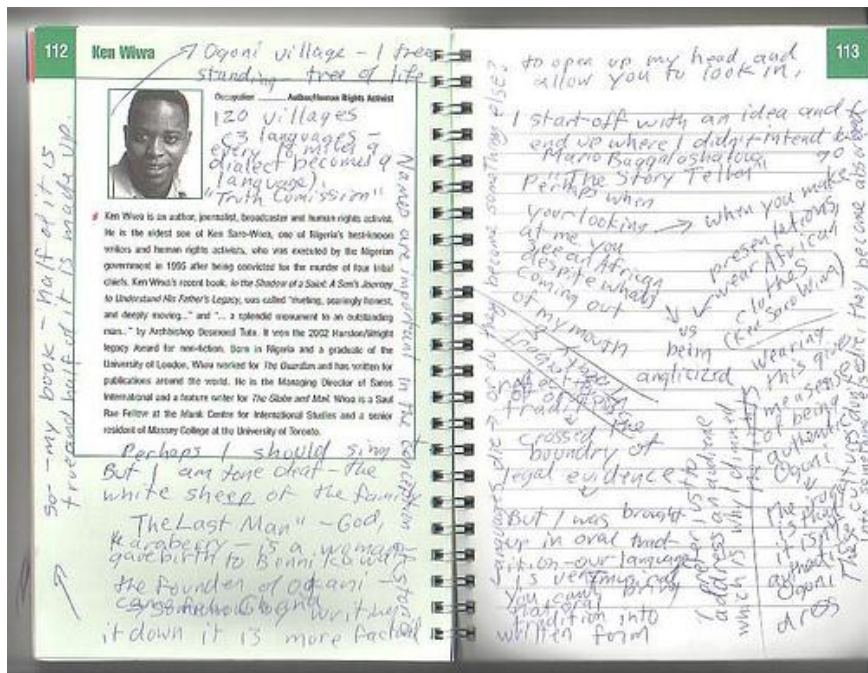
Engagement and Personalized Learning

Responding to David Wiley, Lying About Personalized Learning.[749]

OK, I think we can all agree that having a student interact with nothing but a computer program - no matter how personalized - is a poor substitute for a proper program of learning.

This is not to say that such interactions cannot be employed very productively for spot duty - for example, students can learn to program a computer using an interactive module, create Flash animations through a series of computer demonstrations, or practice learning a language in a self-teaching manual.

Learning, though, when viewed more widely, typically involves some sort of interaction with others. This is not because 'humans are inherently social' or any such thesis about human nature but because what they are learning is composed to a large degree of social constructs - vocabularies, ways of living, ways of practice, and the rest.

So we want to include a dimension of social interaction in our online learning. We want students to engage with communities composed of practitioners, learners, instructors and mentors. And we want to organize these interactions in a way that best suits individual learners. 'Personalized learning' in this context means not merely personalized content but personalized interactions.

But we need to cash out what that means. As Daniel Lemire points out, while students can be a font of communications activities, not all of it will be useful or manageable for other people in the network. His experience is my experience - given *carte blanche* we can expect the full range from serious, detailed enquiries to long strings of questions semantically equivalent to a child asking "why... why... why?" The purpose of such questions can also range variously from genuine attempts to learn to facile attempts to annoy and irritate.

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[749] David Wiley. Lying about Personalized Learning. iterating toward openness. November 11, 2008. http://opencontent.org/blog/archives/655

Thus, because we want to respect the need of others in the course - other students, instructors, mentors, and the like - to manage their own time and their own interactions, it follows that personalized interaction is not simply interaction tailored to the needs of an individual learner. It must be the result of a negotiation of process rather than a one-way catering to an individual learner's needs and wants.

It is in this negotiation that the creation of the social environment of learning is created. It is in this negotiation that social learning consists. There is no fictitious 'common' ground in which learner and mentor share some space - there is rather a series of trials and errors on the part of each in an attempt to negotiate an interaction, a mechanism for communication, a transaction, an engagement.

'Personalized learning' is therefore the creation of a mechanism in which this negotiation for engagement can take place. It is the creation of engagement opportunities - as Nancy White said this week, of 'invitations', of communication ports and protocols, of learning mechanisms on the part of both student and mentor. Much of this negotiation process is automated (as is, for example, our communications networks of telephones or email or RSS feeds) but the actual communication results in the end only from one human sending messages to another.

This does not man each instructor engages in a complete process of negotiation with each student. This mechanism - the supposed paragon of 'personal instruction' - is neither expected nor desired. Not expected, because such a mechanism would require an immense resource of instructors, which society cannot sustain. Not desired, because the range of interactive possibilities would be limited to those that only two people could provide, and therefore insufficiently diverse to foster complexity of thought and understanding.

Engagement with a mentor or instructor, in such an environment, is typically the result of a larger set of interactions, a series of negotiations that occurs with members of a community as a whole, of negotiations with other learners (often resulting in a 'student subculture' within the community), with some more advanced learners, with practitioners, and with mentors and leaders of the community.

Any given negotiation build on the many negotiations that preceded it - just as any given conversation in a language (English, say) builds on each participants' previous learning and practice in that language. That does not mean that no further negotiation is necessary - typically, understandings of language vary widely - but it does reduce to a significant degree the negotiation required in a particular case.

So how do we understand 'personalized learning' in this context? It is the establishment of a mechanism (which may or may not be a technical mechanism - it could even be nothing more than a bunch of people standing in a field) whereby each individual can participate in the creation of engagement with others, where such engagements are directly negotiated by the participants to meet their own individual needs or interests.

P.S. - On Communication

One way of viewing communication is to imagine us with a sheet between us, where we communicate by touching the sheet, producing impressions seen on the other side. Nothing actually passes from one side to the other - our minds do not touch directly, and do not transmit anything directly into one another. We have only the impressions we can make on the sheet, and those that we see in the sheet from other people.

It is tempting - and many many philosophers have taken this turn - to suppose that the sheet is itself what we have *in common* with each other. That this sheet is something that we share, and that communication is this centered on this shared environment, shared meaning (where meaning is fully defined by whatever is seen and felt on the sheet).

But this view is mistaken. There is not in fact a single sheet dividing us. Each of us has our own personal sheets - we are completely surrounded by these sheets, and while these sheets may touch on other sheets, and be impacted by other sheets, we have no way of knowing whether we are touching one person or another, or even whether we are touching people or trees or animal spirits or nothing at all.

We can *infer* to the presence and existence of other people, but the supposition that we have anything in common with these people is but itself an inference of the same kind, and less well supported than any conclusion it seeks to establish, and therefore an artifact of, and not a foundation for, our theories of communication.
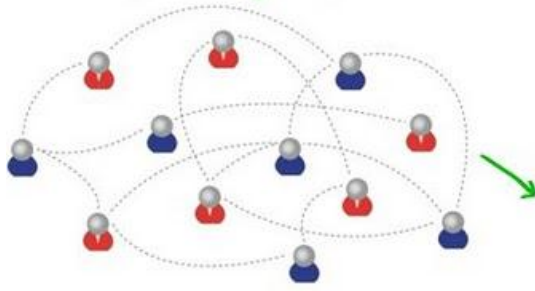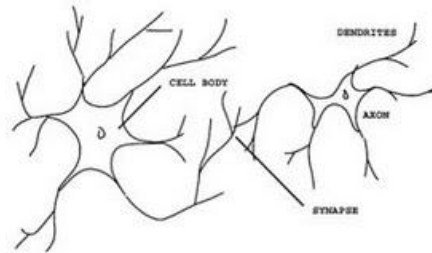
Moncton, Tuesday, November 11, 2008

Learning and Assessment

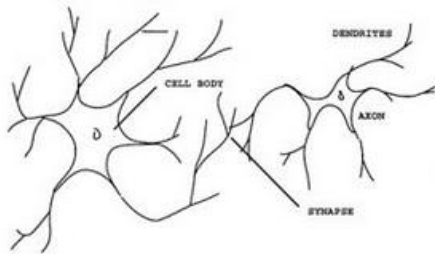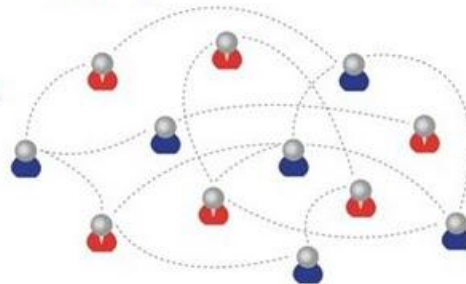(Just practising my Kathy Sierra presentation style. Fonts thanks to advice from Rapid E-Learning Blog.)

Moncton, February 17, 2010

Recognizing Learning

Responding to Rob Wall, who says:[750]

> *Literacy, of any type, is about pattern recognition, about seeing how art is like physics is like literature is like dance is like architecture is like …Literacy is not about knowing where the dots are. Literacy is not about finding dots about which you may not know. Literacy is about connecting the dots and seeing the big picture that emerges.*

Yes. Exactly. This is a very key point.

Put this in context (this came up in a discussion in Den Bosch a few days ago)...

When we think about 'what being a physicist is' or 'how we know a person is a qualified physicist':

- these are (crucially) *not* reducible to a set of necessary and sufficient conditions (we can't find a list of competencies, for example, or course outcomes, etc., that will define a physicist).

- the way an examiner knows whether a students is a qualified physicist is not by *measuring* whether they have succeeded, but rather in *recognizing* that they have succeeded.

... and the reason for this is that the measurement is an inaccurate abstraction - it consists in identifying a few (salient) features of 'being a physicist' and elevating these to the position of *defining* being a physicist.

But this abstraction:
- is not the same as 'being a physicist' - it will typically include things that (in certain contexts) are unimportant, and leave out things that are important
- is not an *objective* account of 'being a physicist' - it reflects a skewed perspective that reflects the biases and prejudices of the person doing the defining (this is especially apparent in a rapidly changing field, where a person may be 'recognized' as being an authority even though he/she does not satisfy traditional 'criteria' (competences, outcomes) defining an 'authority'

(That's why we do not want to collapse the individual data points in a 'team' - why we don't want to define a 'common goal' - because this obscures the pattern in the team membership, and prevents us from *recognizing* things that are important resulting from the interactions of the members).

Moncton, June 04, 2007

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[750] Rob Wall. What You Really Need to Learn: Some Thoughts. Stigmergic Web (weblog). June 3, 2007. http://stigmergicweb.org/2007/06/03/what-you-really-need-to-learn-some-thoughts/ No longer extant. Some clippings here: http://rodhouse.wikispaces.com/21CenturyLearning

Free Learning and Control Learning: On the So-Called Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching

Text of my presentation to SURF Education Days, 13 November 2007, Utrecht, the Netherlands. Slides, audio and video are also available.

1. Introduction

I don't have fancy slides today. I don't have nice pictures or anything like that. I've spent some time over the last few days looking at a paper by Paul Kirschner, John Sweller and Richard E. Clark, which describes the "failure of constructivist discovery problem-based experiential and inquiry based teaching."[751]

For those of you who are familiar with my work you'll know that a great deal of the work that I've done is constructivist discovery problem-based experiential inquiry based teaching. And so this sort of paper is published in Educational Psychologist, which I guess is an important journal. It's been widely cited.

This sort of paper and the criticisms associated with that sort of paper raise questions. I do work in educational theory and I also do work in software development and I'm never completely sure that I'm doing the right thing. I raise questions. Is the work grounded in research? Is this really the way learning happens? And so I question myself and I question myself not just because it's a good thing to do, but just because I'm not positive.

So I worry when I see papers like this. I worry that maybe the foundations of the work that I and other people are doing is not well-grounded, but then I look at a paper like this and I realize that what really needs to be done is that these arguments need to be drawn out. They need to be made explicit and it needs to be shown very clearly and not ambiguously why these are not good arguments and that is going to be my task today.

And for you who are listening to this task today, what you'll be able to take away from this, I believe, is, first of all, an outline an idea of the theory of learning that underlies learning with blogs and wikis and other web 2.0 technologies, but also, more importantly, a way to respond to

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[751] Paul A. Kirschner, John Sweller, Richard E. Clark. 2006. Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching. Educational Psychologist, 41(2), 75-96. Lawrence Erlbaum Associates, Inc. http://www.cogtech.usc.edu/publications/kirschner_Sweller_Clark.pdf

people who think that instructional technology and the use of the Internet in online learning ought to be nothing more than the presentation of instructions to students telling them what to do. That is control learning. That is the old way of learning. The web way of learning, Web 2.0 learning, is the new way. It is free learning and that is what I advocate.

2. Connectivism (Free Learning)

Sometimes this theory is known under the heading of connectivism. Connectivism is a name that was coined originally by George Siemens[752]. Connectivism is essentially, and this is my take on it not necessarily George's, the theory that knowledge and learning can be described and explained using network principals.

Now what do I mean by that? What I mean is: knowledge itself, to know something, is to be organized in a certain way, to have a certain pattern of connectivity in the mind, a certain neural connection in the mind. To learn on that theory is therefore to acquire that pattern of organization. To learn is therefore not to have things pushed in your head but to grow and to develop in a certain way and specifically to grow and develop in such a way that you are able to recognize patterns in the environment.

Connectivist learning theory, therefore, is based on the theory of how networks learn, that is to say, how networks grow, how networks develop, how networks form structures of connections between neurons. There are four major ways in which networks grow. And I'm not going to say that these are the only ways, these are all the ways, that this is the definitive statement. But these are ways that we have observed through history that networks grow.

One way is simple Hebbian association. What that means is that if two neurons fire at the same time and don't fire at the same time, a connection tends to be drawn between them. That's it. Very simple!

The second way is accidental association. If two neurons are beside each other a connection tends to join them.

The third way connections are formed is back propagation and this comes from the theory of connectionism in the field of computer science. The networks form their connection and then feedback is sent into the network according to the output that the network produces. If the network produces good output the connection will be reinforced. If the connection produces bad output the connection will be broken.

And then finally, Boltzmann learning, which is a theory based on thermodynamics, which says essentially that connections will tend to form at the most stable configuration. If you think of it as like throwing a stone into a pond, the water will settle out. Well connection in brains work in much the same way, according to this theory, and the brain settles out.

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[752] George Siemens. 2005. Connectivism: A Learning Theory for a Digital Age. International Journal of Instructional Technology and Distance Learning, Volume 2, Number 1, January, 2005. http://www.itdl.org/Journal/Jan_05/article01.htm

The main thing to understand here is that connectivist learning theory is about how connections form in the brain, and for that matter how connections form in networks generally. Because connectivists talk about not simply networks in the brain, they also talk about learning networks in society at large, networks of people in society who are connected to each other. The two theories work out to be two parts of the same theory.

In connectivist pedagogy, therefore, to teach is to model and demonstrate. To teach is to present experiences to people so that they can begin to form these connections in their mind. And then to learn is to actively form these connections by practicing, by repetition, and by reflecting on that practice.

Both of these imply what might be called participation in an authentic community of practice. The idea here is that to learn is to put oneself in a situation where you are practicing in the way that whatever discipline you are in is practicing. For example, you learn physics by doing physics. You learn how to take care of forests by going to a forest.

The role of the teacher in this model is to practice one's work in an open manner. This has been a challenge, I think, for pretty much all of society, but the idea here is that instead of doing your work in secret in back rooms without being open about what you do, you do your work in an open and transparent manner so that people can see what you're doing.

In preparation for this talk, for example, I created a summary of the Kirschner, Sweller and Clark paper[753] and I put that on my Website and I collected notes from other people who wrote about this paper[754] and I put it on the website and what I wanted people to see is how I go about assembling my thoughts in order to prepare for a talk like this.

To work, on this theory, is to engage in a community. Most of us, when we do our work, in whatever profession, don't do it simply all by ourselves. We are involved in a community of practice. We have shared ways of doing things. We have a shared vocabulary, a shared understanding of what constitutes success, a shared understanding of how we test for that success. And it's to be openly reflective to think about what we're doing in this community and to think about whether it is the best way to do it, why we're doing the things that we're doing.

In this model the role of the learner is to themselves in some sort of environment like this. It may be the actual community of practice itself, which is what I recommend, or it may be a simulation of that community, perhaps a role playing game, perhaps electronic performance support systems, perhaps the actual community of practice itself. You can imagine all the different ways a learner can place themselves into one of those communities of practice. It is to observe the way people who are successful in that practice actually conduct their practice and it is to be reflective to engage in conversations about that practice.

You can see why Web 2.0 and Internet technologies like blogging and wikis and things like social networks play such an important role in these theories. These are technologies that make

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[753] Stephen Downes. 2007. Kirschner, Sweller, Clark (2007): Summary. Half an Hour. http://halfanhour.blogspot.com/2007/11/kirschner-sweller-clark-2006-summary.html
[754] Stephen Downes. 2007a. Kirschner, Sweller, Clark (2007): Readings. Half an Hour. http://halfanhour.blogspot.com/2007/11/kirschner-sweller-clark-2006-readings_12.html

this sort of activity possible. These are technologies that make it possible for a person to practice their discipline in an open manner. These are technologies that make it possible for a community of practice to develop on a worldwide basis connecting people from many different countries together. They make it possible for the learner to observe experts, to interact with experts, and to learn by doing.

3. Instructivism (Control Learning)

The other view of the world is known as, well, there are different names for it, but I will call it control learning or instructivism, and it is the approach that's characterized in the Kirschner, Sweller, and Clark's paper.

It's a model of learning, and especially on line learning, that is what we might call traditional on line learning. What this learning is, is learning based in the theory of learning objects and based in the theory of the learning management system.

And the model here is that our on line learning environments basically emulate the practices and the processes of the content in a traditional classroom. Learning objects contain content in the core, and pedagogy that is wrapped around that content and the idea of this traditional learning is that the content must be explicitly instructional. The content must actually guide the student or the learner through a series of instructional steps.

The idea of learning object theory is that the learning object needs to have, for example, things like learning objectives. It needs to have guided practice. It needs to have assessment of some sort.

The basis for this theory, the basis for this approach and where it is practiced the most is in environments like the U. S. military where the Sharable Courseware Object Model or SCORM

was developed[755]. And SCORM is basically a model of personal learning where you go step by step by step through the learning manual and you follow the instructions that they tell you to follow, you do what they tell you to do and that is what is supposed to produce learning.

The learning management system and we're familiar with the learning management system, we're familiar with systems like blackboard, for example, or even open source systems like Moodle and Sakai. The intention of these programs is to present this material step by step by step.

In the introduction (to this talk) the Buntine oration that I gave in Perth is mentioned[756]. In that talk, there are three major locuses or loci of control; three places in which control of the learning process, control of the learning content is exerted in this traditional picture.

One is in content packaging. And if you think about content packaging what content packaging is, is you take a bunch of learning objects, put them all together, put a wrapper around them and then you compress them with a zip archive or something like that, thereby making them useless even to a browser. Content packaging is a picture of learning as a package that you put on a shelf like a book in a library.

Federated search, second. Federated search is not like Google. Federated search, which is the approach that is recommended by the people who created SCORM by advanced distributed learning is a mechanism where when you search you search this library, this library, this library, and this library and that's it. You search only from recognized authoritative sources who have 'the knowledge', whatever that happens to be, authoritative sources, I guess like Educational Psychologist, the journal.

And then, third, learning design, which is a third major component, which actually has its origins here in the Netherlands with Rob Koper's educational modeling language or EML is a mechanism for stepping you through the presentation of learning materials. Now Learning Design will put you in roles and Learning Design will branch and present different materials in different circumstances, but it's still that theory of presenting material, presenting material, presenting material, and the theory behind that is if you are told what to do you will learn. And that's the basics, the basis of instructivism.

4. The Argument

And so now I turn to the paper, that I intend to criticize in this talk; why minimal guidance during instruction does not work and the corollary of that is why maximal guidance does work.

And what the authors do in this paper is they set up two alternatives and on the one side, say the authors, are those people advocating the hypothesis, people like me, that people learn best in an unguided or minimally guided environment.

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[755] . Advanced Distributed Learning. Website. http://www.adlnet.gov/
[756] Stephen Downes. 2004. Buntine Oration: Learning Networks. Delivered to the at the Australian College of Educators and the Australian Council of Educational Leaders conference in Perth, Australia, October 8, 2004. http://www.downes.ca/post/20

(Just as an aside every time I quote from them I've very sensitive to their use of language. Their use of language is very often loaded or prejudicial and I'm trying to be careful not to be drawn aside by that. "In an unguided or minimally guided environment." What does that mean?)

Generally defined as one in which learners, rather than being presented with essential information, must discover (now they throw that word discover in there very deliberately because they want to tie it to discovery learning) or construct (there you go with constructivism right) essential (notice that word 'essential' - that word has a whole philosophy that comes with it, the whole Saul Kripke essentialism view of the world that there are certain innate natures of things) information for themselves. So that's the bad thing.

On the other side, this is their view now, are those suggesting that novice learners should be provided with direct instructional guidance on the concepts and procedures required by a particular discipline (we'll come back to that) and should not be left to discover, (notice how it's changed a little bit from the first presentation) those procedures (again a very careful word) by themselves.

Just as an aside before I get into the main criticism, I was uncertain, and of course they do not discuss in the paper, what a novice learner is. There's a certain sense in this paper that a novice learner is any person who has not learned what needs to be learned. And if you read the paper a certain way the paper says if you already know what is being taught you have no problem being taught it, but if you don't know, then you have to be instructed, properly so called. That would be an unfair reading of the paper, but they leave it open because they don't tell us what a novice is. Is a novice a baby? Is a novice a 10 year old? Is a novice a first year student in a college or university? We don't know.

So what do they mean by minimally guided learning? Everything! The old theories of discovery learning, problem based learning, inquiry learning, experiential learning, and of course, the most recent thing, constructivism and, if they had thought of it and felt so inclined, they would have included connectivism and on line learning probably all in the same breath.

There are two assumptions, they say, to this unguided kind of learning. The first assumption is that students should be challenged to solve authentic problems (notice the scare quotes) or inquire information, acquire knowledge (again notice how that is phrased, 'acquire knowledge,' I'm going to get it from here and I'm going to put it in here) in information rich settings. And they say (notice again the loaded term, the assumption right, as though we're just making it up) the assumption is that having learners construct their own solutions, whatever that means leads to the most effective learning experience. And then the second assumption, they say, is that the non-guided people assume that knowledge can best be acquired through experience based on the procedures (the discipline). We're going to come back to that.

Now their argument, this is their main argument here, it's a nice categorical syllogism. I like categorical syllogisms because they're so easy to work with. Any instructional procedure (i.e., ours) that ignores the structures that constitute human cognitive architecture (now there again, 'human cognitive architecture', as though the mind is like a house) is not likely to be effective. There, you can see where this is going, right? Minimally guided instruction appears to proceed

with no reference to the characteristics of human cognitive architecture. So we're just one of those things. And indeed, what they mean now (we'll come back to this later in the talk) by 'human cognitive architecture' is the characteristics of working memory, long-term memory and the relations between them. Okay, fine. We'll come back to that. Thus, they conclude, minimally guided instruction is unlikely to result in effective learning.

You see why I certainly worry about papers like this is because what they're saying basically is the approach that people who are talking what 2.0 learning, 2.0 blogs, wikis, social practice, communities practice and all that, has no grounding in the theory of how the mind works. And that's a very serious charge. Turns out to be false but it's still a very serious charge.

So this is their credo, their manifesto, a.k.a. their conclusion: after a half century of advocacy of minimally guided learning (people like me) it appears there is no body of research supporting the technique. Now, off in the distance you can hear the howls and the wails of protest from the people who have been studying this stuff for 50 years and have found that it works, but we'll leave that aside.

Insofar that there is any evidence, they argue, it almost uniformly supports direct strong instructional guidance rather than constructivist based minimal guidance. Not only is non-guided instruction less effective (they even talk about this for a bit) it may produce negative results.

And you ask, "How can that be?"

5. The Reality Check

Well let's do a reality check first about their conclusion. Their argument, first of all, is simply inconsistent internally. These aren't major issues, but it's a bit of a problem.

On the one hand when they're busy criticizing the minimally guided research they say instructors can't apply it, they always cheat. They always do some scaffolding. They won't let students discover things for themselves. They're always suggesting, telling them what to do and all of that. Okay, fair enough.

But on the other hand, they say that minimally guided instruction is failing. Well either they do it and it doesn't work, which is bad, or they don't do it. You can't say both. You can't say they're not doing it, and it doesn't work.

And then also the section later on in the paper they talk about how minimally guided learning, discovery learning, constructivism, and problem based learning especially, are used in 50 medical schools in the United States. Now I hadn't heard any particular criticisms about the quality of doctors in the United States. Maybe that's just a fluke.

But they examine this and they say the strongest criticism they find in those doctors, because the doctors turn out to be fine, but in their paper, they recommend, "unnecessary procedures," and it strikes me knowing the American medical system, that the last cause of the recommendation of unnecessary medical procedures is the kind of learning that we do. This is the most litigious society in the world. If you drop your pencil you will be sued. That is why they recommend unnecessary medical procedures (whatever those might be) not because they were taught to use problem-based learning.

But be that as it may. Their conclusion is simply not plausible. It doesn't make sense. It's not believable. We know that people learn using problem based learning and inquiry based learning. There's a huge body of research and Hmelo-Silver, Duncan, and Chinn cite numerous studies in their response to the Kirschner, Sweller and Clark paper[757]. And even without that research we know that people learn without guidance because we see it all the time. We have the evidence of our own senses.

Nobody went to school to learn how to build the Internet. Nobody was instructed ('they said well first you get a website, get it on the web, get some HTML'). People discovered that all by themselves, and it turns out that the mechanisms of computers are things that even small children can learn by themselves.

Many examples, I'll just point to one. It's called the 'hole in the wall gang' and what they did in cities in India is they would take a computer, they put it literally in a hole in a wall and so the make it assessable to the children in the community. These are children in India, so it's not like they're growing up working on their laptops at home. And so they get this computer. They're not instructed in any way. They learn how to operate it, they learn how to program it and they learn all kind of things about this computer without being told to do anything. So we can see that this works.[758]

Even more to the point, instructivism is a kind of learning by telling; it's a kind of learning by giving people the information, the concepts, the facts. But we know that people have to learn by practice. Learning is not being told. Learning is doing.

[757] Cindy E. Hmelo-Silver, Ravit Golan Duncan, and Clark A. Chinn. 2006. Scaffolding and Achievement in Problem-Based and Inquiry Learning: A Response to Kirschner, Sweller, and Clark (2006). Educational Psychologist 42(2), 99-107. http://www.cogtech.usc.edu/publications/hmelo_ep07.pdf

[758] Mark Rickards. 2005. Teach-yourself computing for kids. BBC News, may 2, 2005. http://news.bbc.co.uk/1/hi/world/south_asia/4498511.stm

Examples are all over the place. Deanna Kuhn writes that we can hope to impart the smallest fraction of knowledge in any science.[759] How could we possible teach science by teaching facts when there is not literally, not enough time to put all the facts in people's heads? Even if we were putting them in one after another every second of every day, there's too many facts in science. We have to do it a different way.

Think about what you would want in medical practice. Would you want a doctor who was told about medicine or a doctor who practiced medicine?

Their argument is based on a straw man. Inquiring learning, problem based learning, are not examples of 'minimally guided learning' and again, Hmelo-Silver, Duncan, and Chinn talked about this at some length. They are based on the process of scaffolding, they are based on direct instruction when needed. Indeed, my criticism of problem based learning and inquiry learning is the instructor is too involved. I think there's too much instructing happening in these kinds of learnings and that there should be less. But that's a separate argument for a different day.

Their argument is a false dilemma and this is the easy and obvious criticism. They are offering (remember at the very beginning where I presented their argument) the choice between minimally guided instruction or strong instruction. And it begs the question who is doing the choosing, doesn't it?

This is the example I like to use for this. Imagine my first visit to Rome. I remember getting off the train and walking out and I'm in Rome, in the train station. I have no idea what I'm doing and so a number of things present themselves here, right? I could take a guided tour. I could get a map and walk around myself. I could just walk around aimlessly and never find my hotel or… these are all things where I am choosing what to do, right? And the alternative is, to be kidnapped and to be told where to go.

Now the alternatives are not 'being kidnapped' or 'being lost'. There's all kinds of ground in between, all kinds of ways that a person can receive guidance that is not in the form of direct instruction. And so their argument is a straw man, yet again.

People who are minimally instructed are in no sense cast adrift. So in preparing this paper for today, nobody told me how to prepare this paper, but that doesn't mean that I'm sitting all alone. I put out messages in e-mail, I log onto websites, I got all kinds of information back, really helpful useful information that mapped out the territory for me, told me about resources I hadn't found, pointed to me through objections. I got lots of guidance when I was preparing this talk, but I was not instructed.

And this is a general criticism. This isn't just me. There's a social dimension to much learning and Miles Berry points to that in his criticism of the article.[760] A lot of learning, even traditional

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[759] Deanna Kuhn. 2007. Is Direct Instruction an Answer to the Right Question? Educational Psychologist 42(2), 109-113. http://www.cogtech.usc.edu/publications/kuhn_ep_07.pdf

[760] . Miles Berry. 2006. Why minimally guided instruction does not work. Weblog. http://elgg.net/mberry/weblog/124841.html

learning in the classroom, contains a large social dimension as you interact with the other people in your class.

6. Scientific Practice

There are some deeper misunderstandings in this paper as well and I want to explore them. Let's turn to Kirschner, Sweller, and Clark's explanation of why learning turned out to be the way it is. And their explanation is inexplicably US-based, but we'll leave that aside.

They identify the curricular reform that happened after Sputnik (it's kind of neat, Sputnik happened and then I was born; I came into the world roughly the same time as Sputnik, so I am a product of these reforms, maybe that's what really scares them). And what the reform is, they say, and it's repeated throughout the paper, is that it's based on the assumption that knowledge is best or can only be acquired or learned through experience that is based on the procedures of the discipline. And they repeat this four or five times, I didn't count them, in the article.

And so they're saying the assumption here is, if you want to learn physics you should practice physics the way a physicist does, which is what I said at the beginning of this talk. And this has led, they say, to this unguided project work (I did lots of projects when I was in school: Ecuador, the Danube River…) and a rejection of instruction (this is the key phrase, it's repeated several times in the paper), a rejection of instruction based on the facts, laws, principles, and theories that make up a discipline's content.

That's a pretty common view, isn't it? There's probably fewer advocating wikis or weblogs or something like that, Wikipedia. People are saying, "what about the facts, what about the laws, what about the content that actually is the discipline, physics, or mathematics or whatever?"

And they say it may be, they say it is, an error to assume that the pedagogical content of the learning experience is identical to the methods and practices of the discipline being studies. So what they're saying is that the basic fundamental assumption of my own theory is in error. And it's a mistake to assume that instruction should focus exclusively on application (well it's one of those weasel words, 'exclusively on', it's not what they mean, what they mean is it's a mistake to say that instruction should be application).

Well what do they think? How do they think science works? Because if it's a mistake to adopt that method, then the nature of that method is pretty important, don't you think?

Well, happily they explain it in a couple of places for us. One place they explain it is when they discuss Kolb (1971), and Kolb and Fry (1975) and they present a process where a person carried out an action and sees the effect, and then they see this and they understand this effect and begin to anticipate the consequence, and as a consequence of that, they generalize. They understand the general principle.

It sounds like discovery learning. And they extend this to other types of unguided or minimally guided instruction. It's one of two major components of problem-based learning, they say in their paper: explicit teaching of problem solving strategies in the form of the HD (hypothetical-deductive) method. Barrows & Tamblyn 1980. 1980 is kind of significant because (Thomas) Kuhn was only about 1974 or so.

And then teaching, it's the same principle. Teaching of the basic content in the context of specific case or instance. So again the same sort of set up here. You have the specific and as a student you're supposed to generalize. That's the law. And there's the problem. That sort of way of going about learning, they argue, might not be the most appropriate way to solve problems. In fact, it's really difficult, especially in clinical settings, especially in "information rich environments." It's really difficult to come up with generalization. You've got all kind of convenient hypotheses (that reminded me of Chomsky when he talks about the poverty of the of stimulus). There's so much information it's really hard to pick the right generalization.

But the thing is, real science - the stuff that real scientists do in real labs - is not the hypothetical deductive method. Hasn't been since the '50's. It was developed by Carl Hempel, and the ink wasn't even dry on the page when Hempel and other logical positivists like A.J. Ayer were being criticized all over the place. Karl Popper, right off the bat, not verification but falsification, which is very much not the HD method. And numerous others. Kuhn - Thomas Kuhn. Lakatos. Lauden. Feyerabend. All pointing to the fact that scientists in practice do not practice the HD model. Nobody does it.

What is science? Science according to Thomas Kuhn (The Structure of Scientific Revolutions) is a community process. The process is not argumentation and it's specifically not inductive argumentation. It's explanations. The criteria for explanations are theory based or theory-bound and include things like simplicity, parsimony, testability. And explanations aren't stand-alone facts. They depend on your expectations; they depend on your theories. As Bas van Fraassen

says in The Scientific Image, the explanation of something depends not only what caused something to happen, but also in your expectation of what could have happened instead. Obviously.

7. The Prestige

Let's turn now to the core of the Kirschner, Sweller and Clark paper, which is the 'cognitive load argument'. This is where you're going to give you cognitive psychology and tell you, here's how learning works.

So their theory is based on the theory of long term and short term memory. They're not going to be interested in sensory memory (I find that a very interesting statement I'm not going to linger on) and the manner in which our cognitive structures are organized. You've heard this before, right? You have short term memory, you have long term memory. Short term memory is the stuff that we are consciously aware of. Long term memory is the stuff we aren't.

Long term memory is - and these are their words - a 'massive knowledge base' and anyone who understands cognitive structures knows how bad a statement that is. If you looked at the structure of the mind, it does not resemble a knowledge base at all. And I won't get into the details of it, but neural structures and databases are two very different things.

And they say, you're skillful in an area because your long term memory contains huge amounts of information, so it's a theory knowledge based on quantity, piled fact on fact on fact. And then they cite – astonishingly – DeGroot's work on chess expertise. But, you know, I play chess. And there's this fiction that chess players who are really good chess players can predict ahead, and they can keep all these different board positions in their head. But you cannot defeat a computer like that. The computer will always predict ahead further than you. But people still can beat computers because they visualize, they recognize, successful formations. They don't memorize a whole bunch of chess positions; they see what is going to work and what is not going to work.

This is Kirschner, Sweller and Clark again: they say the alternate means of instruction is justified by this cognitive theory of long term memory. And the aim of all instruction they say is to alter (nice word there, 'alter') long term memory. If nothing has been changed in long term memory they said nothing has been learned. It harkens back to the logical positivist principle of verificationism, that a difference that makes no difference is a difference at all. Or in Bergmann's formulation, in the dark, all cows are black.

And then the other side of the theory is that working memory, short term memory (and we've seen the research on this) has limited capacity, has limited duration, only lasts for a few minutes and is restricted to a small number of elements - the famous number seven elements. We've done lots of work on that. Seven elements doesn't mean seven digits because if you taught to cluster things you can actually remember more than seven. That's going to form an important part of their theory.

Here's where the prestige comes in (that's from magic, right, the movie, you do your trick and then you do the unexpected thing and it all comes together and all the crowd goes ooh ahh). Here's where it all comes together.

Most learners can, to use their words, construct knowledge. People can actually spot the generalizations. And to do this you must construct a representation. Now this representation, they say, is equally good whether you're using full information or partial information. So if you have the full information you're really not losing anything, but if you have partial information, part of your short term memory is occupied in trying to search for possible theories or hypothesis. And because you're searching for what theory this data could fit into, you're overloaded, your short term memory is overloaded and you are not able to focus and actually think about what you're supposed to be learning.

And so, constructivist – because it's making you search for these theories - is not a good prescriptive instructional designed theory. It's too hard.

8. Personal Knowledge

Well it's all in the search, isn't it? And this is the putative 'worked example effect', where you're doing a search for the hypothesis (imagine a logic problem, "oh what principle am I going to apply, am I going to apply transposition, composition or whatever?"). So you're searching these hypotheses, and it's unrelated to learning, you're trying to find the best fit, but if you're studying a worked example, the theory has already been picked for you and you're looking at what has been done. You're learning by being told. The problem is, problem solving - real human problem solving - doesn't work that way.

We don't do this mental search of our internal hard drive and try to find the right theory. That's not how it works at all. We don't have a whole bunch of general principles or theories stored in our head. Rather we looked at the data and we recognize patterns in that data. It's a process of seeing rather than searching. This is why is so interesting that at the beginning of this they dropped perceptual memory as though it was completely irrelevant. But perceptual memory is totally relevant because perceptual memory is a process of recognition.

There's even in the literature there's discussion of this (I'm not just not making this up). Stephen Kosslyn, for example, image-rotating examples, the theory where you're going through algorithms and processes does not explain reaction time when you're asking people to visualize the rotation of images. We work on a sub-symbolic level, not a symbolic level. Cognition is based on a process of pattern recognition at that sub-symbolic level.

And we know this. There has been a lot of discussion about experts and schemas and how an expert will acquire a frame – to use Lakoff's term – or knowledge of organization. And they even admit, the authors even admit, cognitive research has shown that to acquire expertise in a domain the learners must acquire the necessary schemata.

But what are schemata? What is this 'picture of domain' that a person must have. They (Kirschner, Sweller, Clark) think it is facts, laws, principles, and theories that make up the

discipline's content. But this is simply wrong. It is an incorrect understanding of science. And they ought to know that.

Bloom's Taxonomy talks about types of learning that are not facts, data, and all theories. Or Michael Polanyi, his book Personal Knowledge, talking about personal knowledge, the difference between 'knowing that' and 'knowing how'. And what's important about Polanyi's work is that he says, the bulk of our knowledge, even our conceptual knowledge, is ineffable. That means it cannot be represented in words, which means that a statement (which is a theory) is not a good expression of that knowledge, and that a law is not a good expression of that knowledge. The configuration of connections in your brain, that is a good representation of that knowledge.

Knowing a discipline is knowing the practice of that discipline. It's learning to think like a scientist or a forester or a hockey player, and learning to recognize, to see the way they see, to speak they way they speak their words, to judge the way they judge.

And that's what we are producing in the read-write web. The read-write web, the web in which we talked about what we're doing, we reflected, we practiced, is developing these new kinds of literacies, these new ways of people being able to express how people think - that is, how they talked, how they practiced, how they judged, how they evaluated. There's a nice picture of this, the revision of Bloom's verbs that includes verbs tied to the social infrastructure skills and abilities that help people learn and help people grow new mental configurations, grow in knowledge in this environment.

The pedagogy in this environment is based on personal learning. It's based on the acquisition, the developing, the growth of capacities and aptitudes - like recognition - rather than laws and facts and theories and data. I tried to talk about this a little bit in a paper I presented the last time I was here in Holland called Things You Really Need to Learn. And I talked about the general principle, how to predict consequences. How to stay healthy. How to live a meaningful life. These are the core principles, the core things that people need to learn, not facts and data.

I've talked about the semantic principle, the mechanisms, the ways we design our networks in order to make the most reliable system for recognizing patterns in the environment and these principles I put under the headings of Autonomy, Diversity, Openness, and Interactivity. And I've talked about the principle of personal learning, the idea here that you develop your own learning yourself. You make your own learning and the way you make your own learning is you find the relevance in the environment. And that has to do with similarity or salience and Amos Tversky, interaction, communicating with your community, and then usability, just being able to speak the language, use the interactions.

That's the theory that is really supported by, if you will, the cognitive architecture. And so that's my refutation of Kirschner, Sweller and Clark and my presentation of the alternative connectivist theory of knowledge. And I thank you very much for your time.

Utrecht, December 20, 2007

Response to Kirschner

Here is my response to Kirschner 's criticisms, posted here.[761] Wilfred Reubins provides the translation.

Wilfred Rubens wrote:

> *Paul had doubts if he would respond. Partly because he does not think your 'attack' is not worth responding. He writes that apparently you became upset about his article during the Edublog dinner.*

I discussed my subject during the edublog dinner. But as you can see if you look at the dates of my postings on Half an Hour, I had already begin collecting and working on material prior to the dinner. I became upset, not at the dinner, but when I read the article, which was about a week prior to the talk.

> *Kirschner writes that your speech was not the speech you agreed upon with the Surf organisation (and the speech yo**u were paid for).*

First of all, I was not paid for a speech. I do not charge speaker fees of any kind. My expenses (airfare and hotel) are paid by the organizers; otherwise I could not deliver the talk at all. But my time and effort are freely donated.

In my email to Tom Dousma, of Surf, dated August 1, 2007, here is what I promised:

> *I think I could contribute with a talk titled 'Learning Without Leaders' (or something like that) in which I could outline how learners, supported with new technologies, are able to manage their own learning. A focus of the talk would be to response to some of the very specific objections that have been raised, e.g., that students without guidance do not work, that they do not make the correct (or appropriate) choices, that they do not learn the fundamentals, etc. (if you have heard additional objections you would like to see address, please let me know of them).*

I would say that this is exactly what I delivered.

> *He wonders why you did not get in touch with him but that you choose to hold a monologue instead of a dialogue.*

I have discussed these issues for a long time on my website and in my newsletter. I posted the summary of the Kirschner, Weller and Clark paper as well as a series of responses on my blog, Half an Hour.[762]

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[761] Wilfred Reubins. Comments from Paul Kirshcner. November 17, 2007. Link no longer extant. http://www.e-learning.nl/subpage.aspx?l1=2&subaction=details&newsid=1671&activetab=0

In my newsletter, the day before the talk, I posted[763] that I would be addressing the Kirschner, Sweller and Clark paper during my talk, asking for comments and feedback and received a number of very valuable comments in response.

I did not contact Kirschner (or any of the authors) personally and privately because I did not see any reason to do so. My work is open and public. There was ample opportunity to see what I write and to respond.

It is worth noting that neither Kirschner nor anyone else contacted me prior to the publication of the article in the first place. Of course, I would not expect such exceptional and preferential treatment.

> *Now, he was not able to respond to your contribution.*

He was invited by the organizers to make a response in English, which I would attend (and very politely sit in the back of the room and listen). Probably this was not possible because he did not attend my presentation in the first place.

Kirschner does not read my papers, nor my blog, nor my newsletter, nor attend my presentation, and then suggests that it is my fault that he is not informed.

> *Paul writes that his article was published in one of the best scientific magazines. Three teams of researchers responded. And Kirschner, Clark and Sweller had the opportunity to react. The reader could produce conclusions himselves. Kirschner thinks this is a proper and decent debate.*

A number of the responses remain behind subscription firewalls, and I cannot afford to pay the fees to read them. I have collected and analyzed as much of the public critique as I could find.

It was my opinion that the debate was conducted in a very narrow arena, with limited perspectives offered in response. In the responses to the paper I did not see any recognition of Kirschner's mischaracterization of scientific method. I did see an abstract accusing him of misunderstanding cognitive processes, but this was behind a subscription paywall and so I could not read the entire text.

Kirschner continues to be free to respond to my arguments. I do not believe that 'debate' is limited to a specific academic journal or a specific conference. A debate, properly speaking, is something that is distributed across time and space, and includes a variety of autonomous contributors, communicating through various media, in which there is not an 'audience' per se (this is not a performance of a play!) but participants in a wider discussion.

> *Kirschner writes that they do not mention the "holy cow social-constructivism" (I used the term in my impression). Kirschner, Clark and Sweller warn for the dangers of minimal guidance or no guidance, and their criticism is according to Paul Kirschner based on facts and empirical research.*

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[762] Stephen Downes. Half an Hour (weblog). http://halfanhour.blogspot.com/
[763] Stephen Downes. Kirschner, Sweller, Clark (2006) – Summary. OLDaily (weblog). November 12, 2007. http://www.downes.ca/post/42358

It is very clear to me that the authors attach the presumption of 'little or no guidance' to a number of theories, and find that their criticism of 'little or no guidance' constitutes a basis for criticizing those theories.
There is no question from the text of the paper that the authors believe that a pedagogical process that does not contain direct instruction is therefore one in which there is little or no guidance.

I understand that Kirschner believes that research supports his position. But merely citing research does not produce support. The conclusion must be entailed (or at least, inferred, or at the very least, suggested) by the research. This is not the case here, as I demonstrated in my talk.

> It is OK for him that you call him an instructivist. So was -according to Kirschner- Lev Vygotsky with his ideas concerning the use of scaffolding and the zone of proximal development. Kirschner suggest you should support your "belief" in free-learning with scientific evidence.

In my talk I stated that among my criticisms of constructivism and inquiry learning is the assertion that there is too much instruction. So I too agree that Vygotsky is a type of instructivist. I have criticized this position in the past - here, for example,[764] responding to David Merrill.

There is voluminous research showing that learning takes place when in contexts where there is little or no direct instruction. In my talk I refer both to some of the formal research, as well as appealing to our own experiences, in making this point. Kirschner is simply incorrect to suggest that my 'belief' is not supported by scientific evidence.

The video of my talk has been available on my website for a number of days now. Perhaps Kirschner should view the video before commenting further on what my talk does not contain.

> According to Kirschner you presented strawmen and inadequacies in your speech. He adds: "If I interpret Wilfred's contribution correctly". I wrote for example that according to you Kirschner thinks that there is no evidence for inquiry learning and problem-based learning.

I do not say this. In fact, I acknowledge that in their paper, they do cite support for inquiry learning and problem-based learning. For example, one of the things I cite is their description of the use of problem-based learning by U.S. medical schools. Research does show that this learning is effective, as Kirschner Sweller and Clark note. But they criticize it, because the graduates prescribe "unnecessary procedures".

> Furthermore I wrote that according to you Kirschner has made a caricature of social constructivism. I used this word deliberately because imho it is a label for Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching. This label is rather common in Dutch literature about teaching and learning. And it was my

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[764] Stephen Downes. In Practice… Stephen's Web (weblog). January 28, 2002. http://www.downes.ca/post/98

interpretation of a part of your contribution. I wrote to Paul Kirschner that it was my interpretation but that I think it was what you meant.

It seems clear that Kirschner Sweller and Clark very deliberately sidestepped 'social constructivism'. I am careful therefore not to use this phrase anywhere in my presentation. I also do not engage in any discussion of Vygotsky or social constructivist theory in detail. My response (that the authors pose a false dilemma, for example) is based on the nature of Kirschner Sweller and Clark's statement of the theses, and not of any particular interpretation of any of them.

Kirschner ends his response with the remark that you are not debating. That you use a monologue that you control (e.g. on your weblog).

My own belief is that my own style of dialogue and debate is more open than any alternative being proposed. I may control my own website (though I do allow comments both on my main website and on my blog) but I do not control the blogosphere or the wider internet.

Kirschner may not choose to use open and public fora for debate, but it is certainly inappropriate for him to blame me for this choice.

If his understanding of scientific debate and enquiry is that it takes place only in special fora with limited participation and paying audience, then he is in my view mistaken, and he should not blame me for the consequences of his mistake, particularly after my efforts to correct them.

I conduct my side of the debate in the open five days a week for all to see, and if Kirschner has not seen, and does not care to take part, in this debate, then it is his loss, not mine. And I would say that the advantage that I - and any others who take part - gain from this method *is* empirical evidence for the position that non-guided instruction supports learning.

I used a title "Downes tears Kirschner apart" (at least a Dutch expression which means the same). According to Kirschner a better title would be: "Stephen Downes makes a fool of himself".

I have made a fool of myself before and will no doubt do so again. I am happy to make a fool of myself, if it will advance our knowledge and understanding.

I will be making a transcript of the talk so that Kirschner and others can respond to my specific arguments, should they so desire.

(Update: 2011 – no response was ever forthcoming.)

Utrecht, November 18, 2007

"More German" and Learning Atoms

Responding to Heli, which you should read first...[765]

> *I love to analyze and conceptualize .. but why I have a feeling that it was not allowed here in CritLit2010? I should have been an excellent student but I only gave some fragmented knowledge and occasional comments. What is my problem actually? Fine question :)*

Interesting question. It certainly isn't because you were not allowed in CritLit2010 – there was no prohibition whatsoever against analyzing and conceptualizing.

Because it was a small course, much of your interaction would have been with me. So perhaps you felt that analysis and concepts would not have been an effective strategy in our interactions? If so, you may have been correct.

Let's consider the question of whether interesting learning happened in CritLit2010. The usual, traditional, method of addressing such a problem is to seek out some evidence, and to infer, through a process of analysis and conceptualization, to the existence of some instance of learning (perhaps a second calculation would be required to show that it is 'interesting').

This reflects an approach to learning where what is learned is observable, and measurable, is discrete wholes – precisely the sort of things that reveal themselves through analysis. It is, if you will, an atomistic definition of learning, where after learning we can observe some sort of increase in the mass of atoms (or perhaps an exchange of atoms, if we have had to reject old concepts along the way). These atoms (by definition?) would produce some evidence of their existence, given an appropriately designed experimental mechanism (which, in learning, is called a 'test' or 'assessment').

When I am asked to account for whether interesting learning happened in CritLit2010, I don't want to commit myself to any such picture. Not because I think connectivism resists such an approach – I'm sure we could probably build it in, and I see no shortage of efforts among my colleagues to do exactly that ("where is the 'learning' in the PLE," they ask me, as though assuming we could add some atoms of learning to the mix and detect them coming out the other end). But because the idea of 'atoms of learning' runs contrary to the idea of a learning network.

Let me offer an analogy to explain what I mean. Imagine that you have travelled to a new city for the first time. Imagine, especially, that it is based in a culture different from your own. You return home from the city refreshed, exhilarated. Clearly, you have "learned" from your visit. But what is the evidence that interesting learning happened in your visit to the new city?

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[765] Heli Nurmi. Criteria for Interesting Learning in the Course. Heli Connecting Ideas (Weblog), July 27, 2010. http://helistudies.edublogs.org/2010/07/27/criteria-for-interesting-learning-in-the-course/

If you were asked such a question, you would find yourself almost at once fishing for particular things you might have learned: the foreign word for 'please', perhaps, or the existence of a festival, or the funny way people there line up for and order food. But even were you to be able to elicit the totality of such atoms, it would still not constitute what you learned. Indeed, it would actually misrepresent what you really learned.

Moreover, even if you were not able to come up with any atoms of learning, it would be incorrect to say you hadn't learned anything. As a result of your visit to the new city, you see food slightly differently, your understanding of social organization has become more sophisticated, your expectations of behaviour slightly changed. It may be that you cannot even articulate these new bits of learning (this is what it sounds to me like when you say "it is not easy to follow learning happenings. I cannot follow mine and I should be expert"). But this is not grounds for believing that learning did not happen, only that it is not atomic and identifiable through analysis.

What did you learn from travel to a new city? You might not be able to articulate it at all. An observer might be more perceptive, noticing perhaps a slight change in the way you pronounce words, or slight variations in your menu selections at restaurants. It would be difficult, even impossible, to articulate, and it would definitely not show up over a short period of time – some things might not become evident until you have visited your second, or third, new city.

So my response to the question "how do I know whether interesting learning happened in CritLit2010″ is that the whole model of "discrete cause -> discrete effect" is mistaken here. Asking "did interesting learning happen" is an inappropriate question to ask. It treats learning as (a) something concrete, and (b) an effect, that can be reliably produced by a cause. Yes, you may be able to identify concrete things that were produced by a cause. The mistake lies is saying "aha! *this* was what I learned." When in fact it is probably the least important of the things you learned.

So how do you know? Never mind the quest for discrete bits of learning, how do you know whether taking the course was a valuable activity. As I suggested before, an observer, familiar with your behaviour before and after, may be able to detect slight changes. Your use of language, your behaviour in certain communities, may have become more appropriate in ineffable ways. And your perceptions (untrustworthy and unreliable as always) may also offer clues: you feel a sense of dissonance, which means your existing thought patterns have been challenged, or you feel more comfortable with a group of people, or you feel a sense of exhilaration similar to what you feel after visiting a new city. Or something else.

What *would* show that learning occurred, if we could measure it, would be the formation of new connections, or strengthening (and weakening) of existing connections, between neurons in your brain. Your neural network was altered by the experience of taking the course (and, concurrently, by everything else that happened to you over the six weeks). What *would* show that learning occurred would be an isolation of those changes that happened as a direct result of the course, a comparison with prior states, and then some sort of semantic measure such that the new neural state contains 'more truth' than the old.

Barring such an account (and sketching the account reveals some of the absurdities, such as the idea that one neural state contains 'more truth' than another) we are left with vague generalizations.

But this, at least, seems true: there is no correct one-to-one mapping between (1) a verbal description of facts retained, propositions now believed to be true, or other atomistic bits of knowledge, and (2) the full description of the change of neural state that occurred as a result of the learning. We can't get from 'content language', which is atomistic, to 'neural language', which is not.

When you think about this, you see that this is true, I think. When you think of the proposition that "Paris is the capital of France," you see that there is no neural state that corresponds to 'knowing' or 'having learned' this proposition. Ergo, if we say that learning is the change of neural state, then it is inaccurate and wrong to say that we "learned" that "Paris is the capital of France", and that it is a mistake to treat utterances of such as evidence for that.

Learning is not atomic. There are not 'atoms' of learning. Learning is not something we can count and measure, as though it were cumulative. The assessment of learning through measurement of 'bits of knowledge' is fundamentally in error. A connectivist course does not try to teach 'bits of learning' and hence to ask 'what learning happened?' is the wrong question to ask. At best, we can ask only whether a person is more of a certain sort of person – are they 'more German' for having stayed in Germany for a month, are they 'more of a physicist' for having stayed in the community of physicists for a month. Knowing that there are no necessary or sufficient conditions for being 'more' of any of these, knowing that there is no gauge that measures being 'more German' or 'more of a Physicist'.

Heli said...

My first reaction to your long comment was embarrassment. I cannot follow how your comment is a response to my blog post. You don't speak to me, you imagine some traditional stupid researcher and you show how many mistakes you see in her thinking. It is not me, perhaps on the year 1965 I needed advices like those you give, but not now, no thanks.

You try to convince somebody, I hope that somebody reads what you say. I do not need that. There is smart research about learning. This is my first part, try to send this and write another about what I have learned from you ….

I have been wondering what is the focus of connectivism and you must know something about it. So I can learn from you.

I agree with you writing in how to examine/ explore/inquiry learning. The analogy of visiting a new city is fine and helpful. It is not easy to say what I have learned in visiting or living in web and in certain courses. I know that and agree with you. These are mine/my findings too. I am looking after a smart way of researching learning, for instance narrative stories. Human mind and consciousness must be there and self assessment. It was good that you had open questions in your inquiry (CritLit).

I agree that neural networks are not the evidence. But I leave that discussion to experts. One tweet yesterday "It is unnatural for the cortex to do things alone without the rest of the brain." written by a brain researcher in a congress, that is something I enjoy.

I try to learn from this you said:

> A connectivist course does not try to teach 'bits of learning' and hence to ask 'what learning happened?' is the wrong question to ask. At best, we can ask only whether a person is more of a certain sort of person - are they 'more German' for having stayed in Germany for a month, are they 'more of a physicist' for having stayed in the community of physicists for a month. Knowing that there are no necessary or sufficient conditions for being 'more' of any of these, knowing that there is no gauge that measures being 'more German' or ..

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I tried to ask you earlier that what is the expertise, skills wanted and you spoke about truth, values, decision making, assessing etc (CritLit) Now you speak about living in web or networks, new surroundings. I can follow this: you only offer/give environments and we students learn to swim in those. Student behaviour is the objective that is interesting.

Behavior and especially connections. OK that is a part/side of learning. Important but not all.

Is this a new chain of misunderstanding or is it possible to discuss? I am not sure.

Your more German got me to remember what Israel Ambassador in Finland said in an interview after the attack to a helping-ship and killing people. He said that Israel is not Canada or Finland.

So we must have something identical?

… I continue in my blog[766] and try to understand something about assessing

Moncton, July 6, 2010

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[766] Heli Nurmi. How to Assess Learning. Heli Connecting Ideas (weblog), July 29, 2010. http://helistudies.edublogs.org/2010/07/29/how-to-assess-learning/

Connectivism and Connective Knowledge

Posted to Huffington Post, January 7, 2011

On Jan. 17 George Siemens and I will launch the third offering of our online course called 'Connectivism and Connective Knowledge' -- or CCK11. We use the term 'connectivism' to describe a network-based pedagogy. The course itself uses connectivist principles and is therefore an instantiation of the philosophy of teaching and learning we both espouse.

If you're interested, you can register here: http://cck11.mooc.ca The course is a MOOC -- a massive open online course. What this means is, first, that it may be massive. Our first offering attracted 2200 people, our second about 700 people. Other MOOC-style courses we've offered have also been massive. PLENK 2010, for example, which we offered last fall, attracted 1700 people.

It also means, second, that the course is free and open. There are no fees, no barriers of any kind, to participation. We encourage people to register so they receive the course newsletter, but it's not required. Everything is freely available online and people can browse to their heart's content. Participants contribute as much or as little as they like.

The way CCK11 is set up is that we've defined a twelve-week course of readings. We (George and I) have also committed to twice-weekly online seminars, some of which will feature guests, others of which will be the two of us and any participants who have something to add. We do not require that people study the readings; these are optional (in a connectivist course, *everything* is optional). Rather, what we are saying through this structure is that *we* -- George and I -- will be studying these materials. And people are welcome to come along for the ride.

What is important about a connectivist course, after all, is not the course content. Oh, sure, there is some content -- you can't have a conversation without it -- but the content isn't the important thing. It serves merely as a catalyst, a mechanism for getting our projects, discussions and interactions off the ground. It may be useful to some people, but it isn't the end product, and goodness knows we don't want people memorizing it.

Let me explain why we take this approach and what connectivism is. At its heart, connectivism is the thesis that knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks. Knowledge, therefore, is not *acquired*, as though it were a thing. It is not *transmitted*, as though it were some type of communication.

What we learn, what we know -- these are literally the connections we form between neurons as

a result of experience. The brain is composed of 100 billion neurons[767], and these form some 100 trillion connections and it is these connections that constitute everything we know, everything we believe, everything we imagine. And while it is convenient to *talk* as though knowledge and beliefs are composed of sentences and concepts that we somehow acquire and store, it is *more accurate* -- and pedagogically more useful -- to treat learning as the formation of connections.

Of course, all this is the subject of the course. We'll be talking about connectivism a lot more, explaining and defending the theory, and talking about how it influences how we should talk about, provide and structure education.

From the perspective of the course, what it means is that the *process* of taking the course is itself much more important than the content participants may happen to learn in the course. The idea of a connectivist course is that a learner is immersed within a community of practitioners and introduced to ways of doing the sorts of things practitioners do, and through that practice, becomes more similar in act, thought and values to members of that community. To learn physics, in other words, you join a community of physicists, practice physics, and thereby become *like* a physicist.

Again, it is tempting to say that there are certain things that people learn when they become physicists, that there is some *content* that is essential to being a physicists. But this is misleading and wrong. A description of the content is, at the very best, an *abstraction* of the much more complex set of practices, attitudes and beliefs common among physicists. Because it is an abstraction, such a description cannot be accurate, and may actually mislead people about what being a physicist actually entails. A person who merely knew the content supposedly taught and tested for at a physics academy would feel grossly out of place in a gathering of physicists. It's like knowing the words but not knowing the tune.

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[767] Carl Zimmer. 100 Trillion Connections: New Efforts Probe and Map the Brain's Detailed Architecture. Scientific American, January, 2011. http://www.scientificamerican.com/article.cfm?id=100-trillion-connections

So what a connectivist course becomes is a community of educators attempting to learn how it is that they learn, with the objective of allowing them to be able to help other people learn. We are all educators, or at least, learning to be educators, creating and promoting the (connective) practice of education by actually practicing it.

In practice (and remember, this is just an abstraction, not a definition; just a starting point, and not 'content' to be remembered) connectivist teaching and learning consists of four major sorts of activities:

1. Aggregation

The whole point of offering a course at all is to provide a starting point, to provide a variety of things to read, watch or play with. There is a *lot* of content associated with the course, everything from relatively basic instruction to arguments and discussions to high-level interviews with experts in the field.

The course is supported with a daily newsletter[768], which highlights some of this content. The newsletter is created fresh each day -- it is not prepared content. So delivery may vary. It is composed not only of recommended readings but also articles, videos and recordings made by course facilitators, blog posts, images, videos and other recordings made by course participants, collected tweets from Twitter, bookmarks from Delicious, discussion posts, and whatever else we can think of.

The idea of the newsletter is to aggregate everything that's out there related to the course. This is necessary because the course (like the discipline it models) is *distributed*. People create content on their own blogs, photo accounts or messaging services. The newsletter is one way of bringing these materials together for easy access. Participants are *not* expected to read and watch everything. Even the facilitators cannot do that.

Indeed, what we have experienced after delivering a half dozen MOOCs is that we have to tell people at the start of the course to pick and choose what they will read, watch or participate in. Again and again, we have to stress that there is no central content to the course, that each person creates their own *perspective* on the material by selecting what seems important to them, and that it is these different perspectives that form the basis for the interesting conversations and activities that follow.

2. Remixing

The next step is to draw connections. The idea is to associate[769] the materials (or parts of the materials) with each other, and with materials from elsewhere. There are different ways to associate materials -- typically we look for some sort of commonality, such as a term, reference, topic or category. Sometimes we look for a fit, as though one thing follows from another. There are no rules to association, and part of learning is to get a feel for what goes with what.

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[768] Stephen Downes, et.al. CCK11 Daily Newsletter. April 13, 2011. Connectivism and Connective Knowledge 2011 (Online Course). http://cck11.mooc.ca/newsletter.htm
[769] Associationism. Encyclopedia of Psychology. Gale. Apr 06, 2001. http://findarticles.com/p/articles/mi_g2699/is_0000/ai_2699000025/

The main point here is to encourage people to keep track of this. We suggest that they keep records on their computers of all the documents they've accessed, perhaps with summaries or evaluations of the material. Or, better yet, they can keep a record online somewhere. That way they will be able to share their content with other people.

In the course we make some specific suggestions:

- Create a blog with Blogger. Go to http://www.blogger.com and create a new blog. Or, if you already have a blog, you can use your existing blog. You can also use Wordpress (http://www.wordpress.com) or any other blogging service. Each time you access some content, create a blog post.
- Create an account with del.icio.us and create a new entry for each piece of content you access.
- Take part in an online discussion. You can, for example, join a Google group and exchange thoughts with other course participants, or use the discussion forum provided in the course's online environment.
- Tweet about the item in Twitter. If you have a Twitter account, post something about the content you've accessed.
- Anything else: you can use any other service on the internet -- Flickr, Second Life, Yahoo Groups, Facebook, YouTube, anything! use your existing accounts if you want or create a new one especially for this course. The choice is completely yours.

3. Repurposing

We don't want participants to simply repeat what other people have said. Learning is not simply a process of reception and filtering. It is important to create something, to actively participate in the discipline. This is probably the hardest part of the process, and not everybody will participate at this level (that said, we remind participants, you get out of the course what you put into it; there's no magic here).

But it is important to remember that creativity does not start from scratch. There is this myth that we stare at a blank sheet of paper, and that ideas then spring out of our heads. But it's just a myth. Nobody ever creates something from nothing. That's why we call this section 'repurpose' instead of 'create.' We want to emphasize that we are working with materials that we are not starting from scratch.

What materials? Why, the materials were aggregated and remixed online. These materials are the bricks and mortar that can be used to compose new thoughts and new understandings of the material. What thoughts? What understanding? Well -- that is the subject of this course. This whole course will be about how to read or watch, understand, and work with the content other people create, and how to create new understandings and knowledge out of them.

Again, the role of the participant isn't to memorize a whole bunch of stuff. Rather, your job is to use the techniques and processes described in the course and just practice with them. We will show you the concept or idea, give examples, use them ourselves, and talk about them in depth. Participants can watch what we do and then practice them themselves.

If you're thinking that this isn't really very new educational theory, you're right. It's as old as the hills, forms the core of the concept we now call 'apprenticeship', and has been formally

described most recently as 'constructionism[770]' by the likes of Seymour Papert. What this *isn't* is a short cut. People learn through *practice*, and so this practice forms the core of connectivist pedagogy.

4. Feeding Forward

We want participants to share their work with other people in the course, and with the world at large. Now to be clear: participants don't have to share. They can work completely in private, not showing anything to anybody. Sharing is and will always be *their choice*.

And we know, sharing in public is harder. People can see your mistakes. People can see you try things you're not comfortable with. It's hard, and it's sometimes embarrassing. But it's better. You'll try harder. You'll think more about what you're doing. And you'll get a greater reward -- people will see what you've created and connect on it. Sometimes critically, but often (much more often) with support, help and praise.

Also, people really appreciate it when you share. After all, what you're doing when you share is to create material that other people can learn from. Your sharing creates more content for this course. People appreciate that, you will probably appreciate the content other people in the course share with you.

It's better than some grade or some reward system. As Daniel Pink says[771] in Drive, "Rewards, by their very nature, narrow our focus... by neglecting the ingredients of genuine motivation -- autonomy, mastery, and purpose -- they limit what each of us can achieve." We want people to share only because they feel they have genuinely created something worth sharing, because they feel they are part of the community and working on something that matters, that is important.

Again, these four points are just an abstraction of a rather more complex process. It's as though we described "living in a community" with these four points. As anyone who actually lives in a community knows, participation and interaction is a lot more complex. There are many more subtle cues and practices that cannot be described in a set of rules and principles, and even if they could, would not apply the same way in every community in any case.

And that's the underlying message of connectivism. It is a pedagogy based on the realization that any knowledge, *all* knowledge, is like that. Knowledge is not something we can package neatly in a sentence and pass along as though it were a finished product. It is complicated, distributed, mixed with other concepts, looks differently to different people, is inexpressible, tacit, mutually understood but never articulated.

When we focus on the content of a discipline, we *miss* most of that. We learn the words, but not the dance.

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[770] Wikipedia. Constructionism. Accessed April 30, 2012. http://en.wikipedia.org/wiki/Constructionism_%28learning_theory%29
[771] Larry Fliegelman. 19 Top Ideas for Education in Drive by Daniel Pink. Connected Principals (weblog). January 5, 2011. http://connectedprincipals.com/archives/2202

The Knowledge Hunters

Responding to Dale Pobega[772] (I have attempted to post this there as well, but the comment system rejects it, first because the comment is too long, then because the URL is too long.)

As the theorist behind this Downesian fanatical training agenda I feel I ought to make a few points.

First, it's always pretty easy to show that something we say has already been more or less said before. Consequently I am not particularly concerned about whether what I say is novel or merely a rehash of something already said. What matters is whether it is right.

Personally, I doubt that 1970s progressives were saying the same thing I'm saying, mostly because the mathematics, science and terminology did not exist. And I *do* address the criticisms they faced. But it doesn't matter. If they were prescient, great! It's not a competition.

Second, I have addressed the question of the skills and attitudes needed to succeed in a connectivist environment on numerous occasions. If people presenting the ideas and theory did not cover this, they can hardly be blamed; a one-hour presentation doesn't allow coverage of everything.

But last summer I addressed an entire course to 'critical literacies'[773]. I've looked at the subject in numerous presentations. I wrong a very popular article, 'Things You Really Need To Learn'[774], which describes what ought to form the foundation for a 21st century education.

I know, oh I know, that many students and even adults are not in a position to manage their own learning. They do not have the skills and discipline. This is unfortunate, because it leaves them dependent and unable to adapt.

But the argument that we are currently doing it wrong should not stand successfully against the argument that we should be doing it correctly.

I have long argued - and many others before me! - that children should be encouraged to learn creative and critical thinking, logic, analysis and reasoning, scientific method, and those other

[772] Dale Pobega. Hunters and Heels, PLENKS and Platforms : ConVerge 2010 - A Review. A Second Crack (weblog). December 19, 2010. http://dalepobegateaching.blogspot.ca/2010/12/hunters-and-heels-plenks-and-platforms.html
[773] Stephen Downes and Rita Kop. Critical Literacies. 2010. Online course. Website currently shut down. http://ple.elg.ca/course/
[774] Stephen Downes. Things You Really Need to Learn. Stephen's Web (weblog). August 30, 2006 http://www.downes.ca/post/38502

tools an autodidact will have in plentiful supply. That they do not have these tools today is no reason to continue to teach them specific dates and places, or to have them memorize formulae by rote.

Third, at the core of connectivism is the idea that learning is not a matter of transferring knowledge from a teacher to a learner, but is rather the product of the learner focusing and repeating creative acts, of practising something that is important and reflecting on this practice. Not that I'm the first to say this either! But it continues to astonish me how this basic point eludes so many thinkers.

Take, for example, the proposal that:

"I discourage my own language students from taking too many notes. I want them to be there with me in the moment, hopefully engaging me or the material I present directly, thinking through and subsequently coming to new personal understandings for themselves."

This sounds like a desire to engage students in creativity and participation, but is actually a countervailing edict. Unless there is an active discussion taking place (in which case we might still see some note-taking, but demonstrably less) what is being lost is rather their rapt attention as someone feeds them 'the facts'. That's not engagement, activity, or anything of the sort. It's receptivity.

Oh, I've attended many of those conference presentations, and you'll hear me tap-a-tap-a-tapping at the back of the room. I'm taking notes - hardly a passive activity, but an active engagement with the material, a working through of what is being presented into my own wording and my own vocabulary, in real-time. It's a defense mechanism against the pedagogy of presentation, a way to keep myself from falling asleep while waiting for the speaker to catch up with her idea.

When we discourage note-taking, we are making it about *ourselves* as teachers, which is exactly the opposite of what it should be.

Fourth, even for a polymath such as myself, the road of the autodidact is lonely and frustrating. I know this because of, for example, the hours I have spent discovering that the number of variables in the template must match exactly the number of variables passed to the function filling the template, an error that will be logged with the unhelpful (and incorrect) notification, "syntax error."

One of the differences between the 'discovery learning' of the 1970s and the network learning of today is that today you're supposed to ask people when you run into something like that. You post your code to your blog or a discussion board, or email it to someone you know, and ask, "why won't this work?" And so forth, with all the other frustrations you encounter on the way to mastery of your domain.

In a very real sense, the attitudes and skills lacking in those students who do not succeed in network learning are precisely those surrounding how to frame a question, how to pose it to a

community, and how to interact with them in such a way that they'll respond to you. These are no easy feats for a generation that thinks asking for help is cheating!

What distinguishes network learning from the discovery learning of the 70s is that it's not about the discovery at all. There's no extra reward, no supposition of improved recall, no morally superior consequence, to having discovered something yourself as opposed to have asked someone how to do it. It's about acquiring, through practice, a certain set of skills: of experimentation, of enquiry, of testing and observing, of communicating. The principle being 'discovered' is the least of it! These are a dime a dozen; human knowledge is filled with them, far more (especially in the 21st century) than anyone could remember. Getting at these principles, teasing them out, working them - these are far more important skills, and they will not be learned, quite frankly, by paying attention in class.

Finally, fifth, I speak and write to educators, and the vast majority of them are older people, adults in their 50s, as I am, or those to whom a synonym for 'millennium generation' is 'youngsters'.

I don't talk to these people about how to teach, even though the majority of them are educators. My primary concern isn't the young at all. Rather, I am most interested in these older people, these teachers, themselves. I talk to them about "How to manage your own thinking and learning."[775] Because, I figure, if they can understand and acquire these habits themselves, they will be more able to *demonstrate* (rather than hopelessly try to *tell*) their student show to learn.

Of course, you can hardly blame those people who in fact *are* younger from restraining themselves from taking this approach. Either they suppose that older adults are, in fact, able to learn things for themselves, or if not, hardly feel in a place to correct them. Nor should they.

Finally, I should be clear, none of what I recommend is fact or easy. True, no end of salespeople will try to tell you that this or that educational theory or reform will solve the problems in the workforce (or with our kids, or whatever) in just a few years. But you don't lose weight quickly, you don't build muscles quickly, and correspondingly, you don't train your mind quickly. These things take time, for some very good biological reasons, and on understanding that we can make remarkable, if slow, progress.

And in all of this - and here we are probably very much in agreement - there is very much a contradiction between what I would encourage in an educational system and what those who envision a fleet of learning management systems, core vocabularies and competencies, and standardized assessment mechanisms would envision.

At its heart, what I have to write about is a theory of education based on personal freedom, empowerment and creativity - and I positively *know* that 70s progressives talked about this, and I am wholeheartedly in agreement with them, and arguably the product of such an education.

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[775] Stephen Downes. Web 2.0 and Your Own Learning and Development. Google Video. June 19, 2007. http://video.google.com/videoplay?docid=-5431152345344515009

That's why I am dismayed when people say that students today just don't have the chops to manage their own learning. It's a denial of the sort of education, of the sort of life, that is worth living. It is to suggest, contra all the evidence to the contrary, that there's no point teaching them to live their own lives, because they'll never learn.

And if that's not new - that's fine. It's still worth saying.

Moncton, December 21, 2010