

Knowledge and Learning

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What is Knowledge?

- Something we learn (as assumed by the title of this section)?
- Something we have or acquire (as opposed to, say, a state of being, a quality or property)?
- Something we can pass on (as in teaching and education)?

How We Know...

- Empiricism... the idea that all knowledge comes from experience
 - Confession – I am an empiricist
- Rationalism – the idea that we can reason our way into knowledge
- Logical positivism – knowledge deduced from ‘sense data’ and ‘observation language’

Justified True Belief

- A traditional definition of knowledge: knowledge is justified true belief
 - Introduces the notion of evidence, fact
 - But also, that knowledge depends on a state of mind – that knowledge is contingent?
- Gettier problems...
 - Eg., ‘coins in the pocket’
 - See http://en.wikipedia.org/wiki/Gettier_problem

Externalism

- The ‘fourth clause’ ...
- The idea that something ‘external’ is required for knowledge
 - Knowledge could be *caused* by the world, for example
 - Knowledge could *cohere* with a ‘web of belief’
 - Knowledge could be *socially justified*

Justification

- No matter how you look at it, knowledge is never justified...
- The history of scepticism is (ironically) a history of success – cf. Descartes, Hume
- At a certain point, we have to take a ‘leap of faith’ – but even this has its problems
- Getting ‘something from nothing’

Personal Knowledge

- Knowing how to ride a bicycle:
 - I could explain it to you
 - But it's better if you learn yourself
- Knowing that vs. knowing as a skill
 - 'Tacit knowledge'
 - Michael Polanyi http://en.wikipedia.org/wiki/Tacit_knowledge
 - 'We know much more than we can tell'

Ways of Knowing

- Knowing ‘that’ and knowing ‘how’ – and probably a whole set of these...
 - Knowing ‘what’ (to do, for example)
 - Knowing ‘who’ (as in “it’s who you know...”)
 - Knowing ‘why’ (and why not)
 - Where and when – spatial temporal sensations?

What is Learning?

- The accumulating of a set of facts?
 - Hardly seems likely – the idea of the *idiot savant* - http://en.wikipedia.org/wiki/Idiot_savant
- Learning as doing? Practice makes perfect, but leaves out the ‘why’
- Constructivism – the idea that knowledge is ‘constructed’ by the student
http://carbon.cudenver.edu/~mryder/itc_data/constructivism.html

What is Knowledge (2)

- Chomsky – the ‘poverty of the stimulus’
- The idea that there is innate knowledge...
 - Of oneself, God – Descartes
 - Of archetypes – Jung
 - Of language – Chomsky
 - Words and concepts – Fodor
- But: does universality entail innateness?

Why We Believe

- We believe that the billiard ball will go into the pocket... but why?
 - Our experience of this is just a miserable string of failure
 - And anyway, cause and effect are not logically connected
 - But we can't bear to not believe this
 - Kant – necessary conditions...

What If...

- Knowledge wasn't propositional...
- That even factual knowledge was more like learning a skill?
- That it is a mental state, and not the 'having' of a fact at all...

Behaviourism

- Gilbert Ryle – Descartes’ ‘ghost in the machine’ is a category error... there is no ‘there’ there
- Knowledge = behaviour? Not exactly...
- Knowledge = a *disposition* to behave
 - Counterfactually... what if...?
 - ‘Brakeless trains are dangerous’

The Sense of Knowing

- Behaviourism is counter-intuitive – we know there's something there beyond behaviour
- The Turing Test – The Chinese Room example (Searle) – what is it like to be a bat? (Nagel)
- The sense of knowing is ineliminable...

Knowing How...?

- The presumption behind the innateness theories is that knowledge is propositional
 - That is, that it is made up of facts
 - And, more importantly, that it is composed of (something like) sentences
- Hume – belief is based on custom and habit
 - Knowledge is a belief I can't bring myself to stop believing

The Key Turn...

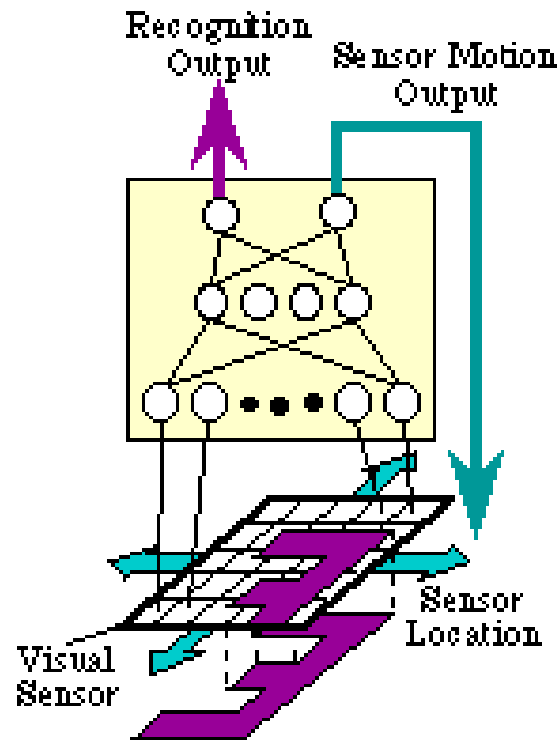
- Wittgenstein... the sceptical problem isn't a problem of justification, it is a problem of language
- My coda... the problem *is* language
- It's not simply that knowledge is like sensation, knowledge *is* sensation
- ... and sensation is non-linguistic

Sensation

- How do we perceive? Through our senses...
- But we do not (in the first instance) perceive a tree as a tree... we are presented with a barrage of stimuli
- The recognition of a tree emerges from the pattern of input perception

Perception

- There is no ‘observation language’
- Perception is a neural process



The structure of the proposed active perception system

Neural Networks

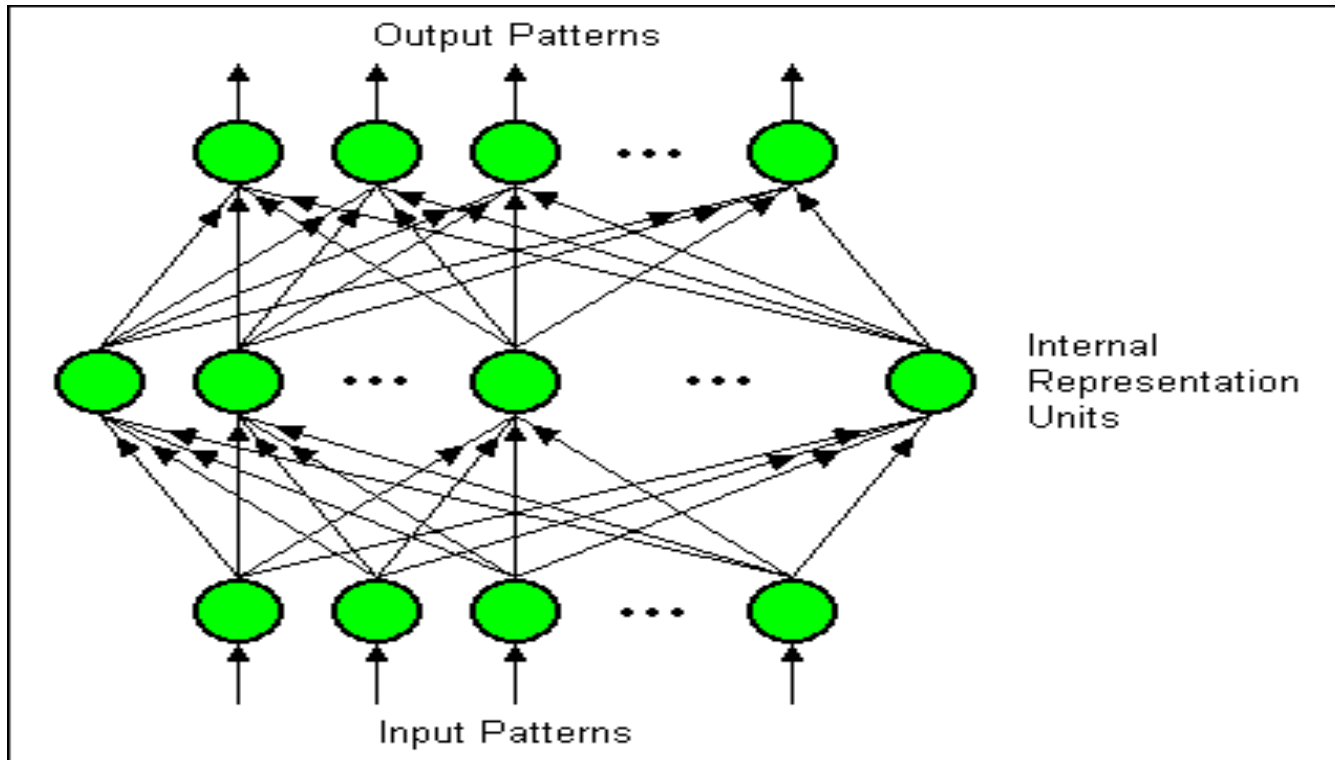


Figure 1. An illustration of the multilayer perceptron architecture used in TD-Gammon's neural network. This architecture is also used in the popular backpropagation learning procedure. Figure reproduced from [9].

Distributed Representation

- The idea that a ‘concept’ exists in no particular place in the mind, but is distributed
- Eg., the idea ‘Paris is the capital of France’ is the combination of thousands (millions?) of neurons and connections

Emergence

- Order out of chaos...
- The concept (eg., an image) arises out of the organization or the pattern of the phenomena (eg. The TV pixels)
- Not just image based... anything can be an 'emergent phenomena'
- See, eg., small worlds networks (Watts)

Context

- If everything is connected to everything, context is of crucial importance – no belief stands on its own, is a part of every other belief
- And we see this in practice: meaning (Wittgenstein, Quine), Causation (Hanson), explanation (van Fraassen), language (Lakoff)

What is learning? (2)

- Not the presentation of data and facts
- Not even the construction of data and facts
- But rather – the influencing of a neural network into a systematically stable pattern of perceptions
- Kuhn – ‘knowing’ is ‘knowing how to solve the problems at the end of the chapter’

Knowledge is Experience

- That is... the sum total of our perceptual states, the ‘custom and habit’ we have acquired in our interactions with the world
- Learning, therefore, is the acquisition of experience
- More specifically, learning is the acquisition of similar experience to those in what may be called a community of practice