

Class 11 - Neuroscience

I. Churchland's discussion of neuroscience

As we have seen, much of contemporary work in the philosophy of mind is driven by speculation and intuition.

Such speculation can be frustrating, since intuitions about abstruse cases can vary.

The eliminative materialist's emphasis on exploring the science of the brain can thus be a relief.

Finally, we can put aside some speculation and look at the hard facts.

Neuroscience can at the very least clear away some of the easy problems of consciousness, displaying mechanisms which account for particular mental functions.

Looking at the brain, we see an overwhelming resource for explaining a wide range of mental phenomena.

"The impression of a cumulative information processing system is impossible to escape" (137).

We construct a functional map, p 143.

The sensory homunculus is the result of a mapping from the somatosensory cortex to the external body.

The motor homunculus is the result of a mapping from the motor cortex to the external body.

Similarly, Churchland speculates, "[V]ictims of mental illness are the victims primarily of sheer chemical circumstance..." (145).

Still, even if we follow the Churchlands into the brain, we can not leave the speculation behind, completely.

First, despite advances in recent years, we don't know very much about the brain.

(Well, I don't, anyway.)

In particular, there are limits on what we can learn from the studies of damaged brains.

See p 141 on frontal lobe; p 142 on the hippocampus; p 150 on the parietal lobe; pp 143-4 on the general problem.

Studies of normal, functioning brains are more difficult, though fMRIs and other technologies lead advances.

Second, the relevance of neurological facts remains an open question.

The speculative, intuitive work in the last half-century has at least shown that there are conceptual limitations to any empirical work.

In particular, the functionalist criticism of identity theory seems to creep back into play when we examine the eliminativist program.

Recall the problems of multiple realizability.

The eliminativist, like the identity theorist, refers questions about mental life to neuroscience.

The reductionist (identity theorist) and the non-reductionist (eliminativist) differ about whether neural states correlate to folk psychological states, or whether the language of neuroscience will replace the old way of speaking.

Both versions of materialism, though, appear chauvinistic.

Churchland, for example, states that, "Significant intelligence requires a nervous system, and single-celled organisms such as algae or bacteria cannot have a nervous system, since a nervous system is itself an organization of many cells" (124).

Similarly, questions about drug treatments for psychological disorders are related to questions about materialism and reduction.

What does it mean if we can eliminate, or at least mitigate, mental disorders by restoring chemical balances in the brain?

The eliminativist might argue that there never was a mental disorder, that our folk psychological terms for mental illnesses are misleading, and dangerous, since they encourage us to believe that the problem is not merely physical.

The anti-reductionist, on the other hand, can still appeal to the distinction between neural correlates of our mental lives and those mental lives themselves.

The drugs might ameliorate the problem in consciousness, without undermining the legitimacy of that level of description.

We treat the broken leg, but not the pain which arises from it.

We are not necessarily committed to the elimination of pain-concepts just because we believe that they have causal, physical origins.

The worry, above, that the eliminativist has not heeded the problems of chauvinism is related to the criticism that neuro-scientific research can only help with the easy problems of consciousness.

But, if we adopt Chalmers' account of consciousness, and his structural isomorphism claim, then understanding the brain does help us explain our conscious experience.

See p 149 on the neuro-scientific explanations of relations among our subjective, sensory qualia.

If our experiences are structurally isomorphic to their neural correlates, then Churchland is not begging the important questions.

Still, we have to ask what kind of evidence we could have for isomorphism.

A posit of isomorphism seems like the speculation I take Churchland to be trying to avoid.

II. Models and minds

Churchland defends research on the brain and its functions, but he takes another approach, as well.

Taking the cue from machine functionalism, Churchland urges us to look at computer models of mental processes, especially of neural networks.

Here are some questions to consider about the project of modeling human cognition:

How do computers help us explore the functional properties of brains?

See Churchland 146, et seq.

Especially consider his three points, on p 154, about neural networks, in particular in the cerebellum:

1. They are resistant to minor damage and cell death.
2. Their parallel processing allows billions of slow synaptic transmissions to proceed rapidly.
3. Networks are plastic.

How does the training-up of a neural network parallel human learning?

Consider the details: the adjustment of weights; the input; the vector coding.

Are there important differences between human learning and training-up a neural network?

How important is it that the climbing fibers (p 164) act to modify weights of synaptic connections?

What is the weight of the observation that neural networks that are trained through back-propagation of

error proceed without explicit rules being represented anywhere in the system (p 163)?

“The elements of cognition...have a character unfamiliar to common sense” (165). Explain.

III. On insight and reduction

The *New Yorker* article I mentioned, describes the attempts of Kounios and Jung-Beeman (KJB) to explain the folk-psychological concept of insight, the “Eureka moment.”

We can take this concept as a case study on the question of reduction and neuroscience.

KJB’s research into insight is related to recent work done on mathematical intuition, or [gut instinct](#).

They all proceed, working on describing the mechanism which produces a certain function.

In these cases, the reductionist paradigm can be seen clearly.

They are what Chalmers would call easy problems.

There are two kinds of questions we might ask about such research.

First, there is a question about whether the phenomenon in question has any phenomenal aspect.

That is, are there elements of our understanding of our Eureka moments, or gut instincts, that resist functional description?

These kinds of questions have to do with whether there are hard problems in addition to the easy ones.

The assumption of this kind of question assumes that there is a proposed reduction, of, say, Eureka moments to activity in the anterior superior temporal gyrus (aSTG), pictured below, in pink; as well as associated activity in the prefrontal cortex.

The Antipodeans would describe their Eureka moments exclusively in terms of the stimulations of their aSTGs and prefrontal cortices.



The second kind of question we can ask about such research is whether the Eureka moment is a natural kind.

If it is, then we would assume that there would be some neuro-scientific reduction, that experiments such as those that KJB performed would be successful.

Another option is that they would not be successful.

Consider:

Jung-Beeman and Kounios went back and analyzed the information from the fMRI experiment to see what was happening inside the brain in the seconds before the gamma burst. “My biggest worry was that we would find nothing,” Kounios said. “I thought there was a good possibility that whatever we found on the EEG wouldn’t show up on the brain imaging.”

The identity theorist predicts that KJB will be successful, given time.

The eliminative materialists predicts that KJB will be unsuccessful, that Eureka moments are not a natural kind, waiting for science to reveal its inner essence, but a loose amalgam of vaguely related

phenomena, with no essential connections.

(And the qualia freak argues that any reduction would necessarily lack any explanation of the phenomenal aspect of the Eureka moment.)

If KJB were unsuccessful at finding reductions, the eliminative materialist would be supported, and we might dismiss the idea of a Eureka moment as old-fashioned, and useless, folk theory.

Churchland, p 144, argues that reductions are difficult to find, generally.

Alternatively, we might hold on to the functional role of the Eureka moment, and deny the legitimacy of the neurological level of explanation.

We now have a variety of tools to take to the problem at hand.