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Cognitive Science and the Philosophy of Mind

Leslie Allan

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Recent advances in cognitive science are shedding new light on two key problems that have vexed philosophers of mind for centuries. The first problem is our notion of free will. Experiments using brain imaging are pointing to the probability that when we act freely, our choices have causal antecedents in previous brain states. It seems there is no ghost in the machine. The second problem is how the mind attaches meaning to things and symbols. Here, the debate between computationalists and connectionists about how brain architectures process information is illuminating this age old question and driving research in new directions.

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In this essay, I want to highlight briefly some examples of how current research in cognitive science is contributing substantively to progress in the philosophy of mind. I will discuss progress in two key areas. The first area concerns the ontology of the mental. Is there a separate mind substance, distinct from matter and energy? The second area deals with the question of how, given a physicalist view of mind, a material mind can reason and attach meaning to linguistic symbols.

Dealing with the issue of ontology in the philosophy of mind first, dualists consider that a materialist view of mind cannot account for our feelings of willing freely; our conscious and uncaused volition to perform free acts. Physicalist and materialist theories of mind eschew such notions of acausal mental events.

The seminal study by the neuroscientists, Libet *et al* [1983], and later studies by Soon *et al* [2008] and others, throws light on this vexed and age-old question of free will versus determinism. These studies demonstrated a time lag between indicators in the brain and the conscious awareness of a voluntary act by experimental subjects. The latest study by Bode *et al* [2011] also purports to show, using functional magnetic resonance imaging (fMRI), that the outcome of such volitions can be detected from patterns in brain activity in the anterior frontopolar cortex some seven seconds before reaching conscious awareness. These studies lend scientific weight to the philosophical view that our feelings of willing freely are misguided.

Let us now look at the second issue in which cognitive science contributes to the philosophy of mind. If speech acts and other bodily motions are wholly caused by prior physical events, then how can a materialist make sense of rational thought and action and of understanding symbolic meaning? Two views now dominate in this area; the classical Artificial Intelligence (AI) approach of the computationalists and the later connectionist model. The computationalist model, first proposed by Hilary Putnam and expounded by Jerry Fodor, drew on the Computational Theory of Mind (CTM); the view that the mind is exactly like a digital computer. In order to show that, in the mind, reasoning is an algorithmic manipulation of symbols using only syntactical rules, Putnam and Fodor conjoined the Representational Theory of Mind (RTM) with the Computational Account of Reasoning (CAR). This, the computationalists claimed, is how meaning and mental reasoning is accounted for on a physicalist and intentional realist scheme.[1]

With the rise of alternative physicalist theories of mind based on connectionist (Rumelhart, McClelland and Smolensky) models, the CTM model of the mind as an algorithmic calculator is being seriously challenged. Connectionist architectures, in contrast to CTM models, do not model psychological processes on atomized intentional states that are concatenated by rules. They work at the level of networks of neurons, where processing takes place at a sub-symbolic level. In neural networks, processing is distributed and not serial, as it is in CTM models.[2]

Without the one-to-one mapping of intensional mental states to brain states required by CTM models, some eliminative materialists have argued that the success of neural network models is a strong case against not only ‘folk psychology’, but also the

[1]For a summary, see Horst [2011].
[2]For a summary, see Garson [2012].

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science of psychology. Connectionists have also argued that neural networks better account for the semantics of language; a problem long endured by philosophers and linguists. *Contra* the CTM model, our concepts, such as 'cat', are not strictly defined by necessary and sufficient conditions. Neural networks naturally accommodate the fuzzy nature of our concepts (as illustrated by Wittgenstein's 'family resemblance' and 'similarity to prototypical examples').

Connectionists have advanced the radical idea that concepts are not represented in the brain by clusters of neuronal firings, but by patterns of activation distributed throughout the brain. Computationalists respond by arguing that networks cannot account for the systematicity of human intelligence, where humans understand and generate sentences in which the components are interchanged in a novel way. A further problem faced by connectionists is identifying representations in the brain given the wide variety of brains in both numbers of neurons and connections between them.

These philosophical issues about how the physical brain reasons and attaches meaning will continue to be informed by advances in the researches of computationalists and connectionists. The vexed problem of free will versus determinism will also be further untangled as philosophers of mind review and discuss the implications of the latest fMRI studies.

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