Statistical Learning as a Mechanism

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Abstract

Philosophers of science have offered various definitions of mechanism, most of which derive from biological or neuroscientific roots. In this paper, I consider whether these definitions apply equally well to cognitive science – and whether cognitive science is, as Abrahamsen and Bechtel state, "more than anything else, a pursuit of cognitive mechanisms" ("Phenomena and Mechanisms: Putting the Symbolic, Connectionist, and Dynamical Systems Debate in Broader Perspective." In R. Stainton (Ed.) *Contemporary Debates in Cognitive Science,* 2006). I examine this question by looking at the example of statistical learning, which has been called a domain-general learning mechanism in the cognitive scientific literature. Though the term "statistical learning" applies to several broadly related attempts to account for the "problem of inference" in human and machine learning, I focus in this paper on one specific instance of statistical learning – that thought to be involved in parsing continuous perceptual input into individuated units (e.g. Saffran, Aslin, & Newport, *Science*, 1996). This focus allows me to hone in on the cognitive scientific level of research rather than more recent attempts to fill in the neuroscientific details of this process. I evaluate the statistical learning "mechanism" under four conceptions of mechanism in the philosophy of science – those of William Bechtel, Stuart Glennan, Jim Woodward, and Carl Craver. Ultimately, I argue that the concept of mechanism described by these philosophers of science does not translate directly from neuroscience and biology to cognitive science but that it nonetheless provides a useful construct that facilitates the process of cognitive scientific research.

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