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Struttura e funzione in neuroscienza cognitiva

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A powerful engine of the current expansion of cognitive science downwards, into the brain, is cognitive neuroscience, i.e., the project to link mental functions with neural structures by developing mechanistic explanations of cognitive processes. In this chapter I examine the nature of the mechanistic explanations, and how they are developed by cognitive neuroscientists, in light of William Bechtel and Carl Craver's works on the subject. More specifically, I first show that a mechanism is a hierarchically organized system, and a mechanistic explanation is intrinsically multilevel. Then I show how discovering mechanisms occurs through the application of two heuristic strategies: *decomposition*, viz. the operation of taking apart a mechanism into either component parts or operations; and *localization*, viz. the operation of mapping the component operations onto component parts. Now, whereas classical cognitive science has adopted a top-down perspective in which decomposition precedes localization, cognitive neuroscience endorses a dialectical, interactive perspective in which decomposition and localization inform each other. This has two implications: first, the knowledge of function obtained through psychological research allows us to identify the neural mechanisms; second, the knowledge of neural structure is a heuristic guide to the development of more sophisticated psychological models. I conclude that this dynamic interaction between structure and function opens a conceptual space for a conciliation between functionalism and identity theory.