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# Studies in the Interaction of Psychology and Neuroscience

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Philosophers have long speculated about the strong constraints that brain science—or, more generally, “natural scientific” descriptions of bodily states—will or should provide for actual or any future possible psychological theories. Hempel and others advocated a translation of psychological language into physical language, presumably a language in which both behavior and brain states would be described. W.V.O. Quine has forecast that psychological talk will ultimately be “cashed out” in physiological or physical terms. The Churchlands foresee the replacement of “folk psychology” with neurobiologically informed descriptions. Dennett treats the “physical stance” as the ultimate locus of explanation. On the other side, Fodor has long plumped for the autonomy of psychology from neuroscience, by analogy with the (alleged) hardware-independence of computer programs.

The first set of predictions were undertaken in virtually complete innocence of actual cases of the interaction of psychology with neuroscience. Quine’s discussions themselves were so many promissory notes about the future course of science. Even Patricia Churchland’s *Neurophilosophy* does not address genuine interactions between psychology and neuroscience, because the representative of psychology in that book is (philosopher’s) folk psychology, not the actual results experimental psychology.

This symposium will examine the interplay between psychology and neuroscience in three domains: 1) the relation between color vision and sensory physiology; 2) neuroethology, or the study of the physiological structures through the investigation of non-human animals in their natural environments; and 3) neurology and neuropsychology, or the study of brain-damaged patients in order to infer normal psychological function. These three topics cover a varied set of theories in psychology, and differing methodologies from neuroscience.

The first paper—Gary Hatfield on “Mental Functions as Constraints on Neurophysiology: Visual Psychology and Physiology”—covers the traditional heart of physiological psychology and brain physiology: the study of normally functioning sensory systems in the laboratory. This case study will reveal that psychology has historically led the way in the postulation of brain mechanisms and the testing of such hypotheses; a further argument will be given to the

effect that psychology must of necessity condition and guide any work on the global functioning of brain systems

The second paper—Brian L. Keeley on “Cognitive Science and the Neuroethology of Electroreception”—examines the methodology of investigating animal nervous systems by relating organisms to their behavioral capacities in the wild; in particular, it traces the interesting case of the discovery of sensory systems in fish that are sensitive to electrical impulses, a discovery that relied on research at a variety of levels. Here, psychological investigation allowed neurophysiologists to understand the function of a structure they could describe anatomically, but whose function had been a mystery. Neurobiology and evolutionary biology also made crucial contributions.

Finally, the third paper—William Hirstein on “Doubt, Certainty, and Confabulation” relates the neurological phenomenon of confabulation—the patient provides false or irrelevant information (without intent to deceive) when asked a question touching on his disability—to feelings of doubt and certainty which guide all of us in our epistemic endeavors. Working from a set of experiments recently performed (together with V.S. Ramachandran) to probe the dynamics of confabulation in split-brain patients, the paper attempts to reconcile theories of confabulation which trace it to frontal damage with theories tracing it to lateral disconnection. The relevance of all this to our ordinary concepts of knowledge, doubt, and certainty is then discussed.

This symposium represents a relatively under-developed area of the philosophy of science: philosophy of cognitive science treated as a branch of the philosophy of science, rather than as an extension of the philosophy of mind. It will reveal the inadequacy for neuroscience and psychology of traditional pictures of reduction via bridge laws, or identity relations between entities referred to in the reducing and to-be-reduced sciences. The session thus promises to aid in the development of a new area of the philosophy of science, and also to address the traditional topic of reduction. It will also serve to illustrate the role of cognitive science in furthering our knowledge of how interdisciplinary science can work to successfully describe natural phenomena.