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Lecture

On the trail of the neuronal code of memories

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Abstract

Among the few propositions on which there is practically universal agreement in Psychology and the Neurosciences is that memories are stored in the brain. The exceptionally high degree of confidence with which this proposition is held is mainly due to our inability to conceive of an alternative analogy to that of storage to account for the survival and re-appearance of past experiences. Yet inability to conceive of alternative solutions to the problem of the survival of the past in no way constitutes direct empirical evidence for the truth of that proposition. Such evidence, however, has been sought in two ways. First, it has been sought in the consequences of focal brain lesions, whether natural or experimental on the ability to form new memories and on the ability of recalling already consolidated ones. Currently, it is also sought in functional neuroimaging data. Both approaches have converged in identifying brain regions apparently specialized in the recognition of particular categories of objects, such as faces, places, words, colors and body parts raising the possibility that such regions are repositories of the concepts of such concrete objects. Yet careful consideration of the relevant facts leads to the conclusion that these regions cannot be storage devices for concepts but, more likely, parts of neuronal mechanisms specializing for the analysis of sensory afferents and the construction of motor plans. Similarly, functional neuroimaging data of object category-specific activation patterns, though uncritically assumed to provide evidence of concept storage, may be more parsimoniously interpreted as representing reconstruction of such concepts, necessary for the process of recognizing the corresponding objects. Specifically, data of both types have mainly contributed to our understanding as to what solutions to the questions of "how" and "where" memories survive, are not realistic. But they have also provided hints, alluded to above, as to how concepts may reappear whenever needed, in the stream of consciousness without having to be deposited for safe keeping in the brain in the form of Hebbian circuits, as it is generally believed. The main goal of this presentation is to demonstrate that, at least in the case of concrete concepts, there is no credible evidence if favor of their being stored and, secondarily, to raise awareness of the need of an alternative conception of concept memory.

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