Response to the Journal Club by van Kesteren and Brown

by David E. Warren, Daniel Tranel, and Melissa C. Duff

We thank the discussants, Drs. van Kesteren and Brown, for their thoughtful review of our recent publication. This response highlights some of the interesting questions they raised.

In preface, we note that our patient group had bilateral lesions concentrated in the ventral mPFC (vmPFC). The importance of the neuroanatomical distinction between the vmPFC and mPFC can be illustrated by considering a different distinction – *unilateral* vmPFC lesions do not affect false recall in the DRM task (Melo et al., 1999) in the same way as *bilateral* lesions (Warren et al., 2014). Thus, while functional neuroimaging studies have implicated a broader human mPFC in memory processes (van Kesteren et al., 2012; Preston and Eichenbaum, 2013), our patient sample allows us to address only the vmPFC. Future neuropsychological studies could evaluate the role of the dorsal mPFC in false memory processes, and we expect that damage to those regions would also reduce false memory.

The discussants suggest that "... mPFC functioning might serve as a mechanism for flexibly accessing memories based on contextual information including task rules and goals." We believe that the role of the vmPFC in memory operations may be even more subtle than this. Consider the example provided by Damasio (1994, p. 49) of a patient with vmPFC damage who, when facing a decision, could retrieve relevant information but could not make the decision. This anecdote and the somatic marker hypothesis suggest that it is the **application** of prior knowledge to current decisions that is supported by vmPFC rather than the **retrieval** of prior knowledge. In an explicit memory test such as the DRM task, putative vmPFC roles in memory retrieval versus mediating the influence of retrieved memories on decisions would be indistinguishable. Carefully designed neuropsychological experiments (e.g., implicit memory tasks) might adjudicate between these two explanations.

The role of vmPFC in encoding and consolidation processes is also of great interest. As suggested by the discussants, simply extending the delay between study and test in the DRM task could potentially reveal whether the vmPFC plays a lasting role in consolidating new memories related to existing schemas. Alternatively, memory tasks that conditionally manipulate the congruence or incongruence of context at study and later test the precision of the resulting memories (van Kesteren et al., 2012; van Kesteren et al., 2013) could provide valuable information about the specific role of the vmPFC in marshaling existing knowledge to support new learning and consolidation. Our laboratory is currently conducting a neuropsychological investigation using the latter method.

Finally, the vmPFC's role in memory and its dense interconnections with many remote brain regions including the medial temporal lobe suggest that it is part of a widespread brain network that supports complex memory processes. Converging findings from neuroimaging, neuropsychology, and animal models will continue to improve our understanding of how this larger system operates, how it can become dysfunctional, and, eventually, how to remediate its operation following damage.

References

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