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Connections between mechanisms for anosognosia and implicit memory

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Abstract

Mograbi and Morris review work highlighting an interesting phenomenon whereby individuals are explicitly anosognosic for their deficits despite intact expression of implicit awareness. Parallels exist between this phenomenon and recent cognitive neuroscience findings demonstrating intact memory test performance despite unawareness of performance. We discuss these parallels with regard to the proposed CAM model. Given that it is possible to investigate the neurological underpinnings of explicit and implicit processing in memory tasks, methods from cognitive neuroscience may offer substantial insight into implicit awareness in anosognosia in various forms of dementia as well as in addition to advancing theoretical understanding of anosognosia broadly.

Mograbi and Morris review mechanisms for anosognosia that bear interesting similarities to recent cognitive neuroscience findings regarding implicit memory. Anosognosia is the lack of awareness of a clinical impairment, such as in hemispatial neglect and potentially various dementias. Anosognosia epitomizes several themes in contemporary implicit memory research, including the distinction of performance, with versus without awareness, the possibility that performance awareness is a graded phenomenon, and the many amazing capabilities that do not require conscious awareness (Ryals & Voss, forthcoming). We wish to highlight these connections and suggest how cognitive neuroscience implicit memory methods and findings could enrich investigations of anosognosia.

Although most anosognosia research involves motor and perceptual impairments, the phenomenon is similar to instances whereby individuals can lack awareness for aspects of performance in memory tests. Indeed, many findings indicate that implicit and explicit performance reflects distinct neural signals, and these signals can be used to better understand the interactive nature of implicit and explicit processing (Dew & Cabeza, 2011; Voss, Lucas, & Paller, 2012). For instance, distinct measures of behavioral performance and electrophysiological signals occur when healthy individuals perform with high accuracy yet lack any awareness that performance is accurate (Ryals, Yadon, Nomi, & Cleary, 2011; Voss & Paller, 2009).

The authors mention the possibility that anosognosia occurs for cognitive impairment in dementia. Indeed, even mild cognitive impairment (MCI, a prodromal cluster of Alzheimer's symptoms) has been associated with variable awareness of memory performance (Cosentino et al., 2007). Recent findings have highlighted the use of implicit

memory tests as assays for low levels of preserved function even in cases of extreme dementia (Kessels, Remmerswaal, & Wilson, 2011); thus, methods used to identify neural correlates of implicit memory could likewise be used in anosognosia more broadly. Mograbi and Morris note that hemiplegic anosognosics unknowingly adjust performance over time despite their lack of awareness. If this finding generalizes across anosognosias (i.e., in dementia), it would provide an excellent means of identifying signals of implicit performance (e.g., those that vary over time with unaware performance improvements).

Identifying neural signals of the awareness decrements in anosognosia would ultimately allow better tests of putative mechanisms. For instance, a crucial component of the CAM model proposed by Mograbi and Morris is the distinction between a cognitive comparator mechanism (CCM) that maps incoming information to existing representations and a Metacognitive Awareness System (MAS) that supports reflective monitoring. MAS and CCM interactivity produces accurate portrayals of task successes and failures in healthy individuals. This model is consistent with the dynamic hierarchical interplay in the frontotemporoparietal system proposed to support awareness in memory. Lack of awareness could simply reflect a breakdown of this interactivity. Alternatively, implicit function could be supported by a distinct set of functions (e.g., Reber, 2013), whereby normal performance (with and without awareness) is dictated by complex interactions between implicit and explicit functions. As Mograbi and Morris propose, it is unlikely that anosognosia is due to a simple neural impairment. The search for mechanisms could thus be enhanced by considering the interactive nature of implicit and explicit processing that is important for memory. In our opinion, many experimental methods from cognitive neuroscience, such as those separating neural signals of memory performance with versus without awareness (e.g., Voss & Paller, 2008) could be used to enrich the understanding of anosognosia.

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