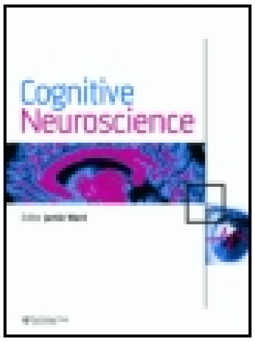

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COMMENTARY

Evidence for fast mapping in adults – Moderating factors yet need to be identified

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ABSTRACT

Cooper, Greve, and Henson (this issue) discuss if *fast mapping* (FM) is dissociable from other learning procedures in adults. We strongly agree that drawing conclusions on cortical integration from recognition accuracy is questionable in healthy young adults. Additionally, we advise against interpreting explicit measures in patient studies if residual hippocampal functioning cannot be excluded or extra-hippocampal structures are also affected. Due to promising fMRI data patterns and confounds in studies reporting no evidence for implicitly measured semantic integration, we suggest that factors moderating FM learning success need to be systematically identified rather than doubting rapid cortical integration through FM.

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Fast mapping; associative memory; consolidation; feature overlap; semantic integration

It has repeatedly been discussed if the learning paradigm *fast mapping* (FM) enables rapid integration of novel associations into cortical networks, potentially bypassing hippocampal processing. Cooper et al. (this issue) conclude that due to the seemingly weak evidence for FM learning in adults, the underlying processes might not be distinct from standard episodic encoding mechanisms.

In patients with severe hippocampal lesions, successful explicit recognition shortly after FM encoding may be considered an indicator of rapid cortical integration since in these patients it is unlikely that retrieval is hippocampus-driven. However, the lack of a learning benefit of FM as measured by explicit recognition tests does not necessarily imply that FM learning is impossible. The variety of residual volumes of brain structures potentially involved in FM learning and the use of different experimental procedures might have led to inconsistent findings. For example, besides other deviations in their experimental protocol, Warren and Duff (2014) informed participants prior to the experiment that learning mechanisms would be investigated. As unpublished data from our own lab revealed that rapid semantic integration through FM in healthy adults only occurs if learning is incidental, intentionality might have prevented FM learning in these patients.

If the hippocampus is functionally intact, explicit recognition accuracy after FM encoding might also reflect hippocampus-based processes. Therefore, we strongly agree that in healthy adults it is more appropriate to investigate cortical integration using less hippocampus-dependent, implicit measures. There is evidence for immediate semantic integration (i.e., semantic priming effects) through FM in healthy young adults (Zaiser, Meyer, & Bader, 2019). Notably, this does not contradict previous studies in which no semantic integration was found (Coutanche & Koch, 2017; Coutanche & Thompson-Schill, 2014) as in these studies, the lack of a semantic priming effect might have been based on potential confounds (e.g., target categories not counterbalanced).

Analogously to FM in patients, it seems reasonable to assume that a benefit of FM encoding for healthy older compared to younger adults should be observable in explicit recognition tests, due to age-related *structural* hippocampus degradation. Therefore, a lack of an FM benefit for older participants (see Greve, Cooper, & Henson, 2014) seems at odds with beneficial effects observed in patients with hippocampal lesions. Yet, it is unclear to what extent the healthy older participants could *functionally* rely on hippocampal involvement during FM encoding, which might have covered FM benefits, and if they could make use of extra-hippocampal medio-temporal processing.

If FM learning is supported by extra-hippocampal structures at encoding, an operationalization in which

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the involvement of these regions is fostered could lead to better cortical integration. There is reason to assume that feature overlap between the previously unknown and the known item might increase recruitment of extra-hippocampal medio-temporal structures, particularly the perirhinal cortex, as this region is crucial for the discrimination between similar objects (e.g., Mundy, Downing, & Graham, 2012). In line with this, the items within an encoding display were strikingly similar in the study by Sharon, Moscovitch, and Gilboa (2011; see also Sharon, 2010). Interestingly, the patterns of perirhinal cortex lesions both in Sharon et al. (2011) and the three patients reported by Cooper et al. (this issue) apparently support this idea: The less volume of perirhinal and parahippocampal structures[1] is available, the worse the recognition accuracy after FM encoding. In support of this, fMRI findings indicate that regions of an extended anterior temporal network, which includes the perirhinal cortex (see Ranganath & Ritchey, 2012), might be especially qualified to support FM learning (Atir-Sharon, Gilboa, Hazan, Koilis, & Manevitz, 2015; Merhav, Karni, & Gilboa, 2015). Accordingly, we found rapid semantic integration measured implicitly in a semantic priming paradigm shortly after FM encoding only if the previously unknown and the known item shared many features (e.g., both animals with striped fur; Zaiser et al., 2019).

We suggest that such factors moderating FM learning success need to be identified systematically in more detail instead of generally questioning the existence of instantaneous cortical integration through FM in adults.

Disclosure statement

No potential conflict of interest was reported by the authors.

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[1]As in Cooper et al. (this issue) and Henson et al. (2016) the perirhinal and parahippocampal cortices are not mentioned separately, we assume that with 'parahippocampal' the authors refer to the parahippocampal gyrus including the perirhinal cortex.