The neural correlates of recollection and familiarity during aging

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The present experiment aimed to investigate age differences in the neural correlates of familiarity and recollection processes during episodic retrieval, when performance is equated between groups thanks to manipulation of task difficulty.

20 young adults and 20 older adults performed an episodic recognition memory task in an event-related fMRI design. At encoding, participants were presented with pictures, either once (Hard condition) or twice (Easy condition). Then, they were scanned while performing a recognition task, with a Remember/Know paradigm.

At a behavioral level, we observed similar level of performance for the two groups in the easy condition for recollection processes and in the hard condition for familiarity. We observed the classical recollection-related effect (increased activity in the left parietal and temporal gyri, left parahippocampus, and bilateral frontal gyrus) and familiarity-related effect (increased activity in the left parietal gyrus and bilateral frontal gyri and decreased activity in the right parahippocampal gyrus and left post-central gyrus), common to young and older groups. In addition, for recollection, we observed age-related reduction of activity in left frontal, left temporal, left parietal cortex and left parahippocampus. Moreover, a region in the right precuneus demonstrated a recollection effect only in the older group that was positively to memory performance. With regard to the familiarity process, we observed that bilateral anterior cingulate, right frontal gyrus and left superior temporal gyrus, were activated in the young but not the older group.

In conclusion, this study showed that neural activity related to recollection and familiarity is reduced in older adults compared to young adults, even when the level of performance of each process is matched between groups. However, for recollection processes only, older adults recruit additional regions, possibly to compensate for their difficulties.

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