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Specialization of Retrieval-Related Activity for Different Memory Dimensions

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The mnemonic representation of complex events is multidimensional. Although it has been shown that the recollection of complex events jointly recruits the Default Mode Network (DMN) and the FrontoParietal Control Network (FPCN), the extent to which activity within these networks varies according to specific memory dimensions (e.g., what, where, when) remains underexplored. To address this, the present study examined to what extent the topography and hemispheric asymmetry of retrieval-related activity are dimension-specific. Using a cued recollection paradigm, participants were asked to judge the truthfulness of statements related to scenes from a previously encoded TV series episode (Sherlock, BBC), along four dimensions: objects/character's details, spatial layouts, temporal sequences, and verbal dialogues. Voxel-wise and network-based analyses were conducted, with attention to hemispheric lateralization and its relationship to behavioral performance. We found a higher degree of dimension-specificity within the DMN compared to the FPCN, especially in posterior nodes of the network, compatible with the presence of a functional subdivision for the processing of different types of mnemonic information. Moreover, a stronger left hemispheric lateralization emerged, partially influenced by the type of information retrieved. Finally, the degree of dimensional specificity positively correlated with behavioral performance, suggesting that such functional segregation supports memory retrieval. These results support the notion that specific memory information is processed by a mosaic of regions within large associative cortical areas involved in higher-order mnemonic functions.

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No

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