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An investigation of the cognitive and neural correlates of semantic memory search related to creative ability

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Abstract

How creative ideas emerge remains unclear. We designed an associative fluency task based on polysemous words to explore the neurocognitive correlates of semantic search related to creativity. We distinguished two search components by assessing clustering and switching performance from participant's responses. We related these components to creativity, executive abilities, and semantic memory structure explored via semantic networks, and identified their predictive functional brain connectivity patterns. Clustering correlated with divergent thinking, and relied on interactions between control, salience, and attentional networks. Switching correlated with the ability to combine remote associates, memory structure, and executive abilities, and was predicted by connectivity between and within the default, control, and salience networks. These results suggest that switching captures interactions between memory structure and control processes guiding the search, while clustering may capture controlled processes related to persistent search. These findings shed new light on the neurocognitive mechanisms of semantic search supporting creativity.