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Working Memory Capacity Predicts More Effective Problem Space Exploration

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Abstract

Why are some people able to explore a problem space more effectively? We used a simple problem-solving task in which problems can be solved quickly within five moves but with a problem space containing 40-60 distinct states. Problem-solving in this task consists of many attempts to solve the problem, but only one solution works. Across these attempts, participants sometimes repeat an attempt from earlier. Exploratory analyses were conducted on data from 70 problems and six individual difference measures for each of 147 participants. We hypothesized that working memory capacity (WMC) would be associated with a higher proportion of unique attempts. WMC was calculated from two complex span tasks. Higher WMC was associated with a higher proportion of unique attempts and faster solution times. Higher WMC was also associated with more self-terminated solution attempts as opposed to being forced to restart the problem after seven moves by the system.