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The Limits of Cognition: Forgetting in Short-Term and Working Memory

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Human cognition would be unthinkable without a “short-term” or “working” memory (WM) that provides ready access to task-relevant information. For example, mental arithmetic would be impossible without memory for intermediate sums, and we can only understand a spoken sentence such as “while Bob hunted the deer ran into the woods” by re-examining already-heard material to resolve our initially incorrect understanding. It is perhaps unsurprising, therefore, that the capacity of our WM predicts higher-level cognitive abilities with considerable precision.

Notwithstanding its importance, the capacity and duration of WM are strikingly limited: People rarely remember more than a handful of items and sometimes forgetting is complete even after a second or two—what explains these striking limitations? Two opposing views vie for an explanation of this rapid forgetting: On the one hand, theorists have postulated that time per se is responsible for forgetting, either through decay or loss of distinctiveness. On the other hand, theorists have rejected temporal accounts and have instead proposed that interference is responsible for forgetting.

This talk reviews some recent evidence and modeling that addresses this issue. We focus in particular on studies in which retention time was manipulated while (a) preventing rehearsal and (b) limiting the extent of interference. Irrespective of whether the method involves a simple-span (i.e., a list followed by recall) or a complex span (list items are interleaved with processing activity), increasing retention duration does not lead to a decline in performance. Moreover, quantitative modeling of the data shows that an interference model provides a better account of the data than various time-based models. We suggest that time per se does not contribute to our striking cognitive limitations.

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