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The influence of spatial encoding on the fate of sensory memory representations unselected by the (retro-)cue

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The role of selective attention in sensory memory and its implications for theories of visual consciousness have been widely explored using retro-cue paradigms. A retro-cue is typically presented after the stimulus array has disappeared, guiding internal attention to a memory representation that is no longer visually available. Studies on retro-cues consistently show that cued items are better recalled than uncued ones. However, the effects of retro-cues on memory maintenance remain a topic of debate, especially when multiple consecutive retro-cues are used. This study aimed to investigate how spatial attention influences the maintenance of sensory memory traces, with a particular focus on uncued items. We implemented a double retro-cueing change detection paradigm, manipulating spatial attention during encoding through a probabilistic spatial pre-cue (70% valid, 30% invalid) across two memory stages: iconic memory (150 ms) and fragile-VSTM (600 ms). Results revealed a general decline in accuracy when two consecutive retro-cues were presented. Importantly, while a valid retro-cue following an invalid one partially counteract the loss associated with the first cue, a second invalid retro-cue incurs additional costs related to items that were not in the focus of attention during encoding. Spatially attended items were more easily retrieved and better maintained, whereas unattended items either failed to enter sensory memory or were too fragile to persist. These results suggest that while retro-cues enhance the maintenance and retrieval of sensory representations, their effectiveness can be modulated by the deployment of attention during encoding, disadvantaging non-selected items.

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