

Sequence Learning in Hybrid Visual Search

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In “hybrid search”, observers search through visual displays for any of several types of target items, which are held in memory. Studies have found that reaction times (RTs) grow with the log of the size of the memory set. Now suppose that targets appeared in a fixed sequence: for example, if the target was the cup on one trial, it would always be the fish on the next trial. In other paradigms, participants have faster reaction times when responding to stimuli that appear in a predictable sequence, even if they are not explicitly aware of that sequence. On the other hand, in hybrid search, observers seem to have trouble restricting memory search to a portion of a memory set. Can observers limit their memory search if they learn a target sequence? 24 participants aged 18-35 completed four blocks of a target localization task. First, they memorized 4 or 16 target items (varied over blocks). Observers performed a memory test to confirm that they knew these targets. Then, they searched for these targets among 3 or 15 distractors (varied over trials within a block). Targets appeared either in a fixed sequence over trials (20 repetitions per block) or in random order. Participants were unaware of the sequences before the experiment. After the experiment, we assessed participants’ explicit knowledge of the sequence with a two-alternative forced-choice test and questionnaire, which we used to classify them as explicit “learners” (n=10) or non-learners (n=14). Learners had faster RTs and, importantly, shallower RT x memory set size slopes than non-learners. The shallower slopes suggest that learners could use knowledge of the next target to guide visual search and/or to restrict the effective memory set size. Further work will be required to determine if explicit knowledge of the sequence is required for this learning benefit.