**Guided Search 5.0: Meeting the challenge of hybrid search and multiple-target foraging**

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The most recent Guided Search model (GS4, Wolfe, 2007) combines serial and parallel processes. Parallel guidance by “preattentive” features prioritizes items for serial selection. Items are selected every ~50 msec, starting a diffusion process that decides if the item is target or distractor. Each diffusion process takes ~300 msec/item. Thus, several items apparently undergo identification in parallel. New extended search paradigms involving multiple possible targets and multiple actual targets in each display require modifications to GS and to other models that assume a single search template and that consider only simple present/absent trial structures. 1: In “Hybrid Search” tasks, observers search visual arrays for any of N distinct target items, held in memory. This is quite easy, even for memory sets of 100 unique objects (Wolfe, 2012). This suggests that selection of each visual item may start accumulation of information to each of N decision boundaries in parallel. Moreover large memory sets show that observers’ “search templates” aren’t limited to the current contents of working memory. 2: In foraging experiments, observers look for multiple instances of the same target (e.g., berry picking). Uncertainty about the number of targets requires new search termination rules. GS5 adopts these from Optimal Foraging Theory within a Bayesian framework in which observers are continually updating their estimates of target probability in the current display. 3: Finally, in “hybrid foraging” tasks, observers easily search visual arrays for multiple instances of N items held in memory. The speed with which items are collected suggests “multi-tasking” in which observers are simultaneously clicking on one target, storing locations of others, and searching for still more. We seem to require memory for locations of targets that have been identified but not collected. The GS5 architecture has implications for real-world extended search tasks such as radiology or satellite image analysis.

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