

Selection and Matching in Visual Search

Visual search for a pre-specified target is a common everyday task that requires a specific interaction between working memory and selective attention. Models of visual search propose that feedback from cortical areas that encode the identity of the target object, i.e. the search-template, to areas with a spatiotopic representation is responsible for the focusing of attention onto the target object's location. Physiological studies in the inferotemporal and the prefrontal cortex support these theories, since neurons that are active during the delay between target-presentation and visual search (*anticipation phase*) encode the search-template. A recent neurophysiological study shows how upon presentation of the search array the representation of items having a feature in common with the search-template is enhanced in parallel (*selection phase*), after which serial selection of a candidate target takes place, presumably reflecting detailed matching of that item to the search-template (*matching phase*). Thus, the search-template plays a dual role in guided search: it guides the selection process and is matched against the selected display item. In the proposed experiment we aim to examine the relationship between the guidance of selective attention and the matching process, and unravel any limitation in the anticipation, selection, and / or matching phase.

Therefore we plan to separately manipulate these three phases. The anticipation phase is manipulated by presenting the subjects with either one or two possible targets (templates) for search. The selection phase will be influenced by presenting a bottom-up selection cue on half of the trials, rendering top-down selection unnecessary. We can distinguish how this manipulation affects selection on target-present vs. -absent trials, separately for one- and two-template trials. The matching phase is again manipulated by the number of templates as the selected item has to be matched against either one or two templates.