Multiple Object Tracking

Observers are shown a display of identical objects, and asked to track a subset of target items. All objects then move independently for some time; observers are then asked to indicate the target items. Observer’s capacity in this task is typically 3–5 objects (Pylyshyn & Storm, 1988).

Tracking Across the Gap

We have previously demonstrated that observers can track moving objects which disappear for up to 400 ms (Alvarez et al. VSS 2003; see also Keane & Pylyshyn VSS 2003, Yin & Thornton, 1999).

How do we do this? Two alternatives

hypothesis 1: “impoveryed occlusion”

We know that observers can successfully track objects which move behind occluders (Scholl & Pylyshyn, 1999). In these studies, objects disappeared asynchronously, and occlusion cues such as accretion and deletion at occluder boundaries are critical for performance. Perhaps the visual system treats the disappearance of objects as an impoverished form of occlusion. If so, performance in tracking across the gap should improve with the addition of occlusion cues. Performance might also improve if objects disappeared one by one, instead of all at once.

hypothesis 2: “out of mind, out of sight”

We have shown that observers can perform a demanding visual search task while tracking at little cost to either task (DiMase et al. VSS 2003). Performance is unchanged if the tracking stimuli disappear during the search task. The visual system must have a mechanism for putting tracking on hold while attention is diverted to another task. This mechanism recruits this storage.

1. Synchronous vs. asynchronous disappearance

Observers were tested in all four stimulus conditions while tracking 5 disks.

Overall, there was a slight advantage for the synchronous conditions; performance fell off more rapidly with gap duration for the asynchronous conditions. Occlusion cues provided no advantage.

2. Varying tracking load

Do the results depend on how many objects are tracked?

Here we tested only the synchronous conditions.

Overall performance decreased with load, but in every case occlusion cues actually improved performance. The appearance of virtual occluders creates interference.

References


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