Top-down and bottom-up influences on dynamic visual attention: Attentional Capture in Multiple Object Tracking

Multiple Object Tracking (MOT) is assumed to be handled by bottom-up (e.g. Pylyshyn & Storm, 1988) or top-down processes of selection (e.g. Yantis, 1992) or both (e.g. Oksama & Hyönä, 2008) – depending on the model assumed. The Attentional Capture (AC) paradigm (e.g. Yantis & Jonides, 1984) is regularly employed to demonstrate influences of bottom-up and/or top-down attentional control. It has up to now not been used to assess influences of irrelevant stimuli in MOT. We investigated whether AC does occur in MOT: Are irrelevant stimuli processed at all in dynamic attentional tasks? We found that sudden onset singletons were effective in lowering probe detection thus demonstrating AC. Tracking performance as dependent measure was not affected. The AC effect persisted in conditions of higher tracking load (experiment 2) and was dramatically increased in lower presentation frequency (experiment 3). Tracking performance was shown to suffer only when irrelevant distractors were presented serially with very short time gaps in between thus effectively disturbing reengaging attention on the tracking set (experiment 4). We discuss that a stable representation of the tracking array in visual working memory and rapid dis- and reengagement of attention allow managing strong disruptions of tracking.