

Invisible collinear integration impairs visual search

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Our visual search performance is compromised when the target overlaps with a task-irrelevant salient distractor organized to a snake-like configuration by collinear bars (Jingling & Tseng, 2012). This phenomenon is puzzling because it is opposite to the prediction from attention capture. We probe the possible neural stage of this effect by asking whether awareness of the collinear grouping of the distractor is required to exert its influence on visual search. Observers viewed a 9×9 search display containing identical horizontal bars except a randomly selected distractor column consisting of orthogonal bars collinearly joined to form a global snakelike vertical distractor. Observers needed to judge the orientation of a target gap either on the collinear distractor (over-lapping target) or the background (non-overlapping). In Experiment 1, we found that only longer collinear distractor (= 5 or 9 elements) but not short (= 3 elements) slowed observers' detection of an overlapping target. In Experiment 2, we presented a full length distractor (= 9 elements) to one eye and continuous flashing color patches (= 6 elements) to the other eye. After proper fusion, the combined percept that observers were aware of, was a short collinear distractor (= 3 elements) in the middle with 3-element-long color patches at two ends. If awareness of the collinear distractor is not required, search impairment should be obtained, and this is what we found. Our results suggest that collinear grouping contributes to the salience map in a different manner from local feature contrast computation, and it does not need to reach conscious awareness to interact with selective attention. Our result signifies the role of perceptual organization in attentional search tasks and provides an additional piece of evidence for the dissociation between attention and awareness.