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Contour integration in dynamic scenes and selective attention

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Contour integration is an integral part of visual information processing requiring observers to combine aligned edge configurations into coherent percepts. Human observers are efficient in detecting contours, reaching peak performances for stimulus presentation times as low as 100ms. However, studies depicting these findings used flashed static stimuli. In nature we rarely encounter this situation, rather, we observe visual scenes over time and develop a coherent picture taking into account dynamic changes. Here, we investigated contour detection in dynamic stimuli comprising Gabor elements rotating at both unique speeds and directions. Contours formed at a predefined time when a number of rotating Gabors reached a configuration of perfect alignment. Since contour integration is believed to be a pop-out process, we expected similar performances for brief and extended presentations. However, performance dropped from 83% to 65% for extended presentations, indicating that contour detection in dynamic scenes is much more demanding, possibly requiring more attention. We quantified to what extent a location cue, a shape cue, or a combination of both, facilitates detection. We found that for brief presentations single cues, and their combination, improved performance by 13%. For long presentations, single cues did not increase performance, but their combination led to an 11%-improvement.
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