Title:

“Frame induced position shifts extend outside the frame in space but not in time.”

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Abstract:

When two probes are flashed at the same physical location within a moving frame, their perceived location can be offset by as much as the frame moves (Özkan et al, PNAS, 2021). Here we examine the extent of the frame’s influence in space and time. First, we positioned the flashed probes in front of or behind the frame in depth (or both) using red/cyan anaglyph glasses. The illusion strength was unaffected by these depth mismatches. In contrast, offsetting the frame from the flashed probes does influence the illusion. The illusion strength dropped to 50% magnitude once the frame was 5.1 dva to the right of the probes’ position. In the vertical direction, the 50% decrease required an offset of 6.9 dva above the probes. Offsets in time from the presentation of the frame caused a complete loss of the illusion. The frame was presented for one to three cycles of left right motion and when the probes were flashed before or after the frame, there was no illusion, no matter how long the frame had been present. This suggests that the illusion depends on immediately present sensory information without any influence of the frame’s motion before or after its actual presence on the screen. Finally, the 6 observers participated in the experiments across sessions lasting about 1.5 hours and we found no evidence that the strength of the illusion varied over this interval. In conclusion, the frame effects do extend outside the boundaries of the frame in space but not in time.