

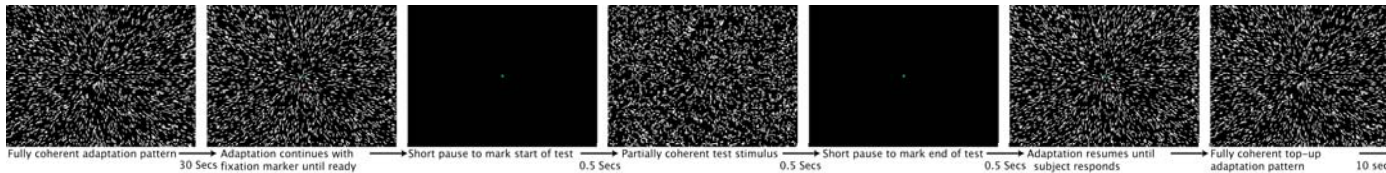
Similar Adaptation Effects on Detection and Localization of Optic Flow Patterns



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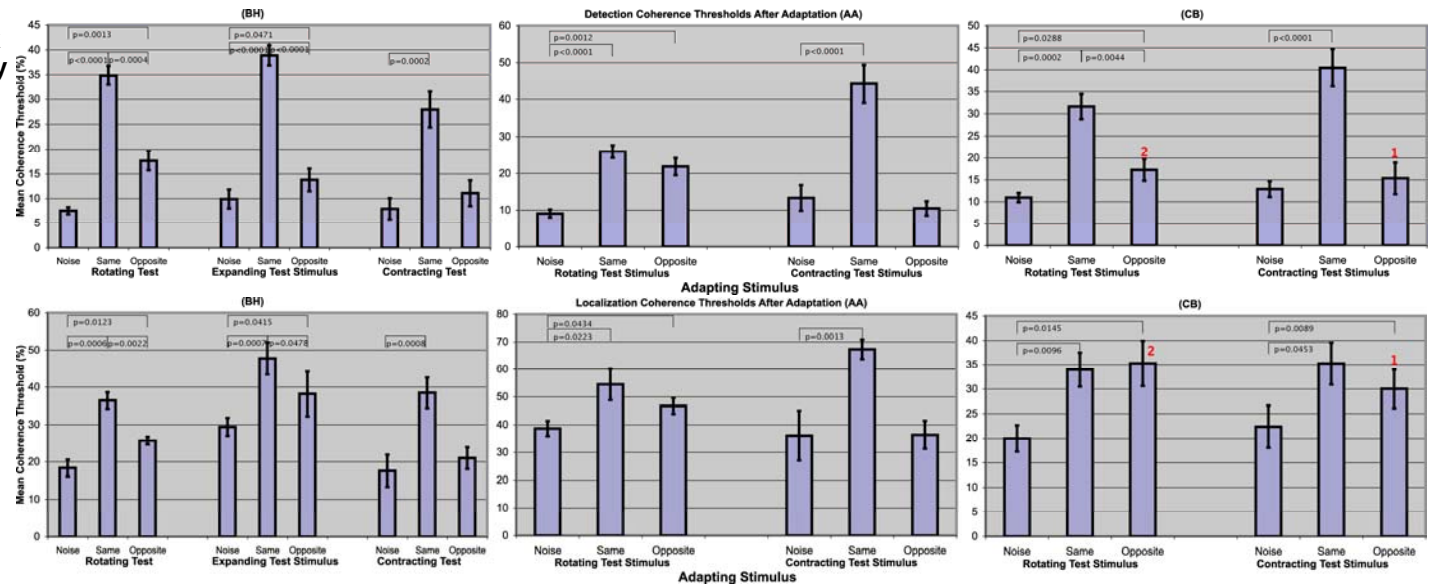
Background:

- Optic flow models of radial (expanding and contracting) and rotational motion processing provide heading determination mechanisms.
- However, heading typically corresponds to the centre of motion of the optic flow field.
- MST optic flow analysis cells seem poorly suited to accurate centre of motion localization.
- Little spatial summation found in accurate localization, extensive spatial summation in pattern detection (Harvey & Braddick 2006 *Perception*, 35 ECVF Abs. Supplement)
- **So, do optic flow detection and accurate centre of motion localization share a neural substrate?**
- Motion coherence thresholds increased after extended viewing of a pattern (adaptation, motion aftereffect) (e.g. Gros et al., 1998 *J. Opt. Soc. Am.* 15, 2003-2011)
- Radial and rotational pattern perception impaired during adaptation (e.g. Bex et al., 1999 *Vis. Res.* 39, 2229-2238).
- **If motion pattern detection and centre of motion localization share a neural substrate, adaptation effects of both tasks should be similar.**



Methods:

- Central fixation marker shown during pauses and waiting for response.
- Localization tasks: subject decided whether centre of motion was 0.1 degrees left or right of fixation marker.
- Pattern detection tasks: subject decided whether pattern was present. Pattern centred 0.1 degrees to left or right.
- 50% of patterns fitted each answer. Order randomised.
- 30 stimuli shown in adaptive staircase of coherence levels in each trial. 75%-correct coherence threshold derived.



Results:

- Same adapting and test pattern direction: Always increased detection and localization coherence thresholds for all patterns.
- Opposite adapting and test pattern direction: Typically increased detection and localization coherence thresholds for rotational and expanding but not contracting patterns.
- Opposite direction adaptation effects smaller than same-direction effects for BH, but similar for AA.

- Differences between detection and localization:
 1. CB's contraction localization, but not detection, coherence thresholds increased by opposite direction motion adaptation.
 2. For CB, opposite direction adaptation effects (where they occurred) were smaller than same-direction effects for detection, but not localization tasks.
- Generally, opposite-direction adaptation effects stronger for localization tasks than for detection tasks for CB.
- **Few differences between adaptation effects on the two tasks. These only occurred for one subject.**

Conclusions:

- Increased coherence thresholds for both tasks after same direction adaptation for all patterns
- Increased coherence thresholds for both tasks after opposite direction adaptation for rotating and expanding, but typically not contracting, patterns
- Similar effects on both tasks: no evidence of separate neural substrates.
- Previous results show different parts of stimulus used for detection and localization.
- However, likely adaptation effects occur through the same mechanism. Identical or closely linked neural populations performing both tasks