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Polarity (and color!) contingent motion aftereffects at the stage of local motion processing

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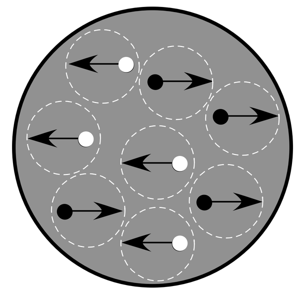
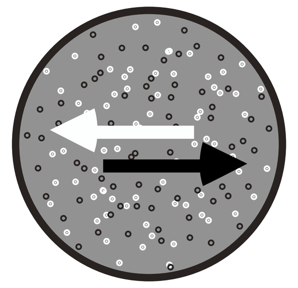
Early interactions

It is widely believed that there are two cascaded stages in motion processing.

A local stage, where motion information is extracted by V1



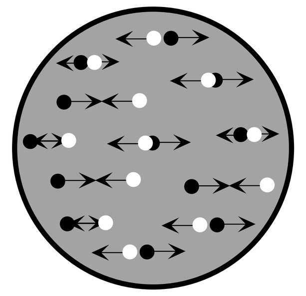
And a global, surface, stage, integrated by area MT.



This study sought to test for the early, local-stage, interaction of luminance polarity and motion and, especially, color and motion.

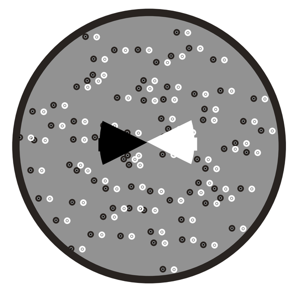
Target: local stage

Consider a 'locally-paired' stimulus, where each dot is paired with an oppositely moving partner



At the local motion stage the different directions are processed independently, as if they had not been paired in the first place.

But there is strong inhibition at the global motion stage.



So the stimulus appears as directionless flicker.

This stimulus therefore selectively targets the local motion stage.

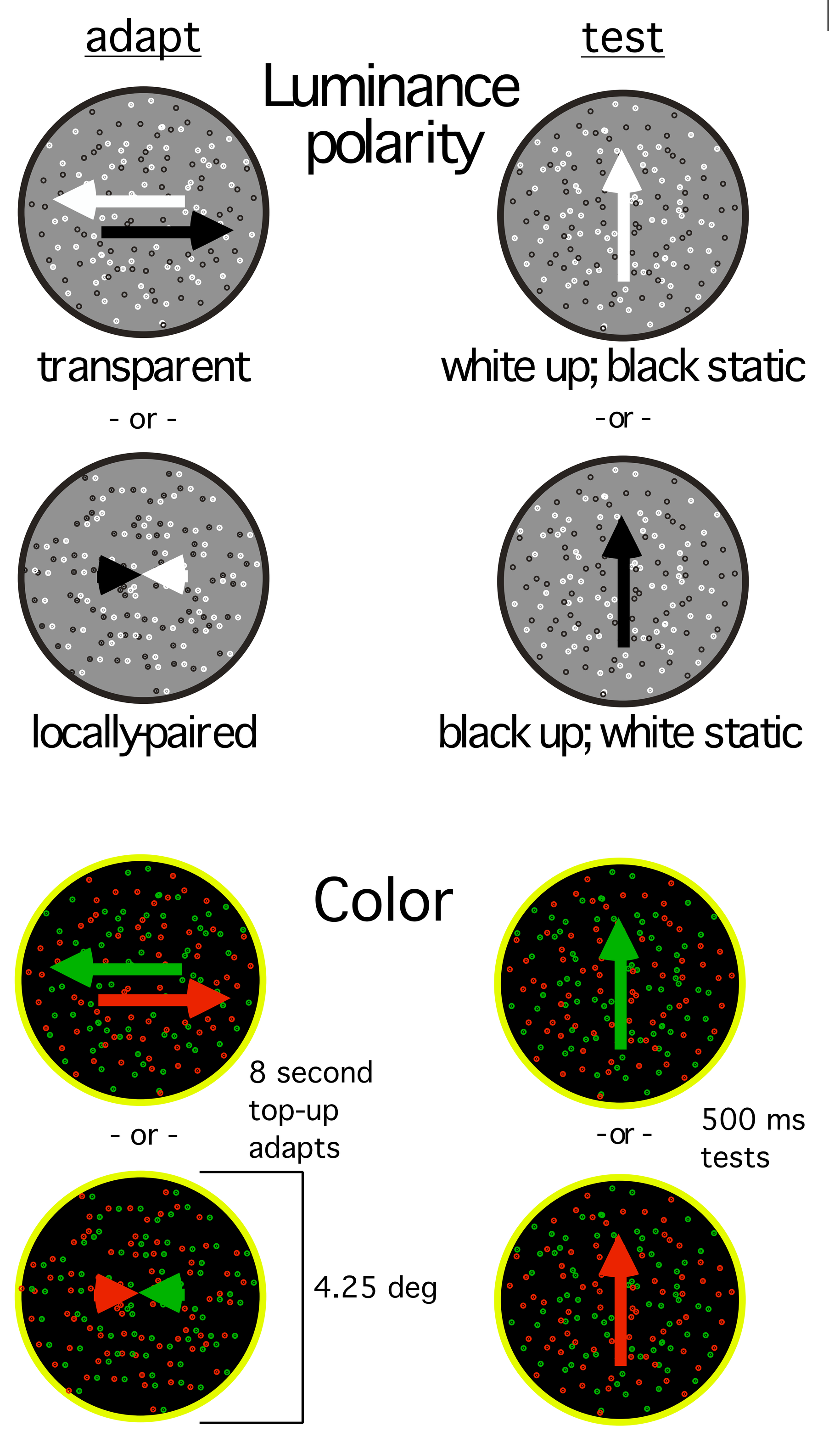
Hypothesis

If there is early, local interaction between luminance polarity and motion, and color and motion,

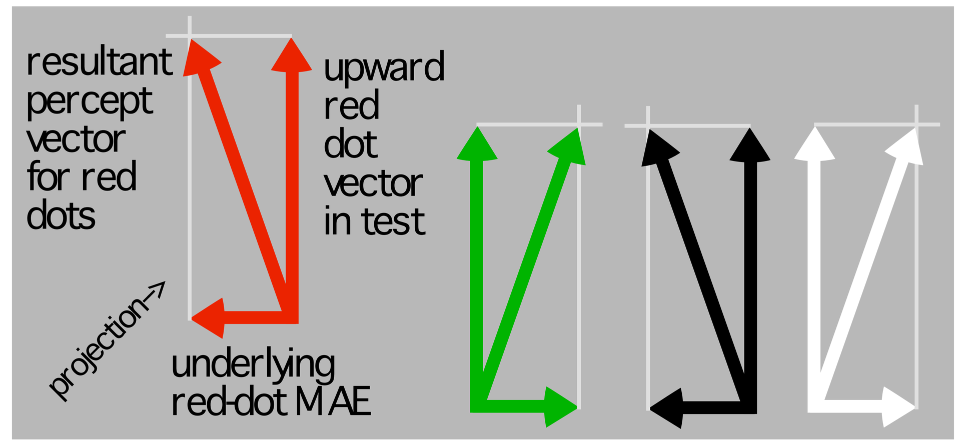
then adaptation to opposite motion vectors - even with locally-paried stimuli - will lead to local, polarity- and color-specific motion adaptation, and

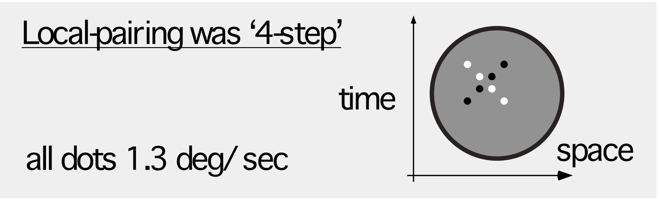
we should be able to induce polarity and color-specific motion aftereffects.

Test



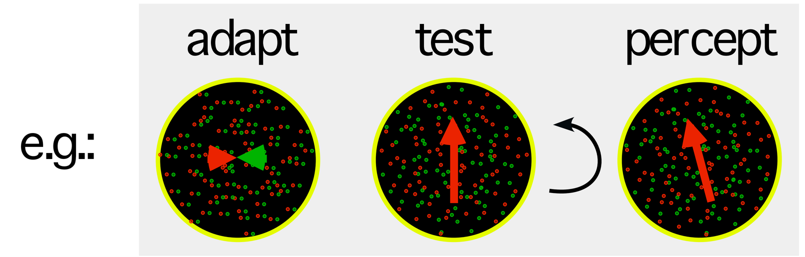
MAE's will yield illusory tilts.

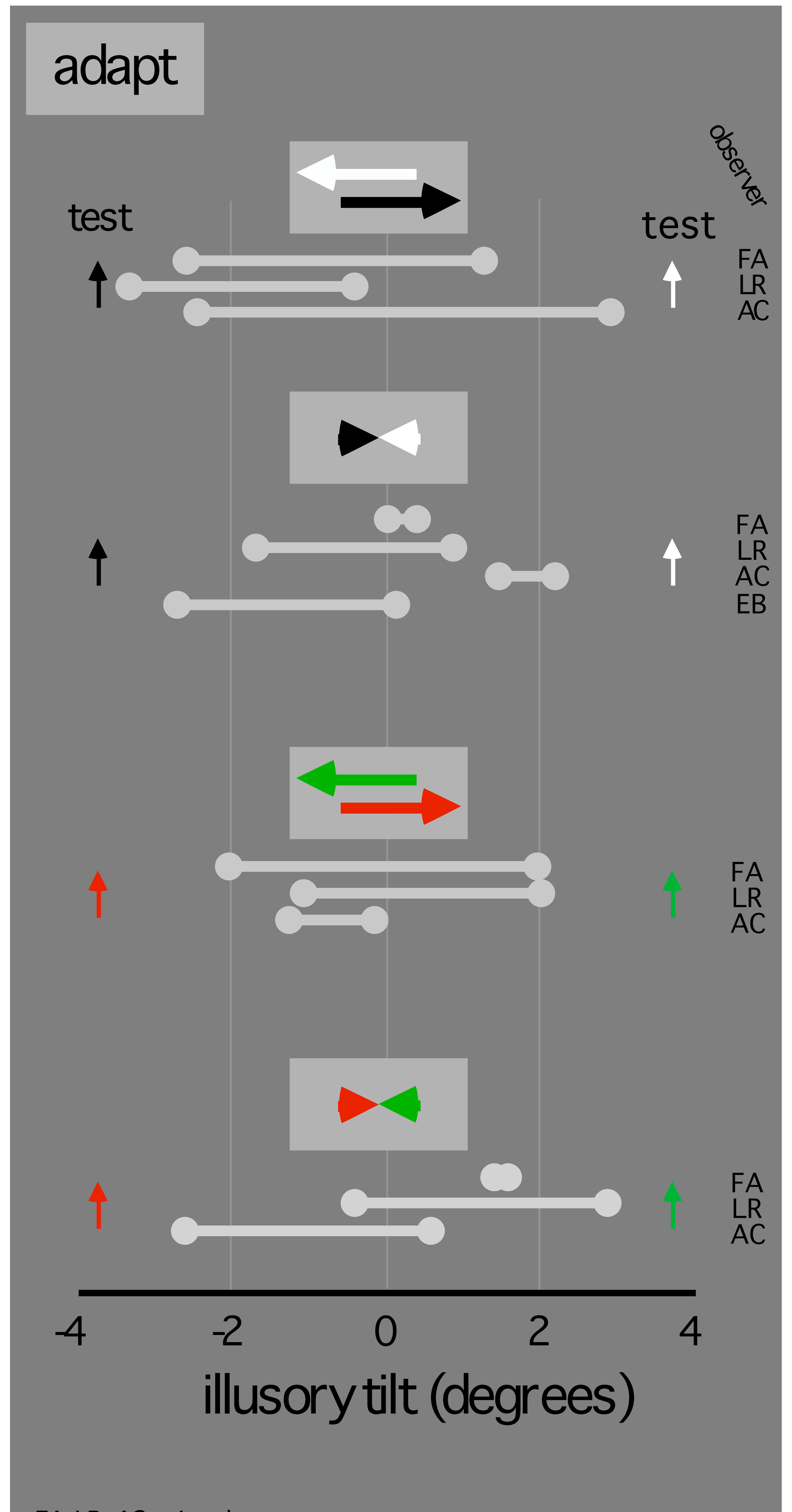




Results

Observers saw illusory tilts.





- FA, LR, AC naive observers
- data points are PSE's from fits of full psychometric functions

Conclusions

Consistent with previous psychophysical and neurophysiological results, there is an early, local interaction of polarity and motion.

Remarkably, there is also an early, local interaction of color and motion.

Our findings point to an interaction of color and motion mechanisms as early as the local motion processing stage of V1.

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