Tilt aftereffect from untilted adaptors and motion aftereffect from static adaptors: Counterintuitive predictions of Li and Atick's efficient binocular coding theory

Keith May & Li Zhaoping (UCL Dept of Computer Science)

www.keithmay.org

Results: Experiment 1

Male subjects

Results of Experiment 2

Female subjects

Results: Experiment 1:

Male subjects

Results: Experiment 2:

Female subjects

Conclusions:

• A tilt aftereffect can be generated by adaptors that are untitled (Experiment 2) or have equal energy at each orientation (Experiment 1).

• Adaptation at least partly mediated by cells with non-oriented receptive fields.

• Summation channel partially implemented by cells with identical isotropic receptive fields in the two eyes.

• Difference channel partially implemented by cells with isotropic receptive fields that have opposite polarities in the two eyes—a few cells like this have been reported (Livingstone & Hubel, 1984, J. Neurosci., 4, 309–356; Shapley & Gur, 1995, J. Neurophysiol., 74, 2100–2125).

Motion aftereffect from static adaptors:

Our tilt aftereffect from untitled adaptors is analogous to our previous work, in which we controlled the perceived direction of motion of the Shadlen–Carney stimulus using static adaptors (May, Zhaoping & Hibbard, 2012, Current Biology, 22, 24–30).

The test stimulus images in our current work are the space–time plots of the Shadlen–Carney stimulus (Shadlen & Carney, 1995, Science, 269, 95–97).

Gratings tilted in space–time are smoothly drifting gratings.

We selectively adapted the binocular channels using static adaptors, and showed that this affected the perceived direction of motion of the Shadlen–Carney stimulus.

This work was supported by a grant from The Gatsby Charitable Foundation to Li Zhaoping.