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Selective Adaptation of Three Motion Systems *((Zhong-Lin Lu*[1]*, George Sperling*[2]*, Justin R. Beck*[3]*))* [1]University of Southern California, Los Angeles, CA 90089; [2]University of California, Irvine, CA 92697; [3]University of California, Davis, CA 95616.

Method: To selectively adapt the primarily monocular first-order motion system, we alternately present luminance sinewave gratings moving in opposite directions in corresponding areas of the left and the right eyes. Stimuli to the left eye and right eye alternate once per sec for 10 sec. To measure the magnitude of the Motion After Effect (MAE), immediately following adaptation, the observer judges the apparent direction of a monocular, pedestalled, first- or second-order motion stimulus of random amplitude, and gives a confidence rating. Adding stationary pedestals to the test stimuli ensures that the third-order system is not effective (it sees only back-and-forth wobble); and the pedestals themselves serve as MAE inducers. To adapt and test the second-order motion system, similar procedures are followed with second-order sinewave gratings. Interocular moving sinewave gratings1 are employed to adapt the binocular third-order system. Dynamic random noise displays with different proportions of "signal" dots moving in particular directions are used as test stimuli to measure the magnitude of the third-order MAE. **Results.** All three types of adaptation stimuli produced significant, highly-selective MAEs. The pattern of high confidence responses indicated that the MAE produced strong perceptual illusions rather than merely instances of decision bias. Adapting to a first-order stimulus affected motion direction discrimination only of first-order stimuli, not second-order stimuli. Adapting to a second-order stimulus affected motion direction discrimination only of the second-order stimuli; there was absolutely no cross adaptation. Strong MAEs were produced with stimuli that were previously shown to be invisible to first- or second-order systems. **Conclusions.** These three modes of highly selective adaptation indicate three functionally distinct motion computations carried out in at least five different sites-the left and right hemispheres each compute both first- and second-order motion, plus there is a binocular site that adapts to third-order stimuli.

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