Abstract View

THE FLASH LAG ILLUSION IS A CONSEQUENCE OF ADAPTIVE SPATIAL FILTERING

D.M. Eagleman*; T.J. Sejnowski

Computational Neurobiology Lab, Salk Institute, La Jolla, CA, USA

In the flash-lag illusion (FLI), a flash aligned with a moving object appears to be offset. Previously, we presented evidence that information from ~80 ms after an event may be used by the visual system to attribute a position estimate to the time of the event (Eagleman & Sejnowski, Science, 2000a). The attributed position of the moving object is an interpolation of its previous positions, which suggests that the FLI is a spatial illusion. Our framework contrasts with the latency difference hypothesis, a temporal model which assumes that a flash takes a longer time to reach awareness than a continuously moving object. Our framework predicts that when an object has a lower signal-to-noise ratio (SNR), more past positional information is included in the interpolation (Eagleman & Sejnowski, Science, 2000b,c). Here we report 3 new experiments that support this spatial filtering explanation: (1) Subjects viewed a random black and white grid upon which a translating patch was defined by second-order motion. The SNR of the moving patch was determined by the fraction of the patch that changed polarity. With degrading SNR, the FLI is sytematically reduced. This result extends demonstrations that reducing the luminance of the moving object reduces the FLI, but, since luminance is held constant here, this cannot be explained by latency difference. Additionally, we show (2) FLI is greatly modified by predictability of a flash (even while luminance remains constant), and (3) subjects can correctly judge temporal order of moving and flashed stimuli, even under the same experimental conditions that produce the FLI. Taken together, these results are inconsistent with a simple model of perceptual latency difference.

Supported by: NIMH

close