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The Mechanism of Isolumint Chromatic Motion Perception
Zhong-Lin Lu, Luis Lesmes, George Sperling

An isoluminant chromatic display is a color display in which the component colors have been so carefully equated in luminance that they stimulate only color-sensitive perceptual mechanisms and not luminance-sensitive mechanisms. The nature of the mechanism by which isoluminant chromatic motion is perceived is an important issue because color and motion processing historically have been associated with different neural pathways. Here we show that isoluminant chromatic motion (I) fails a pedestal test, (ii) has a temporal tuning function that declines to half-amplitude at 3-6 Hz and (iii) is perceived equally well when the entire motion sequence is presented monocularly (entire motion sequence to one eye) versus interocularly (the frames of motion sequence alternate between eyes so that neither eye individually could perceive notion). These three characteristics indicate that chromatic motion is detected by the third-order motion system. Based on this theory, it was possible to take a moving isoluminant red-green grating and, by simply increasing the chromatic contrast of the green component, to generate the full gamut of motion percepts, from compelling smooth motion to motion standstill. the perception of motion standstill when the third-order mechanism is nullified indicates that there is no other motion computation available for purely chromatic motion. It follows that isoluminant chromatic motion is not computed by specialized chromatic motion mechanisms within a color pathway but by the third order specialized chromatic motion mechanisms within a color pathway but by the third-order motion system at a brain level where binocular inputs of form, color, depth, and texture are simultaneously available and where selective attention can exert a major influence