Abstract

Human visual perception relies on signals generated in the rod and cone photoreceptors. Human retinas effectively encode visual information by using rod photoreceptors in low lighting conditions and cone photoreceptors at higher light levels. All of these visual signals must pass through retinal ganglion cells allowing for rod- and cone-generated signals to interact under intermediate lighting conditions (referred to as mesopic conditions). Previous human perceptual experiments under mesopic conditions have revealed interactions between flickering rod and cone stimuli that arise within individual retinas. Here we explore rod-cone flicker cancellation perceptually and relate the data directly to parallel experiments conducted on retinal explants from non-human primates. Our data reveals a strong, suppressive interaction between the rod and cone signals when stimuli are flickered at 7.5 Hz. These perceptual findings are consistent with direct physiological recordings from the primate retina. Together, these experiments provide a better understanding of human vision under intermediate lighting conditions and of the relationship between neural processing in the retina and human perception.

Visual processing of rod and cone signals

Retinal input: photoreceptors

Retinal output: ganglion cells

Human perceptual experiments (preliminary results)

Methods/Results

Conclusions/Future Directions

The preliminary results from the perceptual experiments correspond with the electrophysiological findings. Future perceptual experiments will explore the time dependence of flicker cancellation, and future electrophysiology experiments will highlight the neural mechanisms that underlie this perceptual effect.

Reference