

*Special Issue Introduction***Eye movements and the perception of a clear and stable visual world****Susana Martinez-Conde**

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Eye movements are critical to normal vision: if all eye movements are counteracted, visual perception rapidly fades due to adaptation. Thus, human eyes move continually, even during visual fixation. Due to this incessant motion, natural vision occurs under daunting conditions: saccadic and microsaccadic eye movements abruptly shift the retinal image at intervals ranging from once every several seconds to several times per second. These abrupt displacements are superimposed on a platform of irregular retinal oscillations that can reach velocities of several degrees per second when head and body, as well as the eye, are free to move. Yet despite these continually changing retinal conditions, the visual world appears stable and clear. Indeed, most eye movements are not noticed by the observer who generates them.

Because all of our visual experience occurs in conjunction with eye movements, understanding their perceptual and physiological effects is critical to understanding vision in general. Moreover, the neural mechanisms underlying perceptual suppression during eye movements may be very important towards narrowing down the neural bases of visual awareness. Studies have also shown that our visual system must achieve a delicate balance: although insufficient eye movements lead to neural adaptation and visual fading, excessive motion of the eyes can produce unstable vision and blurring. Thus understanding how perceptual stability is achieved despite eye movements has important implications both for normal vision and for patients suffering from perceptual deficits due to impaired eye movements.

Recent developments have led to new insights through a combination of behavioral, psychophysical, computational and neurophysiological research carried out under conditions that increasingly approach the complex conditions of the natural retinal environment. Among these, fixational eye movement studies comprise a promising and fast-moving field of research. This special issue of *Journal of Vision* offers a broad compilation of recent discoveries concerning the perceptual consequences of eye movements in vision, as well as the mechanisms responsible for producing stable perception from unstable oculomotor behavior.

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