

FREE

Meeting Abstract | December 2009

How the visual system monitors where the eyes will move

Marc A. Sommer

+ Author Affiliations

Journal of Vision December 2009, Vol.9, 13. doi:10.1167/9.14.13

Abstract

"A mystery in psychology is why we perceive the visual world as smoothly continuous, as if it were a movie. This percept is surprising because the retinal input to the brain is more like a slideshow: images jump with every saccadic eye movement. One hypothesis has been that the central visual system transforms its jumpy input into a cinematic percept using predictive information about where the eyes will move. The predictive information, known as corollary discharge, is a copy of the outgoing motor command to the eyes. My colleagues and I have been searching for corollary discharge circuits in the primate brain. We found that a major saccade generating station in the brainstem, the superior colliculus, sends corollary discharge of saccades up to a cerebral visual area, the frontal eye field. Recordings from the pathway revealed that it conveys information about when and where the next saccade will go. Reversible inactivation of the pathway demonstrated that it is needed for behaviors and neuronal operations that use corollary discharge. Some of these neuronal operations require information about saccades made in any direction, a paradox given that most neurons in frontal eye field (as in most of cerebral cortex) are thought to receive information about events in contralateral space only. We showed that, in fact, each frontal eye field receives feedback from both superior colliculi. Hence there are crossed pathways for corollary discharge that complement the same-side pathways. The complementary pathways provide single frontal eye field neurons with information about all of

visual and movement space. While we do not yet completely understand how the visual system creates a percept of visual stability, these recent discoveries offer candidate neuronal circuits that may contribute to the function.”

Sommer, M. A.(2009). How the visual system monitors where the eyes will move [Abstract]. *Journal of Vision*, 9(14): 13, 13a, <http://journalofvision.org/9/14/13/>, doi:10.1167/9.14.13. [[CrossRef](#)]

© 2009 ARVO