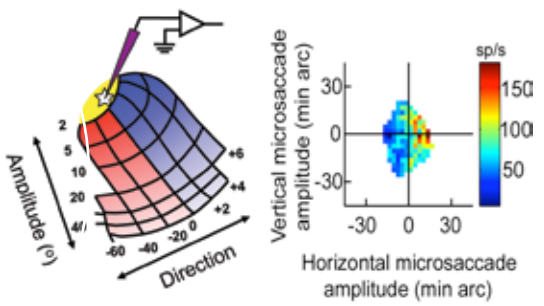

Richard J. Krauzlis

Professor
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"My laboratory investigates the brain mechanisms that link perceptual and cognitive processing to behavioral responses. The long-term goal of our research is to understand how neural circuits distributed across multiple brain regions coordinate even simple motor outputs like eye movements to higher-order processes such as attention, perception, and executive control."

Our eyes are in constant motion. Even when we attempt to stare straight at a stationary target, our eyes jump and jiggle imperceptibly. For several decades, scientists have debated the function, if any, of these unconscious flicks, also known as microsaccades. Wondering whether the command center responsible for generating these quick darts resides within the same brain structure that controls how our eyes scan the lines in a newspaper or follow a moving object, the Krauzlis laboratory decided to measure neural activity in the superior colliculus before and during microsaccades. The superior colliculus is a highly conserved brain region that helps orient the head and eyes either toward or away from the sights and sounds in our environment.

Krauzlis's group not only discovered that the superior colliculus is an integral part of the neural mechanism that controls microsaccades, but also found that individual neurons in the superior colliculus are highly specific about which particular directions and amplitudes they command—even for these smallest of detectable eye movements, which redirect our line of sight by about the width of a sewing needle held at arm's length. Because images on the retina fade if they are perfectly stabilized, discovery of this mechanism explains how the central nervous system generates these miniature movements to constantly shift the scene ever so slightly, thus refreshing the images on our retina and preventing us from going "blind."

Microsaccades, however, do more than prevent the world around us from vanishing from view. When we avoid looking directly at an object of interest—for reasons of propriety, for example—our microsaccades betray our true attraction to the object because their direction is biased toward the object. On the other hand, during some tasks, such as threading a needle, microsaccades tend to be less frequent. By showing that the superior colliculus is involved in generating microsaccades, Krauzlis and his team now have an explanation: Microsaccades provide a snapshot of our priorities at any given moment, even when we try not to move our eyes.

For more information, please visit
salk.edu/faculty/krauzlis.html

Left to right:
Lee Lovejoy, Natalie Dill Moursund, Zhongchau Liao, Eileen Boehle, Sam Nummela, Rich Krauzlis, Shaun Mahaffy, Karine von Bochman, Kristina Nielsen, Alex Zenon