

# Shared Visual Motion Integration for Perception and Pursuit

LELAND S. STONE<sup>1</sup>

BRENT R. BEUTTER<sup>1,2</sup>

JEAN LORENCEAU<sup>3</sup>

<sup>1</sup>Human Factors Research & Technology Division  
Human Information Processing Research Branch  
NASA Ames Research Center

<sup>2</sup>San Jose State University Foundation

<sup>3</sup>Laboratoire de Physiologie de la Perception et de l'Action  
College de France

## Abstract

To examine the relationship between visual motion processing for perception and action, we measured the pursuit eye-movement and perceptual responses to the same complex-motion stimuli. We found that humans can pursue moving line-figure objects, even when partial occlusion makes image motion vastly different from the underlying object motion. This result demonstrates that pursuit performs largely accurate motion integration, i.e. the selective combination of local motion signals across the visual field to derive global object motion. Furthermore, by manipulating perceived motion while keeping image motion identical, we show that the signal driving steady-state pursuit is shared with perception. Our findings not only disprove pursuit models whose control strategy is to minimize retinal image motion, but also suggest a new view of the interplay between visual cortex and cerebellum for visuomotor control.