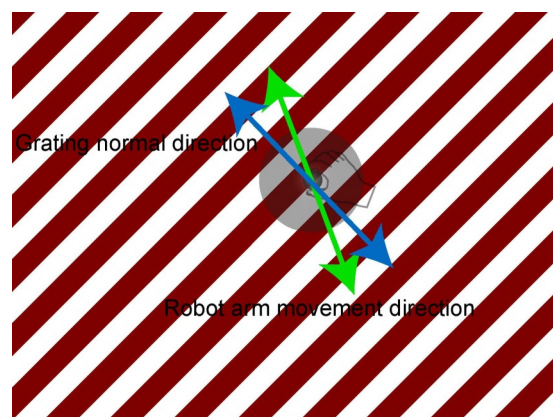


Interaction and integration of vision and proprioception in human motion perception



Dr. Bo Hu

When we move our hands, both visual and proprioceptive input provides information about the motion. In a two-part study, we show that the brain combines the two modalities optimally and can use proprioceptive information to disambiguate visual motion signal. In the first part, we measure the sensitivities of motion direction for each modality alone and two modalities combined. The observed elevation of sensitivity in the combined case shows that the brain integrates visual and proprioceptive information. We then introduce conflicts between the two modalities and find out that the brain behaves in a Bayesian optimal way by weighing the two modalities according to their individual sensitivities. The second part of the study reveals a different way of how the brain combines the two sources of information. We use the "aperture problem", where the motion of a one-dimensional grating pattern behind an aperture, while geometrically ambiguous, appears to move stably in the grating normal direction. We show that when proprioceptive information about the grating motion is available, the brain can use it to disambiguate the visual motion. I will discuss the implications of these results and future research directions.

4PM, WEDNESDAY, JANUARY 25, 2012

Carlson Auditorium, Center for Imaging Science (Bldg. 76)