

# Center for Cognitive Science

University at Buffalo, State University of New York

**Wednesday, September 17, 2003**

280 Park Hall

North Campus

2:00 pm – 4:00 pm

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## "Multimodal Representation of Space and Time"

Perception is a constructive process. We use our various senses to deduce or construct a mental representation of what is out there. In the case of seeing colours, it seems reasonably intuitive that colours must be only inside the head, since light rays differ only along a frequency continuum. But other aspects of the world, including the layout of space, must also be centrally constructed.

Our representation or construction of space involves many different sensory and cognitive systems: it is multimodal. Our visual and auditory systems can tell us the direction of features in the world and sometimes their distance, but it is mainly by interacting in the world that we generate our full perception of space. Interacting involves moving around which introduces other information that is measured by other systems. Thus the brain has to combine information from several different sources to produce its best guess about what it out there.

Sometimes the stories coming from different senses are not compatible with one another. This happens often in unusual environments such as when below deck on a boat. There the cabin moves back and forth with us and seems visually stable. But the vestibular system picks up the swell of the boat and gives us a different story. Which should we rely on to determine our orientation?

The senses also give different information because of the different properties of the sense organs themselves. For example, it takes longer for the retina to convert light energy into nervous activity than it does for the ear. Which sense should we rely on to determine when things happen?

I will talk about how the brain tries to resolve these conflicts. I will illustrate this talk with experiments that my research team have done in which we have given the brain the hardest time by giving it bigger conflicts than usual. We have separated auditory and visual timing cues by looking at the perception of distant events when the sound takes appreciably longer to reach the observer than the light, and we have separated visual from other cues to space and movement by using virtual reality systems. These experiments reveal some interesting strategies that our brain adopts while trying to make a multimodal representation of what's out there.

**Refreshments will be available.**

**Open to the Public.**

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