Keynotes

The three keynote speakers for COSIT'11 are confirmed as follows:
- Ernest Davis, Dept. of Computer Science, New York University (Paper available at http://www.cs.nyu.edu/faculty/davise/papers/cosit.pdf)
- Nora Newcombe, Professor of Psychology at Temple University, PI of the Spatial Intelligence and Learning Center (SILC)
- Thomas Wolbers, Senior Lecturer, Centre for Cognitive and Neural Systems, University of Edinburgh

Speaker: Ernest Davis

Title: Qualitative Spatial Reasoning in Interpreting Text and Narrative

Abstract: Simple natural language texts and narratives often raise problems in commonsense spatial knowledge and reasoning of surprising logical complexity and geometric richness. In this talk, I consider a dozen short texts --- five taken from literature, the remainder contrived as illustrations --- and discuss the spatial reasoning involved in understanding them. I conclude by summarizing their common features, and by tentatively drawing some morals for research in this area.

Speaker: Nora Newcombe

Title: The Development of Spatial Representation and Reasoning

Abstract Piaget offered a constructivist answer to the nativist-empiricist debate, for the spatial domain as for many others. However, in the past few decades, there has been accumulating evidence questioning Piaget's way of conceptualizing spatial knowledge, and indicating earlier competence than he postulated. In fact, geometric representation has been argued by Spelke to be part of core knowledge. In this talk, I will review the nativist-empiricist debate regarding spatial development and propose a neoconstructivist alternative to nativism.

Speaker: Thomas Wolbers

Title: Deciphering the mammalian navigation network

Abstract: The ability to maintain a sense of direction and location while moving about in the environment represents one of the most fundamental cognitive functions. When lesions to the brain or age-related changes impair navigational abilities, we can experience devastating effects on our everyday lives, including a complete loss of independence. In this talk, I will discuss our current understanding of how the mammalian brain computes spatial information from sensory experiences, how this knowledge is used to construct spatial representations and how it can guide our navigational behavior. By synthesizing insights gained from animal and human studies, it is now well understood how neuronal circuits compute information about location, orientation and the layout of the environment. Importantly, core structures of the navigation network can be driven by multiple encoding modalities (i.e. visual, vestibular, haptic), strongly suggesting that the brain represents space in an abstract fashion that is not tied to a specific sensory modality. Finally, I will present evidence for selective age-related change in navigational functioning, which could make important contributions towards understanding mechanisms of brain aging. Taken together, these findings from cognitive neuroscience provide unique insights into the neuronal computations that underlie navigational behavior, which could have important implications for theoretical models of spatial learning.