The Role of Cognitive Strategy in Human-Computer Interaction

ABSTRACT:
A fundamental challenge for the field of human-computer interaction (HCI) is to develop, identify and promote engineering approaches that can predict the usability and learnability of a user interface before it is built. Research in computational cognitive modeling aims to develop and promote the scientific theory that is needed for such predictive engineering approaches. One component of cognitive models of HCI tasks is the cognitive strategy. A cognitive strategy articulates the steps that a person takes to accomplish a piece of work. Cognitive strategies operate on multiple time scales at the same time, such as to issue a computer command every one to ten seconds, or to make multiple eye and hand movements per second to issue those commands. An important challenge in cognitive modeling is to identify the cognitive strategies that people use for HCI tasks so that these strategies can be used to predict performance in other HCI tasks. This talk will illustrate two approaches that Dr. Hornof has evolved to identify plausible cognitive strategies: (a) Propose and consider competing strategies as competing theories, ruling out the strategies that cannot explain human data, and promoting strategies that can. (b) Use eye tracking data in addition to reaction-time data to evaluate and validate strategies, and to converge on models that best characterize how people do tasks. Recent work has expanded the consideration of competing cognitive strategies by developing a parallelized cognitive modeling system that runs hundreds of models in parallel, with different models running different task strategies for the same task. This permits an exploration of how strategy selection is affected by individual differences, training, and task and device characteristics. The work contributes to the science base needed for predictive engineering models.

BIO:
Dr. Anthony Hornof is an Associate Professor in the Department of Computer and Information Science at the University of Oregon. He joined the faculty in 1999 and was promoted with tenure in 2005. Dr. Hornof earned his Ph.D. in 1999 and his Master's degree in 1996, both from the University of Michigan, and both in Computer Science and Engineering. He received a B.A. in Computer Science from Columbia University in 1988. Though Dr. Hornof is intrigued with nearly all aspects of HCI, he is particularly interested in detailed analyses of the human perceptual, cognitive, and motor processing that regulate how people interact with computers. He is also very interested in accessibility and augmentative communication, and works with children with severe motor and communication impairments. Dr. Hornof is published in the leading human-computer interaction journals and conferences; has been awarded $2.3 million in single-investigator research grants; and serves on the editorial board of ACM Transactions on Computer-Human Interaction. The National Science Foundation invited Dr. Hornof to serve as a Program Director in the NSF's Human-Centered Computing and Cyber-Human Systems funding programs, where he served from 2012-2014.

HOST:
Brad Myers

Anthony Hornof
Associate Professor, Department of Computer & Information Science,
University of Oregon

For current HCI seminars Series: http://www.hcii.cmu.edu/news/seminar