Crossroads
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Cognitive Science: At the Crossroads of Computers and the Mind

by ***Ronald Laurids Boring***

Welcome to this special issue of *Crossroads* on cognitive science! Cognitive science is an incredibly dynamic and interesting field, but it can be a daunting task if you're looking for a quick overview. The goal of this issue of *Crossroads* is to make this task a bit easier for you. You'll find four articles to ease your way into cognitive science and introduce you to some of the exciting areas of research and application in this field.

First, what exactly is cognitive science? Cognitive science is the study of the mind. The problem is that *mind* means different things to different people. To a computer scientist, the mind might be something that can be simulated through software or hardware. So, cognitive science would be synonymous with artificial intelligence. On the other hand, to a cognitive psychologist, the mind is the key to understanding human or animal behavior. To a cognitive neuroscientist, the mind is about the brain and its neurological underpinnings. To a philosopher of mind, cognitive science is the culmination of thousands of years of philosophical tradition. To a cognitive linguist, cognitive science is about how thinking and language interact. The list goes on. There are countless subfields of cognitive science, and each one has a unique view on what cognitive science is.

Cognitive science as a field has been around since the 1950s, when computer scientists teamed up with psychologists and linguists to develop models of the human mind and human behavior. What emerged was the information processing approach to human cognition, in which the mind was viewed as a type of central processor of serial mental operations. This model of the mind borrowed heavily from the functioning of computer hardware. The information processing approach has been the dominant approach in cognitive science, although it has recently seen strong challenges from neural network modeling. Neural network modelers argue that the mind does not process information like a single central processing unit but rather like a massively parallel system of simple processors. Ultimately, whether cognitive science is seen from a classical information processing or a neural network perspective, it's still the study of the mind, and it still builds heavily on an alliance between psychological and computer science principles.

We begin this special issue with an article by Naveed Ahmad entitled "The Humanoid Robot Cog." This article provides a summary of robotic work designed to make robots more human-like. This is a great place to begin our exploration of cognitive science, because it introduces us to some of the challenges of simulating human intelligence and human environments. The article entitled "Associative Memory and the Board Game Quarto" by Zachary Kissel introduces many important concepts from neural network modeling as well as their application in constructing a competent opponent for playing Quarto, a variation of tic-tac-toe. Next, Ching Kang Cheng and Xiaoshan Pan's article, "Using Perception in Managing Unstructured Documents," shows how new and old approaches from cognitive science combine to create text classification and search engines. We conclude with "E-Commerce Recommenders: Powerful Tools for E-Business" by Ana Gil and Francisco García. This article further illustrates how a variety of cognitive science ideas can be translated into better software.

Once you've read these articles, I'm sure you'll want to explore cognitive science further. A great place to start is right here with the Association for Computing Machinery (ACM at **http://www.acm.org**). The ACM has three Special Interest Groups (SIGs) that are closely aligned with cognitive science. The Special Interest Group on Information Retrieval (ACM SIGIR), the Special Interest Group on Artificial Intelligence (ACM SIGART), and the Special Interest Group on Computer-Human Interaction (ACM SIGCHI) frequently include cognitive science topics in their journals and conference proceedings. Of course, there are numerous organizations dedicated to

cognitive science in general or to particular subareas of cognitive science. I encourage you to seek them out in addition to ACM's own offerings.

I hope you will enjoy reading this special issue of *Crossroads*, and I hope it will stimulate you to explore cognitive science on your own as well. Happy reading, and happy exploring!

Biography

Ronald Laurids Boring (**rboring@acm.org**) is completing his PhD at the Institute of Cognitive Science at Carleton University, where his research centers on cognitive approaches to human-computer interaction. He earned his Bachelor's and Master's degrees in Psychology from the University of Montana and New Mexico State University, respectively. He subsequently studied Cognitive Science for his doctorate as a way to combine his interests in psychology and computers. He is funded by the Idaho National Engineering and Environmental Laboratory (INEEL).