

Lecture Notes in Artificial Intelligence 6222

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Preface

This is the seventh volume of a series of books on fundamental research in spatial cognition. As with past volumes, the research presented here spans a broad range of research traditions, for spatial cognition concerns not just the basic spatial behavior of biological and artificial agents, but also the reasoning processes that allow spatial planning across broad spatial and temporal scales. Spatial information is critical for coordinated action and thus agents interacting with objects and moving among objects must be able to perceive spatial relations, learn about these relations, and act on them, or store the information for later use, either by themselves or communicated to others. Research on this problem has included both psychology, which works to understand how humans and other mobile organisms solve these problems, and computer science, which considers the nature of the information available in the world and a formal consideration of how these problems might be solved. Research on human spatial cognition also involves the application of representations and processes that may have evolved to handle object and location information to reasoning about higher-order problems, such as displaying non-spatial information in diagrams. Thus, work in spatial cognition extends beyond psychology and computer science into many disciplines including geography and education. The Spatial Cognition conference offers one of the few forums for consideration of the issues spanning this broad academic range.

This volume represents the fruit of a maturing collaboration between two spatial cognition research centers, one that has emphasized psychology (SILC – Spatial Intelligence and Learning Center, National Science Foundation) and one that has emphasized the computational approach (SFB/TR8 Spatial Cognition, German Research Council DFG). This collaboration began in 2008 with joint work on the sixth Spatial Cognition conference that was held in Freiburg, preceded by an NSF-funded workshop. A smaller, more focused, workshop followed in 2009 in New York City, and collaborative work began on a number of individual projects. The emerging consensus is that spatial cognition research must consider both issues of reasoning about small-scale spatial relations of manipulable objects and the larger-scale spatial problems of navigating among locations. The papers and Keynote speakers of this year's conference reflect this emerging approach and, in the present volume, you will see the results of sustained growth in the field of spatial cognition. The combined efforts of the two centers are contributing significantly to providing the infrastructure necessary for a fully-fledged science of space.

For this volume, 35 papers were submitted and reviewed by at least three members of our Program Committee. Twenty-five papers were selected for presentation and inclusion here. In addition to the submitted papers, the Program Chairs invited three scholars to give keynote lectures. Francesca Pazzaglia, of the University of Padova, Italy, gave a lecture considering individual difference in large-scale spatial thinking entitled "Individual Differences in Spatial Language and Wayfinding: The Role of Cognition, Emotion and Motivation," Kenneth Forbus, of Northwestern University,

USA, gave a lecture highlighting work on the computer science approach to education and spatial thinking entitled “CogSketch: Sketch Understanding for Cognitive Science Research and for Education,” and Roger Downs, of Pennsylvania State University, USA, gave a lecture linking geography to navigation entitled “The Refraction of Space: A Radical Reversal of Direction.” Abstracts of the keynote talks are presented in this volume.

Spatial Cognition 2010 took place at the Resort on the Mountain near Mount Hood Oregon—the first time this conference has been held in North America. In addition to the papers that were presented, nearly 50 posters displayed work in progress. The conference also featured two tutorials, four workshops, and a doctoral colloquium where more than a dozen young scholars had the opportunity to present their research. The Spatial Cognition conference was attended by more than 100 delegates from around the world, including the United States, Germany, Canada, Italy, the United Kingdom, Ireland, Bulgaria and Japan.

Many people contributed to the success of Spatial Cognition 2010. We wish to thank: Adrienne Larmett for the organization and logistics for the conference, David Rapp for his work in organizing the poster sessions, Thomas Barkowsky and Ken Forbus for chairing the Workshop Committee, Kai-Florian Richter for organizing the tutorials, and Andrea Frick, Daniele Nardi, and Kristin Ratliff for organizing the doctoral colloquium. A special thank you goes to Andreas Klein for his help with handling the processing of paper contributions for this volume; and we thank the support staff from SILC and the SFB/TR 8 who helped with the event on site in Oregon.

Finally, we thank Alfred Hofmann and his staff at Springer for their continuing support of our book series.

August 2010

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