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Spatial Cognition III

Routes and Navigation,
Human Memory and Learning,
Spatial Representation and Spatial Learning



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Preface

Spatial cognition is an interdisciplinary research area involving artificial intelligence, cognitive psychology, computational linguistics, geography, mathematics, biology, theoretical computer science, architecture, design, and philosophy of mind. As these different disciplines gain a deeper understanding of their fellow disciplines and their research approaches, they increasingly find ways to combine their insights and to conceive powerful mechanisms to analyze and synthesize cognitive systems. Spatial cognition has now reached a point where we can see how different pieces of the puzzle may fit together to form integrated systems of specialized cognitive components. The research triggers new quests for basic issues of cognition and sparks ideas for the development of technological applications that make use of spatial structures and spatial computation. Potential applications can be found in such diverse areas as autonomous robotics, geographic information systems, location-based services, spatial task assistance, multi-agent communication, to name but a few.

This third volume on *Spatial Cognition* marks the final phase of the German Spatial Cognition Priority Program. It augments the results presented in the two precursor volumes published in 1998 and 2000, respectively. The interdisciplinary research program¹ was established by the Deutsche Forschungsgemeinschaft (DFG) in 1996 and terminated after six years, the maximum duration of DFG priority programs. The Spatial Cognition Priority Program consists of 17 research projects at 13 research institutions throughout Germany. Besides carrying out research in individual projects and joint research between projects, the program organized ‘topical colloquia’ and annual plenary colloquia, largely with international participation.

The present volume consists of revised contributions to the eighth plenary colloquium of the Spatial Cognition Priority Program, *Spatial Cognition 2002*, which was held at the Evangelische Akademie in Tutzing (Bavaria) 20–23 May 2002. Topics addressed include diagrammatic representation; spatial ontology, geometry, and paronomies; cognitive robotics; spatial reference systems; spatial reasoning; navigation; geoinformation; spatial memory; knowledge acquisition, imagery, and motion; and virtual reality. The contributions were peer-reviewed before the conference and carefully revised afterwards.

We would like to thank all participants of *Spatial Cognition 2002* and all authors for their contributions and for their revisions in accordance with the reviewers’ recommendations. We thank our commentators and reviewers for their insightful and thorough reviews. We are indebted to Thora Tenbrink for her superb editorial support. We thank the LNAI Series editors Jaime G. Carbonell and Jörg Siekmann as well as Alfred Hofmann of Springer-Verlag for supporting this publication project. We gratefully acknowledge the support of the Spatial Cognition Priority Program by the Deutsche Forschungsgemeinschaft. We thank the members of the review

¹ See www.spatial-cognition.de

committee, Herbert Heuer, Elke van der Meer, Manfred Pinkal (chair), Michael M. Richter, Dirk Vorberg, Ipke Wachsmuth, and Wolfgang Wahlster for their guidance and their support. We are indebted to Andreas Engelke and Gerit Sonntag for their dedicated administration of our research program and for their valuable advice. We acknowledge the support by Erna Büchner and Katja Fleischer of the DFG. We thank Hildegard Westermann of the Knowledge and Language Processing Group at the University of Hamburg for her continuous support of the Spatial Cognition Priority Program. Finally, we wish to thank the Evangelische Akademie Tutzing for providing a stimulating and productive conference environment and for the hospitality they provided for the five plenary meetings we have held at their conference center. In particular, we are indebted to Renate Albrecht of the Akademie Tutzing for accommodating all our special requests and making us feel at home in Schloss Tutzing.

March 2003

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