

## Preface

This symposium intends to meet the growing desire to integrate research into spatial representation and reasoning by the artificial intelligence, cognitive science and cognitive psychology communities. In assuming that, to some degree, the nature of human spatial cognition is relevant to AI research, the aim of this symposium is to:

- initiate an interdisciplinary dialogue to facilitate exchange of ideas and cross-fertilization among researchers;
- review the current influence that research into spatial cognition has on approaches to spatial representation in AI;
- develop a better appreciation of research into spatial representation by identifying issues that span domain and discipline boundaries;
- stimulate the discussion of issues in the computational realization of cognitive models of spatial representation.

Historically, machine vision research has been better aligned with cognitive theories than other fields of AI, probably due to its "all encompassing" nature and historical links with psychology (many topics in machine vision, such as depth perception, object and shape categorization and recognition, have direct counterparts in cognitive psychology). Yet for fields such as robot motion planning, physical and commonsense reasoning, design and machine translation, we find that spatial representation is only one among many other issues. It is this characterization of topics by task description that has in part led to the fragmentation of research into spatial representation. As a generic term "spatial reasoning" now principally circumscribes research into spatial logics and the relationship between spatial and temporal reasoning.

The need to step back and re-assess the contribution that can be made by cognitive science/psychology has come from a number of directions. Technological advances in multimedia, graphics, vision and speech technology are driving research into new interfaces and retrieval mechanisms based on spatial dialogues and queries. Recent years have seen an increase in interest in newer fields that depend heavily on spatial representation, in particular, analogical reasoning, diagrammatic reasoning, integration of vision and natural language processing, and multimodal interface design. Concurrently, cognitive linguistics has concentrated much effort on semantic accounts of spatial language, and the revival of the imagery debate has sharpened the focus of research into human spatial cognition.

This symposium consists of contributions on the computational and cognitive modeling of spatial representation in a number of problem domains, in particular: the representation and processing of natural language spatial expressions; mental and computational imagery; diagrammatic reasoning; analogical reasoning and direct representations of space; navigation and cognitive models of large scale space.

We hope to focus current dispersed debate as to what degree success in these AI domains depends on an understanding and implementation of the components of spatial cognition. At the same time such research should be of benefit to the psychology community, as it is expected that computational modeling will play an increasingly important role with respect to the validation and development of cognitive theories.

Symposium Committee  
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