NEUROBIOLOGY

SPATIAL COGNITION, SPATIAL PERCEPTION: MAPPING THE SELF AND SPACE.

Edited by Francine L. Dolins and Robert W. Mitchell. Cambridge and New York: Cambridge University Press. $110.00. xviii + 581 p. + 6 pl.; ill.; index. ISBN: 978-0-521-84505-2. 2010.

Since Tolman proposed his model of a "cognitive map" in the 1940s, demonstrating complex mental representations of space by animals has proved to be difficult. One promising avenue is perhaps to consider an animal's movement as a multilevel process that results primarily from its own perception of space. This volume emphasizes this perspective by linking spatial perception to spatial cognition, two historically different but closely related approaches for the study of spatial strategies.

Dolins and Mitchell have brought together a group of excellent scientists whose work is poised at the boundary between behavioral ecology, psychology, and neurobiology, and provide a thorough review of the processes of spatial cognition in an evolutionary framework. In the opening chapter, the editors set out the broad conceptual outline and present an overview of each chapter. Then, the book is organized into five specialized parts (23 chapters) covering a wide range of the current body of research, including theoretical debates about models of spatial encoding, usage of landmarks for visual navigation, evolutionary hypotheses for spatial cognition, spatial representation through body movements, and comparisons between spatial skills of human and nonhuman primates. In one of the best chapters, Arleo and Rondi-Reig highlight how animal sensory processes can be implemented in artificial organisms to generate spatial leaning and navigation in neuromimetic robots. But perhaps the greatest strength of this volume is that it does not focus exclusively on humans and apes, but also includes many references to a wider range of organisms (including invertebrates) that highlight some fundamentally shared principles of spatial learning mechanisms across very different animal taxa. It becomes clear, chapter after chapter, that the development of novel technologies will open completely new horizons for the study of spatial cognition, whether by allowing us to look deeper into the brain or to track animals more accurately in their habitats.

I found this to be a very stimulating book. The coherence and the quality of the chapters, some of which are original studies, will no doubt make this volume a key reference for any student or confirmed specialist with an interest in spatial cognition for decades to come.

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COGNITIVE ECOLOGY II.

Edited by Reuven Dukas and John M. Ratcliffe. Chicago (Illinois): University of Chicago Press. $100.00 (hardcover); $40.00 (paper). ix + 372 p.; ill.; index. ISBN: 978-0-226-16935-4-9 (hc); 978-0-226-16936-1 (pb). 2009.

It is only recently that differences in cognitive ability among species and populations began to be studied in the context of their natural environment and analyzed in terms of fitness benefits and costs. This approach, often described as cognitive ecology, has witnessed a significant growth within the last couple of decades, both in terms of theory and empirical data. We now know that closely related species, or even conspecific populations, often markedly differ in their cognitive abilities in a way consistent with their ecological differences. Growing evidence supports the link between the size and complexity of the neural structures involved in learning and the role of learning (in particular spatial and song learning) in the ecology of a given species. Advances in theory and concepts have helped to intergrate the evolutionary views of learning with the general evolutionary theory and has identified general questions to be addressed by empirical research.

The dynamism of the field is clearly reflected in *Cognitive Ecology II*, which offers an interesting view of the diversity of the experimental and theoretical approaches, animal models, and questions related to the study of animal decision and cognitive processes. The different chapters written by experts in the field cover a large spectrum of research from bee foraging to predator cues response in embryos, song learning in birds or use of social versus personal information. Some topics were already discussed in the first version of *Cognitive Ecology*, but the current volume brings in general a fresh look and provides interesting results when integrating different fields such as neurobiology or developmental biology. In general, contributions are of high quality and summarize advances during the past decade, current state of the art, and future directions of cognitive studies. Some chapters, however, present a unique view of the research and neglect alternative hypothesis or theory. As an example, the idea of a relationship between brain size and cognitive flexibility is still strongly debated even if the authors present very conclusive ideas.

This book is a vibrant call for multidisciplinary research programs and opens new perspectives on the study of cognitive ecology by the integration of