# Cognitive Biology

## Evolutionary and Developmental Perspectives on Mind, Brain and Behavior

edited by Luca Tommasi, Mary A. Peterson and Lynn Nadel

The MIT Press
Cambridge, Massachusetts
London, England

This book was set in Times Roman 10/13pt by SNP Best-set Typesetter Ltd., Hong Kong. Printed and bound in the United States of America.

Library of Congress Cataloging-in-Publication Data

Cognitive biology : evolutionary and developmental perspectives on mind, brain, and behavior / edited by Luca Tommasi, Mary A. Peterson, and Lynn Nadel.
p. ; cm.—(Vienna series in theoretical biology)
Includes bibliographical references and index.
ISBN-13: 978-0-262-01293-5 (hardcover : alk. paper)
ISBN-10: 0-262-01293-6 (hardcover : alk. paper) 1. Brain–Evolution. 2. Cognitive science. I. Tommasi, Luca, 1970–. II. Peterson, Mary A., 1950–. III. Nadel, Lynn. IV. Series.
[DNLM: 1. Adaptation, Physiological. 2. Cognition–physiology. 3. Evolution. QT 140 C676 2009]
QL933.C64 2009
153–dc22

2008035962

10 9 8 7 6 5 4 3 2 1

# Preface

In the tradition of the Vienna Series in Theoretical Biology, this book represents the outcome of a complex and creative enterprise, whose first step is that of bringing together representatives from a number of disciplines to discuss and exchange ideas around a main topic that is defined well in advance by half a handful of organizers.

Such first step was accomplished during a three-day workshop that took place in June 2006 at the beautiful mansion of the Konrad Lorenz family, in Altenberg, near Vienna, a location that now hosts the Konrad Lorenz Institute for Evolution and Cognition Research. Here, the convened participants had the hard task of presenting their research and confronting their ideas about the emerging directions that see the cognitive sciences as deeply involved in what looks like an epistemic revolution, more or less fifty years after their official birth. The workshop had in fact been entitled "The New Cognitive Sciences" because it was felt that in the last two decades, many sources of inspiration in the multidisciplinary field of the cognitive sciences were coming from some subfields of the "founding disciplines" more than others.

Whereas the cognitive sciences were strongly dominated by the computational metaphor during a first stage of their existence, and by brain research during a second stage, we felt that, still fully recognizing the relevance of these sources for the flow of fresh ideas into the boiling pot, many other ingredients were being added to the ongoing recipe in a more recent stage. These derive mostly from research at the intersection of psychology and not simply neuroscience, but biology in its wider sense. Results and insights from comparative, developmental and cross-cultural psychology (i.e. from subfields of psychology that have been less relevant for some decades in the cognitive sciences) have recently engendered questions and provided evidence that have become spicy ingredients for the research carried out in the cognitive neurosciences (both theoretical and experimental; i.e. electrophysiology, neuroimaging, and computational neuroscience) but also in harbors of the life sciences that not necessarily are pleasant sanctuaries to many a cognitive scientist, such as genetics, ecology, developmental and evolutionary biology. The aim of the workshop was thus that of providing an overview and engendering

discussion on the cross-disciplinary integration between evolutionary and developmental approaches to cognition in the light of contributions from the life sciences that are not limited to neuroscience.

The second step of the enterprise was that of organizing this book. However, the undertaking of this step was initiated at the end of the first step, under a lucky star: on the last day of the workshop the participants agreed, before getting involved in an adventurous cruise along the Danube, that the content of the book that would grow from their meeting could be explicit from its very outset, that is the title. "Cognitive Biology" sounded like a potential candidate to capture the merging of the cognitive and the life sciences that the workshop aimed at representing with a number of isolated (and fascinating) examples: we believe that this title reflects those examples as well as the bigger picture, and we hope that the book will increase the awareness that this change of attitude shared by a large number of scholars worldwide is, in fact, a serious enterprise reflecting a new understanding of mind, brain and behavior.

The book is structured into four main parts, which probably echo too much our own inclinations for the "hot topics." This is something we feel responsible for, humbly apologizing to those topics that might have been included but have not. The four parts feature chapters devoted, respectively, to spatial cognition (part II, Space), to the relationship among attention, perception and learning (part III, Qualities and Objects), to representations of numbers and economic value (part IV, Numbers and Probability), and to social cognition (part V, Social Entities), all issues central to the contemporary cognitive sciences.

We thank the staff of the KLI for their marvelous hospitality in an unrivalled setting, and for the continuous support provided before, during and after the workshop. As science is nowadays a tough business, it is tremendously reassuring to know that there are still scientific institutions offering so much space to the main ingredient that should enter the boiling pot: ideas.