Cognitive Developmental Change makes an original contribution to the fields of developmental, cognitive and educational science by bringing together a uniquely diverse range of perspectives for analysing the dynamics of change. Connecting traditional Piagetian, information processing, and psychometric approaches with newer frameworks and tools for the assessment and analysis of developmental change, it provides the reader with a cutting-edge account of the latest theory and research. The contributors, all internationally respected experts, were asked when writing to consider three main aspects of cognitive change: its object (What changes in the mind during development?), its nature (How does change occur?) and its causes (Why does change occur? Or, what are the internal and external factors responsible for cognitive change?). As a result chapters cover key theories of cognitive change, the factors that affect change, including neurological, emotional and socio-cultural factors, and the latest methods for measuring and modelling change.

Andreas Demetriou is Professor of Psychology and Dean of the School of Social Sciences and Sciences of Education, University of Cyprus. He is on the editorial board of several leading journals and has published over 120 books, book chapters and journal articles in the areas of cognitive development and education.

Athanassios Raftopoulos is Associate Professor of Epistemology and Cognitive Science in the Department of Psychology, University of Cyprus. He has published extensively on the foundations of cognition, research methods and conceptual change.
The aim of this series is to provide a scholarly forum for current theoretical and empirical issues in cognitive and perceptual development. As the twenty-first century begins, the field is no longer dominated by monolithic theories. Contemporary explanations build on the combined influences of biological, cultural, contextual and ecological factors in well-defined research domains. In the field of cognitive development, cultural and situational factors are widely recognized as influencing the emergence and forms of reasoning in children. In perceptual development, the field has moved beyond the opposition of ‘innate’ and ‘acquired’ to suggest a continuous role for perception in the acquisition of knowledge. These approaches and issues will all be reflected in the series, which will also address such important research themes as the indissociable link between perception and action in the developing motor system, the relationship between perceptual and cognitive development and modern ideas on the development of the brain, the significance of developmental processes themselves, dynamic systems theory and contemporary work in the psychodynamic tradition, especially as it relates to the foundations of self-knowledge.

Titles published in the series

1. Jacqueline Nadel and George Butterworth, *Imitation in Infancy*
2. Margaret Harris and Giyoo Hatano, *Learning to Read and Write: A Cross-Linguistic Perspective*
3. Michael Siegal and Candida Peterson, *Children’s Understanding of Biology and Health*
5. Antonio M. Battro, *Half a Brain is Enough: The Story of Nico*
6. Andrew N. Meltzoff and Wolfgang Prinz, *The Imitative Mind: Development, Evolution and Brain Bases*
8. Edited by Heidi Keller, Ype H. Poortinga and Axel Schölmerich, *Between Culture and Biology: Perspectives on Ontogenetic Development*
9. Nobuo Masataka, *The Onset of Language*
Cognitive Developmental Change

Theories, Models and Measurement

Edited by

Andreas Demetriou and Athanassios Raftopoulos
Dedicated to the memory
of Robbie Case,
a great developmentalist

Cambridge University Press
0521825792 - Cognitive Developmental Change: Theories, Models and Measurement
Edited by Andreas Demetriou and Athanassios Raftopoulos
Frontmatter
More information
## Contents

<table>
<thead>
<tr>
<th>List of contributors</th>
<th>page</th>
<th>xi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface and acknowledgements</td>
<td></td>
<td>xiii</td>
</tr>
<tr>
<td>Introduction: the what, how and why of developmental</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>change: the emergence of a new paradigm</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>ANDREAS DEMETRIOU AND ATHANASSIOS RAFTOPOULOS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Mind, intelligence and development: a cognitive,</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>differential and developmental theory of intelligence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANDREAS DEMETRIOU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Types of cognitive change: a dynamical, connectionist</td>
<td></td>
<td>74</td>
</tr>
<tr>
<td>account</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATHANASSIOS RAFTOPOULOS AND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONSTANTINOS P. CONSTANTINOU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Developmental patterns in proportional reasoning</td>
<td></td>
<td>118</td>
</tr>
<tr>
<td>HAN VAN DER MAAS, BRENDAA JANSSEN AND MAARTJE RAIJMAKERS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Building general knowledge and skill: cognition and</td>
<td></td>
<td>157</td>
</tr>
<tr>
<td>microdevelopment in science learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MARC SCHWARTZ AND KURT W. FISCHER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Cognitive change as strategy change</td>
<td></td>
<td>186</td>
</tr>
<tr>
<td>JOKE TORBEYNS, LAURENCE ARNAUD, PATRICK LEMAIRE AND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIEVEN VERSCHAFFEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 The emergence of mind in the emotional brain</td>
<td></td>
<td>217</td>
</tr>
<tr>
<td>MARC D. LEWIS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Practices of quantification from a socio-cultural</td>
<td></td>
<td>241</td>
</tr>
<tr>
<td>perspective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEOFFREY B. SAXE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

© Cambridge University Press  
www.cambridge.org
Contents

8 Contributions of central conceptual structure theory to education 264
   SHARON GRIFFIN

9 Accelerating the development of general cognitive processing 296
   PHILIP ADEY

10 Dealing with change: manifestations, measurements and methods 318
   ELENA L. GRIGORENKO AND PAUL A. O'KEEFE

11 Dynamic modelling of cognitive development: time, situatedness and variability 354
   PAUL VAN GEERT

12 Modelling individual differences in change through latent variable growth and mixture growth modelling: basic principles and empirical examples 379
   JAN-ERIC GUSTAFSSON

Index 403
Contributors

Philip Adey King’s College London, UK
Laurence Arnaud LPC-CNRS and Université de Provence, France
Constantinos P. Constantinou Department of Education, University of Cyprus, Cyprus
Andreas Demetriou Department of Psychology, University of Cyprus, Cyprus
Kurt W. Fischer Graduate School of Education, Harvard University, USA
Sharon Griffin Department of Education, Clark University, USA
Elena L. Grigorenko Department of Psychology, PACE Center, Yale University, USA
Jan-Eric Gustafsson Department of Education, Göteborg University, Sweden
Brenda Jansen Department of Psychology, University of Amsterdam, The Netherlands
Patrick Jansen LPC-CNRS and Université de Provence, France
Marc D. Lewis Ontario Institute for Studies in Education, University of Toronto, Canada
Paul A. O’Keefe Department of Psychology, PACE Center, Yale University, USA
Athanassios Raftopoulos Department of Psychology, University of Cyprus, Cyprus
Maartje Raijmakers Department of Psychology, University of Amsterdam
Geoffrey B. Saxe Department of Psychology, University of California, Berkeley, USA
List of contributors

Marc Schwartz Graduate School of Education, Harvard University, USA

Joke Torbeyns Catholic University of Leuven, Center for Instructional Psychology and Technology, Belgium

Han van der Maas Department of Psychology, University of Amsterdam, The Netherlands

Paul van Geert Department of Psychology, University of Groningen, The Netherlands

Leaven Verschaffel Catholic University of Leuven, Center for Instructional Psychology and Technology, Leuven
Preface and acknowledgements

Most of the chapters included in this volume have first been presented at two conference symposia, one organized for the Biennial Meeting of the Society for Research in Child Development that took place in Minneapolis in April 2001 and the other organized for the Xth European Conference on Developmental Psychology that took place in Uppsala, Sweden, in August 2001. Both of these symposia focused on the nature of cognitive developmental change from a number of different perspectives and were dedicated to the memory of the late Robbie Case who died suddenly a year earlier in Toronto. As organizers of these symposia and editors of this volume we are grateful to all of our contributors for their participation in this project, and for their cooperation in the long and cumbersome process of the editing of the chapters in their present form. We are also grateful to the University of Cyprus for the financial support that made possible both our participation in the two symposia above and the preparation of the volume itself.

The book is dedicated to the memory of Robbie Case, an inspired, original, and deep developmental thinker whose work has widened our understanding of cognitive development and has opened new conceptual and methodological roads in developmental cognitive science. His untimely death at the age of fifty-six deprived the field of an incisive forward looking mind at the peak of his personal and epistemic maturity and his family and friends of his warm and always enriching presence. We hope that this volume constitutes a step forward on the roads that Robbie opened for all of us.