#### PROGRESS IN BRAIN RESEARCH

#### VOLUME 174

# MIND AND MOTION: THE BIDIRECTIONAL LINK BETWEEN THOUGHT AND ACTION

EDITED BY

## MARKUS RAAB

Institute of Psychology, German Sport University Cologne, Cologne, Germany

## JOSEPH G. JOHNSON

Department of Psychology, Miami University, Oxford, Ohio, USA

HAUKE R. HEEKEREN

Neurocognition of Decision Making Group, Max Planck Institute for Human Development, Berlin, Germany



AMSTERDAM – BOSTON – HEIDELBERG – LONDON – NEW YORK – OXFORD PARIS – SAN DIEGO – SAN FRANCISCO – SINGAPORE – SYDNEY – TOKYO

# Contents

List of Contributors.	v
Preface	vii
Acknowledgment	ix
I. How are Choice Options and their Consequences Perceived and Represented?	
<ol> <li>Grounding cognition in action: expertise, comprehension, and judgment</li> <li>S.L. Beilock (Chicago, IL, USA)</li> </ol>	3
<ul> <li>On the relativity of athletic performance: a comparison perspective on performance judgments in sports</li> <li>L. Damisch and T. Mussweiler (Cologne, Germany)</li> </ul>	13
	15
<ol> <li>A cognitive movement scientist's view on the link between thought and action: insights from the "Badische Zimmer" metaphor EJ. Hossner (Liverpool, UK)</li> </ol>	25
<ol> <li>Perceiving and moving in sports and other high-pressure contexts R.R.D. Oudejans and A. Nieuwenhuys (Amsterdam, The Netherlands)</li> </ol>	35
<ol> <li>How do people perceive and generate options?</li> <li>M. Raab, R.F. de Oliveira and T. Heinen (Cologne, Germany)</li></ol>	49
6. How the orbitofrontal cortex contributes to decision making — A view from neuroscience K.G. Volz and D.Y. von Cramon (Cologne and Leipzig, Germany)	61
7. Perceiving the intentions of others: how do skilled performers make anticipation judgments? A.M. Williams (Liverpool, UK)	73
<ol> <li>The bidirectional links between decision making, perception, and action R.F. de Oliveira, L. Damisch, EJ. Hossner, R.R.D. Oudejans, M. Raab, K.G. Volz and A.M. Williams (Cologne, Germany, Liverpool, UK and Amsterdam, The Netherlands)</li> </ol>	85
II. How are These Options Evaluated and an Intended Course of Action Selected?	
9. (Ir)rationality in action: do soccer players and goalkeepers fail to learn how to best perform during a penalty kick?	
M. Bar-Eli, O.H. Azar and Y. Lurie (Beer Sheva, Israel)	97

10.	Getting around: making fast and frugal navigation decisions J.A. Conlin (Berlin, Germany)	109
11.	Crossmodal interaction in speeded responses: time window of integration model A. Diederich and H. Colonius (Bremen and Oldenburg, Germany)	119
12.	Embodied cognition of movement decisions: a computational modeling approach J.G. Johnson (Oxford, OH, USA)	137
13.	<ul> <li>A multiple-cue learning approach as the basis for understanding and improving soccer referees' decision making</li> <li>H. Plessner, G. Schweizer, R. Brand and D. O'Hare (Leipzig and Potsdam, Germany and Dunedin, New Zealand)</li> </ul>	151
14.	<ul> <li>A conceptual framework for studying emotions-cognitions-performance linkage under conditions that vary in perceived pressure</li> <li>G. Tenenbaum, B.D. Hatfield, R.C. Eklund, W.M. Land, L. Calmeiro, S. Razon and T. Schack (Tallahassee, FL and College Park, MD, USA, Dundee, UK and Bielefeld, Germany)</li> </ul>	159
15.	Visual cues influence motor coordination: behavioral results and potential neural mechanisms mediating perception-action coupling and response selection N. Wenderoth and M. Weigelt (KU Leuven, Belgium and Bielefeld, Germany)	179
16.	<ul> <li>How do motoric realities shape, and become shaped by, the way people evaluate and select potential courses of action? Toward a unitary framework of embodied decision making D.A. DeCaro, M. Bar-Eli, J.A. Conlin, A. Diederich, J.G. Johnson and H. Plessner (Oxford, OH, USA, Beer Sheva, Israel and Berlin, Bremen and Leipzig, Germany)</li></ul>	189
III.	How is a Cognitively Intended Course of Action Physically Implemented?	
17.	Perceptual decision making: a bidirectional link between mind and motion N. Green and H.R. Heekeren (Berlin, Germany)	207
18.	Motor imagery and its implications for understanding the motor system J. Munzert and K. Zentgraf (Giessen, Germany)	219
19.	The cognitive nature of action — functional links between cognitive psychology, movement science, and robotics T. Schack and H. Ritter (Bielefeld, Germany)	231
20.	Mental representations as an underlying mechanism for human performance G. Tenenbaum and W.M. Land (Tallahassee, FL, USA)	251
21.	Biases and optimality of sensory-motor and cognitive decisions J. Trommershäuser (Giessen, Germany)	267

xii

22.	22. Advances in coupling perception and action: the quiet eye as a bidirectional link between attention, and action	ze,	
	J.N. Vickers (Calgary, AB, Canada)	279	
23.		289	
	U. Wolfensteller (Leipzig and Dresden, Germany)	289	
24.	How are actions physically implemented?		
	K. Zentgraf, N. Green, J. Munzert, T. Schack, G. Tenenbaum, J.N. Vickers, M. Weigelt,		
	U. Wolfensteller and H.R. Heekeren (Giessen, Berlin, Bielefeld and Leipzig, Germany,		
	Tallahassee, FL, USA and Calgary, AB, Canada)	303	
25.	Mind and motion: surveying successes and stumbles in looking ahead		
	J.G. Johnson, M. Raab and H.R. Heekeren (Oxford, OH, USA and Cologne, Berlin and		
	Leipzig, Germany)	319	
Sub	ject Index	329	
See	Color Plate Section at the end of this book		