

The Unity of Mind, Brain and World

Issues concerning the unity of minds, bodies and the world have often recurred in the history of philosophy and, more recently, in scientific models. Taking into account both the philosophical and scientific knowledge about consciousness, this book presents and discusses some theoretical guiding ideas for the science of consciousness. The authors argue that, within this interdisciplinary context, a consensus appears to be emerging assuming that the conscious mind and the functioning brain are two aspects of a complex system that interacts with the world. How can this concept of reality – one that includes the existence of consciousness – be approached both philosophically and scientifically? *The Unity of Mind, Brain and World* is the result of a three-year online discussion between the authors who present a diversity of perspectives that tend towards a theoretical synthesis, aimed to contribute to the insertion of this field of knowledge in the academic curriculum.

ALFREDO PEREIRA JR. is Adjunct Professor in the Department of Education at the Institute of Biosciences, São Paulo State University (UNESP).

DIETRICH LEHMANN is Professor Emeritus of Clinical Neurophysiology at the University of Zurich and a Member of The KEY Institute for Brain-Mind Research at the University Hospital of Psychiatry, Zurich.



The Unity of Mind, Brain and World

Current Perspectives on a Science of Consciousness

Edited by

Alfredo Pereira Jr. and Dietrich Lehmann







Shaftesbury Road, Cambridge CB2 8EA, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

314-321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi - 110025, India

103 Penang Road, #05-06/07, Visioncrest Commercial, Singapore 238467

Cambridge University Press is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

We share the University's mission to contribute to society through the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org

Information on this title: www.cambridge.org/9781107026292

© Cambridge University Press & Assessment 2013

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press & Assessment.

First published 2013

A catalogue record for this publication is available from the British Library

Library of Congress Cataloging-in-Publication data

The unity of mind, brain, and world : current perspectives on a science of consciousness / edited by Alfredo Pereira Jr. and Dietrich Lehmann.

pages cm

Includes bibliographical references and index.

ISBN 978-1-107-61729-2

1. Consciousness. I. Pereira, Alfredo, Jr., editor of compilation.

BF311.U58 2013

153 - dc23 2013009531

ISBN 978-1-107-02629-2 Hardback

Cambridge University Press & Assessment has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.



Contents

	List of figures List of tables List of contributors	page vii ix x
	Introduction ALFREDO PEREIRA JR. AND DIETRICH LEHMANN	1
1	Body and world as phenomenal contents of the brain's reality model BJORN MERKER	7
2	Homing in on the brain mechanisms linked to consciousness: The buffer of the perception-and-action interface CHRISTINE A. GODWIN, ADAM GAZZALEY, AND EZEQUIEL MORSELLA	43
3	A biosemiotic view on consciousness derived from system hierarchy RON COTTAM AND WILLY RANSON	77
4	A conceptual framework embedding conscious experience in physical processes WOLFGANG BAER	113
5	Emergence in dual-aspect monism RAM L. P. VIMAL	149
6	Consciousness: Microstates of the brain's electric field as atoms of thought and emotion DIETRICH LEHMANN	191
7	A foundation for the scientific study of consciousness	219

v



vi	Contents	
8	The proemial synapse: Consciousness-generating glial-neuronal units BERNHARD J. MITTERAUER	233
9	A cognitive model of language and conscious processes LEONID PERLOVSKY	265
10	Triple-aspect monism: A conceptual framework for the science of human consciousness ALFREDO PEREIRA JR.	299
	Index	338



Figures

1.1	A minimal sketch of the orienting domain.	page 15
1.2	Two constituents of the decision domain embedded in the	
	schematism of the orienting domain of Fig. 1.1.	21
1.3	Ernst Mach's classical rendition of the view through his	
	left eye.	28
1.4	The full ontology of the consciousness paradigm	
	introduced in the text.	33
2.1	Buffer of the Perception-and-Action Interface (BPAI).	65
3.1	Limitation in the perceptional bandwidth of differently	
	sized perceptional structures within the same environment	
	causes them to be partially isolated from each other.	86
3.2	The representation of a multi-scalar hierarchy.	89
3.3	Hierarchical complex layers and scaled-model/ecosystem	
	pairings.	93
3.4	Unifications of the first and second hyperscales.	103
3.5	Mutual observation between the <i>model</i> hyperscale and its	
	ecosystem hyperscale.	105
4.1	A first-person cognitive cycle with a naïve model of	
	physical reality.	120
	Cognitive loops with a reality belief.	124
4.3	Architecture of a human thought process that creates the	
	feeling of permanent objects in our environment.	131
4.4	Mapping quantum theory to the architecture of a	
	cognitive cycle.	140
	Reality model of space and content.	142
6.1	Power spectra of EEG recordings during times when	
	subjects signaled experiencing visual hallucinations or	
	body image disturbances.	202
6.2	Sequence of maps of momentary potential distribution on	
	the head surface during no-task resting, at intervals of 7.8	
	ms (there were 128 maps per second).	204

vii



viii

Cambridge University Press & Assessment 978-1-107-02629-2 — The Unity of Mind, Brain and World Current Perspectives on a Science of Consciousness Edited by Alfredo Pereira, Jr, Dietrich Lehmann Frontmatter More Information

List of figures 6.3 Maps of momentary potential distribution on the head 205 surface during no-task resting. 6.4 Maps of the potential distribution on the head surface of the four standard microstate classes during no-task resting, obtained from 496 healthy 6 to 80-year-old subjects (data of Koenig et al. 2002). 206 6.5 Glass brain views of brain sources that were active during microstates associated with spontaneous or induced visual-concrete imagery and during microstates associated with spontaneous or induced abstract thought. 208 7.1 Dual-aspect monism. 221 224 7.2 The retinoid system. 7.3 Non-conscious creatures and conscious creatures. 226 7.4 Illusory experience of a central surface sliding over the background. 227 7.5 Perspective illusion of size reflected in fMRI. 228 7.6 Rotated table illusion. 230 8.1 Schematic diagram of possible glial-neuronal interactions at the glutamatergic tripartite synapse. 238 8.2 Basic pathways of information processing in a glial-neuronal synapse. 241 8.3 Outline of an astrocyte domain organization. 245 8.4 Tritogrammatic tree. 247 8.5 Outline of an astrocytic syncytium. 251 8.6 Negations operate on a cyclic proemial relationship. 257 9.1 An example of DL perception of "smile" and "frown" objects in noise. 271 9.2 A hierarchy of cognition. 272 275 9.3 The dual hierarchy of language and cognition.

10.1 The apparent mind and nature paradox.

10.4 The conscious continuum of an episode.

a conscious dynamic system.

10.3 Kinds of temporal relations between and within aspects of

10.2 The TAM tree.

306

312

322

327



Tables

5.1	Status of the three steps of self-as-knower under various	
	conditions; see also (Damasio 2010, pp. 225-240)	
	and our endnotes.	page 163
8.1	Tritostructure.	248
8.2	Quadrivalent permutation system arranged in a	
	lexicographic order.	252
8.3	Example of a Hamilton loop generated by a sequence of	
	negation operators.	253
8.4	Guenther matrix consisting of 24 Hamilton loops.	256
8.5	Hamilton loop generated by a sequence of negation	
	operators.	258

ix



Contributors

- WOLFGANG BAER, Ph.D., Associate Research Professor of Information Sciences, Naval Postgraduate School, Monterey (retired) and Research Director, Nascent Systems Inc., USA.
- RON COTTAM, Ph.D., researcher at the Vrije Universiteit Brussel, Belgium.
- ADAM GAZZALEY, M.D., Ph.D., Associate Professor of Neurology, Physiology, and Psychiatry at the University of California, San Francisco, USA.
- CHRISTINE A. GODWIN, Master's degree student at the Department of Psychology at San Francisco State University, USA.
- DIETRICH LEHMANN, M.D., M.D. (Hon), Professor Emeritus of Clinical Neurophysiology, University of Zurich. Member of The KEY Institute for Brain-Mind Research, University Hospital of Psychiatry, Zurich, Switzerland.
- BJORN MERKER, Ph.D., independent scholar residing in Kristianstad, Sweden.
- BERNHARD J. MITTERAUER, M.D., Professor of Neuropsychiatry (Emeritus) at the University of Salzburg; Volitronics-Institute for Basic Research, Psychopathology and Brainphilosophy, Austria.
- EZEQUIEL MORSELLA, Ph.D., Associate Professor of Psychology at San Francisco State University and Assistant Adjunct Professor at the Department of Neurology at the University of California, San Francisco, USA.
- ALFREDO PEREIRA JR., Ph.D., Professor at Sao Paulo State University (UNESP); researcher of the National Research Council (CNPQ), and sub-coordinator of a Thematic Project of the Foundation for Research Support of the State of Sao Paulo (FAPESP), Brasil.

Х



List of contributors

хi

- LEONID PERLOVSKY, Ph.D., Visiting Scholar, Harvard University, Athinoula A. Martinos Center for Biomedical Imaging; Principal Research Physicist and Technical Advisor, Air Force Research Laboratory, USA.
- WILLY RANSON, Dr., Ir., researcher at the Vrije Universiteit Brussel, Belgium.
- ARNOLD TREHUB, Ph.D., Adjunct Professor of Psychology at the University of Massachusetts at Amherst, USA.
- RAM L. P. VIMAL, Ph.D., Amarāvati-Hīrāmaņi Professor (Research) at Vision Research Institute, 25 Rita St., Lowell, MA 01854, USA, and Dristi Anusandhana Sansthana at: (1) Ahmedabad, India; (2) Pendra, C.G., India; and (3) Betiahata, Gorakhpur, India.