

The Crucible of Consciousness

An Integrated Theory of Mind and Brain

Zoltan Torey

with a foreword by Daniel C. Dennett

**The MIT Press
Cambridge, Massachusetts
London, England**

© Zoltan Torey 1999

First MIT Press edition, 2009

First published in 1999 by Oxford University Press, 253 Normanby Road, South Melbourne, Australia.

All rights reserved. No part of this book may be reproduced in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from the publisher.

MIT Press books may be purchased at special quantity discounts for business or sales promotional use. For information, please email special_sales@mitpress.mit.edu or write to Special Sales Department, The MIT Press, 55 Hayward Street, Cambridge, MA 02142.

This book was set in Stone by Binghamton Valley Composition in Quark, and was printed and bound in the United States of America.

Library of Congress Cataloging-in-Publication Data

Torey, Zoltan.

The crucible of consciousness : an integrated theory of mind and brain / Zoltan Torey.—1st MIT Press ed.

p. cm.

“A Bradford book.”

Originally published: Melbourne ; New York : Oxford University Press, 1999. With new foreword.

Includes bibliographical references and index.

ISBN 978-0-262-51284-8 (pbk. : alk. paper)

1. Consciousness. I. Title.

BF311.T655 2009

153—dc22

2008041421

10 9 8 7 6 5 4 3 2 1

Index

Page references to the glossary appear in bold

- Adrenalin, 28, **231**
- Algorithm, 1, 77, 156–157, 160, **231**
- Animism, 121, 170, 179, 202, **231**
- Anthropic principle, 196, **231**
- Anthropocentrism, 183, 186, 192, 196, 203
- Anthropoid apes, 47
- Arborization, 47–48, 133, **231**
- Armstrong, D.M., 135
- Arousal, 19–22, 31, 34, 36, 39–42, 74, 132–133, 149, 185
- Artificial intelligence, 6, 9, 78, 155, **231**
- Assent, test by, 145–146
- Asymmetry, 21, 34, 39, 41, 44, 55, **235**
- Asymptotic, 191, 198, **232**
- Australopithecus*, 29–30, 91, 185, **232**
- Auto-catalytic surge, 35, 183, **232**
- Auto-causal, 140
- Autonomy
- cortical, 21, 204
 - functional, 31–32, 35, 74, 147, 150–152, 181, 205, **235**
- Awareness, 2–4, 6
- Bickerton, D., 7, 10, 20, 23, 49, 60, 70–71, 76, 156
- Bioelectric data, 19, 36, 45
- Bipedalism, 26, 28–29
- Blakemore, C., 9, 63, 105, 155
- Body tonicity, 31
- Bohm, D., 185, 191
- Bohr, N., 191
- Bootstrapping, 138
- Brainstem, 19, 133, **240**
- Broca's area, 26, 29, 55, **232**
- Bronowski, J., 37, 59
- Carello, C., 158, 165
- Censoring function, 131
- Chalmers, D., 5–6, 10–11, 117–118, 156
- Chimpanzee, 26, 29–30, 88–91, 124
- Chomsky, N., 33, 77–80, 82–84, 86–87, 92, 97–98, 129, 155, 158–159, 162, 176
- Churchland, P. S., 10, 117
- Circularity, regressive, 96, 163, **240**
- Clark, T. W., 117
- Connotation, 22, 42
- Consciousness, 4–8, 23, 95, 99–101, 116–117, 149, 158, 196, 204
- Constancy, mechanism, 20, 44, 56, 59, 63, 73, **233**
- Contour clarity, 36, **233**
- Cook, N., 3
- Corpus callosum, 19, 22, 45, 133, **233**
- Counterdistortion, 57
- Cowan, J. D., 32, 143

- Creutzfeldt, O. D., 115, 126
 Crick, F., 118, 186
 Cultural lag, 178, **233**
- Darwin, C., 2, 13
 Darwinian selection, 150
 Davies, P., 195, 206–207
 Deep structure, 80, **233**
 Dennett, D. C., 1, 3, 6, 8, 77, 146, 156–157, 189
 Denotation, 22, 42
 Determinism, 23, 141
 Deviation amplification, 27, 49, 153
 Dirac, P., 199
 Dissipative structures, 183, **233**
 Dominance hierarchy, 168
 Dominant side, 40, **234**
 Donald, M., 53, 56, 81, 91
 Doublestranded processing, 85, 109–115
 Downward causation, 103, 110, 149
 Dualism, mind–body, 5–6, 14, 21, 110, 117, 126, 190
 Dualistic interactions, 143–144
 Dual representation, 20, 33, 39, 41
 Durational span, 102
 Dyson, F., 189
- Eccles, J., 100, 124, 144–145
 Echo-response, 40
 Edelman, G. M., 15, 43, 83, 102, 111, 131, 143, 150
 Enculturation, 47, **234**
 Endocrine shift, 28
 Endogram, 21, 39–40, 42–43, 45, 58, 72, 97, 102–109, 111, 114–115, 118–122, 131–132, 158, 162, 165, 177, 181, **234**
 Energy balance of the universe, 195
 Energy consumption, 184
 Entelechy, 132, 135–136, 138, 140, 147, 153, 166, 181, 187, 200, 205, 212n, **234**
- Entropy, 150, 153, 184, 191, 193, 195, 200, 208, 211n, **234**
 Epigenesis, 83–84, 185–186
 Epiphenomenalism, 143–144, 146, **234**
 Epistemology, 205, **234**
 Executive role, 147–149
 Explication, 18, 185
- Feature markers, 83, **235**
 Feedback, 16, 49, 61, 71, 81–82, 106, 124, 167, 178, 183, **233**
 Forced drift, 49, **235**
 Forces, fundamental, 192, 194, 207
 Formalism, 17, 46, 82
 Free will, 17, 23, 103, 132, 135–136, 138, 140–141, 147, 150, 153, 198
 Frontal evaluation cortex, 132, **235**
 Frontal scanning, 63, 65, 73, **235**
- Gallup, G. G., 90
 Gazzaniga, M. S., 6, 22, 66, 72, 95, 147–148, 152
 Genotype, 28, **235**
 Gnostic, 199, **235**
 Gödel, K., 158–159, **235**
 Goodall, J., 168
 Gould, S. J., 27, 175
 Guiard, Y., 41
 Gunderson, K., 157, 161–162
- Hadamard, J., 157, 175
 Hampden-Turner, C., 142
 Hassler, R., 130
 Hawking, S., 194
 Headless woman illusion, 135, 146
 Hofstadter, D. R., 77, 95, 102, 189
 Holograph, 197, 199, **235**
 Hominid evolution, 25, 58
 Hopi, 181, **236**
 Hormones, sympathico-adrenal, 27
 Hume, D., 141, 143
 Humphrey, N., 140

- Hunter-gatherers, 168–169
 Hybridization, 6, 163–164
 Hypnosis, 113, 148
- Imprint, 48, 50, 152, **236**
 Indeterminacy, causal, 152–153, 181, 190, **236**
 Inhibition surround, 36, 105, **236**
 Intentionality, 3, 106, 137–138, 151, 156, 161, 211n, **236**
 Interplay (cross-hemispheric), 16, 26, 36, 40–41, 43, 45–46, 51, 54, 57, 72, 120, 187
 Intracortical loop, 137, 148, **236**
- Khroustov, G. E., 92–93
 Kimura, D., 85
 Kinsbourne, M., 42
 Koch, C., 118
 Krantz, G. S., 47
 Kugler, P. N., 158, 165
- La Barre, W., 172
 Lateralization of function, 29–30
 Le Doux, J., 66, 72, 95, 147–148, 152
 Leibnitz, G., 198
 Lenneberg, E. H., 25, 31–32, 39, 48, 53, 162
 Libet, B., 97, 118, 135, 149
 Limbic areas, 22, 132, **237**
 Linguistic universals, 78, 83, **237**
 Logical indeterminacy, 145, **237**
 Lorenz, K., 15, 57, 98, 142, 164, 171, 203
 Luria, I., 199
- MacKay, D., 145–146
 Maruyama, M., 27, 49
 Master neuron, 99, **237**
 Matching function, 119–120
 Mateer, C., 85
 Materialism, 143
 Mead, M., 67–68
- Mind analogue, 17, 157, 161
 Mind–body dualism, 5, 14, 21, 26
 Minsky, M., 9–10, 116
 Modality representation, 33, 44, 78
 Monod, J., 35, 137, 179–180, 182–187, 192, 199, 202, 208
 Motor areas, 19, 39, 49, 137, **237**
 Mountcastle, V., 21
 MRI, 10–12, **237**
 Mundugumor, 171, **237**
 Mysterionism, 5
- Nagel, T., 96, 135
 Natural selection, 13, 25, 150, 156, **237**
 Ndembu, 172, **237**
 Neanderthal, 67, **237**
 Negative entropy, 150, 153, 191, 193, 211n, 238
 Neoteny, 27, 29, 32, **238**
 Noradrenalin, 28, **238**
- Oakley, D. A., 115, 129, 171
 Objectification, 57, **238**
 O’Keefe, J., 109, 126, 166
 Ontological freedom, 146
 Operator-shift, 146, **238**
 Ornstein, R. E., 34, 41
 Oscillation, 20, 22, 34, 39–42, 45, 55, 112–114, 118, 120, 134, 211n
- Pair-bonding, 108
 Paleolithic stagnation, 47–49
 Panpsychism, 100, 143–144, **238**
 Paradigm, **238**
 computational, 160
 delayed feedback, 124
 hypnosis, 148
 matter/spirit, 145
 perceptual defence, 105
 reflective-awareness, 107
 speech, 51
 Penrose, R., 157–158, 190–191, 196

- Percept, **238**
 primary, 33–34, 36, 40, 43–45, 50–51
 secondary, 33–34, 40–41, 43–45, 50
 word-, 20, 39, 41
- PET, 10–12, 78, **239**
- Petitto, L., 89
- Phenotype, 28, **239**
- Philosophy
 analytical, 143, 155, 158
 of mind, 3, 117
- Phrase markers, 79, **239**
- Plasticity, 27, 29, 32, 47–48, **239**
- Pleistocene, 25, 28, **232, 239**
- Pliocene, 25, **239**
- Ploog, G., 48, 84
- Pontifical area, 99, **239**
- Porter, G., 184
- Posner, M., 10, 78, 104
- Post-hypnotic suggestion, 148
- Postnatal learning, 27
- Postnatal neural growth, 47
- Preaction potential, 137–138
- Prebiotic, 186, **239**
- Prigogine, I., 183–185
- Proprioception, 10, 17, 34, 39, 41, 55,
 72, 109–110, 113, 120–121,
 123–124, 126–127, 139, 165, **239**
- Protolanguage, 20, 48–49, 53, 58–61,
 67, 69–71, 73, 92
- Protopercept, 55, 63–65, 73
- Purposive causation, 180
- Qualia, 11–13, 211n, **239**
- Reductionism, 5, **240**
- Reentrance, 97, 103, 106, 109–115,
 165, **240**
- Reticular formation, 132, **240**
- Rose, S., 100
- Russell, B., 141, 159, 162–163
- Sachs, M., 198, 204
- Schema, 169–170, **240**
- Schrödinger, E., 2
- Searle, J., 3, 117, 147, 156
- Seidenberg, M. S., 89
- Selection. *See also* Natural selection
 factor, 27
 premium, 27
 pressures, 25
 principle, 150–151
- Self-reference, 37, 96, 100, 202, **240**
- Semantic congruence, 123, 126
- Shaw, R. E., 158, 165
- Sherrington, C. S., 24
- Sidedness, 29–30, 91
- Singularity, 194–199, 201, 208, **241**
- Singularity, temporal, 102, **242**
- Solipsism, 196, **241**
- Sommerhoff, G., 132
- Songbirds, 29
- Sperry, R. W., 40, 95–96, 103
- Split-brain studies, 40, 148, 172, **241**
- Structure dependence, 83, **241**
- Supplementary motor areas, 137, 144,
241
- Surface structure, 80, **241**
- Tachistoscopic, 131, **241**
- Taxonomic power, 170
- Teilhard de Chardin, P., 100, 182, 208
- Thematic fusion, 123, 126, **242**
- Thermodynamics, 183, 211n, **242**
- Tonicity, 31, **242**
- Towers, B., 74, 109
- Tripartite arrangement, 118
- Turner, V., 172
- Turvey, M. T., 158, 165
- Valency, 137, **242**
- Vocal bulge, 29, **242**
- Vocalization, 50, 53–54, 88
- Watts, A., 139
- Weinberg, A., 3, 192, 194
- Whorf, B. L., 81, 167–168, 181

- Wigner, E., 190, 201, 205–206
Wilson, E. O., 1, 14, 169–170, 178,
200–201, 206
Wittgenstein, L., 163–164, 167
- Young, J. Z., 35, 39
- Zaidel, E., 172
Zeki, S. M., 118
Zuni, 171, **242**