The Journal of Mind and Behavior

Vol. 45 No. 3 Summer 2024

Vol. 45 No. 4 Autumn 2024

ISSN 0271–0137

The Journal of Mind and Behavior (JMB) is dedicated to the interdisciplinary approach within psychology and related fields. Mind and behavior position, interact, and causally relate to each other in multi-directional ways; JMB urges the exploration of these interrelationships. The editors are particularly interested in scholarly work in the following areas: □ the psychology, philosophy, and sociology of experimentation and the scientific method □ the relationships among methodology, operationism, and theory construction □ the mind–body problem in the social sciences, psychiatry and the medical sciences, and the physical sciences □ philosophical impact of a mind–body epistemology upon psychology and its theories of consciousness □ critical examinations of the DSM–biopsychiatry–somatotherapy framework of thought and practice □ issues pertaining to the ethical study of cognition, self-awareness, and higher functions of consciousness in nonhuman animals □ phenomenological, teleological, existential, and introspective reports relevant to psychology, psychosocial methodology, and social philosophy □ historical perspectives on the course and nature of psychological science.

JMB is based upon the premise that all meaningful statements about human behavior rest ultimately upon observation — with no one scientific method possessing, a priori, greater credence than another. Emphasis upon experimental control should not preclude the experiment as a measure of behavior outside the scientific laboratory. The editors recognize the need to propagate ideas and speculations as well as the need to form empirical situations for testing them. However, we believe in a working reciprocity between theory and method (not a confounding), and in a unity among the sciences. Manuscripts should accentuate this interdisciplinary approach — either explicitly in their content, or implicitly within their point of view. (Note: we typically do not publish empirical research.)

JMB offers an immediate publication outlet on a quarterly basis. The Journal publishes one volume per year in the following sequence of issues: Winter, Spring, Summer, and Autumn. There are no submission fees or page costs for accepted manuscripts. JMB is a refereed journal, and all decisions will be made by peer reviewers, the assessing editors, associate editors, and chief editors. Commentaries and responses to individual articles and reviews are welcome. Authors subscribing at the time of manuscript submission are eligible for reduced subscription rates (see below).

All manuscripts should follow the style and preparation presented in the *Publication Manual of the American Psychological Association* (seventh edition, 2020). Particular attention should be paid to the citing of references, both in the text and on the reference page. [Note exceptions to APA style: JMB uses no ampersands or city/state abbreviations in referencing; articles use only three levels of section headings. Sample articles will be sent upon request.] Authors requesting blind review must specify and prepare their manuscripts accordingly. Manuscripts may be sent to the Editor either by post (one copy) or by email:

Raymond Chester Russ, Ph.D., Editor
The Journal of Mind and Behavior
Department of Psychology
University of Maine
5742 Williams Hall
Orono, Maine 04469–5742

Tel. (207) 581-2057
Email: jmb@maine.edu

Yearly subscription rates are $32.00 for students or hardship; $35.00 for past/present JMB authors or for those submitting manuscripts; $46.00 for individuals [individual subscriptions available in hard copy or pdf]; $195.00 for institutions. Air mail rates upon request. All back issues are available and abstracts are located at www.umaine.edu/jmb/. For detailed information contact our Circulation Department at The Institute of Mind and Behavior, P.O. Box 522, Village Station, New York City, New York 10014. Tel: (207) 581-2057.

continued inside back cover

The Journal of Mind and Behavior
Editorial Board

CONTENTS OF BACK ISSUES

A Psycho-Neuro-Endocrine Framework for Depression: A Clinically Eclectic Approach. *Elliot M. Frohman, University of California at San Diego* and *The Winfield Foundation.*

A Biofunctional Model of Distributed Mental Content, Mental Structures, Awareness, and Attention. *Asghar Iran-Nejad and Andrew Ortony, University of Illinois at Urbana–Champaign.*

The Double Bind and Koan Zen. *Patrick Jichaku, George Y. Fujita, and S.I. Shapiro, University of Hawaii.*

Occultism is not Science: A Reply to Kootte. *Richard de Mille, Santa Barbara, California.*

Volume 5, Number 3, Summer 1984

The Classification of Psychology among the Sciences from Francis Bacon to Boniface Kedrov. *Claude M.J. Braun, University of Quebec at Montreal, and Jacinthe M.C. Baribeau, Concordia University, Montreal.*

What is a Perceptual Mistake? *Aaron Ben-Zeev, University of Haifa.*

Affect: A Functional Perspective. *Asghar Iran-Nejad, Gerald L. Clore, and Richard J. Vondruska, University of Illinois at Urbana–Champaign.*

The Subjective Organization of Personal Consciousness: A Concept of Conscious Personality. *Thomas Natsoulas, University of California, Davis.*

The Effects of Sensation Seeking and Misattribution of Arousal on Dyadic Interactions Between Similar or Dissimilar Strangers. *Sarah Williams and Richard M. Ryckman, University of Maine at Orono.*

Fatalism as an Animistic Attribution Process. *Leigh S. Shaffer, West Chester University.*

Volume 5, Number 4, Autumn 1984

Logical Learning Theory: Kuhnian Anomaly or Medievalism Revisited? *Joseph F. Rychlak, Loyola University of Chicago.*

Mental Activity and Physical Reality. *Douglas M. Snyder, Berkeley, California.*

Unity and Multiplicity in Hypnosis, Commissurotomy, and Multiple Personality Disorder. *Dauid G. Benner, Wheaton College, and C. Stephen Evans, St. Olaf College.*

A Comparison of Three Ways of Knowing: Categorical, Structural, and Affirmative. *Viki McCabe, University of California, Los Angeles.*

Two Alternative Epistemological Frameworks in Psychology: The Typological and Variational Modes of Thinking. *Jaan Valsiner, University of North Carolina at Chapel Hill.*

Background and Change in B.F. Skinner's Metatheory from 1930 to 1938. *S.R. Coleman, Cleveland State University.*

A Critical Look at "A Critical Look": Castaneda Recrudescent. *Jordan Paper, York University.*

Logic is not Occultism. *Anton F. Kootte, University of North Florida.*

Volume 6, Numbers 1 and 2, Winter and Spring, 1985 (Special Issue)

The Sexual Body: An Interdisciplinary Perspective by Arthur Efron, SUNY-Buffalo.

Chapter One: *Introduction: The Perspective of the Sexual Body.*

Chapter Two: *Psychoanalysis as the Key Discipline.*

Chapter Three: *Analogues of Original Sin: The Postulate of Innate Destructive Aggression.*

Chapter Four: *The Reichian Tradition: A View of the Sexual Body.*

Chapter Five: *Challenges to Psychoanalytic Theory: Recent Developments.*

Chapter Six: *Reinventing the Asexual Infant : On the Recent "Explosion" in Infant Research.*

Chapter Seven: *The Adult Sexual Body: A Missing Theory.*

Chapter Eight: *The Sexual Body, Psychoanalysis and Science: Bowlby, Peterfreund, and Kohut.*

Chapter Nine: *Lichtenstein, Holland, and Lacan: Ambivalence Toward the Sexual Body, Cooptation, and Defiance.*

Chapter Ten: *World Hypotheses and Interdisciplinary Sciences in Intimate Relation.*

Volume 6, Number 3, Summer 1985

The Ethical Ramifications of Mediation Theory. *Paul G. Muscari, State University College of New York at Glens Falls.*

Logical Behaviorism and the Simulation of Mental Episodes. *Dale Jacquette, University of Nebraska at Lincoln.*

An Introduction to the Perceptual Kind of Conception of Direct (Reflective) Consciousness. *Thomas Natsoulas, University of California, Davis.*

Volume 6, Number 4, Autumn 1985

Volume 7, Number 1, Winter 1986

Volume 7, Numbers 2 and 3, Spring and Summer 1986 (Special Issue)

Contemporary Models of Consciousness: Part I. *Jean E. Burns, Consciousness Research, San Leandro, California.*
The Pluralistic Approach to the Nature of Feelings. *Thomas Natsoulas, University of California, Davis.*
Complementarity and the Relation Between Psychological and Neurophysiological Phenomena. *Douglas M. Snyder, Berkeley, California.*
The Moon Is Not There When I See It: A Response to Snyder. *Mark Garrison, Kentucky State University.*

Volume 11, Numbers 3 and 4, Summer and Autumn 1990 (Special Issue)

Challenging the Therapeutic State: Critical Perspectives on Psychiatry and the Mental Health System by David Cohen, Université de Montréal (Editor).
Introduction: The Medical Model as the Ideology of the Therapeutic State. *Ronald Leifer, Ithaca, New York.*
Toward the Obsolescence of the Schizophrenia Hypothesis. *Theodore R. Sarbin, University of California, Santa Cruz.*
Institutional Mental Health and Social Control: The Ravages of Epistemological Hubris. *Seth Farber, Network Against Coercive Psychiatry.*
Deinstitutionalization: Cycles of Despair. *Andrew Scull , University of California, San Diego.*
Twenty Years Since Women and Madness: Toward a Feminist Institute of Mental Health and Healing. *Phyllis Chesler, College of Staten Island, CUNY.*
The Ex-Patients' Movement: Where We've Been and Where We're Going. *Judi Chamberlin, Ruby Rogers Advocacy and Drop-In Center, Cambridge, Massachusetts.*
AIDS and the Psycho-Social Disciplines: The Social Control of "Dangerous" Behavior. *Mark S. Kaplan, University of Illinois at Urbana–Champaign.*
Therapeutic Professions and the Diffusion of Deficit. *Kenneth J. Gergen, Swarthmore College.*
The Futility of Psychotherapy. *George W. Albee, University of Vermont.*
The Name Game: Toward a Sociology of Diagnosis. *Phil Brown, Brown University* and *Harvard Medical School.*
Subjective Boundaries and Combinations in Psychiatric Diagnoses. *John Mirowsky, University of Illinois at Urbana–Champaign.*
Brain Damage, Dementia and Persistent Cognitive Dysfunction Associated with Neuroleptic Drugs: Evidence, Etiology, Implications. *Peter R. Breggin, Center for the Study of Psychiatry, Bethesda, Maryland.*
The Political Economy of Tardive Dyskinesia: Asymmetries in Power and Responsibility. *David Cohen, Université de Montréal, and Michael McCubbin, York University.*
Electroshock: Death, Brain Damage, Memory Loss, and Brainwashing. *Leonard Roy Frank, San Francisco, California.*
Behavior in a Vacuum: Social-Psychological Theories of Addiction that Deny the Social and Psychological Meanings of Behavior. *Stanton Peele, Mathernatica Policy Research, Princeton, New Jersey.*
The Conceptual Bind in Defining the Volitional Component of Alcoholism: Consequences for Public Policy and Scientific Research. *Richard E. Vatz, Towson State University, and Lee S. Weinberg, University of Pittsburgh.*
False Accusations of Sexual Abuse: Psychiatry's Latest Reign of Error. *Lee Coleman, Berkeley, California.*
Law and Psychiatry: The Problems That Will Not Go Away. *Thomas Szasz, State University of New York, Syracuse.*

Volume 12, Number 1, Winter 1991 (Special Issue)

Consciousness and Commissurotomy: III. Toward the Improvement of Alternative Conceptions. *Thomas Natsoulas, University of California, Davis.*
Perception Without Awareness and Electrodermal Responding: A Strong Test of Subliminal Psychodynamic Activation Effects. *Joseph M. Masling, State University of New York at Buffalo, Robert F. Bomstein, Gettysburg College, Frederick G. Poynton, State University of New York at Buffalo School of Medicine, Sheila Reed, University of Wyoming, and Edward S. Katkin, State University of New York at Stony Brook.*

Inferring Formal Causation from Corresponding Regressions. *William V. Chambers, University of South Florida.*
Beware the Illusion of Technique. *James T. Lamiell, Georgetown University.*
Untangling Cause, Necessity, Temporality, and Method: Response to Chambers' Method of Corresponding Regressions. *Richard N. Williams, Brigham Young University.*
Corresponding Regressions, Procedural Evidence, and the Dialectics of Substantive Theory, Metaphysics, and Methodology. *William V. Chambers, University of South Florida.*
Behavioral Paradigm for a Psychological Resolution of the Free Will Issue. *E. Rae Harcum, The College of William and Mary.*
Empirical and Philosophical Reactions to Harcum's "Behavioral Paradigm for a Psychological Resolution of the Free Will Issue." *Howard R. Pollio and Tracy Henley, The University of Tennessee at Knoxville.*
Some Theoretical and Methodological Questions Concerning Harcum's Proposed Resolution of the Free Will Issue. *Joseph F. Rychlak, Loyola University of Chicago.*
Parity for the Theoretical Ghosts and Gremlins: Response to Pollio/Henley and Rychlak. *E. Rae Harcum, The College of William and Mary.*

Volume 12, Number 2, Spring 1991

Ontological Subjectivity. *Thomas Natsoulas, University of California, Davis.*
A Measurable and Testable Brain-Based Emergent Interactionism: An Alternative to Sperry's Mentalist Emergent Internationalism. *Larry R. Vandervert, Spokane, Washington.*
In Defense of Mentalism and Emergent Interaction. *R.W. Sperry, California Institute of Technology.*
Toward a Model of Attention and Cognition Using a Parallel Distributed Processing Approach. Part 1: Background. *Gregory Christ, University of Ottawa.*
Socially Constituted Knowledge: Philosophical, Psychological, and Feminist Contributions. *William J. Lyddon, University of Southern Mississippi.*
Cultural Variation of Cognitive Processes From a Sociohistorical Psychological Perspective. *Carl Ratner, Humboldt State University.*
On Elitzur's Discussion of the Impact of Consciousness on the Physical World. *Douglas M. Snyder, Berkeley, California.*
Neither Idealism Nor Materialism: A Reply to Snyder. *Avshalom C. Elitzur, The Weizmann Institute of Science.*

Volume 12, Number 3, Summer 1991

The Study of Expression Within a Descriptive Psychology. *Stephan J. Holajter, Calumet College of St. Joseph.*
Toward a Model of Attention and Cognition, Using a Parallel Distributed Processing Approach. Part 2: The Sweeping Model. *Gregory Christ, University of Ottawa.*
Consciousness and AI: A Reconsideration of Shanon. *Tracy B. Henley, Mississippi State University.*
Consciousness and the Computer: A Reply to Henley. *Benny Shanon, The Hebrew University.*
Deconstructing the Chinese Room. *Gordon G. Globus, University of California, Irvine.*
Mind and Body: An Apparent Perceptual Error. *Fred S. Fehr, Arizona State University.*
Contemporary Models of Consciousness: Part II. *Jean E. Burns, Consciousness Research, San Leandro, California.*

Volume 12, Number 4, Autumn 1991

Manuscript Review in Psychology: Psychometrics, Demand Characteristics, and an Alternative Model. *Robert F. Bornstein, Gettysburg College.*
Problems of Burdens and Bias: A Response to Bornstein. *Ronald J. Rychlak, University of Mississippi, and Joseph F. Rychlak, Loyola University of Chicago.*
An Adversary Model of Manuscript Review: Further Comments. *Robert F. Bornstein, Gettysburg College.*
Near-Death Experiences and Systems Theories: A Biosociological Approach to Mystical States. *Bruce Greyson, University of Connecticut School of Medicine.*
From Critic to Theorist: Themes in Skinner's Development from 1928 to 1938. *S.R. Coleman, Cleveland State University.*

On the Modeling of Emergent Interaction: Which Will it Be, The Laws of Thermodynamics, or Sperry's "Wheel" in the Subcircuitry? *Larry R. Vandervert, Spokane, Washington.*

Volume 13, Number 1, Winter 1992

Causal Knowledge: What Can Psychology Teach Philosophers? *Evan Fales and Edward A. Wasserman, The University of Iowa.*
Quantum Theory and Consciousness. *Ben Goertzel, University of Nevada, Las Vegas.*
Consciousness and Commissurotomy: IV. Three Hypothesized Dimensions of Deconnected Left-Hemispheric Consciousness. *Thomas Natsoulas, University of California, Davis.*
The Physiology of Desire. *Keith Butler, University of New Orleans.*
Constructivist Psychology: A Heuristic Framework. *William J. Lyddon and James T. McLaughlin, University of Southern Mississippi.*

Volume 13, Number 2, Spring 1992

Residual Asymmetrical Dualism: A Theory of Mind–Body Relations. *Arthur Efron, State University of New York at Buffalo.*
Toward a Model of Attention and Cognition, Using a Parallel Distributed Processing Approach. Part 3: Consequences and Implications of the Sweeping Model. *Gregory Christ, University of Ottawa.*
Being at Rest. *Douglas M. Snyder, Los Angeles, California.*
Neurophysiological Speculations on Zen Enlightenment. *Gerhard H. Fromm, University of Pittsburgh.*
Toward an Improved Understanding of Sigmund Freud's Conception of Consciousness. *Thomas Natsoulas, University of California, Davis.*

Volume 13, Number 3, Summer 1992

How to be a Scientifically Respectable "Property-Dualist." *Ran Lahav, Southern Methodist University, and Niall Shanks, East Tennessee State University.*
A Plea for the Poetic Metaphor. *Paul G. Muscari, State University of New York at Glens Falls.*
Quantum Mechanics and the Involvement of Mind in the Physical World: A Response to Garrison. *Douglas M. Snyder, Berkeley, California.*
Turnabout on Consciousness: A Mentalist View. *R.W. Sperry, California Institute of Technology.*
Intentionality, Consciousness, and Subjectivity. *Thomas Natsoulas, University of California, Davis.*

Volume 13, Number 4, Autumn 1992

Humanistic Psychology, Human Welfare and the Social Order. *Isaac Prilleltensky, Wilfrid Laurier University.*
On Private Events and Theoretical Terms. *Jay Moore, University of Wisconsin–Milwaukee.*
A Teleologist's Reactions to "On Private Events and Theoretical Terms." *Joseph F. Rychlak, Loyola University of Chicago.*
On Professor Rychlak's Concerns. *Jay Moore, University of Wisconsin–Milwaukee.*
Appendage Theory—Pro and Con. *Thomas Natsoulas, University of California, Davis.*
Freud on Dreams and Kosslyn on Mental Imagery. *Derek Drakoulis Nikolinakos, Temple University.*

Volume 14, Number 1, Winter 1993

Altered Sensory Environments, Altered States of Consciousness and Altered-State Cognition. *Joseph Glicksohn, Tel Aviv University and The Open University of Israel.*
CPU or Self-Reference: Discerning Between Cognitive Science and Quantum Functionalist Models of Mentation. *Kim McCarthy, University of Oregon and Columbia College Chicago, and Amit Goswami, University of Oregon.*
The Naturalists versus the Skeptics: The Debate Over a Scientific Understanding of Consciousness. *Valerie Gray Hardcastle, Virginia Polytechnic Institute and State University.*
Relativism in Gibson's Theory of Picture Perception. *David M. Boynton, University of Maine.*
A New Kind of Transference. *Lauren Lawrence, The New School for Social Research.*

Volume 14, Number 2, Spring 1993

Some Personal Reflections on the APA Centennial. *Seymour B. Sarason, Yale University.*
Consciousness$_4$: Varieties of Intrinsic Theory. *Thomas Natsoulas, University of California, Davis.*

Can Relating the Past Disclose the Future? *Salomon Rettig, Hunter College of CUNY.*
Quantum Mechanics is Probabilistic in Nature. *Douglas M. Snyder, Los Angeles, California.*
Depth of Processing Versus Oppositional Context in Word Recall: A New Look at the Findings of "Hyde and Jenkins" as Viewed by "Craik and Lockhart." *Joseph F. Rychlak and Suzanne Barnard, Loyola University of Chicago.*
Consciousness and Commissurotomy: V. Concerning an Hypothesis of Normal Dual Consciousness. *Thomas Natsoulas, University of California, Davis.*

Volume 14, Number 3, Summer 1993

The Ability of the Sweeping Model to Explain Human Attention: A Commentary on Christ's Approach. *Kevin P. Weinfurt, Georgetown University.*
Reply to "The Ability of the Sweeping Model to Explain Human Attention." *Gregory J. Christ, University of Ottawa.*
Self-Talk and Self-Awareness: On the Nature of the Relation. *Alain Morin, Memorial University of Newfoundland.*
An Introduction to Reflective Seeing: Part I. *Thomas Natsoulas, University of California, Davis.*
Realpolitik in the Addictions Field: Treatment-Professional, Popular-Culture Ideology, and Scientific Research. *Robert E. Haskell, University of New England.*
Neurological Positivism's Evolution of Mathematics. *Larry R. Vandervert, Spokane, Washington.*

Volume 14, Number 4, Autumn 1993

Diagnostic Reasoning and Reliability: A Review of the Literature and a Model of Decision-making. *Jonathan Rabinowitz, Bar Ilan University.*
The Importance of Being Conscious. *Thomas Natsoulas, University of California, Davis.*
The History and Current Status of the Concept "Behavior": An Introduction. *Tracy B. Henley, Mississippi State University.*
A History of Behavior. *Thomas H. Leahey, Virginia Commonwealth University.*
What Counts as "Behavior"? *James J. Jenkins, University of South Florida.*
Behavior as Telosponsivity Rather Than Responsivity. *Joseph F. Rychlak, Loyola University of Chicago.*
Behavior, Adaptation, and Intentionality: Comments on Rychlak, Leahey, and Jenkins. *Stephen Hibbard, University of Tennessee.*
Intentionality and Epistemological Commitment: A Comment on Hibbard. *James J. Jenkins, University of South Florida.*
Intention in Mechanisms and the Baconian Criticism: Is the Modern Cognitivist Reviving Aristotelian Excesses? *Joseph F. Rychlak, Loyola University of Chicago.*

Volume 15, Numbers 1 and 2, Winter and Spring 1994

Challenging the Therapeutic State, Part Two: Further Disquisitions on the Mental Health System by David Cohen, Université de Montréal (Editor).
Environmental Failure–Oppression is the Only Cause of Psychopathology. *David H. Jacobs, National University.*
Limitations of the Critique of the Medical Model. *Ken Barney, Cambridge, Massachusetts.*
Deinstitutionalization: The Illusion of Disillusion. *Michael McCubbin, Université de Montréal.*
Something is Happening: The Contemporary Consumer and Psychiatric Survivor Movement in Historical Context. *Barbara Everett, Homeward Projects, Toronto.*
The Myth of the Reliability of DSM. Stuart A. Kirk, UCLA, School of Social Welfare, and *Herb Kutchins, California State University, Sacramento.*
Caseness and Narrative: Contrasting Approaches to People Who are Psychiatrically Labeled. *Michael A. Susko, Essex Community College, Maryland.*
Blaming the Victims: Silencing Women Sexually Exploited by Psychotherapists. *Catherine D. Nugent, Treatment Exploitation Recovery Network.*
Neuroleptic Drug Treatment of Schizophrenia: The State of the Confusion. *David Cohen, Université de Montréal.*
Determining the Competency of the Neediest. *Jonathan Rabinowitz, Bar-Ilan University.*
ECT: Sham Statistics, the Myth of Convulsive Therapy, and the Case for Consumer Misinformation. *Douglas G. Cameron, World Association of Electroshock Survivors.*

Body Image and Body Schema in a Deafferented Subject. *Shaun Gallagher, Canisius College, and Jonathan Cole, University of Southampton and Poole Hospital, Dorset.*

The Completeness of Systems and the Behavioral Repertoire. *Robert E. Lana, Temple University.*

The Linguistic Network of Signifiers and Imaginal Polysemy: An Essay in the Co-dependent Origination of Symbolic Forms. *Harry Hunt, Brock University.*

Psychiatric Drugging: Forty Years of Pseudo-Science, Self-Interest, and Indifference to Harm. *David H. Jacobs, Center for the Study of Psychiatry and Psychology — West.*

Volume 17, Number 1, Winter 1996

Lobotomy in Scandinavian Psychiatry. *Joar Tranøy, University of Oslo.*

Instrument Driven Theory. *Warren W. Tryon, Fordham University.*

Disunity in Psychology and Other Sciences: The Network or the Block Universe? *Wayne Viney, Colorado State University.*

The Sciousness Hypothesis — Part I. *Thomas Natsoulas, University of California, Davis.*

Volume 17, Number 2, Spring 1996

Social Epistemology and the Recovery of the Normative in the Post-Epistemic Era. *Steve Fuller, University of Durham.*

Problems with the Cognitive Psychological Modeling of Dreaming. *Mark Blagrove, University of Wales Swansea.*

Mad Liberation: The Sociology of Knowledge and the Ultimate Civil Rights Movement. *Robert E. Emerick, San Diego State University.*

The Presence of Environmental Objects to Perceptual Consciousness: Consideration of the Problem with Special Reference to Husserl's Phenomenological Account. *Thomas Natsoulas, University of California, Davis.*

The Sciousness Hypothesis — Part II. *Thomas Natsoulas, University of California, Davis.*

Volume 17, Number 3, Summer 1996

Measurement Units and Theory Construction. *Warren W. Tryon, Fordham University.*

Memory: A Logical Learning Theory Account. *Joseph F. Rychlak, Loyola University of Chicago.*

How We Get There From Here: Dissolution of the Binding Problem. *Valerie Gray Hardcastle, Virginia Polytechnic Institute and State University.*

The Case for Intrinsic Theory I. An Introduction. *Thomas Natsoulas, University of California, Davis.*

Volume 17, Number 4, Autumn 1996

Bridging Social Constructionism and Cognitive Constructivism: A Psychology of Human Possibility and Constraint. *Jack Martin and Jeff Sugarman, Simon Fraser University.*

The Role of Data and Theory in Covariation Assessment: Implications for the Theory-Ladenness of Observation. *Eric G. Freedman, University of Michigan, Flint, and Laurence D. Smith, University of Maine.*

On the Relation Between Behaviorism and Cognitive Psychology. *Jay Moore, University of Wisconsin, Milwaukee.*

The Case for Intrinsic Theory: II. An Examination of a Conception of Consciousness$_4$ as Intrinsic, Necessary, and Concomitant. *Thomas Natsoulas, University of California, Davis.*

Volume 18, Number 1, Winter 1997

Psychiatry and Capitalism. *Richard U'Ren, Oregon Health Sciences University.*

What Multiple Realizability Does Not Show. *Robert M. Francescotti, San Diego State University.*

Spirituality, Belief, and Action. *Hayne W. Reese, West Virginia University.*

Consciousness and Self-Awareness — Part I: Consciousness$_1$, Consciousness$_2$, and Consciousness$_3$. *Thomas Natsoulas, University of California, Davis.*

Consciousness and Self-Awareness — Part II: Consciousness$_4$, Consciousness$_5$, and Consciousness$_6$. *Thomas Natsoulas, University of California, Davis.*

Volume 18, Numbers 2 and 3, Spring and Summer 1997 (Special Issue)

Understanding Tomorrow's Mind: Advances in Chaos Theory, Quantum Theory, and Consciousness in Psychology by Larry Vandervert, American Nonlinear Systems (Editor).

Volume 21, Numbers 1 and 2, Winter and Spring 2000 (Special Issue)

Brain, Knowledge, and Self-Regulation by Asghar Iran-Nejad, University of Alabama (Editor).

Foreword. *Asghar Iran-Nejad, University of Alabama.*

Introduction: The Current State of the Biofunctional Theory of Cognition. *Suzanne Hidi, University of Toronto.*

Bartlett's Schema Theory and Modern Accounts of Learning and Remembering. *Asghar Iran-Nejad and Adam Winsler, University of Alabama.*

Bartlett, Functionalism, and Modern Schema Theories. *William F. Brewer, University of Illinois at Urbana–Champaign.*

Sources of Internal Self-Regulation with a Focus on Language Learning. *Yasushi Kawai, Hokkaido University, Rebecca L. Oxford, Columbia University, and Asghar Iran-Nejad, University of Alabama.*

Response to "Sources of Internal Self-Regulation with a Focus on Language Learning." *Susan R. Schapiro, University at Buffalo, SUNY.*

Knowledge, Self-Regulation, and the Brain–Mind Cycle of Reflection. *Asghar Iran-Nejad, University of Alabama.*

Keep the Solution, Broaden the Problem: Commentary on "Knowledge, Self-Regulation, and the Brain–Mind Cycle of Reflection." *Richard S. Prawat, Michigan State University.*

The Biofunctional Theory of Knowledge and Ecologically Informed Educational Research. *George G. Hruby, University of Georgia.*

Rethinking the Origin of Morality and Moral Development. *Stacey Alldredge, Emmanuel College, and W. Pitt Derryberry, Michael Crowson, and Asghar Iran-Nejad, University of Alabama.*

Models of Moral Development. *Stephen J. Thoma, University of Alabama.*

A Nonlinear, GA-optimized, Fuzzy Logic System for the Evaluation of Multisource Biofunctional Intelligence. *Abdollah Homaifar, Vijayarangan Copalan, and Lynn Dismuke, North Carolina A&T State University and Asghar Iran-Nejad, University of Alabama.*

Commentary on "A Nonlinear, GA-optimized, Fuzzy Logic System for the Evaluation of Multisource Biofunctional Intelligence." *Gerry Dozier, Auburn University.*

The Nature of Distributed Learning and Remembering. *Asghar Iran-Nejad, University of Alabama and Abdollah Homaifar, North Carolina A&T State University.*

Commentary on "The Nature of Distributed Learning and Remembering." *Edward W. Tunstel, Jr., California Institute of Technology.*

The Brain Between Two Paradigms: Can Biofunctionalism Join Wisdom Intuitions to Analytic Science? *Eleanor Rosch, University of California, Berkeley.*

Knowledge Acquisition and Education. *Merlin C. Wittrock, University of California, Los Angeles.*

Issues in Self-Regulation Theory and Research. *Paul R. Pintrich, University of Michigan, Ann Arbor.*

Heeding Prawat and Hruby: Toward an Articulation Between Biofunctional and Post-modern Theories of Human Experience. *Jerry Rosiek and Asghar Iran-Nejad, University* of Alabama.

Volume 21, Number 3, Summer 2000 (Special Issue)

Toward a Unified Psychology: Incommensurability, Hermeneutics, and Morality by Stephen C. Yanchar and Brent D. Slife, Brigham Young University (Editors).

The Problematic of Fragmentation: A Hermeneutic Proposal. *Stephen C. Yanchar and Brent D. Slife, Brigham Young University.*

Progress, Unity, and Three Questions about Incommensurability. *Stephen C. Yanchar, Brigham Young University.*

Are Discourse Communities Incommensurable in a Fragmented Psychology? The Possibility of Disciplinary Coherence. *Brent D. Slife, Brigham Young University.*

On What Basis are Evaluations Possible in a Fragmented Psychology? An Alternative to Objectivism and Relativism. *Kristoffer B. Kristensen, Brent D. Slife, and Stephen C. Yanchar, Brigham Young University.*

Overcoming Fragmentation in Psychology: A Hermeneutic Approach. *Frank C. Richardson, University of Texas at Austin.*

Fragmentation, Hermeneutics, Scholarship, and Liberal Education in Psychology. *Jack Martin, Simon Fraser University.*

Putting It All Together: Toward a Hermeneutic Unity of Psychology. *Stephen C. Yanchar and Brent D. Slife, Brigham Young University.*

Chapter One: *Setting the Problems.*
Chapter Two: *The Behavior Analytic Approach to Language and Thought.*
Chapter Three: *The Cognitive Approach to Language and Thought.*
Chapter Four: *Current Language Theories.*
Chapter Five: *Behavior, Cognition, and Society.*
Chapter Six: *Attitude.*
Chapter Seven: *Deconstruction and Psychology.*
Chapter Eight: *The Behavior–Cognition Dichotomy.*

Volume 23, Number 3, Summer 2002

Intertheoretic Identification and Mind–Brain Reductionism. *Mark Crooks, Michigan State University.*
Don't Go There: Reply to Crooks. *Larry Hauser, Alma College.*
Identism without Objective Qualia: Commentary on Crooks. *James W. Kalat, North Carolina State University.*
The Compatibility of Direct Realism with the Scientific Account of Perception; Comment on Mark Crooks. *J.J.C. Smart, Monash University.*
Comment on Crooks's "Intertheoretic Identification and Mind–Brain Reductionism." *John Smythies, University of California, San Diego and Institute of Neurology, Queen Square, London.*
Four Rejoinders: A Dialogue in Continuation. *Mark Crooks, Michigan State University.*
Understanding Physical Realization (and what it does not entail). *Robert Francescotti, San Diego State University.*
The Experiential Presence of Objects to Perceptual Consciousness: Wilfrid Sellars, Sense Impressions, and Perceptual Takings. *Thomas Natsoulas, University of California, Davis.*

Volume 23, Number 4, Autumn 2002

Missing the Experiential Presence of Environmental Objects: A Construal of Immediate Sensible Representations as Conceptual. *Thomas Natsoulas, University of California, Davis.*
Nature's Psychogenic Forces: Localized Quantum Consciousness. *L. Frederick Zaman III, Neural Engineering Research & Development, Hill Air Force Base.*
Perceptual Experience and Its Contents. *Josefa Toribio, Indiana University.*
How To Do Things With Emotions. *Matthew P. Spackman, Brigham Young University.*

Volume 24, Number 1, Winter 2003

The Case for Intrinsic Theory: VII. An Equivocal Remembrance Theory. *Thomas Natsoulas, University of California, Davis.*
Broken Brains or Flawed Studies? A Critical Review of ADHD Neuroimaging Research. *Jonathan Leo, Western University of Health Sciences, and David Cohen, Florida International University.*
Instructionism is Impossible Due to the Second Law of Thermodynamics. *Halvor Naess, Haukeland University Hospital.*
Genetic Explanation in Psychology. *Marko Barendregt, Vrije Universiteit, Amsterdam.*
Human Consciouness: A Systems Approach to the Mind/Brain Interaction. *Martin L. Lonky, The Trylon Corporation.*

Volume 24, Number 2, Spring 2003

Altered States and the Study of Consciousness — The Case of Ayahuasca. *Benny Shanon, The Hebrew University.*
Schema, Language, and Two Problems of Content. *Deborah K. Heikes, University of Alabama, Huntsville.*
Intrinsic Theory and the Content of Inner Awareness. *Uriah Kriegel, Brown University.*
Agent Causation, Functional Explanation, and Epiphenomenal Engines: Can Conscious Mental Events Be Causally Efficacious? *Stuart Silvers, Clemson University.*
What Is This Autonoetic Consciousness? *Thomas Natsoulas, University of California, Davis.*

Volume 24, Numbers 3 and 4, Summer and Autumn 2003

The Bystander Effect and the Passive Confederate: On the Interaction Between Theory and Method. *Joseph W. Critelli and Kathy W. Keith, University of North Texas.*

Volume 38, Number 1, Winter 2017

John B. Watson's Classical S–R Behaviorism. *J. Moore, University of Wisconsin – Milwaukee.*
Self-belief and Agency. *Nick Zangwill, University of Hull.*
A Philosophical and Rhetorical Theory of BDSM. *Timo Airaksinen, University of Helsinki.*
Moral Nihilism and its Implications. *Marc Krellenstein, Northeastern University.*

Volume 38, Number 2, Spring 2017

Strawson's Case for Mental Passivity. *George Seli, St. John's University.*
The Twin Vantage Point Paradox: A Thought Experiment. *Baland Jalal, University of Cambridge and Vilayanur S. Ramachandran, University of California at San Diego.*
General Intelligence: Adaptation to Evolutionarily Familiar Abstract Relational Invariants, Not to Environmental or Evolutionary Novelty. *Kenneth A. Koenigshofer, University of Maryland University College.*
Critical Notice: Wrestling with the Absurd: Enaction Meets Non-Sense. *Sebastjan Vörös, University of Ljubljana.*

Volume 38, Numbers 3 and 4, Summer and Autumn 2017

The Place of Ordinary Psychological Categories in Behavior Analysis. *Filipe Lazzeri, Federal University of Goias.*
Animal Cognition: An Aristotelean–Thomistic Perspective. *James M. Stedman, University of Texas Health Science Center San Antonio, Matthew Kostelecky, St. Joseph's College at the University of Alberta, Thomas L. Spalding and Christina L. Gagné, University of Alberta.*
The Evolutionary Function of Consciousness and Fregean Representationalism. *Elizabeth Turzynski, Cardiff University.*
Critical Notice: Over and Beyond our Episodic Memories. *Christopher Jude McCarroll, Macquarie University.*
Critical Notice: Confronting Emerging New Technology: The Case of the Sexbots. *Richard T. McClelland, Nanaimo, British Columbia.*
Book Review: *Psychedelic Medicine* by Richard Louis Miller. Reviewed by Tom Trueb, LSW Retired, Delphi, Indiana.

Volume 39, Numbers 1 and 2, Winter and Spring 2018 (Special Issue)

The Propeller Experiment Controller: Automation for the Comparative Analysis of Behavior in Research and Teaching by Christopher A. Varnon, Converse College and Charles I. Abramson, Oklahoma State University.
Chapter One: *Introduction.*
Chapter Two: *Technical Specifications of the Parallax Propeller.*
Chapter Three: *Programming the Propeller with Spin.*
Chapter Four: *Getting Started with the Propeller Experiment Controller.*
Chapter Five: *Propeller Experiment Controller Overview.*
Chapter Six: *Experimental Event.*
Chapter Seven: *Experimental Functions.*
Chapter Eight: *Applications of the Propeller Experiment Controller.*
Chapter Nine: *Future Directions and Conclusion.*
References
Appendix A: *Glossary*
Appendix B: *Useful Links*
Appendix C: *Character Charts*

Volume 39, Number 3, Summer 2018

How Sustainable are Different Levels of Consciousness? *Erik J. Wiersma, Alba Biologics.*
Accounting for the Specious Present: A Defense of Enactivism. *Kaplan Hasanoglu, Emmanuel College.*
Broken Brains or Flawed Studies? An Update on Leo and Cohen's Critical Review of ADHD Neuroimaging. *Charles Marley, University of Edinburgh, Anna M. O'Leary, University of Edinburgh, and Vasiliki-Aliki Nikopoulou, University of Edinburgh.*
Shamelessness in Jane Austen: The Case of Lady Susan. *Richard T. McClelland, Nanaimo, British Columbia.*

The Journal of Mind and Behavior

Vol. 45 Nos. 3 and 4

Summer and Autumn 2024

Library of Congress Cataloging in Publication Data

The Journal of Mind and Behavior. – Vol. 1, no. 1 (spring 1980)–
– [New York, N.Y.: Journal of Mind and Behavior, Inc.] c1980–

1. Psychology–Periodicals. 2. Social psychology–Periodicals. 3. Philosophy–Periodicals.I. Institute of Mind and Behavior

BF1.J6575 150'.5 82–642121
ISSN 0271–0137 AACR 2 MARC-S

The Journal of Mind and Behavior

Summer and Autumn 2024 Vol. 45 Nos. 3 and 4

CONTENTS

The Journal of Mind and Behavior
Summer and Autumn 2024, Volume 45, Numbers 3 and 4
Pages 219–234
ISSN 0271–0137

Alien Minds, Blindsight, and the Evolutionary Origins of Consciousness

H.G. Callaway

Temple University

In his recent book, *Other Minds*, philosopher Peter Godfrey–Smith starts with an epigraph from William James (1890) on the need for *continuity* in accounts of the origin of consciousness (Godfrey–Smith, 2016a, p. vii). Godfrey–Smith approaches the evolution of consciousness by "thinking about different sorts of animals" and "the long spans and successive regimes in the history of life." Among philosophers, he lists the positive influence of Daniel Dennett. Evaluating Godfrey–Smith's claims in the philosophy of mind in comparison to James and Dennett, on the defense of the "Spencerian," adaptationist view of Darwin and evolution, helps locate Godfrey–Smith's philosophy of psychology and mind. In spite of affinity with themes from Herbert Spencer, James and Dennett on biological evolution, Godfrey–Smith gets James's psychology wrong. Partly in consequence, tension arises from Godfrey–Smith's thesis that "subjective experience," as contrasted with consciousness, arrived quite early in evolutionary history. Another claim is that human encounters with the octopus are probably the closest we will come to meeting an intelligent alien. Review of Godfrey–Smith's accounts of cephalopod intelligence provides relevant evidence from ethology. What eventually becomes doubtful, as argued below, is the scant attention to the experimental phenomenon of blindsight; and there is a related philosophical equation of sensory–motor intelligence with subjective experience. Following Dennett's "instrumentalism" too closely leads to serious misunderstanding of James; and misunderstanding James as an "internalist" gives rise to doubtful and poorly argued theses concerning consciousness and subjective experience. Godfrey–Smith's theory of "subjective experience" in contemporary animals does not rule out plausible, nonconscious alternatives regarding their ancient, Cambrian forbearers.

Keywords: consciousness, blindsight, evolution, continuity

Continuity, William James and Other Minds

Consulting Daniel Dennett's work (Dennett, 1995, pp. 394–395; 2017, pp. 138–146) including his references to Godfrey–Smith, what stands out is the

Correspondence concerning this article should be addressed to Professor H.G. Callaway, Philosophy Department, Temple University, Philadelphia, Pennsylvania 19120. Email: HG1Callaway@gmail.com

"Spencerian," or gradualist and empiricist-adaptationist or "externalist" thesis — in contrast to more recent "rationalist" or internalist-structuralist revisionism. Godfrey–Smith substantially agrees with Dennett on this theme, and the agreement is the basis of Godfrey–Smith's opposition to "internalism." "Inner" relations are *adapted to* "outer" relations. Part of the problem is that Godfrey–Smith gets William James's psychology wrong: giving equal standing to James's psychology and his later pragmatism and philosophy of religion.[1]

In his *Principles of Psychology*, James wrote:

> The demand for continuity has, over large tracts of science, proved itself to possess true prophetic power. We ought therefore ourselves sincerely to try every possible mode of conceiving the dawn of consciousness so that it may *not* appear equivalent to the irruption into the universe of a new nature, non-existent until then. (James, 1890, Vol. I, p. 148)

Godfrey–Smith aims to "take us closer to the goal James laid down" on continuity (2016, pp. 77–78), and this implies the need for a reconciliation between understanding consciousness in terms of subjective experience, including Thomas Nagel (1974) and "what it is like" to be a particular animal, and the natural sciences of biology, chemistry, and physics. "*Subjective experience* is the most basic phenomenon that needs explaining, the fact that life feels like something to us" (Godfrey–Smith, 2016a, p. 78).

It is not that James uniformly endorsed Spencer's (1855) *Principles of Psychology*, but Godfrey–Smith over-emphasizes James's criticisms of Spencer to the point of placing James and Spencer in opposing "internalist" vs. "externalist" camps (Godfrey–Smith, 1996, pp. 90–94; pp. 169–171). James is counted as an internalist because of his emphasis on internally generated interests and his pragmatist-flavored arguments against Spencer on truth as correspondence. However, one seeks in vain in James's *Principles* and in the *Briefer Course* (1892/1985) for any discussion of Spencer on correspondence or pragmatic conceptions of truth.

What is most troubling about Godfrey–Smith on James is that he fails to distinguish the scientific naturalism of James's psychology from the pragmatism, and the commitment to metaphysics and the philosophy of religion in James's late work. The distinction is quite explicit in the work of James's student James R. Angell. (See, e.g., Angell, 1907, p. 68; where he rejects the equation of Jamesian functional psychology and pragmatism.) Along with reference to James's magnum opus, *The Principles of Psychology* (1890), readers will find Godfrey–Smith's references and quotations from James in James's *Pragmatism* (1907), *The*

[1] See my related arguments and the account of the contrast in H.G. Callaway (2024) *Functional Psychology and the Philosophy of Mind* and in the Introduction to my critical edition (2022) of James's *Essays in Radical Empiricism.*

Will to Believe (1897), *The Varieties of Religious Experience* (1902), and *Essays in Radical Empiricism* (1912). "The view of mind endorsed" in Godfrey–Smith's early book, *Complexity and the Function of Mind in Nature*, "combines elements from both the pragmatist tradition and from recent naturalism" (1996, p. 196). In the *Principles*, however, James emphasized that "It is highly important that this natural-science point of view should be understood at the outset. Otherwise more may be demanded of the psychologist than he ought to be expected to perform" (1890, Vol. I, pp. 183–184).

The combined appeals to Spencer, James, Dennett, and Nagel may seem puzzling to some, but less so if we see Godfrey–Smith as attempting to bridge the "explanatory gap" between consciousness and functionalism and understand James as advancing a scientific naturalism and a functionalist account of consciousness in his psychology — as contrasted with his later, more philosophical writings on metaphysics and the philosophy of religion. Contrary to Godfrey–Smith's claims of James's "internalism," in *Psychology*: *The Briefer Course* (originally published in 1892) and in the *Principles*, James credited Spencer as a major influence in the development of psychology as a science; and he quoted Spencer approvingly:

> The chief result of all this more modern view is the gradually growing conviction that *mental life is primarily teleological*; that is to say, that our various ways of feeling and thinking have grown to be what they are because of their utility in shaping our *reactions* on the outer world. On the whole, few recent formulas have done more service in psychology than the Spencerian one that the essence of mental life and bodily life are one, namely, "the adjustment of inner to outer relations" (James, 1892/1985, pp. xxvii–xxviii; cf. James, 1890, Vol. I, p. 6; Spencer, 1855, p. 374)

To defend a Jamesian, functional approach against Godfrey–Smith's charge of "internalism," two points are needed. (1) We need to adopt a version of the thesis that interests, which often drive attention, belong to our reactions to the world. They arise from a psychological competition. (See, e.g., Dehaene, 2014, p. 13 on "fame in the brain.") (2) It is important to distinguish Jamesian functional psychology from his later metaphysics, pragmatism, and philosophy of religion.[2]

Internalism and Externalism on Language and Consciousness

Noam Chomsky on the origin of the human language faculty contributes to Godfrey–Smith's paradigm of the "internalist." Godfrey–Smith's statement of the opposition between internalist and externalist views is found in his earlier

[2] It is worth emphasizing that many or most scholars of James's work are more interested in his later philosophical writings starting with James in 1897 and his controversial claims for the will to believe. James's later interests strongly turned to the philosophy of religion.

writings (1996, pp. 39–40). In that book, Godfrey–Smith discusses James and Chomsky; and according to Chomsky, far from having a scientifically accepted, gradualist, adaptationist and evolutionary origin and explanation, "... the processes by which the human mind achieved its present stage of complexity and its particular form of innate organization are a total mystery..." (Chomsky, 1972, p. 97). Chomsky argued that evolution has little to say about the origin of the human language faculty, and that,

> The answer may well lie not so much in the theory of natural selection as in molecular biology, the study of what kinds of physical system can develop under conditions of life on earth and why, ultimately because of physical principles. (1988, p. 167)

We understand better the common emphasis on continuity by looking to what *kind of view* is being rejected, e.g., the claims in Chomsky's writings on the origin of human language and related criticism of the proposed contemporary, neo-Darwinian, synthesis. (See, e.g., Eldredge and Gould, 1972; and Gould, 1980. Early criticism of S.J. Gould's revisionist proposal can be found in Dennett's 1983 paper, "Intentional Systems in Cognitive Ethology.")

Not only does Chomsky make acquisition of a particular natural language dependent on an innate language "organ" or human language faculty, a claim that many find plausible, he doubts and rejects the thesis that the human language and mind arose by Darwinian natural selection. Correspondingly, to make of William James as an "internalist" is to read his later pragmatism concerning truth into Jamesian psychology — ignoring James's expressed allegiance to Spencer on psychological adaptation of "inner" to "outer" relations.

Godfrey–Smith supports an analysis of the "role" or function of mind in nature. "The function of cognition," he holds, "is to enable the agent to deal with environmental complexity" (1996, p. 1). In place of the classical, Aristotelian version of teleological explanation, he adopts a "teleonomic" concept of biological and psychological functions involving a reconciliation (and the commonalities) of the contemporary views of philosophers Larry Wright and Robert Cummins (see Wright, 1973; and Cummins, 1975.) Following Wright, what distinguishes the function of an organ, such as the heart, from its various and sundry effects is explanatory salience. In a more recent book, summarizing the theme of "Function and Teleology," Godfrey–Smith includes Dennett's intentional stance — according to which we "pretend" or adopt the useful "stance" that evolved systems have a designer — among the varieties of teleonomic, functionalist philosophies (Godfrey–Smith, 2014, pp. 59–65; on Dennett's "intentional stance," p. 61). But while Dennett does defend a version of functionalism, he is widely regarded as a skeptic or "eliminatist" concerning conscious experience. As Margaret Boden has put the point, "a common response to his provocative book of 1991 is: 'Not *consciousness* *explained*, but *explained away'*" (2018, p. 115). Or, note Dennett in his last book, *I've Been Thinking*, he wrote: "I'm what you get when you cross a Quine with a Ryle" (Dennett, 2023, p. 67). Note, too, that behaviorism is a form of externalism, and that Godfrey–Smith does not endorse behaviorist versions of externalism.

Regarding Dennett on the "notion of the transmission of memes," Godfrey–Smith is more skeptical (2016a, p. 230n). This skepticism enters into doubts on Dennett's model in *Consciousness Explained* (1991), since that model "does not make use of efferent copies" (Godfrey–Smith, 2016a, p. 230n). Consciousness depends on a "loop" and feedback from action to sensory inputs and vice versa (2016a, pp. 79–84). In this way, animals respond differently to changes in their local environment due to their own activities vs. changes which arise independent of their own activities. Implicitly, at least, this marks a differentiation of self and non-self. It enters into Godfrey–Smith's emphasis on *subjective* experience. But it is not entirely clear that mechanisms involving feedback loops are sufficient for subjective *experience*. We may wonder whether Godfrey–Smith's talk of "subjective experience" is a matter of *experience* — as contrasted with nonconscious interaction.

In his *Complexity and the Function of Mind in Nature*, Godfrey–Smith registers a preference for Dennett's "instrumentalism" of the intentional stance (1996, p. 193). He seems to be led astray on James by following Dennett's externalism too closely. Note that Dennett's writings display no significant interest in the phenomenon of blindsight,[3] and the lacuna chiefly carries over to Godfrey–Smith. While there is a relevant discussion of the work of David Milner and Melvyn Goodale in *Other Minds* (Godfrey–Smith, 2016a, pp. 87–91; cf. Goodale and Milner, 2005), their conclusion regarding nonconscious dorsal stream processing is left standing and unrefuted. In an endnote, Godfrey–Smith is content to suggest that "conscious experience" may not be a "yes or no matter" (2016a, p. 222). What one finds in Dennett's (2021) writings are claims for what he calls "illusionism" regarding consciousness. If conscious awareness is indeed an illusion, then any proposed contrast between conscious visual awareness and blindsight becomes moot.

Alien Minds and Evidence from Ethology

A fascinating feature of Godfrey–Smith's work is his devotion to the study of the various species of octopus (and other cephalopods), and the contrast with standard biological paradigms of mind, intelligence, and consciousness. The octopus is a very distinctive and intelligent animal. In evolutionary terms, it is also

---

[3] According to the American Psychological Association's *Dictionary of Psychology,* blindsight is "the capacity of some individuals with damage to the striate cortex (primary visual cortex or area V1) to detect and even localize visual stimuli presented to the blind portion of the visual field. Discrimination of movement, flicker, wavelength, and orientation may also be present. However, these visual capacities are not accompanied by conscious awareness."

quite distant from the human species. The last common ancestor it shares with human beings goes back some 600 million years; and that animal was likely a "flattened worm-like creature" (Godfrey–Smith, 2016a, p. 4; see also Godfrey–Smith, 2020, pp. 127–128). "The human-octopus ancestor lived at a time when no organisms had made it onto land and the largest animals around it might have been sponges and jellyfish ..." (Godfrey–Smith, 2016a, p. 8). The various species of octopus are most closely related to a subaltern class of marine mollusks. (The broader phylum of mollusks also encompasses clams, shellfish, and snails.) The narrower class of marine mollusks includes the octopus, the nautilus, cuttlefish, and squid; and the octopus is believed to descend from an evolutionary ancestor, which like the still existing nautilus, was protected by a hard shell.

Giving up a protective shell made the octopus capable of more extensive movement and hunting; but given its soft, boneless, invertebrate body, it became more vulnerable to predation. In consequence, most species of octopus are short-lived. Because it is highly subject to predators, longevity has not been selected for. It reproduces by laying very large numbers of eggs on a single occasion, and this contrasts with comparatively long-lived species which reproduce with smaller numbers of offspring, but repeatedly over an extended period of time. The evolutionary development of high levels of intelligence in the octopus and their mastery of camouflage are adaptations to their high vulnerability to predation. Godfrey–Smith puts it this way: "An octopus can't expect to live a long time, especially as they must be active as predators themselves."

> They can't just hide in a hole and wait for food to come to them. They have to be out and about, and once in the open they are vulnerable. This vulnerability makes them ideal candidates for the Medawar and Williams effects to compress their natural lifespan; a cephalopod's lifespan has been tuned by the continual risk of not making it to the next day. As a result, they have ended up with their unusual combination: a very large nervous system and a very short life. They have the large nervous system because of what those unbounded bodies make possible and the need to hunt while being hunted; their lives are short because their vulnerability tunes their lifespan. (Godfrey–Smith, 2016a, pp. 173–174)

In accordance with the Medawar and Williams effects (Medawar, 1952; Williams, 1957), genetic variations favorable in early life and supportive of reproduction will accumulate even when they have unfavorable consequences in later life after the optimal period for reproduction — and thereby produce the phenomenon of aging. "Female octopuses, in general, are an extreme case" writes Godfrey–Smith: "they die after a single pregnancy"; and "when the eggs hatch, the larvae drift off into the water. Soon afterward the female dies" (2016a, pp. 170–171). The male octopus typically dies shortly after depositing its semen.

The distance of the octopus on the tree of life from the more familiar, mammalian paradigms of animal intelligence tells us that natural selection has produced high levels of intelligence — more than once — on separate branches of the tree. As the author formulates the point, "evolution built minds twice over"; and "This is probably the closest we will come to meeting an intelligent alien" (Godfrey–Smith, 2016a, p. 9). Similarly, he remarks that "Vertebrates and cephalopods separately evolved 'camera' eyes" (Godfrey–Smith, 2016a, p. 219n; cf. Randel and Jékely, 2016).

With vertebrate species it is generally possible to identify distinctive structural features of the brain and map them across species. But mapping from the vertebrate brain to the cephalopod brain is not possible. One of the distinctive features of the neurology of the octopus, for example, is that the arms have each their own semi-modular "brain"; and the arms, even when detached, are capable of a range of independent behavior. (Godfrey–Smith, 2016a, p. 51.) The partly distributed configuration of neurophysiology and intelligence is suggestive of an analogy with "federal" forms of organization based in semi-autonomous agency (Godfrey–Smith, 2016a, p. 103).

The evidence of high levels of intelligence in the octopus and others in their class of evolutionary kin is hard to ignore. In general, the comparative estimates of intelligence are based on observation of the subject's behavior. However, Godfrey–Smith seeks to understand the intelligence of the cephalopods in the context of the philosophical problem of "the relation between mind and matter," viz. "How do sentience, intelligence, and consciousness fit into the physical world?" He aims to "make progress on that problem, vast as it is"; and wants "to know how consciousness arose from the raw materials found in living beings" (2016a, pp. 9–10).

> Aeons ago, animals were just one of various unruly clumps of cells that started living together as units in the sea. From there, though, some of them took on a particular lifestyle. They went down a road of mobility and activity, sprouting eyes, antennae, and means to manipulate objects around them. They evolved the creeping of worms, the buzzing of gnats, the global voyages of whales. As part of all this, at some unknown stage, came the evolution of subjective experience. For some animals, there's something it feels like to be such an animal. (Godfrey–Smith, 2016a, p. 10)

According to Godfrey–Smith, the "smart" animals are "the ones with large brains, who are complex and flexible in their behavior" (2016a, p. 7). However, consciousness and high levels of intelligence are late arrivals in evolutionary histories; "sentience" came earlier; and "... if it feels like something to be a squid or octopus, then these are *sentient* beings. Sentience comes before consciousness" (2016a, p. 79). Godfrey–Smith's concepts of sentience, consciousness, and "what it is like" to be a particular animal expresses a version of functionalism — akin to the Darwinian, functional psychology which developed from James's *Principles of Psychology*. "Consciousness surely did not," as James argued, "suddenly irrupt into the universe fully formed" (2016a, p. 77; cf James, 1890, Vol. I, p. 148). Godfrey–Smith counts consciousness as a developed form of sentience. One might also note that in accordance with Jamesian functional psychology, "Consciousness may not uselessly exist" (James, 1890, Vol. I., p. 142).

Having a large brain and complex, flexible behavior are features of many animals including chimps and dolphins, dogs and cats, along with humans and some birds such as crows and parrots. In operant conditioning experiments, it was found that the octopus could be trained to press a lever to get rewarded with a morsel of fish (see Dews, 1959). It is known, though, that habits established by operant conditioning are possible in blindsight (Weiskrantz, 1997, pp. 11–12; cf. Passingham, 2016, p. 22 and Koch, 2004, p. 220 on blindsight). However, since this depends on close temporal pairings, i.e., coincidence-based conditioning, the implication is that operant conditioning does not reflect or capture the higher levels of cognition as reflected in memory-trace conditioning (Dehaene, 2014, pp. 102–103).

Moreover, the experiments mentioned by Godfrey–Smith did not confirm the basic assumptions of operant conditioning. Some of octopus behavior appeared spontaneous and unrelated to known rewards or punishments. In consequence, "one message of octopus experiments is that there is a great deal of individual variability" (2016a, p. 54). Not every octopus started with the same (presumed) species-specific behavioral routines, and some animals took to squirting water at experimenters, or otherwise disrupting the experiments. That indicates an "octopus with a particularly feisty temperament" (2016a, p. 54).

"Another octopus behavior that has made its way from anecdote to experimental investigation is play — interacting with objects just for the sake of it" (Godfrey–Smith, 2016a, p. 59; cf. Mather and Anderson, 1999 and Kuba et al., 2006). Play is indicative of intelligence, since it illustrates behavioral plasticity and escape from rigid, instinct-bound patterns of reaction to objects in the immediate environment. An octopus will initially examine a novel object to see if it is eatable. However, if it is not an item of food, this does not mean that it is uninteresting. Play and exploration of novel objects exemplify complex and flexible behavior. "Some individual octopuses — and only some — will spend time blowing pill bottles around their tank with their jet," or "'bouncing' the bottle back and forth on the stream of water coming from the tank's intake valve" (Godfrey–Smith, 2016a, p. 59).

"Other octopus manipulations of foreign objects are done for more practical reasons" (Godfrey–Smith, 2016a, p. 59). Godfrey–Smith reports on research conducted in Indonesia which involved octopuses in the wild carrying around pairs of half coconut shells for use as portable shelters:

> The shells, neatly halved, must have been cut by humans and discarded. The octopuses put them to good use. One half-shell would be nested inside another, and the octopus would carry the pair beneath its body as it "stilt-walked" across the sea bottom. The octopus would then assemble the halves into a sphere with itself inside. A wide range of animals use found objects for shelters (hermit crabs

> are an example), and some use tools for collecting food (including chimps and some crows). But to assemble and disassemble a "compound" object like this, and put it to use, is very rare. It's not clear what to compare this behavior to, in fact. (Godfrey–Smith, 2016a, p. 64)

In spite of the example of complex tool use (see Finn et al., 2009), the psychologist Nicolas Humphrey (formerly a graduate student of Weiskrantz at Oxford) counts to the critics of Godfrey–Smith on the claimed sentience of the octopus: "... octopuses are not qualiaphiliacs, they are not natural psychologists, they don't regard each other as selves, nor do they care. I'm bound to say therefore that the likelihood of their being sentient and having a phenomenal self is negligible" (Humphrey, 2023, pp. 205–206).

The distributed mode of neuroanatomy of the octopus arose in connection with its mastery of camouflage. This is the ability of the animals to sense and blend into the background of its immediate environment by means of modifications of features of its skin. The animals make themselves look like a rock or, say, clumps of vegetation. Since the octopus is colorblind, the highly developed means of camouflage remain a subject of study, though sensing of the immediate background is evidently a function of the skin and arms. Changes in the apparent colors and texture of the skin also play some limited role in intra-species signaling. (On signals used by octopuses in agonistic interactions, see Scheel, Godfrey–Smith, and Lawrence, 2016.)

Signaling is perhaps best illustrated in mating behavior of the cuttlefish: the females display a white stripe on their side — indicative of their resistance to mating, and the stripe is imitated by smaller, female-impersonator cuttlefish which thereby evade the aggression of dominant males guarding access to favored females. Godfrey–Smith remarks on the highly developed means of possible communication combined with very little apparent uptake by other members within any particular cephalopod species. Lack of fuller communications, as contrasted with large-brained animals living in familial and social groups, coincides with the absence of extensive social relations in the cephalopods. Godfrey–Smith makes a case for octopus consciousness, and for many it is convincing. On his approach, this implies differentiation between self and non-self — and the presence of "subjective experience." A contrary argument is that an animal's factual differentiation between stimuli dependent or independent of its own actions is merely one contributing component of sentience and "what it's like to be" that animal.

Blindsight, Subjective Experience, and Consciousness

Godfrey–Smith's writings lack for any extensive discussion of the experimental phenomenon of blindsight, though it would be helpful in his treatment of the character and origins of subjective experience. Regarding vision in particular, much evidence of nonconscious mental processing arises in connection with the phenomenon of blindsight (see Weiskrantz, 1997). Godfrey–Smith (2016a, p. 144) does attend to the related literature on object constancies in perception, but though the neurological mechanisms of object constancies do help guide action, these mechanisms, in possible contrast with their effects on conscious actions, do not appear in consciousness. Aiming for an account of the evolutionary origin of subjective experience and "what it's like to be" a particular organism, a distinction is proposed between subjective experience and consciousness. On Godfrey–Smith's view, as we have seen, subjective experience arose much earlier than consciousness; and this has the curious consequence that subjective experience is not always conscious. "I see consciousness as one form of subjective experience, not the only form" (2016a, pp. 78–79). In accordance with this distinction on offer, consciousness is a late arrival in evolutionary history, and subjective experience arose much earlier — in "the Cambrian" (2016a, p. 97).

An objection to this view is that for Godfrey–Smith pleasure and pain though exemplifying subjective experience and occasioning action, are, *evidently*, conscious phenomena. Instead of accepting "consciousness" as the comprehensive term, encompassing subjective experience, consciousness is regarded as a highly developed, derivative form of subjective experience with reference made to (and an objection made against) the theories of consciousness in the work of Bernard Baars, Stanislas Dehaene, and Godfrey–Smith's CCNY colleague, Jesse Prinz (see Baars, 1988; Dehaene, 2014; and Prinz, 2012).

For Godfrey–Smith, "The older forms of subjective experience" are "linked to the primordial emotions, pain and pleasure, feeling that must be acted on" (2016a, p. 96). The suggested approach is that subjective experience developed out of the prior evolution of biochemical mechanisms of organisms' attraction to, or avoidance of, features and elements of the immediate environment — including activities of organisms such as bacteria — which lack for subjective experience. "In animal evolution, along with the sheer elaboration of sensing and acting, there's the evolution of new kinds of connection between these activities, especially connections that loop, that involve feedback" (Godfrey–Smith, 2016a, p. 79). Goal-directed activity belongs to the evolutionary roots of subjective experience, and this thesis corrects and contrasts with the frequent, contrary focus on receptivity in isolation from associated activity.

Blindsight is usually understood to be a matter of "non-reflexive visual functions in response to stimuli that are not consciously seen" (Stoerig, 1999, p. 89); and "the phenomenon of blindsight as a processing of visual functions that is not consciously represented has been established in both human and monkey (Stoerig and Cowey, 1997, p. 535). Godfrey–Smith does *mention* blindsight and emphasizes related theory in an article published in 2016. He explains the "latecomer" theory of consciousness, which he opposes, as follows:

> The "dual stream" model of vision developed by David Milner and Melvyn Goodale posits two paths by which visual information is processed in the mammalian brain, of which only one, the "ventral stream," leads to experiences felt as vision. Ventral stream vision functions in the recognition of objects. The dorsal stream handles basic navigation and tasks such as reaching, and does so in a way that can produce effects akin to "blindsight ...." Milner and Goodale distinguish basic sensori-motor abilities from actions based on the construction of an "internal model" of the world, and they associate visual experience only with the latter. "Global workspace" models of consciousness developed by Bernard Baars, Stanislas Dehaene, and others, along with views of consciousness based on sophisticated forms of memory and attention, also appear to motivate a latecomer view, as they all associate consciousness with capacities that go well beyond the mere ability to sense, act, and remember. (2016b, p. 499)

Though there is this much room for scientific doubts on the early arrival of "conscious" subjective experience in Godfrey–Smith (2016b), elsewhere the thesis and related claims are put forward with greater positive force: "Ten years of following octopuses around ... have left me with no real doubt that octopuses experience their lives," and "they are conscious in a broad sense of the term" (Godfrey–Smith, 2020, pp. 146–147). What the scientific evidence clearly supports is high levels of intelligence in the octopus, and presumably similar levels of intelligence arose early on in the evolutionary history of animals. But these points leave plenty of room for scientific doubt that "conscious" subjective experience arose early on. Even supposing that octopuses "experience their lives," and that subjective experience, like camera eyes, evolved more than once and independently, it is less clear that early animals of the Cambrian era had any form of conscious, subjective experience. One might reasonably suppose, for instance, that pain behavior evolved first in the governance of mobility and that conscious pain came much later. This hypothesis would better align with the work in cognitive psychology such as that of Baars and Dehaene.

Among more critical perspectives deserving of Godfrey–Smith's attention, the writings of Michael Gazzaniga and his students figure prominently (see Gazzaniga, 2015, pp. 176–177). However, the evidence for and against blindsight and its broader implications is mixed, and blindsight is not found in every patient suffering V1 lesions in the occipital lobe (see Gazzaniga, 1985, pp. 120–124; Holtzman, 1984). Though many of the studies of interest were published early on — in the 1970s and 1980s, it is worth asking how to explain both the presence and absence of blindsight in different patients on the basis of preserved neurophysiology. The account of blindsight in Milner and Goodale predicts more uniformity.

Of interest, in contrast with Godfrey–Smith on consciousness, is a kind of hypothesis to the effect that forms of consciousness involve several contributing features which each evolved gradually and separately and that only the combination of these features engenders phenomenal consciousness. By analogy consider the proposal of the biologist W.T. Fitch who takes a gradualist, neo-Darwinian approach to the uniquely human, genetic basis of the language faculty (see Fitch, 2009). Fitch distinguishes three components of the human language faculty: (1) imitation, (2) semantic reference, and (3) recursion. He puts forward the hypothesis that though none of the three is unique to human beings, their combination is unique. This allows that each of the three factors evolved separately and gradually, and that the genetic basis of human language arrived with the co-presence and coordination of all three.

In a similar way, we might suppose that subjective consciousness arose from several components which evolved separately; and it may be that Godfrey–Smith in his linking of subjective consciousness to metabolism has already identified several contributing components. For example, "When the genome is used to adaptively control the synthesis of metabolically important chemicals by tracking conditions in the environment," he writes, "that is proto-cognitive in the sense I have in mind" (see the discussion in Godfrey–Smith, 2016b, pp. 490–493). It is not claimed that all animals possess conscious, subjective experience. The argument for distinguishing those that do and those which do not partly turns on observation and experiments focused on pain behavior of contemporary animals. This includes controlled experiments showing a preference of some injured animals for environments containing pain relievers (Godfrey–Smith, 2016a, pp. 94–95; cf. Elwood, 2012 and Eisemann, 1984). But pain behavior may disassociate from the experience of pain in some animals; moreover, supposing that some contemporary animals experience pain, it does not follow that their ancient, Cambrian precursors did. "For a defense of a latecomer view of pain itself," Godfrey–Smith recommends Key (2015).

Part of the argument for the early arrival of subjective experience is developed by analogy with results in the study and use of computerized, "tactile visual substitution systems" (Bach-y-Rita, 1984; see also Bach-y-Rita and Kercel, 2003; Deroy and Auvray, 2012). If a camera is employed by blind patients to feed a pattern of tactile stimulation to the patient's back, then this results in *perception of objects* in the sensory environment (not mere patterns of tactile sensation) only if the patient is able to exercise some active control over the camera, that is, "to act and influence the incoming stream of stimulation" (Godfrey–Smith, 2016a, p. 80). The perception of objects in the environment depends on being able to distinguish between changes which arise from the agent's own activities and those which depend on other changes in the perceptual environment; and this implies some differentiation between self and non-self. The idea is, again, that subjective experience arose with, and depends upon, feedback loops that link an animal's activities back to the senses. Supposing that the presence of feedback loops is a necessary condition of subjective experience, though, it is much more doubtful that it is sufficient. There seem to be some other components, beyond feedback loops — (plausibly) "computation" at a metabolic level, a larger brain and higher levels of intelligence, intra-species signaling, and social life.

Conclusion

The work and good efforts of Peter Godfrey–Smith on the resolution of the "explanatory gap" between subjective experience and the natural sciences contributes much of value to cognitive psychology and related fields of natural science. He goes well beyond the simple suggestion that continued research on detailed problems of cognitive psychology and cognitive neuroscience will result in the so-called hard problem simply dissolving. As argued above, his proposals that consciousness is a special case of subjective experience and that subjective experience arose very early in evolutionary history are less plausible — as scientific hypotheses. Greater attention to the phenomenon and evidence of blindsight may help by re-enforcing the important theoretical distinction between sensory–motor intelligence and animal consciousness. Supposing the octopus enjoys subjective experience, as Godfrey–Smith has argued, it remains reasonable to suppose that its Cambrian ancestors developed only varieties of sensory–motor intelligence: that they were more like philosophical "zombies"; and that other needed components of sentience and consciousness arrived much later. Godfrey–Smith is yet to rule out this viable alternative.

References

Angell, J. R. (1907). The province of functional psychology. *Psychological Review*, *XIV*(2), 61–91.

Baars, B. (1988). *A cognitive theory of consciousness*. Cambridge University Press.

Bach-y-Rita, P. (1984). The relationship between motor processes and cognition in tactile vision substitution. In W. Prinz and A. Sanders (Eds.), *Cognition and motor processes* (pp. 149–160). Springer Verlag.

Bach-y-Rita, P., and Kercel, S. (2003). Sensory substitution and the human–machine interface.*Trends in Cognitive Sciences, 7*(12), 541–546.

Boden, M. (2018). *Artificial intelligence*, *A very short introduction*. Oxford University Press.

Callaway, H.G. (Ed.). (2022). *William James: Essays in radical empiricism. A critical edition*. Lexington Books.

Callaway, H.G. (2024). *Functional psychology and the philosophy of mind*: *Intentional realism in cognitive science.* Cambridge Scholars.

Chomsky, N. (1972). *Language and mind* [enlarged edition]. Harcourt, Brace Jovanovich.

Chomsky, N. (1988). *Language and problems of knowledge*. *The Managua lectures*. MIT Press.

Cummins, R. (1975). Functional analysis. *Journal of Philosophy, 72*, 741–764.

Dehaene, S. (2014). *Consciousness and the brain*: *Deciphering how the brain codes our thoughts*. Viking Penguin.

Dennett, D.C. (1983). Intentional systems in cognitive ethology: The 'Panglossian paradigm' defended. *Behavioral and Brain Sciences, 6*, 343–390.

Dennett, D.C. (1991). *Consciousness explained*. Little, Brown.

Dennett, D.C. (1995). *Darwin's dangerous idea*. *Evolution and the meaning of life*. Simon and Schuster.

Dennett, D.C. (2017). *From bacteria to Bach and back*: *The evolution of minds*. Norton.

Dennett, D.C. (2021). The user illusion of consciousness. *Journal of Consciousness Studies, 28*(11–12), 167–177.

Dennett, D.C. (2023). *I've been thinking*. Norton.

Deroy, O., and Auvray, M. (2012). Reading the world through the skin and ears: A new perspective on sensory substitution. *Frontiers in Psychology, 3*(Article 457), 1–13.

Dews, P. (1959). Some observations on an operant in the octopus. *Journal of the Experimental Analysis of Behavior, 2*(1), 57–63.

Eisemann, C.H. et al. (1984). Do insects feel pain?—a biological view. *Experienta, 40*(2), 164–167.

Eldredge, N., and Gould, S.J. (1972). Punctuated equilibria: An alternative to phyletic gradualism. In T.J. M. Schopf (Ed.), *Models in paleobiology* (pp. 82–115). Freeman and Cooper.

Elwood, R. (2012). Evidence for pain in decapod crustaceans. *Animal Welfare, 21*(supplement 2), 23–27.

Fernald, R. (2000). Evolution of eyes. *Current Opinion in Neurobiology, 10*, 444–450.

Finn, J.K., Tregenza, T., and Norman, M.D. (2009). Defensive tool use in a coconut-carrying octopus. *Current Biology*, *19*, R1069-R1070.

Fitch, W.T. (2009). The biology and evolution of language: "Deep homology" and the evolution of innovation. In M. Gazzaniga et al. (Eds.), *Cognitive neuroscience*; *The biology of the mind (*pp. 873–885, fourth edition). Norton.

Gazzaniga, M. (1985). *The social brain*: *Discovering the networks of the mind*. Basic Books.

Gazzaniga, M. (2015). *Tales from both sides of the brain*: *A life in neuroscience*. HarperCollins.

Gazzaniga, M. et al. (2009). *Cognitive neuroscience*; *The biology of the mind* (fourth edition). Norton.

Godfrey–Smith, P. (1996). *Complexity and the function of mind in nature*. Cambridge University Press.

Godfrey–Smith, P. (2001). Environmental complexity and the evolution of cognition. In R.J. Sternberg and J. C. Kaufman (Eds.), *The evolution of intelligence* (pp. 223–250). Psychology Press.

Godfrey–Smith, P. (2003). *Theory and reality*: *An introduction to the philosophy of science*. University of Chicago Press.

Godfrey–Smith, P. (2014). *Philosophy of biology*. Princeton University Press.

Godfrey–Smith, P. (2016a). *Other minds*: *The octopus, the sea, and the deep origins of consciousness*. Farrar, Straus and Giroux.

Godfrey–Smith, P. (2016b). Mind, matter and metabolism, *Journal of Philosophy, 113*(10), 481–506.

Godfrey–Smith, P. (2017). Animal evolution and the origins of experience. In L. D. Smith (Ed.), *How biology shapes philosophy*: *New foundations for naturalism (*pp. 51–71). Cambridge University Press.

Godfrey–Smith, P. (2020). *Metazoa, animal minds and the birth of consciousness*. William Collins.

Goodale. M., and Milner, D. (2005). *Sight unseen*: *An exploration of conscious and unconscious vision*. Oxford University Press.

Gould, S. J. (1980). Is a new and general theory of evolution emerging? *Paleobiology, 6*, 119–130.

Holtzman, J. (1984). Interactions between cortical and subcortical visual areas: Evidence from human commissurotomy patients, *Vision Research, 24*(8), 801–814.

Humphrey, N. (2023). *Sentience*; *The invention of consciousness*. MIT Press.

James, W. (1890). *The principles of psychology*. 2 volumes. Henry Holt.

James, W. (1897). *The will to believe and other essays in popular philosophy.* Longmans, Green.

James, W. (1902). *The varieties of religious experience*: *A study in human nature*. Longmans, Green.

James, W. (1907). *Pragmatism: A new name for some old ways of thinking.* Longmans, Green.

James, W. (1912). *Essays in radical empiricism*. Longmans, Green.

James, W. (1985). *Psychology*: *The briefer course*. G. Allport (Ed.). University of Notre Dame Press. (originally published 1892)

Key, B. (2015). Fish do not feel pain and its implications for understanding phenomenal consciousness, *Biology and Philosophy, XXX*, 149–165.

Koch, C. (2004). *The quest for consciousness. A neurobiological approach*. Roberts.

Kuba, M., Byrne, R., Meisel, D., and Mather, J. (2006). When do octopuses play? Effects of repeated testing, object type, age, and food deprivation on object play in octopus vulgaris. *Journal of Comparative Psychology, 120*(3), 184–190.

Mather, J., and Anderson, R. (1999). Exploration, play and habituation in octopus dofleini. *Journal of Comparative Psychology, 113*(3), 333–338.

Medawar, P.D. (1952). *An unsolved problem of biology*. H.K. Lewis.

Nagel, T. (1974). What is it like to be a bat? *Philosophical Review, 83*(4), 435–450.

Passingham, R. E. (2016). *Cognitive neuroscience*: *A very short introduction*. Oxford University Press.

Prinz, J. (2012). *The conscious brain: How attention engenders experience*. Oxford University Press.

Randel, N., and Jékely, G. (2016). Phototaxis and the origin of visual eyes. *Philosophical Transactions of the Royal Society, B 371*, 20150042.

Scheel, D., Godfrey–Smith, P., and Lawrence, M. (2016). Signal use by octopuses in agonistic interactions. *Current Biology 26*(3), 377–382.

Spencer, H. (1855). *The principles of psychology*. Longman, Brown, Green, and Longmans.
Stoerig, P. (1999). Blindsight. In R.A. Wilson and F.C. Keil (Eds.), *The MIT encyclopedia of the cognitive sciences* (pp. 88–89). MIT Press.
Stoerig, P., and Cowey, A. (1997). Blindsight in man and monkey. *Brain, 120*, 535–559.
VandenBos, G. R., (Ed.). (2015). *Dictionary of psychology* (second edition). American Psychological Association.
Weiskrantz, L. (1997). *Consciousness lost and found*. Oxford University Press.
Williams, G.C. (1957). Pleiotropy, natural selection, and the evolution of senescence. *Evolution, 11*, 398–411.
Wright, L. (1973). Functions. *Philosophical Review, 82*, 139–168.

The Journal of Mind and Behavior
Summer and Autumn 2024, Volume 45, Numbers 3 and 4
Pages 235–250
ISSN 0271–0137

Left-Hand I-Like Personification and Body Image. A Neurological Case Study

C. Morin and P. Bruguière

Sorbonne Université

Patients with right acquired brain injury (RABI) and left arm paralysis may speak of their left arm as belonging to another person (somatoparaphrenia). A psychoanalytical reading of such discourses has been proposed. Somatoparaphrenia might consist of a breaking up of body image, together with the non-repressed object coming to the fore. We recently realized that RABI patients may also speak of their paralyzed arm as they do of themselves. In this paper, we address the question of whether or not this previously undescribed symptom that we called I-like personification of the paralyzed hand is a variant of somatoparaphrenia, in other words, whether patients with I-like personification of their paralyzed hand show signs of breaking up of body image and undue appearance of the object. We did so by analyzing the discourse and self-portraits of a young brain injured patient, during psychotherapeutic sessions and semi-directive interviews. This analysis showed that, although presenting with a RABI, personifying his left paralyzed arm and occasionally expressing raw oral concerns, the patient could not be considered as suffering a breaking up of his body image, a conclusion which implies a rather good psychological prognostic. Whether patients are brain injured or not, the main guideline for the analysis of their discourse turns out to be their subjective position vis-à-vis their symptoms.

Keywords: right acquired brain injury, I-like personification, body image

Body schema and body image disorders are often observed after a right acquired brain injury (RABI). The most frequent body schema disorders are anosognosia (apparent unawareness of the left hemiplegia) and left hemineglect (not taking into account the stimuli that come from the left side of the body or of the surrounding space) [Esposito et al., 2021]. Body image disorders manifest themselves in the patient's discourse, when they present with somatoparaphrenia. This spectacular neurological symptom consists of personifying the

We have no conflicts of interest to disclose. We thank Christine Picq for sharing her neuropsychological assessment data. We express our gratitude to the journal editor, Raymond Russ. His editing remarks aroused several fundamental questions and made our reflections much clearer. Correspondence concerning this article should be addressed to Catherine Morin, Service de Médecine Physique et Réadaptation, GHU Pitié-Salpêtrière, 75013 Paris, France. Email: cathjp@wanadoo.fr

paralyzed hand: RABI patients with left hemiplegia may affirm that their left hand is not theirs but belongs to someone else. This hand may even be somebody else. The hand is identified as being foreign, sometimes with a persecutory tone. Some characteristic body image disorders clearly manifest themselves when such patients draw their self-portraits and produce figures with disorganized bodies (Morin, 2018). Based upon interviews and self-portraits, we have previously claimed that such symptoms attest for a breaking up of body image in the psychoanalytical acceptation of the term (Morin and Thibierge, 2006). We have also suggested that the existence or not of breaking up of body image may be a critical point and may permit to distinguish two types of patients: patients with a breaking up of body image do not seem to consider themselves concerned with their symptoms, while other patients (wherever the location of their brain lesion) generally react to their deficiencies and the resulting altered self-representation in the same manner any individual reacts to a sudden loss.

We recently met an unknown form of personification of the paralyzed hand: a patient with RABI compared his hand to a "black sheep," [1] the same expression he used to characterize his place in his family. We chose to call this way of attributing self-characteristics to one's paralyzed hand, "I-like personification." The status of this personification deserves discussion. Patients who present with somatoparaphrenia claim that their paralyzed hand belongs to someone else. Somatoparaphrenia thus exhibits two characteristics: (1) the paralyzed hand is personified, (2) the paralyzed hand is foreign to the patient's body. This hand clearly does not pertain to the patient's body image. In the case we describe here, the patient spoke of his paralyzed hand in the very terms he used to speak of himself (i.e., he personified it). However, he never claimed that this hand was foreign to him. The question then arises: Should I-like personification be considered a form of somatoparaphrenia or not? What might be the significance of this symptom? Here, we will address these questions based on the psychotherapeutic sessions (PB) and semi-directive interviews (CM) of this patient.

Matt's Case

Matt came from an observant, upper-middle-class Jewish practicing family. He was the third of four children. He had a Master's in Political Science. He had no

[1] We present this case in accordance with French bio-ethical principles for medical research involving human subjects. We have taken all reasonable steps to disguise the patient we present here. Factual elements of the case description have been changed; it has now become strictly impossible for the patient to be recognized. So, names, characters, businesses, places, events, and incidents are used in a fictitious manner. Any resemblance to actual persons, living or dead, or actual events is purely coincidental.

psychiatric history. He was left-handed.[2] At the age of 23, he found employment abroad in order to gain professional experience. There, he felt himself "lost and persecuted" and began to use various toxic substances. During a party, he jumped out a window after ingesting a number of drugs. He sustained multiple bone injuries and a severe head injury, with skull fractures, diffuse cerebral edema and right parietal and frontal subdural hematomas. A decompressive craniectomy and a temporal lobectomy had to be performed during the evacuation of the subdural hematomas. A cranioplasty and a ventriculoatrial shunting were performed secondarily. The coma lasted 22 days, a period during which a tracheotomy and a gastrostomy were performed. The awakening phase included aggressiveness and confabulations. Magnetic Resonance Imagery (MRI) performed six months after traumatic brain injury (TBI) showed a wide hypodensity in the right hemisphere, the right frontal and temporal lobes being the most damaged regions. There were also left lesions and moderate axonal lesions.

When admitted in the rehabilitation department, two months after his TBI, Matt presented with left hemiplegia. His left upper and lower limbs were paralyzed and hypertonic; he also lacked sensory discrimination in his left hemibody and visual perception in his left visual field. He had a pusher syndrome, i.e., he used his right arm to actively push away from his right side and resisted any attempts to correct this tilted body posture (Babyar et al., 2009). He also suffered cognitive deficits. These deficits included executive dysfunction, memory and attention disorders, the intensity of which he was not fully aware. Matt presented with left hemineglect. He bumped into obstacles on his left, did not eat the bread when placed at his left and omitted the first words in each line when reading. Post traumatic amnesia persisted for three months.

The Psychotherapeutic Work

The psychotherapeutic work (PB) included one session a week. Sessions began two months after TBI and continued for a year. In addition, CM performed a semi-directive interview 14 weeks after TBI. In this interview, Matt was asked to make a drawing that represented himself. Written notes were taken throughout psychotherapeutic sessions and interviews. We have presented the main traits of the psychotherapeutic work at length elsewhere (Bruguière et al., 2022). During the psychotherapeutic work, Matt pondered about the reasons of his act. After reporting what he was told by his relatives ("I jumped because I wanted to save a dog"; "I jumped because I was afraid of cops, I probably had drugs on me

[2] It is well known that cognitive disorders (especially language disorders) observed after hemispheric lesions differ according to whether the patients are left- or right-handed. However, there is no clear evidence that the body schema disorders observed in left-handed subjects would fundamentally differ from those observed in right-handed subjects (Hécaen and Sauguet, 1971).

and I wanted to get away") or by his doctors ("I jumped because of a BDA").[3] Matt admitted that, at the time he fell, he was facing a problem he could not solve: he had thrown himself in a situation of having to make hasty affective and professional decisions and felt trapped in something that did not fit him.

Matt also revisited his family story, which seemed structured around the sublime ideals expressed by his parents ("Stand tall! You are this country's best!"). In fact, Matt had got a Master's in Political Science, but he had no idea of the career he would like to pursue. He felt himself different from his brothers and sisters. He said: "I do not look like my brothers and sisters. They all have dark hair and brown eyes. I'm so different with my blond hair and blue eyes, that's why they used to call me 'the black sheep.' Was I an adopted child? Could I have been abandoned?" He described his place in the family constellation in the formula: "I am the black sheep."

During the first psychotherapeutic sessions, Matt was still trapped in post-coma confabulations. He firmly expressed two delusional convictions, being a "sumo champion" and being "a conveyor for Vatican feasts." When asked "Why a sumo?" Matt answered: "I was skinny. I was told to eat in order to recover, in order to put some weight on. I'm convinced I became a sumo because I was told to fill my boots, but also because I love martial arts. I've always been a fan of Japan, and in my memory, I had to eat a lot of hamburgers, so I put on a lot of weight and got so fat that I became a sumo. I really admire the movie *The Last Samurai* and I have a warrior side. I used to cook a lot when I was abroad, and my mother's friends cook for me to fill me up. I was a rugby player and I always dreamed of being in the front row, and the forwards are called the 'heavyweights.'"

Through the therapeutic process, Matt started to cast a questioning eye on his ideas of being a "sumo" or a "conveyor for Vatican feasts" and to consider these fantasies "as a way of escaping a painful reality" where he felt "lessened and lost, deprived of the capacity to walk and of part of his visual field." In the end, he found what he, himself, called a "hyphen" between his sumo fantasies and the cooking activity he then practiced with his mother.

When commenting upon his disabilities or about the rehabilitation sessions, Matt insisted that he wanted to stand up, to run, not to be a "burden" anymore, to definitively free himself of "a position of passive spectator and become the actor of his life." He said: "Moving means being free, not to be reduced to an armchair someone pushes" and "I'd like to be able to walk on my own to regain my freedom of thought, because I don't have any with my parents." While Matt presented as a compliant patient in therapeutic sessions, aggressiveness did appear, mostly in his relations with his family. "About my glasses… at home, there always seems to be somebody putting the left branch of my glasses on my ear as if I was a doll.

[3] BDA is the French initialism for *bouffée délirante aiguë* — literally acute delusional episode.

That kind of butting in really bothers me!! They set the glasses right, just when I'm deep in my thoughts. And then, to top it all off, it's as though I was expected to say 'thanks.'" He also said: "Some mornings, you feel like tearing down the walls!" Matt often associated aggressiveness with a feeling of being infantilized: "I get scolded when I don't have my hair done properly and my mother combs me like an altar boy." Dependence went hand in hand with passivity: "I feel like a kind of bag that my relatives and therapists pass from hand to hand."

Ending our last session, Matt said:

> Who am I? Where am I? What am I here for? I haven't given up on the person I used to be. How can I reconcile all my different selves? What I would like is to reconcile the person I was with the impatient, demanding and deeply dissatisfied person I am now, and with the person I hope to be. My dream is to acquire enough self-confidence to say: I am what I am without having to fit in a mold. Dare I caress that hope...?

Semi-Directive Interview and Self-Portraits

During the interview with CM, Matt said he could not remember anything about his accident and had to rely upon what his relatives told him ("My dear mother told me it was because of drugs"). He also said that his fall eventually saved his life, since, before his accident, he had not been aware of how fragile he was. Matt was aware of being "what people here call neglectful,"[4] of bumping on walls and objects on his left and omitting words on the left side of the page when reading or writing. Asked about his paralyzed hand, he said it was "somewhat clumsy," "less clever, more repulsive" than before. When proposed to compare his hand to something or somebody he said: "A black sheep."

At the end of the interview, CM requested that Matt draw his self-portrait. Before he did so, in order to assess the impact of hemineglect on Matt's drawings, CM asked him to draw the Eiffel tower, a symmetrical and erect monument (see Figure 1) . Matt performed his drawings clumsily, being left-handed. The Eiffel tower he drew was situated in the upper left half of the sheet. The bottom of the pillar was missing, and the figure was inclined towards the left. When proposed to draw his self-portrait, Matt first insisted on drawing his "curly hair," that he had been afraid of losing after neurosurgery (see Figure 2a). Matt drew two figures (see Figures 2a and 2b). According to him, both drawings represented himself climbing stairs. Indeed, Matt performed the second drawing (a stick figure)

[4] In the professional jargon of rehabilitation departments, therapists often qualify patients with unilateral spatial neglect as "négligent." This term — the French word for neglectful — means careless. While therapists use the term in a spirit that has nothing to do with its usual meaning, patients do not always appreciate the difference, and consider the term a personal criticism.

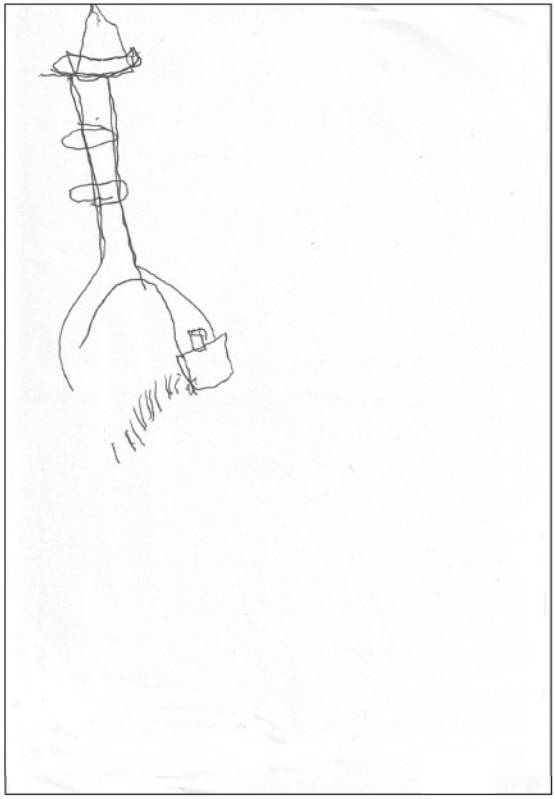


Figure 1: The Eiffel tower (original size 21 x 29.7 cm).

in order to make CM aware that he had represented himself climbing stairs. In fact, at that time, Matt could stand up and make a few steps but was not allowed to walk alone. He was still unable to climb stairs but practiced with his physiotherapist. The body is represented in profile, which is less frequent than the facing representation (Morin, Pradat–Diehl et al., 2003), but not uncommon. The right profile is shown in both portraits. In both self-portraits, the arms are stretched forward. There are traces of left hemineglect: the first drawing develops itself predominantly rightwards; the hair does not cover the back of his head (situated on the left side of the drawing). As in the drawing of the Eiffel tower, Matt's first self-portrait (see Figure 2a) is leaning leftwards. However, it should be pointed out that, as far as body representation is concerned, there are very few signs of hemineglect; only the back of the head is lacking hair. The hair rather extends horizontally backwards. Unlike what we have observed in somatoparaphrenia, the normal structure of body representation is respected in the drawings.

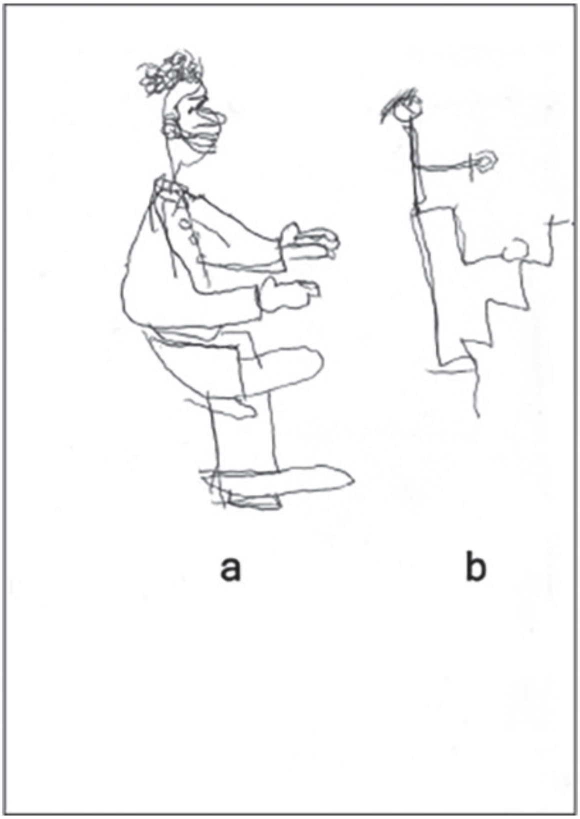


Figure 2: Self-portraits (original size 21 x 29.7 cm). (a) Matt first draws his face, beginning with the chin; he comments: "I was afraid I'd lost my curls, I'm damn glad." Matt then draws his body and limbs, "first arms on the right of the sheet, legs climbing a staircase." CM: Would you mind drawing anything more? Matt then adds the buttons and the shirt's collar. (b) Matt climbing stairs. According to Matt, the circles indicate the paralyzed hand and foot.

Matt's portraits exhibit other striking peculiarities. Both portraits exhibit a smiling mouth. The neck is very thin (see Figure 2a). Both drawings present with the same body and limb attitude: upper limbs extended straightforward, one leg lifted. This leg is shorter than the other one. When asked if he could add something to his first drawing, Matt added the buttons and collar of the shirt. In the second drawing, Matt represented himself climbing stairs: "the weak leg climbs the stairs, the strong one provides support," a position strictly opposite to the physiotherapist's instructions. In this portrait, only the paralyzed arm is visible. Matt commented: "It looks like a Playmobil, arms to the right of the sheet, legs climbing a staircase." Indeed, the Playmobil look of the drawing is due to the circles Matt drew to represent the paralyzed hand and foot.[5] Matt also commented: "The hand is asleep; it will wake up and be stronger."

Discussion

This patient presented with body schema disorders. Signs of anosognosia could be heard in the sentence "The hand is asleep; it will wake up and be stronger." There were a few signs of left hemineglect in the self-portraits. This went along with body image disorders, insofar as Matt described his hand as independent from his body, with its own separate life (for example being asleep). However, this independent hand was not a stranger for Matt, since he compared it to a black sheep, the very terms he used when speaking of himself. Matt also expressed oral concerns during the first psychotherapeutic sessions when claiming he was a sumo. The psychotherapeutic work put to light aggressive reactions to the dependency caused by brain lesions and permitted that Matt questioned himself about his subjective position.

I-Like Personification: An Exceptional Symptom?

The classical neurologic literature about somatoparaphrenia does not mention any case of I-like personification. In this literature, personification in hemiplegic patients is always characterized by the hand belonging to or being someone else (Critchley, 1962; Saetta et al., 2021). This case is not our sole observation of I-like personification. Examples of this type of discourse may be found in our previous publications. A patient said: "He is like me, he worked too much, he would like to stop" (Morin, 2018, p. 103). I-like personification may also manifest itself less directly as in the case of Mr. X. (Morin, 2018, p. 68). This patient presented with right-sided hemiparesis and sensory disorders following a left-sided stroke. He presented without any body schema disorder. He said that his right hand was "a little child's hand." In the following months, this man embraced a monk's life. According to him, this life change was directly caused by the stroke: God helped him to move forward into a new life, "like a little child." He commented: "On this path towards the Father, everything is joy and grace." This persistent reference to "child" and "father" is of special interest insofar as the patient had been adopted during his early childhood.

We reread the notes we had from 56 RABI patients and 14 patients with left acquired brain injury (LABI) during their first week after a stroke (Morin, Timsit et al., 2003). I-like personification was not observed in any of the 14 LABI patients. In RABI patients, we found only one comparable case. A woman spoke of her

[5] The drawing is not free of errors since the climbing leg seems to consist not of three segments (thigh, lower leg, foot), but of four. This could be due to cognitive disorders of body representation.

hand in the following terms: "That does not want to do anything, that's like me, that is sluggish."[6] We also went through our non-formal clinical notes and did not find any other example of I-like personification. However, we remember that, on a few occasions, patients said that they could compare their hand to "a cripple," a term we (strangely) did not pay very much attention to. We can therefore consider that I-like personification is a rare but not an anecdotal symptom.

I-Like Personification: A Version of Somatoparaphrenia?

We have previously shown that the discourse of patients who personify their paralyzed hand attests for a breaking up of body image, and for the repressed object coming to the fore, under the guise of what patients say about their paralyzed hand. In addition, patients with RABI often express oral or anal concerns. We also noticed that RABI patients who personified their paralyzed hand did not seem to be either puzzled or personally concerned by these rather strange thoughts.

Before examining whether Matt's discourse exhibits one or several of these traits, we must remind the reader of what we mean under the terms body image and object. In this paper, the term body image refers to what Lacan called the specular image. The term specular image refers to that crucial moment for subjectivity called the mirror phase when the child recognizes his own image in the mirror, while the mother or any significant carer designates the child by a name (Lacan, 1966/2006a). Winnicott (1967/1982b) also insisted on the crucial role of the mother's look. Lacan's specific contribution was to insist that the acquisition of this specular image which anticipates the image of a complete body can only come about if a certain degree of loss has occurred concerning corporeal exchanges between mother and child (breast, feces, look, and voice). This loss creates a structuring absence, i.e., the absence of the object in the Lacanian acceptation. The stability and structuring value of our body image goes hand in hand with a repression of these corporeal mother–child links (Lacan, 1966/2006c; Thibierge and Morin, 2010). According to Winnicott (1967/1982a), transitional objects may permit that a young child copes with this absence, insofar as they maintain a fictitious corporeal child–mother link. Interestingly, the thumb which the infant suckles is one of these transitional objects. Later on, the lost object will color the subjective position of an individual throughout his life. Freud (1933/1964) thus listed some representatives of the object, which included women in masculine unconscious, or children in womanly unconscious.

In a Winnicottian vein, several authors (Laufer, 1982; Leader, 2016) have proposed that what we do with our hands may have something to do with our

---

[6] Unpublished results.

relationship to our first carers (generally the mother). Laufer (1982, p. 297) shows that our body and particularly our hands unconsciously represent both our own selves and the physical care that we received from our mothers. According to him, the activity of the whole hand in relation to the child's body is a repetition of the experience of the activity of the mother's hand in relation to the child, "inasmuch as the hand is unconsciously identified with the caring and gratifying aspects of the mother."

Geneviève Haag (1985/2018) observed autistic children aged less than two years mothering their left hand with their right hand. Such observations led Haag to think that, during their first year, autistic children behaved as if the right half of their body belonged to their mother, whereas their left side represented some kind of self. It should be emphasized that, in Haag's eyes, the autistic symptoms may reveal developmental processes that are hidden in normal conditions. Under this hypothesis, traces of the early libidinal asymmetry might remain in the individual's unconscious.

Right brain lesions which cause body schema disorders may cause an alteration of both body image and object repression. By body image alterations we mean that self-portraits of RABI patients with somatoparaphrenia represent bodies whose basic structure is altered, with for example both arms on the same side of the body (Morin, 2018, p. 81), or main body parts such as trunk or head lacking (Morin, 2018, pp. 90, 107, 113). In the discourse of patients with somatoparaphrenia, the breaking up of body image is associated with intrusion of the object (Morin, 2018). A man spoke of his hand as a feminine despicable object (Morin, 2018, p. 127). Four women spoke of their paralyzed hand as of a daughter of hers, with self-portraits exhibiting signs of the presence of this daughter in two of them (Morin, 2018, pp. 114–119). Patients did not elaborate around a possible subjective significance of their discourse. For example, Mrs. S. presented with a "daughter somatoparaphrenia" that seemed to exist completely apart from her neurotic mother–daughter relationship. In this case, the therapist did not find it possible to establish links between these two aspects of the patients' words.

The question "Should I-like personification be considered a variant of somatoparaphrenia?" can thus be addressed by considering three points: Does Matt's discourse and drawings reveal signs of breaking up of body image? Does Matt's discourse and drawings, in particular those referring to the paralyzed hand, reveal signs of intrusion of the object? Which subjective position does Matt adopt towards his symptoms?

Body Image in Matt's Self-Portraits

Asking someone to draw a self-portrait (Morin and Bensalah, 1998) belongs to the series of human figure drawing tests. While the Goodenough–Harris test addresses Human Figure Drawings in terms of cognitive performance

(Goodenough, 1926; Harris, 1963), Machover's Draw a Person Test (1949/1980) is used as a projective test. According to Machover (pp. 4–5), this test involves a "projection of the body image, provides a natural vehicle for the expression of one's body needs and conflicts… which could not be made manifest in direct communication." Asking someone to "make a drawing that represents himself" obviously gives us comparable access to the drawer's subjectivity.

Body image is not broken up in Matt's self-portraits. In the first self-portrait, both arms and legs are visible. In the second self-portrait, both legs are differentiated, but only one arm is visible. Matt's drawings represent moving figures. The hands are quite large, disproportionate when compared to the rest of the body. Both self-representations show an aggressive attitude, arms stretched out forward as if with guns in hands in the first drawing, with fists clenched as if ready for battle in the second one. We know the imaginary and symbolic "connections" of the hand, making it the image and symbol of power. As a phallic signifier, the hand, which symbolizes man's mastery over the world, and which is the badge of power, also refers to a lack of being, to castration (Morin, 2018, pp. 36–42). Therefore, when representing himself with outstretched and armed hands, Matt might both affirm his virility and react to the loss caused by the alteration of his self-image — now the image of a person "reduced to a wheelchair someone pushes," "scolded" like a child, having his hair done by his mother "like an altar boy." Matt's self-portraits therefore put to light his neurotic problems.

Oral Concerns and Intrusion of the Object

Over-emphasis of the mouth is observed in Matt's first self-portrait. This trait is frequently tied up with food faddism (Machover, 1949/1980, pp. 43–44). The mouth, which is disproportionately large, opens into a wide smile, symbolizes a demand for food and love (Lacan, 1966/2006c). Non repressed orality figures predominate in Matt's fantasies such as conveying food for feasts (i.e., feeding others). Not surprisingly, they are associated with aggressiveness (Lacan, 1966/2006b) in his fantasies of being a sumo, i.e., being a warrior and eating a lot. However, Matt eventually criticized his confabulations. This is completely different from the case of Mr. R. (Morin, 2018, p. 104) who was unable to comment upon his feeling "like biting a carer's arm." In addition, in Matt's case, these oral concerns never co-occurred with discourses related to the paralyzed hand. Therefore, we cannot affirm that oral objects pathologically intrude in Matt's psychic life.

The Paralyzed Hand and the Object

We have previously shown that the discourse of patients who personify their paralyzed hand attests for the repressed object coming to the fore, under the guise of what patients say about their paralyzed hand. Should we consider that the "black-sheep hand" represents some kind of object to Matt? If so, what kind of object might the "black sheep" be?

Remembering Haag's (1985/2018) proposition that autistic children treat their left hand as their mother treated themselves, we might consider the hypothesis that Matt's brain lesion has brought this libidinal asymmetry to light again, i.e., RABI has brought Matt back to a development stage prior to the mirror phase. This would imply a dramatic alteration of body image, which is not observed in Matt's self-portraits. Referring to Laufer's (1982, p. 297) suggestion that "the hand is unconsciously identified with the caring and gratifying aspects of the mother," we should consider the hypothesis that I-like personification could be related to Matt's position regarding the Other's desire.

Matt's Subjective Position

With Matt's questions regarding his "different selves," his place in the family and his frantic desire to stand up, Matt expresses questions about his self-image and his value in the Other's[7] gaze. This permits that we propose a neurotic interpretation of his discourse and self-portraits.

It is worthwhile emphasizing that Matt insisted to represent himself climbing stairs, an activity he was practicing but was actually still unable to perform. In Matt's eyes "moving means being free, not to be reduced to a wheelchair someone pushes." This concern about free movement can be heard in almost all stroke patients (Morin, 2018, p. 67), who however generally produce static drawings. According to Machover, the majority of drawings obtained from an adult hospital or clinic population without brain lesion are static or at best portray a person who is taking a walk (p. 85). Children, especially boys (Machover, 1949/1980, p. 85), sometimes represent moving bodies, this being linked to fantasies of power and adventure and/or to masculine interest in physical activities (Goodenough, 1926). Therefore, we might say that Matt adopts a juvenile masculine position. Climbing up stairs concerns the lower, the sexual part of the body. This reminds us that Freud, in his dream studies, claimed that symbols such as a staircase or going upstairs represent sexual intercourse (Freud, 1901/1962b, p. 684). Other traits

---

[7] In the Lacanian view, "the Other" refers to the language determinations which constitute the subject, while being alien to him. Even before a person's birth, the Other in language registers the subject at a certain place and assigns symbolic marks to him. The mother (or any helpful carer) is the first to symbolically represent the child in her words and in her relation to him, and she is radically alien to the child (because of the incest prohibition). She is thus the first incarnation of the Other. In his early dependency, the child thus first receives enigmatic messages from the Other. The way the child will hear and answer to these messages will build his subjective position. When speaking to a psychotherapist, a patient addresses his words to a figure of the Other. This address permits that the patient ponders about his subjective position.

of Figure 2b deserve comment. Matt drew the stair steps he was climbing, i.e., he represented the ground; he drew only one line to represent the bottom of his lower foot and the stair, as a result this foot seems to be fused with the step. In our experience with adults, neither stroke nor control drawers represented the ground (Morin, Pradat–Diehl et al., 2003). In children's drawings, this trait has been considered to express a feeling of insecurity (Amod et al., 2013, p. 375; Machover, 1949/1980, p. 92). Matt's insistence to draw buttons (see Figure 2a) leads us along the same line since Machover (1949/1980, p. 126) claims that "button emphasis along the mid-line of the trunk corresponds with subject's body sensitivity and his extreme dependence upon his mother."

The general attitude of the first drawing exhibits a phallic aggressive self-representation with a cartoon-like dynamic attitude: arms stretched out forward, as if the hands held guns. This reminds us of what Matt told to his psychotherapist: "Some mornings, you feel like tearing down the walls!" The hands are quite large, disproportionate when compared to the rest of the body. According to Machover (1949/1980, p. 61), hands are drawn quite large by young boys as an expression of strength. Excessive size indicates compensation for weakness (frailty, vulnerability). Let us remember the words Matt used when speaking of his paralyzed hand as suffering isolation ("a black sheep") or ill-performing ("clumsy").

In Matt's first self-portrait (see Figure 2a), hair is lacking on the left part of the head. From a neurological point of view, this might be considered as a sign of left hemineglect. However, hair is also extending outside the head… leftwards. This exception to hemineglect concerns a body part which, according to Matt's words, entailed much importance to him. Hair emphasis is generally considered an indication of striving for virility (Machover, 1949/1980, pp. 51–52). This behavior reminds us of Mr. E.'s behavior (Morin, 2018, p. 90). This man represented himself fishing in a mountain stream (a typically masculine activity), holding his fishing cane. This drawing was very sketchy, looking clumsy. However, when proposed to add something to his drawing, this man drew, with a lot of details, a very nice trout. This trout was situated in left "neglected" hemispace. Fish is a classical phallic symbol (Freud, 1900/1962a, p. 357). Thus, both Mr. E. and Matt drew a masculine symbol in their left hemispace.

Matt's self-portraits thus put to light his concern with virility and the frailty of his manly posture. Aggressive and virile representations (hands stretched outwards, climbing stairs) do coexist with signs of insecurity and dependence to the mother (representation of the ground, disproportionate hands, buttons on the mid-line). This contrast might reflect the configuration in which Matt was trapped before the injury: dependency and aggressiveness.

That Matt judges his hand a black sheep, the very nomination he heard from his relatives when speaking of himself, sheds light on his subjective position. This suggests that Matt is fixed to his infantile relationship to his parents' supposedly judging and dissatisfied gaze. In other words, we might consider this metaphor as a positive reenactment of an infantile neurosis. This reenactment is however open to further elaboration: by individualizing his hand, making it exist on its own, Matt projects onto it a bad image ("a black sheep"). But, at the same time, Matt opens himself to the hope of some improvement when saying that "it will wake up and be stronger."

These observations suggest that Matt elaborates around his symptoms. Let us compare Matt with Mrs. S. whose "daughter somatoparaphrenia" seemed to exist completely apart from her neurotic mother–daughter relationship. During psychotherapeutic sessions, the patient never established any link between these two lines of her discourse. By contrast, Matt's words suggest that individualizing his hand — making it exist on its own — makes sense in his subjectivity. Matt's words in the last session ("Who am I? Where am I? What am I here to do? How can I reconcile all my different selves?") reveal that Matt ponders about his subjective position, an attitude we did not previously observe in somatoparaphrenic patients.

Conclusion

The patient we describe here spoke of his paralyzed hand with the very terms he used when speaking of himself, a discourse we called I-like personification. He presented with body schema disorders, body image disorders and expressed rather raw oral concerns, a combination of traits we have previously shown to be characteristic of somatoparaphrenia — personification of the paralyzed arm as a foreign person. It might have been tempting to consider, as a consequence, that I-like personification was a form of somatoparaphrenia. However, the analysis of the patient's psychotherapeutic interviews and self-portraits made us reject that hypothesis and consider that Matt basically presented with a neurotic psychopathology. In our reflections, we attached an uppermost importance to Matt's discourse regarding his symptoms. This shows that whether patients are brain injured or not, the main guideline for the analysis of their discourse turns out to be their subjective position vis-à-vis their symptoms.

References

Amod, Z., Gericke, R., and Bain, K. (2013). Projective assessment using the Draw-A-Person Test and Kinetic Family Drawing in South Africa. In S. Laher and K. Cockcroft (Eds.), *Psychological assessment in South Africa. Research and applications* (pp. 375–393). Wits University Press. doi: 10.18772/22013015782.31

Babyar, S.R., Peterson, M.G.E., Bohannon, R., Pérennou, D., and Reding, M. (2009). Clinical examination tools for lateropulsion or pusher syndrome following stroke: A systematic review of the literature. *Clinical Rehabilitation*, *23*(7), 639–650. doi: 10.1177/0269215509104172

Bruguière, P., Morin, C., Maddux, B., and Pradat–Diehl, P. (2022). Contribution of psychoanalytical psychotherapy to the rehabilitation setting for a patient with acquired brain injury. *Journal of Psychosocial Rehabilitation and Mental Healt*h, *10,* 107–117. doi: 10.1007/s40737-022-00299-z

Critchley, M. (1962). Clinical investigation of disease of the parietal lobes of the brain. *Medical Clinics of North America, 46,* 837–857.

Esposito, E., Shekhtman, G., and Chen, P. (2021). Prevalence of spatial neglect post-stroke. A systematic review. *Annals of Physical Medicine and Rehabilitation, 64*(5),101459. doi: 10.1016/j.rehab.2020.10.010

Freud, S. (1962a). The interpretation of dreams. In J. Strachey (Ed.), *The Standard edition of the complete psychological works of Sigmund Freud: The interpretation of dreams* (second edition) and *On dreams* (pp. 339–630). The Hogarth Press and the Institute of Psycho-analysis. (Original work published 1900)

Freud, S. (1962b). On Dreams. In J. Strachey (Ed.), *The Standard edition of the complete psychological works of Sigmund Freud: The interpretation of dreams* (second edition) and *On dreams* (pp. 629–686). The Hogarth Press and the Institute of Psycho-analysis. (Original work published 1901)

Freud, S. (1964). Anxiety and instinctual life. In J. Strachey (Ed.), *The Standard edition of the complete psychological works of Sigmund Freud: New introductory lectures on psycho-analysis and other works* (pp. 81–111). The Hogarth Press and the Institute of Psycho-analysis. (Original work published 1933)

Goodenough, F. (1926). *Measurement of intelligence by drawings*. World Book Company.

Haag, G. (2018). La mère et le bébé dans les deux moitiés du corps. In G. Haag (Eds.), *Le moi corporel. Autisme et développement* (pp. 25–48). Presses Universitaires de France. (Original work published 1985)

Harris, D.B. (1963). *Children's drawings as measures of intellectual maturity*. Harcourt, Brace and World.

Hécaen, H., and Sauguet, J. (1971). Cerebral dominance in left-handed subjects. *Cortex, 7*(1), 19–48.

Lacan, J. (2006a). The mirror stage as formative of the I function as revealed in psychoanalytic experience (Le stade du miroir comme formateur de la fonction du Je telle qu'elle nous est révélée par l'expérience psychanalytique) [B. Fink, H. Fink, and R. Grigg, Trans.]. In *Jacques Lacan. Écrits. The first complete edition in English* (pp. 75–81). Norton. (Original work published 1966)

Lacan, J. (2006b). Aggressiveness in psychoanalysis (L'agressivité en psychanalyse) [B. Fink, H. Fink, and R. Grigg, Trans.]. In *Jacques Lacan. Écrits. The first complete edition in English* (pp. 82–101). Norton. (Original work published 1966)

Lacan, J. (2006c). The subversion of the subject and the dialectic of desire in the Freudian unconscious (Subversion du sujet et dialectique du désir dans l'inconscient freudien) [B. Fink, H. Fink, and R. Grigg, Trans.]. In *Jacques Lacan. Écrits. The first complete edition in English* (pp. 671–702). Norton. (Original work published 1966)

Laufer, M. (1982). Female masturbation in adolescence and the development of the relationship to the body. *International Journal of Psychoanalysis*, *63*(3), 295–302.

Leader, D. (2016). *Hands: What we do with them – and why*. Hamish Hamilton.

Machover, K. (1980). *Personality projection in the drawing of the human figure (A method of personality investigation).* Charles C. Thomas. (Original work published 1949)

Morin, C. (2018). *Stroke, body image and self-representation.* Routledge.

Morin, C., and Bensalah, Y. (1998). The self-portrait in adulthood and aging. *International Journal of Aging and Human Development, 46*(1), 45–70. doi: 10.2190/U3P8-8YBF-0DL0-HV2P

Morin, C., Pradat–Diehl, P., Robain, G., Bensalah, Y., and Perrigot M. (2003). Stroke hemiplegia and specular image, Lessons from self-portraits. *International Journal of Aging and Human Development, 56*(1), 1–41.

Morin, C., and Thibierge, S. (2006). Body image in neurology and psychoanalysis: History and new developments. *Journal of Mind and Behavior, 27*(3–4), 301–318.

Morin, C., Timsit, S., Durand, E., Marchal, F., Manai, R., Perrigot, M., Pradat–Diehl, P., and Rancurel, G. (2003). Discours sur la main, asomatognosie et héminégligence. *Annales de Médecine Physique et Réadaptation, 46,* 514.

Saetta, M., Brugger, P., and Michels, L. (2021). Where in the brain is "the Other's" hand? Mapping dysfunctional neural networks in somatoparaphrenia, *Neuroscience, 10,* 476, 21–33. doi: 10.1016/j.neuroscience.2021.09.007

Thibierge, S., and Morin, C. (2010). The self and the subject: A psychoanalytic Lacanian perspective. *Neuropsychoanalysis*, *12*(1), 81–93.

Winnicott, D.W. (1982a). Transitional objects and transitional phenomena. In D.W. Winnicott and C. Winnicott (Eds.), *Playing and reality* (pp. 1–25). Routledge. (Original work published 1967)

Winnicott, D.W. (1982b). Mirror role of mother and family in child development. In D.W. Winnicott and C. Winnicott (Eds.), *Playing and reality* (pp. 111–118). Routledge. (Original work published 1967)

The Journal of Mind and Behavior
Summer and Autumn 2024, Volume 45, Numbers 3 and 4
Pages 251–258
ISSN 0271–0137

The Homeostatic Structure of Emotion

Koshi Otsuka

Yokohama City, Japan

The structure of emotion is one of the microscopic reactions in the macroscopic systems of a cell, an organ, the organ system, and the brain — though the structure of logic is another of the microscopic reactions with feedback regulations among them. In this study, gradient and threshold are explored in the boundaries between each system and the environment as the barriers to be overcome by emotion for behavior to occur. It has been thought that the resistance of transmembrane gradient and the energy of ATP are the prototypes of emotion in the homeostatic system of a cell. Further, it is suggested that the origin of emotion is hidden in the tautomerizing predominance of nucleic acids that pair with other ones, keeping equilibrium in a gene.

Keywords; homeostasis, threshold, ATP, emotion, consciousness

A homeostatic system has microscopic — low molecular compound — reactions and regulations with a macroscopic — high molecular compound — boundary in the environment in order to balance the system's influx and efflux of energy or material to keep its equilibrium (Ganong, 2005, pp. 7, 48; Nelson and Cox, 2008, pp. 570–571). Therefore, it is thought that a life is a homeostatic and homeodynamic system that is microscopically trying to maintain its macroscopic body. The macroscopically homeostatic and microscopically homeodynamic system of life receives a stimulus from the environment as recognition to make microscopic reactions and regulations for the macroscopic response of behavior. And the macroscopic boundary of a homeostatic system is a kind of barrier that resists against the diffusion of microscopic molecules between the system and the environment with gradient or threshold. Then it seems that there are two structures in microscopic reactions for the macroscopic behavior of a homeostatic system, that is, one is an indirect structure through the microscopic regulation of feedback logic and another is a direct structure without the logic.

Correspondence concerning this article should be addressed to Koshi Otsuka, 4–14 Yamate-cho Naka-ku, Yokohama City, Japan Email: koshi_o_t@yahoo.co.jp

A homeodynamic system reacts microscopically through feedback logic to clear the threshold of a barrier between the macroscopic system and the environment toward behavior on one hand. A homeodynamic system reacts microscopically without logic to break the barrier on the other hand. Is not the macroscopic barrier of a homeostatic system to be overcome by its microscopic reaction with no feedback logic concerned with the formation of emotion?

Programming for the formation of emotion will be advanced in artificial intelligence (AI). However, the fulfillment of this programming means that AI gets the emotion by which human consciousness is inclined to make a mistake in its logical judgement on account of emotional excitement or depression. That AI makes a mistake owing to its emotional influences is inconsistent with a computer being needed for fast and correct calculation. What are microscopic reactions corresponding to the phenomena of emotion in the homeostatic system of a cell and its differentiated systems of the regulatory organ system or the brain?

A cell has a lipid membrane that is impermeable to ions or macromolecules, and this impermeability makes it possible for the cell's plasma membrane to form a barrier between its cytoplasm and the environment (Pollard and Earnshaw, 2008, pp. 111, 167–168). Proteins embedded in a lipid membrane facilitate the movements of ions or other solutes across the membrane, and these proteins, called pumps and channels, selectively transport macromolecules through their pores to allow a cell to make an internal environment different from the external one. Further, an impermeable membrane provides the resistance required to separate charges across its surface. Namely, both pumps and channels produce unpaired charges across their membranes. Then this charge imbalance arouses membrane potential. The pumps that transport unpaired ions generate membrane potentials directly, while the channels that selectively pass unpaired ions can use ion concentration gradients across membranes to generate membrane potentials. At last, the force produced by membrane potential influences the diffusion of ions through the pore of a cellular membrane in both directions to balance its cytoplasm against the environment as an equilibrium. Thus, a cell has the gradient of potential across its boundary as a barrier for its homeostasis.

Nutrients with high-energy bond like CO_2 or carbohydrate are degraded by enzymes, which stabilize the high-energy transition state for chemical reactions, to reach to the production of adenosine triphosphate [ATP] (Pollard and Earnshaw, 2008, pp. 63, 332, 342; Watson et al., 2008, pp. 60–61, 63–64, 69). And organic larger molecular products like polypeptides or polynucleotides are synthesized as the new constituents of a cell from the degraded elements that are activated by ATP in order to facilitate various reactions. ATP provides the other energy that is required for the movement of small molecules across a cellular plasma membrane against its electrical gradient, though ATP is liberated as heat energy in a cell when it is hydrolyzed (Pollard and Earnshaw, 2008, pp. 9, 128). All living species use ATP that is synthesized at mitochondria for many energy-requiring reactions in a cell, since mitochondria appeared 2 billion years ago when α proteobacterium — the origin of mitochondria — fused with the archaeal cells from which eukaryotes branched apart from prokaryotes (Watson et al., 2008, pp. 4–5, 14, 23, 331). Thus, ATP with high energy drives microscopic reaction at a cell's membrane against the transmembrane gradient to clear the macroscopic barrier. Additionally, ATP produces heat by its hydrolysis in every cell. Therefore, it is thought that a cell is loaded with the resistance of membrane to be overcome by ATP with heat, which may be the prototype of emotion. Hence, a cell has emotion with load and energy for behavior.

Is there any barrier that corresponds to the formation of emotion in a tissue and in an organ? Every organ is composed of four tissues — epithelial, connective, muscle, and nervous tissues, and the specialty of an organ is determined by the proportion of each tissue because the function of each organ is accomplished by the combination of each tissue (Marieb, Mallatt, and Wilhelm, 2008, pp. 3–4). As one of the examples in which each tissue becomes uniform and cooperative to exhibit its emotion, neural cells synchronize one after another as nervous tissue through the sequent depolarization over the threshold of each neuron to transmit the one-way electric signals of action potentials in neural organs. Therefore, it is understood that nervous tissue sustains the load of resistant threshold to be overcome by the charged electric energy into each neighboring neuron for the generation of action potential.

The organ of muscle has little difference both from the tissue of muscle and from the cell of muscle because a muscle organ is occupied by its long muscle tissues and a muscle tissue is occupied by its long muscle cells (Marieb et al., 2008, pp. 243, 246). And the contraction of muscle is explained by the sliding mechanism between myosin and actin filaments in a muscle cell such that these long protein filaments slide past one another for the shortening of a muscle organ. The protein of myosin contains the enzyme of ATPase (Pollard and Earnshaw, 2008, pp. 657, 659, 714–715). The myosin head of its filament binds and hydrolyzes ATP, interacting with actin in order to slide along the actin filament. The energy, which is derived from ATP hydrolysis to be stored in the elastic part of the myosin head as conformational change like a kind of stretched spring, is used to displace the myosin head to the next place on the interacting actin filament for the contraction of muscle. In contrast, the energy stored in the stretched myosin is dissipated as heat when the stretch does not overcome the threshold for mechanical work and then these filaments cannot slide. Therefore, it is understood that a muscle tissue and organ are simultaneously extended to sustain the load of stretched tension with thermal energy in order to overcome the resistant threshold for mechanical work. Hence, it is suspected that there is emotion with load and energy for behavior in a tissue or an organ.

One organ connects with the other organs by their common purpose to organize the organ system such as the nervous organ system composed of the brain, spinal cord, motor nerve, sympathetic nerve, etc (Marieb et al., 2008, pp. 4–5). It is proposed that each organ system is further categorized into four collective organ systems — the metabolic collective organ system including the digestive and respiratory organ systems; the circulatory collective organ system including the cardiovascular and urinary organ systems; the connotative collective organ system including the integumentary and reproductive organ systems; and the denotative collective organ system including the motor organ system and the central and somatic nervous systems. Interestingly, the immune organ system, endocrine organ system, and autonomic nervous system are left by categorically subtracting those four collective organ systems from all organs. Then these residual three systems may be systematized into another collective organ system because they have similar bases, that is, first, they are mainly originated in neural crest and branchial arch; second, they apply the basal levels of materials like cells, proteins, and electrons in comparison with compound tissues, foods, or blood; third, they work under the hypothalamus that is the highest center for immunological fever or endocrine and autonomic nervous functions; fourthly, they are separated from subcortical conditioned reflex and cortical integrated network; fifthly, they utilize the original signals of cytokines, hormones, and neurotransmitters for each regulation; sixthly, they cooperate with each other to regulate all cells, tissues, and organs involving themselves; seventhly, they set the derivative regulation for predatory behavior in addition to the basal regulation for vegetative metabolism or circulation; eighthly, they regulate every homeostatic system with microscopic feedback mechanisms in order to maintain the macroscopic organism (Ganong, 2005, pp. 142, 234, 251, 253–254, 279, 372, 374–375, 460–461, 472, 521–522; Marieb et al., 2008, pp. 392, 406, 460–461, 472, 474; Sadler, 2012, pp. 67, 69, 262, 267).

As a result, immune, endocrine, and autonomic nervous systems can be regarded as one of the collective organ systems, called the regulatory organ system because each organ in the nervous organ system is separately classified either into the denotative collective organ system or the regulatory organ system. Many autonomic reflexes are unified by the hypothalamus where the various activities of visceral organs including body temperature, endocrine function, autonomic nervous function, and emotional response are regulated (Ganong, 2005, p. 232; Marieb et al., 2008, p. 392). Therefore, it is thought that these regulative functions are charged to the regulatory organ system, relating to the formation of emotion at the deeper level of a mind — where the mind seems to have been intuitively expressed as heartful — under the hypothalamus, that is, immunological signals cause irritating inflammation with local heat and systemic fever above the normal temperature against infection from foreign microorganisms; and also, endocrinal signals that always activate the metabolism of all organs accelerate the adrenergic supplies of oxygen and glucose over the ordinary volume of hormonal secretion at alert conditions; and further, neuronal signals switch from comfort in rest to uncomfortable tension beyond the alternative threshold between the sympathetic and parasympathetic nervous systems in emergent situations. Hence, the regulatory organ system has the emotion of tension in unadjusted organs with multicellular excitation such as inflammatory heat, first-aid calorie, or adrenergic voltage for behavior.

The limbic system is the most basal part of the cerebral cortex on the brainstem and contains the amygdala, hippocampus, and cingulate gyrus to be concerned with memory and emotion, including their fibers that link them together in order to form closed neuronal circuits (Ganong, 2005, pp. 256, 258; Marieb et al., 2008, pp. 399, 406). The limbic system, which is the oldest part of the cerebral cortex, has three histological layers in comparison with the neocortex with six histological layers, though the limbic system of a human being is the same structure as with other mammals. Since the limbic system connects the primary cortex that directly receives olfactory signals, this explains why smells often trigger emotion, while the system interacts extensively with the prefrontal cortex, then emotion mediated by the system interacts closely with thought mediated by the thinking brain. However, the connection between the limbic system and neocortex is relatively poor to form a kind of threshold against the latter rational suppression, so that neocortical activity does not modify emotional behavior; and instead of this upward relation, many outputs from the limbic system are sent downward to the hypothalamus and reticular formation for the control of visceral responses, so that the reason why the person under emotional stress experiences visceral symptoms like heartburn or high blood pressure through adrenal medulla and sympathetic nerve is explained.

The cingulate gyrus allows people to shift between thoughts to express emotion through gestures, while the anterior part of the cingulate gyrus interprets pain as unpleasant and resolves mental conflict during frustrating tasks (Marieb et al., 2008, pp. 392, 406). The hippocampus receives cortical data including emotion to process the data in order to be remembered by the rest of the central cortex where data are stored as long term memories. The amygdala forms the memories of experience especially related to fear and also retrieves the memories to cause people to re-experience the original emotion in order to make people decide the effective way of handling difficult situations beforehand. And in fact, fear reaction can be produced in conscious animals by the stimulation of the amygdala, while fear reaction and its endocrine and autonomic nervous manifestations through the hypothalamus are absent after the destruction of the amygdala (Ganong, 2005, pp. 256, 259–262). Meanwhile, the regions concerning the stimulation that leads to reward in rat brain are located in the dopaminergic pathway extending from ventral tegmentum in the midbrain to nucleus accumbens at the base of the striatum. Conversely, the regions concerning the stimulation that is avoided are located in the posterior hypothalamus and dorsal midbrain (Ganong, pp. 260, 263, 268). Thus, the subcortical brain distinguishes pleasant demands like appetite or sexuality from unpleasant pressures like fear or conflict to behave alternatively.

Hence, it is thought that the subcortical brain excites its instinct either with pleasantness or frustration as the emotion of oppression in order to efficiently behave with limited liberty in diverse nature with high degree of freedom.

Olfactory nerves are ultimately relayed to the primary olfactory cortex to result in conscious awareness of more than 10,000 different odors in human beings (Ganong, 2005, pp. 186, 189; Marieb et al., 2008, pp. 396, 399). The gustatory cortex is related to the conscious awareness of taste and the discrimination of sweet, salt, sour, bitter, and umami, while the visceral sensory cortex receives the general sensory input of pain, pressure, or hunger from thoracic and abdominal organs. Stimulation to the feeding center of the medial forebrain in conscious animals evokes the appetite for food. Further, the limbic association area that is located on the medial side of frontal lobe processes emotions involved in complex personal and social interaction to guide emotional response, and also the limbic association area aids in the formation of memory and uses this past experience to integrate sensory and motor inputs with the memory in the lobe for future behavior (Marieb et al., 2008, pp. 400–401). The right hemisphere of cerebral cortex is more concerned with emotion or artistic and musical skills though the left hemisphere has greater control over logic or math with certain thresholds between them in most people (90% to 95%). Then the corresponding region in the right hemisphere to Broca's area, which receives the inputs of meanings and concepts from recognition to form the outputs of words toward the premotor cortex for speech, controls emotional overtones given to spoken words. Therefore, it is understood that the cortical brain feels more differentiated satisfaction and complaint as innumerable emotion according to the category of meaning and concept in conscious recognition and logic. And it is thought that consciousness develops motive as the emotion of subjective and objective feelings, where the world of consciousness is more widened and deepened in order to live existentially in complex society.

Subcortical emotion in the limbic system is separated from cortical emotion in the neocortex, though the limbic system and neocortex are more or less connected. It is thought that subcortical emotion is intuitively recognized as a subconscious subject in itself while cortical emotion is objectively represented as a conscious subject through the thresholds of social concept and logic. And the number of patterns in subcortical emotion is few in comparison with cortical emotion, as well as the number of patterns in subcortical logic and behavior is incomparably less than the number of directions in the vectors of cortical ones. In addition, it is conjectured that the subcortical brain has the emotion of oppression that always wants to be efficiently superior to the predatory rivals, whereas the cortical brain has the emotion of feeling that often tries to be diversely tolerant to social others.

Stress in biology has been defined as any pressure in the system that changes or threatens to change an existing steady state (Ganong, 2005, p. 370). If a homeostatic system is attacked by any pressure to counteract the stress with emotion, this emotion can lead the system to restore the changed state back to the original state. There are some phases in emotion, i.e., the conative surge to take action, the physical symptom like blush or tremble, the affective demand of instinct, and the cognitive awareness of sensation (Ganong, 2005, p. 256). From this viewpoint, it is thought that emotions in a cell, the regulatory organ system, the subcortical brain, and the cortical brain are respectively consistent with conative surge, physical symptom, instinctive affect, and objective sensation because each emotion is related to a charged response with threshold, adrenergic reaction with heat, predatory behavior with sex, and social conduct with consciousness. Originally, each system in these differentiated levels respectively shoulders the pressure of biological disorder, regulatory imbalance, subconscious conflict, and conscious irrationality. Then it is suspected that these systems prepare transmembrane barrier with ATP in a cell, inter-organ disproportion with excitation in the regulatory organ system, predatory frustration with excitement in the subcortical brain, and social complaint with the right hemispherical motive in the cortical brain to counteract their troubles directly without logical thinking for emotional behaviors. And as the structure of logic, these systems construct correspondent feedback in a cell, reflective feedback in the regulatory organ system, conditioned reflex in the subcortical brain, and integrated network in the cortical brain to solve their problems through indirect feedback logic. Hence, it is concluded that the structure of emotion has appeared in each homeostatic or differentiated system as cellular load with resistance and potential, as regulatory tension with discomfort and comfort, as subconscious oppression with frustration and pleasantness, and as conscious feelings with complaint and satisfaction in order to respectively transcend cellular disturbance, multicellular disharmony, predatory insufficiency, and social inconsistency by means of another dimension against logic to behavior.

A living thing succeeds its life from generation to generation using both the genetic materials such as nucleic acid or phosphoric acid and the enzymatic machineries such as DNA polymerase or RNA polymerase (Watson et al., 2008, pp. 132, 257). An organism survives only if its DNA is replicated accurately both through favorably geometric alignment between two pairs of nucleotides and through correspondently complementary relationship between nucleotide and polymerase to give DNA its self-coding character (Watson et al., 2008, pp. 106, 198–199, 204–205). Then high rates of mutation in the soma cell would destroy the individual, and high rates of mutation in the germ cell would destroy the species (Watson et al., 2008, p. 257). Nevertheless, if the genetic materials were perpetuated with perfect fidelity, the genetic variation needed to drive evolution would be lacking and then new species would not have arisen. Thus, it is understood that a life depends on a happy balance between the efficiency of exact replication and the diversity of rare mutation. A major limit to the accuracy of replication comes from tautomerization, where there are two isomeric states of tautomeric nucleic acids that are in the relation of equilibrium and also have the different predominance for the pairing of nucleic acids, because the occasional flickering of low-predominant pairing that allows the incorrect pairing of nucleic acids for mutation rarely occurs (Watson et al., 2008, pp. 105, 208, 257). Therefore, it is thought that the flickering between high and low dominant tautomeric nucleic acids in equilibrium is correspondent to the emotion by which a gene overcomes the gradient of dominance between isomeric nucleic acids for the chance of evolution. It seems as if the river of emotion has been traced downstream from the accident of alternative difference with fluctuation, which may be the origin of emotion, in a gene, through the load of transmembrane resistance with energy in a cell, and then through the tension of multicellular unbalance with excitation in the subconscious regulatory mind, and further through the oppression of predatory conflict with excitement in the subconscious instinctive mind, to the feelings of social friction with the right hemispherical motive in conscious mind.

References

Ganong, W.F. (2005). *Review of medical physiology.* San Francisco: McGraw Hill.
Kumar, V., Abbas, A.K., Fausto, N., and Aster, J. (2010). *Pathologic basis of disease.* Philadelphia: Elsevier.
Marieb, E.N., Mallat, J., and Wilhelm, P.B. (2008). *Human anatomy.* San Francisco: Pearson Education.
Nelson, D.L., and Cox, M.M. (2008). *Principles of biochemistry.* New York: W.H. Freeman and Company.
Pollard, T.D., and Earnshaw, W.C. (2008). *Cell biology.* Philadelphia: Elsevier.
Sadler, T.W. (2012). *Langman's medical embryology.* Philadelphia: Lippncott Williams and Wilkins.
Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levin, M., and Losick, R. (2008). *Molecular biology of the gene.* New York: Pearson Education.

The Journal of Mind and Behavior
Summer and Autumn 2024, Volume 45, Numbers 3 and 4
Pages 259–300
ISSN 0271–0137

Freedom, Determination, and Causality

Walter B. Weimer

Pennsylvania State University

Despite centuries of analysis, problems of "determinism," issues surrounding agency, the freedom of agency, personal causation and responsibility of individuals for their choices, still abound. Up to the minute literature is based upon analyses from 18th century figures such as Kant (Onof, 2024). The situation seems to be similar to Talmudic or Shakespearean scholarship: literature often devolves into discussion of how a given scholar's interpretation of another scholar is incorrect (and theirs better), continually moving farther and farther from fundamentals. Often lost in "determinism versus free will" is any sense of perspective on what advances in knowledge from other fields (and newer ones) have on major issues; such as age-old problems of how advances in science (and technology) ramify back through philosophical issues. New data change the battleground, eliminating issues and possibilities without ending legitimate discussion (Weimer, 1976). Classic problems have been solved by more recent analysis, creating in turn new problems in their stead. Advances in physics, psychology, complexity, biosemiosis, and origin of life studies paint a new picture of the problems of determination, and supply a new canvas for them to be painted upon. One fundamental new distinction is between the physical and the functional domains. Another is the difference between rate dependent theories and phenomena in the physical domain, and the rate independent systems of the functional realm. Such distinctions reorient issues away from traditional problems (no matter how "up to the minute") to new formulations. Realization that the functional domain (of semiosis, intentionality, knowledge, etc.) is fundamentally different from, and can and does harness (to use Polanyi's formulation) the law-governed physical domain by employing a system of higher-order constraints, allows us to see there is no incompatibility between agency freedom as higher-order constraint and physical inexorable lawful control. We need accounts in both domains, physical and functional, to complement each other (Pattee, 2012), because either alone is incapable of explaining the complex realms of freedom and determination.

Keywords: determinism, physical vs. functional, free will and agency

"The mind is free in its action — exactly as our common sense knows it to be free. The mind harnesses neurophysiological mechanisms; though it depends on them, it is determined by them."

Michael Polanyi
Knowing and Being, 1969

Dedicated to Raymond Chester Russ, in appreciation for forty five years of stewardship of this Journal.
Correspondence concerning this article should be sent to walterbweimer@msn.com

"(E)very event in the world is connected to every other event. But you cannot carry on science on the supposition that you are going to be able to connect every event with every other event.… It is, therefore, an essential part of the methodology of science to divide the world for any experiment into what we regard as relevant and what we regard, for purposes of that experiment, as irrelevant.

We make a cut. We put the experiment, if you like, into a box. Now the moment we do that,we do violence to the connections in the world. We may have the best cause in the world.… To put a fence around the law, to put a fence around the law of nature that we are trying to tease out. And we have to say, 'For purposes of this experiment everything outside here is regarded as irrelevant, and everything inside here is regarded as relevant.'"

Jacob Bronowski
The Origins of Knowledge and Imagination, 1978

The epigraph from Bronowski represented the original Copenhagen interpretation (now the "operational interpretation") of quantum theory, which replaced billiard ball determinism with statistical probabilism. And yet, Bronowski still had to take the opposed view, held by Einstein, that there must be an underlying level of "deterministic" reality beneath the statistical or probabilistic quantum results. Why? Can these opposed views both be correct? How do we reconcile overwhelming experimental support for quantum entanglement (Einstein's "spooky action at a distance"), with extreme *apparent* determinism, with both quantum realm probabilism and with the choice contingency of the mental/semiotic domain of life? With respect to traditional philosophical questions, how can agents (animal or human) be free to determine their own actions if the laws of nature are inexorable every-where, every-when statements, showing only clockwork physical mechanisms? In short, how, if at all, does physical theory relate to semiotic control and genuine novelty in the universe? Polanyi pointed the way to the answer in "Life's Irreducible Structure" (in Polanyi, 1969). His account, and that of biosemiotic theorists influenced by him (and by Peirce) is far more adequate than better known indeterministic ones of Copenhagen physicists and philosophers who opposed that view, such as Karl Popper (1972, 1982). To see why we must delve into some history.

Basic issues. What happens when events follow events? What principles of order specify the relationships that, once we have classified events into like kinds and classes, can be said to obtain between them? As complex creatures in uncertain environments we have had to evolve to respond to *relatively* invariant aspects of external (and our own internal) environments to have gotten to the point where we can ask such questions. Then problems of knowledge and its acquisition, of what scientific inquiry is and can disclose, and the nature of human conduct immediately arise.

Traditionally such problems are found in philosophy, centering around free will and/or determinism, "chance" and/or necessity, and personal responsibility versus coercion (for individual conduct). The classic problems have all been resolved, and no longer appear except in introductory philosophy or psychology classes as examples for beginners to discuss. The classic problem of "free will" was decisively resolved decades ago by Dickinson S. Miller (under the pseudonym of R. E. Hobart), in a paper whose title alone ends the original issue: "Free will as involving determination and inconceivable without it" (Hobart, 1934). Miller pointed out that one cannot possibly have agency, or have what we call freedom of choice (or "will"), unless one's *own actions* "determine" our choices.

This simultaneously solves the problem of free will and moral responsibility for *voluntary* action. For now, note the crucial point: the "Hobart" paper specifies *determination*. In earlier centuries "hard" science (for example, on the usual interpretation of 19th century physics) "determination" would have construed this as "billiard ball" causality or as strict *determinism and necessity*. In psychology, Freud's plumbing of depth psychological causation of overt issues would have been and remains so interpreted. Indeed mid-20th century behaviorism proposed to dispense with freedom and dignity and provide a "scientific" account in terms of deterministic contingencies of reinforcement alone (Skinner, 1976). In billiard ball interactions of atoms in the void nothing is left to "chance" (except the description of individual ball draws from absolutely uniform urns according to rigid statistical "laws" of probability). Everything is causal necessity (and chance "probability") determined by strict principles called laws of nature, which is what "billiard ball" determinism consists of. The "will" (choice contingency) seemed to be absent from discussion except for a few old-fashioned philosophers.

But what if *determination* is not exhausted by determinism? What if laws of nature do *not* cover everything? What if the universe as a whole is *indeterministic* instead? What if our agency *is* "free to choose" what we do instead of being physically determined? How can we account for obvious "constant" regularities in nature and agent (principally human) behavior if determinism does *not* hold, billiard ball causality is *not* the necessary connection between events, and prediction and control are *not* indispensable to science? In point of fact, all these "not" claims are true statements.

Understanding this requires we explore problems of novelty (emergence) in the physical and functional domains (clearly distinguishing physicality from functionality), and how emergence can be explained in spontaneously organized complex phenomena. Here, while determinate, nature is nondeterministic and non-necessitarian. Although hinted at in antiquity, this has come to be adequately understood only since the beginning of the 20th century with problems posed by the "new" or quantum physics, the dynamic picture of economic activity from the "Austrian" school of economics research into the market order and culture in the 1920s and 1930s, the rise of the transformational approach to the complexity of language in the 1950s, and developments in logic and computation theory from Gödel and Von Neumann from the 1930s to the 1950s. More recently has come the field of biosemiotics, returning to the study of semiosis (meaning and agency) as the definitive characteristic of the functional domain, while semiosis is totally absent from the physical realm. Developments in such fields have shown the inadequacy of explanatory ideals and presuppositions of inquiry that held sway until the quantum revolution (and remain current in many areas).

We begin by exploring the classic deterministic account at its strongest. Brand Blanshard presented a clear and coherent account of the deterministic, and therefore necessitarian, position.

Blanshard on determinism and necessity. Completing his training in the 1920s, Blanshard was familiar with the "new" physics of the quantum, and the equally new and brash philosophy of logical positivism. More sympathetic to Russell, he took Russell's critical analysis of realism (that eventually led Russell [1948] into structural realism) to be a refutation of realism rather than a refinement, opting instead for idealism. His guiding principle was the doctrine of internal relations (or as he preferred, internal relevance). This metaphysical view holds that human understanding consists in grasping the necessity of relations between things. To explain something is to see it as necessitated within a system of relations, a definitive context of constraint, within which it *must* then occur as it in fact does occur. Reality is not just a consistent whole, but rather a positively coherent and unified one, united by necessity, and thus operating totally deterministically. Given sufficient information (which he admits it is never possible to actually possess) it would be possible for Laplace's demon to "predict" the entire fate of the universe from a complete knowledge of its initial conditions. His working hypothesis for philosophic and scientific inquiry was that if the correct relations of internal necessity could be found we would know everything that could be known. Notice at the outset that this position says *nothing* about reality (ontology), as it is only an epistemic (knowledge) doctrine.

Discussing indeterminism and "free will," Blanshard put it this way:

> He [the indeterminist] is not saying that there is any event to which some nameable antecedents are not necessary; he is saying that there are some events whose antecedents do not make them necessary. He is not denying that all consequents have necessary antecedents; he is denying that all antecedents have necessary consequents. He is saying that the state of things just before he decided to tell the truth might have been exactly what it was and yet he might have decided to lie. (1961, pp. 19–20)

Against this Blanshard defined determinism this way: "by determinism, then, I mean the view that every event A is so connected with a later event B that, given A, B must occur" (ibid., p. 20). Echoing Hobart on free will he states: "the real issue, so far as the will is concerned, is not whether we can do what we choose to do, but whether we can choose our own choice, whether the choice itself issues in accordance with law from some antecedent" (ibid., p. 21).

One should note the change from the event A necessitating B to *choice* following from law (from ontology to epistemology), an uncharacteristic lapse for a clear thinker. Unfortunately, we will see this confusion of epistemology and ontology plagues most writers on determinism. No doubt this occurred in Blanshard because he held the principle of internal relevance to apply equally to events and to laws about those events, even though this is a category mistake as Ryle (1950) used the term. But let us accept the Hobart formulation as to conduct (as far as it goes) at this point. Then the issue is whether *determination* is restricted to *determinism*. Must our choices (in conduct, theory construction, knowledge acquisition, or whatever) be restricted to necessary consequences by strict determinism? Are there, allowing Blanshard's definition, events whose antecedents do *not* make them necessary? At that time physics was coming to exactly that conclusion. Blanshard dismissed the conclusion.

Addressing that indeterminism in physics, Blanshard countered "Physicists now tell us that descriptive statements about the behavior of bodies are really statistical statements.… Hence to speak any longer of nature as governed ultimately by causal laws — i.e., statements of precise connection between antecedent and consequent — is simply out of the question" (ibid., p. 23). His conclusion is that such reasoning amounts to an argument from ignorance. Historically, "When things happened whose causes were unknown, it was assumed that they had causes nevertheless. To assume that a frustration of present knowledge, even one that looks permanent, is a sign of chance in nature is both practically uncourageous and theoretically a *non sequitur*" (ibid. p. 29).

Even if the indeterminist argument in physics is accepted, Blanshard held it must be irrelevant to human behavior. We are not single particles. Thus:

> The question of importance… is whether, if acts of choice are dependent on physical processes at all, they depend on the behavior of particles singly or on that of masses of particles. To this there can be but one answer. They depend on mass behavior.… So, even if the physicists are right about the unstable behavior of single particles, there is no reason whatever for translating this theory into a doctrine of indeterminism for human choice. (ibid. p. 25)

Note that the "assumption" Blanshard relies upon cannot ever be tested empirically — it is what Popper and his students (e.g., Watkins, 1958) called a "haunted universe" metaphysical doctrine. Such positions (like the doctrine of atomism and the idea of a plenum universe) have been fruitful in physics as suggestive sources of testable theories, even though they themselves (as metaphysical conjectures) can never be refuted, and thus are not scientific.

Things have changed since Blanshard's metaphysical commitment to determinism seemed reasonable. Determination in relation to physical necessity has given way to the problem of agency control. The necessitarian view can no longer be accepted — choice in agency can and does *supervene* over physical determinism when agents are involved. Functionality constrains physicality. And the laws of nature are not themselves "physical" phenomena, but rather functional (i.e., mental or theoretical constructs) *approximations* of physical phenomena existing in our conception. Never confuse issues in ontology with epistemology. To see this we first detour through what happened in physical theory.

Schrödinger's cat and the death of classical determinism. An enormous literature defends the "new" normal science paradigm shift to indeterminism. Two main features of that shift are, first, realization that what had been regarded as rigidly deterministic "laws" had been based upon the tacit assumption of an infinite number of observations (measurements) supporting definite results when in fact all empirical results that are ever available are finite, by definition *incomplete* representations, statistical in character, and subject to error; and second, all the taken-for-granted every day marvels of 21st-century life (e.g., genetic engineering, microwave ovens, computers, and thousands more) would not exist were it not for acceptance of quantum results that depend upon indeterminacy at that realm ramifying into the phenomenal one of molar behavior in the manifest image of day to day life (Gribbin, 1984). So the quantum theory "cookbook" makes marvelous meals every day, and the recipes it utilizes are inherently statistical and quantal rather than deterministic.

Writing in 1931, Schrödinger summarized the situation:

> 50 years ago it was simply a matter of taste or philosophic prejudice whether the preference was given to determinism or indeterminism. The former was favored by ancient custom, or possibly by an a priori belief. In favor of the latter it could be urged that the ancient habit demonstrably rested on the actual laws which we observe functioning in our surroundings. As soon, however, as the great majority or possibly all of these laws are seen to be of a statistical nature, they ceased to provide a rational argument for the retention of determinism. (1935, p. 67)

In contrast, Blanshard held determinism as a metaphysical a priori *belief* and simply disregarded empirical results that had overwhelmingly accrued prior to his defenses of the doctrine of internal necessity. But what of this metaphysical notion of internal necessity? Can it be reformulated in terms of the connection between observed results and observers in a hopelessly intertwined quantum experimental situation? That is the import of the emphasis upon the inseparability of the observer from both the results of experiments and the *entire* experimental situation in which both observations and results occur. Consider first Schrödinger's and Wigner's (1961, 1964) interpretations of the role of the observer in knowledge.

Preliminary excursus: State vectors and discontinuity. According to the classic phenomenalistic or Copenhagen interpretation, the *information* (whatever that is remains ill defined, and that fact is likely responsible for many physicists failing to distinguish ontology from epistemology) available about the possible states of the quantum system can be characterized in quantum accounts by state vectors that can change in *only* two ways. Due to temporal succession, they change continuously, according to Schrödinger's (1956) time-dependent equation (equations of motion). The state vector also changes *discontinuously*, in probabilistic fashion, *as a result of measurement operations* performed on the system. The problem of measurement *on the object* leads inevitably to the problem of observation *on the measuring apparatus*. This latter step is the epistemically problematic one (where the ontological quest is stymied in epistemic limitations) and concerns what, for Bohr and Copenhagen followers, is known variously as "the reduction of the wave packet or function" or "the collapse of the state vector." (Note particularly that the probabilistic aspect of the theory is located quite far from what "ordinary experience" would expect: one would assume probability laws to govern the change of the system over time, such that interactions of particles would be statistical. But the uncertainty of the system does not increase over time if it is undisturbed by measurement — in such a case change in the state vector is "causal." So-called chance or probability enters with epistemology (with the problem of knowledge *about nature*) in the move from physical to functional, when one *observes* the system in order to judge if it changed in the manner predicted by the equation of motion. Note also that this slip from epistemology to ontology is what later enabled DeWitt's (1970) interpretation of Everett's (1957) dissertation to be an ontological speculation (about "many worlds"). It is the *functional role* of that consciousness (or even purely physical measuring apparatus), *not* anything physical, that gives the meaning of the result obtained. There is no possible purely physical theory specification of function — of semantic information or meaning. Quantum *measures are always semantic* rather than syntactic, and thus fundamentally ambiguous until interpreted in the context of relevant theory and fact.

The cat "paradox." Another way to show the ambiguity in quantum measurement is to recast the situation as Schrödinger did, as a hypothetical experiment in which a single photon passes through a half-silvered mirror. This photon will either be reflected or transmitted through the mirror. If it is reflected, nothing happens. If it is transmitted, it activates a photocell that poisons a cat that has been placed in a small sealed and isolated box. After this "experiment" is over, *but before anyone has looked*, the wave function that represents all the information that quantum mechanics can specify for the combined system is a linear combination of functions representing a dead cat and functions representing a live cat. Indeed, given all the information that is available to quantum mechanics which, remember, is nondeterministic, it is impossible even to say that the cat is either dead or alive! When, however, an observer looks inside the box she will see that the cat is alive or that the cat is dead — which seems to "adjust" the "epistemic" wave function to an ontological reality accordingly. The point is that functional cognitive (actually epistemic) intervention on the part of an *agent* capable of making choices — in the form of the choice of ultimate *interpretation of the meaning* of the system — is necessary to remove an intolerable ambiguity about the cat's existential status.

This ambiguity exists until meaning is provided, which then interprets the result. It is not consciousness that is indispensable, as Wigner suggested, but the requirement that meaning assign definite interpretation to an inherently ambiguous "experimental" ensemble of events. J. A. Wheeler later extended this type of result into the quantum entanglement paradigm, with the empirical outcome that it is the presence (or absence) of meaning that "determines" the result.

Opponents of the Copenhagen interpretation utilize situations such as the cat paradox to argue for the incompleteness of quantum mechanics as a full description of reality. David Bohm (1957/1971a, 1971c, 1976), exponent of a hidden variable approach, suggested that in addition to the wave function, there must be specified further parameters that tell what the actual state of the system is after interaction but before "looking." Such information can only come from a "sub" quantal level of analysis that would explain the observed effects "up" at the quantum level. Bohm's arguments led to what came to be known as the Bohm quantum potential underlying the quantum level of analysis. If his approach were successful, it would show that quantum theory is not a complete description of reality while also leaving it an apparently complete description *at its own level* of analysis. Even if successful, this or any other hidden variable approach (such as Wheeler's quantum "foam," whether as "local" hidden effects or otherwise) must still explain why ascription of meaning has the effect that it does (Endnote 1).

Excursus: *Entanglement and non-locality*, *and determination.* Consider the sort of mutual entrainment that occurs at the quantum level when two (or more) potentially separate entities are put together or paired. Quantum entanglement occurs when pairs (or groups) are generated together or are made to interact so that the quantum state of each constituent cannot be determined or described independently of the other constituent(s), even when they are separated by great distances. Entanglement occurs when the quantum state must be described for the system *as a whole*. For the purpose of analysis, it becomes necessary to regard such pairs or groups as a single entity despite spatial separation of the components.

Non-locality is different from entanglement (despite the separation of parts of pairs implying "instantaneous" transmission of information from one location to the other). Entanglement has been seen as a basic "fact" of quantum life since experiments begun by Alain Aspect (beginning in 1982) indicated that faster than light correlation between entangled entities does indeed occur. The domain of quantum computation could not exist as it does today unless the fact of entanglement were presupposed. Entanglement is necessary but not sufficient for a two-party state to be nonlocal. Non-locality is a more generalized notion of quantum theoretical formulations dealing with the general question of Einstein's "spooky action at a distance." Regardless of these differences, one can ask if either concept restores determinism.

The answer is "No." Entangled pairs as singular conceptual entities still run into the uncertainty principle and statistical determination sooner or later. In the case of non-locality as a conceptual issue, it is not clear what determinism could possibly mean. In an entangled account the classical billiard balls were *never* separated singularities, so one could not ever "cause" another to do anything in any deterministic sense. In a Bohmian enfolded universe there is only a constant movement process which folds and re-folds. While the rate independent (timeless theoretical) factors such as the conservation laws would likely apply the same way as in classical systems, it is not clear how theories of the rate dependent (physical) processes would be deterministic in any usual sense.

Bohm discussed this, well before his enfolded universe views were developed:

> There is no case where those laws (of nature) are completely satisfied — there will always be some discrepancy between the predictions of an underlying determinate law and any set of laws of probability. This discrepancy, I think, is an advantage rather than a disadvantage. First of all we do not know that any set of laws of probability is absolutely and universally true — we only know that it is true in some approximation and in some domain. From the point of view which I am proposing this is hardly surprising as single events are always dependent on an enormous number of factors which fluctuate in a very complicated way.... There has been a general tendency to stress the fact that laws of probability contain causal laws as a limiting case, but it goes the other way as well. If you take a causal law as a limiting case of a law of probability it will not be a perfect causal law but only an approximate case; and if you take a law of probability as a limiting case of a causal law it will also be only an approximate law probability. So if you suppose the infinity of nature then — no matter how far you carry the laws — there will always be something outside, something that gives rise to fluctuations. Hence no causal law can be perfectly exact. On the other hand, however, every fluctuation comes from some causes and therefore no law of probability can be perfectly exact.... So in reality events are related by causal laws and by laws of probability as well as by still other kinds of laws which have not yet been developed. (Bohm, 1957/1971a, p. 84)

Those other kinds of laws "not yet developed" were what he attempted to specify in the determinate regularities of his later enfolded universe view. Whatever they may be, they will be formulated in the totally deterministic timeless or rate independent domain as general statements of determination. Whatever occurs in the indeterministic rate dependent or dynamical existence of the universe will only be linked to such laws by identification or postulation (see Körner, 1966), and thus the only conceptual necessity will remain in our rate independent theories and can never be known to actually exist in the dynamics of the real world events. We continually forget that that presumed linkage is our conceptual creation, and not anything more (Endnote 2).

Bell and the postulate of "superdeterminism." As an intellectual exercise John Stewart Bell (2004) proposed that one could "explain" entanglement phenomena by postulating a superdeterminism, in which chance and accident did not ever exist, and the entire history of the universe had been fixed or known *in advance* of its actual existence (perhaps by Laplace's demon God who existed independently of the universe as a whole). This would "solve" the problem of faster than light entanglement because the universe would already "know" what the separated but entangled particles were going to do, and thus their behavior would be "determined." Is such a metaphysical postulation of any benefit?

Of course not. First of all, superdeterminism is just plain old metaphysical determinism. All determinism is "super," or "specified in advance." As such, it is a Popperian haunted universe metaphysical doctrine (Watkins, 1958), completely untestable and utterly uninformative as to the nature of reality, since no matter what happens (or doesn't happen) it is "compatible" with this postulate. Useful metaphysical doctrines (such as atomism) suggest theories and research that are testable (i.e., have empirical content, which is to say, specify consequences which are *forbidden to occur* if the theory is correct). Bell's "super" postulation does not do this, and cannot be repaired in any manner to make it testable — it (by definition) simply has no empirical content at all. Thus this exercise does not "explain" the phenomena of entanglement or, indeed, anything else.

Complex Phenomena and Determinism at the Functional Level of Existence

Prediction and the novel growth of knowledge and language. Since the 1950s another line of attack has been made against metaphysical determinism at the functional (not physical) macro level of the growth of knowledge and the genesis of novelty. This argument is fatal to strict determinism and predictability without going "down" to the level of sub atomic physics. It is based upon the existence of genuine novelty (that is, completely unpredictable occurrences) in the growth of human knowledge and in the genesis of behavior. When properly understood, it becomes obvious that our behavior is the result of abstract rules of determination, constraints that redefine what we mean by causality, forcing a reformulation of what constitutes scientific understanding in functional realms of complex spontaneous orders such as language and market processes. Although they arose independently, two arguments have been developed that are two sides of the same coin. First in impact was the transformational revolution in linguistics, emphasizing the productivity or creativity of human language, and thus the inadequacy of deterministic models of language (and hence, all cognition around language). Second was the impact of Popperian arguments (based upon Karl Bühler's account of language) emphasizing unpredictability in the growth of knowledge, and thus the impossibility of a linear surface structure or billiard ball account of language in the acquisition of knowledge. Consider them in turn.

Import of the transformational revolution. Until Chomsky's publication of *Syntactic Structures* in 1957, attempts to explain language concentrated upon relating and exhaustively categorizing surface structures. All grammars were phrase structure grammars, attempting to show how the surface components are put together to form sentences. The transformational "revolution" forced the realization that one cannot understand language by more refined attempts to sharpen the "blurred edges" of the statistical picture of the *surface* form of language. We can only account for creativity in language (the generation of novel but appropriate utterances) by coming to grips with the deep structural rules of determination that are manifested in indefinitely extended domains of possible surface particularity.

Transformational approaches explain linguistic surface phenomena by deriving them from abstract rules of determination specifying how deep structural entities (such as S, intuitively understood as sentence, or NP as noun phrase) are constrained to appear in their eventual surface realization. Explanation traces the derivational history of an utterance by listing the successive rewrite rules that change S into the realized surface form. Such explanations manifest how an infinite number of sentences can arise from finite syntactic constraints in conjunction with the finite number of surface words (terminal vocabulary elements) in any natural language. Creativity or productivity, the ability to make (and comprehend) novel but "appropriate" (Brown, 1958) sentences, is a matter of constraint by recursive syntactic structures resulting from rules of varying generating power.

While we now understand how an infinite variety of sentences (where a sentence is a completed meaningful output, a functional rather than physical specification) can be generated from deep conceptual structures, no one can predict either what surface word or sentence a speaker will next utter, nor make any inference from linguistic theory as to the functional cause of any utterance. That is beyond the bounds of understanding in complex domains. Analogous to Boltzmann's impact on thermodynamics in which there is no knowledge possible of the motion of any particular molecule, one result of Chomsky's transformational revolution was the virtual disappearance of attempts to provide causal and predictive accounts of linguistic particulars after the mid 1960s.

Linguistic freedom (another term for creativity) always presupposes rules of order, a context of constraint, in order for it to operate. It consists in the production (to use Brown's felicitous phrase) of "novel but appropriate" utterances. Novelty results in new meanings expressed as sentences through the generative capacity of rules that form syntactic structures. Transformational grammars defined creativity as the result of rules of varying degrees of generating capacity operating on symbols (strings of symbols for rules of transformational power) that produce new strings of symbols. The theory of Post languages (from E. L. Post, 1943, 1965) is the mathematico–logical framework in which grammars, consisting of rules of determination for production of terminal vocabulary items from abstract and non-terminal items, are studied. Even though there is a finite number of rules and terminal and non-terminal vocabulary items, the number of *meaningful* sentences that can result is infinite. All realms of creativity make infinite use of finite means to generate novelty. There is thus an essential complementarity between creativity and constraint. Creativity is dynamically (rate dependently) realized by constraints. No one has seen this more clearly than Howard Pattee (especially 2012). Referring to linguistic creativity as *symbolic* freedom he said: "we now must state the complementary aspect of symbolic freedom, and that is simply the universal requirement of symbol systems that they must have grammatical constraints if they are to have any meaning" (1981, p. 125). Freedom is a problem of meaning no matter where it is manifested, and it results from functional rules of determination rather than from physical laws and determinism.

Rate independent regularity — the products of human conceptualization and theory — is (because it exists only cut off from dynamical reality) frozen for once and for all. As such, it is as "deterministic" as the consequences of a mathematical operation, or a logical deduction (which are our most familiar instances of rate independent regularity). Even though the outcomes are novel and not predictable in advance, they are in a very important sense still "determined" by the iterative conceptual rules which generated those outcomes. They are not due to chance or happenstance or similar notions that have arisen from looking at physical phenomena. They are determinate but not deterministic.

We still need to see how higher-order functional constraints can direct lower-order physical processes that are, in themselves, subject to control by the laws of nature (in conjunction with local boundary constraints). How do we combine (functional) freedom with (physical) control?

Plastic control: Of clocks and clouds. A famous argument by Popper called for indeterminism in physics and, by extension, in the mental realm. He formulated that problem this way: "how can it be that such things as states of mind — volitions, feelings, expectations — influence or control the physical movements of our limbs" (1972, p. 231)? In psychology this became J. C. Eccles' problem of how can it be that physical states of the organism influence its mental states and vice versa (Eccles, 1970, 1976)? Attempts to answer are deterministic whether they emphasize it or not — they are all centralized control point (Popper called them "master-switch") models of control, as for example in Meehl's (1989) resuscitation of the "command neuron" hypothesis. In such cases the body is conceived as a machine (as in Eccles et al.'s [1967/2013] "the cerebellum as a neuronal machine") that is regulated from one or more control centers (as Descartes' pineal gland was supposed to as the "seat" of the soul).

What if such Cartesian approaches put "de cart before de horse"? What if the central problem is elsewhere, in the issue of *how do we combine freedom and control*? Popper felt this latter formulation was fundamental, and identified it as a problem posed by physicist A. H. Compton: What is the influence of meaning upon human behavior?

> There are such things as letters accepting a proposal to lecture, and public announcements of intentions; publicly declared aims and purposes; general moral rules. Each of these documents or pronouncements or rules has a certain content,

> or meaning, which remains invariant if we translate it, or reformulate it. Thus *this content or meaning is something quite abstract*. Yet it can control — perhaps by way of a short cryptic entry in an engagement calendar — the physical movements of a man in such a way as to steer him back from Italy to Connecticut. How can that be? (Popper, 1972, p. 230)

This led Popper to search for *plastic controls* — controls with feedback and hierarchical structure that could learn from their experience. This becomes an evolutionary approach incorporating feedback systems: "My theory… consists of a certain view of evolution as a growing hierarchical system of plastic controls, and of a certain view of organisms as incorporating — or in the case of man, evolving exosomatically — this growing hierarchical system of plastic controls" (ibid., p. 242) Organisms, regarded as a hierarchical system of plastic controls, become systems of clouds that are controlled by other clouds. The "physical" organism is actually an open system instead of a closed and deterministic one. Agency makes "clouds" rather than 19th century deterministic clocks. But Popper had no idea how this could happen (Endnote 3).

This change of formulation — from physical determination to functional control systems — was made without understanding or acknowledgment of the fundamental difference between physical systems and the functional domain of existence in which physical signs become functional symbols and, as higher-order control constraints, select the occurrence of physical events. That understanding came *outside* philosophy, from the origin of life studies, and the physics of symbol systems research.

The causal theory of mind and the issue of dual control. While Popper did little to address causal efficacy in consciousness and the nondeterministic nature of the genesis of language, others clarified what is involved. Polanyi and Pattee (both readily available when Popper was elaborating his [unfortunately contradictory] doctrines of indeterminism in quantum theory and determinism in conscious language) provide the direction in which an answer lies. One can defend both the thesis that language (thus cognition, thought, theory, etc.) is not necessitarian or "determined" and also the causal theory of mind. To do this we must note how certain kinds of purely physical boundary and initial conditions harness deterministic laws of nature, and how "accidents" that are "frozen in time" occur in both physical and functional domains.

The problem is how to beat the second law of thermodynamics without running afoul of the every-where and every-when laws of nature. We must have available sufficient physical degrees of freedom, thus providing a lack of deterministic constraint, to allow agents to be able to choose. Polanyi *solved* this by noting that agency harnesses inexorability. Functionality must constrain physicality rather than being inexorably determined by it. It must provide a *higher-order* form of constraint. There must be dual levels of control, one exercised by the functional mental, and also the physical realm. The use of symbols in the functional mental realm must be free in the sense that they are *under*determined by the laws of nature (and the local boundary conditions). This requires energy degeneracy to avoid thermodynamic limits and inexorable control: The cost of energy expended in symbolizing (thinking in the human case) cannot be large (as is indeed the case with the very low energy "cost" of neural activity), and there cannot be appreciable differences in energy expended for any given symbols (it can't be "harder" or more costly to think or say one word or sentence as opposed to any other). This allows an indefinite number of "thoughts" (neural firings–sentences–words–intuitions–feelings–whatever) to come into existence without being constrained by or in violation of physical laws. This enables a system of *dual control*: as Polanyi (1969) said,

> The mind is free in its actions — exactly as our common sense knows it to be free. The mind harnesses neurophysiological mechanisms; though it depends on them, it is not determined by them.
>
> Moreover, the mind itself includes an ascending sequence of principles. Its appetitive and intellectual workings are transcended by principles of responsibility. Thus the growth of man to his highest levels is seen to take place along the sequence of rising principles. And we see this evolutionary hierarchy built as a sequence of boundaries, each aiming at higher achievements by harnessing the strata below them, to which they themselves are not reducible. (p. 238)

This dual control or hierarchical structuring of differing levels of function allows freedom *within each level* to occur so long as the constraints of the lower level are not violated. Life cannot violate physico–chemical laws of nature, and thought cannot violate the constraints applying to living systems. But due to the downward causation of constraint from higher over lower levels (Campbell, 1974), the "mind" can control our behavior, which in turn can control physical phenomena (that in turn are controlled by the laws of inanimate nature). Earlier Popperian arguments fail to understand this hierarchical *dual* control, and thus cannot begin to address the obvious causal determination of the higher mental processes when it occurs. Looked at from below, each level leaves open and thus indeterminate (*under*determined) the function of the next higher level. Looked at from above, each level imposes (nondeterministic) constraints and controls or "causes" upon lower ones.

Complex functional phenomena and the nature of determination. Physics is not alone in having replaced determinism as strict necessity with determination. In domains of very high complexity, such as the organization of the CNS or the market orders of society, we find it is necessary to abandon the attempt to explain or predict particular events, or (to use Blanshard's terminology) to specify precisely delimited antecedents as causes. All that we can achieve in such domains are "in principle" accounts based upon general rules of order which allow *classes* of events (such as any given particular instantiates) as (energy degenerate) *possibilities,* while prohibiting (if the account is correct) other classes from occurring. Our accounts can address "plastic control" of highly evolved structures by specifying the context of functional constraint that is "causal" (i.e., theoretically well motivated) without being deterministic. These accounts are of *rate independent* (purely formal) specifications of a context of constraint that prohibits the occurrence of particular classes of events in rate dependent (actual empirical) processes. There is no possibility of accounting for complex phenomena by specifying infinite numbers of particulars that must occur or that must be achieved.

Spontaneously organized complex phenomena are biological, social, and (only recently studied) physical phenomena that evolve without conscious or explicit planning (or deliberately imposed "external" controls) according to *internal* regulative principles. They are characterized by decentralized or "coalitional" (as opposed to linear or chaining, or top–down hierarchical) control, unpredictability of particulars, and immense complexity compared with simple systems (Weimer, 1987). They are understandable only in terms of what Hayek (1967) was the first to call *explanation of the principle* rather than the particular. These principles of regulation are rules of interactive constraint rather than deterministic laws. Constrained orders are determinate — regulated by abstract rules or principles — but not deterministic and/or predictable. They are, as Bronowski (1978) and Popper (1972, 1982) emphasized, cloud-like systems that look like clockwork mechanisms. Cloud-like systems, when looked at from the right scale, are clocks.

A precise but unspecifiable definition of complexity. What is "complex" as opposed to "simple?" Spontaneous complexity presents a qualitatively different class of problems from those encountered in "simple" sciences (Weimer, 1987, 2022, 2023). Qualitative differences emerge from quantitative changes in the subject matter: they emerge from simple physical phenomena. They are emergent at a precise but unspecifiable point: *where the least complex rigorous model of a phenomenon is as complex as the phenomenon itself*. For relatively simple phenomena we can, as von Neumann noted, build (physically or mentally) a model of how something works that is less complex than the thing itself: such a model simplifies and economizes to enable us to comprehend the phenomenon. For high complexity the reverse occurs: models are either more complex than the phenomenon, or equally complex, and thus do not enable us to simplify in the attempt to understand. For high complexity we are limited to understanding abstract regulative principles of order rather than ever being able to exhaustively model the particulars (either deterministically, or in the rate independent mode, deductively).

This way of specifying (high) complexity can be called *Von Neumann's conjecture*, stemming from his pioneering work in the theory of self-reproducing automata and the organization of the nervous system. As von Neumann (1966) put it: "It is characteristic of objects of low complexity that it is easier to talk about the object than produce it and easier to predict its properties than to build it. But in the complicated parts of formal logic it is always one order of magnitude harder to tell what an object can do than to produce the object" (p. 51).

Trying to understand the central nervous system led von Neumann to this conjecture. Earlier (1951) he discussed the issues in relation to modeling the visual system: "In this domain a real object might… constitute the simplest description of itself, that is, any attempt to describe it in the usual literary or formal–logical method may lead to something less manageable and more involved" (p 24).

Thus explanation of all particulars by covering laws in complex domains is in the realm of utopian fantasy. Von Neumann's specification of high complexity (reached when the simplest adequate model of the system is as complex as the system itself) provides a criterion with which to draw the distinction between two very different types of scientific understanding. It delimits areas in which pattern prediction, explanation of the principle, abstract regulation by a (largely negative) context of constraint (Weimer, 2020), etc., are all that human understanding can hope to achieve, from "simple" realms in which we are able to provide explanation of particular events, prediction, "laws," and so on.

Limits of explanation: *Complexity and explanation of the principle*. Von Neumann's conjecture leads to this constraint on explanation: it is beyond the capacity of systems to explain (or model) phenomena that are as or more complex than themselves. This limit is reached at self-explanation. The system can only *be* itself, it can never explain itself. An explaining system must be more complexly organized than the thing modeled or explained. No system, such as the human brain, could ever fully explain its own operations (as emphasized by Hayek, 1952/1999). This logical limitation relates back to explanation of the principle — all understanding can hope to achieve in complex orders is explanation of the abstract principles according to which the system is constrained to function. We can never model such systems completely (deduce or predict their particular states), nor corroborate the adequacy of our models in all particulars. Their productivity or creativity — their capacity to make infinite use of finite means — ensures we can never comprehend such systems except in terms of general, abstract rules or principles that generate domains (classes) infinitely rich in particulars.

This limitation must not be confused with the claim that there are:

> Particular rules which no such system could ever state. All the former contention means is that there will always be some rules governing a mind which that mind in its then prevailing state cannot communicate, and that, if it ever were to acquire the capacity of communicating these rules, this would presuppose that it had acquired further higher rules which made the communication of the former possible but which themselves will still be incommunicable. (Hayek, 1967, p. 62)

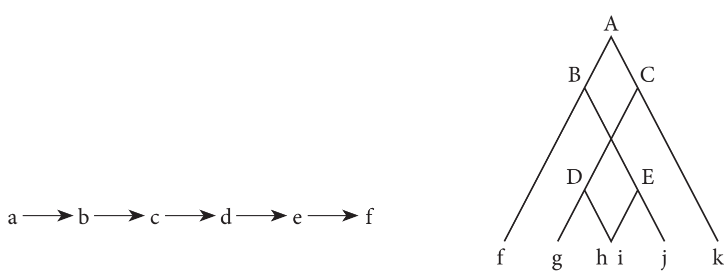
But what sort of understanding does explanation of the principle provide? *Only* information about the compatibility of classifications or kinds of properties that could be exhibited by the complex phenomenon. Our knowledge of a model's adequacy, like the evolutionary survival of a species, will be based solely upon falsification (extinction of a species), in that we can learn only that a particular model we construct is incorrect (when it fails to adequately describe the data). A successful model is always a tentative conjecture — it is never "proven" or "true." A good model is one that has thus far survived serious attempts to refute it. A tenable model generates classes of properties that are the same as classes of properties of the complex order, but we can never know that the model is instantiating exactly the same principles that regulate the complex phenomenon. We can conjecture about the abstract principles and test them against empirical particulars, but our knowledge will always be limited to classes of phenomena compatible with given particulars. Explanation is a specification of a possible context of constraint regulating a complex order, it can never be the deduction of particulars in the order.

Rules versus laws. The character of the complex sciences is quite different from that of the sciences of the relatively simple. More obviously metaphysical, they are less directly testable, and incapable of prediction and control of particular events (except in artificially or deliberately restricted and constrained cases). Thus while they are empirical, they are *not* experimental in the sense in which ratio scaled physical research is. The objects of study cannot be separated from complex contexts and complicated boundary conditions like "simple" physical experiments can. Nor can research disclose "laws of nature" such as those occurring in "simple" science. There can be no time independent deterministic relationships such as Newton's famous F = MA. There can be no "every-where, every-when" inexorable laws in the physical theory sense. All we can expect are *pattern predictions* that result from postulating abstract rules underlying the indefinitely large number of surface particulars. Being finite creatures, we could never comprehend the welter of particulars *at all* except in terms of their relationships to general rules of determination. Prediction of particulars, their "exact" quantification, and deterministic laws are utterly meaningless except in realms of low complexity, with finite domains of reference completely specifiable in advance (Weimer, 2023).

Understanding complex phenomena makes use of abstract rules of determination rather than deterministic laws of prediction. Explanation provides classes of possibilities (equiprobable outcomes) held in check by negative or prohibitory rules of determination. These rules forbid the occurrence of particulars of certain classes without restricting us to the specification of any "positive" particulars (individual events that must occur). They address the potentially infinite welters of particularity in complex orders without restricting them to finite systems of simple phenomena.

Control structures and the nature of determination. I have noted four potential control structures or systems that have been proposed for complex phenomena (Weimer, 2023). These are: (1) linear or causal chain theories of the linkage of events; (2) hierarchical or branching "multiple control" theories that require a terminal versus non-terminal vocabulary distinction for the theoretical and surface empirical terms involved; (3) polycentric (Polanyi) or distributed information accounts that require an increase in the proportion of non-terminal vocabulary items to characterize what relationships exist in that system; and, (4) coalitional (von Foerster) control models that generalize polycentric control to n-dimensional systems that are far more abstract and complex than polycentric orders. Note that only the first two classes of theoretical models can be called deterministic. The other two exhibit increasingly more abstract relationships with particulars which can only involve rules of determination rather than laws or determinism. The classic concept of causality becomes divorced more and more from determinism as we move through those other two types of control.

Consider differences in the explanatory capability of these control structures on a complex order that we all possess: the CNS. Is the CNS functionally equivalent to any of them? One way to answer this question is to consider the effect of disruption on possible control models. In a chain, breaking a link terminates ongoing performance at that point: no control is passed over the disruption, and behavior is stopped at that point. Results with cerebral lesions summarized by Lashley (1929) killed chaining models a century ago.



LINEAR CHAINING MODEL HIERARCHICAL CONTROL MODEL

Figure A: Surface structure linear control versus hierarchical (surface distinguished from deep) centralized control. In the hierarchical diagram the control structures are capitalized and the overt surface behavior is represented by lower case letters.

Consider the more powerful hierarchical structure in Figure A. A hierarchical structure is indefinitely more powerful — since the control relations are from top to bottom rather than between terminal elements, this model not only recognizes *deep* structural control of surface particulars, but can survive even the removal (as by Lashley's cortical lesions) of a higher node. But a hierarchy, even with other hierarchies under it as nodes, is still logically a *centralized* control structure with one final initial node functioning as the chief executive (a proverbial homunculus in the head, or a command neuron, or whatever). Do we really have one "upstairs?" No. While our waking consciousness is pleased to be regarded as a *single* self, there is never any evidence to support that hypothesis.

Two lines of evidence from psychology make this point. First is the tacit dimension of all skilled performance. Not only can we routinely recall a difficult problem, but we can do so while carrying on polite conversation as part of our tennis game, or while driving a car (during either of which we are simultaneously breathing, digesting, and carrying on a myriad of other bodily functions). All such performances interact, to be sure, but they are too independent to be controlled by any one hierarchy. One can hold one's breath without disrupting the other activities (except speaking — but one could write the problem down). There is a constant interaction (better: mutual coordination) between highly complicated activities that *in isolation* look like they are hierarchically controlled, but upon examination one can never find a single final locus of control for them all at once.

A second line of evidence stems from Sperry's (1969, 1976) pioneering studies of corpus callosum sectioning. Here we find a plurality of "selves" that are largely independent when commisurotomy or selective anesthesia removes the usual link between our hemispheres. Similar evidence for independence greater than that permitted by hierarchical control has *long* been available, with classic sources such as Teuber's (1960) work with traumatic cerebral insult, and Penfield's (1975; Penfield and Roberts, 1959) studies of direct cortical stimulation. Similar results have corroborated these accounts for decades.

One can see the same problem for hierarchical control in more "basic" biological processes such as the growth transformation of the face and head during aging (Enlow, 1958). The head dynamically remodels entirely — there is no single locus of control directing the remodeling of the face as an individual ages. What we find is a *mutual coordination* of factors that constrain one another, but no determinism and no single ultimate control center (and one should contrast this with extant computer modeling systems).

Examples such as facial remodeling exemplify what Polanyi called polycentric orders. Later von Foerster (1962) and Shaw (Shaw and McIntyre, 1974/2024) proposed a modification of polycentric ordering they called *coalitional control*. The CNS as a whole is not a monocentric system like a chain or a hierarchy: it seems to be a coalition of many (perhaps) hierarchical structures, somehow allied together, but with no single locus of ultimate control. Decentralization of control is one definitive property of coalitions. The second is the lack of determinate specifiable boundaries between the coordinated systems. Clearly perception is not memory or locomotion, but one cannot sharply separate any of the three. The boundaries of a coalition both as a whole and within itself are intrinsically "fuzzy." A third crucial property is that coalitional structures are super-additive: the whole is more than the additive sum of the parts. Emergence is a fact of coalitional life. What a coalition can "do" is vastly greater than the sum of its individually added parts. Graphic illustration may help clarify this.

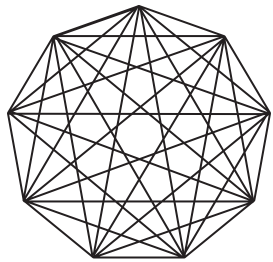


Figure B: Polanyi's polycentric (decentralized) control.

Begin with the simpler models in Figure A. Compare the control relations represented by a chaining model and the hierarchy in Figure A. If we disrupt the chain at the occurrence of surface structure event c, for example, the chain is broken and nothing else occurs beyond it. Removal of hierarchical node D would disrupt surface events at h, but the remainder of the sequence would be intact. Now consider the circular polycentric order in Figure B. The complexity of relatedness here increases as the number of nodes is increased, and the consequence of disruption of any single surface point is minimal in comparison with the hierarchical model. Clearly Polanyi's conception is more adequate (less linearly deterministic) to explaining how the nervous system works than the hierarchical model. It could possibly represent a "simple" system such as the ANS regulation of respiration.

Still more adequate representation of the CNS is found in a coalitional structure, or what Hayek in the 1970s (referring to the social orders) called a *cosmos*. A cosmic structure such as the brain would require a three dimensional sphere with connections through the interior (thus effectively completely filling in the polycentric two-dimensional model and creating a sphere). When one considers the possible interconnections of 100 billion neurons and a trillion glial cells, the sphere is effectively solid: anything is connected with everything, and anything can, as part of a large pattern of activity, "control" anything else. Thus we can "see" why coalitions have fuzzy boundaries and super-additive capacity compared to linear models. We can better appreciate von Neumann's remark that "the order of complexity is out of all proportion to anything we have ever known" (1951, p. 24). Classical simple accounts, such as strict determinism, simply have no place here. "Control" is in the patterns of activity, not their anatomical location.

Research on cortical structural and functional organization has long since made it obvious that the brain functions as a distributed information processing system that is effectively coalitional. Mountecastle (1978) noted three findings in this regard. First, the neocortex is constructed by cloning identical multicellular units or modules. The module is a vertically organized or columnar group whose functioning is similar throughout. Second, the extrinsic connectivity of larger entities is much greater than earlier research recognized. Third, the modules of large entities are themselves fractionated into subsets, linked to similar submodules in other entities. The effect of all this is to corroborate a picture of distributed systems linked in echeloned serial and parallel connections. As Mountecastle noted, "information flow through such a system may follow a number of different pathways, and the dominance of one path or another is a dynamic and changing property of the system" (p. 40).

This *dynamic* coalitional capacity, allowing a flow of constantly changing "control" points to act as though they were the "command neuron" or deterministic cause of subsequent events, is what provides determin*ate* but not billiard ball deterministic "control" in the nervous system. It is what separates humanity from all known "deterministic" machines, including conceptual devices such as Turing machines, so long as they are assumed to compute in discrete steps.

Co-occurrent enablement. Even so, one could assume these differences in control models simply increase the complexity of the billiard ball control structure and make it harder to trace out. Are there cases in which things "just happen" without, to return to Blanshard's criterion, having "antecedents which do not inevitably have necessary consequents?" What happens when a coalitional "control" framework is so amorphous that it is just a loose conjunction of constraints? Can there be antecedent events or situations which do not necessitate consequent events or situations? An example of coalitional structuring that fits this specification in emergent evolutionary domains is Kauffman's (2019) conception of enabled rather than caused emergence. Here there are antecedents (often many) that do not have any necessary causal connection to the emergent novelty that is their consequent.

Consider Kauffman's example of a Darwinian preadaptation (exaptation): the swim bladder. Some fish have a bladder that holds air, and by accident of the fish living in water, some water enters. Some fish have subsequently evolved swim bladders from this accidental conjunction.

Paleontologists think swim bladders evolved from the lungs of lungfish. Water got into some lungs, which now had a mixture of air and water and were poised to evolve into a swim bladder:

> With the swim bladder's emergence, a new function came to exist in the biosphere: neutral buoyancy in the water column.… Might a worm or bacterium evolve to live only in swim bladders? Yes, of course. So the swim bladder, by existing, opens a new crack in the floor of nature, to borrow from Darwin, and a worm can live in that new crack.
>
> And there is still more: does the bladder *cause* the worm to evolve to live in the swim bladder? No. The bladder enables the worm to evolve to live in the swim bladder — a subtle but crucial difference.… The mutation in the worm that is part of the evolution of the capacity to live in swim bladders is itself a random quantum event. Much of the becoming of the biosphere has to do with *making possible*.…

> Natural selection played a role in "fashioning" a working swim bladder. But did natural selection fashion the swim bladder such that it constituted an adjacent possible empty niche in which a worm could evolve to live? NO! But that means that without selection accomplishing it, evolution creates its own possibilities of future evolution! Evolution, without selection achieving it, evolves its own future pathways of becoming! (Kauffman, 2019, pp. 116–117)

Functions cannot be "predicted" or prestated from physical events. Consider the uses of a screwdriver: there is literally an indefinite number of them, and in the future there will be an indefinitely new number of them that just "emerge." No physical theory can ever explain or predict the emergence of a new use for a screwdriver. Physical determination can occur only in a phase space in which an equation of motion can be specified for the variable(s) in question — to trace its motion through the phase space. The problem with a screwdriver is that it is a functional utility that can never be specified in a *single* phase space. The novelty — the emergence — comes into existence because physically specified situations "enable" the emergence of new phase spaces of functionality for the screwdriver. The problem for determinism here is not simply that it is just unbelievably complicated, it is that it is impossibly so. The impossibility is found in the fact that an infinitely complete specified physical situation can never account for or predict that a function will (or will not) emerge. Functionality is always deep structurally ambiguous with respect to any physical specification. The antecedents have no "necessary" consequents whatever.

Back to brains, clocks, and clouds. Determinism requires that everything be a clockwork: regular, orderly, and (to omniscient intelligence) completely predictable because antecedents necessitate consequents. As a metaphysical research program it directs us to interpret everything as a clock, and to postulate that prima facie exceptions, such as clouds, should be analyzed into smaller deterministic clock works. But there is a definite similarity, constantly being empirically explored, between the active brain and the cloud. As Edelman said, the model of the CNS as coalitional and coordinate is not deterministic: "It would be a mistake to conclude… that a system of group-degenerate selection with re-entry of signals operates in clockwork fashion…. Selection can occur from cell groups participating in the states without "telling molecules what to do" (Edelman and Mountcastle, 1978, p. 86). The lack of determinate predictability is equally obvious in molar behavior — especially so in our creative use of language — which is quite cloudlike. As Bronowski said decades ago of word associations, "These responses must have this statistical character: you feed in a perfectly definite piece of information, you get out a perfectly definite answer, but what goes on inside is not at all a computer-like process. It must be much more like the process which we imagine goes on in a cloud of gas" (1978, p. 105). Rule governed creativity in the rate independent realm, as instantiated in a computer or written in an explicit grammar, is one thing; the way in which rate dependent reality operates, such as the dynamical brain, is quite another.

A cryptic remark of von Neumann (1958) in this regard is relevant:

> What matters are not the precise positions of definite markers, digits, but the statistical characteristics of their occurrence, i.e., frequencies of periodic or nearly periodic pulse-trains, etc.
>
> Thus the nervous system appears to be using a radically different system of notation from the ones we are familiar with in ordinary arithmetics and mathematics: instead of the precise systems of markers where the position — and the presence or absence — of every marker counts decisively in determining the meaning of the message, we have here a system of notations in which the meaning is conveyed by the *statistical* properties of the message. (p. 79)

The statistical (patterned) as opposed to purely mathematical character of the CNS becomes clearer with the realization that the all-or-none spike potential is only one type of event in the functioning system. In addition there is the fuzzy, or cloudlike, *graded* wave potential activity that has been emphasized as the mechanism for wavefront interference phenomena in the CNS. Pribram's (1971) holographic model takes advantage of the clouds of pre-and post-synaptic dendritic slow potentials to provide a plausible interpretation of the distributed information processing and retrieval characteristics of the CNS, particularly in "imaging."

Following Wundt and other 19th century theorists, Pribram (1971, 1991, 2013) proposed that the CNS uses both a digital code and an "analog" or wave-like one. Instead of leaving us in indeterminism as Popper does, he argued (as did Edelman) that the two process model provides exactly the sort of plastic control that evolution requires, but on an *abstract* (and indetermin*ate*) rather than and indeterministic basis. "The uncertainty of occurrence of events is only superficial and is the result of holographic "blurring" which reflects underlying symmetries… and not just haphazard occurrences" (Pribram, 1977, p. 98).

In the regulation of complexity we see most clearly the essential tension between clocks and clouds, between (level) determinism and (level) indeterminism, and the emergence of determinate order as an outcome of the interaction of different levels. Spontaneous complex orders will have both characteristics, and their relative prominence will vary over time. We must never identify spontaneous complex orders such as the CNS (or the even more powerful tacit market order of human interaction) with any extant rigorous control model.

Chaos, catastrophe, complexity, and determination. We have focused in physics upon the *in*determinacy of initial conditions and the inevitable statistical nature of so-called deterministic laws in the molar realm, and upon fundamental uncertainty in the quantum realm. But the second half of the 20th century saw new views arise concerning the predictability of events in complex dynamical systems that seem to account for unpredictability in terms of deterministic laws — random or chaotic results from the iterative application of determinate laws to classes of initial conditions that include attractors to pull a dynamical system into (usually long-term) cycles of sequences of states, rather than coming directly to rest. Unlike the case in Brownian motion, relatively small systems without unseen or quantum effects (molecules or atoms are not visible, only their effects in the Brownian situation) can, when in these states, show the randomness now called chaos (stemming from Lorenz, 1963). Simple "deterministic" systems of only a few elements can generate random, totally unpredictable behavior from fixed rules. There is order underlying the creation of this surface chaos. This theory has added deterministic models, strict sensitivity to initial conditions, strange attractors, fractal dimensions and more terminology to our burgeoning vocabulary. Later Thom (1983) introduced catastrophe theory, which studies how seemingly continuous actions can wind up producing discontinuous results — how catastrophic results come from deterministic laws continuously or recursively applied.

There is no need to explore these theories in detail to examine whether they constitute the reinstatement of determinism. They do not. What they provide is examples of what Hayek (well before them) called explanations of the principle rather than the particular. These theories actually build upon the earlier work of Boltzmann and Poincaré. As Poincaré said in 1908:

> A very small cause which escapes our notice determines a considerable effect that we cannot fail to see, and then we say that the effect is due to chance. If we knew exactly the laws of nature and the situation of the universe at the initial moment we could predict exactly the situation of that same universe at a succeeding moment. But even if it were the case that the natural laws had no longer any secret for us, we could still only know the initial situation *approximately*. If that enabled us to predict the succeeding situation with *the same approximation*, that is all we require, and we should say that the phenomenon has been predicted, that it is governed by laws. But it is not always so; it may happen that small differences in the initial conditions produce very great ones in the final phenomena. A small error in the former will produce an enormous error in the latter. Prediction becomes impossible, and we have the fortuitous phenomenon. (1908/2007, pp. 67–68)

Recall that the rate dependent "laws of nature" are not what kills determinism: it is the infinity of complexity of initial conditions in conjunction with the inevitably statistical nature of the laws we have (we have never examined any infinite population to see if they in fact hold). Chaos and catastrophe theories are studies of initial physical conditions, showing that the repeated application of "rigid" (thus deterministic in the rate independent realm) procedures leads to fuzzy results that cannot be predicted in advance. As such, their impact on science is through epistemology and then (inevitably) in the methodology of research.

Crutchfield et al. (1986) put this point well in physics:

> The existence of chaos affects the scientific method itself. The classic approach to verifying a theory is to make predictions and test them against experimental data. If the phenomena are chaotic, however, long-term predictions are intrinsically impossible. This has to be taken into account in judging the merits of the theory. The process of verifying a theory thus becomes a much more delicate operation, relying on statistical and geometric properties rather than on detailed prediction.
>
> Chaos brings a new challenge to the reductionist view that a system can be understood by breaking it down and studying each piece. This view has been prevalent in science in part because there are so many systems for which the behavior of the whole is indeed the sum of its parts. Chaos demonstrates, however, that a system can have complicated behavior that emerges as a consequence of simple, nonlinear interaction of only a few components. (p. 56)

Thus, methodologically, studies of chaos (and catastrophe, despite Thom's dislike of "chance") [Endnote 4] show limits upon the possibility of prediction of particular outcomes in complex phenomena (and, indeed, in some seemingly "simple" situations). Our hope of "scientific" understanding in these domains lies in constructing theories of the rules or principles involved rather than ever being able to enumerate or explain particulars by natural laws. These principles will have a determinate form in our theoretical formulations in the rate independent realm. But that cannot reinstate classical determinism for the rate dependent realm of actual physical phenomena.

Functional Agency, Enablement, and Novelty in a Physical Framework

In physics, freedom is meaningful only with reference to "degrees of freedom," areas in which the laws of nature in combination with the boundary conditions present do not constrain events into a defined path of motion in a phase space. Explanation in physics is finding an equation of the motion of an event or entity in a phase space defined by physical parameters on the axes of the space. It is the areas with a lack of totally defined constraint which allow for the physically "novel" to occur if energy degeneracy is present. Nonlinear interactions in chaos and catastrophe are examples. Crucially, the functional domain can come into existence only because physical systems allow, through energy degeneracy, for its emergence. The closest thing to randomness or pure "chance" is when these degenerate situations (such as life) eventuate into what agents would consider to be "choices" between physically equally possible alternatives. While their basis is in physical systems, agents transcend that physicality because they can choose between alternative equiprobable physical paths. This is Polanyi's "harnessing" physicality through Campbell's downward causation over distance and time. Life and agency are emergent from "purely" physical interactions when, as Pattee put it, signs become symbols. Symbols harness the physical: signs are just physical objects. When the semiotic domain arises, physics has been superseded by functionality. Symbols are now control structures. Life is a matter of meaningful interactions, occurring in functional phase spaces rather than physical ones. This enables agency, the domain of the "will," and its freedom lies entirely in functionality, not physicality.

Determination and personal causation. Self-help or personal motivation books or articles are commonly on how an individual can take charge of their life and escape from the rigid "external" force-determined "physical" domain by utilization of their own "personal" powers of causation. Such accounts intend to help the individual "take charge" of their own lives, and in so doing, stop being a "mere" billiard ball being knocked about solely by external forces beyond their own control (as Skinner, 1976, proposed we must inevitably be). These accounts usually propose that the future is an ever diverging (opening) cone (somewhat analogous to the light cone in a Minkowski diagram) of opening possibilities, and that "well-adjusted" or "fully self-actualized" (or whatever) individuals are those who pick and choose what they want from that range of ever increasing possibilities that are all equally possible. Thus those who are the "self-actualized" "take charge" of their own lives and "make it happen."

Does this account square with what physics allows and scientific understanding actually provides? Not quite. When one takes into account necessary distinctions between rate independent and rate dependent laws, initial and boundary conditions versus lawful dynamics, and the inevitable statistical nature (to say nothing of the thermodynamics) of reality, then a different picture emerges.

What kills determinism in physics is not the lawful dynamics that science attempts to discern. What is covered by the "laws of nature" is postulated to be determinate in all cases and deterministic in those artificially simplistic "experimental" situations in which, *by convention*, we disregard all the inexplicable "slop in the system" and *choose* to regard the relationship between thus isolated phenomena as billiard ball causal. But, and one can hardly emphasize this strongly enough, *the amount of lawful regularity in the universe is tiny* in comparison to the infinitely vast domain of initial conditions that are *merely frozen accidents* and thus *never appear in the lawful dynamics* at all (Endnote 5).

The human existential predicament is described by the second law of thermodynamics: for the brief span of our lives we "beat the universal odds" and stave off otherwise inevitable heat death, thus contributing to a local area *increase* in order and complexity. As such "local entities," we violate the second law up until our individual deaths. But during our lives we can and do bring not only order but fundamental novelty and unpredictability into existence. Life violates thermodynamics in the isolated regions and times when it occurs. Living systems are in the business of violating entropy and creating novelty. In that regard "free will" is, as an exhibition of agency, one of their defining characteristics. Life, dependent upon semiosis, allows us to be free to choose, and choice creates novel outcomes when we exercise the choice contingency inherent in agency.

Our novelty does not come from the unknown future. That future, when unfolded into actual history, is as lawfully determinate as our now frozen-in-history past. Both the past and the future eras (histories) are *lawfully* dynamic (up to the limits imposed by our inherently statistical universe and the existence of error because of our incomplete finite sampling). Then where is the openness? Where can choices exist? The answer is obvious: in the ever increasing welter of present boundary and initial conditions which we as active agents ceaselessly freeze into frozen *accidents* with the passage of time. The relativistic light cone model is essentially backwards: we freeze the future into determined possibilities by assimilating it into the frozen past by our present "initial condition" behavior. The realm of physical undetermined contingency, the area in which we can exercise our free choice, is in the specious present. Recall Poincaré: it *may happen* that small differences in the initial conditions produce very great ones in the final phenomena. Our indeterminately long specious present is the bottom or open end (actually the beginning) of the cone — *we narrow the future* into determinate regularity (and sometimes lawfulness) by continually freezing our initial conditions. Choice contingency freezes out those initial conditions and forces the open bottom end of the light cone to taper together to constrict the future. The light "cone" analogy or model *actually* shows three separate and distinct shapes (none of which are cones), as shown in the three types of diagram in Figure C at right.

First is the "no cone at all" diagram of billiard ball determinism, with the transition from past to future being a thin straight line to the future (we can ignore the actual probabilism and indeterministic statistical nature of reality, which would simply smear and blur the *width* of the straight line, but not change its direction). Next to consider is the case of a single agent with choice control in the "specious present," who shows a small widening

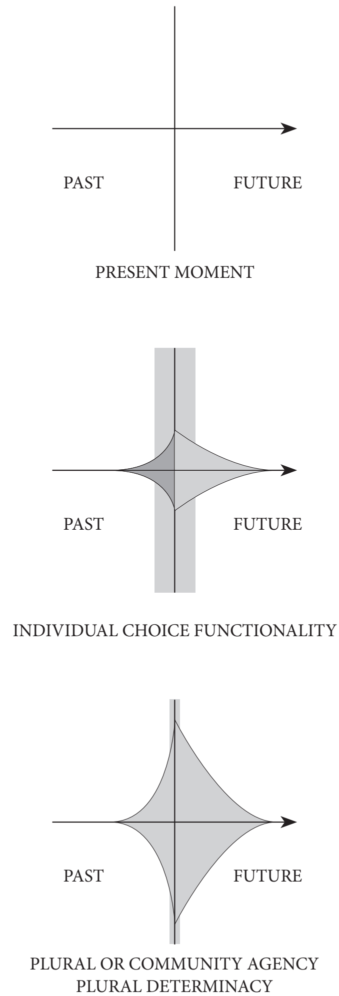


Figure C: Transition from past to future. Top: Physical (Determinate) linear causality. Middle: Functional (Individual Agent) harnessed control. Bottom: Social or Plural harnessed control.

of the (actually probabilistically blurred) straight "line" immediately coming in to the specious present moment, which then closes into a "determined" line in the future *as a result* of choices made in the rate independent realm during that (and each succeeding) specious present(s). In actual fact the line representing the specious present, the experienced now, should be smeared because we do not know in terms of any "clock time" how long it lasts (subjectively it has no time marker at all). Thus we cannot specify exactly how many choices and alternatives actually occur or can co-occur within it. Last to consider is the fact that we are members of *groups* of individuals *all of whom have the power* of taking charge of their own directions in a physical phase space, through choice contingency within their respective specious present moments. The increased degrees of freedom provided by the remaining members of our groups during any (clock time determined) specious present for all of us widens the straight line into a curved flat surface coming from the past to the present instant, and also widens the range of indeterminacy and shape of the curve closing in to a determinate future for any given individual, and eventually also for all of humanity. Obviously one cannot put any numbers or specific designations for the amount of choices that are involved, but in general the relative shapes of the "cones" of the future are specified in these diagrams. If we could not choose for ourselves what we can do in that specious present moment there would be no point to the therapeutic directive to "take charge" of our lives — we would then be stuck in Blanshard's or Skinner's necessaritian nightmare universe in which actual knowledge, free will, and personal causation were illusions because we did not yet "know" the "straight line" deterministic causes of our behavior.

So the usual Einsteinian light cone analogy is false, indeed misleading. We do not proceed from the narrow bottom of a cone to the wider opening of possibilities in the future. We proceed from a highly ordered and frozen (because it is *already* determined by the passage of time) past into a lawfully dynamic future that is, *in between*, continually being constrained and hence altered when our open present choices result in determinate freezing out of ever new initial conditions, which in turn affect that future lawful dynamic by changing its course.

Free will has become a scientific problem. The classic "Hobart" paper resolved the issues of its day by noting that free will requires that we as agents do in fact determine our actions. Subsequently, physics contributed little beyond making it absolutely clear that we must, on epistemic and ontological grounds, make a cut (Pattee's epistemic cut), and a distinction between the inexorable and hence "determined" laws of nature, and the infinite welter of boundary conditions and initial conditions that must be specified in order for us to make sense of, and to utilize (attach to reality), those laws. Then Polanyi (on the margins of physics, psychology, and the biology of life) pointed out that functional life *harnesses* physical inexorability. Living systems, while constrained at the lower level(s) by the conceptually inexorable laws of nature, transcend those laws through their own internal semiotic constraint systems operating as controls. When life came into existence, control by higher order constraints — choice contingency — also arose. It is now up to biology and psychology to specify how that control comes into existence and how it manages to constrain physicality. We can easily understand the physics of binary choice switches (to use the example of David Abel, 2010, 2011), but we now require a biology of agency, to show how such functional switches could have arisen in the physical universe, and a psychology of how they function in life when organisms flip them in one or the other direction. Biologists influenced by Longo and Kauffman have taken important initial steps here. But we need to supply (as Donald Campbell continually emphasized) *all* the intermediate steps from the level of basic physical theory through the biology of life, and then into the psychology of inference and expectation. All that (and no doubt more) will be necessary to understand human action in the complex spontaneous social order that it enables and creates (Endnote 6).

A Summary of "Determinism"

Determinism is the thesis that events are connected (or better, bound) to antecedent and then consequent events by direct "causal" chains following inexorable (every-where, every-when) physical laws. It is a metaphysical research program (not a scientific theory) that guided science until the beginning of the 20th century. It is an incorrect account of the nature of processes in both "simple" sciences in which building a model of the phenomenon that aids and simplifies our understanding is possible, and equally in the realms of complexity in which explanation is a matter of rules which can only specify general principles of outcome rather than particular events. Blanshard was wrong: there is no principle of internal necessity or internal relation *intrinsic to nature.* Any such postulation is found *only* in the rate independent realm of conception, in agency, in our theoretical accounts of nature. As thermodynamics illustrates, prediction of particular events is not an indispensable characteristic of science; in all cases our accounts deal only with principles and not particulars, and when we seem to find particulars being predicted it is because of a simplified description of the "experimental" isolated situation which artificially constrains and sufficiently delimits what we study.

Our theories of inanimate nature were historically the source of hope for the metaphysical research program of determinism. Subsequent research has shown that that hope cannot be sustained. The "laws of nature" that classical science found are in empirical fact actually statistical generalizations rather than deterministic, certain outcomes. This became painfully clear in the physics of the very small, where quantum phenomena become "facts of life" that cannot be explained by deterministic principles.

Summary of Functional Determination

Even at the classical molar level the phenomenon of life refutes determinism, because genuine novelty comes into the universe with the creativity or productivity of behavior and the growth of knowledge. Life, as Polanyi was the first to note, harnesses the inexorability of physical laws with *higher-order* functional constraints. This is how the "mental" can change the "physical," as when plans for a building cause terraforming of the surface of the planet. The character of theories that are necessary to account for novel but appropriate language creativity, and the spontaneous ordering of behavior in the abstract and impersonal realm of the market order, cannot be deterministic even though they depend upon rate independent application of recursive processes according to rules. When we move to the level of abstract and deep structural rules of determination we supplant "laws" of nature by rules of behavior, and automatically transcend prediction of particular events and determination of particular outcomes.

If determinism doesn't work for either simple or complex domains it doesn't work *anywhere*. The "demon" of Laplace was always a convenient fiction — if determinism were true the demon would have been "determined" and thus perfectly predicted. Instead it (and unbelievably naively, our cognition of it) was always proposed to somehow stand *outside* the natural order of events as an infallible epistemic agent, in order to judge that order by observing it — and it would have had to be *un*determined in order to render a correct judgment. All that is available to human understanding is determinate theories that cannot disregard the impossibility of strict determinism. The sooner we give up determinism as a desideratum or necessity for science, the sooner we can go about our business of trying to explain reality.

What does the death of Laplace's demon open up for us? The answer is obvious: everything we are actually interested in. If Laplace's strict physical determinism held sway we could never use it to understand anything about ourselves or our universe. Indeed, without the epistemic cut to separate us from that purely physical determinism there could be no knowledge whatever. Our existential status and its predicaments would remain forever beyond the realm of explanation, because strict determinism cannot countenance knowledge but also probability, error, novelty, emergence, agency, or choice. When you lose determinism you're not losing anything that is indispensable (or indeed anything of great importance), even though it requires always being stuck with ambiguity and the possibility of error. Does this sound too good to be true? It is not.

The Laplacean ideal conceived universal knowledge as a completely formalized, hence completely syntactical or mathematical, representation of reality. But we could *use* these mathematical formulae to explain something only after we had already, by non-formal and extra-mathematical means, come to the point of asking questions about it, and had somehow found (or postulated) a relationship between the questions asked of nature and the mathematical formulae. Mathematical reasoning about experience must inevitably include and depend on *non*mathematical reasoning and hence is literally self-contradictory. Polanyi (1969) noted this:

> Mathematical reasoning about experience must include, besides the antecedent non-mathematical finding and shaping of experience, the equally non-mathematical relating of mathematics to such experience and the eventual, also non-mathematical, understanding of experience elucidated by mathematical theory. It must also include ourselves, carrying out and committing ourselves to these non-mathematical acts of knowing. Hence a mathematical theory of the universe claiming to include its own bearing on experience would be self contradictory in the same sense as the conception of a tool would be if the tool were described as including its own user and the things to which it was to be applied. (p. 179)

Our "interesting" questions involve a level of meaning and pragmatic context that is emergent from, and thus conceptually far above, any account at the smallest "physical" levels. The particulars of entities always lack the characteristics and qualities that the entities themselves possess.

> When we focus our attention on the ultimate particulars of the universe we are facing things which have the least possible meaning. A Laplacean mind that would compute from the present virtually meaningless atomic topography of the world its future similarly meaningless topography would not materially advance our knowledge of the world, let alone represent a universal knowledge of it. (ibid., p. 178)

Each level of reality has its own functional properties, and they cannot be "reduced to" or explained by only the regularities of their particular parts. Our universe is one of downward causation (Campbell, 1974) and, as such, inevitable higher-order control constraint.

The same conclusion applies to probability and error. Thermodynamics, in the form of the second law, is fundamentally statistical in character, and as such requires that we introduce the concept of probability (and thus the concept of error due to inevitable incompleteness) into physical theory and measurement. Where we have probability we must have uncertainty. Where there is uncertainty the possibility of error is also introduced. Polanyi (ibid.) put it well:

> The law of irreversibly increasing entropy governs the fundamental processes of equilibration in nature. But the entropy of the system cannot be computed from the knowledge of its atomic configuration, for it is measured by the extent to which this configuration is uncertain. This argument can be made more definite by assuming quantization. The entropy of a precisely known atomic con-

> figuration is, then, zero and remains zero throughout the future; equilibration by increasing entropy does not take place. We can have equilibration only if we introduce conceptions of probability, by assuming that the configuration of atoms is to a considerable extent uncertain. (p. 174)

Summary

Having begun with Blanshard, let us end with him. From *Reason and Analysis* (1962):

> That the universe is not a mere heap of things and events thrown together in hit-or-miss fashion, that it contains at the lowest estimate many extensive sub-systems, we have argued in some detail. But is it a single system? Granted that some things are related through a necessity linking their qualities, and that some events are related through the necessity implicit in causation, is there any good ground for holding that *all* things and events are inter-related necessarily? (p. 472)

We can now answer this. There are *not* good grounds for holding that all physical things and events are necessarily interrelated. The boundary conditions and the initial conditions of physics cannot be subsumed under the inexorable laws of nature. This leaves the vast majority of the universe — including its apparent regularity — as a matter of accidents that have been frozen into place by no "cause" other than co-occurrence, and the passage of time at that region in the universe's evolutionary history. Those happenings could never have been predicted on the basis of even perfect knowledge of all the laws of nature. As living beings we, as choosing subjects, create *all* initial conditions. Initial conditions exist in the functional domain and not the physical, subject only to constraints imposed by the "lower-level" laws of thermodynamics and the obvious requirement that they must be compatible with (i.e., cannot violate) all natural laws. The *rules* of behavior are not *laws* of nature. This leaves an immense realm for life, in which it is not possible to assert that given physical events must have particular specified consequents (or for that matter, particular specified antecedents). There is genuine novelty, genuine unpredictability, creativity or productivity, in the universe as a result of the behavior of agents (and, of course, frozen accidents). That behavior in turn can and does alter the future history of the physicality of the universe. Functionality constrains and alters physicality. That is the sense in which life harnesses inexorability. We are, as Milton and Rose Friedman (1980) so loved to say, *free to choose*. Living things are constrained by physicality, but are not determined by it. The key to the functional domain is in enablement co-occurrences, not deterministic causality. There is an insurmountable gulf between "constrained to be compatible with" and "determined by." Without that gulf we could have no knowledge at all, and could never even ask questions about the limits of determinism and the nature of free will or choice contingency.

Endnotes

Note 1. *Consciousness is not the problem*. The physics problem need not be framed in terms of the collapse of the state vector or wave function. The problem is that a subject of conceptual activity is required to provide meaningful interpretation. The measurement situation may be looked at as an instance of either surface or deep structural ambiguity, and the various proposals for "disambiguation" treated accordingly. Bohr's reasoning (see Saunders, 2004), leading to his version of the principle of complementarity, was that the only possible language for the unambiguous communication of the results of an experiment was that of "ordinary" or pre-quantum physics (now called "classical," but really implying intuitively "reasonable to common sense"). In discussion of measurement in such classical terms, any results permit inferences about an observed object that exists separately and independently, since it can be said to "have" those properties whether it interacts with anything else (the observer or the experimental apparatus) or not. This makes the situation one of surface structure ambiguity: one and the same entity is *described, and therefore interpreted*, differently depending upon the context of inquiry. In other words, observers disambiguate the ambiguous meaning of the experimental operation(s) by supplying a context that "parses" it in one manner or the other. This proposal led to a dilemma: Is physics about reality or about the observer? Dirac argued that, by convention we study a choice upon the part of nature; Bohr and Heisenberg argued that, by convention, we study a "choice" upon the part of the observer constructing the instruments and reading them (see Bohr, 1949, p. 223). Wigner's and Schrödinger's arguments are powerful initial support for Heisenberg's choice in this dilemma, and it was in terms of those arguments that we discussed the measurement problem.

But examination of the quantum nature of the *total apparatus* (indeed the entire situation of observer plus apparatus) forces a *deep-structural* interpretation of the ambiguity. Experimental conditions cannot be considered just a separate link in the chain of inferences; they remain an indissoluble part of the description of what is called the "observed" object. Arguing against Einstein's realism, Bohr (1934) himself saw that the quantum context forces a new kind of description which does not attempt a sharp separation of observer and observed object. As Bohm (1971c) argued, "A centrally relevant change in descriptive order required in the quantum theory is thus the dropping of the notion of analysis of the world into relatively autonomous parts, separately existent but in interaction. Rather, the primary emphasis is now on *individual wholeness*, in which the observing instrument is not separable from what is observed" (p. 377). This step has not been acknowledged by many, likely because they are reluctant to admit what it does to our conception of scientific analysis. This makes the problem of understanding one of deep structural ambiguity, in which one "object" (a system that is literally one whole) is to functionality actually two systems, in the same way that one

Necker cube is *two* objects when viewed (interpreted) from different perspectives. According to Bohm (1971b):

> In the quantum situation, terms like "observed object," "observing instrument," "experimental conditions" and "experimental results" are just aspects of a single overall "pattern" that are, in effect, abstracted and "pointed out" or "made relevant" by our mode of discourse. Thus it has no meaning to say, for example, that there is an "observed object" that interacts with the "observing instrument." (p. 38)

Instead, reality is an undivided totality of events and their relationships, which is referentially unitary but intensionally deep structurally ambiguous. This underlies the wave–particle duality separating classical from quantum accounts. At issue is whether "the same" phenomenon, which can alternatively be construed as a particle or as a wave, is either a particle or a wave, or whatever (such as some kind of quantum or prequantum field) could underlie both.

Bohr's proposal said that when it is "in" the apparatus, the wave must be treated as a particle. Consistent applications of quantum mechanical description often yield only waves. The so-called completeness of quantum mechanics (as in von Neumann's "proof") arguments say that no analysis of quantum phenomena can disclose other than this (mainly because they build this into the premises). Hidden variable theorists, from Einstein up, searched for a deep structure underlying both relativity and quantum frameworks. If such a framework could be found it could unify both domains.

Note 2. *Hidden variables and determination*. Theorists following Einstein's distaste for quantum indeterminacy are portrayed as searching for factors that, underlying or in addition to the quantum cookbook, would explain quantum results as arising from deterministic variables at a different level. Such variables are presumably "hidden" from view in the results but would render them explicable in traditionally deterministic (but not classical) terms. Bohm, Einstein's most direct intellectual descendant, is portrayed in popularizations and technical articles as proposing a deterministic theory underlying quantum results. Alternatives to Copenhagen, such as the Wheeler–Everett–DeWitt "many worlds" hypothesis now in vogue, proposed instantly branching "universes" that come into existence (i.e., are then somehow "real") with any seeming quantum indeterminacy realization. For example, Schrödinger's cat branches into one world in which it is alive and another in which it is dead, without ever having been (as Copenhagen said) both dead and alive or neither dead nor alive. In each branching structure determinism of outcomes is thus presumed to be preserved. The data relevant to Einstein's "spooky action at a distance" provided by the Aspect et al. experiments having shown non-locality to be a fact of quantum life, the "hidden" views now take for granted (on faith) that some such account or other deterministic underpinnings will be found.

Can such theories reinstate classical determinism in which every event has a necessary immediate and proximal antecedent event? Not at all. Experimental results (by Aspect et al., 1982, and then many others) ruled out "local" hidden variable theories (ones that would have provided the close proximity "fill in the chain" causal account) as incapable of accounting for the data. The quantum cookbook still works, and leaves non-locality as a more global phenomenon requiring explanation in terms of rules of determination rather than strict determinism.

And contrary to superficial interpretation, Bohm's account did *not* involve determinism at all. This is initially surprising, since he is seen as defending Einstein's quest for determinism. But if one understands Bohm it is clear that his starting point, the *undivided* whole of the universe, renders talk of isolated particulars that can be defined and analyzed *as such* to be meaningless. Billiard ball determinism depends upon the possibility (actual existence) of independently and discretely specified basic entities. There can be no linear causality in a framework that is intrinsically continuously relational. As Bohm put it:

> (W)e and our active observation are like that which we observe; i.e. relatively constant patterns abstracted from the universal field movement, and thus merging ultimately with all other patterns that can be abstracted from this movement.… *What is* is a whole movement, in which each aspect flows into and merges with all other aspects. Atoms, electrons, protons, tables, chairs, human beings, planets, galaxies, etc. are then to be regarded as abstractions from the whole movement and are to be described in terms of order, structure, and form in the movement. The notion of a separate substance or entity is dropped, or at most, retained as part of the earlier world view, which is now seen to fit the totality of our experience only in certain limited ways. (1976, pp. 38–39)

Thus for Bohmian mechanics, determinism is a now meaningless, "earlier" concept.

Everett's interpretation of J. A. Wheeler's view of an "undivided" plenum universe is that it is *not*: the overlapping wave functions of the whole universe *never* collapse. They divide the universe into infinitely variegated possibilities of existence. All are equally real (thus divided: the basis of the "many worlds" view), if not actually *realized*. They each "exist" in their own dimensions in some *purely conceptual* "super space–super time." When we in our world make an observation at the quantum level that process forces us to select one such alternative. That selected alternative becomes our "real" world, and the alternatives then are all entirely cut off from the real world, to somehow float away separately into that conceptual super space–time. Each such alternative would contain its own observer who, slightly different from us, making the *same* observation in that world, has gotten a different quantum answer and thus thinks he or she alone "collapses the wave function."

This haunted universe doctrine has no apparent predicted results different from others, like the operational quantum "theory" (the neo-Copenhagen one), but it seems to preserve the term "causal" in some fashion. Does it preserve determinism? Is it deterministic in the classic or linear chain sense? It is so only in the *retrodiction*, never in prediction of how the observer is going to "see" the next quantum level choice. Few theories say we cannot look backward in time and find out how things evolved to the state they presently occupy (indeed Bohm implies that we could in principle "un" or "re" fold our enfolded universe and thus go back "there" in time–space to some specified locale). It is quite another thing to look forward and "predict" the next quantum level choice the ensemble of observer cum apparatus cum measurement will disclose. So the many worlds view implies that reality is *deep structurally ambiguous*, and that it is rendered into one surface form or another by agency — a cognizing subject who is an observer who "sees" the Necker cube from one configuration or the other, or the duck–rabbit as *either* a duck *or* a rabbit. Resolution of deep structural ambiguity can never be deterministic in the rate dependent universe. It can be resolved only in the rate independent realm of conception, by specifying the abstract conceptual structures that allow alternative interpretations of the same surface string of entities — in this case, perceptual structures — to be "seen" or come into existence. This requires *rules* of determination that generate indefinitely extended classes of potentials rather than deterministic or lawful specification of definite particulars.

Note 3. Note the identification (by both Popper and his critics) of meaning with language (specifically the argumentative mode in theories and explicit conjectures or directives), and the use of hierarchical control structures as noncausal (in the classical determinism sense) in our behavior. Both notions are incorrect — other solutions are required for adequately modeling mind and meaning. Consider first an unresolved ambiguity in consciousness and language with respect to causality in Popper's account.

Popper argued that consciousness is causally productive of behavior:

> Conscious states, or sequences of conscious states, may function as systems of control.… Consciousness appears as just one of many interacting kinds of control.… Consciousness can hardly be said to be the highest control system in the hierarchy. For it is to a considerable extent controlled by these exosomatic linguistic systems — even though they may be said to be produced by physical states; yet it controls them to a considerable extent. Just as a legal or social system is produced by us, yet controls us, and is in no reasonable sense "identical" to or "parallel" with us, but interacts with us, so states of consciousness (the "mind") control the body, and interact with it. (1972, p. 257)

While that statement is correct, one should ask how consciousness is to be causal if it is hierarchical and linguistic, when Popper argued for the noncausal nature of language in these argumentative modes of behavior precisely because of that hierarchical nature (he identified hierarchical systems as "noncausal"). He proposed no account of this noncausality, nor resolution of this problem, and Popperians have slipped from beating materialists with the noncausal nature of language and/or consciousness into clearly causal accounts of "plastic control" in other contexts. Studying control structures in complex phenomena indicates ways in which centralized top–down (hierarchical) control structures (what Hayek called *taxis* structures) interact with decentralized or *cosmic* structures in the economic order (Hayek 1979, 1983), in epistemology in general (Weimer, 2023), in language (from the "transformational" revolution), and the origin of life and semiosis (Abel, Barbieri, Pattee, Polanyi, Weimer).

Note 4. The concept of "chance" has little utility in science. As Poincaré noted, we call things chance occurrences only because we are unaware of the underlying regularities. As knowledge increases, there is less utility in employing the concept of chance. Chance is a term for our ignorance, not knowledge. It is not an explanatory concept. In the past, some theorists used the term chance as a substitute for the effects of the indefinitely extended welter of boundary conditions when they interact with an observer's freezing out of initial conditions (C. S. Peirce and Poincaré seem to have done this). Much better that we simply acknowledge our ignorance of all the relevant aspects and not use the term chance at all. No one is apt to confuse ignorance as an explanation for a scientific problem, whereas chance suggests a possible causal entity with a theoretical explanation.

Note 5. This has been obvious for decades. Pattee was the clearest in presenting the essentials:

> The basic distinction that must be made is between *laws* of nature and *rules* of constraints. One cannot usefully apply the concept of control to laws nor to all types of constraints. The same is true for information. Informational and control constraints must be describable in terms of alternative states that are not dynamically related. That is, they must change in time but not change as a function of rates, as do the laws of nature. Such constraints are nonintegrable or nonholonomic, and their behaviors can be said to execute a control rule.… Laws are *inexorable, incorporeal, and universal*; rules are *arbitrary, structure-dependent, and local*.… We cannot alter or evade laws of nature, whereas we can redesign or eliminate a rule; laws do not need a device or structure to execute them, whereas rules can only be executed by specific physical structures that we call control constraints; and finally, laws hold at all times and all places in the universe, whereas rules hold only where and when there is a physical structure to execute them. (Pattee, 2024, p. 23)

When applied to the issues of biological agency and cognition, this results in a fundamental incompatibility that must be acknowledged:

> The incompatibility I am speaking about would occur when describing intentional control policy and how this interacts with the deterministic dynamical activity of what is controlled.... The informational content of an ignition key is incommensurable with the degrees of freedom of the automobile which it starts. This is

> because the informational content in the key is determined by the number of people you do not wish to use your automobile (i.e., an intentional policy) and has virtually nothing to do with the complexities of the deterministic mechanisms of automobiles.... It is obvious that an ignition key cannot be explained as nothing but a slotted brass object with bumps on its edge, no matter how detailed the structural description may be. Nor can the key be explained as nothing but an informational representation of a potential population of car thieves. (ibid., p. 25)

This is the fundamental incompatibility between the physical and the functional, and when coupled with the distinction between the limited domain of the laws of nature and the ubiquity of the frozen accidents of local boundary conditions, taken in conjunction with the control of agency through rules, it becomes obvious that the areas in which "determinism" could hold sway are far smaller and more restricted than had once been thought.

Note 6. What sort of control structure is agency, and how does it "determine" choices and outcomes? All "control" structures in cognition (and other aspects of living systems) are effected by functional constraints. Agency is, tautologically, self-directed or iterative (recursive) constraint control. How can a control constraint manage to constrain itself? By having constraint operation (closure) initiate another constraint operation which ends (in its closure) by initiating the first or initial constraint operation over again. This is how organisms act on their own behalf. Self constraint means that the circular organization of a constraint process specifies its own defining dynamics. The effects of that activity specify and establish the maintenance of the conditions of its own existence. As Mossio and Bich (2017) put it, biological systems *are* what they *do*. As they say, biological systems are specified by:

> [T]he fact that the thermodynamic flow is channeled and harnessed by a *set* of constraints in such a way as to realize mutual dependence between these constraints....The organization of constraints *can be said to achieve self-determination as self-constraint*, since the conditions of existence of the constituents of constraints are, because of closure, mutually determined within and by the organization itself. (2017, pp. 1103–1104)

Agency constraints are sets, as these authors make obvious, patterns of patterns. We are processes. And processes of processes. Semiosis is patterns. Life is patterns. And patterns of patterns.

References

Abel, D. (2010). Constraints versus controls. *Open Cybernetics and Systematics Journal, 4*, 14–27.

Abel, D. (2011). *The first gene: The birth of programming, messaging and formal control.* Longview Press.

Aspect, A., Grangier, M., and Gerard, R. (1982). Experimental realization of Einstein–Podolsky–Rosen–Bohm *Gedankenexperiment*: A new violation of Bell's inequalities. *Physical Review Letters, 49*(2), 91–94. doi: 10.1103/PhysRevLett.49.91

Bell, J. S. (2004). *Speakable and unspeakable in quantum mechanics*. Cambridge Univesity Press.
Blanshard, B. (1961). The case for determinism. In S. Hook (Ed.), *Determinism and freedom* (pp. 19–30). Collier.
Blanshard, B. (1962). *Reason and analysis.* George Allen and Unwin
Bohm, D. (1955). *Quantum theory.* Prentice-Hall.
Bohm, (1971a). *Causality and chance in modern physics.* University of Pennsylvania Press. (originally published 1957)
Bohm, D. (1971b). On Bohr's views concerning quantum theory. In T. Bastin (Ed.), *Quantum theory and beyond: Essays and discussions arising from a colloquium* (pp. 33–40). Cambridge University Press.
Bohm, D. (1971c). Quantum theory as an indication of a new order in physics, Part A: The development of new orders as shown through the history of physics. *Foundations of Physics, (1)*4, 359–371.
Bohm, D. (1976). *Fragmentation and wholeness.* Van Leer Jerusulem Foundation.
Bohr, N. (1934). *Atomic theory and the description of nature.* Cambridge University Press.
Bohr, N. (1949). Discussions with Einstein on epistemological problems in atomic physics. In P. A. Schilpp (Ed.), *The library of living philosophers, Vol. 7. Albert Einstein: Philosopher–scientist* (pp. 199–241). Open Court.
Bronowski, J. (1978). *The origins of knowledge and imagination.* Yale University Press.
Brown, R. (1958). *Words and things.* Free Press.
Campbell, D. T. (1974). "Downward causation" in hierarchically organized biological systems. In F. J. Ayala and T. J. Dobzhansky (Eds.), *Studies in the philosophy of biology* (pp. 179–186). Macmillan and Co.
Chomsky, N. (1957). *Syntactic structures.* Mouton.
Crutchfield, J. P., Farmer, J. D., Packard, N. H., and Shaw, R. S. (1986). Chaos. *Scientific American, 255,* 46–57.
DeWitt, B. S. (1970). Quantum mechanics and reality. *Physics Today, 23*(9), 30–40.
Eccles, J. C. (1970). *Facing reality: Philosophical adventures by a brain scientist.* Springer Verlag.
Eccles, J. C. (1976). Brain and free will. In G. G. Globus, G. Maxwell, and I. Savodnik (Eds.), *Consciousness and the brain* (pp. 101–121). Plenum Press.
Eccles, J. C., Ito, M., and Szentagothai, J. (2013). *The cerebellum as a neuronal machine.* Springer. (originally published 1967)
Edelman, G., and Mountcastle, V. (1978). *The mindful brain: Cortical organization and the group-selective theory of higher brain function.* MIT Press.
Enlow, D. (1958). *The human face: An account of the postnatal growth and development of the cranio-facial skeleton.* Harper and Row.
Everett, H. III. (1957). On the foundations of quantum mechanics. Doctoral dissertation, Department of Physics, Princeton University.
Friedman, M., and Friedman, R. (1980). *Free to choose.* Harcourt.
Gribbin, J. (1984). *In search of Schrödinger's cat: Quantum physics and reality.* Random House.
Hayek, F. A. (1967). *Studies in philosophy, politics, economics, and the history of ideas.* University of Chicago Press.
Hayek, F. A. (1979). *Law, legislation and liberty, Vol. 3: The political order of a free people.* University of Chicago Press.
Hayek, F. A. (1983). *Knowledge, evolution and society.* Adam Smith Institute.
Hayek, F. A. (1999). *The sensory order.* University of Chicago Press. (originally published 1952)
Hobart, R. E. [pseudonym of D. S. Miller]. (1934). Free will as involving determination and inconceivable without it. *Mind, 43*(169), 1–27.
Kauffman, S. (2019). *A world beyond physics.* Oxford University Press.
Körner, S. (1966). *Experience and theory.* Humanities Press.
Lashley, K. S. (1929). *Brain mechanisms and intelligence: A quantitative study of injuries to the brain.* University of Chicago Press.
Lorenz, E. N. (1963). Deterministic nonperiodic flow. *Journal of the Atmospheric Sciences, 20,* 130–141.
Meehl, P. E. (1989). Psychological determinism or chance: Configural cerebral autoselection as a tertium quid. In M. L. Maxwell and C. W. Savage (Eds.), *Science, mind, and psychology* (pp. 211–255). University Press of America.
Mossio, M., and Bich, L. (2017). What makes biological organization teleological? *Synthese, 194*, 1089–1114. doi: 10, 1007/s.11229-014-0594-z
Mountcastle, V. B. (1978). Brain mechanisms for directed attention. In G. M. Edelman and V. B. Mountcastle, *The mindful brain* (pp. 7–50). MIT Press.

Onof, C. (2024). *The problem of free will and naturalism: Paradoxes and Kantian solutions.* Bloomsbury Publishing.
Pattee, H. H. (1981). Symbol-structure complementarity in biological evolution. In E. Jantsch (Ed.), *The evolutionary vision* (pp. 117–128). Westview.
Pattee, H. H. (2012). *Laws, language and life* (with J. Raczaszek–Leonardi). Springer.
Pattee, H. H. (2024). The need for complementarity in models of cognitive behavior: A response to Fowler and Turvey. In W. B. Weimer and D. S. Palermo (Eds.), *Cognition and the symbolic processes Vol. 2* (pp. 21–30). Routledge. (Originally published 1982)
Penfield, W. (1975). *The mystery of the mind.* Princeton University Press.
Penfield, W., and Roberts, L. (1959). *Speech and brain mechanisms.* Princeton University Press.
Poincaré, H. (2007). *Science and method* (translated by F. Maitland). Cosimo Classics. (originally published 1908)
Polanyi, M. (1969). *Knowing and being* (M. Grene, Ed.). University of Chicago Press.
Popper, K. R. (1972). *Objective knowledge: An evolutionary approach.* Oxford University Press.
Popper, K. R. (1982). *Unended quest: An intellectual autobiography.* Open Court Press.
Post, E. L. (1943). Formal reductions of the general combinatorial decision problem. *American Journal of Mathematics, 65,* 197–215.
Post, E. L. (1965). Absolutely unsolvable problems and relatively undecidable propositions — account of an anticipation. In M. Davis (Ed.), *The undecidable: Basic papers on undecidable propositions, unsolvable problems and computable functions* (pp. 340–344). Raven Press.
Pribram, K. H. (1971). *Languages of the brain.* Prentice–Hall.
Pribram, K. H. (1977). Some comments on the nature of the perceived universe. In R. Shaw and J. Bransford (Eds.), *Perceiving, acting, and knowing* (pp. 83–101). Lawrence Erlbaum Associates.
Pribram, K. H. (1991). *Brain and perception: Holonomy and structure in figural processing.* Lawrence Erlbaum Associates.
Pribram, K. H. (2013). *The form within.* Prospecta Press.
Russell, B. (1948). *Human knowledge: Its scope and limits.* Simon and Schuster.
Ryle, G. (1950). *The concept of mind.* Hutchinson.
Saunders, S. (2004). Complimentarity and scientific rationality. *Foundations of Physics, 35*(3), 417–447.
Schrödinger, E. (1935). *Science and the human temperament.* W. W. Norton.
Schrödinger, E. (1956). *What is life? And other scientific essays.* Doubleday.
Shaw, R. E., and McIntyre, M. (2024). Algoristic foundations to cognitive psychology. In W. B. Weimer and D. S. Palermo (Eds.), *Cognition and the symbolic processes* (pp. 305–362). Routledge. (originally published 1974)
Skinner, B. F. (1976). *About behaviorism.* Random House.
Sperry, R. (1969). A modified concept of consciousness. *Psychological Review, 76*(6), 532–536.
Sperry, R. (1976). Mental phenomena as causal determinants in brain function. In G. G. Globus, G. Maxwell, and I. Savodnik (Eds.), *Consciousness and the brain* (pp. 163–177). Plenum Press.
Teuber, H. L. (1960). Perception. In J. Field, H. W. Magoun, and V. E. Hall (Eds.), *Handbook of physiology, neurophysiology III* (pp. 1595–1668), American Physiological Society.
Thom, R. (1983). *Mathermatical models of morphogenesis.* Ellis Horwood.
von Foerster, H. (1962). Biologic. In E. E. Bernard and M. R. Kare (Eds.), *Biological prototypes and synthetic systems* (Vol. 1, pp. 1–12). Plenum Press.
von Neumann, J. (1951). The general and logical theory of automata. In L. Jeffress (Ed.), *Cerebral mechanisms in behavior* (pp. 1–31). Wiley.
von Neumann, J. (1958). *The computer and the brain.* Yale University Press.
von Neumann, J. (1966). *Theory of self-reproducing automata.* University of Illinois Press.
Watkins, J. W. (1958). Confirmable and influential metaphysics. *Mind,* 67(267), 344–365. doi: 10.1093/mindlxvii267.344
Weimer, W. B. (1976). Manifestations of mind: Some conceptual and empirical issues. In G. G. Globus, G. Maxwell, and I. Savodnik (Eds.), *Consciousness and the brain* (pp. 5–31). Plenum Publishing.
Weimer, W. B. (1987). Spontaneously ordered complex phenomena and the unity of the moral sciences. In G. Radnitzky (Ed.), *Centripedal forces in the sciences, Vol 1* (pp. 257–296). Paragon House.
Weimer, W. B. (2020). Complex phenomena and the superior power of negative rules of order. *Cosmos + Taxis, 8*(10 +11), 39–59.

Weimer, W. B. (2022). *Retrieving liberalism from rationalist constructivism, Vol.2: Basics of a liberal psychological, social and moral order.* Palgrave Macmillan.
Weimer, W. B. (2023). *Epistemology of the human sciences: Restoring an evolutionary approach to biology, economics, psychology and philosophy.* Palgrave Macmillan.
Wigner, E. (1961). Remarks on the mind–body problem. In L. J. Good (Ed.), *The scientist speculates* (pp. 284–302). Heinemann.
Wigner, E. (1964). *Symmetries and reflections: Scientific essays of Eugene P. Wigner.* Indiana University Press.

The Journal of Mind and Behavior
Summer and Autumn 2024, Volume 45, Numbers 3 and 4
Pages 301–312
ISSN 0271–0137

Understanding Consciousness by Analogy

Dan Bruiger

Hornby Island, British Columbia

Where a causal approach fails, the nature of consciousness can be understood by means of an analogy, by putting oneself imaginatively in the place of the brain. It is further proposed that neural processes evoke sensation and meaning analogously to how words evoke mental images, namely by fiat. Conscious experience is also likened to a virtual reality generated by the brain, while guided by interaction with the external world. An intentional rather than causal explanation is proposed.

Keywords: explanatory gap, intentionality, fiat

The "hard problem of consciousness" (Chalmers, 1995) is the "explanatory gap" (Levine, 1983) between phenomenal experience and causal processes — in other words, between first-person phenomenology and third-person description. In physical science, explanation typically involves a third-person account, especially in terms of efficient causation.[1] But, that is a closed domain insofar as physical events can only be said to cause other physical events — not sensations, images, feelings, or thoughts about physical events (McGinn, 1989). Knowing *about* an experience is not the same as having it (Godfrey–Smith, 2021). Neural processes, understood as such causal processes, can potentially

Correspondence concerning this article should be addressed to Dan Bruiger, 3105 Cowie Road, Hornby Island, British Columbia, Canada V0R1Z0. Email: dbruiger@gmail.com

[1] Among Aristotle's four types of cause, "efficient" cause is the category which was embraced as primary for dynamics by the early scientists and ever since. "Material" cause also figures in modern science, as concerning the properties of materials. A functionalist view of mind might hold that the biological properties of neurons (material cause) are not essential, whereas their dynamical organization is, which could perhaps be realized in a different medium. A modern version of the "formal" cause of an organism might be its DNA; or the formal cause of a machine, its blueprint. "Final" cause is viewed with suspicion in physics because it implies teleology (as in Intelligent Design). Yet, all these types of cause can pertain to organisms.

account for observable behavior (including cognitive behavior), but not for phenomenality,[2] the subjective "what it is like to be" the system itself (Nagel, 1974).

The mind's natural external orientation becomes problematic when the strategy for understanding consciousness is restricted to the terms of the external world. The problem is "hard" because it cannot be solved in the terms in which questions about the external world are normally posed and answered. A physicalist solution to the problem posed by phenomenality remains elusive — for example, a solution which explains phenomenality in terms of chemical, neuro-physiological, or quantum processes. A computational approach is more promising, because it invokes the intentionality of the programmer. Yet, it still retains a third-person perspective that fails to embrace the point of view of the computational system itself (such as a brain, for example).

On the other hand, metaphorical or analogical thought about mind has a long and rich history: from Plato's cave, to Descartes' demon, to the "brain-in-a-vat," to the *Matrix* films, and the "simulation hypothesis" (Bostrom, 2003). Nature itself was once understood to be or be like an organism and later to be or be like a machine. Following changing technologies, mental processing, and even the universe itself, are now considered to be or be like digital computation or information processing. For example, Max Tegmark (2017) claims that "consciousness is a physical phenomenon that feels non-physical because it's like waves and computations: it has properties independent of its specific physical substrate." The integrated information theory of consciousness (Tononi, 2004) is a laudable application of the computational metaphor, which claims to bridge the explanatory gap. It fails in that regard, however, precisely by abandoning analogical thinking to assert actual identity between mental and physical. A recent refinement of the theory (Albantakis et al., 2023) attempts to formalize a rigorous identity theory of correlates of consciousness. However, simply providing a mathematical framework does not overcome the explanatory gap. The paper carefully defines "experience" and "physical existence," but in the end simply *postulates* an "explanatory identity" between them. Defining each domain rigorously, in terms of a common theoretical domain (information), does not make them equivalent in a way that bridges the explanatory gap.[3] Here let us pursue an alternative strategy.

---

[2] Because "phenomenal experience" is a mildly redundant phrase, hereafter *phenomenality* will be used instead to denote the totality of experience inclusively: all possible contents of consciousness — all experience that can occur to a subject, such as sensations, feelings, thoughts, emotions, imagination, dreams, hallucinations, mental images, qualia, etc.

[3] From the sufficiency of the definition of experience, it does not follow that "Thus, no additional physical property is a necessary requirement for being a substrate of consciousness." Moreover, a biological or relational property may also be required: namely, *embodiment* as an evolutionary relationship with an environment. The authors claim that "The identity is not between two different substances or realms — the phenomenal and the physical — but between intrinsic (subjective) existence and extrinsic (objective) existence." This does no more than rename phenomenal and physical as "intrinsic" and "extrinsic" existence.

There exists a parallel explanatory gap between words and the mental images and feelings they evoke, which does not seem to have given rise explicitly to a "hard problem of language."[4] In fact, these gaps are examples of the same conundrum, which may ultimately be unresolvable simply because we cannot stand outside the dilemma. From a first-person perspective, both language processing and perceptual processing seem transparent. (That is, we are hardly aware of the processes themselves, only of their result.) While transparency itself merits explanation, the hard problem of consciousness amounts to a symbol grounding problem[5] for human beings.

Lacking a scientific resolution of either conundrum, perhaps we can at least gain some comfort from the familiarity of language, by asserting that consciousness arises from neural processes *analogously to how meaning arises from words*, which ultimately involves grounding in sensory experience. Thus, the explanatory burden can be shifted from causal explanation to intentional explanation.[6] The burden falls on the cognitive system as an embodied agent that creates meaning (i.e., significance to itself) for its own purposes.

Cause Versus Intention

The term "neurological" suggests two aspects. There are *neural* events, such as the chemical discharges of nerve cells, propagated along axons. These can be viewed as events in the physical world that happen through causal processes in space and time. However, these are also *logical* events or intentional acts: something the organism *does* for its own reasons, as part of its survival strategy.[7] In that sense, we may think of neurological events as simultaneously intentional

---

[4] Unless for the "symbol grounding problem" for artificial intelligence (Harnad, 1990; Searle, 1980). The problem considered here is not about the relationship between language and *concepts*.

[5] "The symbol grounding problem is a concept in the fields of artificial intelligence, cognitive science, philosophy of mind, and semantics. It addresses the challenge of connecting symbols, such as words or abstract representations, to the real-world objects or concepts they refer to. In essence, it is about how symbols acquire meaning in a way that is tied to the physical world." [Wikipedia: symbol grounding problem].

[6] Note that "intention" here does not refer specially or only to consciously experienced human intentions, but more broadly to connections an agent makes within itself for its own reasons. Like Dennett's (1990) "intentional stance," Vollmer (1986) describes intentional explanation as a way to explain why some behavior may occur at a certain time — how it is "rational, understandable, and to be expected," so that reasons "constitute premises from which agents (and observers) can deduce that certain actions are desirable and appropriate." Note that the reasons of the cognitive system observed may not correspond to the reasons of the observer. Note also that teleology and design are implied, in contrast to efficient causation. Here, however, we are not concerned with accounting for *behavior* but for subjective *experience*. Intentional explanation may be necessary to account for behavior too.

[7] Logical, in the broad sense of a (potentially formalizable) system with elements and rules, not in the narrow sense of a given human logic such as Boolean algebra. Intentional, in the broad sense of being effected by an agent for a reason, not in the narrow sense of conscious human intention.

and causal.[8] Indeed, as noted by Lakoff and Johnson (1980), and earlier by Piaget (1967), causality merges with intentionality in the early development of the human mind. For the infant, the sense of one external event *causing* another derives from, extends, and externalizes the sense of direct manipulation of objects and of willing one's own limbs to move.

While the organism is a material object, subject to causal processes within and without, it is also an *agent*. As a physical thing in the natural world, it can be acted upon by other things. Yet, because it is an autonomous, self-sustaining and self-defining (autopoietic[9]) system, the organism can also act on the world and on those parts of the world that constitute its own physical being. Its actions, whether internal or external, can be viewed as intentional (if not as consciously intended) as well as caused.

In physicalist terms, causality occurs within the domain of physical description of events occurring in the "external" world. The explanatory gap is the fact that consciousness does not seem to occur in that domain, but in some other domain or category, the "phenomenal" realm. While causal explanation may not be able to bridge these domains, here we propose intentional explanation, since *bridging* itself is an intentional action.

An *intentional connection* is a mapping (in the mathematical sense) from one domain to another, made by an agent for some purpose. Physicalism is at a loss to rationalize the domains of the physical and the phenomenal (and thus provide a causal explanation of consciousness), because it confines itself, in effect, to third-person description (Bruiger, 2016). Yet, our brains bridge the explanatory gap on a daily basis, so that somehow neural processes result in conscious experience in the first person. Activity within the brain is normally projected as experience of a real world outside the skull. The challenge is to understand how this happens.[10] The proposal here is that this feat is of the same nature as the (also mysterious) act by which the brain conjures mental images and other experiences upon hearing or reading words. A convenient name for this act is *fiat*.[11] The term conveys the sense of defining into being the elements and operations involved in mapping.[12]

Let us view the organism as an intentional agent making intentional connections. In one sense, these are internal connections that supervene, for example,

---

[8] Similarly, one can consider the connections on a circuit board either as physical (soldered wires) or as intentional (its intended design and use).

[9] The term autopoiesis (literally "self-creation") was introduced by Maturana and Varela (1980).

[10] As illustrated even by the word understand, language itself is largely metaphorical (Lakoff and Johnson, 1980).

[11] I.e., decree, as when the Red Queen orders "Off with her head!" Or declaring into existence, as when God says "Let there be light!" Or supposition, as when the mathematician proposes, "Let x stand for…"

[12] It is interesting in this context that the word *metaphor* derives from a Greek verb meaning to "carry over" or "transfer," which conveys the sense of intention as a mapping from one domain to another.

on physical synaptic connections. In another sense, they are symbolic elements to map a putative external world, including the physical body as part of that world. The explanation of phenomenality we seek is not in terms of physical processes, or causes originating in the external world, but in terms of intentional processes that originate within the organism, which *makes* intentional connections for its own purposes, often in response to the external world.[13] As such, they constitute a form of internal communication and a basis for action. The meaning (to the organism) of these connections supervenes on physical connectivity in the way that semantic meaning does on the symbols and syntax of language.

The Simile of the Submarine

Being intentional must not presume being conscious, since consciousness is what we hope to explain, and circular reasoning is generally considered empty. Nevertheless, we can allow ourselves the subterfuge of analogy — which does, of course, presume our own consciousness as language users. Here we hope to understand the brain's challenge by putting ourselves in its place. The brain is sealed inside the skull, connected via nerve fibers with the world outside. By presumption, there is no other way for information to enter or leave the brain. The skull is a "black box," whose functional content can, to some extent, be inferred by an outside observer from comparing inputs and outputs.[14] From a point of view within it, the world outside the skull is equally a black box.

The skull is not a room with windows through which an imaginary inner occupant views the outside world. Despite the ancient trope, the eyes are not literally portals, but more like remote sensors connected by wires that supply digital feeds to an underground bunker. Out-of-body experiences notwithstanding, there is no door through which to exit to gain experience outside this room. Our metaphorical task is rather to explain *seeing* and *experiencing*, and to arrive at a concept of the *world*, without already presuming any of these: in other words, to explain how the brain constructs phenomenality and a concept of an external world, purely in terms of processes taking place inside the black box. For, otherwise, we are again caught in circular thinking. If we invoke the metaphor of a room, it is a room without portals and exits. If we invoke an imaginary occupant, it is an agent who has never been outside the room and has no prior knowledge of a world outside (or that there is even such a thing as "outside"). With those provisos, we deliberately invoke a hypothetical conscious agent — a homunculus — who can explore this interior environment and do things within it.

---

[13] Some connections come about through natural selection, while the individual organism makes connections through real time learning. However they come about, they establish a basis for action and for evaluating stimuli.

[14] It makes little difference for this argument whether the "black box" is literally the skull, containing the brain inside it, or some other boundary within the skin.

The analogy can be made more tangible by likening the sealed chamber of the skull to a submarine without portholes, hatch, or periscope.[15] As outside observers, *we* know that there is an underwater world surrounding the hull. Our homunculus, however, has no such knowledge to start with. Rather, its task is to gain that knowledge in the only way possible: through trial and error within the confines of the vessel. Let's say that the interior of the submarine comes equipped with what we (as outsiders) recognize as "controls" and "instrument panels" — that is, with what our homunculus may eventually come to recognize as inputs and outputs. There are levers and switches to play with, to try to discover any patterned relationships between those actions and the readings on various gauges and dials. In other words: to explore how doing something to the controls might bring about changes in the instrument readings (Oatley, 1978).

In our outsider's view, what causally connects these inputs and outputs is the ontologically real world outside the hull and the fact that the submarine is a part of that real world, can move through it, and can perform actions upon it (for example, with sonar and robotic arms). In other words, the submarine can affect and be affected by its environment. Pulling a lever inside, for example, might activate a propeller causing motion through the water; pushing a button might issue a sonar pulse whose echo is registered by a sensor. In that feedback loop, it is the real underwater world that mediates the patterns between input and output, by completing the loop, so that the patterns identified contain information about that world. It is thus epistemically possible for our homunculus, through such experimenting, to create a model or map of the underwater environment surrounding the submarine, without ever seeing or touching it directly, simply by actions performed within.

Why would this agent bother to do any of this, apart from idle curiosity? The submarine obviously represents a living organism — in this case, a human body. But, of course, the submarine is *not* an organism but simply a machine. While no machine (so far) has a vested interest in its own existence, an organism is *defined* by that vested interest. The organisms that exist have learned how to negotiate their environments and would not exist otherwise. Natural selection is the process of eliminating failures, which drives evolution. So, we must imagine a corresponding principle whereby submarines that lack a "realistic" enough model of the underwater world are potentially eliminated. We must imagine a submariner who knows nothing yet of that principle, but who simply succeeds or fails to preserve the submarine through trial and error. Let us therefore imagine generations of submarines that have adapted (or not) to the underwater world through some equivalent of natural selection combined with learning. Our agent must bother with the modeling process as a condition for its existence qua organism.

[15] The analogy precludes anything like closed circuit tv or video monitor as one of the remote sensors, which would substitute for a porthole by providing a ready-made image of the outside world. The point is to understand how the brain (homunculus) constructs this image for itself.

The challenge for our hypothetical agent is to interpret the inputs from instruments as information about a real external environment, and from that evidence to model that environment. In our analogy, we imagine the homunculus with eyes to see the interior of the submarine and limbs to move about inside it and manipulate controls. But all that is no more than a concession to metaphor, in which we have placed ourselves imaginatively in the situation of the brain. In relation to the reality outside, the submarine is originally *blind*, *ignorant*, and *uncoordinated*. The task of the homunculus is precisely to learn to see and navigate the surrounding world, incidentally learning to treat it as *real* — that is, as holding the power of life and death over the submarine with its occupant. The submariner's ultimate achievement is to see, as it were, straight through the hull, transparently, as though with x-ray vision. In other words, by an act of conjuring, to experience the model as a real world outside the hull.

The Heuristic Virtue of Virtual Reality

Since the activities of our homunculus, and the data it has gathered, are potentially formalizable in a computer program, we consider a further analogy: virtual reality. The ideal of simulation is to be so like reality that one cannot tell them apart. Normally, a simulation is a computer program that convincingly imitates a real thing or experience. It is itself an analogy. Our submariner's model is a simulation of the undersea world, achieved through a long learning process. Yet, the model cannot be said to *copy* or to literally *resemble* the real thing or situation, to which there is no direct access for comparison. Let us therefore imagine a program that is an original creation, not a copy of something else. Let us further suppose that this original creation is nonetheless guided in an ongoing way by an external reality — for example, through some form of predictive processing (Hohwy, 2013) — just as the development of the submariner's model is guided by the interaction between controls and instruments: through a feedback loop that includes an allegedly real environment. With this modification, we assert that phenomenality is a virtual reality created by the brain, yet continually updated through interaction with a real environment outside the skull (Metzinger, 2009).

A conventional virtual reality is often created as entertainment; but the virtual reality created by the brain is a matter of life and death. A simulation seems real to the degree it is convincing, but the realism of an entertainment does not have the same significance as the brain's natural realism. A conventional virtual-reality headset can be put on or taken off at will by users, who normally will not forget their identity as human beings who can embrace or disengage from the experience. This was not the case for our submariner, who could not leave the submarine and had never had a life outside it to remember. Nor is it the case for the brain. So, in this new analogy we must imagine someone who grew up in the simulation, had never lived outside it, and cannot turn it off. Imagine, therefore, a simulation like in *The Matrix*, designed to be so comprehensive and convincing that it effectively deceives its captive users. Of course, the film is a fiction and we are not deceived in the same literal way. The point is that the transparency of the *Matrix* simulation resembles that of ordinary perception. In the film, a "glitch" in the computer code belies the situation.

There are glitches in the brain's virtual reality too. The science of cognitive psychology is founded on them. The realization that there *is* processing going on, and that the brain somehow *produces* our conscious experience, began with the recognition of perceptual anomalies. These are glitches in normal perception, such as optical illusions, illusions of shape and figure/ground, motion effects, experimental investigations of sensory adaptation, hallucinations, and cognitive illusions such as the rubber hand effect (Metzinger, 2009). If normal perception were seamlessly transparent, we would all be naïve realists who simply believe that the world exists exactly as we see it and that the brain has nothing to do with the world's appearance. In fact, in daily life it serves us well to believe the brain's virtual reality.

However, such reflections led early thinkers like Descartes to the dread conclusion that it is possible to falsify experience by hacking into the nervous system. That suspicion led to the brain-in-a-vat scenario, the *Matrix* films, and the counterintuitive claim that you probably are, without knowing it, living in a simulation (Bostrom, 2003). Descartes' solution to the dilemma was to trust that God would not allow such systematic deception. In modern thought, we might instead trust that *nature* would not allow it — if by deception we mean a set of ideas that would lead to our elimination through natural selection.[16]

The Hard Problem Metaphorically Mitigated

There remains the hard kernel of the problem of consciousness: how to understand the process through which neurological activity in the brain becomes (or is) phenomenality. We've conceded that a strictly causal explanation is ineffective, because causes do not account for the organism's purposive activity as an agent. Computation may provide a better analogy for mental processing than physics or chemistry, because it invokes the agency of the programmer or user. After all, while you can explain the functioning of a computer on a certain level — in physical terms of wiring, electrical charges and flows — it is the *logical* organization of the device that makes it seem to perform mental operations. It can mimic human thought processes because it was designed by human agents to do so, reflecting their intentionality.

---

[16] In that context, the human proclivity to tamper with and defy such natural restraints is remarkable and alarming. We seem fascinated by the border between reality and illusion, and committed to replicate nature artificially.

An autopoietic system has its own intentionality. To experience some form of phenomenality, there must be "something it is like" (Nagel, 1974) to be that system.[17] Such a system has priorities. Events *matter* to it, and this mattering is the foundation and prerequisite for the system's ability to make distinctions meaningful to it, upon which it can act. Phenomenality is how the organism represents these distinctions *to itself* and what they signify for it.[18] Input comes from the world (which includes the body), but response comes from the organism as an agent. Outside observers are used to viewing sensory input (stimuli) in third-person causal terms — that is, from their own point of view. But the organism's response must be viewed from *its* point of view — that is, in the intentional terms of an agent acting in its own interests. An outside observer must understand the organism's observable behaviour *and* its phenomenality in terms of actions or connections made within itself for its own reasons.

From a third-person perspective, phenomenality can be viewed as a sort of internal communication, an internal memo about (largely) external input. From a first-person perspective, the world appears to us in consciousness *like* the way that mental images appear to us when evoked by words — that is, by fiat. If that analogy seems more like magic than science, it is the same magic we use every day in language. In any case, the organism constructs its own first-person point of view and phenomenality through acts that an observer can translate as propositional assertions. The brain creates phenomenality in a parallel way to how it creates meaning in language, through the use of symbols to which it *assigns* meaning in the context of an embodied evolutionary history.

While the words of a natural language have relatively transient definitions, the *sensation* of greenness, for example — unlike the word that represents it — is not merely a linguistic convention subject to social change, but a convention of neurological organization, with the force of long genetic precedent. Indeed, the human cognitive system adapts to distorting colored lenses or filters in such a way that subjective experience of verdant foliage, for example, is eventually restored to its normal greenness (Neitz et al., 2002). The sensation of greenness is just what it is, and different from the sensation of redness, precisely because of the real-world things it refers to in our evolutionary history, from which it cannot be arbitrarily dissociated.

---

[17] Note that this expression, which has become popular to characterize the ineffability of phenomenality, is literally a simile — something like something else! We can relate to the experience of another mind only by analogy with our own experience.

[18] A model or representation may be viewed in the third person as a theoretical object, like a program or brain circuit. As an anonymous reviewer has kindly pointed out, a rat navigating a maze may be said to have a "representation" of the maze. (The same may be said of a virtual creature in a virtual maze). In the case of a human being, that representation would be experienced, in the first person, as a mental image of the maze, not a *perceptual* image. The point here is to elucidate how the brain produces the perceptual image: sensory experience in particular, and phenomenality more generally.

One might still wonder what it is about the qualitative "feel" of greenness that commends it to represent foliage, and what about redness commends it to represent things that must stand out against that background — rather than, for example, vice versa. The question may be likened to asking why a specific meaning is denoted in a particular language by a given word, written and pronounced its particular way, rather than by some other symbol. For the native language user, the association seems natural and self-evident, though of course it is actually a social convention and a product of historical accident, subject to change. The internal communication of the organism may be no less arbitrary in its choice of symbols, but is stabilized by the external world to which it refers. *Some* symbol must be chosen, and will inevitably come to seem imbued with the meaning it is made to convey through its connection to the real world. Thus, it is backwards to ask why grass appears green. Rather, greenness is what it is by virtue of the totality of associations related primarily to chlorophyll.[19] Sensory phenomenality is not something gratuitously added to the information it represents, nor caused by it, any more than words are caused by the things they represent. Rather, it is a *version* of that information presented synoptically in consciousness.

The nature of that re-presentation must be understood intentionally. Phenomenality in general involves the sort of act of fiat demonstrated in the visual blind spot and other perceptual completion effects.[20] In the case of the blind spot, the experience of continuity of the visual field is the brain's way to represent to itself its (true) belief that (despite the physiological blind spot) the external world is visibly continuous (Dennett, 1991). The brain affirms that conviction by an act of fiat, which ignores the sensory discontinuity. In other words, it "fills in" phenomenality in the visual field between the enervated retinal areas on either side of the un-enervated area. However, all enervation is ultimately discrete — with gaps between receptors, for example. These gaps *in turn* must be phenomenally filled in, but on a finer scale — temporally as well as spatially (so that there is continuity of motion). In all cases the brain asserts continuity across discrete structures or events when their discreteness is irrelevant to the organism, just as it asserts continuity between frames of a motion picture. Thus, the world has an analog look despite sensory digitation.

---

[19] Which is why there can be no "inverted spectrum" (the idea that color experiences could be systematically interchanged for different human subjects).

[20] Laboratory experiments demonstrate visual completion effects of various sorts. For a "taxonomy of perceptual completion phenomena" see Pessoa et al. (1998). Other experiments demonstrate various forms of spatial and temporal projection. Still others show the adaptability of the nervous system to restore perception that corresponds to functional behavior within an environment.

Conclusion

At least in some fashion, we can understand consciousness through analogy, and perhaps *only* thus. If analogy seems less than satisfying as an explanation of consciousness, it is because we expect "explanation" to invoke causes among objects. But consciousness is no object. The perceiving subject is never within its own field of view. We can explain things appearing in that field of view in terms of other things found within it. However, it is chasing one's tail to try to explain the experiential field itself in terms of appearances within it. By taking intentionality into account, one can at least begin to grasp the brain's challenges in terms we can humanly relate to.

Despite scientific advancements, we may never have an answer to the mystery of why anything exists at all. Similarly, we may never have an answer to the mystery of how there can be consciousness of it. Indeed, it is only the reflexivity of the conscious mind that gives rise to such questions, and it may be this very reflexivity that renders answers to them perpetually elusive.

References

Albantakis, L., Barbosa, L., Findlay, G., Grassol, M., Haun, A., Marshall, W., Mayner, W., Zaeemzadeh, A., Boly, M., Juel, B., Sasai, S., Fujii, K., David, I., Hendren, J., Lang, J., and Tononi, G. (2023). Integrated information theory (IIT) 4.0: Formulating the properties of phenomenal existence in physical terms. *PLoS Computional Biology, 19*(10), 1–45, *e1011465.*

Bostrom, N. (2003). Are you living in a computer simulation? *Philosophical Quarterly, 53*(211), 243–255.

Bruiger, D. (2016). *The found and the made: Science, reason, and the reality of nature.* Routledge/Transaction.

Chalmers, D. (1995). Facing up to the problem of consciousness. *Journal of Consciousness Studies, 2*(3), 200–219.

Dennett, D. C. (1990). *The intentional stance.* MIT Press.

Dennett, D. C. (1991) *Consciousness explained.* Little Brown.

Godfrey–Smith, P. (2021). *Metazoa: Animal life and the birth of the mind.* Picador (Pan Macmillan).

Harnad, S. (1990). The symbol grounding problem. *Physica D, 42,* 335–346 [arXiv:cs/9906002].

Hohwy, J. (2013). *The predictive mind.* Oxford University Press.

Lakoff, G., and Johnson, M. (1980). *Metaphors we live by*. University of Chicago Press.

Levine, J. (1983). Materialism and qualia: The explanatory gap. *Pacific Philosophical Quarterly, 64,* 354–361.

Maturana, H., and Varela, F. (1980). *Autopoiesis and cognition: The realization of the living.* D. Reidel.

McGinn, C. (1989). Can we solve the mind–body problem? *Mind* [*New Series*], *98*(391), 349–366.

Metzinger, T. (2009). *The ego tunnel: The science of the mind and the myth of the self.* Basic Books.

Nagel, T. (1974). What is it like to be a bat? *Philosophical Review, 83*(4), 435–450.

Neitz, J., Carroll, J., Yamauchi, Y., Neitz, M., and Williams, D. R. (2002). Color perception is mediated by a plastic neural mechanism that is adjustable in adults. *Neuron,* 35(4), 783–792.

Oatley, K. (1978). *Perceptions and representations: The theoretical bases of brain research*. Methuen.

Pessoa, L., Thomson, E., and Noë, A. (1998). Finding out about filling-in: A guide to perceptual completion for visual science and the philosophy of perception. *Behavioral and Brain Sciences, 21*(6), 723–802.

Piaget, J. (1967). *La construction du rèel chez l'enfant*. Delachaux et Niestlé.

Searle, J. (1980). Minds, brains, and programs. *Behavioral and Brain Sciences 3*(3), 417–457.

Tegmark, M. (2017). *Life 3.0: Being human in the age of artificial intelligence.* Alfred A. Knopf.
Tononi, G. (2004). An information integration theory of consciousness. *BMC Neuroscience* 5, 42.
Vollmer, F. (1986). Intentional explanation and its place in psychology. *Journal for the Theory of Social Behaviour, 16*(3), 285–298.

The Journal of Mind and Behavior
Summer and Autumn 2024, Volume 45, Numbers 3 and 4
Pages 313–344
ISSN 0271–0137

Humanism at a Crossroads

Robert H. Kuehnel

Institute of Mind and Behavior

This paper will review our general understanding of humanist philosophy, and two variations on the general view, in an attempt to determine whether a humanist mindset might be contributing to our uncaring disregard for the ecology of planet Earth. The two variations of humanist philosophy — put forward by the historian, Yuval Noah Harari, and the philosopher, William James — will be evaluated on the question of the extent to which they view the nature of humans as being "exceptional" — ontologically distinct from the natural world, or integrated with it. The logical implications of human exceptionalism for how individuals relate to the natural world and environmental action to preserve it will be drawn out, as will the empirical findings. I will review the major environmental problems the world currently faces and assess how exceptionalist thinking and attitudes might affect how we respond to them. Some thoughts on how we might affect the outcomes will be offered.

Keywords: human exceptionalism, humanism, ecological overshoot

The intention of this paper is to investigate the ideology at play in the minds of those who feel their humanity sets them apart from nature. These minds appear to be complacent in the face of plain and compelling evidence that we are doing irreparable harm to the ecology and inhabitants of the planet — human and non-human. Such minds appear to believe we can remain on the path of forever elevating our standards of living, of creating energy-intensive technologies that will allow us to do so, and of ruthlessly extracting Earth's resources as if they were unlimited. We will attempt to answer the following questions: What is this ideology and why does it result in so little care about the natural world and its non-human inhabitants? And, how might we effect a change in the way this ideology plays out?

I'll begin by introducing some of the thinking of the Israeli historian, Yuval Noah Harari. In his 2015 book, *Sapiens: A Brief History of Humankind*, Harari introduced the idea that theistic religions have been in decline for the past 300

Correspondence concerning this article should be addressed to Robert H. Kuehnel, Ph.D., 6772 Colton Road, LaFayette, New York 13084. Email: rhkuehnel@gmail.com

years or so, and are being replaced by "natural-law religions." He defines the latter as "system[s] of human norms and values that are founded on belief in a super-human order" (p. 228). As examples of such religions, Harari offers liberalism, communism, capitalism, nationalism and Nazism. He acknowledges that these creeds are more typically considered "ideologies," and does not quibble with using the terms interchangeably; however, these natural-law religions are distinguished by having their justifications in laws that go beyond human conventions; while not divine in origin, their authority is found in principles thought to be immutable and to not be the result of human construction. These laws can be discovered by humans but not authored by them. Of the non-theistic religions cited above, Harari characterizes liberalism, communism, and Nazism as "humanist religions." Whereas theistic religions sanctify gods, humanist religions sanctify humanity — or humans. A direct quote is in order here:

> Humanism is a belief that *Homo Sapiens* has a unique and sacred nature, which is fundamentally different from the nature of all other animals and of all other phenomena. Humanists believe that the unique nature of *Homo Sapiens* is the most important thing in the world, and it determines the meaning of everything that happens in the universe. The supreme good is the good of *Homo Sapiens*. The rest of the world and all other beings exist for the benefit of this species. (2015, p. 230)

Could it be that the humanist mindset, as described by Harari, accounts for our uncaring disregard for the natural environment and its non-human inhabitants? Could humanism and the humanist sensibility be the unlikely culprits in the breakdown of the ecology of the planet? Harari has more to say about humanism in his 2017 book, *Homo Deus*, and the sway of humanism over our relations with other creatures on the planet, domestic and others. He will place his notion of humanism at the center of the pivot sapiens will make in the twenty-first century. But before going deeper into Harari's view, I will put his portrayal of the nature of humanism in context. Let's take a look at how others have characterized this philosophy.

Humanism

According to Nicola Abbagnano (1967), humanism began to coalesce as a basic aspect of the European Renaissance. The thrust of humanist thinking was to reintegrate man into the world of nature and history in a way that had fallen away during the medieval period.[1] The purpose and meaning of human life during the Middle Ages were viewed by Renaissance thinkers as having been defined by the hierarchical structures of Church and fiefdom. In contrast, the

[1] The term "man" is preserved here because the emphasis in this context was on "man" as an inclusive category distinguished from the dominant systems within which humans found themselves.

early humanist philosophers sought to emphasize the human capacity to change and develop over the course of time — to have histories — and to highlight our connection with nature, as beings with bodily needs and valuations that can form the bases of their moral systems. The idealized aestheticism of the monastic was brought to par with, or surpassed by, the person connected with society and the pleasures of secular life. Abbagnano identified the following themes as capturing the change in thinking that defined humanism and its differentiation from the ethos of the medieval period: naturalism, freedom, historical perspective, religion, and science.

Freedom

Renaissance humanism brought a new emphasis to human freedom. In contrast with the dominant hierarchies that ruled in feudal society, the new cosmopolitanism of the burgeoning municipalities of Europe allowed for newfound freedoms and autonomy in daily life. Rather than relying on the Church or fiefdom to mediate the needs of humans with the cosmic order, individuals now had greater latitude to select the means and methods of getting their needs, and aspirations, met. While the bases of free will and self-determination (and the consequences of choosing wrongly) find their origins in earliest Biblical scripture, freedom to determine one's destiny could only come into play as the constraints of medieval institutions began to give way. Individual choice became a factor in how to get one's material and social needs met. Each individual was becoming a free agent in their own world, and less a stone in the sling of forces beyond their control. Although initially viewed as a radical freedom, the compass of free will would be tempered in the minds of later humanists. Nevertheless, this new emphasis on human freedom represents an important step away from the medieval mentality.

Freedom continued to be an important aspect of humanist thinking into the Enlightenment, influencing the United States Constitution and Bill of Rights in the eighteenth century, and shaping the United Nations' Universal Declaration of Human Rights the twentieth century. And here we might note that Harari's notion of a humanism so broad as to include communism and Nazism may represent a departure from the more commonly held view. The view of humanism more commonly held is that of "liberal humanism" — a view of humanism so closely associated with freedom — *Liberté* — that the word becomes a part of its meaning. When Harari establishes the parameters of humanism so expansively as to include political systems associated with totalitarianism or authoritarianism, he places the emphasis of the meaning of humanism somewhere other than its long association with freedom. This form of humanism emphasizes the "human" in humanism, and downplays these other aspects of Renaissance humanism. Being human, having the mark of humanity, is what distinguishes us from all other animals and all other phenomena.

Naturalism

The early humanists of the Italian Renaissance developed the understanding that even though man is endowed with a soul that allows for a measure of freedom, he is a natural being as well — with a body composed of natural elements. As natural beings, humans have material needs and an innate responsiveness to the natural world that allows those needs to be met. This insight might not seem remarkable until placed in context. Human culture was coming out of the medieval period, with its ascendent religiosity and Scholasticism, that idealized the life of the aesthete, the other-worldly monastic, as the pinnacle of human attainment. Although, according to Church doctrine, the human soul would temporarily take residence in the material world, Scriptural guidance was to minimize the indulgences of the flesh. Separateness from the material world and from temptations of sense were to be celebrated. In contrast, the humanistic trend of thinking brought human nature back into contact with the natural world, and in good kilter with the elements that nourish us and bring pleasure. This turn away from the spiritual and toward the natural was anathema to the sensibilities of the Middle Ages; to have an ethics — an ethics of utility in how we get our needs met — that was oriented toward the world and not the divine would have been thought impious, at minimum.

Viewing humans as fully part of the physical environment, and indeed functioning with physical bodies made up of natural elements, opened the door to the life sciences of biology, physiology, and anatomy as applied to humans. Socrates' imperative to "Know thyself" may be viewed as an early introspective method that prefigures the science of psychology.

Historical Perspective

This reconnection of man with the physicality of his being was an aspect of the "return to antiquity" of Renaissance humanism, and the philosophers and writers of classical Greece and Rome were reexamined in their historical context. Classical Greek philosophy had clearly been a preoccupation of the Scholastic period as well, although their treatment of the views of Plato and Aristotle were thought by the humanists to be detached from their historical contexts and used only to serve the purposes of contemporary Scholastic discourse. They lacked, according to the humanists, historical perspective — much as pre-Renaissance painting lacked the optic perspective that would allow objects to be presented in proper, spatial context. Being unable to appreciate Platonism and Aristotelianism in relation to what the historical Plato and Aristotle may have said and meant, left their treatments of the topics to be lifeless specimens of what once were living intellectual interchanges. The philosopher Epicurus was viewed with renewed interest due to his development of moral tenets that incorporated hedonic values into a system of balanced and moderate engagement with the pleasures of life.

This revival of the natural aspects of human nature by the humanists is especially pertinent to the potential for how twenty-first century humans might view their place in the natural world.

Religion

Connection with the divine was not abandoned by the humanists, but the supernatural aspects of a person's life were no longer considered paramount. Here again, we find Renaissance humanist thought making a "return to antiquity" and looking to classical Greek philosophy and culture as models to be emulated. The Greeks were seen as having developed reasoned ways of understanding the world that took a step away from reliance on myth and religious tradition as primary explanatory schemes. Pre-Socratic, and perhaps prehistoric thinkers, were viewed as having developed abstract schemes that began by naming general categories of things — kinds — into which individual concrete entities could be classed and differentiated on the basis of their qualities or predicates. Logic as a conceptual tool can then provide a way to understand entities based on the abstract categories they may be considered members of. Thus, human rationality began to replace religious scripture as the preferred means for coming to know the universe.

Science

The association of humanism with naturalism is especially pertinent to the development of the sciences in modern Western culture. As mentioned above, Harari observes that theistic religions have been on the decline over the past 300 years. The reasons for this decline are no doubt many, but not least of them would be the emergence of the sciences as methods for explaining the world in ways that do not rely on a Creator to account for the world's design and ongoing operation. At first, the Renaissance Church demanded homage from the scientists and repentance from those who questioned scriptural doctrine, and required that the findings of science be brought in line with Church dogma. However, as time went on, science was better able to go its own way. Even though many present-day scientists and scholars claim to embrace both a belief in God and a belief in the mathematical and empirical bases of science, their spheres of influence in the lives of these men and women tend to be separate. While science and religion may tolerate one another in polite company, they sleep in separate beds.

Jamesian Humanism

A good articulation of the humanist position at the beginning of the twentieth century was made by William James (1910). This was an especially important time for humanist thinking because it could now be informed by Darwin's theory of evolution. James incorporates many insights from evolutionary theory into his conception of humanism. Because a central question of this paper has to do with how our views of our humanity affect the way we relate to the natural world, the fact that we have evolved through the process of natural selection is an essential one.

Nonetheless, even though we may fully recognize that we are organic beings inextricably connected with nature, this insight may not prevent us from treating nature, and its non-human inhabitants, in purely objective and rapacious ways. However, the more we see ourselves as intimately connected with, and not essentially different from, this world of plants, animals, landscapes, and ecosystems, the more we would likely be to value them for their own sake — as kindred beings and nurturing environments. This is the hypothesis, at least, that bears on our questions of interest. Therefore, in order to test this hypothesis, we will engage in a comparison of the Jamesian, evolutionarily-informed humanism, with the "natural religion" humanism presented by Harari. These two types were not chosen because they perfectly typify divergent theories of humanism, but rather because they epitomize certain elements that bear on the question of interest: Does how we view ourselves vis-à-vis the natural world affect how we treat it?

Their differing views of humanism may be distinguished on the basis of three dimensions that have relevance to the question of how we relate to the natural world, and how we treat it: the nature of truth, the nature of the self, and how exceptional we are as compared with other animals. And, perhaps something should be said about the two theories at the most general level. The view of humanism formulated by Harari may best be considered a somewhat imprecise, non-technical, unrefined popular philosophy. It consists of a less than fully integrated set of commonly held beliefs that might guide the thinking and behavior of the average person. Alternatively, James's view is that of a professional philosopher. As such, it is couched in precise terms that are used in reasoned argument. While there is absolutely no rule that says the beliefs of the average person will miss the mark more often or more completely than those of the professional philosopher, the following explications will reflect these stylistic differences in the way each form of humanism bears on the issues of interest.

The Nature of Truth

As a historian, Harari attempts to portray humanism in a non-normative way, a description of humanism as it actually reveals itself. In point of fact, Harari argues against some of the key assumptions of the theory of humanism he presents, as well as the beneficence of its implications. This version of humanism is presented as a form of religious belief, based in superhuman principles that are thought to be immutable, but are nevertheless not dependent on a supernatural creator. In more technical terms, this view would qualify as a form of idealism. The world reflects an order that cannot entirely be accounted for on the basis of the empirical facts.

That order is independent of the world, and the world conforms to it. This kind of truth can be discovered but not created by humans. In Harari's telling of it, the superhuman principles that support humanism were originally divine in origin. They were articulated in the Scriptures of the Judeo–Christian tradition. Humans were created in the divine image, separate and apart from all the other creatures of the world, creatures placed in the world for the benefit of humans. This was all well and good until, in Harari's view, God came to his untimely demise — a slow loss of influence that occurred over centuries — but a death nonetheless.

Harari's (2017) interest in humanism has to do with humanism's being a moral system that, in the absence of theistic belief, complements the amorality of science and helps guide us in shaping our future into the twenty-first century. He refers to the relationship between science and religion as "the odd couple." According to Harari, we humans were spared the decent into moral chaos that should have come with the death of God (for many) by humanism. The specialness of humans, and their rights, were conveyed from the Creationist myth to the humanist myth. This transition has arguably served us well. We still think in moral terms — what is good and bad — and generally act accordingly even in the absence of threat of damnation.

Harari goes on to point out that, at least in the West, the belief in a Supreme Being held by some has more the character of a deism, an abstract notion that people can accept or reject without much consequence. Either way, science will provide an explanation for "creation," and humanism can provide guidance with regard to a moral and worthwhile life. The religious systems present during earlier civilizations, and present in some parts of the world today, offered the final word on morality and how best to live one's life, and that word had the character of being absolute truth — dominating the social structures of the time and place and not dependent on human sensibilities. Nowadays, in most of the world, people have the free option to accept or reject belief in a Supreme Being. If such a belief enhances the life of the believer and it does not run afoul of the full countenance of other beliefs held by the adherent, so be it. However, if belief in God in the modern-day adherent no longer works, or fails to jive with one's other beliefs, it can be discarded and replaced. The "natural law religion" of humanism can be adopted — with or without belief in a deity.

Whereas Harari takes the idea of "natural law religion" as the starting point for his discussion of the belief structure of humanism, James does the opposite. Recall that natural law religions, while not divinely inspired, nevertheless find their authority in principles that are immutable and not the result of human construction. James (1910) cites the formulation of humanism by F. C. S. Schiller (1902) as the inspiration for his own view. For Schiller, humanism is the doctrine that truths are essentially human-made. The questions we ask in our pursuit of truth are shaped by our human motivations, are directed to meet what we find satisfying, and always have a "human twist." Schiller asserts, "The world is essentially

. . . what we make of it. It is fruitless to define it by what it originally was or by what it is apart from us; it IS what is made of it. Hence . . . the world is PLASTIC" [shapable] (p. 60). James (1910) goes on to explain that Schiller's view is not a variation of subjective idealism that dismisses the limiting factors of a world that exists independent of our knowing it. Rather, the independent world is delved into as the subject of our truth inquiries and provides resistance to mistaken hypotheses. The statements that qualify as "true" are thus shaped by this world; however, these assertions of truth are primarily determined by the questions we ask, by the interests that drive these questions, and by the directions we chose to pursue in our investigations. James also offers the qualification that the world we meet in our investigations is not entirely "plastic" in the sense that it gives way to the inquiries that test its reality. Instead, it would be better to say that our working models of reality are flexible to the degree that these models take shape in the mold of the purposes of our inquiry, and that the mold must flex around the structures or resistances it meets in the course of investigating the world.

For James (1910, p. 112), "'Reality' is in general what truths have to take account of." This reality may be viewed as consisting of three parts. The first part is the raw data of the sensory input we encounter. James famously calls this the "flux of sensations." The referent of this phrase is difficult to pin down because the act of envisagement will immediately impose a structure on it, which is, by definition, unstructured — a "flux." James refers to this flux as "pure experience." Interestingly, pure experience has neither subject nor object. The subject presumed to be having the experience, and the referent thought to be the object of the experience, are both constructed in the wake of the experience. The experience is thus "pure" in the sense of being unparsed — non-dual — in nature. So, sensations appear, sources unknown. They are given, neither true nor false. Only our formulations, what we make of them and say about them, are testable and subject to judgments of truth or falsity.

The second aspect of reality for James, which bears on our ability to take account of it, has to do with how these sensations coalesce into percepts that we discriminate, place in a field of perception, and assess in terms of their mutual relations. The first step of this process involves placing percepts in contextual spatial and temporal dimensions; it is only within these dimensions that comparison can occur. According to James, at the most abstract level, sensations have the attributes of intensity and extensity, with the latter being "the original sensation of space, out of which all the exact knowledge of space that we afterwards come to have is woven by processes of discrimination, association, and selection" (James, 1890, vol. II, p. 135). On the other hand, simple sensations have no attribute of duration. It is only when sensations coalesce into percepts of some complexity that they take on "the echo of the objects just past, and, in a less degree, perhaps the foretaste of those just to arrive" (James, 1890, vol. I, p. 606). So, there is a coming-and-going of the objects of consciousness that constitutes the "stream of consciousness." "Consciousness is in the form of time." Interestingly, James claims there is no present moment in consciousness, only the sub-feeling of something that comes followed by the sub-feeling of something that goes; past and future are divided by an indivisible, and hence abstract, non-existent, instant. Thus, he adopts a previously coined term, "the specious present" — a present that is an abstraction with no concrete existence. At minimum, the present moment contains a beginning and an end — it has duration.

The second step of the process of sorting the elements of reality involves the immediate recognition of ways in which our percepts are similar and dissimilar, the integration of these percepts with one another to form objects, the discrimination of foreground from background, and the perception of how objects relate to one another in terms of size and proximity in the perceptual or conceptual field. The term "object" is here used loosely, because objects are not perceived directly but rather abstracted on the basis of their perceived qualities. This second step provides the context within which we can organize the elements of our worlds in terms of categories and mathematical and logical relations.

The third part of reality consists of the catalog of our experiences and knowledge — our "apperceptive mass" — that was generated by the prior applications of the processes described above. These are the beliefs and expectations we bring to new experiences, which might be considered anticipations with regard to what new encounters will reveal. These implicit expectations tend to give form to incoming experience and may operate in the way we think of confirmation bias. Pure experience is instantaneously shaped by these expectations; however, these expectations — and the "truths" based on previous experiences — are not entirely entrenched. This is an important way that reality holds sway over the truth value of our perceptions and beliefs, by resisting our expected outcomes, frustrating our hypotheses, and therefore guiding our beliefs as to what is consistent with an independent reality.

For James, the above analysis serves as the very basis of humanism. There is no denial of a reality apart from our ways of knowing it, or even contending that it is unknowable as is a tenet of Kantianism. The world we live in is a human world, not because there is no independent reality, but because our processes of attention, discrimination, and association mold or carve that reality into one that fits our interests and suits our purposes. And before we step away from James's conception of humanism, we should note that his humanism is intimately tied up with his theory of truth — pragmatism. In essence, James's pragmatism holds that truth is an attribute of statements we make about the world; that all statements of truth are hypotheses; and that the statements or beliefs that have consequences that are good for us, that serve our higher values, are truer than those that do not — so long as these beliefs are not inconsistent with the mass of beliefs about the world that we have already logged as being true, and do not violate our sense of logic. So, the pragmatic aspect of testing the truth value of a belief involves looking to the consequences of holding that belief. Truths that do not have meaningful consequences are, by definition, inconsequential — meaningless.

James takes no firm position on the existence of God, other than to say that the notion of a personal god — an all-knowing, all-powerful being who takes an interest in the plight of each and every person and weighs in on their fate — has some major problems. For example, citing the "scale of evil actually in sight" in the world, he concludes that a "God who can relish such superfluities of horror is no God for humans to appeal to" (James, 1910, p. 69). Further, "We can with difficulty comprehend the character of a cosmic mind whose purposes are fully revealed by the strange mixture of goods and evils that we find in this actual world's particulars (James, 1910, p. 56). For his own part, James (1910) did say:

> My belief in the Absolute, based on the good it does me, must run the gauntlet of all my other beliefs. Grant that it may be true in giving me a moral holiday. Nevertheless, as I conceive it, — and let me speak now confidentially, as it were, and merely in my own private person, — it clashes with other truths of mine whose benefits I hate to give up on its account. It happens to be associated with a kind of logic of which I am the enemy, I find that it entangles me in metaphysical paradoxes that are unacceptable, etc. . . . I personally just give up the Absolute. (pp. 41–42)

It is interesting to note that James (1896) stated his regret at having titled his famous monograph, "The Will to Believe," and not "The Right to Believe." The reason for his regret was the confusion he thought to have been caused by the term "will." The argument of the essay is typically considered to be a defense of the "right" to believe in God, with the term "will" just confusing things. But in the context of his pragmatism, the term "will" is appropriate. In essence, James's argument is that in a matter of such great importance as the meaning of life and the place of a superordinate plan that might make sense of it, the types of evidence one takes into account need not be empirical and objectively verifiable. James himself counted "inner experiences" as being of primary importance in determining the existence and relevance of an Absolute. So, in the matter of religious belief, the nature of truth is as it is in other realms — pragmatic. If belief in an Absolute serves the good or wellbeing of the individual by supporting their higher values, and it does not come into conflict with the manifold beliefs they have about existence, and does not result in logical inconsistencies, their will to believe is justified.

Nature of the Self

For Harari, the key element of the creationist myth that was conveyed to humanism was belief in an essential, unitary, unique, and sacred nature of the human self. Recall that it is the human self that makes humans "fundamentally different from the nature of all other animals and of all other phenomena," and justifies the thesis that "[t]he rest of the world and all other beings exist for the benefit of this species" (Harari, 2015, p. 230). Although Harari argues against the logic and wisdom of this conveyance of human's sacred nature, he contends that the torch was nevertheless passed. Further, the transmission of this belief accounts for the enshrinement of "human rights" as an article of faith in the humanist myth. Even though this human essence may not be eternal or of divine origin, this sort of humanism holds that we do possess a self that is unique and set apart from all other creatures.

Interestingly, Harari (2017) argues against the possibility of the existence of a unitary, individual self — this "essential spark" — on the basis of evolutionary theory. The argument runs as follows. If the self of the human being is an individual unity, then the self cannot be divided, i.e., the self is not a composite of other things. Many things, large and small, can change in a person's makeup over time — cells divide, wear out, and are eliminated as waste; a person's image of themself changes from birth to adolescence and beyond; learning occurs, knowledge accrues, and sensibilities may eventually fade. But a unitary self remains the same, unchanged in its essence, from birth to death.

Evolutionary theory has it that biological entities come into existence through the selection of their component traits, one by one, as the result of the viability, or lack thereof, of such traits over generations. The salamander and its component parts evolved gradually; traits conducive to survival and reproductive success are passed from one generation to the next; less helpful traits fall out of existence and disappear at the end of a line of descent in the phylogenetic tree. Harari (2017) argues that something unitary — which is not composed of constituent parts, and which cannot change — cannot come into existence through natural selection. For example, the fingers used to type this page, like the fingers of that salamander, appear to have evolved from a fish that had digit bones in its pectoral fins that probably helped support its transition from water to land (Long and Cloutier, 2020). The number of evolutionary steps that occurred over the 380 million years that culminated in these human fingers is beyond comprehension — minute variations, generation after generation, the vast multitude of which were shed along the way. Something that is indivisible and immutable cannot come into being, cannot become a component of a biological entity as the result of evolution and natural selection. So, if humans do indeed have unique, essential, indivisible souls, humans in their entirety are not the product of evolution as we believe all animals to be.

For his part, James does not hesitate to delve into the question of the existence of a pure principle of identity, of a self. On the one hand, he notes that if by "self" one means a substantial soul, or transcendental principle of unity, the proponents of such conceptions have yet to provide positive accounts of what the actual nature of such selves might be. On the other hand, he argues that David Hume's analysis of the self which concludes that it consists of nothing other than a bundle of perceptions connected by an association of ideas — that there is "no self" — "runs against the entire commonsense of mankind" (James, 1890, vol I, p. 330). James consequently endorses neither the "spiritualist" notion of a substantial soul, nor the conclusion of Associationism that humans are completely bereft of a personal self.

James (1890, vol I, pp. 330–342) begins his own inquiry with an unequivocal acceptance of the fact that, barring severe psychopathology, we have a consciousness of personal sameness over time and that we can distinguish those thoughts that are self-referencing from those that reference elements of an objective world. The former we experience as "warm and intimate," the latter as "cold and foreign." The "animal warmth" that accompanies current and past thoughts of the self becomes a "herd-mark" or "brand" that "runs through them all like a thread through a chaplet and makes them into a whole." This coherence of thoughts that belong to me constitutes my phenomenal self — "I am the same self that I was yesterday."

When confronted with the question of whether consciousness — the prime evidence for the existence of a self — exists, James (1904) concludes: it depends on what sort of existence. For James, consciousness is a process. Although it does "stand for a function," there is "no aboriginal stuff or quality of being" that it consists of. The function of consciousness is knowing. Thoughts clearly exist. But, as to the question of whether there is a "self" that lies behind thoughts and supports them, James compares the question to that of whether there exists a substrate "matter" that serves to support the properties of objects that we can observe. James considers Locke to have debunked the idea that the existence of the properties of an object implies the existence of a substrate — matter or substance — that must support their existence; we can know nothing of the substrate itself apart from its properties. Common sense holds that it must be there, but all we have for actual data are the properties. James contends that the same applies to the existence of a soul. Common sense says that there must be something behind the thinking, something doing the thinking, but all we have are the thoughts. Introspect as we may, no self comes into view, just our thinking, our looking, our wondering. The closest James comes to identifying the nature of the self is to identify it with the passage of thoughts (and sensations, feelings, perceptions, discriminations, awarenesses) in a steam of consciousness. Unlike the Associationists, he does not assume there to be something in the nature of thoughts that makes them coherent and congeal into a sense of self — a self that has no existence. James contends that the empirical self consists of the Thought that is passing in consciousness at the moment. Interestingly, we cannot apprehend the present Thought until it passes. Thoughts cannot look themselves in the eye, they can only be seen as they pass to the latter portion of the "present moment." According to James (1890), the passing Thought can be considered the actual, empirical self because it inherits the title from the previous Thought. Recall the "herd-mark" or "brand" that "runs through them all like a thread through a chaplet and makes them into a whole." That brand carries with it the history of all the passing Thoughts that constitute the empirical self, each in its turn. The title is conveyed from one passing Thought to the next. According to James, that is all the self needed for the science of psychology. Musings beyond that step into the metaphysical — unobservable, untestable, non-scientific — realm.

The Degree to which Humans are "Exceptional"

The very premise of Harari's version of humanism is that humans are exceptional. His contention bears repeating:

> Humanism is a belief that *Homo Sapiens* has a unique and sacred nature, which is fundamentally different from the nature of all other animals and of all other phenomena. Humanists believe that the unique nature of *Homo Sapiens* is the most important thing in the world, and it determines the meaning of everything that happens in the universe. The supreme good is the good of *Homo Sapiens*. The rest of the world and all other beings exist for the benefit of this species. (Harari, 2015, p. 230)

In point of fact, however, according to Harari, we are not "exceptional" due to any qualities that inhere in individual humans, but rather because humans as a species underwent a cognitive revolution about 70,000 years ago that permitted us to create an "intersubjective reality" populated by shared myths and stories that motivate us to work together, collectively, to accomplish feats no individual or small group of humans could accomplish on their own. However, this specialness as a species would not seem to imply that we, as individuals, are exceptional — unusually good or outstanding — in a moral sense. Just the reverse — we are exceptional only on account of what we have created collectively — our sense of being morally exceptional is a function of our own story.

According to Harari (2017), from the time of the cognitive revolution in homo sapiens up until the agricultural revolution a millennium or so ago, humans related to other creatures — their prey and those that would prey on them — with a greater sense of commonality and connection than we now see in most current human societies. Only with the dawn of the agricultural era and the widespread domestication of animals for food and labor did our myths begin to portray humans as being entitled to dominate the natural world and its creatures. Now subject to the vagaries of drought, flood, and pestilence, humans were sorely in need of supernatural powers to intercede on their behalf to prevent the destruction of their crops and herds. Deities were cast in the role of intermediaries between humans and nature, who might be depended on to intercede on our behalf in return for our worship and sacrificial offerings (oblations usually consisting of domestic animals). As Harari put it, the cast of characters on the stage of life went from a multitude of actors interacting crossways, to just a few: the gods at the pinnacle, humans in the chorus, and all others relegated to the status of props.

So, what makes humans exceptional according to Harari? According to his portrayal of the humanist myth, humans are exceptional because they were deemed so in Judeo–Christian Scripture that came into play during the agricultural revolution — they were cast as masters of the lower creatures by virtue of their unique, essential "spark" or soul. With the passing of belief in the creationist myth, humans inherited an offspring myth that endorses their status as exceptional beings. This exceptionalism portrays humans as being of a different ontological status — a higher status — than the rest of creation. However, while the fact that we are able to collaborate, in multitudes, represents a definite evolutionary advantage, no difference in ontological status from other animals is implied. We are creative and highly adaptive, but not of a different sort.

As you might guess, James's view of human exceptionalism is more nuanced. Coming of age in the throes of American modernity, James surely noted something pretty special, and yes, exceptional, about this species homo sapiens. The fact that humans created the cultures of the world tells us there is indeed something exceptional about homo sapiens. And yet, the term of identification is homo sapiens, one species among the order of primates, nested within the family of great apes. James described humans as the only "metaphysical animal," capable of pondering the wonders of the universe, and as the only "talking animal," able to generate and use symbolic language. But always "animals" — one species among a multitude in the great tree of life that Darwin saw into.

In James's humanism, the connection with nature is there, notwithstanding the cultural and technical accomplishments of the species as a whole. We eat food, keep our dens, procreate, scavenge at our local grocers, and do much the same in many respects as our fellow domestic and wild species do. There is no place in the theory for when, where, or how homo sapiens became ensouled. It could have happened. Maybe it happened when Adam first coupled with Eve after the Fall. Or sooner in the development of the species? While this possibility cannot be denied, James understood the implications for Darwin's insights, and his form of humanism can be viewed as a naturalistic, evolutionarily-informed humanism. That said, his insight into the nature of consciousness manifested in "inferior animals," may have missed the mark.

As noted by Walter Veit (2023) and others, William James — the "Father of Consciousness Studies"— was an introspectionist during the heyday of this approach in American and European psychology. His starting point for observing and understanding consciousness was the human mind — his own mind. Consciousness is only observable subjectively, so where better to devote one's attention if interested in the profound questions at stake? The problem is that human minds are accessible to human observers only. And, when speaking precisely, only one mind is accessible to one observer — the one with the one and only mind that is open to them, and to them only. So, we immediately encounter the "problem of other minds." How do I know that I am not the only being who has a mind or consciousness? I can ask others about their minds, but this only works if I am speaking with a creature who can communicate in a language that I am familiar with. And even then: Is this an AI automaton pulling my leg? Who's to know? And the problem quickly spirals when it comes to asking a fish I have just caught, "Do you feel any pain?"

So, James started his studies of consciousness in a seemingly logical place — his own mind — but, by implication, relegated the minds of other beings to an unknown and perhaps unknowable status. Human consciousness then appears to be special — exceptional — by default as it were. However, as the evolutionary biologist Veit (2023) and others have pointed out, introspection applied to human consciousness may not have been the best avenue for drawing out the implications of evolutionary theory for consciousness across species. We are coming to understand that consciousness, which is presumably a function that was selected and shaped by natural selection, very likely has its roots in phylogenic development much, much earlier and more distant from the thread now present in the great apes. Only by starting to investigate consciousness with this presupposition can we hope to more thoroughly plumb its origins and its presence in the multitude of creatures that show its hallmark. So, James's humanism may have been less exceptionalist had he embarked with a different method. But that just demonstrates the resilience of James's theory of truth. When we have a belief, a hypothesis, we can put it to the test either empirically or logically. If the belief once thought true now seems less so, so much better for posterity.

James did directly address the question of whether our differences from "lower creatures" is absolute — "exceptional" — or merely relative, in an oft quoted passage:

> I firmly disbelieve, myself, that our human experience is the highest form of experience in the universe. I believe rather that we stand in much the same relation to the whole of the universe as our canine and feline pets do to the whole of human life. They inhabit our drawing rooms and libraries. They take part in scenes of whose significance they have no inkling. They are merely tangent to curves of history the beginnings and ends of forms of which pass wholly beyond their ken. So, we are tangents to the wider life of things. But, just as many of the dog's and cat's ideals coincide with our ideals, and the dogs and cats have daily living proof of the fact, so we may well believe, on the proofs that religious experience affords, that higher powers exist and are at work to save the world on ideal lines similar to our own. (1910, p. 137)

A defensible conclusion on the question of the exceptionality of James's version of humanism is the we, as humans, are thoroughly embedded — body and mind — in the natural order of things. We are cogs in ecosystems, and the sooner we come to appreciate the outsized impact we have, the better. So, we might next consider what is at stake. What difference might it make whether we view ourselves as exceptional, unique, special in the order of things; or, alternatively, we see ourselves immersed, face to face with our fellow creatures, in the tumult of climate change and environmental degradation?

Human Exceptionalism vs. a more Naturalistic Humanism: Potential Implications for the Environment

Human exceptionalism, being of the view that we as humans have no essential, moral connection with other creatures, would have a hard time arguing against human self-interest. I believe this is where we are, generally, when it comes to the attitudes of the average person with respect to concern for the environment. If it affects me, my children, people I am concerned about, perhaps even my broader group or my locality, then yes, I am concerned. If the effects of environmental degradation are seemingly distant from me, my loved ones, and my pocketbook, the problem is not on my priority list.

There are others who unmistakably feel a connection with other creatures, from insects to mammals, birds and reptiles — even fish! Knowledge of the suffering of other creatures elicits feelings of compassion. I believe this is a statement of fact, and I believe that this is one reason the environmental movement has become as robust as it is. I take this to be an indication of a sense of kinship with a world that includes a broad range of non-human beings, and a suggestion of the presence of a more naturalistic humanism in much of humanity, or perhaps a biocentrism for that matter. (Biocentrism, an ethical point of view that believes all living things have inherent value, surely has greater affinity with an evolutionarily-informed humanism than with human exceptionalism.) This is my hypothesis.

Perhaps one way of approaching the question of what material difference it makes whether we consider ourselves as an "exceptional" overlay on the natural order, or whether we consider ourselves to be part and parcel of that order, is to reframe the question: Are we of this world, natural beings through and through, or do we have an essential core that should more properly be thought of as inhabiting a uniquely human world? Let's next review the major social–environmental challenges we face and attempt to determine what difference it might make whether we feel ourselves exceptional or of the natural order.

Ecological Overshoot

Simply stated, ecological overshoot occurs when the material demands on a system — the ecological system of the planet — go beyond the capacity of the system to meet those demands (Merz et al., 2023). To the extent that we see ourselves as an exceptional species, being of a kind that is different and ontologically separate from other animals, we may believe we are exempt from the natural limitations of the carrying capacity of the environment and consequently overshoot the environment's ability to sustain us in the long term. As noted by the population ecological economist William Rees (2024), the rapid growth in our material demands on the environment — closely related to human population growth — is a relatively recent phenomenon in the history of the human species. Humans have witnessed more change in population and technology in the last 200 years than occurred in the prior 250,000-year history of the species. Only for a person born in the early 1800s or later did it happen that they would see noticeable changes in technological advancement over the course of their lifetime. Born in 1914, my father went from seeing a sky mostly empty of technology other than kites, to witnessing the boom in propeller-driven biplanes and monoplanes in the 1920s, to jets in the late 1950s, to a moon landing in the 1960s, and to a night sky littered with satellites and even a space station before his death in the early 2000s. Because we were born into this world of rapid change in technology, change seems normal. Why shouldn't it continue forever? We have a story to explain why it will. We are outside of nature, and our technology will allow us to bypass the limits of ecological carrying capacity that apply to other species.

As generally applied to animal species, carrying capacity is "the average maximum population . . . that a particular habitat can sustain indefinitely without that species endangering or disturbing irreversibly that habitat" (Rees, 2024). Carrying capacity is not fixed for a species in a given habitat, but varies depending on changing conditions in its locality. Such conditions would include the amount of food available, which might vary as the result of weather conditions or competition with other species, the presence of predators, or the spread of infectious diseases. Local populations tend to rise and fall in response to such changing conditions. These changing conditions, along with changes in numbers of the local population, are considered to be limiting factors on local population size, which can multiply or crash depending on the presence or absence of these limits. The numbers of local populations are therefore kept in check.

As the result of our capacity to collaborate for scientific and technological advancement, we have been able to reduce, or stave off, many of the factors that limit our population size, such as medicine for disease, agriculture for food, fossil fuels for energy, and various methods for eliminating predators. Relatively recent improvements in public health and the consequent increase in longevity, in particular, have been an important factor in population growth. Compounding the effects of population growth on the ecological carrying capacity of our environment is the parallel explosion in our consumption. "Cheap" energy has given us greater access to a variety of goods and afforded an average increase in per capita consumption by a factor of 13- or 14-fold (Rees, 2024) over the past two centuries or so. Consumption inevitably results in waste as the result of energy and material expended in production processes, and as the result of product obsolescence, which has notoriously become more rapid. This waste must be reintegrated into the environment, by such primitive methods as burying, burning, or simply dumping in nonproprietary spaces, including our oceans. So, now we have a massive increase in population, a massive increase in the per capita consumption of materials drawn from the environment, along with massive waste in the forms of carbon pollution, solid waste pollution, and chemical and radioactive pollution, all of which must be disposed of in the selfsame environment — the same square-footage of land and cubic footage of water bodies and atmosphere — that we had before the industrial revolution just 200 years ago. That is the meaning of ecological overshoot.

One recent estimate of ecological overshoot, operationalized as the number of Earths required to support our current world population at current levels of consumption and waste disposal, is 1.75 Earths (Merz et al., 2023). That means we would need an additional three-quarters of a planet of the size and quality of Earth to sustain ourselves. Given that we only have one Earth, we are seeing the consequences of overshoot in the forms of climate change, biodiversity loss, and the accumulation of toxic waste. And the human exceptionalist bible does not have a chapter on what to do when we exceed the capacity of our home to sustain us, because the assumption is that we are not entirely of this natural world. We are special and unique, of our own human world. However, a naturalistic humanism tells us that even though humans are indeed a generalist species, along with racoons and crows, able to survive under a wide variety of environmental conditions, we are nevertheless biological organisms and ultimately subject to the ecological limits of our environment.

Empirical Review of the Effects of Human Exceptionalism on Environmental Action

We have some evidence that human exceptionalism hinders environmental action. In a recent review of the relevant literature by Kim et al. (2023), the authors settled on a definition of human exceptionalism as "beliefs that humans and human societies exist independently of the ecosystems in which they are embedded, thereby promoting a sharp ontological boundary between humans and the rest of the world" (p. 358). One implication of this conceptualization is that "evolutionary constraints and ecological limitations do not apply to humans"; another is that "humans are in an ontologically unique category, separated by a conceptual chasm from the nonhuman natural world" (p. 359). Further, this conceptualization falls within a larger framework of interconnected knowledge and values, such as "humans are the most highly evolved species" and "human life is more valuable than the lives of other species" (p. 360). The problem with such statements is not necessarily that they entirely lack truth value — humans are indeed exceptional in many ways — but that they may lead to more far-reaching conclusions that are clearly mistaken, such as "human innovation and technology will allow the species to free itself of its relationship with, and dependence on, the natural environment." Such beliefs may explain why news of environmental disasters and impending threats of environmental "tipping points," such as the melting of arctic permafrost and consequent release of large volumes of methane, seem to fall on deaf ears. If humans can be expected to innovate their way out of such predicaments, we may be just fine.

Kim et al. (2023) found that human exceptionalist thinking is common in U.S. undergraduate students and adults from Western, Educated, Industrialized, Rich and Democratic (WEIRD) countries. Such thinking is consequently widespread, and Kim et al. found it reflected in attitudes toward climate change. For example, they found the belief that humans will be much less likely to be subject to habitat loss, and will be much more likely to survive climate change regardless of which other species survive, to be commonly expressed. They found an asymmetry in beliefs about the degree to which humans impact nature, versus the degree to which nature impacts humans. Human exceptionalist thinking tends to see humans as having large impact on nature, but as being relatively impervious to the impacts of natural phenomena.

Kim et al.'s (2023) review nevertheless found that human exceptionalist thinking is not universal. They identified cultural differences among children; for example, children of an indigenous tribe in Wisconsin show little human exceptionalist thinking (Herrmann, Waxman, and Medin, 2010). They also found less evidence of such thinking in rural Euro–American children as compared with their urban counterparts. They speculate that informal experiences with nature, such as hiking, fishing, and hunting, allow for the direct interaction with animals and observation of their functioning in their natural environments, fostering ecological reasoning (Betz and Coley, 2020). Among adults, commercial fishermen have been found to exhibit higher levels of ecological reasoning (Shafto and Coley, 2003), and adults who are more adept at recreational fishing tend to show higher levels of proenvironmental behavior (Varade, Choi, Helmuth, and Scyphers, 2023). Another way that children can develop habits of thought that are less prone to be exceptionalist is through exposure to the cultural teachings and traditional ecological knowledge in indigenous cultures (Birkes, Colding, and Folke, 2000).

Potential Remedies

The following may be seen as the issues of greatest environmental importance that will be affected by the extent to which we view ourselves as exceptional beings who are not entirely of the natural order. Strategies for addressing these problems will be highlighted.

Population

According to Skirbekk (2022), human population growth for most of human history was limited by high infant and child mortality. As a result, from the time of the agricultural revolution (circa 10,000 BCE) until 1700, world population grew, on average, by only about 0.04% annually. In 1700, world population is estimated to have been between 600 and 680 million people. As viewed on a graph, the trend in world population growth since the agricultural revolution would be a line very gradually ascending from the x-axis over time, trending more steeply upward between 1700 and 1900, then abruptly becoming nearly vertical over the course to the past century. Regarding twentieth and early twenty-first century growth, consider the following. When my father was 13 years old in 1927, world population crossed the 2-billion mark. It exceeded 2.5 billion just before my birth in 1952. At the time of this writing — December 2024 — it is approximately 8.1 billion. World population has more than quadrupled in the past 100 years (Eberstadt, 2024).

Now, even though human population had been expanding at an exponential rate over the past century, the past few decades have shown the greatest decline in the rate of population growth since the bubonic plague of fourteenth century Eurasia. The trend line has begun to level off. According to Skirbekk (2022), the recent spread of low fertility responsible for slowing population growth "is largely the product of what most people would consider improvements in the human condition: the expansion of education, greater gender equality, lower child mortality, better social safety nets, and vastly increased reproductive autonomy and control" (p. xiv). Further, "The increase in education is probably the main reason why global fertility has decreased, and increasing educational participation and attainment appears to be the most effective way to reduce fertility without resorting to coercion" (p. 2). Eberstadt (2024) contends that the net effect of the social and demographic factors that are curbing population growth can be encapsulated in a simple phrase: "a worldwide reduction in the desire to have children."

With regard to the health of the environment, relatively low fertility — and slowing population growth — "may well be essential for the continuation of life on Earth" (Skirbekk, 2022). And yet, we hear the richest man in the world saying "'population collapse' is a bigger threat than climate change" (Bagenstose, 2022), and world leaders clamoring for efforts to raise fertility rates. Slowing population growth will, no doubt, require significant adjustments in economic policy and will affect the power dynamics among nations; however, the consequences of a species with a 300,000-year history of slow but steady population growth and then showing a quadrupling of its population in the timeframe of a single century would appear to be much more dire — especially in a species as expansive and voracious in its appetites as humans. Given that the population boom of the last century appears to be slowing as the result of naturally occurring social and demographic forces, and that we are already exceeding the carrying capacity of the planet, the calls from world leaders to reverse the trend seem especially misguided.

Eberstadt (2024) acknowledges that very significant stresses will be placed on world economies by a cohort of aging individuals who will have less and less material support from smaller succeeding generations. The power dynamics among nations will also shift as the result of the fact that depopulation is occurring at different rates in different parts of the world. He is clear-eyed about the profound challenges to the economic and political status quo, but notes that government attempts to incentivize childbearing have failed to bring fertility rates back to replacement levels, and that future government policy "will not stave off depopulation." He concludes that depopulation "is not a grave sentence; rather, it is a difficult new context, one in which countries can still find ways to thrive. Governments must prepare now to meet the social and economic challenges of an aging and depopulating world."

Skirbekk (2022) argues that governments can best address demographic challenges by enacting policies that help individuals have and raise the children they want, rather than attempting to push women to have more children. He suggests that we encourage — or at least not discourage — the slowing population trends in developed countries, and work to facilitate the demographic shift to fewer children and smaller family size in less developed countries by fostering the changes that work: higher education, access to family planning, and generally elevating the economic well-being of the populations.

Before moving on from this topic, it should be noted that while the trend toward depopulation is encouraging, it does not mean that we are off the hook with respect to ecological overshoot. Recall that our current world population, consuming at its current per capita level, exceeds the carrying capacity of the planet by almost double. Some estimates are that population will peak at around 11 billion by the end of this century — almost 3 billion beyond our already unsustainable level. Further, small variations in factors related to these predictions may result in significant under- or over-estimates of population growth. We need to further empower women to have the number of children they want by ensuring access to family planning, and we need to provide adequate support for the care and education of the children they choose to have.

Consumption and Economic Growth

The science tells us that overconsumption is a key driver of ecological overshoot, and that there are several things individuals can do to help. We can limit our consumption of energy-intensive commodities, such as electricity, gasoline, and natural gas, and invest in energy efficient technologies to heat and cool our homes and power our vehicles. Or, we can simply travel less and live in smaller spaces. We can limit consumption of beef, lamb, veal, and dairy in order to use our land more efficiently and reduce methane emissions. Even though the impacts of such individual actions are limited, they're nevertheless important because they help shape our personal identities and our sense that we are engaged with the natural world and trying to preserve it. However, collective effort is by far the most effective way to address the problem of overconsumption and overshoot. Our continuing access to cheap, convenient energy has allowed us to overshoot many planetary boundaries (Merz et al., 2023). This energy is “cheap” because its price does not include its downstream costs to the environment and society. Not only do cheap fossil fuels produce the greenhouse gases that are warming the environment, they also decrease the actual costs of products manufactured with their use, such as concrete and steel, plastics, and a plethora of discretionary consumer products that end up overflowing our landfills and oceans. All of these products are much less expensive than they would be if their price reflected the true social and environmental costs they entail. Individuals can join with others and support organizations that represent their values and lobby their politicians to enact the policies and legislation needed to make the necessary changes.

The economic policy endorsed by a majority of economists as the best way to reduce our reliance on cheap fossil fuels and to have their price reflect their true costs on the environment and society is to place a price on carbon pollution (Thaler and Sustein, 2021). Carbon pricing is an elegant intervention that makes polluters pay and has many strong advantages. A carbon pricing plan can be implemented simply and quickly, a feature that is consistent with the urgency and direness of our present situation. A carbon price reduces greenhouse gas emissions across the whole economy, including the industrial sector and manufacturing, and consequently results in a general slowing of economic growth if properly implemented. (Some plans include the redistribution of the carbon fee on an equitable basis to the people affected by the fee; others redirect the proceeds to communities most hard hit by the climate crisis. Either way, the wealthiest would bear the greatest burden, as they are the biggest consumers and would consequently be footing the largest portion of the fee.) The domestic fee on carbon can be complemented by carbon border adjustment mechanisms that would place a fee on imported goods that were manufactured with cheap fossil fuels in their countries of origin. The policy has the potential for appeal across the political spectrum because it is a market-based solution that does not increase national budgets. And yet, in order to receive popular support, constituents would need to be environmentally minded and willing to see the lowering of their standards of living that will come with degrowth. The human exceptionalist creed tends not to support such attitudes.

Merz et al. (2023) contend that anthropogenic ecological overshoot, which is the result of both human population size and overconsumption, is actually attributable to a “deeper, more subversive modern crisis in human behavior” (p. 1). They call this crisis “the Human Behavioural Crisis,” a term used specifically to mean “the consequences of the innate suite of human behaviours that were once adaptive in early hominid evolution, but have now been exploited to serve the global industrial economy” (p. 6). This “innate suite of human behaviours” includes the human inclinations to seek pleasure and avoid pain, to aggregate resources, to display dominance or sex appeal, and to procrastinate when action is not immediately called for; these are the human dispositions being manipulated by marketing science. Merz et al.'s (2023) contention is that our economic system depends on ever-increasing profits to sustain itself, and it consequently exploits innate human behaviors through powerful behavioural manipulation strategies — the "brave new world" of marketing — to increase demand for unneeded products and thereby meet their profit requirements. Thus, social psychological science is being used to deliberately drive the current levels of consumption that result in ecological overshoot. While human exceptionalism is not explicitly discussed as playing a role in these dynamics, consumers' exceptionalist thinking — for example, "it doesn't matter where the things I buy come from, or where they go when I throw them out; that stuff doesn't affect me" — would appear to be relevant.

Merz et al. (2023) argue that because the bases of the environmental crisis are actually behavioural in origin, a focus on strategies such as transitioning to renewable sources of energy are not effective because they target the symptoms of the problem and not the cause. Further, such efforts are futile because humanity's ever-growing demands are not self-limiting. The goal should consequently be to change human behavior. They advocate for the use of tactics that are not different in kind from those being used successfully by the marketing industry, but to deploy these tactics to accomplish a better outcome: to "steer our collective behaviours to conform to the natural laws that bind all life on Earth" (p. 15). Such a goal might be accomplished, for example, by interventions that target social norms of consumption and bring them in line with ecological considerations. They acknowledge the ethical questions inherent in engaging in the deliberate manipulation of behaviour, but argue that the alternative is to permit current manipulative marketing practices to dominate even though they run contrary to "the science of limits to growth."

Adaptation to the Climate Crisis vs. Addressing the Causes

If we live in a uniquely human world, our fate is not necessarily bound up with that of other species. The clearest example we have of this in current times is the degree to which our response to the climate crisis involves climate "adaptation" as opposed to addressing the primary causes of the crisis. We can construct movable seawalls to protect our cities from sea level rise, condition the air of our homes and vehicles to mitigate the effects of ambient heat and wildfire smoke, drain our lakes and rivers and desalinate ocean water to supply our fields and swimming pools, construct buildings that will withstand category 5 hurricanes. In short, we can construct a fortress to protect our uniquely human world.

But here we find some evidence that the term "human" in human exceptionalism may be less than precise. Those left outside the walls of our human world include not only animals, but a significant minority — if not a majority — of other humans as well. Which humans? The less affluent, of course. So, the way in which the developed areas of the world are focusing on adapting their living spaces, individually and collectively, to counter the effects of a world whose environment is breaking down demonstrates that the exceptionalism that we're talking about might better be termed the exceptionalism of the affluent among us. This should not be surprising. In any case, if our fate as humans is independent of that of the natural world, we need not worry too much about those left to fend for themselves as we lift the drawbridge to our climate-adapted human world.

This is not to say that there are not ways to adapt to climate disruptions that benefit humans and nonhuman creatures as well. Natural approaches to climate adaptation — such as restoring wetlands, reforestation, and revitalizing other natural environments to increase their capacity to sequester atmospheric and oceanic carbon, provide buffers to sea level rise, and provide sorely needed natural habitat — can be of benefit to all. But most every dollar spent on shielding humans exclusively from the damages of climate disruption is a dollar spent in the name of human exceptionalism.

Finally, there is an insidious and unavoidable problem for humans as well when we focus on addressing the effects of climate change primarily. Focusing our resources on adapting to the changes that come with climate change, without properly addressing the source problem, is like stacking sandbags around downstream houses without fixing the hole that is rapidly undermining the dam. In the absence of a plan to address the causes — greenhouse gas emissions — the effects will just keep coming and intensifying. Adaptation may protect the current generation in the near term, but it does little for the long-term prospects of upcoming generations.

Unfortunately, the current trend in developed nations appears to be away from any large-scale effort to do more to address the fossil fuel use that is driving overshoot (Young, 2024). Following the 2024 elections in the United States the incoming administration has shown little interest in recognizing the problem, let alone taking any sort of action. Even in the longer term, the opposition party seems satisfied with what they have accomplished with the passage of the Inflation Reduction Act even though it is generally understood that this package of incentives for greening the economy will fall short of achieving the nation's goal of reducing emissions by 50% by 2030. Consequently, action to address climate change is expected to shift to the local level primarily, and to focus on adapting local communities to the floods, sea level rise, water shortages, wildfire threats, and hurricanes and other extreme weather events that are on the rise.

Even our attempts to address the causes of carbon pollution by the greening of our energy sources are becoming a losing endeavor. As we devote huge sums to the conversion to renewable sources of energy, expand mining in sensitive areas and contemplate dredging the oceans for the resources required, take vast swatches of wild habitat and agricultural land to construct solar farms, repurpose aging nuclear plants and plan a new generation of modular plants at costs unknown, the huge demand for power from AI data centers, computer chip fabrication, Bitcoin mining, and ever rising consumption are outstripping any advances that might be achieved by the contribution of green energy to the grid. Worldwide, fossil fuel use is not being replaced by renewables to any great degree. As rapidly as investment is flowing into the green energy markets, this trend does not really represent a "transition." Renewable energy is simply supplementing our primary use of fossil fuels. Greenhouse gas emissions continue to rise. With all the hype, our supply of energy is not keeping pace with demand. And the ecological costs of the transition itself are becoming astronomical. As one example, in order to achieve the climate goals set by the Paris Accord, tens of millions of miles will have to be added to the world's power grid to accommodate decentralized renewable sources of energy and to balance out their intermittent supplies — by 2040 (Merz et al. 2023). Ninety percent of the copper needed will come from open pit mines, which produce millions of tons of waste and disrupt the lives of humans and wildlife. Nevertheless, human exceptionalist thinking has it that our technological advances will save us, even as the numbers and the evidence say just the opposite.

According to Rees (2024), "the only thing worse that the failure of the energy transition would be the success of the energy transition." His thinking runs as follows. The availability of "cheap" fossil fuels over the past 200 years has allowed us to ramp up our exploitation of natural resources exponentially. For example, without diesel-powered factory trawlers, we would not be able to deplete the world's fisheries. Without cheap energy to power feller bunchers, skidders, and loaders, we would not be able to clear-cut the millions of acres of forests needed to produce single-use paper products and biomass to be converted to other types of "cheap" energy. Supplementing our energy supply with renewables constitutes "business as usual, by alternative means." The exploitation of the planet will continue, as will the problem of what to do with all the waste. Climate change is just one symptom of ecological overshoot. There are limits to growth and we will have to confront them. In the absence of any change in our thinking about the matter, one has to wonder what the attainment of the pinnacle of unlimited clean power — nuclear fusion — would mean for the planet.

Psychological Distance from Nature and Nature Connectedness

Kim et al. (2023) discuss some constructs that are related to human exceptionalism and that may be of value in efforts to temper human exceptionalist thinking and thereby open the way for more proenvironmental motivation and behavior. "Psychological distance" is the subjective distance between one's immediate, here and now experience, and things that are thought about (Liberman et al., 2007). Things thought about, or "construed," are distant from immediate experience in the sense that they are representations of things that are abstracted, and that consequently lose a degree of tangibleness and thus seem less real. Psychological distance can occur along four dimensions: temporal, spatial, social, and "hypothetical." The application of this construct in the environmental realm would more likely involve the dimensions of space and hypotheticality. For example, if a person thinks of the field, forest, or wetland as being "out there, somewhere" with few experiential memories, anticipations of direct contact, and little appreciation of the experience of immersion in those environments, they would be considered "psychologically distant" from those environments. Similarly, if a person enjoys ice fishing, the vanishing of lake ice over the past decade would tend to make global warming psychologically close, real, and not hypothetical for them. So, as applied to a person's relationship to the nonhuman, natural environment, psychological distance would affect the degree to which the person has a repertoire of experiences that make nature tangible, real, and alive versus vague and spotty.

A second psychological construct that Kim et al. (2023) offer as being of relevance to human exceptionalism is "connectedness to nature" or nature relatedness. They define this concept as "the extent to which one is aware of and values the relationship between oneself and the rest of nature" (p. 363). They argue that people who feel related to nature in a positive way are more likely to feel commonalities with the natural world that would mitigate against the exceptionalist view of being separate from nature.

Kim et al. (2023) conclude that interventions that lessen people's psychological distance from nature and ecosystems and improve their sense of connectedness to the natural world may serve as "levers" to lessen human exceptionalist thinking, and to "weaken perceived ontological boundaries between humans and nature more generally" (p. 364). They suggest that such strategies may be more successful in ameliorating human exceptionalism than by attempting to assail this mindset more directly. The advantage of this position is that it provides fruitful ground for generating hypotheses that might guide our thinking about such things as urban planning and childhood education. For example, in urban areas, does proximity to greenspace affect residents' feelings of connectedness to nature and, if so, does this influence their attitudes toward the environment and their proenvironmental behaviors?

Additional questions left open are the following. How do we account for human exceptionalist attitudes among the arguably large number of people for whom the natural world is psychologically "close," and who are well aware of their relationship with nature? We know that many who live in rural settings, and whose work takes place in natural, relatively undeveloped spaces — workers in the lumber industry, ranchers, miners — often lobby against, and vote against, proenvironmental legislation. Perhaps economic self-interest and the press to objectify and commodify nature serve to override more intimate forms of connection? Psychological closeness and feelings of connectedness with nature may be helpful, but not sufficient, conditions for overcoming exceptionalist thinking.

Finally, it would be helpful to identify ways for us to determine the extent to which we think of ourselves as exceptional, and ways to change or mitigate the impact.

Spiritual Connection with Nature

The hypothesis here is that a spiritual connection with nature will tend to increase proenvironmental thinking and behavior. There are many potential ways for people to connect with nature on a spiritual level. A person's choice of how to develop a nature-oriented spiritual practice will depend on their own sensibilities and religious or spiritual background. The following is offered as one example.

Buddhist meditation practices are directed to the undermining of the sense of a unitary, essential, personal self that is ontologically separate from the rest of the world. One such practice is zazen, sitting meditation associated with Zen Buddhism. In Buddhism generally, belief in a separate self — unique to the individual and separate from other beings — is considered a form of "ignorance" or "delusion" which, together with greed and hatred, constitute the "three poisons" — negative qualities of the mind that cause most of our problems and the problems of the world. The Zen approach emphasizes meditation as the means of seeing directly into the nature of the self, into its essential emptiness or "sunyata," and seeing through the stories that tell of a separate self (Dogen, 1997).

As Buddhist teachings have migrated from one region to another in their long history, they have tended to be adaptive with respect to the new cultures that received them. For example, when transmitted from India to China, they were affected by the sensibilities of Confucianism and Taoism, the main religions or moral codes already present in China. This strand of Buddhism tended to become less philosophical and more practical in its approach as a result. The development of "Chan" Buddhism ("Zen" in Japanese) was the outcome of this adaptation. We are presently witnessing Buddhism's transition to the Americas and Europe. One adaptation appears to be that Zen's longstanding affinity with nature is translating into a close association with the environmental movement in the West (see for example, Snyder, 1990). Zen monasteries often have a contingent devoted to environmental issues (e.g., Zen Mountain Monastery),[2] and environmental organizations sometimes have Buddhist practice groups within (e.g., Citizens' Climate Lobby).[3] David Loy (2018) has argued that Zen practitioners have something special to bring to the environmental movement, and that Zen practice can further the aspirations and resilience of environmental activists. This is a hypothesis in need of personal verification, for we know that even Zen masters are not immune

[2] Zen Mountain Monastery, Green Dragon Earth Initiative. https://zmm.org/our-programs/earth-initiative

[3] Citizens' Climate Lobby, Buddhist Action Team. https://community.citizensclimate.org/groups/home/947

to egotism and moral lapses (Thompson, 2020). But the argument has some prima facie appeal. The first precept or moral principle of Buddhism is to refrain from taking the life of another being, including animals. The ideal of Mahayana Buddhism, which includes the Zen school, is embodied in the Bodhisattva — a celestial being who seeks awakening, and whose wisdom and compassion are used to assist sentient beings and liberate them from suffering. Many environmental activists aspire to this ideal as well.

Conclusions

This review has confirmed one thing: the environmental crisis goes deeper than the climate problem, deeper than greening our sources of energy. It goes to the core of who we are. That's not a bad thing. Solutions can only come once the multiple causes of the problem have been identified. The precursors of human exceptionalism and its effect on the way we relate to the natural world appear to date back a very long way. According to Harari, the seeds were sewn millennia ago. The actual impacts of humans thinking of themselves as being unique, special, of a different kind from other creatures were quite limited until we developed the technologies that allowed us to massively ramp up our use of fossil fuels and put them to work in our factories, our means of transport, and our dwellings. The size of the human population was not a problem until we made advances in public health, in medicine, and in intensive agricultural practices made possible by fossil fuels. These advances have allowed us to circumvent the problems of disease and food scarcity that would otherwise have limited population growth. Now, with big jumps in population and in per capita consumption facilitated by cheap fossil fuels, we are faced with the consequences of human exceptionalism unleashed. We now have the choice of paying the piper by reining in growth in both consumption and population, or we can continue on a path that people in the know — climate scientists, ecologists, and ecological economists — say leads only to destruction.

The intention of this paper was to investigate the ideology that seems connected to the general complacency of a seeming majority of people in the face of the plain and compelling facts that our environment is degrading at an accelerating rate, and is in serious trouble. We have looked at two variations in how we conceptualize humanism — belief systems that tell the story of what it means to be human. We have found that one system — the human exceptionalism story — has allowed for belief in a uniquely human world that can drift away from the limits of the natural world, without consequence. However, we have seen that this uniquely human world inevitably draws its sustenance from a natural world of limited resources and of limited capacity to process waste. As we continue to operate under the illusion that technology will solve these problems, the time for finding real solutions is running short.

An alternative to this trajectory is currently viable and in many ways is already being actualized. The variation of humanism that can lead to a more positive course is one that is informed by evolutionary theory and one that recognizes our place as one species among many in the natural order. This view may not be ascendent because it may have less appeal for those who cherish the idea that humans have an "essential spark" that differentiates them from other animals and from that natural world itself. This more naturalist form of humanism can certainly acknowledge the many immense cultural accomplishments of the human species. The centerpiece achievement of this species is that it has spun tales and stories that give meaning to the world, and provide context for our artistic, scientific, religious, and philosophic endeavors. This sort of humanism is open to the natural limits of its ecological niche, a niche that encompasses the entire planet, and is willing to respect those limits even at a cost. Many people do see themselves as biological beings, through and through, and are actively working to preserve their natural home.

James, Harari, and all the researchers cited in this paper have much to offer with respect to our coming to terms with the environmental crisis and potential solutions. James tells us that humans do not change their beliefs easily, that new facts need to be integrated into our existing systems of belief and these systems are naturally prone to be conservative in integrating new information. But his contention is that all knowledge is pragmatic, that its ultimate power is its ability to serve our betterment. Given sufficient reason, our unproductive way of viewing the world can change. Harari explains that our systems of belief are not simply caldrons of facts organized along logical lines, but rather stories that interpret the facts and provide themes, explanations, and evaluations of our experiences. The main storyline that needs to be addressed if we are to avoid the worst consequences of ecological overshoot is that, while we may be exceptional, we are animals nonetheless — animals that are part of nature, not immune from environmental degradation, and that our technology will not save us. Our job as scientists, curators of the environment, and concerned citizens is to educate and advocate, to keep information flowing about what is happening to the natural world and, most importantly, the most viable solutions for addressing the causes. Changes in the environment are happening, and happening fast. The time will soon come when these changes will become all too apparent, and the thinking of the average citizen will have to accommodate the information and make the pragmatic turn in response. They will be well served, and the planet will be well served, if they are made aware of what needs to be done and how to do it.

So, here we stand at a crossroads. We can continue in the direction we have been traveling. This road is for exceptional beings, beings not entirely of this world. These travelers have the power to create their own world, one that is increasingly divorced from the natural world and one that may eventually be become independent of the natural world. This is a world without consequences because it is a fantasy world. If things start looking too dire, we can always call in the writer and demand a different ending — or so we think.

Or, we can move in a different direction. This direction is for humans who know they are a very special species, a species that has created an incredible world of their own within the matrix of the natural world. However, these humans understand that their world is tied very closely to the natural world. They understand the rule that nature has limits, and that there are consequences to violating this simple rule. The term to best describe the creed of these humans might be a "naturalistic humanism." These humans might sometimes chafe at the idea of having to live within limits, but they understand that there are consequences of doing otherwise — consequences for themselves, and consequences for the breathtaking array of creatures they share their home with. Not everyone has to be on this road for things to change. An active and involved minority who are committed to the cause can have a big impact.

References

Abbagnano, N. (1967). Humanism. In P. Edwards (Ed.), *The encyclopedia of philosophy* (vol 4, pp. 69–72). Macmillan.

Bagenstose, K. (2022, October 3). Elon Musk says "population collapse" is a bigger threat than climate change. USA Today. https://www.usatoday.com/story/news/2022/10/03/elon-musk-says-falling-population-worse-than-climate-change-it/10440026002/?gnt-cfr=1&gca-cat=p

Betz, N., and Coley, J.D. (2020). Development of conceptual flexibility in intuitive biology: Effects of environment and experience. *Frontiers in Psychology, 11,* 537–672.

Birkes, F., Colding, J., and Folke, C. (2000). Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications, 10*(5), 1251–1262.

Dogen, E. (1997). *The wholehearted way: A translation of Eihei Dogen's* Bendowa [with commentary by Kosho Uchiyama Roshi]. Tuttle Publishing.

Eberstadt, N. (2024). The age of depopulation: Surviving a world gone gray. *Foreign Affairs*, *103*(6). https://www.foreignaffairs.com/world/age-depopulation-surviving-world-gone-gray-nicholas-eberstadt

Harari, Y.N. (2015). *Sapiens: A brief history of humankind*. Harper Perennial.

Harari, Y.N. (2017). *Homo deus*. Harper Perennial.

Herrmann, P., Waxman, S.R., and Medin, D.L. (2010). Anthropocentrism is not the first step in children's reasoning about the world. *Proceedings of the National Academy of Sciences, 107*(22), 9979–9984.

James, W. (1890). *The principles of psychology*, (vol I and II). Dover Publications.

James, W. (1896). *The will to believe*. Harvard University Press.

James, W. (1904). Does consciousness exist? In *Essays in radical empiricism*. Longman Green.

James, W. (1910). *Pragmatism and the meaning of truth*. Watchmaker Publishing.

Kim, J.J.H., Betz, N., Helmuth, B., and Coley, J.D. (2023). Conceptualizing human–nature relationships: Implications of human exceptionalism thinking for sustainability and conservation. *Topics in Cognitive Science, 15*, 357–387.

Liberman, N., Trope, Y., and Stephan, E. (2007). Psychological distance. In A. W. Kruglanski and E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (second edition, pp. 353–381). Guilford Press.

Long, J.A., and Cloutier, R. (2020). The unexpected origin of fingers. *Scientific American*, *32*(6), 46–53.

Loy, D. R. (2018). *Ecodharma: Buddhist teachings for the ecological crisis.* Wisdom Publications.

Merz, J.M., Barnard, P., Rees, W.E., Smith, D., Maroni, M., Rhodes, C.J., Dederer, J.H., Bajaj, N., Joy, M.K., Wiedman, T., and Sutherland, R. (2023). World scientists' warning: The behavioral crisis driving ecological overshoot. *Science Progress*, *106*(3), 1–22.

Rees, W. (2024, December 5). Confronting overshoot: Changing the story of human exceptionalism. [Blog post]. Retrieved from https://www.populationbalance.org/podcast/williamrees-2
Schiller, F.C.S. (1902). Axioms and postulates. In (H. Sturt, Ed.), *Personal idealism: Philosophical essays by eight members of the University of Oxford* (pp. 1–47). Macmillan.
Shafto, P., and Coley, J.D. (2003). Development of categorization and reasoning in the natural world: Novices to experts, naïve similarity to ecological knowledge. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 29*(4), 641–649.
Skirbekk, V. (2022). *Decline and prosper: Changing global birth rates and the advantages of fewer children*. Palgrave Macmillan.
Snyder, G. (1990). *Practice of the wild.* Counterpoint.
Thaler, R.H., and Sustein, C.R. (2021). *Nudge: The final edition*. Penguin Books.
Thompson, E. (2020). *Why I am not a Buddhist.* Yale University Press.
Varade, M., Choi, F., Helmuth, B., and Scyphers, S. (2023). Catching versus counting: Comparing the proenvironmental attitudes, behaviors, and climate concerns of recreational fishers and citizen scientists. *Sustainability, 15,* 307.
Veit, W. (2023). *A philosophy for the science of animal consciousness.* Routledge.
Young, R. (2024, December 17). 2024 marked a year of declining interest in climate change mitigation. https://www.wbur.org/hereandnow/2024/12/17/climate-change-mitigation

Critical Notices
Book Reviews
Book Notes

The Journal of Mind and Behavior
Summer and Autumn 2024, Volume 45, Numbers 3 and 4
Pages 345–348
ISSN 0271–0137

Souzousei wa Dokokara Yatte Kuruka [*Where Does Creativity Come From*]*?* by Yukio Pegio Gunji. Tokyo, Japan: Chikumashobo, 2023, 288 pages, JPY1,034 paperback [in Japanese].

Reviewed by Osamu Kiritani, Tokyo Women's Medical University

Cognitive science uses artificial intelligence to model the human mind. In this book, Yukio Pegio Gunji, a Japanese theoretical biologist, proposes the notion of "traumatic structure" to capture human creativity. He suggests that creativity is difficult to model with AI because it comes from "the outside." According to Gunji, cognitive scientists like Boden (2004) view creativity merely as a manipulation of data, and fail to capture anything that comes from the outside. He compares the outside to what Wittgenstein (1922/1998) stated "we cannot speak of." The outside is also compared to what speculative realism (Brassier et al., 2007) posits lies outside the correlation between thinking and being. Gunji not only speaks of the outside but also proposes a notion that makes us accessible to it. The notion of traumatic structure is proposed to capture creativity that comes from the outside.

The traumatic structure is defined as a pair of binary oppositions. People with trauma often feel like perpetrators even though they are victims, which can sometimes lead to their healing. Gunji suggests that this healing experience arises through a pair of binary oppositions: feelings of victims/perpetrators and positions of selves/others. The term "traumatic structure" is named after this healing experience. He attempts to show that human creativity arises through a traumatic structure by illustrating various cases from art, literature, culture, and science. In this review, I will first cite two examples from science and then two examples from culture. (1) Before Alfred Wegener developed the theory of continental drift in the early twentieth century, the geosyncline theory dominated geology. It posits that in a seafloor depression called "syncline," sediment accumulates, and once a certain amount has built up, it is uplifted to form a mountain. The continental drift theory, which is the foundation of plate tectonics, arose through the traumatic structure of vertical/horizontal movements and uplift/drift. (2) When fish swim

Correspondence concerning this review should be addressed to Osamu Kiritani, Ph.D., Clinical and Academic Research Promotion Center, Tokyo Women's Medical University, 8-1 Kawada-cho, Shinjuku-ku, Tokyo 162-8666, Japan. Email: osamu.kiritani@gmail.com

in the ocean, their shadows appear dark when viewed from below due to sunlight coming from above the water. Therefore, if a predator is positioned deeper than they are, the fish can be easily spotted. The bioluminescent organs on the undersides of some fish emit light that matches the surrounding brightness, making it harder for them to be seen. This phenomenon is called "counter-lightning." In many cases, the bioluminescent organs of animals are used to attract or communicate with mates. The researcher who discovered this phenomenon tried to understand how glowing only downward, rather than all around, could be linked to being prominent to mates, but found that it is related to being conspicuous to predators. The concept of counter-lightning arose through the traumatic structure of glowing all around/only downward and being prominent/conspicuous. (3) Yoshihiko, one of the popular wrestlers in DDT Pro-Wrestling, is just a blow-up doll. A human wrestler attacks Yoshihiko, but at the same time, he acts as if he is being attacked by Yoshihiko. Yoshihiko arose through the traumatic structure of a serious match/play and a human/doll. (4) In an affair with a prostitute, being too demanding or too indifferent can lead to the collapse of the relationship. Such an affair arises through the traumatic structure of demands/indifference and fulfillment/collapse.

I have also experienced my idea arising through a traumatic structure. In a previous paper (Kiritani, 2012), I argued that the meaning of life is survival and reproduction. In contrast, Wittgenstein (1922/1998) suggested that there is no meaning of life, since even if we survive forever, this eternal life is as enigmatic as our present life. I have recently proposed a solution to this antinomy in the following way:

> Let us distinguish between *types* (abstract concepts) and *tokens* (individual instances). From the point of view of type, there is no meaning of life. We eat or have sex for survival or reproduction. But for what do we survive or reproduce? Life has no meaning from the viewpoint of type. However, from the point of view of token, there is a meaning of life. We survive now for our survival in the future. We reproduce for our children's reproduction. Life has a meaning from the viewpoint of token. The former is *type nihilism*, while the latter is *token realism* about the meaning of life. (Kiritani, 2024)

This solution seems to have arisen through the traumatic structure of the type/token distinction and being meaningful/meaningless. The antinomy of life being meaningful and meaningless at once has been solved by distinguishing between types and tokens.

This book is challenging, as Gunji contrasts his ideas not only with the AI modeling of creativity as mentioned above, but also with other psychological or biological theories related to creativity, such as affordance and autopoiesis. Furthermore, his ideas are compared with contemporary movements in philosophy, including postmodernism and speculative realism. Although the book is written in Japanese, Gunji presents the notion of traumatic structure and its mathematical model in English (Gunji and Nakamura, 2022).

References

Boden, M.A. (2003). *The creative mind: Myths and mechanisms* (second edition). London: Routledge.

Brassier, R., Grant, I.H., Harman, G., and Meillassoux, Q. (2007). Speculative realism. *Collapse*, *3*, 307–450.

Gunji, Y.P., and Nakamura, K. (2022). Psychological origin of quantum logic: An orthomodular lattice derived from natural-born intelligence without Hilbert space. *BioSystems*, *215–216*, 104649.

Kiritani, O. (2012). Teleology and the meaning of life. *Journal of Mind and Behavior*, *33*, 97–102.

Kiritani, O. (2024, October 16). Type nihilism, token realism: A dialogue. *Pharos*. https://warwick-pharosmagazine.wordpress.com/2024/10/16/type-nihilism-token-realism-a-dialogue/

Wittgenstein, L. (1998). *Tractatus logico-philosophicus* [C.K. Ogden, Trans.]. New York: Dover. (Original work published 1922)

The Journal of Mind and Behavior
Summer and Autumn 2024, Volume 45, Numbers 3 and 4
Pages 349–354
ISSN 0271–0137

Truth and Generosity: How Truth Makes Language Possible by Neal O. Weiner and Tina Lee Forsee. Independently published, 2023, 108 pages, $14.99 (hardback), $9.25 (paperback)

Reviewed by Mostyn Jones, Pittsburgh, Pennsylvania

Truth and Generosity is a succinct, cogent, and very clear investigation into how we make sense of language, literature, and culture. It was partly inspired by Donald Davidson's philosophy of language. The authors of *Truth and Generosity* are Neal Weiner and Tina Lee Forsee. Weiner is a Plato scholar who taught at Marlboro College for 37 years and was educated at St. Johns's College, the University of Chicago, and the University of Texas, where he obtained his Ph.D. Forsee is his collaborating author and editor, who specializes in philosophy and fiction.

Truth and Generosity is exceedingly well-written and accessible to general audiences. But it also powerfully challenges some fundamental postmodernist ideas. For example, it attacks Sapir and Whorf's relativistic claims that language compels different views of the world and different societies live in distinct worlds, "not merely the same world with different labels attached" (Sapir, 1929, p. 209). *Truth and Generosity* argues that "The very fact that we can communicate with each other and translate other languages into our own means there must be a vast body of belief we all share . . . . *Truth is the condition that makes language possible*" (p. iv).

The authors' attack on relativism begins with the principle of generosity (a greatly extended version of Davidson's principle of charity, which Weiner actually developed on his own). The point is that words are so ambiguous, and their combinations are so idiomatic, figurative, and eccentric that abundant generosity is required to interpret them. The principle of generosity thus says that to best understand people's words and outlooks, we should choose the interpretation that is most likely to be true (p. 6). Such generosity is often lacking in political discourse, where opponents willfully misconstrue each other's words.

Pursuing these topics, the authors investigate language development. They note that the demand for literal truth is characteristic of Western philosophy and

Correspondence concerning this review should be addressed to Mostyn Jones, Ph.D. at mwj412@gmail.com

science but less characteristic of poetry and Eastern philosophy, which often rely on metaphors and imagery that do not readily contradict each other (p. 16ff). Natural language is also quite metaphorical and poetic, for its word meanings largely evolve by metaphorical extensions (e.g., cool, neat, lousy, stinks, handy, catty), which makes language highly figurative in nature (pp. 18, 30f).

Continuing on the topic of language development, the authors argue that our natural language is neither a code, invention, nor convention. Natural language does resemble codes (e.g., Morse code) in that both use symbols that have little intuitive connection to what they signify. But Morse code is strictly literal in that it mechanically uses dashes, dots, etc. to represent letters, words, etc., without any ambiguity. In contrast, the closest that natural language (including in its more formal settings) comes to literal meaning is with metaphors that have become so familiar that their figurative nature is now overlooked (brilliant scholar, colossal bore). Such words thus remain quite ambiguous p. 21f).

Nor was language invented like Morse code was. Such inventions require self-conscious, systematic thought, which in turn requires speech. So, "the invention of speech is an incoherent idea" (p. 24).[1] Similarly, language is not a convention. Systematically assigning meanings to words requires abilities to not only speak, but also speak about speaking. So, language is not an elaborate invention or table of conventions. Instead, it develops by far subtler processes of evolving usage (involving figurative extensions and deviations of words such as *stinky* turning into a general pejorative). In these processes, people make sense of changing words through their shared beliefs and the principle of generosity, which urges us to understand people's words and outlooks by choosing the interpretation that is most likely to be true (pp. 23–41).

Having thus shown how the principle of generosity operates in the development of everyday language, the authors turn to the principle's philosophical implications. Again, this greatly extends Davidson's views. The general argument is that the "principle of generosity underlies all communication whatsoever and thereby guarantees the unified, public character of anything worth calling a world" (p. 42).

Their targets here are postmodernist assumptions of the 1960s that deny there is any superior account of the world. On these assumptions, conflicting accounts correspond to alternative worlds, not just the same world with different labels attached (p. 43f). This cultural relativism was tied to cultural determinism, in which different cultures and languages determine different world views.

The authors argue that this determinism is based on empirical misconceptions, such as that the Chinese must have a different conception of time from ours because their language has no tenses. In fact, the Chinese adverbs do mark time

---

[1] While Esperanto was invented, it is just an elaborate code that translates symbols into symbols.

(p. 71). The authors add that even if there were empirical evidence that grammars do fundamentally differ, this by itself does not show that cultures actually think in fundamentally different ways (p. 71f).

Moreover, these relativistic and deterministic accounts of language and thought overlook the principle of generosity. People must share a vast body of beliefs in order to understand each other (pp. 70–83.). Without these beliefs, interactions ultimately become unintelligible, and other languages and intelligences are unrecognizable. These beliefs are thus on the whole indispensable and (practically speaking) true. They involve beliefs about space, time, and material being that allow us to make sense of the world. The authors point out that all this precludes prevalent claims that truth is relative to different cultures.

Truth and Generosity is at its most eloquent and visionary in portraying the principle of generosity as a teleological principle for intelligibility in all spheres of human endeavor — akin to Plato's supreme form of the Good. The principle of generosity offers an account of what it means to make sense. It can thus serve this teleological role of binding things into an intelligible whole (p. 97).

The principle of generosity is thus an interpretive ideal — like a pragmatic Kantian regulative idea — at higher levels of literature and theorizing. The truest interpretation is the one that best fits the parts into a coherent whole (p. 90f). Here, the principle of generosity, in which things must be assumed to make sense, runs alongside the principle of sufficient reason, in which to make sense means "there is a reason for every part; every detail serves as a means to the whole. The whole serves as an end, giving meaning to the part" (p. 97).

My own ideas relate to Weiner and Forsee's intriguing ideas in three ways. The first concerns their argument against claims that truth is culturally relative.

Is Truth Culturally Relative?

Weiner and Forsee counter claim that truth is culturally relative by pointing out that cultures communicate and interact and therefore must share vast amounts of non-relative beliefs indispensable to making sense of the world. They argue that these shared foundational beliefs about the world are interpreted in terms of the principles of generosity and sufficient reason.

I would only add here that these foundational features include perceptions as well as beliefs. There is considerable experimental evidence (from Sperling, 1960 to Lamme, 2020) for foundational (brute, preattentive) levels of perception, such as the basic contours of objects. These foundational percepts must exist for us to communicate and interact. If percepts were endlessly re-interpretable, perception would collapse into dream. As in Escher prints, nowhere could we point and say that "this is real."

Of course, individuals experiencing illusions may temporarily see my outstretched hand as a writhing snake. But we can still be said to inhabit the same reality if our foundational percepts generally align. This also applies to the speculative worlds and dimensions of quantum physics. They are real insofar as there is evidence for them in our fundamental percepts. So, a shared reality arguably requires shared beliefs and percepts.

Is There Evidence that Language Determines Thought?

As noted above, Weiner and Forsee argue that there is little empirical evidence for claims that different languages determine different world views. I would elaborate on this argument a bit by adding that we can not move from observations that languages differ to conclusions that underlying thought processes differ without checking for differences in underlying thought processes independently of differences in languages. Otherwise, we simply assume what we set out to prove.

For example, the Nootka treat "the stone falls" as "it stones downward" (Sapir, 1924). Determinists see this as evidence of a fundamentally different set of categories than those articulated by Aristotle or Kant, in that the Nootka replace our category of object with the category of process. However, independent evidence of these conceptual categories is needed. For example, the Nootka may merely express in a unique way the universal propensity of human beings to conceptualize their world in terms of objects in the process of interacting. After all, objects and processes seem conceptually interdependent. For example, can we say that everything consists of vibrations without explaining what it is that vibrates?

How Do Language and Thought Affect Each Other?

Weiner and Forsee argue that language was not created by deliberate reflections, for the latter requires speech and the systematic thinking it fosters. Instead, language arose from subtle figurative extensions interpreted by shared beliefs and generosity. This sensible argument raises a question: How does the authors' argument that deliberate, reflective thought does not create language align with their argument above that language does not determine thought? I would argue that both arguments might be further enhanced by showing how they can fit together in a single theory of how thought and language affect each other.

Of relevance here are Vygotsky's (1962, 1978) arguments that thought and language are *independent* entities that *synergize* (i.e., work together to do what they can not do apart). I have elaborated upon this synergistic approach as follows (Jones, 1995a, 1995b).

To start with, Vygotsky argues that the roots of thought and language are at least partly independent of each other. Infants and non-human animals exhibit a pre-intellectual form of language and a pre-linguistic form of thought. Also, thought and language can be impaired independently of one another. Furthermore, languages are at least in part elaborate cultural artifacts that thought must struggle to internalize and struggle to express itself through. Thought is not a series of words and is in fact often difficult to put into words.

This synergistic approach confronts claims that thought determines language and that language determines thought. For example, Piaget (1967) often seems to treat language as a mere outgrowth of, and a mere vehicle for, thought. However, language transforms thought profoundly at its highest stages (e.g., during formal education). On the other hand, Whorf (1956) claims that different languages compel different kinds of thought. However, research shows that language influences different kinds of thought in different ways and degrees. Furthermore, language does not even emerge until after the early foundations of thought (including object permanence) develop, as Piaget rightly noted.

So, language need not be seen as an imprisoning cage for thought nor a passive vehicle for thought. Arguably, thoughtful language and symbolic thought emerged synergistically. To begin with, it was the growing powers of thought that allowed language to become symbolic rather than instinctual, making language more voluntary and flexible — and giving us the power to talk about anything in any way. In turn, due to language, thought was no longer immediately bound to perceptual stimuli. It was mediated by symbols and ideas. We could represent and manipulate the world internally through symbolic thought. Symbolism also reinforced thought by making it more abstract, systematic, and coordinated.

Arguably, it is this synergy of thought and language that makes humans so distinctive. Symbolism produced more organized, resourceful, and interactive minds and societies. The result was more richly meaningful, elaborately planned, and complexly channeled forms of life. Language is a unique tool, for we have turned it inward to master ourselves, our inner potentials. It makes action more reflective, voluntary, and planned. It allows us to construct complex structures of society and thought. It is the basis of the most uniquely human forms of society and thought. It leads beyond the confined world of beasts to the wide-open possibilities of civilization and reason.[2]

However, our symbolic thought is not just the source of our distinctive powers but also our distinctive limitations. We have lifted our eyes from the limited perceptual horizons of beasts and gazed out into a conceptual universe of ideas whose endless possibilities produce not just our free will but also our peculiar predicament. The human predicament is that due to our abstract symbolic thought, we lack both the sure instinctual guidance of beasts and the omniscience of God. We are left in between, in a world of eternal conflicts, intractable dilemmas, and bewildering possibilities. As Oakeshott (1962, p. 60) said, “Man sails a boundless

[2] This approach contrasts with rationalism and empiricism, which assume that all humans think basically the same way (via reasoning or associations, respectively). For in the synergy above, thought has shifted to increasingly expansive levels of organization, each with greater conceptual power and mobility, thus leading humans to greater powers for self-awareness, self-mastery, and free will.

and bottomless sea; there is neither harbour for shelter, nor floor for anchor, neither starting-place nor appointed destination."

This synergistic approach may thus help fit together Weiner and Forsee's two arguments that deliberate, reflective thought does not create language and that language does not determine thought. Recall the full argument in the former: *deliberate reflections could not have created language because these deliberate reflections require speech and the systematic thinking it fosters; instead, language arose from subtle figurative extensions interpreted by shared beliefs and generosity*. The synergistic approach might modify this slightly. While vocabulary evolves in subtle figurative ways, grammar may have required some deliberate planning, but just at prerational levels.

In this manner, the synergistic approach posits three stages. (1) Animal thought can involve clever problem-solving. But animal language relies primarily on innate links between signals and the objects referred to, while human language relies primarily on culturally formed links. (2) Human language among nomadic bands and tribal villages includes complex noun declensions, verb conjugations, and moods. Their thought is preliterate and takes poetic and mythopoeic forms (imagery) at prerational, preoperational levels. (3) Literate thought among civilized societies consists of abstract, systematic thinking (reasoning) at rational, operational levels. Language is relatively abstract and hierarchical, as in scientific and legal thinking.

In this scheme, symbolic thought and language, including grammar, arose in stage (2). So, the argument above that *deliberate, reflective* thought does not create language should perhaps be slightly modified to say that *rational* thought does not do so — yet *prerational* thought likely did do so.

References

Jones, M. (1995a). The roots of imagination. Ph.D. Dissertation, University of Manchester, Department of Philosophy.

Jones, M. (1995b). Inadequacies in current theories of imagination. *Southern Journal of Philosophy, 33*(3), 313–334.

Lamme, V. (2020). Visual functions generating conscious seeing, *Frontiers in Psychology, 11*(83), 1–10.

Oakeshott, M. (1962). *Rationalism in politics*. Liberty Fund.

Piaget, J. (1967). *The language and thought of the child*. Routledge & Kegan Paul.

Sapir, E. (1924). Grammarian and his language. *American Mercury, 1*, 149–155.

Sapir, E. (1929). The status of linguistics as a science. *Language, 5*(4), 207–214.

Sperling, G. (1960). The information available in brief visual presentations. *Psychological Monographs, 74*(11), 1–29.

Vygotsky, L. (1962). *Thought and language*. MIT Press.

Vygotsky, L. (1978). *Mind and society*. Harvard University Press.

Whorf, B. (1956). *Language, thought and reality: Selected writings of Benjamin Lee Whorf* (J. Carroll, Ed.). MIT Press.

AUTHOR INDEX VOLUME 45

A NOTE ON OUR BOOK REVIEW POLICY

All books *solicited* from publishers will be sent to selected individuals for review. JMB also accepts unsolicited reviews. Reviews should be absent of all titles except the name of the work reviewed, author of work reviewed, place of publication, publisher, date of latest publication, number of pages, and price. An example of a JMB review can be made available to serve as a stylesheet. JMB also publishes review essays traditionally called "Critical Notices": close-grained reviews of approximately 5,000 words that become genuine contributions to the secondary literature. For books in cognitive science, philosophy of mind, consciousness studies, the sociology of scientific knowledge and social philosophy, or if a potential reviewer would like to canvass the suitability of a target book, please contact Leslie Marsh, Ph.D., Department of Pathology and Laboratory Medicine, University of British Columbia Hospital, via email at leslie.marsh@ubc.ca. For all other books contact the Editor.

JMB is abstracted or indexed in: *Cultures, Langues, Textes: La Revue de Sommaires; Current Contents (Social and Behavioral Sciences); EBSCOhost; EMBASE/Excerpta Medica; International Bibliography of Book Reviews; International Bibliography of Periodical Literature; Linguistics and Language Behavior Abstracts; Physics Abstracts; ProQuest; Psychiatric Rehabilitation Journal; PsychINFO/Psychological Abstracts; Research Alert; Social Science Citation Index; Social Work Abstracts; Sociological Abstracts; The Philosopher's Index*. The Journal of Mind and Behavior website is located at www.jmb-online.com

The Journal of Mind and Behavior
Summer and Autumn 2024 Vol. 45 Nos. 3 and 4

CONTENTS