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Biological and Neuroscientific Foundations of Philosophy: Towards a New Paradigm. A Comprehensive Critical Review. Franco Fabbro (Author). Routledge · 2023

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Abstract

Franco Fabbro, a distinguished Italian neuroscientist and clinician with decades of experience in physiology, child neuropsychiatry, and clinical psychology, has undertaken an audacious project: to reorient the entire enterprise of philosophy away from its longstanding love affair with mathematics and physics and toward the living, breathing, symbol-using organism. In *Biological and Neuroscientific Foundations of Philosophy: Towards a New Paradigm* (Routledge, 2023), Fabbro argues that the dominant "physico-mathematical paradigm"—rooted in the work of Galileo, Descartes, and Newton—has exhausted its usefulness as the primary interlocutor for philosophical reflection. While not denying its immense historical and practical value, he insists that this paradigm is now insufficient for addressing the most pressing questions about mind, knowledge, language, and existence. Instead, he proposes a new foundation rooted in biology, neuroscience, and information theory—one that takes seriously the symbolic nature of DNA, the psyche, and language. This extended review offers a chapter-by-chapter analysis, identifies major theoretical contributions, assesses strengths and weaknesses, and evaluates the book's significance for contemporary philosophy and interdisciplinary research.

Key Words: Neurophilosophy; philosophy of biology; symbolic systems; DNA; information theory; evolutionary epistemology; predictive processing; Dunbar's number; digital philosophy; philosophy of the organism.

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I. Structure and Overview: A Multi-Layered Argument

The book is divided into ten chapters, framed by a substantial preface and a concluding synthesis. The progression is carefully designed to

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lead the reader from a critique of the old paradigm, through the empirical realities of life and evolution, and finally to a new ontological and epistemological framework based on symbolic systems.

Chapter Overview: Chapters 1–2 critique the physico-mathematical paradigm; Chapters 3–4 trace life and human evolution; Chapter 5 analyzes social organization; Chapters 6–7 examine information and DNA as symbolic systems; Chapters 8–9 cover the psyche and language; Chapter 10 synthesizes the argument into a new philosophical curriculum.

Chapters 1–2: The Critique of the Physico-Mathematical Paradigm

Fabbro begins by acknowledging the historical debt philosophy owes to mathematics and physics, from Plato's Academy inscription ("Let no one ignorant of geometry enter") to Kant's reliance on Newtonian mechanics. However, he argues that this paradigm has serious limitations: it dismisses secondary qualities (sensory experience) as illusory, it operates through idealized "physics in a box" abstractions that ignore the complexity of real systems, and it treats time as reversible—a stark contrast to the irreversible, existential temporality of living beings. He then reviews the foundational crises of modern physics (relativity, quantum mechanics, non-locality, the strange ontology of elementary particles) to show that even physics itself has moved away from naive realism and determinism. The message is clear: if physics cannot provide the absolute certainty it once promised, why should it remain the sole model for philosophical knowledge?

Chapters 3–4: The Tree of Life and Human Evolution

These chapters provide the biological and anthropological grounding for Fabbro's alternative. He traces life from its chemical origins (the LUCA — last universal common ancestor) through the emergence of multicellular organisms, the evolution of nervous systems, and the appearance of consciousness. He draws heavily on Gerald Edelman's theory of neuronal group selection and the idea that the brain is a "recognition system" that constructs adaptive models of the world rather than passively mirroring it. The hominid story—from *Australopithecus* to *Homo sapiens*—is presented with special attention to the role of bipedalism, brain expansion (especially the frontal lobes), and the social intelligence hypothesis (Robin Dunbar's work). Fabbro argues that the "cognitive revolution" around 80,000 years ago, marked by the explosion of symbolic artifacts, was likely driven by the invention of language—not as a gradual evolution but as a collective, almost playful invention by a sufficiently large group of children, as seen in the case of Nicaraguan Sign Language.

Chapter 5: Stages of Social Organization

This chapter may surprise readers expecting a purely "biological" focus. Fabbro insists that human consciousness and thought cannot be understood outside the specific social structures in which they develop. He analyzes the transition from hunter-gatherer bands (egalitarian, nomadic, with characteristic group sizes of ~15, ~150, and ~1500) to agricultural societies, cities, states, and empires. He draws on Lewis Mumford's concept of the "megamachine"—a hierarchical, almost mechanical organization of human labor that enabled monumental works (pyramids, the Manhattan Project) but also alienated individuals from their natural social capacities. Fabbro is sharply critical of modern mass societies and information technologies for exacerbating loneliness, inequality, and uncritical conformity. He provocatively suggests that any authentic democratic politics must respect the neurocognitive constraints of the human brain, for example by organizing society into small, self-governing units of around 5,000 people (a figure he derives from Aristotle and Dunbar).

Chapters 6–7: Information and DNA as Symbolic Systems

These chapters form the theoretical core of the new paradigm. Fabbro reviews the history of information theory (Shannon, Wiener, Bateson) and argues that information is neither matter nor energy but a relational entity that only exists for an observer capable of detecting differences. He adopts and extends Gregory Bateson's famous definition: "information is a difference that makes a difference *for someone*." Crucially, Fabbro argues that the first such "someone" was the first self-replicating macro-molecule (RNA or DNA). The genetic code is a truly symbolic system because there is an arbitrary, conventional relationship between a triplet of nucleotides (the signifier) and an amino acid (the signified). This discovery, he emphasizes, was anticipated by John von Neumann, who argued that any self-reproducing automaton must have a "symbolic code" that is physically distinct from the structure it builds.

Chapters 8–9: The Psyche and Language as Symbolic Systems

The psyche (mind) is presented as a second, nested symbolic system. Drawing on Kenneth Craik's model, Fabbro describes thought as a process of (1) translating external stimuli into internal symbols, (2) computing or simulating alternative scenarios, and (3) retranslating the results into action. He reviews evidence from predictive processing theories (Helmholtz, Friston) and from clinical neuroscience (e.g., the separation of ventral and dorsal visual pathways, the role of the hippocampus in spatial and episodic memory). Language is the third, outermost symbolic system. Fabbro follows the "instruction of imagination" theory (Daniel Dor): language did not evolve primarily for

communication but for sharing the contents of imagination. It enables the construction of an intersubjective, narrative reality. However, language also has profound limitations: it is inherently ambiguous, it seduces us into believing that its categories map directly onto the world, and it can be used for systematic self-deception. Fabbro is highly critical of the "digital philosophy" movement (Chaitin, Wolfram) that claims the universe is made of bits and that God is a programmer; he calls this a modern version of Pythagorean idealism that ignores the embodied, symbolic, and observer-dependent nature of information.

Chapter 10: Conclusions — Toward a New Philosophy

The final chapter synthesizes the argument and outlines a new philosophical curriculum based on biology, neuroscience, and symbolic systems rather than on logic and physics alone. Fabbro introduces a diagram contrasting the "naive view" (physical world → biological world → psyche → language) with his "critical view" (language → psyche → DNA → physical world). The latter recognizes that our access to reality is always mediated by symbolic systems, the outermost of which is language. He concludes by calling for a "philosophy of the organism" that takes seriously the fundamental properties of life: autonomy, the distinction between inside and outside, the maintenance of structure (survival), the irreversible arrow of time, teleonomy (goal-directedness), and the central role of information.

II. Major Theoretical Contributions

2.1 The Nested Symbolic Systems Framework. Perhaps the most innovative idea is that DNA, the psyche, and language are three instances of the same kind of phenomenon: a symbolic code that maps one set of entities (nucleotides, neural firing patterns, phonemes) onto another set (amino acids, objects and events in the world, meanings). This framework unifies domains that are usually studied in complete isolation. It also explains why knowledge is always "slippery": because the mapping is arbitrary and evolved for survival and reproduction, not for truth. Fabbro thus aligns himself with recent work in evolutionary epistemology (e.g., Donald Hoffman's "interface theory of perception") but grounds it in a more detailed biological and neuroscientific account.

2.2 The Primacy of the Observer in Information Theory. Fabbro's insistence that information requires an observer who can "make a difference" is a crucial corrective to the reductive tendency in some branches of computer science and physics. He shows that even Boltzmann's formulation of entropy implicitly depends on the observer's knowledge of possible microstates. By tracing the origin of

information back to the first self-replicating molecules, he provides a naturalistic account that avoids both Platonism (information as a transcendent substance) and eliminative materialism (information as merely physical).

2.3 A Neuroscientifically Informed Political Philosophy. The application of Dunbar's number and related findings to social and political organization is one of the most provocative and practically relevant parts of the book. Fabbro argues that the massive scale of modern states and cities violates the social capacities for which our brains evolved. He does not advocate a naive return to hunter-gatherer life, but he does insist that any realistic political reform must work *with* our neurocognitive constraints rather than against them. This echoes ideas from Murray Bookchin's "libertarian municipalism" and from the ancient Greek *polis*, but Fabbro grounds them in empirical data about neocortical size and group dynamics.

2.4 A Detailed Critique of Digital Philosophy. While many philosophers have expressed skepticism about computationalism and the "it from bit" hypothesis, Fabbro provides a particularly clear and empirically grounded critique. He points out that a computer simulation of a cow produces no milk, whereas a simulation of a mathematician can produce a genuine proof. The difference is that the mathematician is an embodied, purposive, living system embedded in a social and historical context. Digital philosophy confuses the map for the territory and the tool for the agent.

Key Insights from the Book

1. Philosophy must reorient from the physico-mathematical paradigm to a biological paradigm grounded in the properties of living organisms and symbolic systems.

2. DNA, the psyche, and language are three nested symbolic systems, each characterized by an arbitrary mapping between signifier and signified.

3. Information is not a primary substance of the universe but a relational phenomenon that arises with and because of living, observing systems.

4. The first observer in the universe was the first self-replicating molecule (RNA or DNA), capable of "reading" and "copying" information.

5. Human social organization must respect neurocognitive constraints such as Dunbar's number (~150 for effective community, ~5000 for maximal self-governance).

6. Language evolved not primarily for communication but for sharing the contents of imagination, enabling intersubjective reality.

7. Digital philosophy (the "it from bit" hypothesis) confuses simulation with agency and ignores the embodied, purposive nature of living

systems.

8. The Galilean-Cartesian paradigm's dismissal of secondary qualities and reversible time is inadequate for understanding life and consciousness.

9. Any authentic democratic politics must work with, not against, the evolved social capacities of the human brain.

10. A new philosophical curriculum should prioritize biology, neuroscience, information theory, and symbolic systems over pure logic and mathematical physics.

III. Strengths of the Book

Interdisciplinary Mastery

Fabbro moves seamlessly from molecular biology to paleoanthropology, from quantum mechanics to political theory. The book is densely referenced (the bibliography alone spans over 20 pages) and engages with primary sources in a way that is rare for a work of this breadth.

Clarity and Accessibility

Despite the complexity of the subject matter, Fabbro writes in a lucid, jargon-free style. He explains technical concepts (e.g., the genetic code, Heisenberg's uncertainty principle, predictive processing) with admirable simplicity without dumbing them down. This makes the book suitable for advanced undergraduates as well as specialists.

A Genuine Paradigm Proposal

Unlike many "neurophilosophy" works that merely add a few brain facts to standard philosophical debates, Fabbro offers a coherent, systematic alternative framework. His call to reorder the philosophical curriculum (10% physics-math, 10% biology, 10% evolution and social organization, 10% information theory, 10% neuroscience, 10% language, etc.) is specific and actionable.

Ethical and Political Relevance

The book does not shy away from the implications of its view for how we should live and organize society. Fabbro's critique of modern mass society, media propaganda, and technological alienation is timely and disturbing. He connects the dots between the biology of social bonding, the psychology of narrative, and the politics of manipulation.

IV. Weaknesses and Open Questions

The Status of Mathematics and Physics

While Fabbro convincingly shows that the physico-mathematical paradigm is insufficient as a *foundation* for all knowledge, he may go

too far in demoting these disciplines. Many aspects of the world (e.g., the orbit of planets, the structure of crystals, the dynamics of electrical circuits) are indeed described with astonishing precision by mathematics, and they do not obviously depend on living observers. A more nuanced position might hold that the *practice* of science is rooted in the lifeworld, but that some mathematical structures are "discovered" rather than "constructed."

The Problem of the Observer

Fabbro argues that the first observer was the first self-replicating molecule, which could "read" and "copy" information. But can we really attribute observer status to an RNA strand? This stretches the ordinary meaning of "observer" (which usually implies consciousness, or at least some form of agency). The risk of anthropomorphism remains.

The Argument Against Digital Philosophy

Fabbro's critique is powerful, but he may underestimate the possibility of emergent properties in sufficiently complex computational systems. Could a future artificial intelligence, embodied in a robot with sensors and actuators, develop something like a "symbolic system" that is functionally analogous to DNA and the psyche? His framework seems to leave the door open, but he does not develop it.

The Social/Political Prescription

While Fabbro's call for smaller, self-governing units is appealing, it is also extremely vague and arguably utopian. How do we get from our current globalized, digital, hyper-connected world to a federation of 5,000-person communities without violence, coercion, or technological regression? Fabbro offers no concrete transition strategy.

Missing Engagement with Non-Western Philosophies

The book is firmly rooted in the Western tradition (from Parmenides to Heidegger). Fabbro mentions the Buddha and some indigenous cultures in passing, but he does not systematically consider whether other philosophical traditions have already anticipated his "biological turn." Engaging with Daoism or Buddhism could enrich his argument.

V. Significance for Contemporary Philosophy and Science

Despite these limitations, *Biological and Neuroscientific Foundations of Philosophy* is a significant and timely work. It arrives at a moment when many philosophers and scientists are disillusioned with both the reductionist ambitions of physicalism and the obscurantism of some postmodern thought. Fabbro offers a third way: a naturalism that takes consciousness and meaning seriously because it recognizes them as evolved, symbolic, and information-based phenomena.

The book will be of particular interest to: **Philosophers of mind**

seeking an empirically grounded alternative to both dualism and eliminativism; **cognitive scientists** who want to understand the broader philosophical implications of their research; **biologists and neuroscientists** curious about how their findings can inform epistemology, ontology, and ethics; and **political theorists** open to evolutionary and neurocognitive constraints on social organization.

In the classroom, the book could serve as a core text for an advanced course in neurophilosophy or philosophy of biology, supplemented by primary readings from Edelman, Deacon, Pattee, and others. Its clear structure and summaries make it suitable for graduate seminars and motivated undergraduates.

Final Verdict

Rating: ★★★★½ (4.5/5)

A major contribution that will shape the field, albeit with some unresolved tensions. Recommended for philosophers of mind, neuroscientists, cognitive psychologists, evolutionary biologists, and political theorists.

Franco Fabbro has written an ambitious, erudite, and passionately argued manifesto for a new philosophical beginning. He successfully diagnoses the limitations of the physico-mathematical paradigm and provides a wealth of biological, neuroscientific, and anthropological data to support his alternative. The nested symbolic systems framework is a genuine theoretical contribution that promises to unify domains as diverse as molecular genetics, cognitive psychology, and linguistics. His critiques of digital philosophy and of scale-blind political theory are sharp and timely. Whether or not one accepts all of his conclusions, no serious philosopher or cognitive scientist can afford to ignore the questions he raises.

References

Fabbro, F. (2023). *Biological and Neuroscientific Foundations of Philosophy: Towards a New Paradigm*. Routledge. DOI: 10.4324/9781003360155

Bateson, G. (1972). *Steps to an Ecology of Mind*. Chandler Publishing.

Craik, K. J. W. (1943). *The Nature of Explanation*. Cambridge University Press.

Dunbar, R. I. M. (1998). *Grooming, Gossip, and the Evolution of Language*. Harvard University Press.

Edelman, G. M. (1987). *Neural Darwinism: The Theory of Neuronal Group Selection*. Basic Books.

Pattee, H. H. (2012). *Laws and Language in the Physical and Biosciences*. Springer.

von Neumann, J. (1966). *The Theory of Self-Reproducing Automata*. University of Illinois Press.