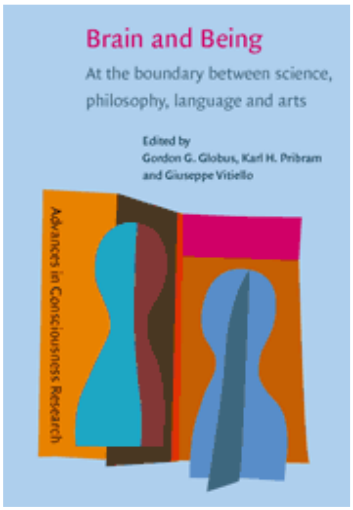
Book Review

BRAIN AND BEING

At the boundary between science, philosophy, language and arts.

Gordon Globus[1]



Eds. G. Globus, K. Pribram and G. Vitiello. Amsterdam and Philadelphia: John Benjamins. 347 pages, 2004.

This collection of papers comes out of a meeting held at the Institute for Scientific Interchange in Torino, Italy, in November 2002. The aim was to explore the possibilities for dialogue between workers in quantum brain theory and in the humanities, in particular art, philosophy and language. Although there have been attempts to reconcile the cognitive and brain sciences with the humanities, the tendency is for the humanities to be fit to the Procrustean bed of the computational brain as wet computer. The extension of the quantum revolution in physics to quantum neurophysics might open a true cooperative dynamics.

Seven of the seventeen papers are oriented toward quantum brain dynamics (QBD). Included is a reprint of the classic 1967 paper in quantum brain dynamics, "Brain and physics of many-body problems," by Luigi Ricciardi and Hiroomi Umezawa. Yasushi Takahashi and Mari Jibu provide detailed notes on the historical development of the original form of QBD.

Jibu and Kunio Yasue lucidly present a developed form of QBD in relation to quantum field theory. "The fundamental physical process of the brain … is nothing else but Quantum Electrodynamics (QED) of the electric dipole field of dipolar solitons and water molecules with a symmetry property under the dipole rotation" (267). Memory printing, recall and decay are discussed.

Giuseppe Vitiello elaborates recent developments in the dissipative quantum model of brain, which is based in Umezawa's Hermitean thermofield dynamics. Vitiello's model has dual modes, with primacy given to the vacuum state *entre-deux*. The consciousness phenomenon basically resides in the vacuum state interactions between the dual ~ and non~ modes, which must be

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Doubles that are matching time-reversed mirror-images. Vitiello also discusses a conscious artificial device, which he calls "Spartacus," that is able to exhibit mistakes in its behavior.

Gordon Globus offers a model based in nonHermitean thermofield dynamics in which the matching is an achievement rather than given. Rather than consciousness, the result of the ~conjugate match is Being. His approach is monadological. He finds a deep connection between this model and the famous Riemann Hypothesis in mathematics.

Fabrizio Desideri tackles the problem of the self-transcendence of consciousness and the problematic unity of consciousness. Consciousness is in relations both of transcendence and immanence to the brain's neural activity. He considers "the relationship between the dynamical identity of the self and the dynamical structure of the universe" (27) in terms of Vitiello's dissipative model.

Eliano Pessa also connects his discussion of quantum connectionism and the emergence of cognition to Vitiello's work. He shows that "the direct introduction of quantum-like features within neural dynamics gives rise to the occurrence of long-range correlations, like the ones characterizing the [emergent] macroscopic cognitive operation" (127, bracket added).

Georg Franck takes a phenomenological look at QBD, which in this context is about perception and recollection. The first and third person perspectives share a common viewpoint: the temporal present, Now. Discussion of mental presence and the temporal present mediates the ontological difference between phenomenal consciousness and the reality described by physics.

Three articles in the collection are related to the work of David Bohm. Rather than using quantum neurophysics to explain consciousness studies and cognitive science, Paavo Pylkkänen focuses on how intuitions derived from quantum physics bring up new or neglected aspects of the mind. There are analogies between quantum and mental processes, as when Bohm drew an analogy between non-logical, uncontrollable and unpredictable aspects of the general thinking process and quantum physics.

Basil Hiley considers the notion of "active information" which he had developed in conjunction with Bohm. Hiley wants to get at the meaning of information without relying on a semantic interpreter. Active information shapes the dynamical process, so that "the meaning in the wave is expressed through the form that develops" (207). Information coming in to the brain actively shapes the neural process rather than being neurally processed.

Maxim Stamenov takes some rather obscure but pregnant observations by Bohm about the "rheomode" as an alternative language and creatively develops a systematic account. Here the verb rather than the noun plays the primary role. The rheomode blocks the usual fragmentation of language and brings out the whole movement.

Emilio Del Giudice's contribution is holistic, too, concerned with our psycho-emotional-physical unity well recognized by Freud and his followers. Contemporary molecular biology remains unable to comprehend this unity. Del Giudice discusses how quantum field theory opens the way to an understanding of a psyche deeply rooted in the body. He emphasizes the role of coherent systems and their instantaneous interaction through phase.

Arkady Plotnitsky also brings in the Freudian unconscious to a "nonclassical theory" in which the ultimate objects are indescribable, unknowable and unthinkable. He describes a nonclassical epistemology of the mind. The unconscious mind is not an exterior reservoir outside of consciousness but instead "refers to the nonclassical dynamics that continuously involves the

reciprocal and mutually inhibiting interactions with conscousness upon which it produces certain effects" (35).

Karl Pribram observes that the same mathematical formulations apply to information measurement, thermodynamics, quantum physics and brain processes. Common to all is the Fourier relationship in which a space-time pattern is transformed into a spectral domain that is characterized by a set of waveforms that encode amplitude, frequency and phase. Brain processes unify the experiential with the physical.

Martin Fleischmann argues that the purely atomistic view is insufficient for the description of Nature, which requires collective dynamics for the analysis of seemingly individual phenomena, such as the passage of ions through pores. Collective dynamics is a precondition for building a quantum bridge between matter and mind.

Teruaki Nakagomi consistently incorporates fundamental theories of physics into a monadology whose structure consists of individual monads with consciousness and volition, internal worlds in which individual monads live, and communications between monads and correspondences among internal worlds. His monadology applies both to the basic physical level and the human level.

Nadia Prete's "Doubling the image to face the obscenity of photography" is a postmodern work which for principled reasons resists summarization. Photography duplicates objects, a doubling which Prete brilliantly interrogates.

Brain and Being illustrates both the promise and the perils of the interface between NeuroQuantology and the humanities. It can be anticipated that a cooperative dynamics will continue to develop between these fields as the 21st century progresses.

Brain and Being - Table of Content

At the boundary between science, philosophy, language and arts
Table of contents

Foreword	ix
1. Doubling image to face the obscenity of photography *Nadia **Prete***	1
2. The self-transcendence of consciousness towards its models: Consciousness as noumenal emergence. Some philosophical remarks on the Quantum Field Theory model of Giuseppe Vitiello *Fabrizio **Desideri***	23
3. The unthinkable: Nonclassical theory, the unconscious mind and the quantum brain *Arkady **Plotnitsky***	31
4. Mental presence and the temporal present *Georg **Franck***	49

5. The psycho-emotional-physical unity of living organisms as an outcome of quantum physics 71

Emilio Del ***Giudice***

6. Dual mode ontology and its application to the Riemann Hypothesis 89

Gordon G. ***Globus***

7. Quantum monadology and consciousness 113

Teruaki ***Nakagomi***

8. Quantum connectionism and the emergence of cognition 129

Eliano ***Pessa***

9. The rheomode of language of David Bohm as a way to re-construct the access to physical reality 149

Maxim I. ***Stamenov***

10. Can quantum analogies help us to understand the process of thought? 167

Paavo ***Pylkkänen***

11. Information, quantum theory and the brain 199

B.J. ***Hiley***

12. Brain and mathematics 217

Karl H. ***Pribram***

13. Searching for the biophysics of an elementary system 243

Martin ***Fleischmann***

14. Brain and physics of many-body problems 257

Luigi Maria ***Ricciardi*** *and Hiroomi* ***Umezawa***

15. Quantum Brain Dynamics and Quantum Field Theory 269

Mari ***Jibu*** *and Kunio* ***Yasue***

16. Brain and Quantum Field Theory: Notes on monumental discussions presenting Quantum Field Models of brain 293

Yasushi ***Takahashi*** *and Mari* ***Jibu***

17. The dissipative brain 317

Giuseppe ***Vitiello***

Name index

Subject index