

Mind, Matter, and Quantum Mechanics – Toward a New Conceptual Theoretical Framework *

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Roger Penrose [Fig. 1]: “It’s turning out that there is something out there which is behaving according to our expectations. And this state is not unreal.”



Anton Zeilinger [Fig. 2]: “Absolutely! I don’t want to be misunderstood being an antirealist. All I’m saying is that there is – obviously – something out there that we can perceive with our mathematical descriptions. All I want to say is, that we can in fact only make statements about our observations. And whatever we say about reality *is* a mental construction, and we have to be very cautious when we do that. Basically, we should only do it with crossed fingers.”¹

Key Words

Transdisciplinary Correlations between Academic Research Disciplines, Communication Problems, Implicit Assumptions, Conceptions of Reality, Extended Science.

Abstract

Frequently, rationally less justifiable arguments and often so called *implicit* assumptions (which are not *explicitly* clarified) regarding our conceptions of reality are perhaps an underestimated but crucial factor causing controversial discussions between the representatives of equal and different disciplines. The essay conceptualizes the separation of academic disciplines from a new theoretical viewpoint by looking at the fundamental structures of reality on the level of the roots, not the fruits. Basic assumptions and deeply rooted convictions and conceptions of reality, theories and models in quantum physics, consciousness studies and art may thereby be regarded as a cause for communication problems.

Can a wider scope of how to define the foundation of science support the concept of a necessary initiation of a movement towards a more expansive and deliberate synchronization of the separate disciplines into new synthetic combinations of knowledge? The essay speculatively concludes with some central points of how new modes of knowledge production may be envisioned. It includes a perspective on the *origin* of knowledge with a wider scope that goes beyond the conventional frameworks of scientific and artistic exploration.

The focus of this essay doesn’t lie in the reconceptualization or even attempted resolution of such puzzling and controversial questions in the history of philosophy and science like “How does the material world relate to its apparently non-material

¹ Penrose, R., Zeilinger, A.. Quotes from a panel discussion held at the 4th Swiss Biennial on Science, Technics and Aesthetics, *The Enigma of Consciousness*, Lucerne, Switzerland, January 20–21, 2001.

counterpart, that is the domain of models and theories originating from our mental realms?”, or “How is the mind and quantum theory related to reality?” etc. Though, the title of this essay “Mind, Matter, and Quantum Mechanics – Toward a New Conceptual Framework” may suggest to go *beyond* the formal discussed framework of conceptualizing material and mental properties of the world, as proposed in the writings of Henry P. Stapp.² This is however not the intention of this essay as I shall show.

As an independent scholar I am interested in *correlations* and *interrelations* between academic research disciplines and conceptual epistemological frameworks of research in a rather general way, and also from the perspective of their communication problems. I came across a speculative paper written by Harald Atmanspacher, a German physicist who is collaborating with the Swiss quantum physicist Hans Primas. Their speculations conceptualize the separation of mind and matter with a quite different approach by not simply presupposing it – an astonishingly fresh *non-dualist* conception – but by looking at *correlations* between mental and material aspects from the perspective of their origin.³ Atmanspacher and Primas take a look at the *transition* from an unseparated mind and matter domain to a separated one “as a result of a general kind of symmetry breaking, which can be described formally in terms of *inequivalent representations*”.⁴ Their approach offers an *unseparated* combination of mind and matter speculating from the perspective of the framework of physics about possible correlations between mental and material states. Atmanspacher suggestively relates the concept of the archetypal *unus mundus* of the Swiss psychologist C. G. Jung to a domain in the physical world where synchronistic events (as discussed by Jung and Pauli⁵) could be related to *nonlocal correlations* between mental and material states. I propose to conceptualize the *separation* of academic disciplines from an *analogous* theoretical viewpoint by looking at the *fundamental structures of reality* on the level of the roots, not the fruits.



[Fig. 3]. As I come from a curator’s background with a variety of experience in science and art, I also consider my approach as a kind of initiation, and a “re-formulation”, or “re-focus” of my interest to encompass the connection between physics, consciousness research, and art, and to understand it as part of a wider exploration of how science and art fit into a general cultural landscape. Clearly, I see the necessity for a similar creative and conceptual innovation, a radical new way of thinking about science and art in terms of the

² For further references to these issues see: Stapp, H. P. (1993). *Mind, Matter, and Quantum Mechanics*. Berlin Heidelberg: Springer-Verlag. Penrose, R. (1994). *Shadows of the Mind: A Search for the Missing Science of Consciousness*. New York: Oxford University Press.

³ Non-dualistic epistemological approaches are proposed by the European philosophers Silvio Ceccato, Gotthard Günther, Giselher Guttman, and Josef Mitterer.

⁴ Atmanspacher, H. (2003). Mind and matter as asymptotically disjoint, inequivalent representations with broken time-reversal symmetry. *BioSystems*. 68, pp19-30.

⁵ For references see: Meier, C.A. (1992). *Wolfgang Pauli und C.G. Jung*. 1st Edition Berlin Heidelberg New York: Springer Verlag.

interrelatedness of their codes or constituent parts. From this perspective, I consider Michael Century's proposal which focuses on a "multi-perspective framework from which to view the rising density of communication between the worlds of art, technology, and science"⁶ as supportive for my basic intentions of breaching scientific and disciplinary boundaries in the process of knowledge production.

Brian Josephson and Beverly Rubik have suggested that there is an array of artificial dualities to be overcome by a new "extended science" including those between ourselves and nature, mind and body, mind and matter, feminine and masculine, observer and observed, science and values, inductive vs. deductive logic, and philosophy and science. They emphasize that it could be important that such an "extended science" would envision "as in principle a continuum of activity ranging from science as it is currently practised to the humanities and the arts". They further write that new insights could be included that "may be gained from spiritual or religious practices. (...) to explicitly include consciousness in its many dimensions, including creativity; the use of symbol, myth, and metaphor; the role of the feminine; the historical perspective; and cross cultural aspects."⁷

I have been interested in investigating the interrelations between scientific exploration, philosophical controversy and art production. On a more abstract level I am also interested in the different conceptions of reality in quantum physics and their relation to philosophical theories, consciousness and its models and theories. From a curator's perspective, I have been specifically challenged over the past ten years by scrutinizing the potential of relating different discourses to each other. Among these discourses I have addressed the relation between quantum physics and consciousness research, and philosophy and art, for example. They have taken place in many transdisciplinary panel discussions and conversations between keynote speakers, chairpersons, and an audience which consists of academics, laymen, and students at the Swiss Biennial on Science, Technics and Aesthetics.⁸ The aim of these meetings was to invite internationally acclaimed scientists, physicists and artists to present and discuss their research topics in Lucerne on physics⁹ and art,¹⁰ and make these presentations accessible for philosophical and artistic interpretation.

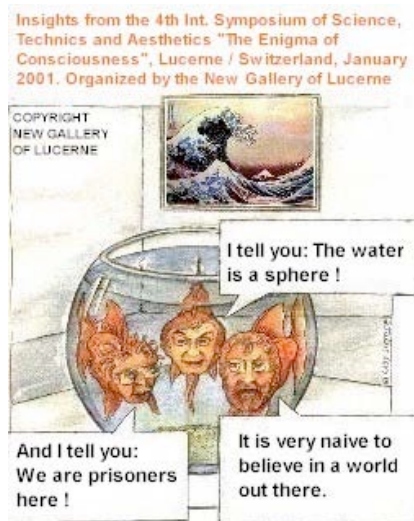
⁶ Michael Century's analysis focuses on the "apparently rising density of communication which suggests the need to begin rethinking some aspects of the relationship between cultural support policy, innovation and research policy, and the still nascent but interconnected set of concerns about the requirements for widespread creative participation in a ,techno-sphere' increasingly shaped by fast-changing digital media technologies." Century, M. (1999). *Transdisciplinary Knowledge Production and the Arts*. Studio Labs since 1960. Sussex University, and McGill University's: Graduate Program in Communication. Report. A major occupation of the author has been in the past ten years to convince research councils and cultural institutions in Switzerland of the necessity to support the Biennial on Science, Technics and Aesthetics. The Swiss Biennial's aim is to foster and enable exchange and collaboration among the faculties, and break down the conceptual and institutional barriers to transdisciplinary research.

⁷ Josephson, B., Rubik, B. (1992). *The Challenge of Consciousness Research*. Philadelphia: University of Cambridge/UK, and Temple University, Center for Frontier Sciences. p4.

⁸ For more information about the Swiss Biennial on Science, Technics and Aesthetics see: <http://www.neugal.ch>.

⁹ Physicists and their research topics included: Krauss, Lawrence: *The Physics of Star Trek* (1997); Nimtz, Günter: *Faster than Light and Space without Time* (1999); Penrose, Roger (his background is mathematics: *Quantum Theory and the Brain: Some Experimental Ideas* (2001); Zeilinger, Anton: *Is there a Role for Consciousness in a Quantum World?* (2001); Rössler, Otto E. (his background is chaos theory): *Is Physics an observer-private Phenomenon like Consciousness?* (2001); Finkelstein, David Ritz: *Space-Time and Quantum Theory* (2003); Hiley, Basil J.: *Relativity, Quantum Gravity and Space-Time Structures* (2003); Stapp, Henry P.: *Quantum Theory of the Human Person* (2003); Visser, Matt: *Do the Laws of Physics permit Wormholes for Interstellar Travel or Machines for Time Travel?* (2003); Shimony, Abner: *How deep into Philosophy has recent*

Frequently, rationally less justifiable arguments and often so called *implicit* assumptions¹¹ regarding our conceptions of reality are perhaps an underestimated but crucial factor causing controversial discussions between the representatives of equal and different disciplines. In order to make transparent what I conceive from my experiential standpoint as *implicit assumptions* which in a broader context are often labelled also as *personal convictions*, and sometimes *speculations*, I shall introduce two examples. One example comes from physics and consciousness research, and one from art. These examples are related to different conceptions and constructions of reality, and depend – this is my assumption – on a deeper level of consciousness on unpronounced beliefs, personal persuasions, fictions or subjective philosophies. Such conceptions and constructions of reality may emerge from a deeper collective intuition and intelligence.



[Fig. 4]. A possible way to visualize basic assumptions or personal convictions is the view from the metaphoric fish tank. In my example the glass wall serves as an interface between the observer and the observed. The physicist Roger Penrose and the anesthesiologist Stuart Hameroff are represented by the goldfish in the center which resembles Roger Penrose. They are often accused of being reductionists. The basic claim of their model of consciousness – also known as “Orch-OR”-model¹² –

is that consciousness arises from intracellular protein structures called microtubules. Hameroff and Penrose use for the philosophical support of their model arguments of A.N. Whitehead’s pan-experientialist approach which basically states that consciousness is a sequence of discrete events which occur in a wide field of proto-conscious experience. Such a proto-conscious field as the fundamental level of reality in space-time geometry on the Planck scale is one of Penrose’s and Hameroff’s basic assumptions.

The Austrian physicist Anton Zeilinger and the German chaos theorist Otto E.

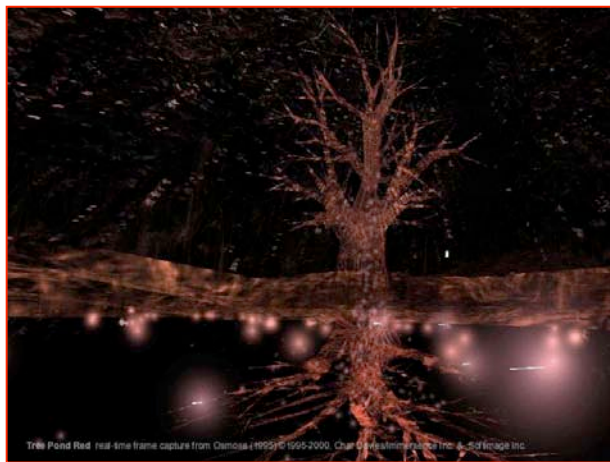
Physics taken us? (2005); Braunstein, Samuel L.: *Quantum Teleportation and the Nature of Reality* (2005); Bierman Dick J.: *Does Consciousness Collapse the Wave-Function?* (2005).

¹⁰ Artists and their research topics included: Möller, Christian: *The virtual Language of Interactive Architecture* (1995); Brümmer, Ludger: *The Special Aesthetics of Computer Music*; Stone, Allucquère Rosanne, as the leader of the panel discussions (1997); Weibel, Peter: *Digital Doubles* (1997); Keisuke, Oki: *Synchrony in the Computer Age* (1997); Lovejoy, Margot: *Transaesthetics* (1999); Sommerer, Christa: *Art as a Living System* (1999); Sermon, Paul: *Telematic Presence* (1999); Gabriel, Ulrike: *Perceptual Arena* (2001); Ascott, Roy: *Art, Technology and Consciousness* (2001), *The necessary Confluence of Art, Science, Technology, and Consciousness Research* (2005); Davies, Char: *Landscape, Earth, Body, Being, Space and Time in the Immersive Virtual Environments ,Osmoste’ and ,Ephemere’* (2003); Snow, Michael: *Time and Space as Representation* (2003); Scott, Jill: *Creative Metaphors and Transdisciplinary Approaches to Teleportation* (2005).

¹¹ Assumptions which are not *explicitly* clarified. By addressing the issue of *implicit* assumptions regarding the complex relationships between mind and matter Atmanspacher writes “One of the main reasons for its controversial nature [of material and mental aspects of the world] is understood in different ways depending on basic assumptions concerning our conceptions of reality. What makes all approaches toward this question as well as discussions about those approaches so difficult is the fact that those assumptions are often implicit rather than clarified explicitly.” Atmanspacher. *Mind and matter as asymptotically disjoint, inequivalent representations with broken time-reversal symmetry. BioSystems*. 68.

¹² In Hameroff’s and Penrose’s “Orch-OR”-model of consciousness the paradoxical characteristics of the conscious observer are replaced by an *objective physical* process called “Orchestrated Objective Reduction” or “Orch-OR”.

Rössler presented in Lucerne views diametrically opposed to the Platonic or more physical realism of Roger Penrose and Stuart Hameroff. Anton Zeilinger is represented by the goldfish on the right. Zeilinger sticks to the Copenhagen Interpretation¹³ of quantum mechanics and he claims that “whatever information could be ascribed to ‘basic units’ on the quantum level had to be subjective because it depended on the observer’s choice of measuring apparatus.” Otto E. Rössler who is represented by the goldfish on the left concluded at the Lucerne meeting in a sort of summary of his lecture that “ultimately everybody lives in her or his ,own quantum world””. He compared consciousness with a prison “from which noone will get out alive.” Ernst von Glasersfeld wrote in his conference report “These four speakers (Hameroff, Penrose, Rössler, Zeilinger) of the other seven invited speakers who were specifically concerned with the question of how much quantum mechanics could contribute to a solution of the enigma of consciousness, were with regard to epistemological position split down the middle”.¹⁴



[Fig. 5]. In the case of media artist Char Davies, personal convictions (in the sense of basic assumptions) concerning her conception of reality may be related to the antipathy for the Cartesian ideology. This antipathy has perhaps a deeper impact on her aesthetic preferences, too, and it may be against the general aesthetics that dominate both the virtual reality community and most of the computer entertainment industry.¹⁵ Char Davies claims that her interactive installation *Osmose* is about

“our subjective experience as sentient, embodied, incarnate, living beings embedded in enveloping, flowing space.”¹⁶ To create the experience of “immersion” or being in an “immersive virtual space” the artist creates a 360 degree spherically-enveloping virtual environment through the use of HMDs (head-mounted displays). Her goal is not to project artificial worlds, but to “remind people of their connection to the natural (rather than man-made) environment not only biologically, but spiritually and psychologically, as regenerative source and mythological ground.”¹⁷ The work of Char Davies is referred to as a “highly crafted construction, a product of both great technological sophistication and intensive conceptualization.”¹⁸ Margaret Wertheim describes Char Davies' virtual worlds as “not only visually unique but also

¹³ The Copenhagen Interpretation is an interpretation of quantum mechanics formulated by the Danish physicist Niels Bohr and the German physicist Werner Heisenberg while collaborating in Copenhagen around 1927. Their interpretation attempts to answer some perplexing questions which arise as a result of the wave-particle duality in quantum mechanics, such as the measurement problem. The Copenhagen interpretation is the most widely-accepted specific interpretation of quantum mechanics, followed by the Many-Worlds Interpretation. Although current trends show substantial competition from alternative interpretations, throughout much of the twentieth century the Copenhagen interpretation has had obvious majority acceptance among physicists.

¹⁴ Glasersfeld, E. v. (2001). *The Enigma of Consciousness*. Report on Lucerne Conference, 20-21 January 2001. *Journal of Consciousness Studies*. 8 (4), p79.

¹⁵ See: Wertheim, M. (1997). *Virtual Ecology*. Virtual reality shimmers on the horizon of our collective consciousness like a technological mirage..., *Yes!*, Summer, <http://www.yesmagazine.org/article.asp?ID=897>.

¹⁶ Wertheim. *Virtual Ecology*. *Yes!*, <http://www.yesmagazine.org/article.asp?ID=897>.

¹⁷ Uchtmann, R. G. (2003). *Visions of the Emerald Beyond*. 5th Lucerne Conference on Consciousness, Physics and Arts, 'Space Time and Beyond, January 18-19, 2003. *Journal of Consciousness Studies*. 10 (8), p77.

¹⁸ Wertheim. *Virtual Ecology*. *Yes!*, <http://www.yesmagazine.org/article.asp?ID=897>.

brehtaking in their technological sophistication. (...) They give you the feeling of really being immersed in ‚another reality‘.”¹⁹ Davies concludes: “On another level, my method involves circumventing the conventions of linear perspective, Cartesian space and objective realism (probably inherent to the computer as progeny of western civilization) in order to collapse a culturally-created distance between subject-viewer and the world. In this light, my research is philosophical, as it attempts to express a non-dualist worldview which envisions the human self inside the ‚natural‘ world, alive and flowing, enveloping like a womb.”²⁰ In *Osmose* the interconnected “worlds” are each identified with a simple description: the Grid, the Clearing, the Forest, the Subterranean World, and so on. Interwoven with the *forest* is leaf where one enters the space of the leaves on the forest floor; the *pond*, where the user descends into a strangely plastic pool of water; the *clearing*, where one can literally enter a tree, its lifeblood coursing through the veins in its trunk; and the *abyss*, a glowing subterranean chasm.²¹

Along these lines, there was a informal exchange of thoughts at the Swiss Biennial between Char Davies and Benny Shanon, a psychologist and cognitive scientist from Israel who studied Ayahuasca, a powerful plant-made psychotropic brew from the Amazonian region. I came to hear about it coincidentally. Both Davies and Shanon reported to me that the conversation was “extremely fruitful”.²² I assume that it did because of their shared subjective phenomenological approaches in viewing reality.

In order to envision new modes of knowledge production that may also include a perspective on the *origin* of knowledge with a wider scope that goes beyond the conventional frameworks of scientific and artistic exploration, I wish to conclude with some central points that call for a change in the ideology and methodology of contemporary science. This change should encourage further inquiries in the nature of reality, and facilitate an “interpenetration of disciplinary epistemologies”.²³ It ought to be understood as an important contributing factor to the advancement of knowledge, too. Science and art and the interrelations between scientific exploration, philosophical controversy and art production, and deeply rooted convictions and conceptions of reality, theories and models in quantum physics, consciousness studies and art may thus be bridged in a *transdisciplinary* way.

*The points include:*²⁴

- The extension in the concept of what constitutes science and the quest for knowledge. The support of the search for a more open concept of knowledge in general.

¹⁹ Ibid.

²⁰ This statement refers to the artist’s 3-D digital still images prior to her conceptualization of immersive virtual space. References: Davies, C. (1993). Char Davies. In: Leopoldseder, H. *Der PrixArs Electronica93. International Compendium of the Computer Arts, Computergraphik*. Linz: Veritas-Verlag. And Char Davies, personal e-mail to author, May 29, 2005.

²¹ Wertheim. Virtual Ecology. *Yes!*, <http://www.yesmagazine.org/article.asp?ID=897>.

²² Char Davies and Benny Shanon, personal message to author, January 19, 2003.

²³ Century, M.. Transdisciplinary Knowledge Production and the Arts. Studio Labs since 1960. Report.

²⁴ Josephson, B., Rubik, B.. The Challenge of Consciousness Research. pp2-5.

- The systemic implementation of heterogeneous, transdisciplinary, horizontal, and fluid research methodologies to stimulate new collaborative modes of inquiry.
- The recognition that all approaches to reality are value-influenced, and the address of the limitations of scientific approaches, verification, and theories.
- The awareness and recognition of the relevance of personal convictions, persuasions, and subjective assumptions as emergent property of a deeper collective intuition and intelligence.
- The acknowledgment of the important role of experience in science.²⁵
- The realization that consciousness itself consists of experience and reflection on experience. (e.g. the use of virtual reality technologies in art can push the boundaries of experience to a remarkable extreme).
- The recognition of a clear distinction between “reality” (e.g. media-made reality) and the “real” which – according to Jacques Lacan – is that what can’t be spoken, or be conceived in other semiotic ways. Or expressed more simply, it’s that realm of the mental properties, which is furthest away from the symbolic but closest to physical experience – to desire and death.
- The development of activities ranging from science as it’s practised today to the humanities and the arts including cross-cultural aspects.
- The exploration of boundaries between physics and philosophy, the physical and metaphysical studies.
- The use of language as an effective means of exploring quasi-objectively what has previously been characterised as being subjective. And the awareness that one can also easily become imprisoned in the constraints of language.
- The development of qualitative attributes of being and feeling in order to stress the importance of quality as well as quantity.
- The recognition of the anecdotal and the more tenuous aspects of nature. The development of ways of codification and utilization of such information.
- The recognition that science is not an isolated system, but a powerful force having profound influences on both society and the environment.

²⁵ The physicist Piet Hut in a conversation with the Dalai Lama speaks about “a filter that separates experience from the construction of science”. Replying to the Dalai Lama’s counter-question of what is ‘filtered out’ from the construction of science with regard to which aspects of general experience Hut answers: “ (...) Three hundred years ago, people determined that the length of an object is physics, but its touch and color is subjective. Human beings can feel the object and can see the color. But in physics we only talk about mass, length, and time. Color has not been interesting for physicists. Now we have a much more detailed understanding of matter, and we have modified the filter: now we can compute the color of materials. Our filter is getting larger and we can describe more.” Hut, P. (2004). *Science in Search of a Worldview*. In: Zajonc, A. *The New Physics and Cosmology*. New York: Oxford University Press. p196.

I hope that these points including the evidence of the two presented examples support the idea what Michael Century called “a necessary initiation of a movement towards a more expansive and deliberate synchronization of the separate disciplines into new synthetic combinations of knowledge”.²⁶ In order to initiate such a movement it certainly will be important to include a wider scope of how to define the foundation of science. A more open scope that takes us beyond the conventional foundation of science and its accepted methodology of solely *quantitative, observable* or *measurable* attributes.

I hope to encourage with this approach further inquiries in the nature of reality where art may play the role of a vital factor. It will be needed to shape the multiple aesthetic and scientific dimensions of our knowledge of the world in the future.

Lucerne, February 2005

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Illustrations

Fig. 1 Roger Penrose, Photograph, © New Gallery Lucerne, Switzerland, 2001.

Fig. 2 Anton Zeilinger, Photograph, © New Gallery Lucerne, Switzerland, 2001.

Fig. 3 Art, Physics, Consciousness Research, © New Gallery Lucerne, Switzerland, 2005.

Fig. 4 “Insights from...”, Water-color drawing by Gabriela Stettler, © New Gallery Lucerne, Switzerland, 2001.

Fig. 5 “Tree pond”, Digital frame captured in real-time through HMD during live performance of immersive virtual environment Osmose, © Char Davies, 1995.

²⁶ Century, M.. Transdisciplinary Knowledge Production and the Arts. Studio Labs since 1960. Report.