PHYSICS WITHIN NONDUAL CONSCIOUSNESS

Amit Goswami
Institute of Theoretical Science, University of Oregon, Eugene, and Institute of Noetic Sciences, Sausalito, California

Introduction

A basic problem of philosophy is to establish monism underlying all the apparent dualisms that exist around and about us. Some of these dualisms are

consciousness/matter
transcendent/immanent
conscious/unconscious
subject/object
life/nonlife
mind/brain
exteriority/interiority
subject/person

The straightforward approach, of course, is to consider all these as real dualities—this is the philosophy of dualism. However, the philosophy of dualism is not considered tenable if we take a scientific, explanatory, and verifiable approach. Take the dualism of consciousness and matter, for example. If consciousness and matter are truly dualistic, that is, made of two entirely different substances, then how do they interact? Their interaction requires a mediator. The obvious absence of a mediator speaks in favor of a monism.

According to many physicists, scientists, and philosophers, physics must be carried out on the basis of the philosophy of material or scientific realism—the philosophy that only matter is real; all else, including consciousness, is an epiphenomenon of matter. It is assumed that such an approach serves to establish monism, based on material supremacy, over dualism. But material monism is a pseudomonism. In truth, material-realistic models of consciousness are unable to explain the hard questions of consciousness such as the subject/object split nature of experience (Chalmers 1995).

Similarly, there are holistic approaches within the basic materialist ontology (Capra 1996) that try to resolve the consciousness/matter and transcendent/immanent dualisms by regarding consciousness as a holistic aspect of matter (the whole is greater than the parts), but this completely ignores the transcendent aspect of consciousness (Wilber 1996).

The philosopher Daniel Dennet (1991) agrees that materialist cognitive-science models of consciousness in the brain do succumb to an underlying dualism, the implicit idea that a homunculus is looking at the computer output that the brain

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generates. Dennet's own answer is operationalism (also called logical positivism). Consciousness is a purely operational concept; there is no substance to it and no causal efficacy, and thus no explanation is needed for the hard questions of consciousness.

Operationalism does not work because consciousness does have causal efficacy as exhibited in such phenomena as creativity, ethics, and spirituality. But how does one include a causally potent consciousness in material-realist science, in which there is only upward causation—cause rising upwards in the hierarchical structures of matter? Elementary particles and their interactions cause all phenomena of the atoms; atoms and their interactions cause all phenomena of the molecules; molecules and their interactions cause all phenomena of the neurons; neurons are responsible for all phenomena of the brain; and the brain is the causal basis for consciousness.

The physicist Henry Stapp (1995) has shown that in classical physics there are only two ways that consciousness can be treated: epiphenomenalism and dualism. But quantum physics has opened a way to introduce a causally efficacious consciousness in physics, and thus in all science (Goswami 1993; Herbert 1993; Stapp 1993; Eccles 1994). In particular, I have shown (Goswami 1989, 1990, 1993) that if quantum physics is interpreted on the basis of the primacy of consciousness as according to the philosophy of monistic idealism, then all the well-known paradoxes of quantum physics can be resolved satisfactorily.

Like material realism, the philosophy of monistic idealism is also very old. The oldest known version is probably the Indian Vedānta, but the esoteric traditions behind all great religions are based on this philosophy. In the Western academy, Plato is perhaps the most easily identified monistic idealist.

In monistic idealism, consciousness is the ground of all being and is transcendent. What we see as the immanent reality lies transcendent within consciousness until consciousness creates it by a power that Easterners call *maya* and that Plato identified as projection. The transcendent and the immanent are complementary aspects of one and the same thing; *nama* (name) and *rupa* (form) in Vedānta, yang and yin in Taoism, heaven and earth in Christianity, and the archetypes and the shadow show in the allegory of Plato's cave (Plato 1980) are some examples of such complementary pairs. This pair, along with consciousness (which transcends them both), makes up the trinity common to all the great spiritual traditions.

Thus, in the monistic-idealist philosophy of the Hindus, the subject/object split awareness that we experience is regarded as an appearance and is considered a result of *maya,* which is a discontinuous movement in consciousness for which no logical explanation can be given. Buddhists make this a little more clear via their doctrine of *patticha sammupada,* dependent co-arising of subject and object, neither of which have self-nature apart from consciousness, which is the only being. (Outside Hinduism and Buddhism and, in general, the Eastern religions, however, the cosmology—how the one consciousness, the ground of being, becomes many—takes on a variety of forms, and the unity of all traditions is far from obvious.)

Thus, in monistic idealism (of the East, at least), there is a symmetry between the

subject pole and the object pole of an experience (they both are appearances), whereas in material realism the object pole is considered real and the subject pole a mere epiphenomenon. What is more is that quantum physics supports and explicates the idealist cosmology of how immanence comes about (Goswami 1993).

The traditional literature of monistic idealism is quite emphatic about the monism behind all dualities; however, it is silent about explicitly resolving such dualities as the mind/brain duality, the life/nonlife duality, and the interiority/exteriority (of awareness) duality.

The purpose of this essay is to give elaboration when needed, and new explanations when called for, of all the dualities mentioned above, using the idealist interpretation of quantum mechanics. Note that I am not saying that all dualisms are bad or contradictions, but only that if we are to take a scientific approach, we must incorporate the dualities on a monistic basis.

Quantum Measurement Theory: Monism behind Consciousness/Matter and Subject/Object Dualities

We will begin with a review of quantum measurement theory. In quantum physics, objects are depicted as waves of possibility or superpositions of possibilities. Quantum mathematics enables us to calculate the probabilities associated with each of the possibilities of a possibility wave.

But there is no quantum mathematics for calculating the reduction of the possibility wave to a unique actuality. Thus, this collapse or reduction of the possibility wave to actuality must be regarded as a discontinuous movement of choice complementing the continuous and deterministic movement in between measurements.

The mathematician John von Neumann argued that the choosing agent has to be a nonmaterial consciousness that transcends space, time, and quantum mechanics because any so-called measurement machine, being made of submicroscopic matter waves of possibility, is itself a wave of possibility. (The job of the "measurement" apparatus is not to "measure," which it cannot do, but to amplify the submicroscopic signal into a macroscopic one, which it can.)

But here is that dualism again: can nonmaterial consciousness act on matter without an intermediary? The dualism disappears when we posit consciousness as the ground of being and matter as waves of possibility within consciousness. Notice that this agrees with our intuition that a possibility makes sense only when embedded within a consciousness that considers it. Consciousness recognizes one of the possibilities that is chosen and becomes the actual event. The paradox of Wigner's friend—*whose* choice counts when there are conflicting possibilities and more than one observer choosing?—is resolved by the monistic-idealist doctrine of one consciousness (Bass 1971; Goswami 1989; Blood 1993). There is always one consciousness choosing, and the choice of that one is free, for which no mechanism or algorithm can be given. Our individuality and predictability arises from conditioning (Goswami 1990; see also below).

Conscious/Unconscious Distinction and Subject/Object Split

When is a measurement? In quantum mechanics, all phenomena are registered phenomena, registered in the brain of an observer. Collapse of the possibility wave occurs only when there is an observer looking with awareness. In the absence of collapse—no looking or sensory perception—there is consciousness, but there is no awareness. This is called *unconscious processing* in the literature.

In conscious processing there is awareness, there is a subject/object split. Quantum measurement involving the brain, because of its "tangled hierarchical" nature, creates the subject/object split (Goswami 1993).

What is a tangled hierarchy? In a simple hierarchy of two levels, the causal efficacy lies with the lower level. But in a tangled hierarchy, such as the liar's paradox, *I am a liar,* the causal efficacy fluctuates between the two levels of hierarchy creating an infinite oscillation and thereby self-reference (for details, see Hofstadter 1980). In the brain, quantum measurement is tangled hierarchical; in the brain, the apparatus producing the quantum signal and the amplifying apparatus are of the same size (Stapp 1993), creating the tangle.

In this way, quantum-measurement theory clarifies the role of the discontinuous movement (collapse) that Easterners called *maya*. *Maya* is not explained; Easterners are right about *maya* being beyond logic. But the tangled hierarchical nature of quantum collapse explains self-reference, the subject/object split of experience.

Finally, is there any evidence that consciousness is needed to collapse the quantum waves of possibility? There is. In the experiment of Helmuth Schmidt (1993), random radioactive decay events are used to generate random number sequences that are recorded in computers and even a printout is made, except that nobody looks at the data or the printout for a time. After maybe three months, an independent observer, who has the sealed printout, chooses a direction of deviation from random numbers that he or she wants to see, and now psychics, looking at the computer output, try to influence the randomness of the radioactive decay in the chosen direction. They succeed, as verified by the printout, to an amazing degree of three standard deviations. In a control experiment, it is verified that if an observer looks thoroughly at the printout beforehand, no psychic influence on randomness is possible. The conclusion: only when consciousness looks is there a collapse of possibility into actuality.

Life/Nonlife Duality

We do not need to be anthropomorphic, however, by insisting that a human observer with a brain is needed for quantum collapse. Instead, here we have a wonderful opportunity to distinguish life from nonlife.

What is life? The biologist Humberto Maturana (1980) has correctly pointed out that what distinguishes life from nonlife is subject/object cognition—the ability of life to see itself separate from its environment. How does this ability arise? We posit that a self-referential (that is, tangled hierarchical) quantum measurement takes place in a living cell, producing the ability to distinguish itself from its environment

(Goswami 1994). This way of viewing life has led to an understanding of biological evolution (Goswami 1997) as a punctuated equilibrium (Eldredge and Gould 1972).

The Mind/Brain Problem: A New Psychophysical Parallelism

In Western psychology, no distinction is made between consciousness and mind. Moreover, the current prejudice of cognitive science is that mind is brain. In monistic-idealist psychology, however, mind and brain are recognized as two distinct bodies of consciousness (the brain is part of the physical body, of course).

Why do we need a mind separate from the brain? Computer scientists are gradually conceding (Penrose 1989, 1994; Banerji 1994) that the brain, looked upon as a computer, a symbol-processing machine, cannot process meaning. Suppose we reserve some of the symbols for processing meaning. We will then need more symbols to process the meaning of the meaning symbols, and still more symbols to process the meaning of the meaning of the meaning symbols, ad infinitum. In the more rigorous proof, this inability of the brain to process meaning is seen as an example of Goedel's incompleteness theorem.

So the mind is needed to process meaning; mind gives meaning to the symbols of the physical world as is clear in such actions as watching TV. At the physical level, the movements on the TV screen are electronic movements, but physics does not tell us about the meaning (Sperry 1980).

But if mind and brain are disparate bodies made of different substances, then the specter of dualism raises its ugly head again. What mediates the interaction of mind and brain?

In the quantum-within-consciousness model of reality, there is an answer to this dualism also. To see the answer, consider an experiment carried out by the neurophysiologist Jacobo Grinberg-Zylberbaum and his collaborators (1994). In this experiment, two subjects meditate together for twenty minutes with the intention of direct (nonlocal) communication between them, which they maintain for the rest of the duration of the experiment. Then they are separated in electromagnetically isolated chambers, and their brains are connected to individual electroencephalogram (EEG) machines. One subject is now shown a series of light flashes producing a well-known electrical response in his brain, recorded as an "evoked" potential in the EEG. Surprisingly, the partner, who does not see light flashes and who does not even know the exact time of the light flashes, also registers electrical activity in his or her brain recorded by the EEG as a "transferred" potential similar in strength and phase to the evoked potential. (Control subjects do not show any such transferred potentials.) How did such a nonlocal transfer of a specific electrical activity in the brain occur? The succinct explanation is this: consciousness collapses (nearly) identical actualities in the locally isolated but correlated brains from the possibilities available in both brains. This gives rise to the idea that consciousness can nonlocally mediate the interaction of the brain and mind, provided, like the brain, that mind also consists of quantum possibilities within consciousness.

The reader will recognize that this solution is similar to the old philosophy of

psychophysical parallelism—brain and mind function in parallel in exact correspondence. However, in the old philosophy, there is a subtle dualism: what maintains the parallelism? With the quantum collapse of correlated brain and mind, consciousness maintains the parallelism.

We now can see the full analogy with the computer. The brain gives symbols; it is the hardware. Consciousness (the programmer) uses the mind to give correlated meanings to the symbols of the brain, creating software.

Is there any evidence that mental movements of meaning are quantum movements? The telltale signs of the quantum movement are discontinuity and nonlocality. The discontinuous movement of the mind is apparent in creative acts that can be regarded as a discontinuous shift in meaning (Goswami 1998). The nonlocality of mental movement is also well known—it is called telepathy. Mental telepathy has been verified in the laboratory by many experiments (Targ and Puthoff 1977; Jahn 1982).

Exteriority and Interiority of Awareness

One of the deep puzzles of awareness is why the physical world is experienced as external and public—objective—but the mental is experienced as internal and private—subjective. The explanation lies in how the uncertainty principle plays in the mental world as opposed to the physical world.

First, let's discuss in what way the movements of the modes of the mind obey a quantum-uncertainty principle. As the physicist David Bohm (1951) pointed out, the movement of meaning is collapsed in thought in two very distinct and complementary ways that suggest the play of the uncertainty principle. When we keep track of the meaning (the feature) of every thought, we lose track of the direction (the association) of thought. And when we center on the direction of thought, we lose track of individual meanings. Thus, feature and association of thought are two complementary aspects of the movement of meaning akin to the position and velocity of material objects. For material objects, both the position and the velocity can never be ascertained simultaneously with complete accuracy—this is the uncertainty principle. Likewise, for meaning objects of the mind, both feature and association can never be ascertained simultaneously with complete accuracy. The uncertainty principle plays a big role in mind being experienced as internal.

Second, let's examine the situation with regard to how we experience the physical world. The physical, as Descartes recognized, is, *res extensa,* body with extension, and, therefore, divisible. In other words, in the physical world, microbodies make up macrobodies.

In contrast to microbodies of the physical world, for whom the uncertainty principle is a dominant influence, for the macrobodies of large mass and size the uncertainty principle becomes relatively ineffective. What this means is that the possibility waves of the macrobodies are very sluggish in their expansion in between measurements. So, what I observe of a macrobody is what you observe a little later, our observations thus forming a consensus, because in between the two observations, the quantum uncertainty of the macrobodies is very small. Another way of

seeing this is that because of the subdued action of the uncertainty principle, our observation does not affect the macrobodies in any appreciable way.

The physical world is also built in such a way that we never directly see the micro; we see the micro with the intermediary of the macro. The macroscopic measurement apparatus we use to "see" the micro amplifies the micro, giving us some kind of a reading of a macroscopic pointer. Since the pointer is macroscopic, once its possibility wave is collapsed as a result of a quantum measurement by a conscious observer, it expands rather slowly in possibility. So another observer is going to the see the pointer essentially giving the same reading, giving rise to a consensus. It is this sharability of observations giving rise to consensus that creates the illusion that the physical reality is objective, independent of the subject, that it must be external to us.

Now compare the situation with the mental world. As Descartes correctly realized, mind is indivisible, like what physicists call an infinite medium. Thoughts are meaning waves of this infinite medium.

Thus mind is indivisible; there is no micro-macro division. The advantage of this is that we can directly think thoughts, quantum as they are, very susceptible to quantum uncertainty; there is no intermediary we need to use. The disadvantage is that the possibility waves of meaning spread fast between two observations; the uncertainty principle demands that one observation (thinking) affects the thought so much that nobody else can think the same thought (unless in special situations of nonlocal correlation, as in telepathy). Therefore, thoughts are not normally shareable; we experience them as private, and therefore as internal.

The truth is, then, that both the physical and the mental worlds are internal to consciousness, but because of the different ways the two worlds are built, the physical is experienced as public and external, and the mental as private and internal.

Subject/Person Duality

Although many of us report occasionally having spontaneous experiences of a nonlocal and universal self (it is called the *ātman* in Vedānta), most often we experience ourselves as a "person," individualized and identified with a seemingly local body-mind. This raises another duality. Do we have two "I"s, one nonlocal/universal and one local/personal?

The subject of the subject/object split in the quantum measurement is universal and nonlocal and is experienced as such. I call it the quantum-self experience. Clearly, the quantum self is akin to the *ātman* of Vedānta (Goswami 1993). But how does the ego arise?

The ego arises because of our tendency to process our sensory data via the reflection in the mirror of past memory before we experience them. A part and parcel of quantum measurement in the brain is the formation of memory. If a previously experienced stimulus arrives at the brain, not only is there a primary-awareness experience connected with the direct perception of the stimulus, but also a secondary-awareness experience. This is because the brain plays back the memory, which now

acts as a secondary stimulus. However, if there are both the primary stimulus and a secondary stimulus, the quantum response of the brain is found to be conditioned more favorable to the previous response (Mitchell and Goswami 1992). Thus, with increasing reflection from the mirror of past memory, we acquire conditioning, a habit pattern, a character, that is clearly identified with a person. Apart from the personal history carried in our memories, this character is the main ingredient of our persona, our individuality.

Since the mind and brain are correlated bodies acting in parallel, the mind also acquires conditioning in this way in the process of making a software representation of the mind onto our brain. We thus acquire a mental character, a mental pattern of propensities.

Notice that the mind does not have a micro-macro division; there is no structure in the mental world: we all share the same mind. However, as we acquire a mental character, we tend to use some mental functions more than others. This gives us a functional identity that we call our individual mind. It is this individual mind that is our basic ego identity. Apart from our structural body identity, there is nothing more important to us than this individualized mind identity. We identify with our individualized mind so much that we tend to experience it as a rigid structure. This is the ego.

Notice that there is no duality in this explanation of the quantum self and the ego because both selves are clearly recognized as mere identities of one consciousness. The quantum self is an identity arising from the (false) identification with the subject pole of the subject/object split experience. The ego identity is an identity arising from identifying with the conditioned and limited functional mind.

Conclusions

I have shown that if physics, and science in general, is carried out with the primacy of consciousness, then the dualities that commonly frustrate philosophy are resolved. We cannot do this so long as we use classical Newtonian physics. But quantum physics has opened the door toward this science within a consciousness that is duality free. The conclusion, then, is straightforward. All science needs to be extended using this quantum-within-consciousness interpretation of quantum measurement. This new science-within-consciousness goes smoothly into the conventional classical, physics-based materialist science with the limit of complete conditioning. This is the correspondence principle (Goswami 1993, 1994). The existence of such a correspondence principle reassures us that we have a genuine paradigm shift in our hands.

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References

Banerji, Ranan B. 1994. *Beyond Words.* Philadelphia: St. Joseph's University.

Bass, Ludwig. 1971. "The Mind of Wigner's Friend." *Harmathena,* no. 112. Dublin: Dublin University.

Blood, Casey. 1993. *On the Relation of the Mathematics of Quantum Mechanics to the Perceived Physical Universe and Free Will.* Camden, New Jersey: Rutgers University.

Bohm, David 1951. *Quantum Mechanics.* Englewood Cliffs: Prentice-Hall.

Capra, Fritjof. 1996. *The Web of Life: A New Scientific Understanding of Living Systems.* New York: Anchor/Doubleday.

Chalmers, David J. 1995. *Toward a Theory of Consciousness.* Cambridge: MIT Press.

Dennett, Daniel C. 1991. *Consciousness Explained.* New York: Basic Books.

Eccles, John C. 1994. *How the Self Controls Its Brain.* New York: Springer-Verlag.

Eldredge, Niles, and Stephen Jay Gould. 1972. "Punctuated Equilibria: An Alternative to Phyletic Gradualism." In *Models of Paleontology,* edited by T.J.M. Schopf. San Francisco: Freeman.

Goswami, Amit. 1989. "Idealist Interpretation of Quantum Mechanics." *Physics Essays* 2 : 385–400.

———. 1990. "Consciousness in Quantum Physics and the Mind-Body Problem." *Journal of Mind and Behavior* 11 : 75–96.

———. 1993. *The Self-Aware Universe: How Consciousness Creates the Material World.* New York: Putnam/Tarcher.

———. 1994. *Science within Consciousness.* Research Report. Sausalito, California: Institute of Noetic Sciences.

———. 1997. "Consciousness and Biological Order: Toward a Quantum Theory of Life and Its Evolution." *Integrated Physiological and Behavioral Science* 32 : 75–89.

———. 1998. *Quantum Creativity.* Cresskill, New Jersey: Hampton Press.

Grinberg-Zylberbaum, Jacobs, Michael Delaflor, Leah Attie, and Amit Goswami. 1994. "Einstein-Podolsky-Rosen Paradox in the Human Brain: The Transferred Potential." *Physics Essays* 7 : 422–428.

Herbert, Nick. 1993. *Elemental Mind: Human Consciousness and the New Physics.* New York: Dutton.

Hofstadter, Douglas R. 1980. *Gödel, Escher, Bach: An Eternal Golden Braid.* New York: Basic Books.

Jahn, Robert G. 1982. "The Persistent Paradox of Psychic Phenomena: An Engineering Perspective." *Proceedings* 70 : 135–170.

Maturana, Humberto R. 1980. "Biology of Cognition." In Humberto R. Maturana and Francisco J. Varela, *Autopoiesis and Cognition: The Realization of the Living*. Dordrecht: D. Reidel.

Mitchell, Mark, and Amit Goswami. 1992. "Quantum Mechanics for Observer Systems." *Physics Essays* 5 : 526–529.

Penrose, Roger. 1989. *The Emperor's New Mind: Concerning Computers, Minds, and the Laws of Physics*. Oxford: Oxford University Press.

———. 1994. *Shadows of the Mind*. Oxford: Oxford University Press.

Plato. 1980. *The Collected Dialogs of Plato*. Edited by Edith Hamilton and Huntington Cairns. Princeton: Princeton University Press.

Schmidt, H. 1993. "Observation of a Psychokinetic Effect under Highly Controlled Conditions." *Journal of Parapsychology* 57 : 351–372.

Sperry, Roger. 1980. "Mind-Brain Interaction: Mentalism, Yes; Dualism, No." *Neuroscience* 5 : 195–200.

Stapp, Henry P. 1993. *Mind, Matter, and Quantum Mechanics*. New York: Springer-Verlag.

———. 1995. Private Communication.

Targ, Russell, and Harold E. Puthoff. 1977. *Mind-Reach: Scientists Look at Psychic Ability*. New York: Dell.

Wilber, Ken. 1996. *A Brief History of Everything*. Boston: Shambhalla.