QUANTUM THEORY, THE UNIQUE SELF, AND EVOLUTION

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ABSTRACT This article links quantum physical definitions of objectivity and reality to the Unique Self concept of enlightenment. The quantum physical description of phenomena in nature revolutionized classical physics, a framework that presupposes objectivity. One of quantum theory's central tenets is that all observations are context-bound, which implies that objectivity is merely an ideal abstraction. The Unique Self teaching transcends classical teachings of enlightenment in asserting that all experiences are qualified by an individual's unique perspective. This implies that truth is merely an individual abstraction. In the following, I relate the two theories to each other to propose that quantum theory, broadly interpreted, challenges the Unique Self to accept a Unique Obligation in sustaining the perpetually creative processes that have resulted in his or her own creation. I propose an ethics of behavior for the Unique Self that fosters creativity by upholding evolutionary variety.

KEY WORDS creativity; evolution; objectivity; quantum mechanics; Unique Self

Quantum theory is one of the most remarkable milestones in the history of science (von Weizsäcker, 1992). Preceding the development of quantum theory's mathematical formalism, it became clear that much of the behavior of matter cannot be explained if matter is considered to be constituted of tinier particles of matter, a notion basic to classical physical theory. A group of scientists in Copenhagen, Denmark, realized that contradictions in classical physical theory could not be resolved without questioning objectivity, among other things. By viewing matter as an expression of reality and not as its foundation, physical aspects of nature could be predicted and experimental outcomes explained that thoroughly stymied the possibility within the framework of classical physics. Quantum physicists soon discovered that reality is not adequately described if objects are considered to be made of tiny, but discrete bits of matter, and that an adequate description of reality necessitates formalisms for the informational exchange between interacting particles. These were seen to be transitional appearances in a continual process of exchange. Adding to this the premise that matter is not static in time and does not come to rest once an interaction has taken place, they postulated that matter is involved in a process of perpetual interaction and evolution to new forms, always following certain rules of conservation and symmetry (Heisenberg, 1969) that are, in fact, the basic "buildings blocks" of life.[1] Matter is their primary manifestation and not, as thought before, the source (von Weizsäcker, 1992).

The processual character of this new conception of reality brought with it another question: To what extent can we predict the future of such a process of informational exchange that results in the perpetual evolution of new forms? It will be seen that quantum theory answers this question with an inconclusive array of possible manifestations. The *likelihood* of a desired, particular manifestation can be predicted, but what truly manifests cannot be known. Conversely, once a new state has manifested, the contribution of each participant to the outcome can no longer be traced. In other words, the emergent properties of a new whole cannot be

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traced back to the participants. Knowing what emerged cannot inform the observer about the precise nature of its arising; knowing what arose in the course of an observation will not allow us to predict what will happen next. This indeterminism in space and time is one of the basic tenets of quantum theory.

With this indeterminism, the causal relations fundamental to most areas of scientific inquiry sacrifice their singular significance. I discuss this in greater detail below. What is important for the moment is that quantum theory is as much a theory about the limits to what can be known as it is a theory about subatomic particles. "Quantum theory is indeterminate," writes von Weizsäcker (1992). "We cannot know the incidents that would result from an interaction in advance. Our predictive ability is limited to quantifiable possibilities, specifically to contingent probabilities" (p. 333).

The symmetry and conservation laws that underlie interactions, and this indeterminism with respect to the future, are fundamental principles that have resolved paradox and explained many aspects of the observable, physical world. Common sense and the rigorous application of theory both dictate that such laws that hold for an atom must also hold for an atom in a complex system of atoms, such as humans. In the following, I interpret this to mean that the ever-evolving context of life driven by powers we are ultimately unable to predict and control implies that each being is involved in a process of continual change that simultaneously makes us a subject enacting change, and an object of the change. Following these thoughts, I suggest that each human holds a singular position in space-time and is unique, irreplaceable, and significant as a participating subject in our common evolution. This is one link to the Unique Self teachings. The inescapable context-dependence that renders any observation relative to the frame of reference of the involved observer, and its equivalence to the equally inescapable perspective of the Unique Self experiencing his own reality, is the other.

Why write about this at all, and why bother to link two such different areas of inquiry? There is a simple reason: the insights into the nature of reality yielded by quantum theory can be justified to have profound implications for our roles and practices as individuals living in the eco-biosphere we call the cosmos. In *Quantum Questions*, Ken Wilber (2001) notes that the physicists associated with quantum physics, from Einstein and Bohr to Heisenberg, realized that physics and spirituality both "were necessary for a complete and full and integral approach to reality, but neither could be reduced to, or derived from, the other" (p. ix). This is true, but I side with Sir Arthur Eddington (1939) in maintaining that "the compartments into which human thought is divided are not so water-tight that fundamental progress in one is a matter of indifference to the rest… It seems to me unreasonable to maintain that the working out of these wider implications of the new conception [quantum theory] should be left entirely to those who do not understand it" (p. 8).

I approach two areas of inquiry: the conceptual framework of modern physics, and a conceptual framework of modern spirituality, and relate one to the other. While it is clear that one cannot be derived from the other, and they are usually considered complementary domains of knowledge, I consider some wider implications of quantum theory here, and find that they support the tenets of the concept of the Unique Self. The insights to be gained from quantum physical theory do not simply confirm that there are forces active in nature not accessible to the empirical methods of science, they imply that each individual is irreplaceable and significant in further evolution, not only in materialistic terms of passing on genes, but in terms of his or her perpetual interactions with, and thus enactment of, culture and nature (Dürr, 2009, 2010). By relating the role of the Unique Self to that of the participatory observer described by quantum theory, and by arguing that the indeterminism inherent to scientific observation applies throughout every domain of inquiry, from nuclear physics to developmental psychology to climate change, I arrive at the conviction that quantum theory can be used to suggest one important normative, ethical standard for individual and collective decision-making that neither the mathematical formalisms of quantum theory nor the concept of the Unique Self alone can provide. I suggest that a broader interpretation of quantum theory challenges the Unique Self to accept an obligation in sustaining the processes that result in a being's very creation.

Restating the previous paragraph in more colloquial terms, I endeavor to show how individuals may realize their singular and perpetual involvement in a network of significant interactions by virtue of the insights gained from quantum theory. This unique participatory role in the process of evolution implies that behavior makes a difference. If the Unique Self does make a difference, the question immediately arises as to how one can make the best of this in the interest of further evolution. I use the implications of quantum theory to argue that predictions of future events to assess the value of policy or enactments are limited in their utility, and that other sources of information ought to be consulted. I suggest that the moment by moment actions undertaken by the Unique Self ought to be directed toward maintaining collective variety and individual creativity, thereby sustaining, or even widening, the information base available to further evolution.

I lay the groundwork by first describing the central tenets of the Copenhagen interpretation of quantum theory. I discuss their implications as applied to atoms and to highly complex, living systems, trying to keep the language simple.[2] Next, I summarize the Unique Self teaching as described by Marc Gafni. To relate the two concepts to each other, I look at aspects of the nature of reality. What constitutes matter? What aspects of this knowledge can be applied to the Unique Self? How does matter evolve? How do more complex systems evolve? How do we observe and measure matter, and what is the role of the observer? How do we observe and assess complex systems, and what is the role of the observer? How useful are predictions of the future based on descriptions of the past? What other sources of information exist to guide behavior when predictions based on evaluations of the past may not suffice? Can quantum theory give the Unique Self any useful information on how to fulfill its unique obligation the best?

The Copenhagen Interpretation of Quantum Theory

What constitutes matter? Early in the 20th century, foundations were laid for the formulation of a theoretical framework for a new physics called *quantum theory*. Many of the controversies surrounding the development of the formalisms of the theory were discussed at the Institute for Theoretical Physics in Copenhagen and became known as the Copenhagen interpretation (Bohr, 1960).

Developed in the 1920s, the Copenhagen interpretation overturned the traditional teachings of classical physics. Classical physics could not explain why atoms do not collapse, or why light sometimes behaves as a particle and sometimes like a wave, or why energy is exchanged in packets and not continuously. Quantum theory accounts for all of these phenomena. By also showing that the knowledge to be gained from physical observations of phenomena in time and space depends on the context in which it is gathered, the concept of objective reality upon which classical scientific knowledge rested (and mostly still rests) was radically questioned. The significance of this has barely been realized, even 90 years after its conception.

In classical physics, reality could be completely described using four dimensions: time, space, mass, and force. The description of nature within these dimensions was consistent for hundreds of years: "Nature and nature's law lay in night. God said, 'Let Newton be,' and all was light," wrote Alexander Pope in the 18th century (von Weizsäcker, 1992, p. 354), describing the universality of classical physics. The formalism was simple, and the observation of reality seemed straightforward. Complex systems could be understood by understanding their parts, and holons evolved in time in a manner that was predictable.

Much, if not most, of our present-day knowledge acquisition is structured this way. Scientific methods isolate two variables and relate them to each other (e.g., a targeted genetic mutation and crop yields; a habit, such as smoking, and lung cancer). As measurement methods were refined, however, many phenomena showed up that defied the classical description, which is always structured as a force acting on a static state, causing an evolution in time, which results in a new static state. The Nuclear Overhauser Effect, for example, which involves the transfer of spin from one polarized population of spins to another, can neither be described nor predicted using the reality dimensions of classical physics. Nor can they explain that a wave may be perceived as a particle, a tone, or a color. Heat transfer is gradual, but electrons are not excited gradually; they