SCIENCE AND TRANSFORMATION

Levels of Reality in Science and in Consciousness

It is easy to blame science and technology for the environmental problems in which we now find ourselves. We imagine that if we could just go back to nature, everything would be all right. But that is not possible. What is possible, however, is for the person using a technology to do so with a state of awareness that is appropriate to it. My training in physics and my subsequent explorations of consciousness have led me to believe that this might not only solve our problems, but also facilitate the evolution of our consciousness. The "problems" may actually be opportunities for growth!

In this article I focus on nuclear technology and quantum physics because of my experience in that area, but the point I make generalizes to all areas of science and technology.

The technological success of science has brought such change and such improvement in living conditions in the past 300 years that we have tended to accept as absolutely real the rather limited concepts and worldview on which it is based. These ideas influence our perceptions, actions, and how we give form to our experience.

Among the early Greeks, "physis," the word from which "physics" was derived, was the study of the nature of reality, the inner reality of human consciousness as well as that of external matter. But over the past 300 years changes in consciousness have lagged far behind the theoretical and technical changes. For example, we are using the powerful tools of atomic physics with a consciousness rooted in the older, mechanistic Newtonian physics.

What is the history of the relationship between scientific theory and direct personal experience, and how is this relationship evolving?

The alchemists, whose work preceded modern experimental science, acted from a union of inner and outer experience. The processes that occurred in their furnaces and crucibles and the processes that occurred in their bodies and consciousness were two aspects of the same reality. To speak of one was to speak of the other.

In the 1600's, partly in reaction to the witch hunts connected with misuses of the occult, Newtonian physics was created with its emphasis on objective measurement. Great effort was made to remove the "contamination" of subjective experience from scientific work. Scientists lost touch with the mystical aspect of their work and instead came to value the ability to predict and control the material world. Analytical and separative thinking is ideal for this pursuit and has deeply affected how most of us see reality, people as well as things. But even in Newtonian physics there is some connection to direct experience. Concepts such as tension, force, and pressure appeal to a muscular common sense, and the theoretical models are easily visualized. These theories make sense, literally! They are rooted in sensory experience.

Electromagnetic theory of the late 1800's represented a step away from direct experience. It speaks of electromagnetic waves moving through a vacuum, waves where there is nothing that is waving! For most of us this doesn't make sense, and physicists of the late 1800's made great but unsuccessful efforts to retain in the theory an ether that fills space and carries electromagnetic waves just as water carries water waves. It was hard to give up the connection with direct sensory experience.

With the quantum physics of the 1920's things got worse. Now there were no consistent models that could be visualized or connected to sensory experience in any way. All attempts at making models led to paradoxes. Quantum physics was an abstract mathematical formalism, and it worked! It gave numbers that agreed with measurement, and it predicted new phenomena that were subsequently observed. As physics students we were told that all attempts to connect quantum physics with our direct experience were irrelevant, and that we should ignore the confusion that we felt when faced with a reality that seemed unreal.

For me, this confusion was the starting point of a long journey that has led me to an understanding of the mismatch between the technology we use and the consciousness with which we use it. Noticing the parallels between the paradoxes of quantum physics and the paradoxes of Zen Buddhism, I made intellectual explorations of oriental philosophy and religion. Dissatisfied with purely intellectual explanations, I

turned to meditation and to the experiential aspects of humanistic and transpersonal psychology. For a while, the confusion only increased, but then, about 15 years after I first encountered it, one of the paradoxes of quantum physics, the wave/particle paradox, was resolved for me in a spontaneous transcendent experience. The wave/particle paradox says, "Light is a wave spread out in space. Light is point particles taking up no space at all. Both of these and neither of these all at once." During the transcendent experience I realized that the wave/particle paradox had functioned as a koan for me, as a riddle that had led me to a new state of consciousness.

This happened during the time I was participating in a sensory awareness study group. One afternoon I sat on a couch by a window reading Fritjof Capra's *Tao of Physics*. His ideas were not new to me, and it was with delight and interest that I was reading his book in its final form. I was reading the chapter entitled "Beyond Language" where he speaks of the paradoxical nature of mystical experience, of Zen koans, and of how through their lack of logic koans lead one to experience a reality that is beyond language. He compared this to the experience of the physicists who invented quantum physics:

> "Here we find a striking parallel to the paradoxical situation which confronted physicists at the beginning of atomic physics. As in Zen, the truth was hidden in paradoxes that could not be solved by logical reasoning, but had to be understood in terms of a new awareness; the awareness of atomic reality. The teacher here was, of course, nature, who like the Zen masters does not provide any statements. She just provides the riddles." — F. Capra, *The Tao of Physics*, p.49

The phrase "awareness of atomic reality" triggered in me an experience that lasted about a half hour and was accompanied by changes that were noticed by people around me who commented that I seemed to be in a transcendent state. The experience began with a sense of sudden dissolution, especially of visual forms. The initial experience is impossible to describe in words. After a moment, I was aware of patterns of energy, millions of pinpoints of light, and a confused rush of visual sensation. Soon the experience stabilized somewhat, and I became aware

of visual forms corresponding to what I now would call the furniture in the room and the sunlight on the trees outside. But everything was somehow different; there was no in-here/out-there split in my seeing!

This experience of no-separation cannot be fully described in words since words are, in their essence, distinctions and separations. It was an experience of union in which I and the world of objects did not exist separately. In this state of awareness there was no space or sense of separation between objects and my eyes. Thus I felt no need for light to exist to connect objects to eyes. Objects, eyes, and light no longer had the objective existence they had seemed to have just before. Separate self-identity and separate objects were optional ways of structuring experience rather than absolute realities. I wandered around delighted, awed, and amazed. I was aware that I had often had moments of this kind of seeing while looking through a camera. I had described it as "becoming what I photograph," even though that had then seemed crazy, impossible, and not quite accurate.

When experienced as two alternative ways of structuring awareness, rather than as qualities of something objectively real, the existence of light-as-waves and light-as-particles no longer seemed paradoxical. I realized that the wave/particle paradox had been my first koan, and that I had just solved it. The phrase "awareness of atomic reality" had pulled together my experiences in awareness work, in physics, and in photography to create a new state of awareness.

This new seeing gradually faded. I think that I was feeling overwhelmed and not ready to let go of my old worldview or of my separate identify. Since then, sometimes spontaneously and sometimes in meditation, I re-experience that seeing for short periods of time. I also find that I am more open to the possibility that things are not as they seem to be. I have learned to trust my experience of reality more than I trust what other people say about reality.

I had felt confused and had judged myself to be stupid when I first encountered the wave/particle paradox. I had accepted the orthodox physics thinking that says that quantum physics has no meaning for personal reality, that it is just a computational device, and that ques-

tions about things you can't measure are meaningless. I now look at the confusion as an opportunity for learning and growth rather than as an indication of my stupidity. The difficulties and confusion I experienced when I first studied quantum physics were not caused by quantum physics itself, but by the limited perspective I had and by my fear of letting go of this perspective. The following statements by physicist David Bohm were for me an affirmation of what I had experienced.

> "The typical reaction of a student who studies quantum mechanics is that first he doesn't understand it, and by a year or two later he says that there is nothing to understand because it is nothing but a system of computation. At the same time they've got to say, no, it isn't just that, we're discussing reality. After all, physicists would have no motive for the work they do if they didn't believe that these particles are really the building blocks of the universe. So, you see, you have to sustain this myth. It's actually not so easy. It takes several years and a lot of skill to train people to be able to do it (avoid the philosophical implications of quantum physics)."
>
> "Let's take a physicist. He's been subjected to all these courses in quantum mechanics and pressures to think in this way. He'll be approved of if he does, disapproved of if he doesn't, he gets a job if he does, not if he doesn't, and so on, and so on. The minute the idea occurs of thinking in another way, there will be intense pressure which will blot it out." -- D. Bohm, "The Enfolding-Unfolding Universe," *ReVision*, vol. 1, #3/4, Summer/Fall 1978, pp. 31 & 36

The wave particle "koan" experience was for me the seed of a new understanding of the relationship between physics and direct experience. Science, which often seems to be an attempt to explain and use nature, is at its deepest level a search for meaning, not just intellectual understanding, but a direct knowing of reality. The strong desire for theories that make sense is an expression of this. There are, however, two aspects of making sense: 1) being sensory, and 2) having meaning or connection with direct experience. It is possible to give up the first without giving up the second. Physicists have generally assumed that human experience of the world must be sensory and that human consciousness follows the mechanistic laws of Newtonian physics. By denying, or simply being ignorant of, levels of reality and states of consciousness that go beyond

sensory experience, physicists assume that it is necessary to give up the possibility of any direct experience of the reality that the mathematical theories of modern physics describe. All that is really necessary is giving up the requirement that this experience be in the ordinary sensory modes.

The transcendent experience that was facilitated by the wave/particle "koan" showed me that direct experience of the world of quantum physics is indeed possible, that quantum physics does have meaning. The confusion and paradoxes that emerge when one attempts to relate quantum physics to sensory experience resolve when the reality described by quantum physics is experienced directly. From that state of consciousness statements such as, "In quantum physics we cannot take ourselves out of the picture," "The observer has become the participator," and "There is no absolute truth out there." become descriptions of one's direct experience, not just descriptions of a physics theory.

We all have direct experience of the world of Newtonian physics. It makes sense to us, literally. And, as I have described, direct experience of the world of quantum physics is also possible. It was probably experienced by the inventors of quantum physics, and it is similar to meditative and mystical experiences described in many traditions. Also from experiences of my own and from accounts of other people's experiences it seems likely that it is also possible to experience directly the worlds of relativity theory, of electromagnetism, and of other parts of physics, and that many psychic and healing phenomena that appear extraordinary on our usual Newtonian, sensory reality are actually quite ordinary in these other realities.

I do not mean to imply that consciousness can in any way be explained by physics. Rather, I am simply saying that the correlation between the external world described by physics and the various kinds of direct experience of reality, the different levels of consciousness points to an interconnection between consciousness and matter. Neither one causes or explains the other. Both are aspects of the unnameable underlying unity that has been given many names including Tao, The One, God, and Self.

But why is it that the new physics which clearly has a potential for giving us a less separative view of reality, has instead been used mostly in very separative ways, e.g. building bombs, tearing up the land to mine uranium, and polluting the world with nuclear wastes? Why is there a mismatch between our technological development and the growth of our consciousness, our experience of reality? And what can be done to correct this imbalance?

One reason for the mismatch lies in the difficulty of translating quantum physics from mathematics into ordinary language. The people who design nuclear technology are engineers. Most of them make no pretense of having a deep philosophical understanding of physics. Only recently have a few people written non-technical books about quantum physics. Thus, only physicists had even the possibility of realizing that quantum physics has implications for consciousness. But because of their training in Newtonian physics, most physicists are not particularly open to experiencing these implications. Direct experience of the realms described by quantum physics is not easily available to people whose awareness has been limited by a Newtonian concept of reality (refer back to the second part of the Bohm quote above).

Another reason is that there seems to be a high priority in humans for our inner and outer realities to be congruent, to match and to support each other. And since most of us, including engineers and physicists, assume that human experience of the world must be sensory, there is great psychological pressure to try to reduce quantum physics to the level of the kind of experience we allow ourselves, the sensory, separative, Newtonian level.

Physicists studying quantum physics are faced with the choice of either 1) making paradoxical descriptions of the world of quantum physics in an attempt to have it make sense, to be sensory, or 2) declaring that quantum physics has no connection with direct experience. In scientific training the latter choice is stressed. At the time of learning quantum physics each physicist experiences the confusion mentioned earlier. It is a confusion that is not just intellectual; it involves the whole

of one's being and challenges one's sensory, separative, Newtonian self-image and worldview. Then most physicists make the choice to suppress the confusion and disregard the conflict.

So we have produced several generations of scientists and engineers who are technically proficient in the use of nuclear technology and who have been taught to separate it from their inner personal experience, usually by denying or numbing awareness of the inner. This ensures the separative, insensitive, inhumane use of nuclear technology.

When we realize that it is the assumption of separation between ourselves and what we observe that is the root of this misuse, we can recognize the necessity of dealing with nuclear energy from the appropriate state of consciousness, from a directly experienced awareness of the interconnectedness of everything, of union with the universe. From this state of awareness nuclear bombs and nuclear pollution are unthinkable; one would experience them as suicide, as bombing and polluting one's self. This is a solution to the problem through transcendence or dissolution of it. The problem is no longer a problem because of a shift to a more expanded awareness, rather than because of a "fix-it" solution created on the same level of awareness in which the problem was stated. If in some way nuclear weapons were dismantled without this shift in awareness, our troubles would not be over, for the attachment to the separative consciousness would only emerge in another, perhaps worse, manifestation.

It is important to remember that it is not separative consciousness itself that is the problem here, but our clinging to it and use of it in inappropriate situations. Separative thinking and Newtonian mechanics are perfectly marvelous tools for mechanical situations, but not for the use of nuclear energy. (In fact, in the unitive state one does not even consider "using" something. There is nothing separate to be used!)

The unitive state of awareness is necessary not only for people who work with nuclear energy and technology, but also for the "anti-nuclear" people. Much anti-nuclear sentiment is just as separative and destructive as the force it opposes. The increasing use of non-violence training among anti-nuclear people is an encouraging step toward the recognition of this.

I will conclude with what might seem to be an amazing statement: I have not met anyone, not even a physicist and certainly not myself, who understands quantum physics with his or her whole being, with body, mind, and spirit. Some understand it functionally; they can put it to use to create new technology. Some understand it intellectually; they can use it to make predictions in particle physics. Some understand it philosophically; they can see parallels with oriental philosophies and religions as well as with many varieties of mysticism. Some people understand it intuitively; it seems to be an appropriate metaphor for experiences they have had in meditation. But I know no one for whom it is a living reality, for whom it makes sense at all levels of their being. Quantum physics may be a riddle that the universe has given us as a teacher. We are still learning its solution!

We are in a situation where we will either experience large scale evolution to planetary, unitive awareness or not survive. Every scientist who has studied quantum physics has been given a koan, a seed that if allowed to sprout could result in great unfolding and growth in awareness. The concepts of modern quantum physics are particularly powerful for us because they touch us deep within our existing scientific belief system rather than overlaying it with a set of beliefs from another culture.

The nuclear crisis is both a problem and an opportunity. Just as in many mythologies the demons guard a treasure, there is within the nuclear problem a jewel, a seed of transformation. The kind of action on the nuclear crisis that at this point seems appropriate is work on transforming consciousness, coupled with continued technological, political, social, ecological, and educational work done by people who know and experience unitive consciousness.

While this article has focused on quantum physics and the related nuclear technology, I feel sure that other areas of science and their related technologies also have within them similar seeds of transformation that will sprout and grow when we approach them with a willingness to learn and to be changed.