Book Catalog Excerpt from The Dancing Wu Li Masters

Foreword

When Gary Zukav announced his plans for this book, creating the outline with Al Huang and me watching at a dinner table at Esalen, 1976, I did not realize the magnitude of the job he took on with such joy. Watching the book grow has been instructive and rewarding, because Zukav has insisted on going through the whole evolution of the quantum relativistic physics of today, treating it as it is, an unfolding story. As a result this book is not only readable, but it also puts the reader in touch with all the various ways that physicists have worked out for talking about what is so hard to talk about. In short, Gary Zukav has written a very good book for laymen.

Zukav's attitude to physics is rather close to mine, so I must be a layman too, and it is more stimulating to talk physics with him than with most professionals. He knows that physics is, among other things, an attempt to harmonize with a much greater entity than ourselves, requiring us to seek, formulate and eradicate first one and then another of our most cherished prejudices and oldest habits of thought, in a never-ending quest for the unattainable.

Zukav has graciously offered me this place to add my own emphases to his narrative. Since it has been three years since we met, I must sift my memory for a while.

Migrating whales come to mind first. I remember us standing on the Esalen cliffs and watching them cavort as they headed south. Next comes to mind beautiful Monarch butterflies, dotting the fields from the first day, and covering one magic tree as thick as leaves in a grand finale. Between the whales and the butterflies it was difficult for us to feel self-important and very easy for us to play.

The very difficulty of communicating with the physicists at Esalen helped me to realize how differently most physicists think about quantum mechanics than I do. Not that my way is new, it is one of two ways already pointed out in john Von Neumann's 1932 book, The Mathematical Foundation of Quantum mechanics:

1. Quantum mechanics deals with propositions defined by processes of preparation and observation involving subject and object and obeying a new logic; not with objective properties of the object alone.

2. Quantum mechanics deals with objective properties of; the object alone, obeying the old logic, but they jump in a random way when an observation is made.

Most working physicists seem to see one of these ways (the second) and not the other. Perhaps personality can determine the direction of science. I think there are "thing" minds and "people" minds. Good parents, psychologists and writers have to be "people" people, while mechanics, engineers and physicists tend to be "thing" people. Physics has become too scary for such physicists because it is already so thingless. New evolutions, as profound as those of Einstein and Heisenberg, are waiting for a new generation of more daring and integrated thinkers.

While most physicists take for granted the quantum tools of their daily work, there is a vanguard already testing roads to the next physics, and a rearguard still conscientiously holding the road back to the old. Bell's theorem is mainly important to the latter, and its prominence in the book does not mean it uncovers problems in present-day quantum physics. Rather Bell's theorem drives toward a view that most physicists already assume: that quantum mechanics is something new and different.

Here it helps to distinguish between a complete theory, predicting everything, what Newtonians look for (it does not seem that Newton was a strict Newtonian, since he wanted God to reset the world clock now and then) and a maximal theory, predicting as much as possible, what quantum physicists look for. In spite of their controversy, Einstein and Bohr both agreed, in their different ways, that quantum mechanics is incomplete, and even that it is not yet maximal. What they really debated was whether or not an incomplete theory can be maximal. Throughout their famous controversy Einstein argued, "Alas, our theory is too poor for experience," and Bohr replied, "No, no! Experience is too rich for our theory"; just as some existential philosophers despair at the indeterminacy of life and the existence of choices, and others feel elan vital.

One of the features of quantum mechanics that leads to such controversy is its concern with the nonexistent, the potential. There is some of this in all language, or words could only be used once, but quantum mechanics is more involved with probabilities than classical mechanics. Some people feel this discredits quantum theory, makes it less than maximal theory. So it is important to mention in defense of quantum theory that in spite of indeterminacy, quantum mechanics can be entirely expressed in yes-or-no terms about individual experiments, just like classical mechanics, and that probabilities can be derived as a law of large numbers and need not be postulated. I prefer to state the difference between classical and quantum theories not as presented in textbooks, but thus: Once sufficient data is given, classical mechanics gives yes-or-no answers for all further questions while quantum mechanics simply leaves unanswered some questions in the theory, to be answered by experience. I wish here also to note the regrettable tendency, in myself also, to feel that quantum mechanics must thereby deny physical existence to those answers that are found in experience only, not in the theory, such as the momentum of a localized electron. So involved are we in our symbol systems.

After a week of talking, the conference was still working on the elements of quantum logic, and never did get far into the new quantum time concepts we wanted to try out, but it made it easier to move on to the next set of problems, which occupy me today. Quantum mechanics is characterized by its unanswered questions. Some logicians, Martin Davis for one, have suggested these may be related to the undecidable propositions dominating]logic since Godel. I used to know better. Nowadays I think they may be right, the common element being reflexivity and the impossibility for finite systems of total self-knowledge. The proper study of mankind is endless, it seems. I hope these ideas work out and Gary Zukav writes a book about them. He does it well.

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New York
July 1978

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9/12/96