

**Keynote Address by Henry P. Stapp**

**International Symposium on:**

**“Cultural Diversity and Transversal Values:  
East-West Dialog on Spiritual-Secular Dynamics”**

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**Session on:**

**“Toward a New Synthesis of Transversal Values”**

**Topic:**

**“The concept of the Human Being, East and West”**

**Title:**

**“Science’s Conception of Human Beings as a Basis for Moral Theory.”**

My talk has three related parts. The first is about

## **Human Freedom**

“in the great drama of existence we ourselves are both *actors* and spectators.”

Niels Bohr proclaimed this several times, and it was re-iterated by Werner Heisenberg.

This assertion might seem neither profound nor surprising. For even a *mechanical robot* that both moves, and also senses light signals, *is both actor and spectator*.

However, Bohr’s meaning is both profound and surprising. It refers to what is, from a philosophical standpoint, *the most radical innovation* wrought by the replacement of classical mechanics by quantum mechanics. It concerns an important *change in the role of the human being as “actor”* that goes far beyond anything that classical mechanics can allow.

The huge disparity between classical mechanics and quantum mechanics is connected to the fact that classical dynamics is specified by *one single physical process*, whereas quantum dynamics involves *four different processes*. These four processes impact in different ways upon a human being. To understand the nature and role of human beings in a world governed by quantum laws one must understand the nature of these four processes.

John von Neumann, in his rigorous formulation of quantum mechanics, gave the names “Process 1” and “Process 2” to two of these four processes.

“Process 2” is the analog in quantum mechanics of the *single dynamical process* of classical mechanics. Like its classical counterpart, “Process 2” is *continuous*, and *strictly deterministic*. However, “Process 2” incorporates the famous *Heisenberg uncertainties*. Consequently, it generates, in the brain of each person, a physical state that corresponds *not* to one single stream of consciousness, but to a continuous “smear” of possible streams of consciousness.

The central problem in quantum theory is therefore this: How is this *continuous smear of possible* streams of consciousness reduced to the one that a person actually experiences?

Orthodox quantum theory achieves this reduction by introducing *three other kinds of processes*.

The first other kind of process is called by von Neumann a “Process 1” intervention. The Process 1 interventions are *probing actions*, and they are described in purely physical terms.

However, and this is the key point, orthodox quantum theory gives *neither a physical cause, nor a statistical probability*, for a Process 1 intervention to occur.

According to Bohr and Heisenberg, and in actual scientific practice, the choice of which probing action actually occurs, and when it occurs, is specified by a “*free choice on the part of the experimenter*”. I call this “*free choice on the part of the experimenter*” by the name “Process 4”.

Finally, there is the process that Dirac calls “a choice on the part of *nature*”. It is a selection of *some particular outcome* of the freely chosen Process 1 probing action. This act of choosing is called “Process 3”; and it is a *random* choice.

This brings us to the main point!

The two adjectives “random” and “free” are highly significant. A *random* choice is a choice that is constrained by *statistical* conditions. This entry of *randomness* into quantum mechanics has been extensively discussed by physicists and philosophers.

But the word *free* signifies something altogether different. Within the mathematical machinery of orthodox quantum theory the choice of which Process 1 probing action will actually occur is constrained by *no conditions whatever, statistical or otherwise*.

Moreover, this choice is treated *in actual scientific practice* as a *conscious choice on the part of a human being*, the famous “*free choice on the part of the experimenter*”.

*Thus in orthodox theory these “Process 4” choices---of which probing action will actually occur---are free in the double sense that they are not specified by the physically described aspects of the situation, but are specified, in actual scientific practice, by “a free choice on the part of the experimenter.”*

It is, of course, conceivable that these Process 4 choices will eventually be explained in purely physical terms. However, any such explanation must go substantially beyond the presently understood deterministic physical Process 2.

On the other hand, there is no hint or suggestion, within orthodox quantum mechanics that a purely physical explanation of Process 4 is possible, and there is no rational reason why such a reversion to nineteenth century concepts is demanded or warranted.

*Conclusion: A major advance in physics has presented us with a science-based conception of nature in which our physical actions are influenced by our thoughts, feelings, and reasons, in ways not ultimately controlled by mindless mechanical processes. This shattering of the shackles of nineteenth century physics opens the way to the construction of science-based ethical theories of a kind incompatible with the mechanistic conception of nature that dominated science from the time of Isaac Newton until the dawn of the twentieth century.*

I turn next to Part 2, which is about

### **Quantum Wholeness and Spiritual-Secular Dynamics**

In 1935 Albert Einstein, together with two young colleagues, Boris Podolsky and Nathan Rosen, published a paper that focused attention on a paradoxical feature of quantum theory. The theory appears to require this: *What is experienced by one person must depend, in certain situations, upon what a faraway and seemingly disconnected person freely decides to do.* An intense scrutiny of this puzzling situation by physicists has made clear the fact that the structure of quantum mechanics is profoundly compatible with the idea that the Process 4 choices can be consistently regarded as *free* choices. But this element of freedom entails a deep level of interconnectedness of the conscious experiences of persons situated in far-apart regions.

This non-local connectedness has been endlessly discussed by physicists and philosophers of science and is known to be strictly incompatible with any ordinary ---that is, classical-type---idea of how the world operates.

The subtle connectivity---revealed by these purely secular scientific studies---between the experiences associated with physically separated persons seems to demand the existence of a reality that can provide the needed connections. But these connections go far beyond anything that classical materialism can accommodate. What seems to be called for is a pervading immaterial global reality that is informed by our thoughts, and that can subtly act back upon far-away other persons.

This general idea of a global immaterial---say spiritual---presence is probably the core intuitive idea of all religions, both east and west. *But then purely secular studies of certain paradoxical features of empirical phenomena have led to conclusions about the nature of reality that, on the one hand, seem incompatible with the materialist conception of nature, and, on the other hand, are suggestive of the existence of a pervading “spiritual” presence of the kind that lies at the heart of all religions.*

I can now turn to Part 3, which rests on the conclusions from Parts 1 and 2:

### **Rational Science-Based Moral Theory**

Deterministic materialism is inhospitable to rational moral theory.

In the first place, a materialist striving to maintain high moral standards is placed in the irrational position of acting as if his conscious choices can make a difference in the course of physical events, while believing that they cannot possibly do so, because he believes that the entire course of physical events is mechanically fixed at the birth of the universe.

In the second place, any belief in one's own intrinsic deep connectedness to the community of human beings, and to nature herself---which might provide a basis for values extending beyond one's own bodily and psychological self---must be dismissed as a delusion by the rational classical materialist.

But rationality and respect for science does not entail accepting local deterministic materialism, or even materialism with only random interventions. For orthodox contemporary physics includes not only *deterministic* features, and *random* features, but also causally efficacious human *free* choices. Moreover, it yields a conception nature that must accommodate certain subtle *immaterial connections* between various physically disconnected parts.

This conception of nature, and of our place within it, arises from the *orthodox* interpretation of quantum mechanics. There are other interpretations, but the orthodox interpretation is the one that is directly supported by empirical evidence, and the one that all others must in the end sustain, insofar as its predictions continue to be validated in the ever-more-refined conditions under which they are being tested.

This orthodox-science-based conception of human beings as *actors* that are *free* to act efficaciously upon the physical world, and that are linked together by an immaterial presence, is in line with the inner core of all religions, and it buttresses, from a secular perspective, the communal values that religions spawn. But the valued community includes all human beings, not merely co-religionists.

Acceptance of this science-based conception of nature, and of ourselves, allows the construction of a moral theory that captures the positive aspects of religious ethical teaching while evading both the negativities directed at non-co-religionists, and the destitution of mechanistic materialism. The sense of *separateness*, *isolation*, and *powerlessness* that issues from the nineteenth century image of man as automaton is replaced by a conception of physically efficacious creative human selves imbedded in an encompassing community endeavor and adventure. This conception of nature, and of ourselves, provides a rational foundation for exercising our mind-based freedom of action in accord with values that give weight to the good of the whole.