Theories of Psi

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When a belief is widely held in the face of overwhelming evidence to the contrary, we call it a superstition By that criterion, the most egregious superstition of modern times, perhaps of all time, is the "scientific" belief in the non-existence of psi. Dean Radin's excellent new book "The Conscious Universe" is the best debunking of this superstition to date. If you really take in the parade of facts he presents, you will never again be a happy believer in the official mythology. Those of us who have already said goodbye to this form of happiness may be tempted to renew our hopes that research into the so-called paranormal may at last become respectable. I'm not holding my breath, though. Here's what William James wrote in 1909:

> Not long after Darwin's 'Origin of Species' appeared I was studying with that excellent anatomist and man, Jeffries Wyman, at Harvard. He was a convert, yet so far a half-hesitating one, to Darwin's views; but I heard him make a remark that applies well to the subject I now write about. When, he said, a theory gets propounded over and over again, coming up afresh after each time orthodox criticism has buried it, and each time seeming solider and harder to abolish, you may be sure there is truth in it. Owen and Lamark and Chambers had been triumphantly dispatched and buried, but there was Darwin making the very same heresy seem only more plausible. How often has "Science" killed off all spook philosophy, and laid ghosts and raps and "telepathy" away underground as so much popular delusion? Yet never before were these things offered us so voluminously and never in such authentic-seeming shape or with such good credentials. The tide seems steadily to be rising, in spite of all the expedients of scientific orthodoxy.

Why was James' optimism about the "rising tide" so wrong? The key wrong word in his over-confident statement is "theory".

Those who think of parapsychology as something modern will be surprised to learn that the first society for the scientific study of psi was formed in the 18th Century by a philosopher of the enlightenment named Maimonades (not to be confused with Moses Maimonades, who lived in the Middle Ages). His society collected data for 15 years, but finally dissolved itself with the statement that, although their data had fully convinced them of the reality of the phenomena they were investigating, collecting more data was pointless, since nothing resembling a theory was anywhere on the horizon.

Unfortunately, I don't see that very much has changed since this announcement. Most of the so-called theories today seem, if anything, worse than the turn-of–the century speculations of first-rate minds like William James and Frederick Meyers. The problem is not that we lack a solution to some well-defined puzzle. The real problem is that science, as we know it, doesn't provide us with a *context* in which the puzzling data of psi make any kind of theoretical sense at all.

It has been truly said that today's science is based on 300-year-old philosophy, and today's philosophy is based on 300-year-old science. This creates an odd situation, since both science and philosophy have moved into a vastly larger world than anything that could have been imagined in the year 1700, and yet both are still trying to translate their new discoveries into the belief system of that more parochial age. The situation is much like that in the 16th century, when the blossoming spirit of the scientific age still had to express itself in the language of Medieval scholasticism.

What new conceptual system will take the place of today's scholasticism? What new language will give us the words we need for our new thoughts? All I have to say now is that this new system, whatever else it does, must make room for the following three ideas:

1) Casualty is a special case of a more fundamental explanatory principle that is unchanged by reversing past and future.

2) Logical words like AND and OR are relative, like left and right or up and down [see author's postscript].

3) The polarity of *subject* and *object* pervades all of nature.

Are these the hottest items off the Web page of the Delphic Oracle? No, they are actually some rather old technical findings of ordinary physics, translated into English. This says something about the "new" language, and of how assiduously we have avoided it. Let's look at these three findings in a bit more detail:

First, cause and effect. Note that these are perfectly good working words in everyday life, where they point to the possibilities for using certain events as means to others, and otherwise present no mysteries. [see von Wright ref]. However, the word "causality" has also been applied by philosophers to all kinds of other things, including Newtonian determinism. Remember, Newtonian determinism says that if we are given the exact position and velocity of every particle at some particular time, we can calculate these for all future times (and also for all past times, which is sometimes overlooked. Newton's laws are in fact symmetrical in past and future.) Never mind that this is already stretching the meaning of casualty pretty far – what I want to point out here is that Newtonian determinism was given a more natural a-casual statement in the 18th century as the so-called principle of least action, which says that objects move from their initial positions to their final positions along paths that minimize a certain quantity called action. Note that in this formulation the states of the world no longer include velocities, and that motion is now determined only when we specify both the first state and the last state of a system.

It turns out that we can translate this least action principle into a law that applies to random rather than mechanical processes, where least action now turns into least *improbability*. The resulting mathematical formalism does in fact transform common-sense causality into a new and more general explanatory principle – for one thing, it allows cause-and-effect to go backward in time. The math here was discovered in the 1960's by Helmudt Schmidt, and independently a bit earlier by myself. It was this math that suggested Schmidt's experiments in backwards PK, whereas I eventually turned it into the Link Theory interpretation of quantum mechanics.

It should be noted that the need to go beyond causality in thinking about psi has been recognized by many people, notably Jung and Pauli, and was the subject of a book by Arthur Koestler (ref.).

The relativity of AND and OR was discovered by von Neumann in the late 1920's in connection with his profound and definitive work in the foundations of quantum mechanics. The uncertainty principle says that you can't measure both position and momentum. The classical explanation for this is that measuring either one disturbs the other. What von Neumann discovered is that the real reason you can't say "position x AND momentum y" is that AND has a different meaning for the observer of x than it does for the observer of y, just as left and right have different meanings for observers facing in different directions [see author's postscript].

A principle of relativity always raises the question of what is not relative, i.e., what is invariant under change of viewpoint. Von Neumann, in the 1930's, tried to answer that question for AND and OR. I don't know how to explain it, but in so trying, the most brilliant mathematician of our century made a stupid mistake: he simply piled all of the viewpoints into one heap and said "*There*, that *heap* is what is invariant." His heap was billed as a brave new invention called quantum logic. Not surprisingly it was a complete flop, and has given logic a bad name in physics ever since. Fortunately, a better notion of invariance under relativized AND is now available, and has been presented in this Journal[1].

Finally, a very brief look at subject and object. That these concepts pervade physics is hardly news, since subjective change, i.e., change of viewpoint, is the key concept in all theories of relativity. In the middle of the late century, the mathematician Hamilton made the surprising discovery that subjective and objective change are indistinguishable in Newtonian mechanics. To put it an other way, it is impossible to ever tell whether you are keeping a fixed viewpoint on a changing object, or you are changing your viewpoint on a fixed object. Hamilton's principle has come down into quantum mechanics intact, where it has leads to a number of useful mathematical techniques.

Another way to state Hamilton's principle is that you are free to change your viewpoint back and forth between that which sees all change as objective and that which sees all change as subjective. But what if this "metachange" of viewpoint were itself within the domain of Hamilton's principle? Then it would have to have its objective

counterpart. That is to say, it would be indistinguishable from a change in some two-state objective variable. In quantum terms, this would mean that there is a two-state quantum entity which is the "carrier" of the subject-object distinction. This particle, which has been called the *Janus particle*, would belong to all quantum objects, but its state would have to be unobservable, since if we could observe it, Hamilton's principle itself would break down. It so happens that the existence of particle with precisely these features is mathematically equivalent to a certain basic feature of quantum mechanics that has not been explained in any other way, namely the fact that probability amplitudes are complex numbers [ref.]. If this is really the right explanation, then the subject-object polarity is a fundamental aspect of the structure of matter.

Link Theory has shown how to view quantum mechanics as a large-number phenomenon within a universe subject to much more general laws. We can easily imagine the breaking of "Janus symmetry" in this larger universe, which would allow matter not only to contain the polarity of subject and object, but to contain actual subjects and objects! This would be the beginning of a real theory of mind. Such a theory would completely heal the Cartesian split between mind and matter, thereby presenting us with a myriad of hitherto undreamed of possibilities for mind-matter interaction. At this point, we would probably be ready to start on a real theory of psi.

References

[unavailable]

Is AND really relative?

Author's postscript, Jan. 2002

I no longer think that the relativity of logical AND is the right way to explain why we can't simultaneously measure complementary quantities like position and momentum. Although quantum complementarity does in fact present us with a deep new principle of relativity, and it is right to locate that principle in what is usually called logic, some recent work has produced a much better logical analysis that doesn't involve changing the rules for AND. Here is a brief sketch of this new approach, which, though still in its early stages, looks much more promising than older approaches such as Boolean Geometry[1].

Logic, as currently taught, has three levels.

Level 1 is the science of pure predication and proof. One of the great achievements of modern times is to have put this science into a form whose principles are as self-evident as 2+2 = 4. This happened in the latter part of the Nineteenth Century, and the people responsible, or at least those whose names we know, had modest aims, mostly having to do with fixing the serious bugs in the Aristotelian logic still taught in

the schools of their time. What emerged, however, was a totally new branch of mathematics. This has come to be called the *predicate calculus*, and it has nailed down once and for all what is meant by logical proof. In essence, the predicate calculus is the grammar of the words AND, OR, NOT, SOME and ALL. What makes it so important is how deeply these rules are embedded in all of human thought. If you believe they are wrong, and you want to convince the rest of us to change them, you had better have awfully good reasons, for to do so would be like convincing us that 2+2 = 5.

The second level goes beyond those rules that govern predication *in general* to introduce a *particular* predicate, the *equality* predicate x=y. The axioms for equality are normally presented as belonging to logic, and Quine[2] has argued very cogently that this is proper. Even if we agree with him, though, we must be clear that the equality axioms are *independent* of the axioms of "pure" logic at level 1. Level 2 thus has room for changes that don't bear on the rules for AND.

The third level, and here I am referring to what is found in most logic textbooks, is *set theory*. Quine[3] argues, and again very cogently, that set theory does *not* really belong to logic, and here I agree with him. Though there have been various attempts to create a quantum set theory, I don't see how changes on level 3 can be fundamental enough to come to grips with complementarity.

This brings us back to level 2. What I am proposing is that we should found level 2 on a *three-place* predicate that I call *sameness*, rather than on the two place equality predicate x=y. My notation for this predicate is y(x=z), read "x is the same y as z". Examples: "2+2 is the same number as 2*2", "Mary is the same woman as Mrs. Smith", "Bill is the same man he was ten years ago", "The morning star is the same planet as the evening star", "Your car is the same color as mine" etc. The axioms of sameness are very simple:

Axiom 1. y(x=x)
Axiom 2. If y(x=z) then y(z=x)
Axiom 3. If y(x=z) and y(z=w) then y(x=w)

Logical analysis has shown that the sameness predicate has some remarkable properties. For instance, it can be "morphed" into any other predicate by applying suitable axioms; it's the *Morpheus* of predicates, so-to-speak. Another remarkable fact is that any axiom system can be translated into an axiom system in which sameness is the only predicate. All of this is beyond the scope of the present paper, however; the point here is to see how sameness handles complementarity.

Suppose we are given q and p such that q(x=z) means that x has the same position as z and p(x=z) means they have the same momentum. Now if we can *measure* position, then we can tell whether x has the same position as z, and similarly if we can *measure* momentum, we can tell whether x has the same momentum as z. Therefore if we can simultaneously measure both position AND momentum, we can tell whether x has the same position AND the same momentum as z. Thus the question arises as to whether this

compound of two samenesses comes under the aegis of our three-term sameness relation. That is, is there an r(x=y) that holds of x and z if and only if p(x=z) AND q(x=z)?

The axioms of sameness don't say either yes or no. This is the crucial point for our new analysis of complementarity. The expression (p(x=z) AND q(x=z)) defines a perfectly legitimate "variable" equality predicate, call it $E_{pq}(x,z)$, which is a function of p and q. It does not follow, however, that ∃r such that r(x=z) if and only if $E_{pq}(x,z)$. If we think of the y in the y(x=z) as specifying a certain kind of *discrimination*, then the sameness axioms have nothing to say about whether the separate discriminations made by y and y' can be conjoined into a *single* discrimination. In a classical world they always can; indeed this is perhaps a good way of defining a classical world. But when they can't, we are launched into deeper waters, and we'll say that y and y' are *complementary*. This turns out to work very well in quantum mechanics. But as Bohr suspected, complementarity extends far beyond physics.

Where, then, do we now stand with the relativity of AND? In a deep sense it is still there. But it has moved from propositional logic to the domain of equality and discrimination. We are no longer messing around with the logic of the connective AND itself. Our attention has turned from level 1 to level 2. It's there that the notion of a *thing* first appears. And it's there that the *truth-functional* AND undergoes a metamorphosis into the *substantial* AND of bread *AND* cheese, black *AND* white, position *AND* momentum. But when we have realized that this substantial AND is relative to *how* things are the same, we must then avoid the mistake of projecting its relativity back into the domain of simple truth-functionality.

References

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2. Quine, W. V., "The Scope of Logic", in Philosophy of Logic, Prentice-Hall 1970
3. ibid.