

Re: Is State Vector Reduction a 'Process'?

Source: <http://sci.tech-archive.net/Archive/sci.physics.research/2005-06/msg00268.html>

- *From:* rof@xxxxxxxxxxxxx
 - *Date:* Fri, 10 Jun 2005 06:22:40 +0000 (UTC)
-

Arnold Neumaier <Arnold.Neumaier@xxxxxxxxxxxxx> writes:

>rof@xxxxxxxxxxxxx wrote:

>> Arnold Neumaier <Arnold.Neumaier@xxxxxxxxxxxxx> writes:

>>

>>>rof@xxxxxxxxxxxxx wrote:

>>

>> I may have confused the official Copenhagen interpretation with
>> what Bohr, Heisenberg, von Neumann and so on believed. As Scerir
>> pointed out in this thread, Heisenberg said "The discontinuous change
>> in the probability function, however, takes place with the act
>> of registration, because it is the discontinuous change
>> of our knowledge in the instant of registration that has its
>> image in the discontinuous change of the probability function.",
>> Hiesenberg, "Physics and Philosophy", 1958

>I commented that already. the 'acto of registration' happens on the
>photographic plate or in the eye, not in the mind, and is simply
>the irreversible magnification due to dissipation by interaction with
>a macroscopic detector. It is objective and has no connection to
>any 'knowledge'.

>... only that your interpretation of what he said in terms of
>knowledge is a postmodern interpretation, and either the
>Copenhagen interpretation nor Heisenberg's intention.

My apologies for taking so long to reply. Various collegiate matters have occupied my attention for the last week.

Anyway, to summarize:

Heisenberg said "it is the discontinuous change of our knowledge in the instant of registration that has its image in the discontinuous change of the probability function."

My interpretation of this is: it is the discontinuous change of our knowledge in the instant of registration that has its image in the discontinuous change of the probability function.

Re: Is State Vector Reduction a 'Process'?

Your interpretation of it is: it is not the discontinuous change of our knowledge in the instant of registration that has its image in the discontinuous change of the probability function. It has no connection to any 'knowledge'.

Then you declare that your arguments are excellent, and that my interpretation of what Heisenberg said is "a postmodern interpretation".

Now, what appears to me to be happening here is that your position, that Heisenberg believed that collapse "is objective and has no connection to any 'knowledge'", is entirely incorrect, and that Heisenberg said so himself, and that when confronted with this fact, you gave the impression that his statements required "interpretation". You then "interpreted" his statement to mean exactly the opposite of what he said. Then you accused me of having a distorted interpretation because I took Heisenberg at his word, and proceeded to insult me by calling my interpretation postmodern.

Heisenberg was even more explicit about the connection to knowledge, which you deny he believed in:

"This probability function represents a mixture of two things, partly a fact and partly our knowledge of a fact. It represents a fact in so far as it assigns at the initial time the probability unity (i.e., complete certainty) to the initial situation: the electron moving with the observed velocity at the observed position; 'observed' means observed within the accuracy of the experiment. It represents our knowledge in so far as another observer could perhaps know the position of the electron more accurately. The error in the experiment does – at least to some extent – not represent a property of the electron but a deficiency in our knowledge of the electron. Also this deficiency of knowledge is expressed in the probability function." Heisenberg, *Physics and Philosophy*

He said this in chapter three, and goes on to say:

"We can, for instance, predict the probability for finding the electron at a later time at a given point in the cloud chamber. It should be emphasised, however, that the probability function does not in itself represent a course of events in the course of time. It represents a tendency for events and our knowledge of events."

A little further, he says:

"The observation ... breaks the determined continuity of the probability function by changing our knowledge of the system."

You will, of course, deny that you intended any insult when you used the word postmodern, and you will claim that everything Heisenberg said above is completely consistent with your interpretation, which is that the wavefunction has nothing at all to do with knowledge. Then you'll claim that your

Re: Is State Vector Reduction a 'Process'?

position is not absurd, despite the fact that it obviously is. You will probably focus on the occurrence of the word "fact" in Heisenberg's quote above, and claim that its appearance demonstrates that you are right, while ignoring the parts where he says things like "the probability function ... represents a tendency for events and our knowledge of events."

Now, I should point out here that your claim that your arguments are excellent is incorrect; that they are, as I said they would be, unconvincing even to yourself. You have adopted a position where you interpret a statement to mean its opposite, and you have done this not because you find that it is an excellent argument, but because you can't allow yourself to change your mind in public, because you fear that there is some humiliation associated with that. Let me assure you that anybody whose respect for you drops when he sees you change your mind is a person whose respect is not worth having. A reasonable person would have more respect for you if you showed the ability to change your mind, and therefore learn, rather than sticking to a position long after it has become ridiculous.

By the way, when you claimed that Heisenberg didn't think the 'act of registration' happened in the mind:
>... the 'act of registration' happens on the
>photographic plate or in the eye, not in the mind, and is simply
>the irreversible magnification due to dissipation by interaction with
>a macroscopic detector.
you were wrong.

Heisenberg agrees with me that the "act of registration" does indeed occur in the mind of the observer, and not on the photographic plate:
"Therefore, the transition from the 'possible' to the 'actual' takes place during the act of observation. If we want to describe what happens in an atomic event, we have to realize that the word 'happens' can apply only to the observation, not to the state of affairs between two observations. It applies to the physical, not the psychical act of observation, and we may say that the transition from the 'possible' to the 'actual' takes place as soon as the interaction of the object with the measuring device, and thereby with the rest of the world, has come into play; it is not connected with the act of registration of the result by the mind of the observer. The discontinuous change in the probability function, however, takes place with the act of registration, because it is the discontinuous change of our knowledge in the instant of registration that has its image in the discontinuous change of the probability function."

The act which we are talking about is, according to Heisenberg, "the act of registration of the result by the mind of the observer",

Re: Is State Vector Reduction a 'Process'?

and it is this that corresponds to the "discontinuous change in the probability function". What happens at the photographic plate is the transition from 'possible' to 'actual'.

Since this all happens in a chapter called "The Copenhagen Interpretation of Quantum Theory", and since Heisenberg is, I hope you will agree, competent to tell us what the Copenhagen interpretation is, perhaps you would be kind enough to acknowledge that I have told you something about the Copenhagen interpretation that you didn't previously know, namely that according to that interpretation, collapse is associated with the "act of registration of the result by the mind of the observer".

You can read the chapter online at:

<http://www.marxists.org/reference/subject/philosophy/works/ge/heisenb3.htm>

>> With due respect, and I sincerely mean no offense, I believe
>> that you have been infected

>Whatever I am infected with, I hope it is highly infectuous
>and incurable, so that it spreads and has a lasting effect.

You have become infected with it precisely because it is highly infectious, and because it has spread far and has had a lasting effect.

It is, however, not incurable, although the patients certainly don't like the medicine.

>> with the mental disease that I
>> ranted about in an earlier post:
>> <http://groups-beta.google.com/group/sci.physics.research/msg/69ca190957f25c12?dmode=source>

>This is a long post, I cannot recognize myself reflected in it.
>Neither do I recognize signs of a mental disease in my behavior.

It is extremely rare that one spots a mental disease in oneself, but let me assure you that you are a textbook case.

>> My understanding is that this is why you react so negatively to the
>> suggestion that the wavefunction describes knowledge.

>I followed the historical development of the interpretations of QM
>quite closely, reading hundreds of papers, to be able to make up my
>own mind of how I should interpret QM (and other physics).
>In the discussions on s.p.r., I share my insights for those who might
>wish to learn from it. I simply think that phrasing objective
>descriptions in a psychological language, making them dependent on
>mental processes, is neither necessary to understanding nor does it
>serve any useful purpose. There is nothing inherently absurd about
>this assessment.

Re: Is State Vector Reduction a 'Process'?

Re: Is State Vector Reduction a 'Process'?

These are your boasts about how well-read you are (despite your rather poor knowledge of the Copenhagen interpretation), your beliefs and your opinions. You cannot claim that your interpretation was shared by the founders of quantum mechanics. I will acknowledge that you are a strict conformist, but what you are conforming to is the modern desire to rid physics of any reference to subjective experience, and thereby achieve "purity". This desire spreads like a disease, which comes complete with instructions to ridicule those who insist, as did Heisenberg, Bohr and von Neumann, that subjective experience must be considered carefully and not ignored. Objectivity has become a religion, and those who insist that physicists should completely ignore subjective experience have become fanatical and have been allowed to take over.

>>>>A definition

>>>>of measurement isn't missing because measurement is the
>>>>acquisition of new knowledge.

>>

>>>This is not a good definition since it is never specified what
>>>constitutes acquisition of knowledge.

>>

>> Acquisition of knowledge is what happens when you look at the
>> measuring device and see where the pointer is pointing. That's
>> perfectly precise for a normal person, but it seems insufficient
>> to somebody who wants to know about "the real objective world".

>It seems that it is sufficient for you. But it is insufficient for me.

>I want a mathematical model of reality within which one can clearly
>say what exists, what is an experiment, an observer, a measurement,
>a record, etc., in such a way that one can predict in principle which
>experiments give outcomes with which accuracy.
>Such arguments are common in quantum mechanical foundations (e.g.
>discussions of the Heisenberg microscope) but currently based on
>informal notions of experiment, observer, measurement, record
>only.

>My goal is to put the foundations of physics on a basis similarly to
>the foundations of mathematics, where the whole logical process of
>coherent deduction can be modelled on a metalevel and gives clarity
>to the foundations of mathematics that is missing in physics.

>And I think that such foundations are possible and will provide the
>same clarity for physics.

Well, they are not possible. What you are looking for is an ontology. I will explain in the other thread, "Why physicists should pay attention to the mind", where it is that you can find the proof that this task is hopeless. You will, however, have to pay attention to the mind to understand the proof.

Re: Is State Vector Reduction a 'Process'?

>> Of course, if this is pointed out to them, they
>> deny it, saying "Why not at all – I am the most
>> reasonable of fellows.

>Everyone who has a sensible point of view argues that way,
>including you.

Reasonableness is to be demonstrated in one's words and actions. One should not proclaim that one is great and reasonable, that one has read hundreds of papers and has excellent arguments. A person may seek to acquire credibility by stating that they deserve it, but such a person actually deserves less credibility. One should give one's arguments and let others judge if they are good or bad; if one has read many papers, it should be shown by giving knowledgeable answers.

>Your argument sounds as if you are not claiming that the wave function
>collapse is about the change of real knowledge of real minds,
>but about how knowledge should change if someone observes something
>and acts completely rational. But then it becomes a moral statement
>completely outside science.

>However, the collapse was formulated by the founders as a necessity to
>make sense of quantum mechanics, and not as a postulate about moral
>standards for maintaining knowledge in minds.

Now, morality is about good and evil. The question of how one should use the knowledge one has to make the best predictions about the results of experiments is a strategic question, which has nothing to do with good or evil, and hence has nothing to do with morality. You must have confused "What I have to do in order to accomplish task X" with "What it makes me a good person to do." It seems to me that it would require an almost superhuman ability to become confused, to make that mistake. It is certainly not an excellent argument.

>>>Furthermore, knowledge depends on subjective decisions to trust
>>>a measurement. If we discard one as an artifact, there is no
>>>collapse. How can the collapse depend on such subjective issues?
>>

>> In the "wavefunction represents knowledge" interpretation, the
>> wavefunction is not an objective thing,

>How then can a non-objective thing change in time in an objective way???
>(Please don't be offended by the three ?s!)

Consider, for example, a random walk in one dimension. Suppose I see where the particle is at time 0 and you see where it is at time 1. At time 10, we both look at where the particle is, but

Re: Is State Vector Reduction a 'Process'?

don't look at it between the first time we see it and the final time. We each use the same equation to describe the time–evolution of the probability distribution for the position of the particle, and hence the probability distribution evolves in an objective way (recall – objective means the same for everybody, subjective means differs from person to person). The probability distribution, however, is subjective, because you use a different one to mine – yours is a delta function at time 1, while mine is a delta function at time 0 and is spread out at time 1. That is an example of how a non–objective thing can change in time in an objective way.

>> but different observers
>> will use different wavefunctions, depending on what knowledge they
>> have about the system.

>If I know nothing about an experimnt, which wave function should I use?
>Should I use instead of a pure state the microcanonical ensemble,
>suggested by many statistical mechanics treatments as noninformative
>prior? Then I make observations and find that they are not in accordance
>with the predictions of my ensemble since it is born of ignorance
>rather than knowledge...

You will use a density matrix if you know absolutely nothing about the preparation of the system.

>> The "collapse" is what happens when the
>> observer receives new knowledge, and updates his mathematical
>> representation of his knowledge to reflect the new knowledge that
>> he has.

>This must be a ficticious observer invented to suit your interpretation.

>A real observer with a real mind has no wave function in his mind --
>that changes unitarily according to a differential equation whose
>solution requires a computing capacity much beyond the mind's power, and
>once it sees a measurement (any look out of the window, or only a
>careful look at the detector needle to be sure of the third decimal?)
>it computes the solution of the corresponding eigenvalue problem to
>find out how the wave functions must be collapsed to be consistent.

>At least you won't find that when interrogating the most competent
>experimental physicists who know how they update their knowledge.

Your sneering isn't justified. The statement regarding collapse above is exactly what the Copenhagen interpretation states. If you claim that you weren't sneering, then you have to also claim that you really thought I was suggesting that people solve Schrodinger's equation in their mind in the course of everyday life. You did not really think that.

Re: Is State Vector Reduction a 'Process'?

>> Recall that subjective doesn't mean simply bad.

>I never assumed that. But subjective means outside the realm of science,
>unless that subjectivity can be explained and predicted by models of how
>it arises from something objective, such as the subjective
>observer-dependence in special and general relativity.

So you appear to be saying that you think the processes in the brain provide a sufficient explanation of subjective experience. If you do, then you cannot claim that von Neumann agrees with you:

"It is inherently entirely correct that the measurement or the related process of the subjective perception is a new entity relative to the physical environment and is not reducible to the latter. Indeed, subjective perception leads us into the intellectual inner life of the individual, which is extra-observational by its very nature."
von Neumann, *Mathematical Foundations of Quantum Mechanics*, p. 418

>>>At the time of Bohr, von Neumann and Wigner, the collapse meant
>>>something objective, though it might have been related to the mind
>>>in some unspecified way.

>>

>> I have to disagree with that, although I do not mean it in an
>> adversarial way. The relation to the mind was perfectly clear and
>> very specific for these people, at least by the '50s. Also, since
>> they understood that the wavefunction represented knowledge, the
>> collapse wasn't an objective thing for them.

>Please support your claims by solid evidence!

I do support my claims with solid evidence, but you consistently pretend that I haven't, which is a dishonest thing for you to do. The quotations from Heisenberg above where he explicitly says that collapse corresponds to the reception of knowledge by the observer, and von Neumann's statements about psycho-physical parallelism, are solid evidence.

>>>>Von Neumann takes the collapse as an axiom, hence also testifies to its
>>>>reality.

>>>>

>>>>He uses it as an axiom, but that doesn't mean that he claimed that
>>>>the wavefunction didn't represent knowledge.

>>

>>>But he certainly didn't claim that the wavefunction does represent
>>>knowledge.

>>

>> As I quoted before,

>>

>> "Let us assume that we do not know the state of a system, S, but
>> that we have made certain measurements about the state of S and

Re: Is State Vector Reduction a 'Process'?

>> know their results. In reality, it always happens this way, because
>> we can learn something about the state of S only from the results
>> of measurements. More precisely, the states are only a theoretical
>> construction, only the results of measurements are actually available,
>> and the problem of physics is to furnish relationships between the
>> results of past and future measurements." p. 337

>>
>> This is exactly a claim that the wavefunction represents
>> knowledge.

>I cannot understand how you can possibly arrive at this statement.
>If your claim were true, what von Neumann actually said (first sentence)
>would mean: "Let us assume that we do not know what we know (the state
>of S)", and then he deduces correctly from this (obviously false)
>premise everything he likes.

No; if my claim were true, what von Neumann said would not mean that.
You are using an argument of the form: "If what you said were true,
then X", where X is a contradiction. However, you didn't even attempt
to show how X would follow from the antecedent. You merely stated
that X would follow, as though the fact that you stated it were
a sufficient proof.

>>>No. A proposition is a statement that is true or false,
>>>or undecidable. It has nothing to do with whether or not
>>>anyone knows (or claims to know) its truth or falsehood.
>>
>> Logic, which includes the propositional calculus, is the formal
>> science of inference, and inference can only be done by the mind.

>No. It is routinely (and more reliably) done by computers.

...

>> The desire to assert that logic has nothing to do with the mind is,
>> I believe, rooted in the primitive notion of nobility,

>No. For example, it can be rooted in the fact that logic can
>be performed by microchips, which have little to do with mind as
>commonly understood.

I previously said:

>>I have to anticipate how somebody could reject something as
>>simple as this. The only thing I can think of is that somebody
>>might claim that, since computers can be programmed to do
>>symbolic manipulation, logic has nothing to do with thinking.
>>

>>The problem with this argument is that the fact that computers
>>can do the symbolic manipulation associated with formal logic
>>indicates only that logic can be represented by symbolic
>>manipulations, but establishes nothing about what those

Re: Is State Vector Reduction a 'Process'?

>>symbolic manipulations describe. Logic was established
>>in its present form because those symbolic manipulations
>>describe certain rules of correct thinking.

Now, you did exactly what I predicted – said that logic can be done by computers and therefore has nothing to do with thinking. You ignored the fact that I had anticipated this argument and explained why it is wrong. I will explain again, in more detail, why it is wrong, and I would ask that the next time you reply, you either address the argument that I give, or admit that logic does have a connection to the mind.

The more detailed version of the explanation is:
Yes, computers can do symbolic manipulation, and the rules of inference and deduction, by which we produce new knowledge from existing knowledge, have been characterized accurately enough to be expressed symbolically. However, the fact that computers can manipulate symbols does not mean that logic is not a characterization of inference as done by thinking people.

I said: The formal system X describes Y.
You said: The formal system X does not describe Y because X can be implemented in a computer.

In the present case, X refers to symbolic logic and Y refers to inference, which is what happens when a person goes from the knowledge that "All men are mortal" and the additional knowledge that "Socrates is a man" to the knowledge that "Socrates is mortal".

We could, however, replace X with "The Euler equations", and Y with "Fluid dynamics", and your argument would just be as invalid:

Me: The Euler equations describe fluid dynamics
You: The Euler equations don't describe fluid dynamics because the Euler equations can be implemented in a computer.

In fact, when we use computers to do symbolic logic, we program them with rules which are specifically chosen because they match "natural inference", meaning inference done by humans in the course of their thinking. The rules of symbolic logic were constructed to describe correct deductive thought, and computers can be used to manipulate the symbols to produce conclusions that we trust because we know that, if we carefully examine each symbolic manipulation that the computer does, it will agree with a deduction that a human could have made without the help of the computer.

Re: Is State Vector Reduction a 'Process'?

Please let me know if you understand this, or if I have to explain it in further detail.

>> I was
>> asserting that von Neumann was aware that we only know the results
>> of measurements,

>I agree with this assertion. It is in flat contradiction with your claim
>that the wave function represents our knowledge. For a wave function
>needs infinitely many bits to specify, while the results of measurements
>(according to what you just stated, the only thing we know about the
>system) can be coded in the finite number of bits making up a protocol.

Any wavefunction that can be written down by a human has a finite Kolmogorov complexity, otherwise the human wouldn't be able to write it down. Finite Kolmogorov complexity means finite information.

>> "More precisely, the states are only a theoretical construction,
>> only the results of measurements are actually available, and the
>> problem of physics is to furnish relationships between the results
>> of past and future measurements. To be sure, this is always
>> accomplished through the introduction of the auxilliary concept
>> "state", but the physical theory must then tell us on the one hand
>> how to make from past measurements inferences about the present
>> state, and on the other hand, how to go from the present state to
>> the results of future measurements." p. 337
>>
>> What he is saying is that, in quantum mechanics, what we call
>> a "state" is actually a theoretical construction

>but with the same objective status as mass, temperature, momentum,
>charge distribution, etc. of an object. These are also theoretical
>constructs used to organize our observations.

Almost, but not quite. Different observers will assign different states to the same system, so it is not quite as objective as mass or temperature.

>> Basically, you are saying that knowledge is a dirty thing,

>No. You read this into my statements. Knowledge has nothing to
>do with cleanliness. Dirty things can be washed; I wouldn't know
>how to wash knowledge.

Bravo, Arnold. You truly are the master of the metaphor.

>Knowledge is what we (think we) know. This may be a number of
>experimental results to within some accuracy, an approximate
>description of a quantum mechanical state, the rough
>temperature distribution in a room, the behavior of a piece of
>equipment according to the manufacturer's manual (perhaps

Re: Is State Vector Reduction a 'Process'?

- >corrected by our own calibration experiments), the weight,
- >length and age of the persons working in a room, etc.
- >It is (in some idealization) something describable in a finite
- >string of symbols.

- >On the other hand, fundamental physics is about the mathematical
- >model of Nature resulting from such information. This model
- >(von Neumann's "theoretical construction") is inferred from
- >observations and contains more accurate parts, less accurate parts,
- >probably a few mistaken parts, and completely unknown parts –
- >it is like a 17th century world map, but instead for the
- >physical phenomenon under study. The objective state of the
- >system is one of the polethora of states compatible with the
- >available information – which one, we don't know. But if we know
- >sufficiently much, all compatible states are approximately the same,
- >so working with any particular of them will give good predictions.

- >Nothing here prevents one of taking the system to be the whole universe.
- >The state of the universe must simply be compatible with all details
- >we observed in the parts of the universe accessible to our experiments.

It would be helpful if you took care to distinguish between your own personal interpretation of quantum mechanics and the interpretation which you claim von Neumann had. Here, I will point out that while you claim that "fundamental physics is about the mathematical model of Nature", von Neumann claims that "the problem of physics is to furnish relations between the results of past and future measurements." p.337

You will, mostly likely claim that these two positions are compatible, but they indicate a completely different way of looking at the task of physics. You want a mathematical model of nature itself, and think that measurements and their results should be a part of the model, and shouldn't have any privileged status within the theory. You are demanding more from fundamental physics than von Neumann did, who simply wanted relations between the results of measurements.

- >> Also, when you say "I don't buy this," are you saying that
- >> you don't believe that von Neumann held this opinion,
- >> namely that the principle of psycho–physical parallelism
- >> tells us that we can consider what we are observing
- >> to be within our own bodies? Because he did:
- >>
- >> "We wish to measure a temperature. ... [we can] say: this
- >> temperature is measured by the thermometer. ... we can
- >> calculate the resultant length of the mercury column,
- >> and then say: this length is seen by the observer. Going
- >> still further, and taking the light source into consideration ...
- >> we would say: this image is registered by the retina of the
- >> observer. And were our physiological knowledge more precise

Re: Is State Vector Reduction a 'Process'?

>> than it is today, we could go still further, tracing the
>> chemical reactions which produce the impression of this image on
>> the retina, in the optic nerve tract and in the brain, and then in
>> the end say: these chemical changes of his brain cells are
>> perceived by the observer." p.419
>>
>> "That this boundary can be pushed arbitrarily into the interior
>> of the body of the observer is the content of the principle
>> of the psycho-physical parallelism." p.420

>Von Neumann says that collapse happens in each particular physical
>system (defined by its boundary), but that consistency requires that
>if we regard a particular system as part of a bigger system then
>the collapse of the larger system must give, for the smaller system,
>results compatible with the collapse of the smaller system considered
>by itself. This is nothing more than an obvious compatibility
>condition. It has nothing to do with the nature of the two systems,

This is not correct. The boundary separates the observed system from the observer, and von Neumann is very clear about this:
"We must always divide the world into two parts, the one being the observed system, the other the observer." p.420

Please note that he says "must".

Please acknowledge that, according to von Neumann, the boundary separates the observed system from the observer, and does not merely separate one physical system from another.

Please acknowledge that von Neumann's view, that the task of physics is to provide relations between the results of experiments, is crucial to understanding why the boundary, between the observer and the observed system, must be placed somewhere. It is quite clearly the observer who has access to the results of measurements, and who seeks the relations between them, and that is why there has to be a boundary between the observer, who examines the results, and the observed system, which furnishes the observer with the results.

It is only if you reject von Neumann's view, that the task of physics is to provide relations between the results of experiments, and suppose instead that the task of physics is to describe "what's really going on", that you can think that measurements and their results don't have a privileged role within physics. It is only if you think that measurements don't have a privileged role, that you can drop the demand that the boundary be placed somewhere.

Now you have done this – rejected von Neumann's view of physics, and you demand an ontology, that is, a description of the world as it really is in itself and considered

Re: Is State Vector Reduction a 'Process'?

in isolation from the manner in which we know about it, namely through the results of experiments. As I said earlier, I will tell you in the other thread where you can find the proof that your dream is hopeless.

For the moment, please acknowledge that this is indeed what you are trying to do, and that von Neumann didn't consider your task – a description of nature in which measurements and the observer have no privileged role – to be a part of physics.

>You might care to notice that von Neumann carefully avoids to invoke >either the 'mind' or the observer's 'knowledge'.

He refers to the "process of the subjective perception" on page 418, and, on page 421, divides the world into three parts: 'I [is] everything up to the retina of the observer, II his retina, nerve tracts and brain, III his abstract "ego."'

By the 'abstract "ego"' he refers to the mind of the observer.

I recommend that you read the relevant parts of the book before making statements about what he doesn't refer to.

>Von Neumann simply argues that the collapse is consistent with the >psycho–physical parallelism (to the extent that one can define the >latter by the assertion that the "boundary can be pushed arbitrarily >into the interior of the body of the observer").

That is not how he defines the principle of psycho–physical parallelism. He defines it, on page 419, as the principle "that it must be possible to describe the extra–physical process of the subjective perception as if it were in reality in the physical world – i.e., to assign to its parts equivalent physical processes in the objective environment, in ordinary space."

>... argument does not require a body or a brain; it is true wherever >the boundary is placed, for example when the boundary is placed >between the exposed photographic plate and the process developing >the plate to see the picture.

>Thus the psycho–physical parallelism is completely inessential for >the interpretation of the collapse.

He says, on page 418, that the principle of psycho–physical parallelism "is a fundamental requirement of the scientific viewpoint". On page 421, he says "The danger lies in the fact that the principle of the psycho–physical parallelism is violated, so long as it is not shown that the boundary between the observed system and the observer can be displaced arbitrarily in the sense given

Re: Is State Vector Reduction a 'Process'?

above."

Clearly, he doesn't want the principle to be violated, and regards it as rather important, unlike you. Your claim that he considered it "completely inessential for the interpretation of the collapse" is incorrect. In fact, he devotes the rest of the chapter, indeed the rest of the book, to showing that the collapse postulate does not in fact violate the principle of psycho-physical parallelism. In doing so, he clearly separates the world into three parts – one being everything outside the observer's brain, another being the observer's brain, and the third being the observer himself, namely the observer's mind, or as he calls, it the 'abstract "ego"'. I highly recommend that physicists read this book. It's a very good book.

>> He also didn't have the "subjective means bad" attitude of modern
>> physicists, and was aware that what we deal with in physics is
>> not "the real world", but rather with subjective observations:
>> "Indeed experience only makes statements of this type: an observer
>> has made a certain (subjective) observation; and never any like
>> this: a physical quantity has a certain value." p.420

>Von Neumann is more careful in his use of language than you in your
>interpretation of his words.

>There is a difference between 'experience' and 'experiment'.
>The former is a psychological concept; the latter is a concept
>of physics.

>An experience produces subjective sensory perceptions;
>an experiment produces recorded values of physical quantities.

And the first is bad, and banned from discussion of physics,
while the second is good, and may be talked about.

>> For him, the distinction between the observer and the observed
>> was of fundamental importance in quantum mechanics; this is
>> the so-called quantum/classical boundary:
>> "That is, we must always divide the world into two parts,
>> the one being the observed system, the other the observer. ...
>> The boundary between the two is arbitrary to a large extent. ...

>.. to such an extent that his observer can be an inanimate object
>like a camera or a thermometer.

No; he spends considerable time in chapter six explaining that the subjective experience of the observer is very important and has to be considered carefully, to avoid violating the principle of psycho-physical parallelism. You keep pretending that this is not the case, claiming that he never mentions the mind, when in fact he does, and claiming that he considered subjective experience

Re: Is State Vector Reduction a 'Process'?

unimportant, when he thinks it's important enough to devote an entire chapter to.

You want to give the impression that von Neumann agreed with your interpretation, because you can thereby claim some credibility for your personal views. However, von Neumann's interpretation of quantum mechanics was that it is there to furnish us with relations between the results of experiments, while your interpretation is that measurements have no privileged role in physics, and that quantum mechanics is there to give us a description of the world as it really is. These viewpoints are in complete opposition.

>> but this does not change the fact that in each method of description
>> the boundary must be placed somewhere, if the method is not to
>> proceed vacuously, i.e., if a comparison with experiment is to be
>> possible." p.420

>>
>> So, from von Neumann's point of view, to use a "wavefunction of the
>> universe" would be to proceed vacuously.

>Only in this last statement I agree with your interpretation of
>his position.

At last. I was beginning to think that you would continue to stick to the "von Neumann agrees with me" story until you found yourself saying that true is false.

>At this point my view of quantum mechanics differs from his.
>And with good grounds.

The grounds are the following:

You want a description of the world in which the observer is just another subsystem of the whole world, and in which measurement has no privileged role.

Von Neumann believed that the task of physics is to furnish relations between the results of experiments, and so measurements and their results must have a privileged role in the formalism.

Von Neumann's view is only consistent if there is a boundary between the observer and the observed system.

You do not recognise this boundary as important because you fundamentally disagree with von Neumann about what the task of physics is. You believe that the task of physics is to describe the world as it really is, and so it should be possible to describe the entire world as it really is, and hence have a "wavefunction of the universe."

Is this accurate?

Re: Is State Vector Reduction a 'Process'?

R.

• *Follow-Ups:*

◆ *Re: Is State Vector Reduction a 'Process'?*

◇ *From:* Arnold Neumaier

• *References:*

◆ *Re: Is State Vector Reduction a 'Process'?*

◇ *From:* rof

◆ *Re: Is State Vector Reduction a 'Process'?*

◇ *From:* Arnold Neumaier

• Prev by Date: *Re: Is State Vector Reduction a 'Process'?*

• Next by Date: *Question.*

• Previous by thread: *Re: Is State Vector Reduction a 'Process'?*

• Next by thread: *Re: Is State Vector Reduction a 'Process'?*

• Index(es):

◆ *Date*

◆ *Thread*