Commentary on Hodgson's Target Article in JCS.

Introduction.

Hodgson aims to present a scientifically and philosophically respectable defense of the claim "that free will exists and is inconsistent with determinism." That thesis is incompatible with the truth of classical physics. Classical mechanics is deterministic. Hence if it were true then nothing inconsistent with determinism could exist, contrary to the claims about free will. Thus Hodgson appeals to quantum mechanics (QM), which, by virtue of its indeterministic features, provides a scientifically respectable way around this first difficulty.

Hodgson rejects also the idea that free will is *random*. But he then creates a very serious – and altogether unnecessary – new difficulty by grossly mis-characterizing quantum mechanics. He says that "according to QM, any indeterminism is mere randomness." If that were true, and if QM were true, then free will could not exist and be, as required, both indeterministic and non-random. Thus he is forced to abandon not only classical mechanics but also QM. However, the main problem with the idea of free will since the time of Isaac Newton has been its incompatibility with basic physical theory. Proposing a solution that conflicts with basic physical theory is precisely what is *not* scientifically respectable.

This second problem is specious. It arises from an incorrect claim about the nature of quantum theory, namely that every quantum mechanical process is either causal (deterministic) or chance (random). Actually, orthodox quantum theory involves, not just *two* process but *three*: causation, chance, *and choice*.

Orthodox quantum dynamics is a tripartite process. The process called Process **1** by von Neumann is absolutely essential, and it involves an element of "choice." It constitutes the major departure of QM from classical mechanics, *because it brings actions selected and performed by human agents directly into the fundamental structure of the theory.* The causal roots of these choices are not specified by the theory. Nor are there any statistical constraints on these choices. They are, explicitly, "Free Choices," not in the strong sense that the theory dogmatically asserts that they have no causal roots at all, but in the weak sense that contemporary orthodox QM treats them as free parameters.

Orthodox Copenhagen QM is formulated in a realistic and practical way. It is structured around the activities of human agents, who are considered able to freely elect to probe a system of interest in any one of many possible ways. Bohr emphasized the freedom of the experimenters in passages such as:

"The freedom of experimentation, presupposed in classical physics, is of course retained and corresponds to the free choice of experimental arrangement for which the mathematical structure of the quantum mechanical formalism offers the appropriate latitude." (Bohr, 1958: 73}

The fact that the causal roots of these “free choices” *are not specified by contemporary QM* stems from the fact that in the original Copenhagen formulation of quantum theory the human experimenter is considered to stand outside the system to which the quantum laws are applied. Those quantum laws are the only precise laws of nature recognized by that theory. Thus, according to the Copenhagen philosophy, *there are no presently known laws that govern the choices* made by the agent about how he or she will act upon the quantum system that he or she is probing.

The introduction of choices made by participating agents directly into the basic structure of the theory constitutes a profound change in the principles of physics. It is greatly celebrated and much discussed, and is epitomized in Niels Bohr’s dictum that “ in the great drama of existence we ourselves are both actors and spectators.” (Bohr, 1963: 15 & 1958: 81) The emphasis here is on “actors”: in classical physics the human agents were treated essentially as spectators. But orthodox QM is formulated only within the context of agents acting on systems and observing what happens. The choices made by the agents as to how they will act play an essential role in the extraction from the theory of predictions pertaining to the outcomes of observations, *and these “free” choices can also strongly influence the course of physical events in the observed system.*

The second part of the tripartite quantum process is “causal.” It is specified by the Schroedinger equation of motion, and is locally and globally deterministic. Von Neumann calls this causal component Process **2**.

The third process in contemporary QM is ruled by “chance”. Dirac called this process a “choice on the part of nature.” It picks out, in way governed only by a statistical rule, a definite outcome of the probing action selected by Process **1.**

In orthodox Copenhagen QM the agent is taken to include not only his own physical body and stream of conscious experiences, but also his measuring devices. His actions and resulting observations – as represented within his stream of consciousness – are described in a language that allows him to communicate to colleagues what he has done and what he has learned.

The agent acts intentionally upon the system being probed in order to elicit an experiential feedback that can be recognized. Then the occurrence of that recognizable response indicates that the examined system has a corresponding property. The agent’s choice of action specifies a separation of the state of the system being examined into two subsystems, one corresponding to the occurrence of the recognizable positive feedback, the other corresponding to the non-occurrence of that response. This theoretical structure allows the actions and feedbacks, described in terms of experiences residing in the stream of consciousness of the agent, to become correlated to physically described properties of the system being examined.

This Copenhagen formulation is pragmatically useful. But it is not suitable for analyzing the connection between the experiences of an agent and his physical brain. That is because the brain and body of the agent are, in the Copenhagen scheme, not parts of the physically described system. However, John von Neumann (1932/1955) expressed QM in a form that allows (the quantum counterparts of) all of the particles in the universe to be included in the physically described part of the theory, with only the streams of consciousness of agents being described in terms of the way we experience objects, intentions, and feelings.

In this form of QM the brain of the agent becomes the system being examined by that experientially described agent. But the theory is still pragmatic in the sense that no commitment need be made about the ontological character of either the physically described system or the stream of consciousness. The physically described system is treated as an objectively existing system, even though it effectively represents knowledge, information, and tendencies for experiential mind-brain events to occur. The events in each stream of consciousness are experiential events that coincide with – and structurally correspond to – physical events in the brain of the agent. Whether this puts consciousness inside the brain of the agent (identity theory) or outside it (duality) need not be specified. Science proceeds without making an ontological commitment on this issue.

These matters are described in more detail in Stapp (2003). I have briefly summarized here only what is needed to make intelligible the following comments on Hodgson's target article**.**

The impact of QM on Hodgson's thesis and arguments.

Hodgson's first three propositions and the arguments supporting them, are largely in line with QM, at least to the extent that the "laws of nature" that he cites are restricted to the laws recognized by contemporary physical theory. However, in the argument supporting Proposition 4 it is claimed that "It is plain that such feelings and other reasons are of diverse kinds, generally not measurable and generally incommeasurable." An apparently contrary possibility is that the role of conscious feelings is precisely to provide the basis for *assigning comparative values* to highly diverse possible actions, such as keeping a promise or helping a friend in need. My own experience is that I "feel" the comparative value of the competing *physically incommensurate* possibilities, in the process of deciding between physically diverse possible courses of action. So it is not plainly evident to me that that all of consciousness is not just an elaboration and development of "feelings," whose function from the evolutionary outset has been to provide comparative evaluations of *diverse physically incommensurable* possible actions.

In QM the Process **3** **"**choice on the part of nature" is governed by a statistical rule fixed purely by physical conditions. That means the choice between the physically opposed options is treated as having no causal roots in the past: the choice simply pops out, but in accordance with a "propensity" rule defined exclusively by the *physical* characteristics of the various options. These choices might actually have causal roots, but the theory does not acknowledge them.

Process **1** could, similarly, be ruled by tendencies or propensities controlled, however, not by physical characteristics, but by the experiential "feels," of the diverse options. The point here is that the Process **1** choices must, according to orthodox QM, *somehow get made*, but the existing theory provides no rules for *how* these choices get made. Additional hypotheses are needed to complete the theory, and the hypothesis that Process I is governed by propensities based on "feels" is a viable candidate. A stronger hypothesis would be that the Process **1** choices are completely *fixed and determined* by a process based on comparisons of "feels."

These possibilities *for extending rather than contradicting* QM have an impact upon Proposition 5, which asserts that "the subject makes an effective non-random selection between the available alternatives, based on these non-conclusive reasons, albeit not determined by rules or laws of nature. This is a vital proposition, one that is necessary to overcome the alleged dichotomy of determinism and randomness."

Proposition 5 is the linchpin of Hodgson's position. But if one accepts orthodox QM then there is no "dichotomy of determinism and randomness." Orthodox QM provides a third option, "Choice." Hence the validity of QM need not be denied, and scientific respectability can be retained.

However, Hodgson's Proposition 5 places strong conditions upon this *selection* process, namely that the selection process be both non-random, and not determined by rules or laws of nature.

Now the QM Process **1** selection is not controlled by *the randomness of Process **3***, which is the randomness associated with nature's choice of an *outcome* of the probing action specified by Process **1**. Nor is this Process **1** selection controlled by *the rule or law of nature, specified by the Schoedinger equation.* But the Process **1** might be, as suggested above, governed by *a different element of randomness,* say one associated with propensities governed by "feel" rather than by geometric form, or by a rule or law of *human* (or agent) nature based, for example, on "feels." There is no compelling need to go to the extreme of denying *all randomness and all rules*. That option leads to a degree of incomprehensibility that would make rational modeling difficult if not impossible. There is no rational need to go that far.

Hodgson's arguments supporting Propostion 5 are, as Hodgson himself admits, difficult. But accepting the existence of the QM mandated selection Process **1** is easy: it is demanded by orthodox contemporary physical theory. And allowing this Process **1** choice to be governed by *feel-based rules* is what Hodgson's arguments actually support.

For example, Hodgson gives, in support of proposition 5, an argument based on evolution. He says "If choices were in fact determined by algorithms, such as evolution-selected computation-like procedures, which *as algorithms* need no help from conscious judgement, and could indeed be hindered by conscious interference, there could be no plausible explanation of why evolution selected in favor of brains that, at considerable expense in terms of complexity and energy-use, support conscious processes." But this argument is not a general argument for the idea that the needed selection processes can "not [be] accounted for by strict rules of any kind." Quite the opposite! It is an argument *in favor* of the idea that the selection process is governed by rules that create physically efficacious judgments based on experienced feelings. Indeed, all of Hodgson's arguments tend to support, and certainly not to deny, the existence of rules that create a feel-based causally efficacious selection process. This dovetails with the fact that there is both room, and a need, for the incorporation of some such rules into orthodox QM.

The *outcome* of an agent's intentional action is implemented, in von Neumann QM, by a mind-brain event that, at the physical level, actualizes, as a unified whole, a spatially extended complex informational structure instantiated in the brain of the agent. At the experiential level this event is an experience that grasps the form of that informational structure.

This capacity of a quantum agent to “know as a whole” the content of a spatially extended informational structure renders a conscious quantum agent fundamentally different from a mechanical automata that is adequately describable in terms of the principles of classical mechanics, and hence lacks Process **1** choices. The behavior of the robot is controlled exclusively by the local mechanical interactions of microscopic elements with neighboring microscopic elements, and these simple micro-elements can “know” or “feel” nothing beyond their immediate microscopic neighborhood.

But the behavior of a quantum agent can be influenced, and in principle controlled, by the complex spatially extended informational structures that he can grasp and know as wholes. For Process **1** is intrinsically non-local: it identifies and actualizes *as a unit* a change in a spatially extended portion of the brain of the agent.

Hodgson’s final aim is to provide a scientifically respectable theory of personal responsibility, and his endeavor to make the selection process depend on neither rules nor chance is intended to blunt the argument that each of a person’s acts is a consequence of ultimate causes beyond his control, or pure chance, and hence that he cannot be held responsible for it. Quantum theory gives a reply to that claim. Personal responsibility arises not from ultimate causes but from immediate causes, and specifically from an agent’s capacity to adequately grasp the consequences of its possible actions, and to control its actions on the basis of judgments about those consequences. Classical mechanics provides no way to scientifically understand how a human agent, consisting basically of collections of “solid, massy, hard, impenetrable, movable particles” (Newton: Optics, 3rd ed, p,375/6) can have the feelings by which we evaluate the integral content of complex physical structures that extend over extended portions of the brain, and how those feelings can produce felt judgments that can have physical consequences that go beyond the mindless effects of local mechanical motions. But quantum mechanics converts the starkly material character of the classical state of the brain into the qualities of knowledge, information, and probability that are closer in character to experience, and it features a mathematical opening that allows experiences *per se* to enter into brain dynamics in a way that permits non-localized evaluative feelings to influence what the brain does. These features of the quantum brain make it far better suited to account for the adequate grasping and control needed to bear responsibility than the motions of miniature billiard balls.

References.

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