Commentary on Hodgson's Target Article in JCS.

Hodgson aims to present a scientifically and philosophically respectable defense of the claim "that free will exists and is inconsistent with determinism." His argument depends upon an important claim made and defended in Hodgson (2002). That claim is that nature has two different kinds of processes: quantitative processes and qualitative processes. Quantitative processes are based on *mathematical descriptions*, and can be general. They can be deterministic and/or random, but can merely *constrain*: they may leave certain options open. Qualitative processes occur only under special conditions, and allow agents/subjects to grasp or feel whole gestalts, and make judgments that are influenced by these feelings. These judgments can influence *selections* that can choose between options left open by the quantitative process.

In the target article Hodgson elaborates upon his earlier argument by stating and defending nine propositions. The linchpin is 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."

Hodgson's arguments supporting Proposition 5 are, as he himself admits, "difficult." For example, he gives an argument based on evolution to support his contention that there is in the selection process an element "that is not accounted for by strict rules of any kind." 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 judgment, 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." However, this argument does not justify, or even support, the conclusion that the selection processes cannot be "accounted for by strict rules of any kind." What it is difficult to understand is how such a selection process could produce pertinent determinate actions or beliefs without any rules. What the argument certainly does buttress the idea that the selection process needs to give real causal efficacy to our thoughts, ideas, and feelings *themselves*, in order for these *qualitative* feature of reality to have a non-redundant functional role in the unfolding of the world, and hence a reason to exist and to evolve. But that does not mean that this functional role of consciousness is achieved without *rules of any kind.*

Hodgson's thesis is incompatible with the truth of classical physics, in which all physical activity is fixed by local mechanical laws from initial physical conditions. Thus Hodgson appeals to quantum mechanics (QM). However, he creates unnecessary difficulties by asserting both that that the selection process is "inconsistent with determinism" and is "nonrandom," and that "according to QM, any indeterminism is mere randomness." It is not true that QM says that "any indeterminism is mere randomness." If it did, then Hodgson's claim that the selection process is both inconsistent with determinism and non-random would mean that the selection process would not be consistent with QM, and his appeal to QM would fail to achieve its objective. But, in fact, contemporary orthodox quantum mechanics explicitly introduces a selection process that is neither fixed by any known deterministic rule nor subject to any known statistical rule, but which has, by virtue of the known (i.e., postulated) deterministic and statistical laws, specified impacts on the course of physical events.

Orthodox QM has *three* processes: the locally deterministic Schroedinger equation, the random "choice on the part of nature," and the process called Process **1** by von Neumann. This process **1** 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,* at the level of practical application of the theory, and evades speculation pertaining to the causal roots of these choices.

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 dynamics constitutes a profound change in the principles of physics, as understood and applied in QM as contrasted to classical mechanics. This switch 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 Copenhagen 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 strongly influence the course of physical events in the observed system.*

These “free choices” are normally experienced as being determined by a thought or idea, such as a desire to test some theory, or to determine some parameter. There is no basis in contemporary physics to deny the strong intuition that our thoughts, ideas, and feelings do affect our choices of how to act, while being themselves not determined solely by the physically described aspects of nature.

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. The agent's choice of action specifies a reduction 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 mathematically/physically described properties of the system being examined.

This connection between physical description and conscious experience is the basis of science. Copenhagen quantum theory brings into science the very activity *of doing science*, and replaces certain ontological features of classical physical that turn out to be unknowable in principle by the knowable, communicable, and partly controllable conscious experiences that constitute the empirical foundation of scientific practice.

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) formulated QM in a way 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 von Neumann form of QM the brain of the agent becomes the system being probed by the experientially described agent. 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. Each event E in a stream of consciousness is an experiential event that occurs in conjunction with a physical event in the brain of the experiencing agent. This physical event is specified by a definite mathematical structure P(E) acting on the brain of the agent. This action actualizes the neural correlates of the conscious experience E. This connection between conscious experiences and their neural correlates is a key part of the theory, and it ties neatly into neuroscience, which is now seriously endeavoring to map out the connection between human experiences and their neural correlates.

The action of consciousness upon brain events can have important consequences not only for individual events but also for statistical average values. Thus our conscious thoughts, although themselves undetermined by the presently known laws of physics, can have important effects on what the brain does. This reverses the relationship that held in classical physics, where conscious experiences were imagined to be completely determine by the brain, but could play no irreplaceable role in what the brain does, because all brain activity is determined by the initial physical conditions of the universe together with local mechanical laws that never acknowledge the existence of conscious experiences.

Persons accustomed to thinking about physics in *classical* terms may consider far-fetched the idea of introducing experiential qualities into the basic equations of brain dynamics. If, following Isaac Newton, one considers the world to be made of “solid, massy, hard, impenetrable, movable particles” (Newton, 1721) that move in accordance with immutable deterministic laws that fix the entire course of history from initial conditions, then the idea that experiential qualities enter in a non-redundant and non-eliminable way into the flow of physical events might seem to be absurd. But quantum phenomena show the concepts of classical physics to be inconsistent with the observed behavior of the world, and the new theory, Copenhagen QM, replaces that classical materialist conception of the physical world by an essentially “idea-like” structure. The physical state represents “our knowledge,” rather than material substance, and is used to compute predictions about what we will find out if we probe nature in various alternative possible ways. Von Neumann’s generalization of the Copenhagen version of QM gives a theory of the mind-brain that explicitly involves both idea-like and matter-like features. In view of this un-sought --- and initially stoutly resisted ---entry of idea-like qualities into the basic structure of physics it is no longer irrational to believe that idea-like qualities may play an essential role in brain dynamics. Of course, a priori reasonableness is not enough in science: a scientific theory must deliver the goods. Some consequences of pursuing this line in psychology and neuroscience are described in Stapp (2001, 2003) and Schwartz (2002, 2004).

Hodgson’s final aim is to provide a scientifically respectable and rational theory of personal responsibility. He argues that, to rescue the concept of personal responsibility, the choices must be free, in the strong sense of being “inconsistent with determinism” and “not accounted for by rules of any kind.” “…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.”

The first main point of this commentary is that these conditions on the choices made by human agents are completely in line with contemporary basic physical theory. They conflict with features of classical physics that have *not been retained* in contemporary physical theory. Quantum theory brings the human observer into the causal structure in an important way, while not specifying, as yet, any rules that fix the observer’s causally efficacious choices about how to act.

The absence of these rules in contemporary physical theory does not mean that definite experiences occur without rules of any kind. Hodgson's insistence that the qualitative process be both non-deterministic and non-random was meant to rescue the concept of personal responsibility from the argument that a person cannot be held responsible for any action that was already pre-determined before he or she was born, or was determined by random choices beyond his or her control. However, personal responsibility is rooted not in the *ultimate* causes of an agent's actions but in the *immediate* causes of those actions. The personal responsibility of a human being arises from his or her nature as a human being: as an agent that is able to grasp and be moved by the meaning of the complex informational structures that have been instantiated in his or her brain by the sequence of mind-brain events whose mental sides constitute his or her stream of consciousness. It arises from his or her character as the thinking, reflecting, selecting, and physically efficacious agent that deep intuition proclaims him or her to be, as contrasted to the essentially mindless automaton ruled by local mechanical process that nineteenth century philosophers, and even some twentieth century philosophers, mistakenly claimed him or her to be. The whole idea of "determinism," as applied to human beings, is reshaped in the passage from classical physics to quantum physics, because in the latter case all of the depth of holistic graspings of meanings and values can enter in irreplaceable and non-mechanical ways into the determination of an action.

In view of these considerations I believe that Hodgson's arguments can be strengthened by (1) emphasizing how his first thesis --- that our conscious choices need not be completely determined by algorithmic physical processes, and yet can strongly influence our physical actions --- is not contrary to physics but is in fact exemplified by contemporary physical theory, and (2) dropping the condition that our selections are not "accounted for by strict rules of any kind." Rules that give full weight to the causal efficacy of a person's consciously constructed value system and to the consequence of the processes of plausible reasoning that occur both consciously and unconsciously in the dynamics of that person's mind-brain do not, I believe, contravene the principle of personal responsibility.

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