

# Does Post-Newtonian Physics Suggest a Post-Kantian View of Human Experience?

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*Immanuel Kant (1724-1804) German philosopher, one of the central Enlightenment figures*

## *Introduction*

**I**mmanuel Kant famously thought that the presuppositions of Newtonian physics are the necessary conditions of the possibility of experience in general— both ‘outer’ and ‘inner’ experience. Today we know, of course, that Newtonian physics only applies to a limited domain of physical reality and is radically inadequate in the quantum and relativistic domains. This gives rise to an interesting question: could the radical changes in physics suggest new conditions for the possibility of experience? In other words, does post-Newtonian physics suggest a post-Kantian view of human experience?

To get a better idea of this difficult issue it is very useful to consider the opening words of Peter Strawson’s acclaimed 1966 book, *Bounds of Sense: An Essay on Kant’s Critique of Pure Reason*:

*It is possible to imagine kinds of world very different from the world as we know it. It is possible to describe types of experience very different from the experience we actually have. But not any purported or grammatically permissible description of a possible kind of experience would be a truly intelligible description. There are limits to what we can conceive of, or make intelligible to ourselves, as a possible general structure of experience. The investigation of these limits, the investigation of the set of ideas which forms the limiting framework of all our*

*thought about the world and experience of the world, is, evidently, an important and interesting philosophical undertaking. No philosopher has made a more strenuous attempt on it than Kant. (1966: 15)*

So, according to Strawson, Kant was centrally concerned with the ‘bounds of sense’—with the ‘...limits to what we can conceive of, or make intelligible to ourselves, as a possible general structure of experience’ (1966: 15). Or, as Brook (1997: 5) puts it, ‘...what interested [Kant] were the most general constraints on anything that could function as a mind...’ Kant’s own view of these limits or constraints was closely tied with his understanding of Newtonian physics. For Kant thought that the presuppositions of Newtonian physics are the necessary conditions of the possibility of experience in general. So in this sense it is fair to say that Kant’s view of human experience is Newtonian. Indeed, when we consider the main general theses of what Strawson (1966: 24) calls Kant’s ‘metaphysics of experience,’ we find in them a strong emphasis upon features of Newtonian physics. For example, according to Strawson, Kant argues that ‘...there must be one unified (spatio-temporal) framework of empirical reality embracing all experience and its objects’ and that ‘...certain principles of permanence and causality must be satisfied in the physical or objective world of things in space.’ (1966: 24). Kant (1787) himself wrote:

*Other forms of intuition besides those of space and time, other forms of understanding besides the discursive forms of thought, or of cognition by means of conceptions, we can neither imagine nor make intelligible to ourselves; and even if we could, they would still not belong to experience, which is the only mode of cognition by which objects are presented to us. (B263).*

Kant assumed that Newton had hit on a uniquely adequate system of physics (Toulmin 2003). In retrospect, we can say that Kant was mistaken about this, even by his own standards. For, as Toulmin (2003) points out,

*...20th-century astrophysics and quantum mechanics have succeeded in giving non-Euclidean and post-Newtonian concepts an entirely coherent empirical application in the scientific explanation of natural phenomena—and this was something that Kant was not prepared to contemplate.*

Now, the fact that Newtonian physics turned out to be limited and was replaced by quantum and relativity physics opens up the possibility that the Kantian ‘bounds of sense’ concerning the possible general structure of experience might be extended. In other words, why should the presuppositions of Newtonian physics (which

fail completely in some empirical domains) be assumed to define the necessary conditions for the possibility of experience in general? Could, say, quantum theory extend the bounds of conceivability and enable us to develop intelligible descriptions that capture some non-Newtonian features of our experience, at least as possible features of experience? And, even more radically, could it be that actual human experience exhibits some non-Newtonian features?



*Plaque commemorating Kant in Kaliningrad, Russia*

The above questions are, of course, very difficult and will be explored in this brief paper only in a very preliminary way. Our strategy will be to consider some concrete suggestions to the effect that quantum principles and structures can adequately describe aspects of human experience. We will start by exploring the physicist David Bohm’s suggestion that there are *analogies* between quantum processes and thought. These suggestions are then elaborated into a sketch of what a quantum view of human experience might be like.

## ***Bohm’s Analogies Between Thought and Quantum Processes***

In his acclaimed text-book *Quantum Theory* (1951) David Bohm pointed to three analogies between the human thought process and quantum processes analogies which can be denoted as follows:

- Effects of observation
- Unanalyzability
- Presence of a *classical limit*

Let us consider these briefly in turn (for a much more detailed discussion see Pylkkänen 2014; also Wang et al. 2013).

***Effects of observation.*** In his discussion, Bohm first draws attention to the fact that introspective observation of thought typically introduces unpredictable and uncon-



trollable changes in the way thought proceeds thereafter. Analogously, observation of the position of a particle introduces unpredictable and uncontrollable changes in the particle's momentum. Note that partly due to these kinds of features of introspection, Kant thought that empirical psychology (insofar as it relies on introspection) cannot be a science (Brook 1997: 9-10).

**Unanalyzability.** Bohm suggests that a part of the significance of each element of the thought process originates in its indivisible and incompletely controllable connections with other elements. Analogously, some of the essential properties of a quantum system (e.g. whether it is a wave or a particle) depend on indivisible and incompletely controllable connections with surrounding objects.

**Both thought and quantum processes have a 'classical limit.'** Bohm suggests that the logical process corresponds to the most general type of thought process in the same way that the classical limit corresponds to the most general quantum process. His idea is that the rules of logic are analogous to the causal laws of classical physics. Similarly, he suggests that concepts and objects are analogous. The suggestion is that logically definable concepts play the same fundamental role in abstract and precise

thinking as do separable objects and phenomena in our customary description of the world. At the same time, he points to an analogy between pre-logical thinking and the quantum process. He says that the basic thinking process probably cannot be described as logical. For example, he thinks that the sudden emergence of a new idea is analogous to a quantum jump.

He then raises the question of whether these analogies are just a coincidence or whether they might be a sign of a deeper connection. He acknowledges that they could be a mere coincidence, but goes on to consider an alternative, namely the possibility that the physical aspect of thought might involve quantum processes in some important way. This, he suggests, would explain in a qualitative way the analogies. Let us briefly consider how, starting with the 'observation analogy.'

Now, if the physical aspect of thought involved quantum processes in a non-negligible way, this would enable us to develop a qualitative account of why the direction ('momentum') of thought is disturbed by an attempt to define its content ('position'). How about the 'unanalyzability analogy'? If the physical aspect of thought and language involved quantum processes (e.g. indivisible



links), it might be possible to develop a qualitative naturalistic explanation of some holistic features of language and meaning. Here one could also explore the relevance of Bohm's later suggestion that the wave function contains 'active information.'

Finally, how might we explain the 'classical limit analogy'? This might be explainable if the physical aspect of the alogical, aconceptual thought process involved quantum processes (with inseparability, discontinuity, etc.), while the physical aspect of the logical and conceptual thought process involved classical processes (e.g. classically describable, separable, neural 'activation patterns' governed, for all practical purposes, by the classical laws of physics; for a discussion of quantum theories of consciousness, see Atmanspacher 2014, Wendt 2015 and Pylkkänen 2018).

## *The Classical Limit of Experience*

In order to get a better view of the relevance of these analogies, let us consider further the 'classical limit' analogy. In the picture we are sketching, it seems that we have 'two physical worlds': the general quantum world and the special case of a classically describable world which is part of this quantum world and in which quantum effects are negligibly small. Similarly, we have 'two minds': the mind in the sense of a general alogical and aconceptual thinking process, and the special case of the mind as a logical thinking process with logically definable concepts which the former gives rise to in some conditions (cf. Smolensky 1988).

The above implies that the relationship between the quantum and classical domains is analogous to the relationship between aconceptual and conceptual mind. In other words, the *quantum world* of inseparable objects and discontinuous processes typically contains within it a *classical world* of separable objects and processes which are both causal and continuous. And the *aconceptual mind*, with its alogical processes, contains the special case of the *conceptual mind*, which engages in logical thinking (cf. Pylkkö 1998; Bermudez & Cahen 2012; Smolensky 1988).

To contrast this with a Kantian view of experience, let us consider Strawson's succinct description of the latter:

*Experience consists of temporally ordered intuitions so conceptualized and connected that: (1) many such intuitions have the character of perceptions of a law-governed world of objects (bodies in space and time) [...] and (2) there exists for all such intuitions at least the potentiality of their being ascribed by a self-conscious subject to himself as his own states of awareness. (1966: 236-7)*

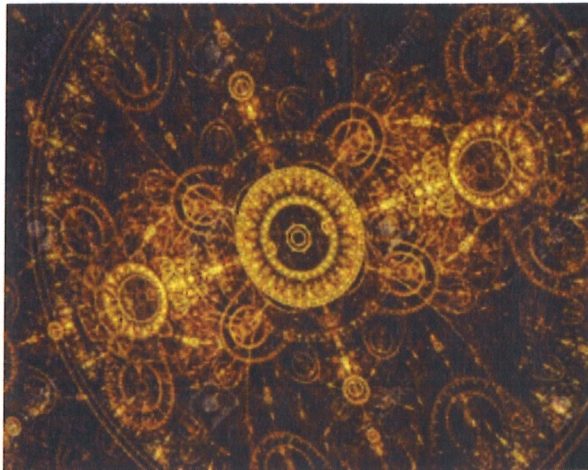
This quotation brings out nicely the 'classical' nature of Kant's view of experience. Of course, in our above sketch of a more general, quantum view of experience, we are not denying the validity of the Kantian view altogether. We are implying rather that Kant was able to describe 'the classical limit' of human experience. Note also that an aconceptual view of the mind is typically asubjectivist (e.g. Pylkkö 1998). It is assumed that a fully self-conscious subject is typically not present or dominant in the more general, aconceptual experience. Rather, such a subject is something that only emerges in the classical limit of experience, i.e., when aconceptual experience in some typical circumstances divides and crystallizes into concepts and objects. Thus we can say that a quantum view of human experience would not deny altogether the role that Kant gives to the self-conscious subject. However, such a subject is not seen as the most fundamental aspect of human experience. As Pylkkö (1998) has emphasized, such asubjectivist views have also—independently of any quantum considerations—been proposed in the 'post-phenomenological' approaches of, e.g., the late Heidegger, Merleau-Ponty, Bataille and Patocka.

## *Are There Non-Newtonian Features in Kant's View of Experience?*

To be fair, it can be argued that there are some aspects of Kant's view of experience that fit also with quantum-like experience, as sketched above. We already noted above that Kant thought that empirical psychology (insofar as it relies on introspection) cannot be a science, saying: 'Even the observation itself alters and distorts the state of the object observed' (quoted in Brook 2007: 10). In other words, Kant anticipated that there is a kind of 'psychological uncertainty principle' analogous to the uncertainty principle of quantum theory. It can also be argued that Kant's observations and inferences concerning synthesis, unity and self-awareness are holistic in a sense that is difficult to reconcile with a Newtonian mechanistic viewpoint. Andrew Brook thinks that these observations and inferences '...can quite easily be made to fit into materialist theories of mind, including contemporary ones' (2007:15). However, I think Brook is too optimistic here, and that to enable such a fit it might be useful to emphasize the quantum-like features of some of Kant's ideas.

For example, Brook (2007: 32) notes that Kant's thought was that '...in the same way as a representation of the usual





sort has a single object, individual representations and/or their objects become the single more complex object of “one single experience...”—namely what Kant called ‘a general experience.’ To capture this notion of ‘a general experience’ Brook introduces the notion of a *global representation*, which is ‘...a representation that has a number of particular representations and/or their objects or contents as its *single global object*’ (2007: 33). Such a single global object is, in turn, defined as ‘...an intentional object that represents a number of intentional objects and/or the representations that represent them, such that to be aware of any of these objects and/or their representations is also to be aware of other objects and/or representations that make it up and of the collection of them as a single group’ (2007: 33). These notions point to a kind of unity that does not quite fit with a typical Newtonian way of thinking, which emphasizes the role of independent elements in mechanical interaction. However, such unity is often invoked in various interpretations of quantum theory—for example, in Bohm’s notion of the implicate order, in which each part enfolds, or implicates, the whole (Bohm 1980; Pylykänen 2007). I think Brook’s above definitions resonate with, say, Bohm’s implicate order much better than they resonate with the ‘explicate order’ of the typical Newtonian mechanistic worldview (which tacitly underlies much of contemporary materialist philosophy of mind), but I will not argue for my view here in more detail.

## Concluding Remarks

So, does post-Newtonian physics suggest a post-Kantian view of human experience? We have seen above that there are some interesting analogies between quantum processes and thought that help us to understand the nature of the human mind more comprehensively (see also Pylykänen 2014). In this sense, post-Newtonian (quantum) physics does indeed encourage us to develop a post-Kantian view of human experience. But to qualify this view, we have also suggested that there are aspects of Kant’s view of experience which fit better with a quantum rather than a Newtonian worldview. Thus, while Kant thought that the presuppositions of Newtonian physics are the necessary conditions of the possibility of experience in general (both ‘outer and ‘inner’), he was, it seems, also drawing attention to some principles of uncertainty and unity in experience which are non-Newtonian, and he thus anticipated some of the indeterministic and holistic principles of quantum theory that were to emerge in the later development of physics.

We began this article by drawing attention to Strawson’s view that Kant was centrally concerned with the bounds of sense—with the limits to what we can conceive of, or make intelligible to ourselves, as a possible general structure of experience. We have suggested that these bounds can be extended from those defined by Newtonian physics to quantum ones. Yet, one may ask, isn’t quantum theory, if anything, difficult to understand, i.e. unintelligible (cf. von Wright 1986; Pylykänen 2017)? And if so, will not this lack of intelligibility be transferred to any quantum view of experience? Are we then traversing (rather than extending) the bounds of sense? Ladyman and Ross (2007: 10) point out that ‘[w]hat counts as intuitive depends partly on our ontogenetic cognitive makeup and partly on culturally specific learning.’ Thus, as we learn to think in terms of quantum concepts and principles, to play this new language game as it were, intelligibility may emerge in the process. Indeed, Wang et al. (2013: 681) point out that ‘...quantum theory is inherently consistent with deeply rooted psychological conceptions and intuitions. It offers a fresh conceptual framework for explaining empirical puzzles of cognition and provides a rich new source of alternative formal tools for cognitive modeling.’ So, for example, the feature that bothered Kant, namely that introspective observation itself alters and distorts the state of the object observed, fits well with a quantum framework, where such effects are natural and inbuilt features, both conceptually and mathematically.

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