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DUALISM, PHYSICALISM AND THE PARMENIDEAN DOGMA

1. A Physicalist Objection to Dualistic Interactionism

One of the principal physicalist objections to the dualistic interactionist account of mind is that it violates the law or principle of the conservation of energy. This objection, as stated by Cornman and Lehrer is as follows :

> When some bodily event causes a mental event, then the physical energy involved in the bodily event is expended in such a way that it is not transferred to anything else; energy is lost. When some mental event causes a bodily event, then the energy gained or lost by the resultant bodily event has not been transferred from or to anything physical so that the total amount of energy is changed. According to this objection, because both minds acting on bodies and bodies acting on minds would violate the principle of the conservation of energy, we have good reasons for concluding that there is no such interaction.[1]

A standard dualist reply to this criticism is that the principle of the conservation of energy is not merely an empirical generalization, it is a defining-postulate of a purely closed physical world, and as such is not known to be **true.** The physicalist in return replies that dualistic interactionism violates a principle which is not known to have a single physical counter-instance, and hence dualistic interactionism is problematic because it violates a justified principle. Now this argument can be met if it can be shown that the conservation laws are not universally true, even for the entities of physics. This I shall attempt to do in section 2 of this paper. In section 3 I shall outline some surprising metaphysical consequences of the argument which I shall now give.

2. Virtual Particles, Quantum Electrodynamics and the Conservation Laws

In quantum electrodynamics and mesodynamics, a process is

said to be virtual if it does not conserve energy but lasts for too short a time to be observed. Shrader-Frechette[2] has recently argued that the participants in various virtual processes, virtual particles, are physically problematic because (1) they are unobservable, being incapable of being detected by counters and track pictures and (2) their postulation is highly arbitrary, since they were introduced merely to save conservation laws up to the point at which the uncertainty relations are applicable. Hendrick and Murphy[3] have pointed out, correctly I believe, that the postulation of virtual particles is far from arbitrary, given the important role they play in physical theories such as Feynman's quantum electrodynamics.[4] Here instead of understanding particle interaction by means of a mediating electromagnetic field, particle interaction is understood by means of mediating virtual particles exchanged between the interacting particles. The success of Feynman's theory also constitutes an objection to Shrader-Frechette's criticism that virtual particles are unobservable, for it seems that we may have indirect evidence for the existence of virtual particles given that Feynman's theory does itself enjoy experimental success.

Nevertheless, I believe that the notions of virtual processes and virtual particles are problematic, and the physical theories which make use of them are mythical. Mario Bunge expressed the same proposition in 1970.[5] Bunge's most detailed criticism consisted of a rejection of the most frequent justification for the postulation of virtual particles, based upon the fourth indeterminacy inequality: $\Delta E.\ \Delta t \geqslant \pi/2$. As Bunge pointed out, it is a scatter-free parameter and not a dynamical variable representable in Hilbert space, so that the fourth indeterminacy inequality cannot be either an axiom or a theorem of the quantum theory. The objection which I shall now give is much stronger than that made by Bunge: I shall argue that the concept of a virtual particle is inconsistent. If this is so then it will follow that Feynman's electrodynamics, whatever its empirical success, is also inconsistent, and assuming that no inconsistent theory is correct, it follows that Feynman's electrodynamics is necessarily incorrect.

We must first note that virtual particles are not treated in an instrumentalist fashion by most physicists as more aids to computation, without any physical meaning. If this was so, then nothing would prevent a violation of various conservation laws from occurring. Further, it is sufficient to note the fact that the $1/r^2$ force between two protons at a distance r apart arises from the virtual photons emitted by the one and absorbed by the other, to refute the instrumentalist interpretation of virtual particles. Virtual photons are postulated by quantum electrodynamics to be *causally* responsible for the $1/r^2$ force and this fact is inconsistent with the instrumentalist position. From this fact we can also deduce that virtual particles must exist in the spatio-temporal continuum, because they are involved in causal interactions with allegedly real physical particles such as protons. More however can be said about the nature of virtual particles. Virtual particles may be identified with actually existing particles. The weak decay of the lambda hyperon into a pion and a proton whilst taking place through a virtual stage : $\Lambda^0 \rightarrow (\bar{p} + n + p) \rightarrow \pi^- + p$ does in fact involve a proton, neutron and anti-proton. But it is a truth of logic, that if some entity x has property F, then x has F i.e.$(\forall x)\,(Fx \rightarrow Fx)$. If we let 'x' designate a proton and 'F' the property of existing for longer than 10^{-23} seconds, then we have fallen into contradiction. *All* protons are said to exist for longer than 10^{-23} seconds, and yet some protons, namely virtual protons, do not exist for longer than 10^{-23} seconds. Note that since it is not technically possible to observe particles in the lifetime range shorter than 10^{-11} seconds,[6] it follows that all the physical evidence available today must support the assertion of the truth of the propostion that all protons exist for longer than 10^{-23} seconds. The assumption of the existence of virtual particles thus leads us into contradiction.

Physicists may argue that this contradiction is only apparent. They may say that there are really two types of protons, normal long-living protons, and short-living virtual photons. The virtual protons share many of the physical properties of protons such as spin and strangeness, but they are not stable. This position

is not free from logical difficulties. These virtual protons must then be described, as they are in most of the literature, as "virtual" and not "real", as *not existing but having the capacity to exist if energy is added to the system.* Virtual protons are thus potential protons. To say that there is a virtual proton at the space-time point $P_0(x, y, z, t)$ is to say that if energy was added to that point, a normal proton would come into being. Whilst this is a perfectly coherent description, it is in direct contradiction with the standard causal role given to virtual particles in quantum electrodynamics. As has been stated, the existence of the $1/r^2$ force between two protons is explained by the emission of a virtual photon by one proton and its absorption by the other. This is a real physical effect, which requires that the emitted and absorbed particle *actually* and not merely, potentially exist. A "potentially existing particle" can no more be an *actual* cause of some *actual* event than a "potentially existing thief" can *actually* steal the crown jewels, it can only be a potential cause.

It follows then that the concept of a virtual particle is logically inconsistent, and that any physical theory which has this concept as its basic explanatory concept, must be logically untenable. This scepticism about the logical cogency of the concept of a virtual particle has quite radical consequences for physical theory. First, it means that standard energy conservation theorems fail for some micro-physical processes. Second, it means that the explanation of the properties of many systems, such as the proton-neutron system, must be explained on an alternative basis to the standard Feynman quantum electrodynamics. This in turn must involve a substantial revision of received micro-physical theory. Third, it means that the conservation laws are not universally true. If this is so, then Cornman and Lehrer's criticism of dualistic interaction collapses.

3. Physicalism and the Parmenidean Dogma

Physicalism is the view that there are no properties, relations or objects in the world beyond those postulated by contemporary physics.[7] Now it is obviously true that the conservation laws enjoy great explanatory and predictive power, and

yet we have claimed that they are not universally true. It is possible however for us to methodologically save the conservation laws at the price of rejecting the doctrine of physicalism. The physicalist believes that the universe is a purely closed physical system. But if the defining-postulate of this notion is the principle of the conservation of energy, then we may say that any object which violates the principle of the conservation of energy is not purely physical; it will be said to have non-physical properties. The principle of the conservation of energy will be said to hold only for *purely* physical entities. Thus the particles described in section 2 are not *purely* physical entities. Therefore physicalism is false.

The ultimate justification for the principle of the conservation of energy, lies as Stace saw, in the *Parmenidean dogma :* that something cannot come out of nothing, that being cannot arise from non-being or something go to nothing. Yet as Stace and others have shown[8] many common world objects violate the Parmenidean dogma for they either come out of nothing or disappear into nothing. Waves disappear when the water is calm, the shape of the hole disappears when the dirt is filled back in. Indeed, if an object changes colour from green to red, then the red has come from nowhere, and the green has disappeared into non-existence. Since these objects and properties violate the Parmenidean dogma, they cannot be taken to be solely physical. Hence physicalism is false.

The physicalist in reply could argue that the cited common world entities do obey the law of conservation of mass-energy when the waves stop, no loss in water mass or energy occurs. When a finger print is rubbed off of a gun no loss in energy is observed. Let us grant this. Common world objects are of course composed of physical particles. Nevertheless since common world objects can be created or destroyed by having their structure created or destroyed, it follows that common world objects cannot be solely physical. The wave on the ocean or the fingerprint on the gun are patterns or structures of physical entities. A structure or pattern can be created or destroyed, because it does not have any mass itself. Strictly speaking then,

physical conservation laws are inapplicable to such entities. Hence they must not be purely physical objects.

If this is so, then the physicalists' dream of reducing the rich world of common sense, to the abstract world of the physicist is an impossible one. Structures, patterns and organizations need not be taken to be abstract entities, and nor need common world objects for such phenomena are inmates of the world of our experience rather than being guests of Platonic heaven. Thus there is simply more in this world than the physicists say that there is, and much more to reality than the ontological myopia of the physicalists would allow us to see.[9]

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NOTES

1. J. W. Cornman and K. Lehrer, *Philosophical Problems and Arguments*, 2nd edition, (Macmillan, New York, 1974), pp. 253-254.
2. K. Shrader-Frechette, "Atomism in Crisis : An Analysis of the Current High Energy Paradigm", *Philosophy of Science*, vol. 44, 1977, pp. 409-440. Citation pp. 419-421.
3. R. E. Hendrick and A. Murphy, "Atomism and the Illusion of Crisis : The Danger of Applying Kuhnian Categories to *Current* Particles Physics", *Philosophy of Science*, vol. 48, 1981, pp. 454-468. Citation pp. 458-459.
4. R. P. Feynman, *Quantum Electrodynamics*, (W. A. Benjamin, New York, 1961).
5. M. Bunge, "Virtual Processes and Virtual Particles : Real or Fictitious ?", *International Journal of Theoretical Physics*, vol. 3, 1970, pp. 507-508.
6. D. B. Cline, A. K. Mann and C. Rubbia, "The Search for New Families of Elementary Particles", *Scientific American*, vol. 234, 1976, pp. 44-54. Citation pp. 50-51.
7. cf. J. J. C. Smart, *Philosophy and Scientific Realism*, (Routledge and Kegan Paul, London, 1963).
8. W. T. Stace, "The Parmenidean Dogma", *Philosophy*, vol. XXIX, 1949, pp. 195-204; A. Kuhn, "Dualism Reconstructed", *General Systems*, vol. XXII, 1977, pp. 91-97.
9. For a more detailed critique of physicalism cf. Chapter 2 of J. W. Smith, *Reductionism and Cultural Being*, (Martinus Nijhoff, The Hauge, 1984).