

Panpsychism and the Dissolution of Dispositional Properties

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The present paper presents a case for panpsychism which is based on the rejection of Whitehead's well-known concept of the causal efficacy of immediately past actual occasions dispositionally exercising a power to influence their successors. But the rejection of causal efficacy, I shall argue, is required at a deeper level by the Whiteheadian and at once Hegelian concept of the self-conformation of successor occasions to their predecessors. At this deeper level, I shall also seek to show that dispositional physical properties for both Whitehead and Hegel must be reducible to phenomenal mental properties.

This is the third argument for panpsychism on which I have worked. Beyond developing the argument, I will also seek to show that the tendency of these arguments is not purely metaphysical, i.e., that the kind of panpsychism which is defended helps us more fully explain results in the natural sciences. The first argument, an argument from parsimony (Butler, 1972), held that a cosmology with only one type of substantial individual is rationally preferable to a cosmology with more than one type. I argued that the brain of a conscious human being is the only entity which we know from within, and that it is known introspectively from within to be mental, to have phenomenal properties or qualia.

I also argued that there is no way of observing elementary particles from within in order to know that they are not psychic in character, and further that it is possible to form a sufficiently general concept of mind to allow the possibility of attributing the mental property of sentience even to such particles. Mind in the minimal sense is sentient without any distinction between types of sentience corresponding to different specialized sense organs, and even without the distinction between pain and well-being necessary to conceive the mind of a one-celled organism. Mind is minimally a sensation of wellbeing undisturbed by the sensation of pain. I concluded in the interests of parsimony that there is no sufficient reason to assert two types of substance (both mental and non-mental), and so that there is no sufficient reason to deny panpsychism.

The second argument is a genetic argument (Butler, 1978). I argued for mental evolution as well as physical evolution. In both cases evolution proceeds from the simple to the more complex. Mental evolution, I held, begins from the simplest conceivable mind, just as physical evolution proceeds from the simplest conceivable particle. Since the simplest conceivable mind is pre-biological—a mind devoid of the contrast between alternating pain and the sensation of well-being characteristic of the simplest conceivable mind of a one-celled organism—mental evolution begins with pre-biological mentality inhabiting inanimate matter. I still hold this point to be correct.

However, in this paper I shall correct my original formulation of the argument, holding in the light of current natural science that, while the simplest conceivable particle with its specific mind may exist, neither physical nor mental evolution began from such a particle or mind.

Paul M. Churchland concluded his reply to my original formulation of the two arguments for panpsychism in the following words: Unless panpsychism constructs genuinely explicit theoretical proposals and testable hypotheses, and unless it achieves some systematic successes in experimental predictions and technological control, it will continue to appear to be what it probably is—a theoretical hangover from a less knowledgeable time. (Churchland, 1996, p. 215)

In light of the resurgent interest in panpsychism in recent years (e.g., Strawson, 2006; Basile, 2008; Skrbina, 2005), it can no longer be said that it is "a theoretical hangover from a less knowledgeable time." One purpose of this paper is more specifically to reply to Churchland by building a case for the explanatory and predictive power of panpsychism. He distinguished two types of panpsychism: one type ascribes both physical and mental properties throughout the natural world, while another type ascribes only mentalistic properties. But he concludes that neither type has shown anything to compare with the "experimental and explanatory successes" of modern atomism. I will defend the second type.

In the first part of this paper I will introduce my third argument for panpsychism. It depends on the existence of mentalistic properties understood as qualia. Pain cannot be merely a brain state, since we feel sorry for people with pain but have no reason for feel sorry for anyone merely because of his or her brain state. I shall call this third argument the reductionistic argument. It argues for the reduction of physicalistic properties to mentalistic properties. I will argue that only mental properties, not physical properties, are ascribable by showing that physical properties

are incapable of coherent conceptual analysis without reduction to phenomenal properties. From this I will conclude that the explanatory success of physical science is indirectly an explanatory success of the complex mentalistic descriptions to which physicalistic descriptions can be reduced. By a correct conceptual analysis of physical properties, a panpsychism allowing for only occurrent mental or phenomenal properties inherits all the explanatory virtues of physical science. By occurrent properties I mean properties that are in principle directly inspectable, such as greenness or pain. They are phenomenally present to some subject of experience. Dispositional properties, if they exist, are not directly inspectable, but are only experimentally discoverable, such as the brittleness of a vase.

Galen Strawson agrees that mental properties are "occurrent" rather than "dispositional," but he goes on to hold as a panpsychist that what is physical "cannot in principle be fully grasped in the terms of physics" (2006, pp. 3-4). I shall argue that, since dispositional properties like energy are incoherent, what is physical ultimately cannot at all be grasped in the terms of physics.

Since the literature distinguishes between reductive and eliminative materialism, so we might distinguish between reductive and eliminative panpsychism. Reductive panpsychism admits the existence of physical bodies but analyzes them without remainder in terms of mentalistic descriptions. Eliminative panpsychism simply eliminates bodies. Since I find this to be a verbal distinction without important metaphysical consequences, we may allow either usage. In this paper I shall consistently conform to the reductive formulation.

In the second part of this paper, I will develop the second genetic or evolutionary argument further. I will seek to show that, independently of the reductionistic argument introduced in this paper, panpsychism survives because different panpsychist hypotheses underlying different forms of matter on an evolutionary scale offer greater success in explanation and prediction than purely physicalistic hypotheses. I originally formulated the genetic argument without consideration of reductive panpsychism. If the reductive argument is now accepted, the "evolution of matter" becomes an evolution of mind understood in terms of the complex mentalistic descriptions into which physical dispositional properties will be analyzed in the next section.

I. *Dispositional Properties and the Reductionistic Argument for Panpsychism*

In assessing the metaphysics of materialism we first take "physical" to mean what physical science says it means. Surveying physics texts, we find that physical properties are either relational like spatiotemporal location or dispositional like force, mass, and energy. Dispositional properties are non-relational. Thus the atom could have the power to destroy cities even if no cities existed. A lone atom has no actual location, and thus no actual motion understood as change of location. The lone atom's property of having mass means that it is logically possible for bodies other than the atom to exist with location, and to cause a change in the atom's state of motion. A lone atom has no actual state of motion to be changed. Yet if we can coherently maintain that in a different logically possible world the atom has location which can be changed, this possibility is sufficient to make even a lone atom physical.

Hegel (2008, p. 150) held that a power or force must express or manifest itself in order to exist. This suggests that something existing merely by itself in the world could not have a dispositional property. For such a property to exist, its expression must be solicited by the existence of a second thing. This apparent contradiction between what we ordinarily suppose regarding dispositional properties and what Hegel seems to suggest can be resolved, I think, only if we suppose that the expressions of a force which Hegel finds to be necessary to its existence include logically possible expressions, not just actual expressions. An actual and thus not merely possible disposition, e.g., actual genius, is relative to all logical possibilities of its manifestation. Actual works of genius are only necessary to verify actual genius, not for actual genius to exist. To argue that an isolated atom lacks a dispositional property of physics like mass because none can be verified by observing its expression would be to commit the basic error of the verifiability principle of meaning.

Anything that has a dispositional property before exercise of the disposition would somehow, as an underlying subject of change, have to be identical with the same thing during its exercise of the disposition. But the identity in question is not the logical identity of the indiscernibility of identicals. The green leaf in the Spring has a disposition to turn brown in the Fall, but the green leaf and the brown leaf are discernible and thus are not logically identical. Yet they are commonly viewed to be bodily identical. Aristotle—as we shall note below—believed that any body that has a disposition or potentiality exists continuously from a state of unactualized potentiality to a state of actualized potentiality. The body is thus a "substance" in the Aristotelian sense. However, in contemporary quantum physics events are discontinuous. Nonetheless, an electron in quantum

physics events are discontinuous. Nonetheless, an electron in one orbit can still have a disposition to change orbits. It can be bodily identical with a discernibly different electron in another orbit without moving continuously from one orbit to the next. A leaf has a disposition for its velocity to be altered by a force exercised upon it by a second body, such as the wind. The leaf prior to the acceleration is bodily identical with the leaf after the acceleration, quite independently of the question of continuity. Based on a principle derived from the Eleatic Zeno, I will maintain that the leaf and indeed all bodies are, like the electron, discontinuous. My argument against dispositional properties will depend on showing, first, that to be a body in fact cannot be to exist continuously. If bodies exist, they must each exist as a temporal aggregate of externally related changeless events, each devoid of dispositional properties. For anything that had dispositional properties would have to be capable of change. Secondly, my refutation of dispositional properties will depend quite generally on showing that the properties of a bodily aggregate are reducible to properties of the members of the aggregate, in this case changeless events. Since to exist is to have properties, irreducible bodies with dispositional properties, by virtue of their reduction to events, cannot exist. Thus a body's disposition to be altered in its velocity when exposed to an external force could only lie in the fact that future events in the series either occur in a different direction from previous events in the series, or occur further apart from one another than previous events in the series, or both.

Xg

~

x6

xs

x1 x2 x3 x4

Change in Vector

x, Xz x3 x4 xs x6 ~ xs x, Xz x3 x4

Change in Speed Change in Vector and Speed

This reduction, by reducing dispositional physical properties, seems to leave us with relational properties, namely, relative positions. However, once I reach a panpsychist conclusion, I shall argue in a manner reminiscent of Leibniz that positions can be reduced or eliminated in favor of mental properties, namely, perceptions or prehensions. One event is more remote in position than another event in relation to a third event because the first event's has a certain sense impression

white is smaller than an otherwise similar sense impression belonging to the second event. Continuous change is impossible as long as we maintain the principle that for an event to occur it must take time. The principle belongs to the rational core of Zeno's refutation of motion (Butler, 1981). Continuous motion would depend on a body occupying an infinity of successive positions in a finite amount of time. But how much time must be spent in a single position in order to be in that position at all? If an event's being at a certain place must take a finite duration of time to occur at all, continuous motion would take an endless duration of time, and thus could never be completed.

Analogously, if you were happy yesterday but for no time at all, you were not happy at all yesterday. Likewise, you could not have been on Mars last night but for no time at all. If you were there for no time at all, you were not there at all. No body that fails to pause momentarily in the occupation of a place is ever really there at all.

Infinitesimal Durations? Continuous motion is impossible whether because the body is in a place only for some time or because it is there merely instantaneously, i.e., for no time at all and thus not at all. But a third possibility is discussable by which to save continuous change. It may be suggested that change might prove possible by a body's occupation of a position for an infinitesimal duration. By an infinitesimal duration we mean a duration that is infinitely small, thus not determinately small. The duration is neither zero nor finite, but is vanishingly small.

In other words, no matter how small we may imagine the duration to be, the truth is that the amount of time which the body spends at a certain place is even smaller. If we say that it spends a billionth of the second in one place, it is at once there for a half of a billionth of a second. But it is not for that reason that we can rest content with the supposition that it occupies the place for a half of a billionth of a second. It is there for less than half a billionth of a second, but never for any stable finite duration no matter how small. We may imagine the series of ever smaller fractions proceeding endlessly. The number of fractions in this diminishing series is infinite.

Yet this infinity of ever smaller fractions is itself no more a fraction than the number of natural numbers is a natural number. The duration of an event may include an infinity of infinitesimals, a cardinal sum of infinitesimals, but there is no such thing as a determinate infinitesimal duration. There is no need to dispute the existence of infinitesimals in mathematics. We are free to extend the number system to include infinitesimals (Robinson, 1996). But an infinitesimal is not an infinitely small fraction of a natural number. It is an endless series of diminishing fractions tending at the limit to zero without ever reaching zero. The point is not that

there are no infinitesimal numbers, but that no infinitesimal number can be the measure of the duration of an event.

Duration, like size, is measurable. And for something to be measured there must be a unit of measure of which the thing being measured has a determinate amount. Neither an infinitesimal nor an infinite number can function as a unit of measure. To measure is to count a finite number of iterations of some unit. To measure a length of time, at least approximately, is to count up to a certain number of some unit, such as a billionth or trillionth of a second. A minute can be measured as sixty seconds or a million microseconds, but not as any finite amount of infinitesimals. Just as there is no such thing as the next instant, there is no such thing as the next infinitesimal tending at the limit at that instant. If these statements pass muster, the existence of infinitesimal numbers is incapable of saving continuous change. Even if there is an infinitely small time segment there is no infinitely brief duration of any actual occurrence. If we imagine the volume of a body shrinking to the point that it has no volume at all, by the same token it becomes no body at all. Similarly, if we imagine the duration of an event losing duration to the point that it has no duration at all, it ceases to occur at all. No change can be a continuous infinite series of states of affairs. But accidental change, as conceived by Aristotle, did presuppose a continuously existing subject of change passing through an endless series of accidental states in a finite duration. If such accidental change is impossible, dispositional properties are also impossible.

Aristotle and the Refutation of Continuants. Aristotle, countering Zeno, supposed one-to-one correspondence between an infinity of durationless instants in a time segment and the infinity of points of furthest advance from a body's point of departure to its point of arrival in motion. But this implies that being at a place takes no time at all, and that means it never happened at all. It is Aristotle who seems to make a false assumption when he writes:

Zeno's argument makes a false assumption in asserting that it is impossible for a thing to pass over or severally to come in contact with infinite things in a finite time. For there are two senses in which length and time and generally anything continuous are called infinite: they are called so either in respect of divisibility or in respect of their extremities. So while a thing in a finite time cannot come in contact with things quantitatively infinite, it can come in contact with things infinite in respect of divisibility. (Aristotle, 1941, Bk. VI, Ch. 2, 233a & b).

Zeno refuted continuous change of place, but analogous arguments refute all forms of continuous change. The sky from midday to midnight cannot get continuously darker, since there would have to be an infinite number of shades of darkness in a finite duration of time. Each shade would have to exist for a finite duration, since to have a shade of darkness for no time at all is not to have that shade of darkness at all.

A Proof of Qualia. This line of argument leads to an event cosmology, replacing the concept of change in the career of a continuant with that of succession. We have a finite number of shades of darkness in succession, with a discontinuous jump from one to the next, metaphorically a motion picture theory of reality. Since each event is momentary and internally unchanging in its properties, it lacks any potentialities or dispositional properties implying accidental properties that can change.

Since mass, energy and force can exist only as dispositional properties, it follows that nothing can have such properties. But, since an event, like anything that is, must have some determinate properties in order to avoid being nothing at all, we infer that it must have non-dispositional, categorical or occurrent properties. Phenomenal properties, we suggest, remain the only plausible candidates for such occurrent properties. A strong best argument for qualia seems to be that the physical descriptions to which reductive materialists would reduce qualia, or in favor of which eliminative materialists wish to eliminate qualia, cannot be analyzed without reducing physical properties precisely to qualia.

The All or Nothing Principle. Note that change of intensity is also impossible. Given an infinite number of degrees of intensity on a continuum, an event that began with low intensity and then continuously increased its intensity could never complete the process. For it would have to enjoy each of infinitely numerous degrees of intensity for a finite duration of time. The conclusion is that each event, whether a quantum event or an event of human experience, reaches its maximum intensity all at once and maintains that intensity constant throughout the duration of its occurrence. The world presents itself as profoundly digital. The only instantaneous events that exist are limits, whether the beginning or end of a concrete event enjoying duration. "Though we cannot think of an instantaneous event falling within our experience that is not a terminus of something that takes time, we can think of plenty of events that are such termini" (Anscombe, 1964, p. 18).

A temporally extended event has a finitely small duration. It has continuous existence but no continuous change. This makes the succession of events staccato, abrupt, disjointed. This view may not be as aesthetically pleasing as the belief in continuous change. As one recent defender of Zeno writes, "we are only accustomed

to continuous motion after all, and we cherish it so deeply" (Gao, 2006). But what gives us the right to decide questions of metaphysics by an appeal to aesthetic consolations?

Once we say that an event takes time, this principle would apply to any temporally successive phases of what Whitehead calls the concrescence of an actual occasion. And this would mean that the process of concrescence would be endless, that it could never be completed. Ultimately Whitehead must resolve this problem by viewing the successive phases of concrescence as an external reconstruction of the actual occasion, rather than as a real process intrinsic to it. "The analysis of an actual occasion is only intellectual. ... Each actual entity is a cell with atomic unity. But in analysis it can only be understood to be a process" (Whitehead, 1979, p. 227).

Robert Neville has raised the problem of how, in light of the discontinuity of actual occasions, we can understand the continuity of personal identity as a personally ordered society of successive occasions. Whitehead understands the continuity of a person over his or her career as consistent with the discontinuity of occasions: the same form of the individual is replicated or reiterated from occasion to occasion. Neville agrees, but correctly specifies that the reiterated form is normative. The present occasion in the career of an individual continues the life of the same individual by prehending and identifying with commitments made in previous occasions in the same life. "It is important for freedom to notice that the reiterated pattern can include moral factors like promises » (Neville, 1974, p. 42).

Hegel and Whitehead. The denial of dispositional properties and their dissolution into occurrent phenomenal properties is ultimately a point of agreement between Hegel and Whitehead. Hegel held that only the present event, the effect, causes the past event to be a cause (Hegel, 2008, pp. 167-168). The causal status of a past event thus can only be acquired posthumously. But a posthumous property is incoherent, since it is a property which is possessed even after what possesses it no longer exists! Since to have properties is to be, posthumous properties are impossible. Thus we must finally deny the causal efficacy of the past. We must substitute for the concept of causal efficacy a concept of the present event's act of selective "prehension" or self-conformation (as well as its selective disconformation) to the past. Whitehead opposed Hume by upholding the directly intuited causal efficacy of a prehended flash in causing the act of blinking. "The man will explain his experience by saying 'The flash made me blink....' The philosophy of philosophy of organism

accepts the man's explanation" Whitehead, PR, pp. 174-175). Elsewhere Whitehead writes: "Locke's doctrine of 'power' is reproduced in the philosophy of organism.... In Locke's phraseology the objectified actual occasion is then exerting power" (1979, p. 58). For many people, the point about the flash of light and blinking is Whitehead at his most memorable. The problem with this is that, according to Whitehead's own philosophy of organism, the objectified actual occasion is no longer active or creative.

[T]here is a vector character that transfers the cause into the effect. There is a feeling from the cause which acquires the subjectivity of the new effect without loss of its original subjectivity in the cause. Simple physical feelings embody the reproductive character of nature. In virtue of these feelings time is the conformation of the present to the immediate past. (Whitehead, 1979, pp. 237-238)

In this quote Whitehead starts by buying into the causal power of the past and then ends by invoking only the present's exercised power of selfconformation in some respect to the prehended past. Only the present prehending occasion is active. So we must really say, not that the flash made me blink, but that the blinking prehended the flash and at once preserved it within itself as a stimulus of itself. The present subjective activity of blinking contains an objectification of a non-causal just past flash under the new determination which it never actually had, that of being a cause or stimulus. The past no longer subjectively acts, but is present only as an objectively immortal stimulus through the present event's appropriation of it as such.

All prehension contains both novelty, but also a decision to allow itself to be influenced by the past. This is a decision to disconform in one way even by conforming to it in another way. For example, a photonic event n in the career of a photon in a vacuum disconforms to the position of the prehended previous such event $n-1$. But event n conforms to photonic event $n-1$ in the matter of the distance of event $n-1$ from its predecessor event $n-2$. Assuming the cogency of more general arguments for panpsychism, here is a panpsychist hypothesis for understanding in particular constant velocity for a photon. To complete the hypothesis, the actual distance of photonic event n from its prehended predecessor event $n-1$ is to be understood in terms of the magnitude of the impression of the just past photonic event $n-1$ as directly prehended or objectified within the phenomenal field of event n . Event n is internally related to event $n-1$ which is not internally related to the novel event.

Each event in the series shares the instant of its cessation n with the instant of the next event's onset, making direct prehension of the preceding event possible. If we were to revert to the language of causal efficacy, this asymmetry would become the asymmetry of the causal relation to which Charles Hartshorne has repeatedly pointed (e.g., 1984, p. 106). event $n-2$, 1 event $n-1$, event n

Prehension is generalized from perception, and is analyzable in terms of phenomenal properties. If an event occurs but cannot have dispositional physical properties, the only tenable mind-brain identity thesis is that the identity of sentience with a physical brain state is identity of itself with itself under a false description. Yet something can be singled out even under a false description (Donnellan, 1967). Assuming that no comparable incoherence can be found in description by phenomenal properties, phenomenological description proves to be the true description of what is falsely re-identified in physicalistic terms. We conclude that, if physicalistic descriptions have explanatory and predictive power as Churchland maintains, a panpsychism with description merely in terms of occurrent phenomenal properties also has explanatory and predictive power. It inherits that power.

II. *Particular Panpsychist Explanatory and Predictive Hypotheses*

My original genetic argument for panpsychism concluded that complex minds have evolved ultimately from the simplest conceivable mind, and that the simplest conceivable mind is pre-biological, lacking the ability to alternate between pain and well-being through adaptive responses to threatening stimuli. This genetic argument creates a research program for cosmology as comparative psychology. The aim of this program is to hypothesize different forms of mentality to help more fully explain different apparent forms of physical behavior, including behavior in the realm of inanimate matter. I shall construct a theory of the initial stages in the evolution of mind in the light of contemporary natural science, arguing that mind at each stage has explanatory power, allowing a prediction of bodily behavior with greater confidence. Thus the explanatory power of panpsychism is not merely inherited through the above analysis of dispositional physical properties into phenomenal properties. I suggest that physical individuals change in themselves (and not merely for external observers), and that intrinsic change requires an individual body or particle to discri-

minate between and contrast qualitative differences in its immediate environment.

The individual distinguishes qualitatively between a just past qualitative state calling for one behavioral response and a new state calling for a new response. The new state, due its exclusion of the alternative previous state, is said to be "informative." All particles and bodies are alleged, in their behavioral responses, to be selectively sensitive to various stimulus situations in their changing environments.

Yet this is not by itself an argument for panpsychism, since it assumes that sensation mediates stimulus and response without argument. But if our three arguments—the argument from parsimony, the genetic argument, and the reductive argument—establish the general panpsychist thesis, we are called upon if possible to provide a specific panpsychist hypothesis to explain apparent change in a particle, atom, or molecule.

To explain is to reply to the question "Why?" As long as one can still ask "Why?" without a satisfactory answer, any explanation is incomplete. If we learn as a general law that photons impinging on the retina tend to cause blinking, this will permit us to predict blinking. But the question will still be unanswered "Why do photons impinging on retina cause blinking?" Once we learn that photons cause sensed pain and that the pain causes blinking, we understand better why photons cause blinking.

This will not enable us to predict more behavior which we could not have otherwise predicted. But it will provide a more satisfactory explanation, and hence a more reliable prediction. If we do not know why a particular cause (e.g., stimulus) results in a particular effect (e.g., response), we have less assurance that the prediction will uniformly hold than if we do know why.

The knee jerk is another example of a reflex mediated by sensation, though here the sensation is not one of intense pain as in the case of blinking. Yet there is a noticeable sensation of tension which is then released by the jerk. However, many reflexes occur throughout the human body without any noticeable sensation of pain or even tension. But, since they are not mediated by the central nervous system, we would not expect to be conscious of any pain or sensed tension involved.

A mentalistic understanding of the response explains more than mere constant conjunction between apparent physical descriptions. Yet the explanation of such an unconditioned reflex by introduction of the hypothesis of intermediary pain is not teleological explanation. A conditioned response is teleological. When a dog performs a trick for a biscuit we may suppose that the dog learns to see the trick as a means to alleviating a pang of hunger. But an unconditioned response is different.

When photons strike the retina, the blinking response is normally automatic, without contemplation by the organism of the blinking as a means of relieving the sensation of pain. My main explanatory panpsychist hypothesis is that a stimulus response model, modified according to Hegel's and Dewey's conception of it, should be applied to the behavior of bodies in the world of inanimate matter. This model assumes both the stimulus and the response to be describable by what are at first glance, pending reduction, physical properties. A stimulus at first glance has a dispositional physical property consisting in its capacity for causing a response. Yet it is of the nature of a disposition that it can exist without being exercised. It is only a tendency. The stimulus-response model I use further supposes that in the biological world no response to a stimulus is fully explainable unless it is understandable by the respondent's intention. It is not understandable that a sudden packet of photons causes someone to blink unless we suppose the photons to cause a sensation of pain from which the respondent intends to escape, hence unless we introduce an intermediary mental event connecting the physical stimulus situation to the physical response. The blinking response expresses a mental intention, thought it is not a learned response like the trick learned by a dog for the sake of a biscuit.

A stimulus-response model is a cause-effect model. The physical stimulus is a cause, and the response an effect. As we have explained, the cause does not exist before the effect. The particular present effect causes the cause to be the cause which it is. The effect solicits the cause to express itself the present, in that effect. A response as a particular response to a particular stimulus solicits the stimulus to be a stimulus of that response. The heat of a flame first stimulates the response of a child's finger outstretched with intention of touching it. The child touches it, and it hurts. Afterwards the heat is a very different stimulus, stimulating the response of flight in a child who remembers the pain of touching. The stimulus lacks the causal power it has independently of its effect, but becomes the stimulus it is in light of its effect. A force, as Hegel holds, is what it is through its expression. The response of flight is the expression of a stimulus. Since attraction and flight are different responses to heat, the stimulus in one case is a different stimulus from the conditioned or learned response which occurs in the second case. The stimulus which stimulates flight is not the stimulus which stimulates touching. Flight is not a purely passive response to heat as a pain-provoking stimulus, since it embodies the intention of avoiding pain. The experience of pain transforms the heat from being a stimulus of touching into being one of flight. The stimulus of flight really only exists in the present experience of it as provoking flight.

This was Dewey's conclusion in reflecting on the reflex arc, grounded in a Hegelian reflection on cause and effect, force and its expression. Our specific panpsychist hypothesis concerning the apparent world of inanimate matter—apparent pending reduction—is that intrinsic change before the evolution of life exhibits one genuine feature of life, namely, stimulus-response behavior, but without exhibiting other characteristics necessary to life such as reproduction or evolutionary adaptation over generations to a changing environment. Nor does apparent stimulus response behavior at the pre-biological level appear to display the kind of learning or variability of response through habituation or sensitization which is displayed by living organisms. We would not want to call a photon, an apparent photonic particle of matter, a living organism simply because it adapts to the impact of a non-transparent surface by changing the direction of its motion. Yet its behavior becomes understandable on a stimulus-response model if we attribute some analogue of pain to a photonic event upon impact. We thus hypothesize that the pain-mediated stimulus-response behavior of the most primitive one-celled organism is not the first such behavior to emerge in the apparent physical universe.

The hypothesis is that change in ostensible particles, atoms, and molecules should also be interpreted as such stimulus-response behavior. The evolution of the first life is not the first evolution of stimulus-response behavior, but is rather the complication of such behavior to include other emergent factors of life such as growth, organization, metabolism, reproduction, adaptation through generations to a changed environment, memory, and the habituation or sensitization of responses to stimulus situations.

I am not hypothesizing, however, that unconditioned stimulus response behavior mediated by pain, reflex behavior for short, is a cosmic constant. Supposing that there is a generalized sort of "pain" or discomfort which, like its opposite the sensation of well-being, does not depend on a specialized sense organ, a reflected photon shows understandable reflex behavior. But a photon maintaining its velocity in a vacuum (or in gravitational field with curved lines of inertial motion) does not show such behavior. Reflex behavior contrasts to the non-stimulus-response behavior of a photon of constant velocity. Non-stimulus-response behavior becomes understandable by a different but equally specific explanatory panpsychist hypothesis, by the hypothesis of an occurrent state of wellbeing as the reality behind the photon's non-exercise of its apparent dispositional property of potentially changing direction upon impact. (Yet if the photon's dispositional property, like all such properties, is merely apparent, its failure to exercise a dispositional property which we merely

Properties suppose it might exercise-subject to the reduction or elimination of dispositional properties in generally-is also merely apparent.)

A reflex is an automatic response to a stimulus. The reflection of a photon becomes such an automatic response. The panpsychist hypothesis makes the behavior of the photon understandable. In this case as well, the physical stimulus by itself does not provide a complete explanation of the physical response. The question remains: why does this stimulus cause this response? That question can be answered by realizing that the unreduced or apparent physical stimulus does not directly "cause" the response. It "causes" the response indirectly by directly causing pain. More exactly, the photonic response directly apprehends or prebends the stimulus as painful.

A stimulus has the dispositional physical property of being capable of causing a response. However, the disposition is not the only condition of its exercise. A reflex is not automatic in the sense that it cannot empirically fail. The photon as a body must continue to exist and not decay upon striking a reflective surface if the redirection of its motion is to occur. The reality behind merely apparent dispositional properties is either occurrent general pain or occurrent well-being.

A question which this raises is whether a mind that consciously discriminates in this manner is the simplest conceivable mind which we must suppose to be the starting point of mental evolution. Mentally as well as physically, evolutionary theory asserts that what is complex evolves out of what is simpler, though not necessarily out of the least simple conceivable unreduced particle or mind. The simplest conceivable particle capable of change is stable. It cannot be a completely unstable momentary quantum event. The absolutely simplest conceivable mind would be that of an absolutely stable apparent particle. Such particles, pending their reduction, may exist. They may exist in the background radiation of so-called dark matter incapable of emitting photons. Absolutely stable parallel particles, all flying with the same velocity, or equally stable dispersed particles reaching the velocity of escape in the expanding universe, might exhibit mentality at its simplest conceivable level. But we can never verify that a particle is absolutely stable, since the fact that it has endured until the present does not prove that it will not decay in the future. The simplest conceivable mind would be a sensation of a single undifferentiated quality, containing no information-bearing discrimination of distinct phenomenal qualities, hence no consciousness conceived as a contrast effect. Such a mind would be the mind of a totally unchanging stable particle following the law of inertia, without being impacted by any external force.

David Chalmers suggests that all experience contains information bearing consciousness of contrasting phenomenal states. But this is to suppose that all particles intrinsically change by mentally contrasting different phenomenal states eliciting different behavioral responses. "[W]herever there is causal interaction, there is information, and wherever there is information, there is experience. . . . [H]aving experiences ... may qualify as mind in its simplest form." (Chalmers, 1996, pp. 297-299).

But I am arguing that the mental life of the simplest conceivable particles does not exhibit change or consciousness of different phenomenal states, so that Chalmers theory of experience or mind as involving the experience of contrasting phenomenal qualities cannot be a fully universal theory of mind.

However, mind at this simplest conceivable level would lack any evolutionary potential. Particles of a nature allowing us to hypothesize the simplest conceivable mind may not even exist. All particles may eventually decay. Ancient atomism depended on a Parmenidean assumption in holding that atoms were everlasting. From being we could only derive being, not non-being. But the fact that an atom or even the world exists at time t_1 does not prove that it also exists at time t_1+n . The fact the world exists now may induce us into the lazy certitude that it will also exist thereafter, but that fact provides no real evidence. Yet contemporary particle physics is not party to that Parmenidean assumption. As a consequence of the fact that we cannot assume the existence of the simplest conceivable particles, we cannot assume the existence of the simplest conceivable minds. Since biological forms of mind that are not purely chemical exist, they have evolved, but they have evolved from a simpler form of mind capable of decay, which is a precursor of death. A still simpler form of apparent matter may exist, and it is important to have a specific panpsychist hypothesis to explain it if it does exist. But, even if there is such a form of matter, it is an evolutionary dead-end. Our panpsychist hypothesis in the case of particles capable of decay invokes the second to the simplest conceivable type of mind, mind consisting in the experience of well-being followed by pain and then the cessation of sensation, the cessation of existence.

The next higher degree of mental complication, corresponding to particles capable of surviving change, is then a mind capable of avoiding decay by an adaptive response. A good hypothesis in natural science, including a good panpsychist hypothesis, is one that helps explain a body's apparent physical behavior. The type of mind posited in a given case must be a type that has the «causal power» to modify or maintain subsequent bodily states in a particular way. Spinoza proposed that the sensation of generalized pleasure or well being—as contrasted to specific organ pleasure dependent on a specific sense organ—is causally effective in maintaining or increasing well being. The generalized sensation of pain, on the other hand, has a physical tendency to cause non-self-maintenance or decay by a body or particle. These two hypotheses are confirmed in human experience. If the three general arguments for panpsychism given above are valid, some special panpsychist hypo-

thesis is needed to explain different physical behavior at the pre-biological level. The stability of unreduced behavior of a particle is partly explainable by hypothesizing that it is inhabited by a general sensation of well-being which is positively reinforcing, while the decay of a particle is explainable by the hypothesis that its well-being is disturbed by pain for which it has no adaptive response. Pain and decay occur in such a particle when the conditions of its support fall out from under it. That is what happens to a particle in isolation when emitted from another particle. Only the absorption of an isolated particle into a larger stable particle may again give it stability.

If the argument we have previously given against the possibility of change is valid, we must ultimately reject the concept of « interaction" between particles. Interaction means that one particle acts on another which reacts on the first. Due to this reaction, the first particle would change. From the standpoint of quantum theory, the concept of interaction between continuants yields to the concept of successive discrete events, each at rest through its own duration. The burning log in the fire place heats a room, and then is cooled by the room which it has heated. Common sense holds that the burning log and the atmosphere of the room interact. The log indirectly causes itself to lose heat. By our panpsychist hypothesis, later events in that series of events which we call the log act to negativelyprehend some character of earlier events in the same series. (I use the Whiteheadian term "prehend" connote to a cosmically generalized concept of sensory perception.)

Contrary to classical atomism, to be destroyed in contemporary physics does not mean to have structure and then decompose into simpler particles. A particle, unlike a classical atom, can be simple and yet decay. It can go out of existence without dividing. It can pass from some finite energy level to a zero energy level. Yet even if the particle does not decay, each quantum event in the succession of events which is the particle can perish. An electronic quantum event upon impact in a one orbit can pass into a zero energy level in that orbit, but energy is maintained because the cessation of an electronic quantum event in that orbit is compensated by the emer-

gence of another electron event in another orbit. Quantum theory implies that there are no particles with continuous existence, hence no absolutely stable quantum events. The question of the « indestructibility" of a particle becomes the question of whether the series of quantum events is endless.

A photon is not an indestructible particle. As long as it follows the law of inertia in a gravitational field without colliding with another particle, we hypothesize that it exhibits mentality at the simplest conceivable level, without any differentiation between sensed qualities. Its sensation of wellbeing "causes" it to hold its state of motion constant. In other words, the next photonic quantum event positively prehends the rate of change of place shown by previous photonic quantum events. A photonic event n distances itself from the place of the prior photonic event $n-1$ in the same way in which photonic event $n-1$ distances itself from the prior photonic event $n-2$. It selects the previous event's way of selecting its place on the basis of the photonic event $n-2$, which in turn preserves the way in which event $n-3$ selects place on the basis of the place of event $n-4$, and so on. Such photonic events experience well-being.

But if a photon decays in photosynthesis as its energy is absorbed in the creation of a higher energy particle, it experiences well-being interrupted by discomfort. Thirdly, the photon in collision with a non-transparent surface experiences discomfort, and restores well-being only by changing direction. Discomfort repels it from replicating its behavior.

If an unstable neutron disintegrates after fifteen minutes when ejected from the nucleus of an atom, the explanatory panpsychist hypothesis is still different: the neutron consciously experiences something akin to pain in contrast to traces of the lost state of well-being which it had in the atomic nucleus. The neutron is not inhabited by the mind of a changing particle, let alone that of a living organism. It lacks a repertoire of adaptive responses with which to counter different forms of pain-provoking stimuli and thus with which to restore well being. The mind of a living organism even at the level of the amoeba is more highly evolved than that of a particle surviving threatening stimuli by an adaptive response. Yet both the changing particle and the amoeba are capable of passing from well-being to discomfort and back again to well being. The mental life in both cases is thus a repeated cycle of well-being disturbed and well-being restored. (This is not an assertion of fact, but an explanatory hypothesis that-in the light of parsimony, the evolutionary theory of mind, and the reducibility of dispositional physical properties-is alleged to be more likely true or not.)

The thesis that discomfort evidences a threat of tissue damage and

causes flight, and that pleasure conceived very generally is a cause of the continuance of behavior, is empirically confirmed in the human case. Pain, a mental event, has the causal power to alter behavior. For example, we have noted the stimulus consisting in photons hitting the retina, ostensibly a physical event. The adaptive response is the physical event of blinking. But what explains the fact that this stimulus causes this response? The physical stimulus of photons hitting the retina causes a mental sensation of pain, we have said, and that pain in a living organism in turn causes a physical blinking.

A one-celled organism also exhibits stimulus-response behavior. When an amoeba is exposed to oil in water, it withdraws. The panpsychist hypothesis is that the amoeba also experiences a kind of pain or discomfort, which causes the behavior of withdrawal. The amoeba is capable of a range of adaptive responses, and beyond this range dies. The amoeba is in the same evolutionary order as human beings. The argument from parsimony leads us to prefer interpreting the amoeba's behavior on analogy as well as disanalogy with human stimulus-response behavior. This means that we must be able to conceive mental states for the amoeba, but ones which are much simpler than in the human case. The amoeba lacks sense organs, and so its mentality lacks the different types of sensation corresponding to different human sense organs. It also lacks the specific types of organ pain peculiar to different sense organs, such as blinding visual pain or repugnant odor pain. Thus the amoeba contains no visual sensations, hearing sensations, or smell sensations at all. We must assert a generalized sensation of pain, tension or discomfort without the presence of structurally differentiated sense organs. We know from the human case that discomfort is common to some taste sensations, some visual sensations, and some audio sensations. In this sense it is a *common sensible*. We are contemplating the possibility of generalized discomfort that is neither that of light sensations, taste sensations, or audio sensations.

But the supposed mentality of the amoeba or even of the reflected photon, though much simpler than human mentality, is not the simplest conceivable mentality. For it contains the complexity of reflectively contrasting discomfort and well-being to. A conceivable mind on the next simpler level would experience well-being followed by discomfort, followed by decay and the cessation of sensation. Mind on this level includes discomfort reflecting on lost well-being, but no well-being reflecting on pain overcome.

Since the argument from parsimony depends on the conceivability of the mind of a photon in a vacuum or of the mind of an amoeba, it itself requires us to go beyond the concept of mind in general and to distinguish different types of possible mental happenings.

The parsimony argument depends on the premise that anthropomorphism can be avoided, that the subhuman mind of an amoeba, or even of an unchanging and absolutely stable particle, is not excluded. The genetic argument, however, proceeds to conclude that the logically possible mind of an unreduced particle capable of adaptive stimulus-response behavior and of eventual decay is not merely logically possible but is actual. It is actual so long as we deny that a complex biological mind could have radically emerged all at once, without evolving from a conceivably simpler mind. Ultimately we have to weigh what is more likely: 1. the evolutionary emergence of a complex whole from some conceivably simpler mind or 2. the radical emergence of mental complexity out of no simpler mind. If the evolutionary emergence of atomic complexity from simpler particles is accepted in physics, what reason do we have to discount it in the theory of the mind in favor of a radical emergence of mental complexity out of no simpler mind (as in epiphenomenalism or in creationism)?

We have pointed to a very general analogy between a primitive organism and the human mind, but there is a dissimilarity we have not mentioned. The connection between the human sensation of well-being and self-maintenance of the human organism is less necessary than in the case of a one-celled organism. Much as a rat on a treadmill can be so addicted to pleasure that it eventually dies of exhaustion, a human being on drugs may experience a euphoria that is very dangerous to health.

The reason is that a human mind, as the central control center of a hierarchically organized organism, can malfunction by losing active channels of communication with other organs. This is similar to the way in which Louis XVI might have felt quite happy at the palace in Versailles by not receiving messages regarding what was happening on the streets of Paris. But the amoeba and even the photon reflected off a non-transparent surface is in a different situation. It is not the central control center of a complex system. The connection between well-being and self-maintenance in the case of the human being is far looser than in the case of the amoeba or photon.

David Skrbina convincingly argues that an abstract panpsychism which argues merely that everything in nature inwardly has mind in general, totally abstracting from or negating any positive concept of mind, has no explanatory value.

«Panpsychism... only claims that all things (however defined) possess some mind-like quality. It says nothing, per se, about the nature of mind, nor of the specific relationship of mind to matter The view that it "crumbles to nothing" (Humphrey) when pressed to do explanatory work is the consequence of the lack of a corresponding concept of mind. To be fully intelligible the panpsychist outlook must be joined with a positive theory of mind. (Skrbina, 2005, p. 249)

I have argued for a theory of mind that is not merely general but that is specific and positive in identifying the type of mentality that has explanatory value at a given stage of evolution. Regarding "the specific relationship of mind to matter," our positive theory of mind assumes that we know minds under merely false, apparent, unreduced physical dispositional descriptions as well as under true non-physical occurrent mental descriptions.

Although we have argued that physical properties are reducible, we continue to work with them in a penultimate stage of analysis. Our theory of mind thus asserts that events under a mental description can so-to-speak have a "causal power" to alter events under a physical description, and vice versa. Damage to living tissue causes pain, and pain causes withdrawal from the physical causes of such damage. We refer to subhuman mental states under the description of causing behavioral changes manifesting flight from a hostile environment. We are aware of well-being by direct acquaintance, but we can also identify it under the very different description of tending to cause a continuation of established behavior. When human beings and even rats continue rewarding behavior, without hypothesizing sentience of positive tonality there is a gap in our explanation of the self-maintenance of behavior. Pleasure makes the behavior pattern understandable by virtue of its causal tendency. And this may be accepted even though, at more ultimate level of analysis, causal tendencies disappear in favor of the emergent present event's act of self-conformation to the past.

Conclusion. Materialists like Paul Churchland need to consider the explanatory power of different panpsychist hypotheses for a fuller explanation of the behavior of different bodies. They also need to look more carefully at the analysis of physical properties eliminating dispositional properties before they conclude that panpsychism has no explanatory or predictive power.

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