Causality, Emergentism, and Mentality

ROBERT M. HEMM, JR.

Mentality has proven extremely difficult to explain or account for in the sciences. By mentality, I mean the various capacities of reasoning, deduction, understanding, or other abilities that give rise to the kind of sophisticated interaction with the world that sets human beings and animals apart from all other living and non-living things. This difficulty represents one of the central features of the mind-body problem. The purpose of this paper is to suggest the possibility of an empirical outcome that would allow for an adequate explanation of mentality and remain consistent with our scientific hypotheses about the physical world.

The outcome I wish to consider is that brains are indeterminate and perhaps chaotic systems. The nature of their physical material and extended interaction with the world may result in their behavior being such that it cannot be precisely captured by the laws of physical causation. In this case, it would be possible for the brain to exhibit emergent properties, namely properties that could not be predicted from precise knowledge of its physical structure. The emergence of these properties could provide a physical account for our conscious experience and mentality.

I also offer two corollaries to this position. First, if mentality is indeed accounted for by the emergence of properties in brains, then Searle's argument about the importance of the brain itself in generating mentality would seem to be right (Searle, 1980, reprinted in Rosenthal, pp 509-519). Mentality may not be as multiply realizable as previously thought. This would deprive functionalists of one of their primary arguments against identity theories. Second, this model would render ontological functionalism[1] completely inadequate for describing the mentality of conscious entities. Functionalism is grounded in the idea that mentality consists of causal relations between inputs, machine states of the entity being described, and outputs. If it turns out that accounting for mentality requires a departure from the realm of normal causal relations, then functional accounts are invariably going to leave out part of the picture.

Causality, Chaos, and Indeterminism

Causality has been the subject of intense debate in the history of philosophy. Hume is well known for having argued that events we habitually take to be causally related are only incidentally correlated, and such observations do not prove the existence of causal order. Kant thought causality could be deduced from *a priori* considerations, as a necessary condition for the possibility of experience. The question of whether or not the universe is governed by a universal causal order remains unresolved, and developments in quantum mechanics have further clouded the issue.

In his book, *The Disorder Of Things*, John Dupre describes four possible ways in which the universe might be causally ordered. First, there is the possibility of strict determinism. This describes a world completely and precisely governed by exceptionless causal laws such that the state of things at time T′ can be exactly deduced from the state of things at time T. Second, there is what he calls probabilistic uniformitarianism. In this case, the world is still governed by universal causal laws, but laws under which the outcome at time T′ can only be predicted in terms of probabilities which can be generated from the state of the world at time T.[2] Third, there is probabilistic catastrophism. Here, the probabilities described in probabilistic uniformitarianism are not stable and inevitably disintegrate in bewildering complexity. The sheer plurality of possible causes and the indeterminability of their individual causal powers renders the precise generation of causal probabilities impossible. Thus, probabilistic causal laws do not actually exist, but can only be guessed or approximated. Finally, there is the lingering possibility of complete randomness, in which there is no causal connection between events whatsoever (Dupre, 172-173).

Neither strict determinism nor complete randomness are taken very seriously by the current scientific community. With the rise of quantum mechanics and string theory, probabilistic uniformitarianism seems to be the most mainstream view today. Dupre argues, however, for probabilistic catastrophism. To make his case, he first cites the fact that generating probabilistic causal accounts, especially in complex situations, faces insurmountable epistemological difficulties. Specifically, he brings up chaos theory, which deals with systems that are guided by relatively

deterministic mathematical functions, but functions that are indefinitely sensitive to exactness and alterations of certain variables. Thus, if realized physically, it would be impossible to measure such systems accurately enough to give a true account of the processes in motion. Meteorology is hypothesized to be an example of such a system, which would explain our failure in predicting the weather with much accuracy.[3] If it is not possible for us to generate causal probabilities, Dupre argues, why think they exist[4] (Dupre, 194-195)?

Dupre also makes general arguments against any sort of unamity thesis. This is the idea that all properties, phenomena, and laws in higher level sciences are derived from those in lower level sciences, and that a single overarching set of causal laws can be used to articulate all interactions taking place at all levels of complexity in the universe. Why then, he asks, do we encounter such heterogeneity in the types of phenomena and properties we encounter in the universe, heterogeneity which despite all our scientific efforts continues to resist reduction (Dupre, 203)?

While both of these arguments are central to the thesis of this paper, I do recognize that Dupre's claims are empirical ones, and ones which I am not qualified to evaluate in detail. Further scientific investigations may reveal them to be true or false, or may simply leave them unevaluated. However, I believe the conclusions reached by Dupre are plausible, and my task here is to examine their implications for the mind-body problem should we stipulate them. So, my position may be stated as conditional: If probabilistic catastrophism is true, it has important consequences for the mind/body problem.

Indeterminism and Emergentism

I turn now to a discussion of emergentism, a position that Jaegwon Kim summarizes in three tenets.

> 1. All that exists in the spacetime world are the basic particles recognized in physics and their aggregates....
> 2. When aggregates of material particles attain an appropriate level of structural complexity, genuinely novel properties emerge to characterize these structured systems....

> 3. Emergent properties are irreducible to, and unpredictable from, the lower-level phenomena from which they emerge (Kim 227-228).

Thus, emergentism is a type of non-reductive physicalism. When this doctrine is applied to the philosophy of mind, it is held that mentality is an emergent property of certain aggregate neurological constructions, namely brains. This property is a real and present feature of the world, but does not strictly reduce to more basic physical laws which govern the smaller parts comprising the brain. This sort of formulation allows consciousness to exist in the physical world without requiring that it be reducible. Hence, physicalism is combined with property dualism.

Emergentism faces a serious problem, however, which is that of downward causation. Emergentism takes emergent properties to be real and novel in themselves, not merely resultant from properties of lower level organizations of parts. Phenomena like mentality, once they emerge, seem to take on a life of their own. However, the problem then arises that if these properties are genuinely real, they would presumably interact causally with the world like anything else. Indeed, our mental states and events, decisions, and actions do seem to interact with the physical world through the apparatus of our bodies. My decision to lift my arm effects a change in the physical state of the world which is reflected at the level of elementary physics upward. Hence, these irreducible properties seem to interrupt the closed causal nexus that governs interactions at the more basic level, effectively subjecting it to the same objections that discredit Cartesian dualism (Kim 229-230). If the interactions at a certain levelare being influenced by interactions from another level (in Descartes' case, the mental and physical realms) how is this being done? By what mechanism? This is where Dupre's arguments become important.

Probabilistic catastrophism, unlike strict determinism or probabilistic uniformitarianism, does not specifically require a closed causal nexus governed by universal laws that determines outcomes or probabilities of outcomes. Without requiring the strict adherence to universal causal laws, it becomes possible for emergent properties to have downward causal powers without needing to be reducible. One could see the interaction of my consciousness with the world swinging the odds that a cataclysm

of events occurs in my neurological system, such that my arm moves. This type of interaction can be especially well articulated if the brain's functioning falls under the heading of any type of chaos theory, under which very minor alterations in isolated parts of the brain could produce large changes in overall outcomes. Now of course, it cannot be that the emergent properties cause particular outcomes that would have no chance whatsoever of occurring without the specific intervention. Emergentism has no problem with this caveat. Indeed, it would seem that the physical state of the brain and the specifics of the conscious experience must be closely related. Any theory in which this was not the case would fly directly in the face of overwhelming psychological and neurological evidence. It is certainly true that there are general rules of correlation extending between the emergent properties and the lower-level parts. The emergentist thesis is that these correlations are not *explained* by any set of reducible scientific laws. A universe governed by probabilistic catastrophism seems to make this possible.

Functionalism and Multiple Realizability

Emergentism under such a scheme creates serious problems for any functionalist theory of mentality. Functionalism seems incompatible with it in three ways. First, part of the impetus for something like emergentism is to render an account of consciousness and qualitative experience, an intuitively major part of human mentality but one which functionalism conspicuously seems to avoid or attempts to explain away as non-existent. While in this paper I am focusing primarily on mentality, an account of mentality ought to be compatible with some account of consciousness and qualitative experience. Second, all functionalist accounts include a *ceteris paribus* clause which precludes structure-changing events from being counted as inputs. However, this clause seems to ignore a central aspect of the brain's extended existence, and thus functionalism falls short of giving a complete account of the mentality to which the brain gives rise. Finally, if we accept that universal causal laws do not exist, functionalism's basis for explanation seems ill-founded, making it at best an approximation.

The first incompatibility is, for the most part, self-explanatory. Nagel's well-known article, "What's It Like To Be A

Bat?" (1974, reprinted in Rosenthal, pp 422-428) crystallized the problems with ignoring the first-person phenomenological experiences that comprise consciousness. Functionalism describes human beings as machines, and while providing algorithms for behavior, the machine-state paradigm offers no explanation for the qualitative experience of tasting chocolate, or how it feels to find one's way with bat sonar. Clearly, a complete picture of mentality should make some provision for such considerations.

The second incompatibility shows a way in which a functional account starkly contrasts with the functioning of actual brains. In order to allow the state-tables conceived in a functional model to be ontologically accurate, the functionalist must include a *ceteris paribus* clause so that very abnormal or structure-altering events (piercing of the cranium) are not counted as inputs.[5]

However, I contend that constant structural changes in the brain are neither abnormal, nor should they be excluded as important elements in understanding mentality. The brain is an incredibly complex system, consisting of billions of neurons, constantly taking in nutrients, forming new pathways, removing dead cells, and generally responding to its non-neurological interactions with the world (interactions that do not occur directly by way of incoming or outgoing nervous signals). Under the emergentist model, it seems likely that this ability to evolve and be in a state of constant structural flux plays some part in the emergence of mental properties. Hence, a functionalist model specifically lacks the dynamism that could be a crucial ingredient in mentality. While functionalism is indeed useful in making broader generalizations and seeming to uncover regularities, I state again that its determinations are too vague to account truly for the processes actually at work.

Finally and most importantly, functionalism bases mentality in the causal relations between inputs, machine-states, and outputs. The state-tables that articulate these relations either describe them either as deterministic (given state S and input I, output O and go to S′), or as probabilistic (given state S and input I, x% chance to output O and go to S′ and y% chance to output O* and go to S*) (Putnam, 1967, reprinted in Rosenthal, pp. 197-203). However, this relies on universal laws that are either strictly deterministic or probabilistically uniformitarian.

The type of emergentism I am describing does not conform to either type of laws, and thus a functionalist account that uses them does so on false grounds.

The emergentist thesis, combined with probabilistic catastrophism, leaves the question open as to whether or not mentality can be multiply realized. The thesis does, however, make it an empirical question, not a necessary condition. Using his famous Chinese room example, John Searle argued that the mere ability to mimic and provide appropriate output (given an input) does not amount to understanding or mentality. In "Minds, Brains, and Programs", Searle states, "My own view is that only a machine could think, and indeed only very special kinds of machines, namely brains and machines that had the same causal powers as brains," (1980, reprinted in Rosenthal, pg 519). It is unclear what it would mean to have the same causal powers as brains under the emergentist thesis. The irreducibility of the relation between the brain and mentality makes it difficult to evaluate what other types of systems might spawn the emergence of mental properties. It is certainly possible that mentality only emerges from brainy substances, in which case it would not be multiply realizable. On the other hand, mentality could appear in a system or medium very different from a brain, but it would be difficult to know whether or not this was the case. Our assignment of mentality to entities in the world is based primarily on behavioral observations, and thus a non-brainy system that had mental properties but did not behave in customary ways would be very hard to recognize. In any case, the question becomes one for science.

Notes

[1] It is important to distinguish between instrumental and ontological functionalism here. Instrumentalist functionalism only offers functional models as a useful tool in understanding mentality (something along the lines of what Daniel Dennett might suggest (Dennett, 1975, reprinted in Rosenthal, pp. 339-350), whereas ontological functionalism holds that mental states and functional states are identical, and thus functionalism captures the whole of mentality.

[2] Probabilistic uniformitarianism can be read to be either reductionist, or anti-reductionist. That is, it could be that the probabilistic laws operating at the various levels of organization are ultimately derivable from the laws operating at the most basic level (physics). On the other hand, it may be that the laws are not derivable, yielding an anti-reductionist theory. Dupre seems to peg most scientists as subscribers to something resembling the former interpretation (Dupre, 172), though either account seems plausible.

[3] One might say, however, that while meteorology does seem at times to be

chaotic and impenetrable, this does not mean that all science is like this, for we do frequently seem to observe isolated uniformities under the right conditions, such as the results of elementary chemistry experiments. I offer two responses. First, it does not follow that because probabilities in situations are ultimately indeterminate means they can not approximate out to something extremely high (approaching deterministic certainty). Second, it may be that in many cases where we take causal relations to be uniform, abnormalities are occurring, and either our observational apparatus and precision of classification are not adequately sensitive to them, or they are simply being written off as tainted experimental data. In both cases, we would be simply interpreting what we observe to be uniform when in fact it is not.

[4] The condition Dupre is speaking of is, on its face, an epistemological one. Dupre suggests that so far we have been unable to pin down strict causal laws, and given this difficulty, concludes that we have every reason to suspect that they do not exist at all, a metaphysical argument. Clearly, the thesis of this paper depends heavily on this indeed being a metaphysical condition, and not just an epistemic one.

[5] This is a criticism not exclusively applicable to functionalism, but to all sciences in general. Traditional laws of biology and chemistry begin to break down when extraordinary circumstances are presented (such as being in close proximity to a black hole).

Bibliography

Daniel C. Dennett, "True Believers: The Intensional Strategy and Why It Works" 1975, reprinted in Rosenthal (1991), pp. 339-350.

John Dupre, *The Disorder Of Things: Metaphysical Foundations Of The Dis unity Of Science.* Harvard University Press, Cambridge, MA, 1993. pp. 146-217.

Jaegwon Kim, *Philosophy of Mind.* Westview Press. Boulder, CO, 1998. pp. 226-233.

Thomas Nagel, "What Is It Like to Be a Bat?" 1974, reprinted in Rosenthal (1991), pp. 422-428.

Hilary Putnam, "The Nature of Mental States" 1967, reprinted in Rosenthal (1991), pp. 197-203.

David M. Rosenthal, The Nature of Mind. Oxford University Press. Oxford, UK, 1991.

John R. Searle, "Minds, Brains, and Programs." 1980, reprinted in Rosenthal (1991), pp. 509-519.