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## **Causation, Laws of Nature, and Mental Causation**

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### ***Abstract***

In this paper we argue that the type-identity theory of mental and neural states yields a plausible solution to the problem of mental causation and can successfully reply to various objections that have recently been raised against it. We begin by presenting the problem of mental causation and by offering a brief discussion of the problem of the nature of natural laws: our purpose in this first part is to show why a correct understanding of *ceteris paribus* clauses in laws opens the way to psychophysical laws. By examining the relationship between singular causation and causal laws, and by taking into account the claims emerging from the preceding sections, we then present and evaluate five different models of mental causation. Our conclusion is that only a monistic model is capable of making "the mind matter" without introducing implausible views of the causal relation between mind and body. Finally, we show how such a model can dispose of certain common dualistic objections that have been put forward against it.

*Keywords:* mental causation, causation, laws of nature, conservation of energy

### ***1. Introduction***

In a recent book, Jaegwon Kim (1998) has forcefully argued that the old Cartesian problem of explaining the relationship between mind and brain is still with us, particularly in the form of giving an account of mental causation that assigns causal efficaciousness to our mental states. How can our mind influence the physical world, granting that our intentional actions and our perceptions seem to entail that mental events can be, respectively, causes and effects of physical events? If this sort of generic psycho-physical interactions must be admitted, according to Kim it turns out that many currently accepted and influential physicalistic views of the mind-body problem are incompatible with the commonsensical assumption that our behavior is causally dependent on our

beliefs and desires, regarded as causally efficacious mental states of any thinking subject.

In this paper we argue that the type identity theory of mental and neural states yields a plausible solution to the problem of mental causation and can successfully reply to various objections that have recently been raised against it. In the first section of the paper we present the problem of mental causation as Kim has formulated it. In the second section we briefly discuss the nature of laws and show why a correct understanding of *ceteris paribus* clauses opens the way to psychophysical laws. In the third section we examine the relationship between singular causation and causal laws. In the fourth section we evaluate five different models of mental causation in light of the claims emerging from the preceding sections, arguing that the monistic model is capable of making the mind matter without introducing implausible views of the causal relation between mind and body. Finally we show how such a model can dispose of certain common dualistic objections that have been put forward against it.

## ***2. The Importance of Mental Causation***

Kim's argument in favor of the claim that the problem of mental causation is still haunting us can be thus summarized: if we suppose that each physical event must have physical causes and effects (the so-called principle of "the causal closure of the physical world"), then mental events can be causally efficacious only by being identical to physical events. Any other form of weaker co-variance between mental and physical properties just won't do, first and foremost Davidson's celebrated anomalous monism, and more generally, token-identity theories between the mental and the physical.

Strangely enough, however, such discussions about how mental events can, *qua mental*, influence our body and the physical world, dismiss a more careful examination of the relationship between causation and laws, and the more general nature of causation per se. And yet these more general questions are hardly irrelevant.

As is well known, one of these physicalistic views, Davidson's (1970), is a clear illustration that one's theory of the relationship between causation and laws of nature is of paramount importance to evaluate the strength of the argument. Davidson admits that mental and physical states are in causal commerce, but given his view that (1) strict, exceptionless laws can only be found in physics and that (2) the mental world is subject to normative and holistic constraints not to be found in the physical world, he has to claim that there cannot be any psycho-physical law. Combined with his endorsement of a nomological theory of causation, the thesis that there are no psycho-physical laws, conjoined with the view that mind and body are in causal interaction, leads Davidson to think that a mental event can be causally efficacious only by being subject to a strict, *physical* law. But any event that is subject to a physical law must admit of a physical description, and hence must be physical: it follows that every mental event is identical with a physical event. To this conclusion, Kim objects that since it is not the mental properties of the event in question that do the causal work *qua mental*, Davidson ends up in a sort of epiphenomenalist position, one, that is, that denies any causal power to the

mental.

Well, what's wrong with epiphenomenalism, or with the assumption that the mental is causally inert with respect to the body as much as the lights of a computer are with respect to the inner mechanism of the machine? Or, even more radically, what's wrong with assuming, together with the eliminativist philosopher à la Churchland, that all our (folk-psychological) talk of beliefs and desires as explainers of our behavior will one day be completely replaced and shown to be false? (2) Haven't we already replaced naïve Aristotelian physics with Newtonian science?

To this eliminativist attitude, which Kim does not seem to take seriously, one could object that not only does the very possibility of psychology as a science depend on the fact that "mental phenomena must be capable of functioning as indispensable links in causal chains leading to physical behavior" (Kim 1998, p. 30). What is even more important, if folk psychology is also wrong in trying to explain our behavior with beliefs and desires - something that requires in its turn an attribution of causal power to the latter - then most of what we believe of the world is false: "if it isn't literally true that my wanting is causally responsible for my reaching, and my itching is causally responsible for my scratching and my believing is causally responsible for my saying...if none of that is literally true, then practically everything I believe about anything is false and it's the end of the world" (Fodor, 1990, p. 156).

We shall argue that any general theory of causation, both in itself and in its relation to the question of the nature of laws, should confront itself with the problem of mental causation, to be regarded as a sort of *consistency test* of the theory. Conversely, we will also maintain that the problem of mental causation cannot be sharply formulated or its importance correctly evaluated, if we don't first try to solve issues such as nomological vs. singular theories of causation, or such as the difference between laws in the physical sciences and laws in the special sciences, and such as the role of *ceteris paribus* clauses in general. We shall show that it is only by achieving some sort of *reflective equilibrium* between (i) understanding the particular case of mental causation by placing it into the more general framework of a philosophical theory of causation, and (ii) measuring the consistency of the latter by testing it against the particular issues of mental causation, that we can shed some light on both questions and on the relation between body and mind.

### ***3. Ceteris Paribus Laws and Nomological Views of Causation***

Before starting our discussion, we must respond to a foreseeable objection that might be taken to undermine radically our project: are we not trying to explain the mysterious (mental causation) by the even more obscure and controversial theories of law and theories of causation? Shouldn't we rely on experiments in neuro-psychology in order to evaluate the truth of our commonsensical assumptions about the efficacy of mental states?(3) After all, the question whether mechanisms producing mental states can be (or actually are) *separated* from mechanisms underlying actions that we normally explain in terms of such states, is an *empirical* one.

While we wholeheartedly agree with this remark, it remains true that many

metaphysical arguments about the relationship between mind and body need to be evaluated on their own grounds, especially in so far as they rely on false presuppositions about the existence of strict physical laws, or implausible views of the relationship between causation and laws. For instance, van Fraassen has already remarked that Davidson's classification between nomic and anomalous forms of monism and dualism rely on the claim that there is a clear-cut distinction between merely true empirical generalizations and lawlike statements: if this presupposition were to fail, then there would obviously "be psycho-physical laws, even if no interesting ones" (van Fraassen 1989, p.34). And in a more recent essay, Davidson himself recognizes that a distinction between true empirical generalizations and lawlike statements is "essential to his argument for Anomalous Monism" (1995, p. 266).

In our opinion, the serious shortcoming of Davidson's view is his claim that physical laws have no *ceteris paribus* clauses, a position that, in our opinion, both Cartwright (1983) and Giere (1988) have convincingly refuted. To the extent that the non-existence of psycho-physical laws is made to depend on the distinction between strict laws and *ceteris paribus* generalizations, Davidson's argument for the token-identity theory fails completely. Consequently, given that Davidson's anomalous monism has independent shortcomings, Kim's worry that the latter is committed to a form of epiphenomenalism about mental events is misplaced. Couldn't it be that, in general, the problem of mental causation is a by-product of wrong views of causation and of the nature of laws? In order to inquire into this question, we need to make some general philosophical assumptions, for the justification of which we refer the reader to further work of ours.(4)

From the assumption that all natural laws are true only in ideal conditions, one might want to derive some plausibility for singularist theories of causation: if there are no laws (van Fraassen 1989) or true fundamental laws (Cartwright 1983), we cannot claim that the token event a causes the token event b only if events of type A are *regularly* associated with events of type B, as the follower of neo-Humean analyses of causation usually argues (nomological theory of causation). The association in question is the lawlike or nomic relationship between the event types, which, given the "*ceteris paribus* view of laws", is present in a complete, platonic sense only in the model. In the real world, such a relationship is only partially exemplified, by processes whose properties are never exactly identical with the idealized features of the models and never identical among themselves.

In the following we shall therefore take for granted that the notion of causation need not presuppose the notion of law in four different cases. The first two are quite obvious: (1) if fundamental laws are literally false as in Cartwright's view, or (2) if laws do not exist at all, as in van Fraassen's view, then events cannot exemplify the nomic link *a fortiori*. Furthermore, (3) if the view that laws are neither true nor false is taken to imply that they are devoid of empirical content (pseudo-descriptions), then it also follows that in the actual world events cannot exemplify any nomic link. Finally, (4) if *ceteris paribus* laws do have empirically content and can be regarded as being only approximately true, there arises in any case the epistemic problem of establishing under what respect a succession of events of type A and B is relevantly similar for us to say that they exemplify the *same* law, given that the circumstances of application are always different. For instance, if two bodies

are subject both to electric and gravitational forces, which law do they instantiate, Newton's or Coulomb?

Even the last argument is clearly epistemic, what matters for our purpose is to point out that this problem is in principle not different from establishing in single cases whether we are facing a genuine causal link or not. Therefore, we might as well assume that something can cause something else in the circumstances mentioned in the *ceteris paribus* clauses, independently of the existence of regular associations between A and B. Of course, within the fourth, "approximativist" option just described, one can still defend a nomological view of causation *and* hold on to the *ceteris paribus* view of laws: there is no strict contradiction in accepting both theses as true. However, the main advantage of the regularist theory of causation seems to be lost, since the problem of deciding whether we have repeated instances of the same law in different cases is not epistemically lighter than the problem of ascertaining the presence of a genuine, non-spurious causal link between the two entities.

On the other hand, it is clear why one wants to hold on to a nomological view of causation: according to Hume, *a priori* we cannot deduce the effect from the cause. Therefore we need the repetition of many instances of the same type of link between token events to be sure that we are not facing an accidental succession and thereby avoid fallacies of the kind *post hoc propter hoc*. However, this epistemic argument is not incompatible with the thesis that we can perceive *directly* the causal link in single instances, *after* the effect has taken place. There might well be no set of well-defined laws covering different single cases of Peter sliding on a banana and falling, but we are still justified in saying that the banana peel made him fall (caused him to fall). Analogously, a child touching a hot stove will not try to repeat the experience to make sure that the association still holds in the future.

If we cannot reduce the notion of "causation" to that of "law", we should likewise avoid regarding the notion of causation as more fundamental than the notion of laws. As an argument for this claim consider that whenever nomically related events take place outside their respective light-cone, as in Bell-type quantum correlations, *relativity enjoins us to regard the two measurement results (the two events) as being nomically related but not as causally related* (5). Any two states of a body moving inertially are nomically related but not causally related, since causes presuppose forces. More generally, it seems that whenever we are facing laws of co-existence rather than laws of succession, that is, laws restricting the kinds of events that are admissible in spacelike surfaces of a relativistic spacetime, the talk of causal laws is out of place and should be reserved only for laws of succession.

#### **4. Singular Causation and Laws**

We have argued that laws of a certain generality are idealizations and that the notion of causation cannot be reduced to that of laws. What then is singular causation, and how is this notion connected to psychophysical laws? How does it support different versions of the identity theory (namely token identity versus type identity theories between mind and body)?

We possess causal knowledge because we basically experience the world as

being causally connected. *Prima facie*, the link relating mental and physical states does not appear to be different from the connection between merely physical events. We could not act without knowing - or at least have reliable expectations about - the effects of our own actions, and the impact these would have on the things around us and we do not treat our actions as in principle different from the action of other merely physical systems.

Is it reasonable to claim that we *perceive* singular causal facts without having had any previous experience of them? When somebody, for the first time, sees an hurricane hitting a house and its roof being swept off, she realizes immediately that the strong wind has caused the roof to fly away, provided of course that she already acquired the relevant concepts. Indeed, we want to argue that causation is a primitive category, so that, in our example, the causal fact she perceives is a brute fact about nature (6). This clearly means that we take causality to be a fundamental category that cannot be explicated in terms of more fundamental notions. The causal nexus obeys its own logic, and we take the failures of representing it by some of the common logical connectives (extensional or intensional) as a strong indication that such nexus should be represented by a primitive symbol on its own.

What then we say about the causal nexus from an *ontological* point of view? Answering this question seems important to shed light on the question of how to understand mental causation. *First*, let us remark that the singular cause is *causally necessary* for its actual effect, that is, the effect would not have happened unless its cause brought it into being. Had this particular hurricane not hit this particular house with this particular force, the roof would not have been swept off at this particular moment. *Second*, a singular cause *produces* its effect. In other words, the singular cause *causally necessitates* its actual effect, that is, the effect is forced to happen by its cause.

*Third*, the singular cause is *causally prior* to its actual effect, and by this we mean that the casual relation is asymmetric, that is if  $x$  causes  $y$ , then it is not the case that  $y$  causes  $x$ . This third requirement amounts to saying that the cause possesses the producing power and, therefore, brings about the effect, even though we do not claim that the cause is *temporally prior* to the effect *a priori*.

*Fourth*, singular causation does not act in a vacuum. It always takes place in a particular causal field (a notion due to J.L. Mackie 1972) containing some circumstances that allow, or at least do not prohibit, the nexus to happen. In case the roof had been wired with steel or if it had had another shape, it might not have been swept off.

We shall distinguish *causally relevant circumstances* from causally irrelevant ones. Those that take part in the field, and whose presence or absence would result in a case, in which the cause would not have acted, are the causally relevant circumstances. For instance, whether it is day or night while the storm rages is a causally irrelevant circumstance, but perhaps not the actual temperature.

As we can see, very many facts can belong to the causal field, and which of them we select as *the* cause depends, as Norwood Russell Hanson (1958) noticed, on our cognitive interests. The owner, the insurance company and the constructors may have different interests in describing the accident; the owner wants the insurance money and focuses on the hurricane, the insurance company doesn't want to pay and focuses on a bad construction, and the constructor focuses on the fact that the house was built only to resist a wind

force of 150 mph, and that the actual hurricane had reached this limit in certain areas.

Such a dependency on our cognitive interest, however, does not turn the causal connection into an epistemic notion, as van Fraassen (1980) claims. It only shows that among those many facts belonging to the causal field, we may have different reasons to select one rather than another as the cause. In other words, both the cause and the relevant circumstances of the field are causally necessary for the effect, and together they are causally sufficient, in the sense that they, as a whole, causally necessitate the effect.

Now, we perceive singular causal facts as something depending on the events and matter involved, but we *do not merely* perceive them as individual cases; at the same time we perceive them as exemplifications of our general notion of causation. We must have such a notion that applies whenever we see some particular fact as an instance of causation, in the same way in which we need to have the notion of a cat in order to recognize it whenever we see one. We have not acquired the notion of a cat by observing just one cat, we have observed and acted with many cats, and noticed their differences with respect to all other types of animals. Similarly, our notion of causation is acquired through our experience of, and interactions with, many causal circumstances in comparison with our experience of, and interactions with, many situations where no causal connections are involved. This provides the epistemic justification of the above ontological claims that express what would have happened in the case in which the cause, or the effect, had not, contrary to the fact, happened.

It is clear that we apply such a general notion of causation whenever we see a singular causal fact, but it is also clear that this notion does not imply the existence of causal laws. Causation is an ontological concept, as well as a formal scheme, in the sense that it applies independently of the particular nature of the cause and the effect. What makes a relation a law depends very much *on the very nature* of the cause and the effect.

The next point is: how do we get to a causal law, if there are any, from singular causes? Well, we get there through abstractions and idealizations. First we have to see the individual cause *a* and the individual effect *b* as two instances of separate types *A* and *B*. Here we already disregard many contingent properties of particular hurricanes and particular roofs. By looking at them as *types* we see them as 'ideal' hurricanes and 'ideal' roofs, they are no longer concrete hurricanes and roofs because of their lack of individual properties. But, second and most important, we have to select among the actual circumstances those, which, by abstraction, can be considered as the *nomologically relevant* circumstances.

First of all we must classify all the actual circumstances as types; then we must select among them those, which always reappear as instances of these types in all other circumstances in which a hurricane sweeps off a roof. It means that the nomologically relevant circumstances become an *ideal* set of the actual circumstances. For instance, *a* causes *b* in the actual circumstances because somebody (*P*), or something (*Q*), didn't intervene although *P*, or *Q*, might have done so. The absence of such a particular intervention is causally relevant to the fact that *a* causes *b*, but neither the intervention of *P*, nor of *Q*, belongs to the nomologically relevant circumstances.

A nomologically relevant circumstance for event type *A* causing type *B* may therefore be defined as an ideal circumstance of a certain type which exists in

every possible world in which an instance of  $A$ , that is, either  $a1, a2, a3$ , etc., co-exists with an instance of  $B$ , that is, either  $b1, b2, b3$ , etc., but which does not exist in every possible world in which an instance of  $B$  occurs without an instance of  $A$ . In science, we isolate the nomologically relevant circumstances among the actual circumstances, by virtue of observations and experiments on situations which we regard as sufficiently similar to one another by contrasting situations in which instances of  $A$  and  $B$  occur, with situations in which an instance of  $A$  occurs without an instance of  $B$ , as well as with situations in which an instance of  $B$  occurs without an instance of  $A$  (7).

The upshot of this discussion is that any generalization of singular causes to a causal law is quantification over all singular relational states of affairs,  $a1$  causes  $b1$ ,  $a2$  causes  $b2$ , ..., and the nomologically relevant circumstances. Thus, we have that

**CL:** '*Ceteris paribus*', A causes B' is a law of nature if, and only if,  $(x)(y)(z)(A(x) \ \& \ CJ(y) \ \text{causes} \ B(z))$ , where  $y$  runs over all nomologically relevant circumstances  $CJ$  (8)

From an ontological perspective, it is possible to specify a causal law of nature as an abstraction from singular causal facts; but from an epistemic viewpoint, the practical discovery and justification of such a law may not always be available, because of its complexity.

Based on what has been said until now, it should be clear that neither the notion of regularity, nor that of counterfactuality, nor that of probability, can provide us with an account of causation. This suits well with the fact that we may have regularities without causes, counterfactuals without causes, and statistical correlations without causes. Rather we must say that the existence of regularities, probabilities, and counterfactuals should be regarded as *evidence* for the existence of a causal law.

### 5. *Mental causation*

Let us therefore suppose that both causation and lawlikeness are two fundamental notions, non-supervenient on non-nomic or non-causal facts. What does this entail for the problem of mental causation? It could be argued that if the causal link does not supervene or cannot be reduced to non-causal notions (physical *transference* of energy, *exchange* of virtual particles or of conserved quantities, etc. are clearly *causal* notions) (9), there is no a priori difficulty in attributing it to different ontological domains as the mental and the neural, provided that the expression "different ontological domain" does not presuppose different substances (substance dualism), but rather different *properties*, or ontologically viewed, different universals, belonging to different levels of reality. By referring to different *levels* of reality, we are thereby not foreclosing the possibility that the properties related by causation will turn out to be irreducible to one another. In order to further verify these claims, we need to inquire into the nature of causal *relata*, and the ontological commitments of singular causation.

Our discussion will proceed in three steps: (1) we shall present five



different causal models of the relationship between the mental and the physical, based on the above account of singular causation; (2) we shall evaluate these models against the *causal closure thesis*, namely the claim that the physical world is causally closed because of the principle of conservation of energy; and finally (3) we shall compare the models by evaluating their ability to make room for psycho-physical laws.

### 5.1 Five models of mental causation

What can the notion of singular causation tell us about the relationship between mental and physical events? It seems possible to set up five different models that fulfill the notion in different ways. In the following pictures, remember that black arrows stand for causally necessary relations, whereas white arrows represent causally necessary and sufficient connections.

Let us call singular, token mental states  $M$ ,  $M^*$ ,  $M^{**}$ , etc., and singular, token physical states  $P$ ,  $P^*$ ,  $P^{**}$ , etc. If we claim that  $M$ ,  $M^*$ ,  $M^{**}$  are identical with  $P$ ,  $P^*$ ,  $P^{**}$ , then there cannot be any causal connection between the  $M$ s and the  $P$ s. Obviously, a necessary condition for the existence of a causal connection between a and b is that a and b as the cause and the effect be ontologically different, in the sense that the individuation of one cannot be reduced to the individuation of the other. Hence, if we assume that  $M$ ,  $M^*$ ,  $M^{**}$  are identical with  $P$ ,  $P^*$ ,  $P^{**}$  respectively, we have a case of identity (the mental is identical with the physical) and therefore no causal connection can exist between  $M$  and  $P$ ,  $M^*$  and  $P^*$  and  $M^{**}$  and  $P^{**}$ .

It is partially for this reason that a defender of the causal efficacy of the mental like Searle holds the following position: two causal judgments ' $M$  causes  $M^*$ ' and ' $P$  causes  $P^*$ ' are different "descriptions of the same system at different levels" (1995, p. 219), while ' $P$  causes  $M$ ' and ' $P^*$  causes  $M^*$ ' are also true without it being the case that  $M$  is reducible to  $P$  and  $M^*$  to  $P^*$ . Notoriously, Searle defends the subjective, irreducible ontology of the mental, and therefore cannot claim that  $P$  and  $M$  are identical, but only that they can be causally related. The difficult question he must face is whether the existence of two causal descriptions of the same system (or the same relational state of affairs) at two different levels entails or not the identity of the relata. If it does, then for the reasons mentioned above,  $P$  cannot cause  $M$ , simply because it is identical with it, and Searle's view of the causal efficacy of the mental collapses into incoherence (see also Kim 1998, p. 49). If it doesn't, how can we claim that one and the same event  $P$  can cause both  $P^*$  and  $M$  (which exist at two different ontological levels) while avoiding the threat of epiphenomenism for  $M$ ? And if we avoid such a threat by insisting that  $M^*$  is caused by both  $M$  and  $P^*$ , don't we fall into the trap of overdetermining the causes of  $M^*$ ? While we do not want to rule out Searle's solution as impossible, what seems clear is that he needs to say more about the alleged causal relations existing between mental and physical properties and cannot just leave to the future development of the neurosciences the task to clarify the nature of such relations. In the following, we will try to pick up the challenge posed by Searle by discussing different models of mental causation.

To begin with, let us suppose that, contrary to Searle, causal connections can exist only between physical states or between mental states, where the latter

states are regarded as alternative descriptions of the former. So if  $P$  causes  $P^*$ ,  $P$  must, given the circumstances, be both *causally necessary and sufficient for  $P^*$* , and similarly if  $P^*$  causes  $P^{**}$ ,  $P^*$  must, given some other circumstances, be causally necessary and sufficient for  $P^{**}$ . The same relationships would hold for the  $M$ 's, but this model not allow either "downward" or "upward" causation and therefore reflects a version of *monism* (fig. 1). Notice that in the figure below, the two vertical, parallel lines represent token-identity between the respective events or states, while the white arrows represent, as said above, causally necessary and sufficient conditions for token events or states (10).

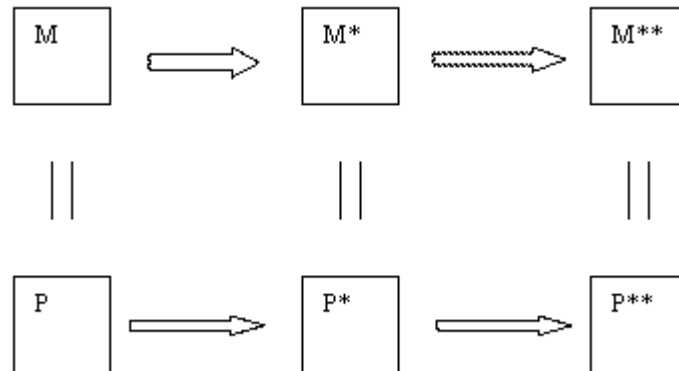


Figure 1. Monism

Within the other four models we are going to introduce, we shall assume that  $M$ ,  $M^*$ ,  $M^{**}$  are not identical with  $P$ ,  $P^*$ ,  $P^{**}$ . It is now possible to have various causal links between them.

The first of these models is the one we get by claiming that the causal connections between the  $P$ s is the same as in the model of reduction, that is,  $P$  is, given the circumstances, causally necessary and causally sufficient for  $P^*$ , represented by the white arrow of fig. 2. However, each  $P$  is *only causally necessary but not sufficient for  $M$* . Moreover, each  $M$  is also *only causally necessary but not sufficient for another  $M$* . But since a singular cause has to be causally sufficient for its effect, neither  $P$  nor  $M$  can by itself be the cause of any  $M^*$ . Instead we have a situation in which it is only the *conjunction* of  $P^*$  and  $M$  that, given the circumstances, is causally necessary and sufficient for  $M^*$ . So here  $P^*$  and  $M$  contribute to cause  $M^*$ .

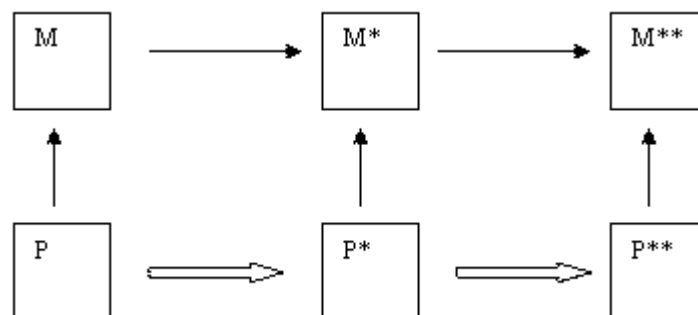


Figure 2: Emergentism

We shall call this model the model of *emergentism*. The mental level consists of ontologically independent mental phenomena that play an active role in

producing other mental phenomena, together with the underlying physical phenomena. The striking feature of the model is that no mental phenomena can take part in the production of any physical phenomena, but some physical phenomena always play a role in bringing about mental phenomena.

This model also resembles epiphenomenalism because no physical event (neural event) can ever be caused by a mental event, but, strictly speaking, it is not epiphenomenalistic, because mental events are endowed with the causal power of producing, together with physical events, other mental events, which are therefore *not* causally inert. Obviously, if we were interested in rescuing the intuition that desires and beliefs, in virtue of their mental content, make a causal difference in making our bodies move, this model would be useless, since here mental-to-physical causation is impossible: causation is always "upward" and never "downward"! It is for this reason that we cannot think of a philosopher that has defended such an option.

In the third model, both mental and physical states are very much interconnected, in the sense that for each mental state  $M$ , and for each physical state  $P^*$ , *there* has to be both an  $M$  and a  $P$  that together bring about  $P^*$  (fig. 3). For instance,  $M$  together with  $P^*$  causes  $M^*$ , since both are in the circumstances causally necessary and together causally sufficient for it, or  $M^*$  and  $P$  cause  $P^*$  for similar reasons. This model seems to reflect *property dualism*, and despite his allegations of overcoming the traditional position on the body-mind problem, the position it portrays seems closest to the one defended by Searle.

Obviously, the  $P$ 's we are considering here are physical events that can normally be caused by mental states, like grasping an object by moving one's arm, or developing a psycho-somatic disease, and not events like our heart suddenly stopping for a valve failure that are never taken to depend on mental volitions. In this sense, the  $P$ 's we are considering are an appropriately restricted set of the physical events occurring in our body, and, as we are about to see, the same applies to the next model.

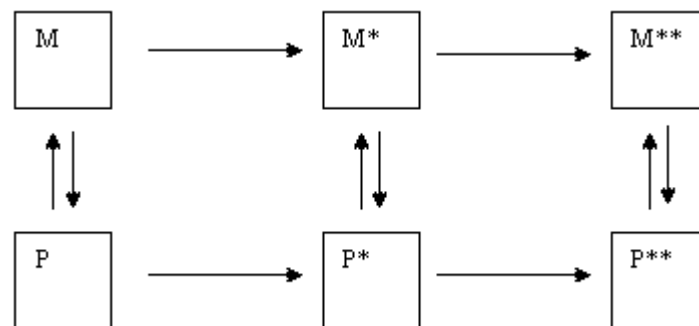


Figure 3. Property Dualism

The fourth model reflects typical Cartesian substance dualism (fig. 4). Here a mental state  $M$  may cause a physical state  $P$ , or vice versa, due to the assumption that  $M$  may, in the circumstances, be *causally necessary and sufficient* for  $P$ , or vice versa. So we can have causal links like  $M \square P \square P^*$ , or  $M^* \square M^{**} \square P^{**}$ , just to mention two examples, where ' $\square$ ' expresses the necessary and sufficient conditions of the causal relation. In this model, we have cases of overdetermination: in fact, what would prevent a mental state  $M^*$  from being fully brought about by two causes, a mental event  $M$  and a physical event  $P^*$ , operating at the same time? Apparently nothing.

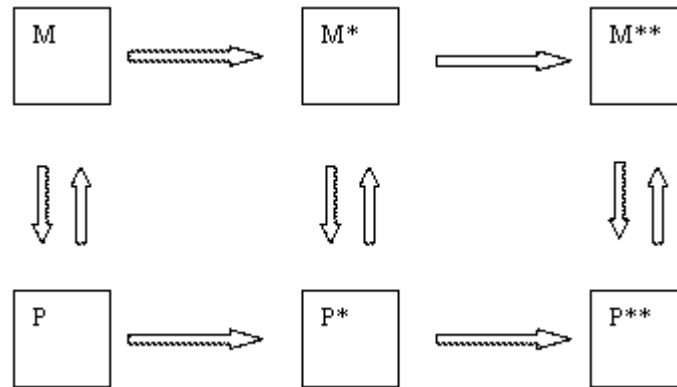


Figure 4. Substance dualism

The fifth model reflects psycho-physical parallelism (fig. 5). Here the causal links are exclusively relating mental events or physical events and no causal connection exists between the mental and the physical realm. Moreover, inhabitants of the two realms are not token-identical, as it was the case with the monism of fig. 1. Such a situation is reminiscent of the famous pre-established harmony defended by Leibniz.

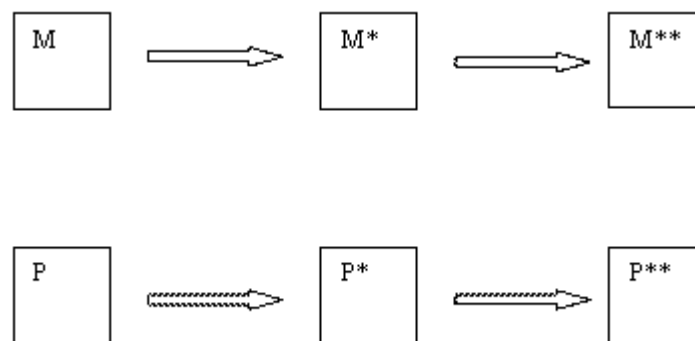


Figure 5. Psycho-physical parallelism

## §5.2. The five models and the Principle of the Causal Closure of the Physical World

After having described these five models, we want to make an evaluation of them, especially by keeping in mind the principle of the causal closure of the physical world (P). We shall define the causal closure not directly in terms of the principle of the conservation of energy, but in terms that can account for it:

**(P): Causal closureness:** All causal relationships are said to be closed on a certain level if, and only if, for every two causally connected elements on this level,  $x$  and  $y$ ,  $x$  is both causally necessary and sufficient for  $y$  in the circumstances

On the *physical level*, where the application of the principle of the conservation of energy makes sense, the ideas expressed in (P) and according to which

causes are causally necessary and sufficient for their effects is seen to correspond to energy conservation. In fact, if a cause were insufficient, then it would not provide the energy that is necessary for the interaction to take place (there would be less energy in the cause than is needed for the effect to occur); while if the cause were unnecessary, the amount of energy required for the interaction would be excessive (too much energy in the cause). In both cases, however, there would be a violation of the principle of the conservation of energy. Notice also that by applying such a principle we are not contravening the position expressed above about the non-analyzability of the causal relation in terms of some more primitive notion (like energy transfer); rather, we are simply using it to illustrate in a clearer way the implications of the causal closure vis à vis the soundness of the metaphysical views expressed by the various models.

If we begin from the last model we presented, we can see that psycho-physical parallelism by all means satisfies the causal closure postulate. In fact, the view was created to meet this very challenge. But since there are many other good reasons not to take the model seriously, the whole concept underlying it seems very implausible: the miraculous co-variation of physical and mental states would be utterly unexplainable and perhaps would be acceptable only on theistic grounds.

Both dualist models (substance dualism and property dualism) are easily seen to violate the causal closure thesis. On the one hand, what is so nice about such models is the fact that they allow causal links from the mental realm to the physical realm, or *vice versa*, as whenever we wish to listen to the radio and act accordingly, or feel the pain of the mosquito bite after the physical interaction. On the other hand, neither the model of property dualism, nor that of substance dualism, satisfies the principle of the causal closure of the physical world. The former model needs both a physical property and a mental property to have a cause of a mental state or a physical state, that is, both mental and physical states are only partial causes of other mental states or other physical states. The second model contains both mental causes of physical events and physical causes of mental events. Moreover, the fact that we may have perhaps infinitely many instances of causal overdetermination in the case of substance dualism makes this model even less convincing. For these reasons, our interest will focus on the two remaining models.

As we can see, neither model violates the principle of causal closure within the physical realm, in the sense that each physical event is both necessary and sufficient for another physical event, even though in the emergentist model, physical events may cause mental events: consequently, the mental realm in the latter model cannot be regarded as causally closed. Furthermore, it is still quite mysterious how physical events can be partial causes of mental events without being deprived of their energy, that is, without violating the principle of the conservation of energy.

However, both models seem to provide us with an account of physical-to-physical and mental-to-mental causation within a general conceptual framework of singular causality, and both models can apparently explain all empirical findings within neuroscience. If one has to make a decision between these two, it has to be made on other arguments, for instance whether both models can account for mental-to-physical causation, something that, as we have already seen, is not the case with emergentism. A further argument could

involve the compatibility with psycho-physical laws.

### 5.3. The five models and psycho-physical laws

Until now we have been considering only instances of token-token identity and token-token causation. We have also argued that not even within the physical world there are any strictly universal laws, and that laws must be recognized as abstractions and generalizations from singular causal facts. If this is true, however, many obstacles against the existence of psycho-physical laws are removed. Even within a model like that of psycho-physical parallelism, it would be possible to have some kind of laws between the mental and the physical, although these could not be causal in nature. If there were some regular correspondence between the same mental states and the same physical states, then we would have a law of co-variation instead of a law of succession. The model of psycho-physical parallelism is, however, excluded for other reasons, as are the two other dualist models.

Before we proceed we should consider possible forms of identity. Two entities,  $x$  and  $y$ , may ontologically be one and the same in two different ways. First,  $x$  and  $y$  are said to be *contingently* identical if and only if they are identical in the actual world, but not in every possible world. Secondly, let us say that two tokens  $x$  and  $y$  are *necessarily* identical if and only if they are identical in all possible worlds. Thus,  $x$  and  $y$  are ontologically distinct if they are not token-identical in any world. Moreover, we shall say that we have a *law of identity* between *types* of entities  $X$  and  $Y$  (11), if and only if their tokens are identical in all possible worlds; while we have a *law of co-existence* between two types of entities  $X$  and  $Y$  if and only if their tokens are nomically related but ontologically distinct in every possible world in which they co-exist.

Within the *model of monism* we have two interesting ways of generalizing: on the level of identity and on the level of causation. First, one may argue that we have only token-token identity between mental states and physical states, by denying any form of type identity. Then, of course, there is no room for psycho-neural laws, nor for psycho-physical laws (Davidson's view). What we have is that a singular physical state and a corresponding singular mental state are two aspects of one and the same reality. The mental and the physical appear distinct as of different, irreducible descriptions.

Notice a first drawback of these token-identity claims. A view which tries to exclude any psycho-physical laws of identity or co-existence is highly implausible, given the fact that some mental states show highly regular a connection with some physical states, say, thirst and a certain physical state of our body and brain. So type-type identity should be preferred within monistic views, despite the objections to the multiple realizability of mental states (Putnam 1967, Fodor 1972), to which we come if we break the type-type identity and we opt for a type-token "correspondence": the *same* type of mental state can be instantiated by physical states of different types. (12)

If, however, Fodor is right with respect to multiple realizability of the mental, there cannot be even a law of partial identity between the mental and the physical, but then it is difficult to see how we can distinguish physical states that have mental counterparts from those that do not have such counterparts: such a distinction would be sufficient to have some kind of psycho-physical laws. In fact, since the different physical states instantiating the same mental

type have nothing in common (otherwise they would belong to the same physical type), just about anything can instantiate a mental event. This consequence strikes us as implausible, and we take this as a serious shortcoming of Fodor's multiple realizability view.

Indeed, the multiple realizability of the mental can be constrained by an argument of supervenience, by saying that one and the same mental state *A* may be instantiated by many different physical states *B, C, D, F*, meaning that each of these different physical states gives always rise to the same mental state *A*. Each and every one of these physical states is sufficient for a person being in a mental state *A*. Thus, if two states, *x* and *y* have exactly the same physical properties, say *B*, then they will always have exactly the same mental property *A*, and if *x*, but not *y*, has the property *A*, then only *x* has one of the properties *B, C, D, F*, whereas *y* does not have any of them. Apparently, we have now been able to formulate a "law" of partial identity between mental states and a disjunction of physical states, where a type of mental state is identical with a disjunction of physical states in some but not all possible worlds. Certainly, well known puzzles about the non-natural character of a disjunction of predicates may raise further worries about the legitimacy of calling such a partial correspondence a genuine law.

Finally, we have the type-type identity as the third possibility. This is the truly *reductionist view*: here we have a law of complete identity (a bridge law) (13) by which a mental state and a physical state are identical in every possible world. The identity of certain type of mental states with a certain type of physical states seems a necessary requirement of reductionism, and we have already seen some of the weak points of the token-identity. Consider furthermore that when we claim that water is (identical to) H<sub>2</sub>O, or that the temperature in gases is (identical to) mean molecular velocity, we claim that the identities in question hold in every possible world (a posteriori necessity of the Kripkean form) (14). Therefore, in a reductive claim about pain and the famous C-fibers, we need to claim, likewise, that pain is *essentially* stimulations of C-fiber, and therefore necessarily identical to it, at least relatively to certain species. It is well-known that such a reduction may be eliminative (materialism, idealism) or non-eliminative (epiphenomenalism or identity theories).

## 6. *Emergentism or monism?*

In an attempt to evaluate the three different cases above, we have already pointed out that we find the token-token version implausible if it excludes any form of psycho-physical laws. The type-token "correspondence" seems only plausible given the constraints of supervenience, but its plausibility is questioned as soon as one realizes that what makes some physical states sufficient for a certain mental state seems to be a brute, not further explainable fact of nature. The type-type version has its difficulties of either explaining how subjective, first-person mental states are ontologically reducible to third-person physical states without ceasing to exist (non-eliminationism), or why mental states seem to exist if they are nothing but physical states (eliminationism *à la* Churchland). In our mind, however, these difficulties are not unsolvable. Recall that all three versions hold that it is the physical world (or some monistic version of that) that

does all the causal work. Physical states render mental states causally superfluous, or rather they make mental states causally efficacious only in virtue of their identity with physical states.

The *model of emergentism* does fulfill the thesis of causal closure, which means that no mental state can cause, or be a partial cause of, a physical state. At the same time, however, the model opens up for the possibility of mental states being causally active with respect to other mental states, but not with respect to physical states. This is important because a mental state is by itself never causally efficacious, since a physical state must always be involved with a mental state to bring about another mental state. Neither mental states nor physical states are alone sufficient to cause a mental state. But this does not exclude psycho-physical laws, in particular, laws of succession.

To convince ourselves of this claim, let us consider the singular causal link:  $M \& P^*$  causes  $M^*$ . A psycho-physical law of succession has to look like (CL) above. Now, assume that  $M$  has the property  $A$ ,  $P^*$  has the property  $H$ , and  $M^*$  has the property  $B$ . Then if the singular causal link can, given some circumstances  $C$ , be generalized along the line:

**PPCL:** '*Ceteris paribus*,  $A \& H$  causes  $B$ ' is a law of nature if, and only if,  $(w)(x)(y)(z)(A(w) \& H(x) \& CJ(y) \text{ causes } B(z))$ , where  $y$  runs over all nomo-logically relevant circumstances  $CJ$ ,

then we have a psycho-physical law of succession: obviously, only some form of type-type causation can satisfy (PPCL), given that laws always have to relate types of states.

The model of emergency presents the mental as ontological distinct from the physical; nonetheless, it regards the mental as partially causally active, and also regards physical states as being causally necessary but not causally sufficient for mental states. From a naturalistic point of view, one might argue that the mental has emerged as something distinct from the physical because it gave the organism an advantage in coping with the environment. But the problem is that in this model the mental is causally isolated from the physical so that the mental cannot play any role in the organism's adaptation to its environment.

Whether psycho-physical laws exist or not is not something philosophy can determine, as the question rests entirely on empirical discoveries of the neurosciences. But we see no reason why they shouldn't exist, as long as one recognizes that every law is a *ceteris paribus* law which may, because of the complexity of the *ceteris paribus* clause, only be manifested under very special circumstances and therefore have only very few instances.

We believe, however, that on the understanding of the laws of nature and causation that we have defended in this paper, together with some sound principle of causal closure, the philosophical arguments point towards the model of monism. In fact, if we want to justify the view that mental states have causal efficacy - say, because we think of desires and wishes as causes of our actions - then somehow mental states have to be regarded as identical with physical states. The kind of identity theory we advocate is non-eliminativist: by claiming that light is electromagnetic radiation, or that temperature is mean molecular velocity, we don't thereby regard light or temperature as having been



eliminated. Likewise, by claiming that certain mental states are identical with certain neural states, we are just claiming that the former are the latter and vice versa, not that the former don't exist. The kind of identity in question is therefore a scientific reduction, in which the senses associated to the descriptions belonging to the two different theories are semantically irreducible, but the descriptions themselves are co-referential.

## 7. *Some misconceived objections against the identity theory*

### 7.1. The zombie argument

At this point it seems appropriate to defend the monistic theory from the most common objections, aimed at denying the thesis of supervenience, namely the thesis that two physically identical worlds must exemplify the same mental properties. Is it conceivable to suppose that there are replica of ourselves (MD and JF), atom by atom and molecule by molecule identical to our bodies, but devoid of mental states? This objection is usually referred to as the "zombie objection". If it were conceivable that identical copies of ourselves exist without consciousness, the existing and confirmed evidence for the relation between our brains and our conscious states in our world could not be used to *explain* the latter, given that in another (logically or metaphysically) possible world brains don't give origin to any mental state. According to Chalmers (1996, p. 133-140), such an argument is meant to show that the conceptual link between the physical basis of supervenience and what supervenes on it is explanatory weak or inadequate.

As we see it, the zombie objection is, as many of these "conceivability arguments" in philosophy, *question-begging*. If a global mental state is identical with a physical state, it is inconceivable that a replica of oneself has no mental properties; it is only by presupposing that the physical and the mental are different (dualism of properties) that the zombie objection can be conceived, since mental properties are part of what makes MD and JF what they are.

If one is not fully satisfied with this reply, we think it undeniable that what we can conceive depends on what we *know* and is therefore a strongly *contextual* notion: before Copernicus and Newton, the motion of the earth was in general regarded as unconceivable, although Aristarcus had already envisaged this possibility. If this is granted, and we just cannot "conceive" how it can be denied, the conceivability argument is only meant to show that current scientific evidence in favor of the type identity theory is weak, namely that we have no reason (coming from current science) to suppose that a type of mental state is identical with a type neural state. If such a link between what is conceivable and what we know is to be denied, "conceivable" could just be synonymous with "logically possible", or "metaphysically possible" or "physically possible". Let us analyze these interpretation in turn.

The first rendering (logical possibility), would make the notion of conceivable so weak as to make it useless and irrelevant for philosophical arguments. In fact, we can claim that almost any proposition is true as long as we do not contradict ourselves; and even though a replica of ourselves without

mental states may be logically possible (meaning we can imagine it without perceiving contradictions), this is completely irrelevant for establishing whether in our world neural states are (type or token) identical with mental states.

More relevant, because much more constraining a notion, is the "translation" of conceivable given by metaphysically possible. In this case, however, how do we judge whether a zombie is metaphysically possible without taking into account what current science tells us about the relationship between mind and brains? It seems we are falling back in the interpretation of conceivable given above in terms of our knowledge: after all, if metaphysics is the attempt at establishing what "there is" or the ultimate constituents and properties of reality, epistemic arguments become relevant to choose among alternative proposals, and current science gives us the measure of reasonable beliefs about the structure of reality.

Ultimately, if conceivable means physically possible, whether zombies can exist is a question that should be left to current neurosciences, because it is our knowledge of physical or natural laws that provide us with the best theory of physical possibility. Physically possible is whatever is consistent with and allowed by natural laws. Perhaps the identity between neural and mental states could be contingent, meaning that the same type of mental state could be realized in different ways, but this is also a question that cannot simply be solved on the basis of conceptual analysis.

With respect to the requirements of explanation emerging from the zombie-argument, let us simply remark that even to the extent that the kind of relation linking mental and neural states were to prove contingent, explanations of the existence of such a link are reasonable and can be given in terms of the evidence for the link. We can explain why light is electromagnetic radiation by providing all the evidence that physicists usually give to convince us of the identity, as much as some astronomical facts can be quoted as to why the Morning Star and the Evening Star are two co-referential expressions.

## 7.2. Mary or the color-blind neuro-physiologist

Mary is a neuro-physiologist who has been brought up in a black-and-white room but who has complete knowledge of the neurophysiology of color perception of people leaving in a normal, colored environment. Later, she is allowed to observe colored objects for the first time. Supposing that she perceives a green object for the first time, can it then be argued that she thereby comes to know a new fact, namely, what it is like to see greenness? Shouldn't one acknowledge that there are other facts beyond the physico-neural facts of the brain, facts that would be irreducible to a complete physicalistic or neurophysiological description exhaustively known by her by hypothesis?

Some philosophers have tried to counter this argument by claiming that Mary does not really have access to a new fact, but simply to a new mode of presentation of the same fact that she already knows from neurophysiology (15). However, rather than endorsing this viewpoint, we tend to acknowledge that even the emergence of a new perspective about the same event or fact on Mary's part amounts to knowledge of a *new* fact.

A first way of blocking this argument amounts instead to questioning the meaning of "knowledge" in the claim that "Mary knows everything about the

neurophysiology of color perceptions". In fact, *why should we assume that she can attach a precise sense to words for colors despite the fact that she has never been exposed directly to them?* In all other cases in which mankind has succeeded in identifying features or descriptions of phenomena previously thought to be unrelated (light and electromagnetic radiation, Hesperus and Phosphorus), we had independent access to both modes of picking out the referent. But let us be charitable about this point, and grant that she can attach *some sense* to other people words designating colors and relating such words to types of brain states. Some other difficulty still stands in the way of claiming that she really has complete knowledge of color neurophysiology.

In fact, if a necessary condition to claim that she *knows* everything about color perception is that she has to have the corresponding brain state herself (so that knowledge by acquaintance is also needed for us to claim that one has *complete* knowledge), then it is just *inconsistent* to argue that she knows everything about color perception from a neurophysiological point of view, precisely because she has never been exposed to experience of colors.

It could be objected that the introduction of personal or subjective "viewpoints" about the world is incompatible with a scientific description, given that the latter is usually associated with an objective viewpoint, or a view from "nowhere" and "nowhen". However, if there has to be a reduction of the mental to the physical which does not endorse eliminationism, we cannot expect that the subjective or personal elements of our experience of the world are not part of what must be reduced, since reducing does not amount to eliminating (16).

Furthermore, the claim that Mary's looking at a colored object for the first time amounts to her having a new experience does not entail that the latter is irreducible to a brain state. The fact that we cannot deduce the quality of an experience or the new fact from an impersonal description of the brain state of someone else who is perceiving a color is no objection against the identity theory. Let us imagine that Mary's complete knowledge includes, as it should, knowledge of the brain states that people in the normal world have when they look at colored objects. Let us also assume that Mary has access to her own brain states, that is, that she knows what neuro-physiological states are instantiated by people lacking color vision like herself. So she knows that when she looks at a black and white picture of a tomato in her black and white room, her brain state and the brain of a person looking at the colored tomato in the real world must *differ*.

It follows that she knows that there are brain states that she lacks and that are related to color perception, since these are usually exemplified by people interacting with colors. However, she does not know yet what it is like to experience colors and therefore what it is like for her brain to be in the corresponding state unless (1) she goes out of the room and watches the world or (2) she manipulates her own brain (perhaps with some chemicals) so as to put it in the very same state in which other people's brains are when they perceive colors. In both cases, she gains knowledge of a new experience, a new fact given by her first perception (or hallucination) of colors, which she already knew how to describe in neuro-physiological terms.

In a word, the moral of Mary's story is as follows: *epistemically*, the accumulation of physiological knowledge about other people's brain is not *sufficient* to also know what they are experiencing when they are looking at colors. However, such a correct epistemic remark has no *ontological*

significance *vis à vis* the identity theory, since the new fact given by Mary's experiencing colors for the first time can be regarded as identical with Mary's having a new brain state that she never instantiated before.

From our discussion it also follows that the debate on whether Mary is really getting to know a new fact or is just acquiring a new ability is a red herring. She undergoes a new experience, as much as she would if she had been exposed to any experience involving a different token-brain state that she never exemplified before but belonging to an ontological kind that she had been observing by studying the brains of other subjects. Suppose that Mary can tell the content of the belief of an observer exposed to colors from his brain state, for instance she can tell that "Mr X is looking at a red apple". We must say that when she observes a red apple for the first time, then she must have a different belief, which is acquired in a non-inferential way, namely the belief that "I am looking at a red apple". Such a difference nicely reflect the fact that Mary's argument really hinges on purely epistemic considerations, and has no ontological import.

## **8. Conclusions**

In the first part of the paper, we have tried to explore the consequences of some reasonable assumptions about causation and laws for the problem of mental causation. These considerations led us to some form of monistic materialism, based on a type identity theory. In the second part, we examined and refuted the main arguments that have been raised against the identity theory and the supervenience of the mental on the physical. Such an examination confirms the conclusion drawn in the first part of the paper.

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## NOTES

(1) We thank the Danish Academy of Science for having given to one of us the opportunity of spending a research period in Rome. The audience in Vercelli, and J. Kim in particular, has provided useful suggestions and criticism, which we have tried to take

into account. We are also thankful to the anonymous referee for his precious remarks, which have certainly improved our work.[back](#)

(2) Churchland (1995).[back](#)

(3) See Glymour's (1999) review of Kim's book, which correctly warns philosophers of mind to build on science rather than on dubious metaphysical assumptions. [back](#)

(4) See Faye (1994) and Dorato (2000).[back](#)

(5) Banning, of course, superluminal causation and action at a distance.[back](#)

(6) See the psychological studies of Michotte (1963).[back](#)

(7) As is evident, in our view causal laws, unlike singular causal statements, refer to types of events. However, we don't regard types of events as universals in Armstrong's sense. See his (1983). [back](#)

(8) As is evident, in our view causal laws, unlike singular causal statements, refer to types of events. However, we don't regard types of events as universals in Armstrong's sense. See his (1983). [back](#)

(9) For the conception of causation as energy flow, see Fair (1979). Heathcote (1989) develops a reductive account of causation as *interaction* in a suitable quantum field theory, while Dowe (2000) defends the claim that causation is exchange of conserved quantities. [back](#)

(10) Such a token-identity between mental and physical events is defended by Davidson (1970), except that he is committed to a nomological theory of causation. [back](#)

(11) Recall from CL above that laws must always involve kinds of entities. [back](#)

(12) The converse claim that the same kind of physical state is instantiated by token mental states belonging to different types has had no advocates, since it would break the supervenience of the mental on the physical. A difference in the mental type would not correspond to a difference in the physical type. [back](#)

(13) On the role of bridge laws in scientific reduction, see Nagel (1961).[back](#)

(14) See Kripke (1980).[back](#)

(15) Lewis (1988), Nemirow (1990).[back](#)

(16) Compare Nagel (1974).[back](#)

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