

THE MONIST

An International Quarterly Journal of General Philosophical Inquiry

FOUNDED 1888 BY EDWARD C. HEGELER

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With the foregoing distinctions in mind, it can be seen that the qualitative categories and the conceptual categories for the world hypothesis being here developed are distinct sorts of predicates. The qualitative categories refer to qualitative properties of the world, the conceptual categories to conceptual properties. A full description of the world in terms of either the qualitative or the conceptual properties would be true, so far as our world hypothesis may be adequate, but the truth of the conceptual description would ultimately depend on the truth of the qualitative one.

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CAUSATION

Metaphysicians, theologians and philosophers generally once thought of an efficient cause as something that *produces* something. That which was produced, according to this ancient idea, was a new being. In the case the new being was a substance—a soul, for example, or matter, or any substance at all—then the causation of that being was considered an act of creation. It is in this sense that God was quite naturally thought of as the creator of the world, and also, as its efficient cause. If, on the other hand, the new being was simply a modification of an existing substance, then there was no creation, in the strict sense, but only what Aristotle called generation. When a sculptor, for instance, fabricates a statue, he does not create anything, but simply imposes changes upon what already exists. Still, he does produce a new being—namely, a statue—even though this new being is only the modification of a substance that already existed. This is the way Plato, in contrast to later Christian theologians, thought of God's relation to the world. God, or the demiurge, according to this idea, was the cause of the world only in the sense that he converted chaos into a universe. He did not create the chaos with which he began.

Now this original idea of an efficient cause had no necessary connection with the ideas of uniformity, constancy or law. It was always supposed that, given the cause, the effect must follow; but this was not usually understood to mean that, given the same cause, the same effect must always follow. A particular sculptor, for example,

was considered the efficient cause of a particular statue, but it was not supposed that this sculptor could do nothing but make statues. The necessity of an effect, given its cause, was thought to be a consequence of the *power* of the cause to produce it, and not of any invariance between that cause and that effect. Thus, if a sculptor has the power to make a statue, and exercises that power upon marble, then the marble cannot help but become a statue; the effect must follow, given its cause. Thus arose the idea, so clear to our predecessors but so obscure and implausible to us, that a cause must be as great or greater than its effect; the greater cannot be produced by the lesser. It is also this idea of the power of a cause to produce its effect which gave rise to the common distinction between acting and being acted upon, and the kindred distinctions between agent and patient, activity and passivity. A sculptor *acts* in creating; or causing, a statue, but the marble upon which he acts, or exercises his power, does not act; it is a purely passive recipient of changes imposed by an active cause.

We thus find in this ancient idea of an efficient cause two closely related concepts, that of *power* or *efficacy*, and that of *necessity* or *compulsion*, both of which concepts modern philosophers have been eager to eschew if they can. The idea of efficacy is, of course, part of the very etymology of "efficient cause."

Power.—An efficient cause was thought to produce its effect by virtue of its power to do so. Berkeley considered this so obvious that he used it as an important argument to prove that our ideas cannot be caused by other ideas, but must be produced by an active being. Ideas, he said, are altogether inert or passive things, without the power to cause anything. God, of course, has always been thought

of by theologians and philosophers as a being of such power that he can produce a world. This is essentially what was meant by calling God a "first cause"—namely, that everything ultimately depends for its existence upon his power, whereas he depends upon the power of nothing except himself. It was in the same way that statues, temples and other human artifacts were considered the expression of human power. The very movements of men and animals were thought to be the expression of the power of such creatures over their own bodies, leading Aristotle to describe animals as self-moved. When philosophers eventually came to analyze this idea of power within the presuppositions of empiricism they became involved, of course, in enormous difficulties. The longest part of Locke's *Essay* is devoted to a tortuous and inconclusive discussion of it. Thomas Reid finally affirmed that the idea of the active power of a cause—as exemplified, for instance, in the power of a man over his own voluntary movements—cannot be analyzed or defined at all, though it seemed to him perfectly clear and intelligible.

This is but an intimation of the importance that the idea of causal power once had in philosophy and metaphysics. It is seldom any longer referred to, being now assumed to be, at best, a derivative concept, with the result that much traditional metaphysics is simply incomprehensible to modern students.

There is, however, one element in this notion of causal power or efficacy that has never been doubted, and is even still a part of everyone's conception of causation; namely, that the power of an efficient cause never extends to things past. This priority of efficient causes to their effects is not, moreover, a mere convention of speech, but a metaphysical necessity. The power of a cause to produce an effect has a

fixed temporal direction that results, not from the connotations of words, but from its very nature as an efficient cause. Nothing past is within the power of anything, either to do or undo. Aristotelians might express this by saying that the past contains no potentialities or real possibilities; everything past can only be what it actually is. Things present, on the other hand, are capable of becoming a variety of things, depending on what they are converted to by the causes that act upon them. It is in this sense, according to this way of looking at things, that the future, unlike the past, contains alternative and mutually incompatible possibilities, and is thus within the power of men and other efficient causes and movers to determine in this way and that.

Necessity. The second concept involved in this original idea of an efficient cause, it was noted, is that of *necessity* or *compulsion*. The efficient cause, it was always thought, *makes* its effect happen, the relation between cause and effect being such that, given the former, the latter cannot fail to occur. There was never thought to be any *necessitation* or *compulsion* in the reverse direction, however; that is, an effect was never thought of as compelling the occurrence of its cause, despite the fact that the cause could be as certainly inferred from the effect as the effect from the cause. Thus, a man vanquishes his foe by making him die; that is, by doing something which renders it impossible for him to live. But despite the fact that one can infallibly infer a cause from such an effect, it was never thought that the effect compelled the occurrence of the cause. Similarly, a man, in raising his arm, makes it move upwards, the arm being the passive recipient of changes wrought by an active cause. Or, to take an example from inanimate nature, the sun warms a stone, or makes it be-

come warmer, in a manner in which it cannot be said that the stone, in becoming warmer, makes the sun shine upon it.

A return to the metaphysics of causation. This ancient idea of an efficient cause that I have very loosely sketched is generally considered by contemporary philosophers to be metaphysical and obscure, and quite plainly erroneous. We have, it is generally thought, long since gotten rid of such esoteric concepts as power and compulsion, reducing causation to simple, empirically discoverable relationships such as succession and uniformity. I believe, on the contrary, that while this older metaphysical idea of an efficient cause is not an easy one to grasp, it is nonetheless superior and far closer to the truth of things than the conceptions of causation that are now usually taken for granted.

It is the aim of this discussion to defend this claim. I shall do so by showing that the attempts of modern philosophy to expurgate the ideas of necessity and power from the concept of causation, and to reduce causation to constancy of sequence, have failed, and that the ideas of power and necessity are essential to that concept. Many philosophers are now apparently agreed that causation cannot be described without in one way or another introducing modal concepts, which amounts to re-establishing the necessity which Hume was once thought to have gotten rid of, but hardly anyone, apparently, has noticed that we need also the idea of power or efficacy. If, as I believe, both of these ideas are indispensable, then it will be found that the advance of contemporary philosophy over the metaphysics of our predecessors is much less impressive than we had supposed.

Necessity vs. invariable sequence. Let the letters A, B, C . . . etc., designate events, states of affairs, conditions, or substances which, we assume, *have* existed. These symbols, in other words, shall designate anything we please that was ever real. This stipulation excludes from our consideration not only things future, but also things that might have but in fact did not exist, as well as impossible things, kinds or classes of things as distinguished from things themselves, and so on. Now we want to consider true assertions of the form "A was the cause of B," where in we assume that A was in fact, as asserted, the cause of B.

Let A, for example, be the beheading of Anne Boleyn, and B her subsequent death, and assume that the former was the cause of the latter. What, then, is asserted by that statement? Does it mean that A and B are constantly conjoined, B following upon A? Plainly not, for the event A, like B, occurred only once in the history of the universe. The assertion that A and B are constantly conjoined—that the one never occurs without the other—is therefore true, but not significant. Each is also constantly conjoined with every other event that has occurred only once. Nor do we avoid this obvious difficulty by saying that B must follow immediately upon A in order to be the effect of A; for there were numberless things that followed immediately upon A. At the moment of Anne's death, for instance, numberless persons were being born here and there, others were dying, and, let us suppose, some bird was producing a novel combination of notes from a certain twig, any of which events we may assume not to have happened before or since. Yet the beheading of that queen had nothing to do with these. Mere constancy of conjunction, then, even with temporal contiguity, does not constitute causation.

Here there is an enormous temptation to introduce classes or kinds, and to say, after the fashion familiar to all students of philosophy, that A was the cause of B, provided A was immediately followed by B, and that things similar to A are always in similar circumstances followed by things similar to B. This, however, only allows us to avoid speaking of necessary connections by exploiting the vagueness in the notion of similarity. When confronted with counter examples, one can always say that the requisite similarity was lacking, and thus avoid having to say that the necessary connection was lacking. What does "similar" mean in this context? If we construe it to mean *exactly* similar, then the class of things similar to A and the class of things similar to B have each only one member, namely, A and B, and we are back where we started. The only thing exactly similar to the beheading of Anne Boleyn, for instance, is the beheading of Anne Boleyn, and the only thing exactly similar to her death is her death. Other things are only more or less similar to these—similar, that is, in some respects, and dissimilar in others. If, however, we allow the similarity to be one of degree, then the statement that things similar to A are always followed by things similar to B is not true. A stage dramatization of the beheading of Anne Boleyn is similar—perhaps very similar—to the beheading of Anne Boleyn, but it is not followed by anything very similar to her death. Here it is tempting to introduce the idea of relevance, and say that things similar to A in all relevant respects are followed by things similar to B in all relevant respects; but this just gives the whole thing away. "Relevant respects," it soon turns out, are nothing but those features of the situation that have some causal connection with each other. Or consider another example. Suppose we have two pairs of matches. The first

pair are similar to each other in all respects, let us suppose, except only that one is red and the other blue. The other pair are likewise similar in all respects, except only that one is wet and the other dry. Now the degree of similarity between the members of each pair is the same. One of the differences, however, is "relevant" to the question of what happens when the matches are rubbed, while the other is not. Whether the match is red or blue is irrelevant, but whether it is wet or dry is not. But all this means, obviously, is that the dryness of a match is casually connected to its igniting, while its color is not.

Laws. Sometimes difficulties of the kind suggested have been countered by introducing the idea of a *law* into the description of casual connections. For instance, it is sometimes suggested that a given A was the cause of a given B, provided there is a law to the effect that whenever A occurs in certain circumstances, it is followed by B. This appears, however, to involve the same problems of uniqueness and similarity that we have just considered. There can be no law connecting just two things. It can be no law, for example, that if Anne Boleyn is beheaded, *she* dies, or whenever a particular match is rubbed, *it* ignites.

One could, perhaps, overcome these difficulties by embodying in the statement of the law precisely those respects in which things must be similar in order to behave similarly under certain specified conditions, all other similarities and differences being disregarded as irrelevant. For example, there could be a law to the effect that whenever *any* match of such and such precisely stated chemical composition is treated in a certain specified way, under certain specified conditions, then it ignites. Any match of that description would, of course, be similar to any other fitting the same description, and any other similarities and differ-

ences between such matches, however conspicuous, would be "irrelevant" i.e., not mentioned in the law.

That overcomes the difficulty of specifying how similar two causes must be in order to have similar effects. They must, according to this suggestion, be exactly similar in certain respects only, and can be as dissimilar as one pleases in other respects. But here we shall find that, by introducing the idea of a law, we have tacitly re-introduced the idea of a necessary connection between cause and effect—precisely the thing we were trying to avoid. A general statement counts as a *law* only if we can use it to infer, not only what does happen, but what would happen if something else were to happen, and this we can never do from a statement that is merely a true general statement.

To make this clear, assume that there is a true statement to the effect that any match having a certain set of properties ignites when rubbed in a certain manner under certain conditions. Such a statement, though true, need not be a law. We could easily take a handful (or a car full) of matches, and give all of them some set of properties that distinguished them from all other matches that ever have existed or ever will exist. For example, we could put the same unique combination of marks on the sticks. Having done so, we could then rub each in a certain way and, if all of them in fact ignited, it would then be *true* that *any* match that has those properties ignites when rubbed in that fashion. But this, though a true statement, would be no law, simply because there is no necessary connection between a match's having those properties and behaving as it does when rubbed. If, contrary to fact, another match were to have those properties, but lacked, say, the property of dryness, it might not ignite. For a true general statement of this kind to count as a law, then, we must be able

to use it to infer what would happen if something else, which does not happen, were to happen; for instance, that a certain match which lacks some property would ignite if only it had that property. This, however, expresses some necessary, and not merely *de facto*, connection between properties and events. There is some connection between a match's being dry and igniting when rubbed. There is not the same connection between its being decorated in a certain way and igniting when rubbed—even though it may be true that every match so decorated does ignite when rubbed. But this only means that the decoration on its stick does not have anything to do—has no necessary connection—with a match's igniting when rubbed, while its being dry does.¹

Causes as necessary and sufficient conditions. In the light of the foregoing we can now set forth our problem more clearly in the following way.

Every event occurs under innumerable and infinitely complex conditions. Some of these are relevant to the occurrence of the event in question, while others have nothing to do with it. This means, that some of the conditions under which a given event occurs are such that it would not have occurred, had those conditions been absent, while others are such that their presence or absence makes no difference.

Suppose, for instance, that a given match has ignited, and assume that this was caused by something. Now it would be impossible to set forth all the conditions under which this occurred, for they are numberless. A description of them would be incomplete if it were not a description of the entire universe at that moment. But among

those conditions there were, let us suppose, those consisting of (a) the match's being dry (b) its being rubbed in a certain way, (c) its being of such and such chemical composition, (d) the rubbing surface being of such and such roughness, (e) the presence of dust motes in the air nearby, (f) the sun shining, (g) the presence of an observer named Smith, and so on. Now some of these conditions—namely, (a) through (d), and others as well—had something to do with the match igniting, while others—such as (e), for instance—had no causal connection with it. This we have learned from experience. Our problem, then, is not to state how we *know* which were the causal conditions of its igniting and which were not. The answer to this is obvious—we know by experience and induction. Our problem is, rather, to state just what relationship those causal conditions had to the match igniting, but which the numberless irrelevant conditions had not; to state, for example, what connection the match's being rubbed had to its igniting, but which the presence of dust motes had not.

The most natural way of expressing this connection is to say that had the match not been rubbed, then it would not have ignited, given all the other conditions that occurred, but only those that occurred, whereas, given those other conditions that occurred, including the match's being rubbed as it was, it would still have ignited, even had the dust motes been absent. This appears to be exactly what one has in mind in saying that the friction on the match head had something to do with its igniting, while the presence of the dust motes did not—the latter condition was not at all necessary for the igniting of the match, whereas the former was. This, however, is simply a way of saying that the friction was a *necessary condition* of the match igniting, given the other conditions that occurred

¹ This point was suggested by R. M. Chisholm's "Law Statements and Counterfactual Inference," *Analysis*, 15 (1955), pp. 97-105.

but no others, whereas the presence of dust motes was not.

If this is correct, then we can simply assert that the cause, A, of an event, B, is that totality of conditions, from among all those, but only those, that occurred, each of which was necessary for the occurrence of B. Now if this set of conditions, A, is thus understood, as it should be, to include *every* condition, out of that totality that occurred, that was necessary for the occurrence of B, then we can say that the set of conditions, A, is also *sufficient* for B, since no other condition was necessary. We can, accordingly, understand the relationship between any set of conditions A, and any set B, expressed in the statement that A was the cause of B, to be simply described in this fashion: That A was the set, from among all those conditions that occurred, each of which was necessary, and the totality of which was sufficient, for the occurrence of B. This appears to be exactly what distinguishes the causal conditions of any event from all those that occurred but which were not causally connected with the event in question.

It is now evident that this reintroduces the concept of necessity which Hume was once so widely believed to have gotten rid of. For to say of any condition that a certain event would not have occurred if that condition had been absent is exactly equivalent to saying that this condition was necessary for its occurrence, or, that it was such that the event in question would not have occurred without it, given only those other conditions that occurred. There seems, however, as we have seen, to be no other way of distinguishing the causal conditions of any event from those infinitely numerous and complex other conditions under which any given event occurs. We cannot distinguish them by introducing the concept of a law, unless we understand the law to be, not merely a statement of what does happen,

but what must happen; for we can find true statements of what does happen, and happens invariably, which are not laws. The conjunction of properties and events can be as constant as we please, with no exception whatever, without there being any causal connections between them. It is not until we can say what would have happened, had something else happened which did not happen, that we leave the realm of mere constancy of conjunction and find ourselves speaking of a causal connection; and as soon as we speak in this fashion, we are speaking of necessary connections.

Now to say of a given event that it would not have occurred without the occurrence of another is the same as saying that the occurrence of the one without the other was causally, though not logically, impossible; or, that in a non-logical sense, the one without the other could not have occurred. We can accordingly define the concepts of necessity and sufficiency in the following way.

To say of any condition or set of conditions, x, that it was *necessary* for the occurrence of some event, E, means that, within the totality of other conditions that occurred, but only those, the occurrence of E without x was impossible, or could not obtain. Similarly, to say of any condition or set of conditions, x, that it was *sufficient* for some event, E, means that, within the totality of other conditions that occurred, but only those, the occurrence of x without E was impossible, or could not obtain. The expression "was impossible" in these definitions has, of course, the same sense as "could not have occurred" in the discussion preceding and not the sense of *logical* impossibility. There are, we can grant at once, no logically necessary connections between causes and effects. In terms of our earlier example, we can say that Anne Boleyn could not live long after being

beheaded, or that it was impossible for her to do so, without maintaining that this was logically impossible.

The concepts of necessity and sufficiency, as thus defined, are of course the converses of each other, such that if any condition or set of conditions is necessary for another, that other is sufficient for it, and vice versa. The statement, that x is necessary for E , is logically equivalent to saying the E is sufficient for x , and similarly, the statement that x is sufficient for E is logically equivalent to saying that E is necessary for x . This fact enables us now to introduce a very convenient notation, as follows. If we let x and E represent any conditions, events or sets of these, we can symbolize the expression, " x is sufficient for E ," with an arrow in this way:

$$x \longrightarrow E.$$

Similarly, we can symbolize the expression " x is necessary for E " with a reverse arrow, in this way:

$$x \longleftarrow E.$$

Since, moreover, the expression " x is sufficient for E " is exactly equivalent to " E is necessary for x ," we can regard as exactly equivalent the following representations of this relationship:

$$\begin{array}{l} x \longrightarrow E. \\ E \longleftarrow x, \end{array}$$

since the first of these means that the occurrence of x without E is impossible, and the second means exactly the same thing. It should be noted, however, that the arrows symbolize no temporal relations whatever.

With this clear and convenient way of symbolizing these relationships, we can now represent the conception of causation at which we have arrived in the following way.

Consider again a particular event that has occurred at a particular time and place, such as the igniting of a particu-

lar match, and call this E . Now E , we can be sure, occurred under a numerous set of conditions, which we can represent as a, b, c, \dots, n . Let a , for instance, be the condition consisting of the match's being dry, b its being rubbed, c its being of such and such chemical composition, d the rubbing surface being of such and such roughness, e the presence of dust motes in the air, f the sun shining, and so on, *ad infinitum*. Now some of these conditions—namely, a, b, c and d —were presumably necessary for E , in the sense that E would not have occurred in the absence of any of them, given only the other conditions that occurred, whereas others, such as e and f , had nothing to do with E . If, furthermore, as we can assume for illustration, a, b, c and d were jointly sufficient for E , the relations thus described can be symbolized as follows:

$$\begin{array}{l} a \longleftarrow E \\ b \longleftarrow E \\ c \longleftarrow E \\ d \longleftarrow E \\ e \\ f \\ abcd \longrightarrow E \end{array}$$

And since a, b, c and d are each individually necessary for E , it follows that E is sufficient for all of them, and we can accordingly symbolize this:

$$abcd \longleftarrow E.$$

And this permits us to express the causal relation, in this example, with the utmost simplicity as follows:

$$abcd \longleftrightarrow E,$$

which means, simply, that the cause of E was that set of conditions, within the totality, only, of those that actually occurred, that was necessary and sufficient for E .

It is at this point that our metaphysical difficulties

really begin, but before turning to those, two points of clarification must be made.

The first point is, that this analysis does not exactly express the "ordinary use" of the word "cause," and does not purport to. The reason for this is not that the analysis itself is unprecise, but rather that ordinary usage is, in such cases. Most persons, for example, are content to call "the cause" of any event some one condition that is conspicuous or, more commonly, whatever part of the causal conditions that is novel. In the example we have been using, for example, the rubbing of the match would normally be regarded as "the cause" of its igniting, without regard to its dryness, its chemical composition, and so on. But the reason for this, quite obviously, is that these other conditions are taken for granted. They are not mentioned, not because they are thought to have nothing to do with the match igniting, but rather, because they are presupposed. Philosophically, it makes no difference at all whether we say that, given the other conditions necessary for the match's igniting, it was then caused to ignite by being rubbed, or whether we say that its being rubbed was, together with these other conditions, the cause of its igniting. Its being rubbed has neither more nor less to do with its igniting than does, say, its being dry. The only difference is that it was, presumably, dry all the while and, in that state, was rubbed. It might just as well have been rubbed all the while and, in that state, suddenly rendered dry, in which case we could say that it was ignited by suddenly becoming dry.

The second point is, that there is a perfectly natural point of view from which perhaps no condition is ever really necessary for the occurrence of any event, nor any set of conditions sufficient for it, from which one could de-

rive the absurd result that, on the analysis suggested, events do not have any causes. We said, for instance, that the match's being rubbed was a necessary condition for its igniting. But, it might at first seem, that is not a necessary condition at all, since there are other ways of igniting matches—touching them to hot surfaces, for instance. Similarly, we said that rubbing the match was, together with certain other conditions, sufficient for its igniting. But this might seem false, since it would be possible to prevent it from igniting, even under these conditions—by applying a fire extinguisher, for instance.

This objection overlooks an essential qualification in the analysis, however. We said that the cause of an event E is that set of conditions that were, within the totality of those other conditions, only, that in fact occurred, individually necessary and jointly sufficient for E. If, in terms of our example, that totality of other conditions that in fact occurred did not, in fact, include some such condition as the match's being in contact with a hot surface, nor the application of any fire extinguisher, etc., then, within the totality of conditions that did occur, its being rubbed *was* necessary for its igniting, and was also, together with certain other conditions that occurred, sufficient for its igniting.

Time and efficacy. Our analysis of the causal relationship, as it now stands, has one strange consequence that is immediately obvious; namely, that it does not enable us to draw any distinction between cause and effect. We have suggested that the cause of an event is that set of conditions, among all those that occur, which is necessary and sufficient for that event, from which it of course follows that if any condition or set of conditions, A, is the cause of another, B, then B is automatically also the cause of A.

For concerning any A and any B, if A is necessary and sufficient for B, and therefore, on our analysis, the cause of B, then it logically follows that B is necessary and sufficient for A, and therefore the cause of A. This is quite plainly absurd. One cannot possibly say that a match's igniting is the cause of its being rubbed, that a stone's being warm is the cause of the sun's shining upon it, or that a man's being intoxicated is the cause of his having alcohol in his blood, despite the fact that the relationships of necessity and sufficiency between cause and effect are the same in both directions.

Earlier metaphysicians took it for granted that the difference between cause and effect was one of power or efficacy or, what amounts to the same thing, that the cause of anything was always something active, and its effect some change in something that is passive. Thus, the sun has the power to warm a stone, but the stone has no power to make the sun shine; it is simply the passive recipient of a change wrought by the sun. Similarly, alcohol in the blood has the power to produce feelings of intoxication, but a man cannot by having such feelings, produce alcohol in his blood.

Modern philosophers, on the contrary, have almost universally supposed that the difference between cause and effect is not to be found in anything so esoteric as power or efficacy, but is simply a temporal difference, nothing more. The cause of an event, it is now almost universally supposed, is some condition or set of conditions that precedes some other, its effect, in time. Thus, if our analysis of the causal relationship is otherwise correct, then it should, according to this prevalent view, have some qualification added about time, such as to require that the cause should occur before its effect.

I believe this to be the profoundest error in modern philosophy, and the source of more misconceptions than any other. By this simple expedient of introducing considerations of time, philosophers imagine that they no longer need to talk metaphysically of causal power or efficacy. In fact, of course, philosophers, like everyone else, do still speak freely of power and efficacy—of the power of various substances to corrode, to dissolve, to cause intoxication, to cause death, and so on. But in their philosophies, they imagine that such terms express only ideas of *time*, and that they can be omitted from any exact description of causal connections, just by the simple device of introducing temporal qualifications.

I intend to prove that this is an error, by showing, first, that in many perfectly clear instances of causation, causes do not precede their effects in time, but are entirely contemporaneous with them, and second, that the causal conditions of an event cannot, in fact, precede that event in time.

Before doing this, however, let us consider a question that is meant to give some intimation that what I have called a profound error is an error indeed.

Let us suppose, for now, that there is a temporal interval between a cause and its effect, such that it is true to say that one occurs *before* the other. Now if the relationships between the two are otherwise identical—namely, are simply the relationships of necessity and sufficiency set forth above, or, for that matter, any other relationships whatever—the question can be asked, *why* it should be thought so important to regard only the prior condition or set of conditions as the cause of the subsequent one, and never the subsequent one as the cause of the prior one. There is, certainly, an absurdity in saying that a man's

dying is the cause of his being shot, or that a man's being intoxicated is the cause of his having imbibed alcohol, rather than the other way around; but what *kind* of absurdity is it? Is it merely a verbal error, a wrong choice of vocabulary, or is it a metaphysical absurdity? Compare it with the following simple example. If one were to point out that a son cannot exist before his father, he would probably not be *merely* calling attention to a point of vocabulary. He would be stating an obvious truth of biology. If, on the other hand, one were to say that one's brother's sons cannot be his nieces, but must be his nephews, he would obviously be making only a point about language, about the use of certain words. Now then, when one says that a cause cannot come after its effect, which kind of point is he making? Is he *merely* calling attention to a matter of vocabulary, or is he saying something metaphysically significant about causes and their effects?

It seems fairly clear that there is something metaphysically absurd, and not merely an inept choice of words, in supposing that efficient causes might work backwards. There is surely some reason why nothing can produce an effect in the past, and the reason cannot just be, that if it did, we would not then *call* it a cause.

Consider the following illustration.² There is a variety of ways in which one might ensure that a certain man—say, some political rival—is dead on a certain day. One way would be to shoot him the day before. We can assume that this, together with all the other conditions prevailing, is sufficient for his being dead the next day, and further, that in case conditions are such that he would not have died had he not been shot, then it is also necessary for his being dead then. But another, equally good way of en-

² This example was suggested by R. M. Chisholm.

suring that he is dead on that day would be to attend his funeral later on. This would surely be sufficient for his prior death and, in case conditions are such that his being dead is sufficient for someone's attending his funeral, then it is also a necessary condition of his prior death. Suppose, then, that one man shoots him, and another attends his funeral, and that both of these acts are related to that man's death in exactly the same way, except only for the difference in time; that is, that each act is, given only those other conditions that occur, both necessary and sufficient for his being dead on the day in question. Why should one man be blamed more than the other, or held any more responsible for the death? Each man, equally with the other, did something necessary and sufficient for that man's death. Either act guarantees the death as well as the other. The thing to note is, that this question is *not* answered by merely observing that one of these acts occurred before the death, and the other after; that is already quite obvious. Nor is it answered by noting that we do not, as it happens, *call* the subsequent event the cause. That is obvious and irrelevant; the word "cause" was not even used in the example. We do not hold a man responsible for any event, unless something he does is a necessary and sufficient *prior* condition of it. That is granted. But merely stating that fact does not answer the question, Why not? It cannot be a mere question of vocabulary whether, for example, a certain man should be hanged for what he has done.

The correct answer to this question, I believe, is that no cause exerts any power over the past. The same idea is expressed, more metaphysically, by saying that all past things are actual, and never at some later time potentially what they are not then actually, whereas a present thing

can be actually one thing but potentially another. This would be expressed in terms of our example by saying that a man who shoots another acts upon him, or does something to him, or is an agent, whereas the man who is thus killed does not, in dying, act upon his assassin, but is the passive recipient, or patient, of the other's causal activity. The man who merely attends the funeral, on the other hand, does not act upon him who is already dead. He is merely the passive observer of what has already been done.

This metaphysical way of conceiving these relations seems, moreover, to be the way all men do think of causes and effects, and it explains the enormous absurdity in the supposition that causes might act so as to alter things already past. For anything to be a cause it must act upon something and, as a matter of fact—indeed, of metaphysical necessity—nothing past can be acted upon by anything. The profound error of modern philosophy has been to suppose that, in making that point, one is making only a point about language.

Contemporaneous causes and effects. If we can cite clear examples of causal connections, wherein those conditions that constitute the cause and those that constitute the effect are entirely contemporaneous, neither occurring before the other, then it will have been proved that the difference between a cause and its effect cannot be a temporal one, but must consist of something else.

In fact, such examples are not at all hard to find. Consider, for instance, a locomotive that is pulling a caboose, and to make it simple, suppose this is all it is pulling. Now here the motion of the locomotive is sufficient for the motion of the caboose, the two being connected in such a way that the former cannot move without the latter mov-

ing with it. But so also, the motion of the caboose is sufficient for the motion of the locomotive, for, given that the two are connected as they are, it would be impossible for the caboose to be moving without the locomotive moving with it. From this it logically follows that, conditions being such as they are—viz., both objects being in motion, there being no other movers present, no obstructions to motion, and so on—the motion of each object is also necessary for the motion of the other. But is there any temporal gap between the motion of one and the motion of the other? Clearly, there is not. They move together, and in no sense is the motion of one followed by the motion of the other.

Here it is tempting to say that the locomotive must *start* moving before the caboose can start moving, but this is both irrelevant and false. It is irrelevant, because the effect we are considering is not the caboose's *beginning* to move, but its moving. And it is false because we can suppose the two to be securely connected, such that as soon as either begins to move the other must move too. Even if we do not make this supposition, and suppose, instead, that the locomotive does begin moving first, and moves some short distance before overcoming the looseness of its connection with the caboose, still, it is no cause of the motion of the caboose until that looseness is overcome. When that happens, and not until then, the locomotive imparts its motion to the caboose. Cause and effect are, then, perfectly contemporaneous.

Again, consider the relationships between one's hand and a pencil he is holding while writing. We can ignore here the difficult question of what causes the *hand* to move. It is surely true, in any case, that the motion of the pencil is caused by the motion of the hand. This means, first, that conditions are such that the motion of the hand is sufficient

for the motion of the pencil. Given precisely those conditions, however, the motion of the pencil is sufficient for the motion of the hand; neither can move, under the conditions assumed—that the fingers are grasping the pencil, etc.—without the other moving with it. It follows, then, that under these conditions the motion of either is also necessary for the motion of the other. And, quite obviously, both motions are contemporaneous; the motion of neither is *followed* by the motion of the other.

Or again, consider a leaf that is being fluttered by the wind. Here it would be quite clearly erroneous to say that the wind currents impinge upon the leaf, and then, some time later, the leaf flutters in response. There is no gap in time at all. One might want to say that the leaf, however light, does offer some resistance to the wind, and that the wind must overcome this slight resistance before any fluttering occurs. But then we need only add, that the wind is no cause of the leaf's motion until that resistance is overcome. Cause and effect are again, then, contemporaneous.

What, then, distinguishes cause and effect in the foregoing examples? It is not the time of occurrence, for both occur strictly together. It is not any difference in the relations of necessity and sufficiency, for these are identical both ways. But there is one thing which, in all these cases, appears to distinguish the cause from the effect; namely, that the cause acts upon something else to produce some change. The locomotive pulls the caboose, but the caboose does not push the locomotive; it just follows passively along. The hand pushes the pencil, and imparts motion to it, while the pencil is just passively moved. The wind acts upon the leaf, to move it; but it is no explanation of the wind's blowing to say that the leaf is moving. In

all these cases, to be sure, what has been distinguished as the cause is itself moved by something else—the locomotive by steam in its cylinders, the hand by a man, the wind by things more complex and obscure; but that only calls attention to the fact that causes can themselves be the effects of other causes. Whether all causes must be such, or whether, on the contrary, something can be a "first cause" or a "prime mover" is something that need not concern us here. One can, in any case, see why it has seemed plausible, and even necessary, to some thinkers

The examples just considered suggest our final point; namely, that there not only is no temporal gap between cause and effect in certain examples that come readily to mind, but that there is in fact never any such gap in any example that one carefully considers.³ This will be seen, I think, if we consider a clear example of causation wherein the cause seems, at first, to precede its effect, and then find that, even in such a case, there is no such temporal priority at all.

Consider, then, the case of a window breaking as a result of a stone being thrown against it. Here it is tempting to say that the stone is first thrown, and then the window breaks, implying that the cause occurs before the effect. But that is not a good description of what happens. It is not enough that the stone should be thrown; it must hit the window. Even then, it must overcome the resistance of the window. Only then does the window break; cause and effect are simultaneous. Nor does one avoid this conclusion by the familiar device of conceiving of both cause and effect as events, both having duration in time, and being such that the effect begins to occur as soon as the

³ A similar point is made by Bertrand Russell, "On the Notion of Cause," in *Mysticism and Logic* (London: Allen and Unwin, 1956).

cause ceases. It is, at best, simply arbitrary how one divides any process up into events. But even if one does permit himself to do this, and regards a cause, for instance, as a change occurring over a length of time, it is obvious that not all that change can be counted as the cause of some other change following it in time. In the example we are considering, for instance, it is the impact of the stone against the glass that causes the shattering; it is not what the stone was doing before then. Had the stone behaved exactly as it did up to that moment, but then made no contact with the glass, or had it then struck the glass with a force insufficient to break it, the glass would not have shattered. The behavior of the stone up to that moment was, accordingly, not sufficient for the effect in question. Similarly, had the stone behaved entirely differently up to that moment, but then somehow, at that moment, exerted upon the glass the pressure that it did exert, the glass would have broken as it did anyway. The behavior of the stone up to that moment was, accordingly, neither necessary nor sufficient for the effect in question. What *was* necessary and sufficient, on the other hand, was that the stone should at that moment only have exerted the pressure it did; and, given that condition, then the window breaks—not a day or two later, and not a second or two later, but at that very moment. The shattering of the glass can also, of course, be conceived as a process that takes time; but here we need only note that the only part of that shattering that is caused by the impact of the stone is that part that occurs at the moment of impact. The subsequent behavior of the glass is the effect of what happens after the glass has been struck.

Here again, then—and, I believe, in any example one closely considers—cause and effect are contemporaneous.

It is therefore no priority in time that distinguishes the cause from the effect, nor is it, again, any difference in the relations of necessity and sufficiency, these being, as always, identical either way. What does seem to distinguish cause from effect is that the former is something that acts upon the glass to produce its shattered condition. Of course the glass acts upon the stone, too, to produce, for example, its retarded velocity, but that is a different effect, and a different cause, and these are also contemporaneous. To point this out is only, in any case, to call attention to the fact that causes, in acting, can sometimes be acted upon. Whether this is always so is a question, important to theology and to the problem of free will, that need not concern us.

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