CAUSAL RELATIONS*

WHAT is the logical form of singular causal statements like: 'The flood caused the famine', 'The stabbing caused Caesar's death', 'The burning of the house caused the roasting of the pig'? This question is more modest than the question how we know such statements are true, and the question whether they can be analyzed in terms of, say, constant conjunction. The request for the logical form is modest because it is answered when we have identified the logical or grammatical roles of the words (or other significant stretches) in the sentences under scrutiny. It goes beyond this to define, analyze, or set down axioms governing, particular words or expressions.

I

According to Hume, "we may define a cause to be an object, followed by another, and where all the objects similar to the first are followed by objects similar to the second." This definition pretty clearly suggests that causes and effects are entities that can be named or described by singular terms; probably events, since one can follow another. But in the *Treatise*, under "rules by which to judge of causes and effects," Hume says that "where several different objects produce the same effect, it must be by means of some quality, which we discover to be common amongst them. For as like effects imply like causes, we must always ascribe the causation to the circumstances, wherein we discover the resemblance." Here it seems to be the "quality" or "circumstances" of an event that is the cause rather than the event itself, for the event itself is the same as others in some respects

and different in other respects. The suspicion that it is not events, but something more closely tied to the descriptions of events, that Hume holds to be causes, is fortified by Hume's claim that causal statements are never necessary. For if events were causes, then a true description of some event would be 'the cause of b', and, given that such an event exists, it follows logically that the cause of b caused b.

Mill said that the cause "is the sum total of the conditions positive and negative taken together . . . which being realized, the consequent invariably follows." Many discussions of causality have concentrated on the question whether Mill was right in insisting that the "real Cause" must include all the antecedent conditions that jointly were sufficient for the effect, and much ingenuity has been spent on discovering factors, pragmatic or otherwise, that guide and justify our choice of some "part" of the conditions as the cause. There has been general agreement that the notion of cause may be at least partly characterized in terms of sufficient and (or) necessary conditions.[1] Yet it seems to me we do not understand how such characterizations are to be applied to particular causes.

Take one of Mill's examples: some man, say Smith, dies, and the cause of his death is said to be that his foot slipped in climbing a ladder. Mill would say we have not given the whole cause, since having a foot slip in climbing a ladder is not always followed by death. What we were after, however, was not the cause of death in general but the cause of Smith's death: does it make sense to ask under what conditions Smith's death invariably follows? Mill suggests that part of the cause of Smith's death is "the circumstance of his weight," perhaps because if Smith had been light as a feather his slip might not have injured him. Mill's explanation of why we don't bother to mention this circumstance is that it is too obvious to bear mention, but it seems to me that if it was Smith's fall that killed him, and Smith weighed twelve stone, then Smith's fall was the fall of a man who weighed twelve stone, whether or not we know it or mention it. How could Smith's actual fall, with Smith weighing, as he did, twelve stone, be any more efficacious in killing him than Smith's actual fall?

The difficulty has nothing to do with Mill's sweeping view of the cause, but attends any attempt of this kind to treat particular causes as necessary or sufficient conditions. Thus Mackie asks, "What is the exact force of [the statement of some experts] that this short-circuit caused this fire?" And he answers, "Clearly the experts are not saying that the short-circuit was a necessary condition for this house's catch-

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[1] For a recent example, with reference to many others, see J. L. Mackie, "Causes and Conditions," *American Philosophical Quarterly*, II, 4 (October 1965): 245–264.

ing fire at this time; they know perfectly well that a short-circuit some-
where else, or the overturning of a lighted oil stove . . . might, if it
had occurred, have set the house on fire" (*ibid.*, 245). Suppose the
experts know what they are said to; how does this bear on the ques-
tion whether the short circuit was a necessary condition of this
particular fire? For a short circuit elsewhere could not have caused
this fire, nor could the overturning of a lighted oil stove.

To talk of particular events as conditions is bewildering, but per-
haps causes aren't events (like the short circuit, or Smith's fall from
the ladder), but correspond rather to sentences (perhaps like the fact
that this short circuit occurred, or the fact that Smith fell from the
ladder). Sentences can express conditions of truth for others—hence
the word 'conditional'.

If causes correspond to sentences rather than singular terms, the
logical form of a sentence like:

(1)   The short circuit caused the fire.

would be given more accurately by:

(2)   *The fact that* there was a short circuit *caused it to be the case that*
there was a fire.

In (2) the italicized words constitute a sentential connective like
'and' or 'if . . . then . . .'. This approach no doubt receives support
from the idea that causal laws are universal conditionals, and singular
causal statements ought to be instances of them. Yet the idea is not
easily implemented. Suppose, first that a causal law is (as it is usually
said Hume taught) nothing but a universally quantified material
conditional. If (2) is an instance of such, the italicized words have
just the meaning of the material conditional, 'If there was a short
circuit, then there was a fire'. No doubt (2) entails this, but not con-
versely, since (2) entails something stronger, namely the conjunction
'There was a short circuit *and* there was a fire'. We might try treat-
ing (2) as the conjunction of the appropriate law and 'There was
a short circuit and there was a fire'—indeed this seems a possible inter-
pretation of Hume's definition of cause quoted above—but then (2)
would no longer be an instance of the law. And aside from the inher-
ent implausibility of this suggestion as giving the logical form of (2) (in
contrast, say, to giving the grounds on which it might be asserted)
there is also the oddity that an inference from the fact that there was a
short circuit and there was a fire, and the law, to (2) would turn out
to be no more than a conjoining of the premises.

Suppose, then, that there is a non-truth-functional causal connec-

tive, as has been proposed by many.[2] In line with the concept of a cause as a condition, the causal connective is conceived as a conditional, though stronger than the truth-functional conditional. Thus Arthur Pap writes, "The distinctive property of causal implication as compared with material implication is just that the falsity of the antecedent is no ground for inferring the truth of the causal implication" (212). If the connective Pap had in mind were that of (2), this remark would be strange, for it is a property of the connective in (2) that the falsity of either the "antecedent" or the "consequent" is a ground for inferring the falsity of (2). That treating the causal connective as a kind of conditional unsuits it for the work of (1) or (2) is perhaps even more evident from Burks' remark that "p is causally sufficient for q is logically equivalent to $\sim q$ is causally sufficient for $\sim p$" (369). Indeed, this shows not only that Burks' connective is not that of (2), but also that it is not the subjunctive causal connective 'would cause'. My tickling Jones would cause him to laugh, but his not laughing would not cause it to be the case that I didn't tickle him.

These considerations show that the connective of (2), and hence by hypothesis of (1), cannot, as is often assumed, be a conditional of any sort, but they do not show that (2) does not give the logical form of singular causal statements. To show this needs a stronger argument, and I think there is one, as follows.

It is obvious that the connective in (2) is not truth-functional, since (2) may change from true to false if the contained sentences are switched. Nevertheless, substitution of singular terms for others with the same extension in sentences like (1) and (2) does not touch their truth value. If Smith's death was caused by the fall from the ladder and Smith was the first man to land on the moon, then the fall from the ladder was the cause of the death of the first man to land on the moon. And if the fact that there was a fire in Jones's house caused it to be the case that the pig was roasted, and Jones's house is the oldest building on Elm street, then the fact that there was a fire in the oldest building on Elm street caused it to be the case that the pig was roasted. We must accept the principle of extensional substitution, then. Surely also we cannot change the truth value of the likes of (2) by substituting logically equivalent sentences for sentences in it. Thus (2) retains its truth if for 'there was a fire' we substitute the logically equivalent '$\hat{x} (x = x$ & there was a fire$) = \hat{x} (x = x)$'; retains it still

2 For example by: Mackie, *op. cit.*, p. 254; Arthur Burks, "The Logic of Causal Propositions," *Mind*, LX, 239 (July 1951): 363–382; and Arthur Pap, "Disposition Concepts and Extensional Logic," in *Minnesota Studies in the Philosophy of Science*, II, ed. by H. Feigl, M. Scriven, and G. Maxwell (Minneapolis: Univ. of Minnesota Press, 1958), pp. 196–224.

if for the left side of this identity we write the coextensive singular term '$\hat{x}$ ($x = x$ & Nero fiddled)'; and still retains it if we replace '$\hat{x}$ ($x = x$ & Nero fiddled) $= \hat{x}$ ($x = x$)' by the logically equivalent 'Nero fiddled'. Since the only aspect of 'there was a fire' and 'Nero fiddled' that matters to this chain of reasoning is the fact of their material equivalence, it appears that our assumed principles have led to the conclusion that the main connective of (2) is, contrary to what we supposed, truth-functional.[8]

Having already seen that the connective of (2) cannot be truth-functional, it is tempting to try to escape the dilemma by tampering with the principles of substitution that led to it. But there is another, and, I think, wholly preferable way out: we may reject the hypothesis that (2) gives the logical form of (1), and with it the ideas that the 'caused' of (1) is a more or less concealed sentential connective, and that causes are fully expressed only by sentences.

<div align="center">II</div>

Consider these six sentences:

(3)   *It is a fact that* Jack fell down.
(4)   Jack fell down *and* Jack broke his crown.
(5)   Jack fell down *before* Jack broke his crown.
(6)   Jack fell down, *which caused it to be the case that* Jack broke his crown.
(7)   *Jones forgot the fact that* Jack fell down.
(8)   *That* Jack fell down *explains the fact that* Jack broke his crown.

Substitution of equivalent sentences for, or substitution of coextensive singular terms or predicates in, the contained sentences, will not alter the truth value of (3) or (4): here extensionality reigns. In (7) and (8), intensionality reigns, in that similar substitution in or for the contained sentences is not guaranteed to save truth. (5) and (6) seem to fall in between; for in them substitution of coextensive singular terms preserves truth, whereas substitution of equivalent sentences does not. However this last is, as we just saw with respect to (2), and hence also (6), untenable middle ground.

Our recent argument would apply equally against taking the 'before' of (5) as the sentential connective it appears to be. And of course we don't interpret 'before' as a sentential connective, but

8 This argument is closely related to one spelled out by Dagfinn Føllesdal [in "Quantification into Causal Contexts" in *Boston Studies in the Philosophy of Science*, II, ed. R. S. Cohen and M. W. Wartofsky (New York: Humanities, 1966), pp. 263–274] to show that unrestricted quantification into causal contexts leads to difficulties. His argument is in turn a direct adaptation of Quine's [*Word and Object* (Cambridge, Mass.: MIT Press, 1960), pp. 197–198] to show that (logical) modal distinctions collapse under certain natural assumptions. My argument derives directly from Frege.

rather as an ordinary two-place relation true of ordered pairs of times; this is made to work by introducing an extra place into the predicates ('*x* fell down' becoming '*x* fell down at *t*') and an ontology of times to suit. The logical form of (5) is made perspicuous, then, by:

(5′)   There exist times *t* and *t′* such that Jack fell down at *t*, Jack broke his crown at *t′*, and *t* preceded *t′*.

This standard way of dealing with (5) seems to me essentially correct, and I propose to apply the same strategy to (6), which then comes out:

(6′)   There exist events *e* and *e′* such that *e* is a falling down of Jack, *e′* is a breaking of his crown by Jack, and *e* caused *e′*.

Once events are on hand, an obvious economy suggests itself: (5) may as well be construed as about events rather than times. With this, the canonical version of (5) becomes just (6′), with 'preceded' replacing 'caused'. Indeed, it would be difficult to make sense of the claim that causes precede, or at least do not follow, their effects if (5) and (6) did not thus have parallel structures. We will still want to be able to say when an event occurred, but with events this requires an ontology of pure numbers only. So 'Jack fell down at 3 P.M.' says that there is an event *e* that is a falling down of Jack, and the time of *e*, measured in hours after noon, is three; more briefly, $(\exists e) \ (F \ (\text{Jack}, e) \ \& \ t \ (e) = 3)$.

On the present plan, (6) means some fall of Jack's caused some breaking of Jack's crown; so (6) is not false if Jack fell more than once, broke his crown more than once, or had a crown-breaking fall more than once. Nor, if such repetitions turned out to be the case, would we have grounds for saying that (6) referred to one rather than another of the fracturings. The same does not go for 'The short circuit caused the fire' or 'The flood caused the famine' or 'Jack's fall caused the breaking of Jack's crown'; here singularity is imputed. ('Jack's fall', like 'the day after tomorrow', is no less a singular term because it may refer to different entities on different occasions.) To do justice to 'Jack's fall caused the breaking of Jack's crown' what we need is something like 'The one and only falling down of Jack caused the one and only breaking of his crown by Jack'; in some symbols of the trade, '$(\imath e) \ F \ (\text{Jack}, e)$ caused $(\imath e) \ B \ (\text{Jack's crown}, e)$'.

Evidently (1) and (2) do not have the same logical form. If we think in terms of standard notations for first-order languages, it is (1) that more or less wears its form on its face; (2), like many existentially quantified sentences, does not (witness 'Somebody loves somebody').

The relation between (1) and (2) remains obvious and close: (1) entails (2), but not conversely.[4]

III

The salient point that emerges so far is that we must distinguish firmly between causes and the features we hit on for describing them, and hence between the question whether a statement says truly that one event caused another and the further question whether the events are characterized in such a way that we can deduce, or otherwise infer, from laws or other causal lore, that the relation was causal. "The cause of this match's lighting is that it was struck.—Yes, but that was only *part* of the cause; it had to be a dry match, there had to be adequate oxygen in the atmosphere, it had to be struck hard enough, etc." We ought now to appreciate that the "Yes, but" comment does not have the force we thought. It cannot be that the striking of this match was only part of the cause, for this match was in fact dry, in adequate oxygen, and the striking was hard enough. What is partial in the sentence "The cause of this match's lighting is that it was struck" is the *description* of the cause; as we add to the description of the cause, we may approach the point where we can deduce, from this description and laws, that an effect of the kind described would follow.

If Flora dried herself with a coarse towel, she dried herself with a towel. This is an inference we know how to articulate, and the articulation depends in an obvious way on reflecting in language an ontology that includes such things as towels: if there is a towel that is coarse and was used by Flora in her drying, there is a towel that was used by Flora in her drying. The usual way of doing things does not, however, give similar expression to the similar inference from 'Flora dried herself with a towel on the beach at noon' to 'Flora dried herself with a towel', or for that matter, from the last to 'Flora dried herself'. But if, as I suggest, we render 'Flora dried herself' as about an event, as well as about Flora, these inferences turn out to be quite parallel to the more familiar ones. Thus if there was an event that was a drying by Flora of herself and that was done with a towel, on the beach, at noon, then clearly there was an event that was a drying by Flora of herself—and so on.

[4] A familiar device I use for testing hypotheses about logical grammar is translation into standard quantificational form; since the semantics of such languages is transparent, translation into them is a way of providing a semantic theory (a theory of the logical form) for what is translated. In this employment, canonical notation is not to be conceived as an improvement on the vernacular, but as a comment on it.

For elaboration and defense of the view of events sketched in this section, see my "The Logical Form of Action Sentences" in *The Logic of Action and Preference,* ed. Nicholas Rescher (Pittsburgh: University Press, 1967).

The mode of inference carries over directly to causal statements. If it was a drying she gave herself with a coarse towel on the beach at noon that caused those awful splotches to appear on Flora's skin, then it was a drying she gave herself that did it; we may also conclude that it was something that happened on the beach, something that took place at noon, and something that was done with a towel, that caused the tragedy. These little pieces of reasoning seem all to be endorsed by intuition, and it speaks well for the analysis of causal statements in terms of events that on that analysis the arguments are transparently valid.

Mill, we are now in better position to see, was wrong in thinking we have not specified the whole cause of an event when we have not wholly specified it. And there is not, as Mill and others have maintained, anything elliptical in the claim that a certain man's death was caused by his eating a particular dish, even though death resulted only because the man had a particular bodily constitution, a particular state of present health, and so on. On the other hand Mill was, I think, quite right in saying that "there certainly is, among the circumstances that took place, some combination or other on which death is invariably consequent . . . the whole of which circumstances perhaps constituted in this particular case the conditions of the phenomenon . . ." (*A System of Logic,* book III, chap. v, § 3.) Mill's critics are no doubt justified in contending that we may correctly give the cause without saying enough about it to demonstrate that it was sufficient; but they share Mill's confusion if they think every deletion from the description of an event represents something deleted from the event described.

The relation between a singular causal statement like 'The short circuit caused the fire' and necessary and sufficient conditions seems, in brief, to be this. The fuller we make the description of the cause, the better our chances of demonstrating that it was sufficient (as described) to produce the effect, and the worse our chances of demonstrating that it was necessary; the fuller we make the description of the effect, the better our chances of demonstrating that the cause (as described) was necessary, and the worse our chances of demonstrating that it was sufficient. The symmetry of these remarks strongly suggests that in whatever sense causes are correctly said to be (described as) sufficient, they are as correctly said to be necessary. Here is an example. We may suppose there is some predicate '$P(x,y,e)$' true of Brutus, Caesar, and Brutus's stabbing of Caesar and such that any stab (by anyone of anyone) that is P is followed by the death of the stabbed. And let us suppose further that this law meets Mill's require-

ments of being *unconditional*—it supports counterfactuals of the form 'If Cleopatra had received a stab that was *P,* she would have died'. Now we can prove (assuming a man dies only once) that Brutus's stab was sufficient for Caesar's death. Yet it was not the cause of Caesar's death, for Caesar's death was the death of a man with more wounds than Brutus inflicted, and such a death could not have been caused by an event that was *P* ('*P*' was chosen to apply only to stabbings administered by a single hand). The trouble here is not that the description of the cause is partial, but that the event described was literally (spatio-temporally) only part of the cause.

Can we then analyze '*a* caused *b*' as meaning that *a* and *b* may be described in such a way that the existence of each could be demonstrated, in the light of causal laws, to be a necessary and sufficient condition of the existence of the other? One objection, foreshadowed in previous discussion, is that the analysandum does, but the analysans does not, entail the existence of *a* and *b*. Suppose we add, in remedy, the condition that either *a* or *b,* as described, exists. Then on the proposed analysis one can show that the causal relation holds between any two events. To apply the point in the direction of sufficiency, imagine some description '$(\imath x)\,Fx$' under which the existence of an event *a* may be shown sufficient for the existence of *b*. Then the existence of an arbitrary event *c* may equally be shown sufficient for the existence of *b*: just take as the description of *c* the following: '$(\imath y)\,(y = c \,\&\, (\exists!x)\,Fx)$'.[5] It seems unlikely that any simple and natural restrictions on the form of allowable descriptions would meet this difficulty, but since I have abjured the analysis of the causal relation, I shall not pursue the matter here.

There remains a legitimate question concerning the relation between causal laws and singular causal statements that may be raised independently. Setting aside the abbreviations successful analysis might authorize, what form are causal laws apt to have if from them, and a premise to the effect that an event of a certain (acceptable) description exists, we are to infer a singular causal statement saying that the event caused, or was caused by, another? A possibility I find attractive is that a full-fledged causal law has the form of a conjunction:

$$(L) \begin{cases} (S) & (e)(n)((Fe \,\&\, t(e) = n) \to \\ & \qquad (\exists!f)(Gf \,\&\, t(f) = n + \epsilon \,\&\, C(e,f))) \text{ and} \\ (N) & (e)(n)((Ge \,\&\, t(e) = n + \epsilon) \to \\ & \qquad (\exists!f)(Ff \,\&\, t(f) = n \,\&\, C(f, e))) \end{cases}$$

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[5] Here I am indebted to Professor Carl Hempel, and in the next sentence to John Wallace.

Here the variables 'e' and 'f' range over events, 'n' ranges over numbers, F and G are properties of events, '$C(e, f)$' is read 'e causes f', and 't' is a function that assigns a number to an event to mark the time the event occurs. Now, given the premise:

(P) $(\exists !e)(Fe \,\&\, t(e) = 3)$

(C) $(\imath e)(Fe \,\&\, t(e) = 3)$ caused $(\imath e)(Ge \,\&\, t(e) = 3 + \epsilon)$

It is worth remarking that part (N) of (L) is as necessary to the proof of (C) from (P) as it is to the proof of (C) from the premise '$(\exists !e)(Ge \,\&\, t(e) = 3 + \epsilon))$'. This is perhaps more reason for holding that causes are, in the sense discussed above, necessary as well as sufficient conditions.

Explaining "why an event occurred," on this account of laws, may take an instructively large number of forms, even if we limit explanation to the resources of deduction. Suppose, for example, we want to explain the fact that there was a fire in the house at 3:01 P.M. Armed with appropriate premises in the form of (P) and (L), we may deduce: that there was a fire in the house at 3:01 P.M.; that it was caused by a short circuit at 3:00 P.M.; that there was only one fire in the house at 3:01 P.M.; that this fire was caused by the one and only short circuit that occurred at 3:00 P.M. Some of these explanations fall short of using all that is given by the premises; and this is lucky, since we often know less. Given only (S) and (P), for example, we cannot prove there was only one fire in the house at 3:01 P.M., though we can prove there was exactly one fire in the house at 3:01 P.M. that was caused by the short circuit. An interesting case is where we know a law in the form of (N), but not the corresponding (S). Then we may show that, given that an event of a particular sort occurred, there must have been a cause answering to a certain description, but, given the same description of the cause, we could not have predicted the effect. An example might be where the effect is getting pregnant.

If we explain why it is that a particular event occurred by deducing a statement that there is such an event (under a particular description) from a premise known to be true, then a simple way of explaining an event, for example the fire in the house at 3:01 P.M., consists in producing a statement of the form of (C); and this explanation makes no use of laws. The explanation will be greatly enhanced by whatever we can say in favor of the truth of (C); needless to say, producing the likes of (L) and (P), if they are known true, clinches the matter. In most cases, however, the request for ex-

planation will describe the event in terms that fall under no full-fledged law. The device to which we will then resort, if we can, is apt to be redescription of the event. For we can explain the occurrence of any event a if we know (L), (P), and the further fact that $a = (\imath e) (Ge \ \& \ t(e) = 3 + \epsilon)$. Analogous remarks apply to the redescription of the cause, and to cases where all we want, or can, explain is the fact that there was *an* event of a certain sort.

The great majority of singular causal statements are not backed, we may be sure, by laws in the way (C) is backed by (L). The relation in general is rather this: if 'a caused b' is true, then there are descriptions of a and b such that the result of substituting them for 'a' and 'b' in 'a caused b' is entailed by true premises of the form of (L) and (P); and the converse holds if suitable restrictions are put on the descriptions.[6] If this is correct, it does not follow that we must be able to dredge up a law if we know a singular causal statement to be true; all that follows is that we know there must be a covering law. And very often, I think, our justification for accepting a singular causal statement is that we have reason to believe an appropriate causal law exists, though we do not know what it is. Generalizations like 'If you strike a well-made match hard enough against a properly prepared surface, then, other conditions being favorable, it will light' owe their importance not to the fact that we can hope eventually to render them untendentious and exceptionless, but rather to the fact that they summarize much of our evidence for believing that full-fledged causal laws exist covering events we wish to explain.[7]

If the story I have told is true, it is possible to reconcile, within limits, two accounts thought by their champions to be opposed. One account agrees with Hume and Mill to this extent: it says that a singular causal statement 'a caused b' entails that there is a law to the effect that "all the objects similar to a are followed by objects similar to b" and that we have reason to believe the singular statement only in so far as we have reason to believe there is such a law. The second

[6] Clearly this account cannot be taken as a definition of the causal relation. Not only is there the inherently vague quantification over expressions (of what language?), but there is also the problem of spelling out the "suitable restrictions."

[7] The thought in these paragraphs, like much more that appears here, was first adumbrated in my "Actions, Reasons, and Causes," this JOURNAL, LX, 23 (Nov. 7, 1963): 685–700, especially pp. 696–699; reprinted in *Free Will and Determinism*, ed. Bernard Berofsky (New York: Harper & Row, 1966). This conception of causality was subsequently discussed and, with various modifications, employed by Samuel Gorovitz, "Causal Judgments and Causal Explanations," this JOURNAL, LXII, 23 (Dec. 2, 1965): 695–711, and by Bernard Berofsky, "Causality and General Laws," this JOURNAL, LXIII, 6 (Mar. 17, 1966): 148–157.

account (persuasively argued by C. J. Ducasse [8]) maintains that singular causal statements entail no law and that we can know them to be true without knowing any relevant law. Both of these accounts are entailed, I think, by the account I have given, and they are consistent (I therefore hope) with each other. The reconciliation depends, of course, on the distinction between knowing there is a law "covering" two events and knowing what the law is: in my view, Ducasse is right that singular causal statements entail no law; Hume is right that they entail there is a law.

IV

Much of what philosophers have said of causes and causal relations is intelligible only on the assumption (often enough explicit) that causes are individual events, and causal relations hold between events. Yet, through failure to connect this basic *aperçu* with the grammar of singular causal judgments, these same philosophers have found themselves pressed, especially when trying to put causal statements into quantificational form, into trying to express the relation of cause to effect by a sentential connective. Hence the popularity of the utterly misleading question: can causal relations be expressed by the purely extensional material conditional, or is some stronger (non-Humean) connection involved? The question is misleading because it confuses two separate matters: the logical form of causal statements and the analysis of causality. So far as form is concerned, the issue of nonextensionality does not arise, since the relation of causality between events can be expressed (no matter how "strong" or "weak" it is) by an ordinary two-place predicate in an ordinary, extensional first-order language. These plain resources will perhaps be outrun by an adequate account of the form of causal laws, subjunctives, and counterfactual conditionals, to which most attempts to analyze the causal relation turn. But this is, I have urged, another question.

This is not to say there are no causal idioms that directly raise the issue of apparently non-truth-functional connectives. On the contrary, a host of statement forms, many of them strikingly similar, at least at first view, to those we have considered, challenge the account just given. Here are samples: 'The failure of the sprinkling system caused the fire', 'The slowness with which controls were applied caused the rapidity with which the inflation developed', 'The col-

8 See his "Critique of Hume's Conception of Causality," this JOURNAL, LXIII, 6 (Mar. 17, 1966): 141–148; *Causation and the Types of Necessity* (Seattle: University of Washington Press, 1924); *Nature, Mind, and Death* (La Salle, Ill.: Open Court, 1951), part II. I have omitted from my "second account" much that Ducasse says that is not consistent with Hume.

lapse was caused, not by the fact that the bolt gave way, but by the fact that it gave way so suddenly and unexpectedly', 'The fact that the dam did not hold caused the flood'. Some of these sentences may yield to the methods I have prescribed, especially if failures are counted among events, but others remain recalcitrant. What we must say in such cases is that in addition to, or in place of, giving what Mill calls the "producing cause," such sentences tell, or suggest, a causal story. They are, in other words, rudimentary causal explanations. Explanations typically relate statements, not events. I suggest therefore that the 'caused' of the sample sentences in this paragraph is not the 'caused' of straightforward singular causal statements, but is best expressed by the words 'causally explains'.[9]

A final remark. It is often said that events can be explained and predicted only in so far as they have repeatable characteristics, but not in so far as they are particulars. No doubt there is a clear and trivial sense in which this is true, but we ought not to lose sight of the less obvious point that there is an important difference between explaining the fact that there was *an* explosion in the broom closet and explaining the occurrence of *the* explosion in the broom closet. Explanation of the second sort touches the particular event as closely as language can ever touch any particular. Of course this claim is persuasive only if there are such things as events to which singular terms, especially definite descriptions, may refer. But the assumption, ontological and metaphysical, that there are events, is one without which we cannot make sense of much of our most common talk; or so, at any rate, I have been arguing. I do not know any better, or further, way of showing what there is.

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[9] Zeno Vendler has ingeniously marshalled the linguistic evidence for a deep distinction, in our use of 'cause', 'effect', and related words, between occurrences of verb-nominalizations that are fact-like or propositional, and occurrences that are event-like. [See Zeno Vendler, "Effects, Results and Consequences," in *Analytic Philosophy*, ed. R. J. Butler (New York: Barnes & Noble, 1962), pp. 1–15.] Vendler concludes that the 'caused' of 'John's action caused the disturbance' is always flanked by expressions used in the propositional or fact-like sense, whereas 'was an effect of' or 'was due to' in 'The shaking of the earth was an effect of (was due to) the explosion' is flanked by expressions in the event-like sense. My distinction between essentially sentential expressions and the expressions that refer to events is much the same as Vendler's and owes much to him, though I have used more traditional semantic tools and have interpreted the evidence differently.

My suggestion that 'caused' is sometimes a relation, sometimes a connective, with corresponding changes in the interpretation of the expressions flanking it, has much in common with the thesis of J. M. Shorter's "Causality, and a Method of Analysis," in *Analytic Philosophy*, II, 1965, pp. 145–157.