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EXPLANATION, CAUSATION AND LAWS *

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1. To explain is to render intelligible or capable of being understood. The subject of the verb—what explains—is either a body of information, or a person giving the information.

Explanations are in order whenever understanding is in order: the kinds of things that get explained are very various. Before turning to explanation of the natural world in general, I want to look briefly at some special areas where, in a way, the application of the concept of explanation is more secure, because the things explained are things which are essentially capable of being understood: things which could not exist if there where no understanding them.

My first set of examples: someone, or the information they convey, might explain the meaning of a word, or a passage from Wittgenstein or Gödel; the rules of chess; the conventions observed in some human activity. While, at a deep theoretical level, there may be philosophical disagreement about what understanding language consists in, there could be no such things as language, rules or conventions, without the possibility of understanding them, and hence the possibility of giving and receiving information which secures such understanding. And at an everyday level, there is no deep problem about what is involved here.

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An example, which is rather self-indulgent. A few days ago I came across the following bit of discourse: "Former lover not beautiful? Tell me what you mean!". Well, the context was a kind of word-puzzle, to be solved as follows: EX can mean former lover; PLAIN can mean not beautiful, so (by principles of compositionality), EX PLAIN can mean 'former lover not beautiful'. The second sentence is offered as a definition of the answer: 'Tell me what you mean!'—'Explain!'. This has the classic form of a clue in the minor art form (beloved in Britain), the cryptic crossword puzzle: a more or less intelligible bit of discourse containing both a definition and a cryptic indication of the word defined.

In the above, I have explained something to you: the conventions of a certain kind of puzzle; how they apply in a particular example of the genre; and (where as we should not expect the "definitions" involved to satisfy standards of philosophical adequacy) the example itself gives one relatively unproblematic use of "explain".

Turn now, briefly, to explanations of human behaviour and mental life: explanations of what I am doing, why I think such-and-such, and so forth. It is almost universally accepted that it is constitutive of their being mental life, that the behaviour of the beings who live it is capable of being interpreted or understood in certain, broadly rational, terms—what, in its most non-commital form, has come to be known as a folk psychology (this, the only point I want to make here, being neutral as to whether reasons are causes, whether mental states must be physically realisable, and other important questions about psychological explanation). Only the eliminative materialists see the categories which we ordinarily use to understand the behaviour of ourselves and others as, like an outdated scientific hypothesis, capable of being overthrown. For the rest of us, refraining from understanding ourselves and each other in

these ordinary terms would be (as Davidson puts it)[1] changing the subject—denying that there is mental life at all. So here too, the possibility of understanding, and hence explaining, and moreover, understanding in certain terms, is essential to the existence of the thing to be explained.

2. Let us now turn to explanation of the non-human natural world: Of why there was an earth-quake or a crop failure; why water turns to steam; and so forth. In the light of our above discussion, two questions arise: First, must there be anything to be understood? Is there room, while refraining from scepticism about the *existence* of such things as earth-quakes, crops and water, for scepticism about whether there must be answers to questions about why they ocurred, failed, or turn to steam? Unlike the cases above, at first sight, it is far from clear that the possibility of understanding is essential to the existence of the things in question. Secondly, if there is such a thing as understanding/explaining here—if there are answers to these why-questions—is there some particular form which they must take? Philosophers have offered answers to this second question, but, as is our professional wont, there is considerable disagreement amongst us.

Now, if we forget about metaphysical worries derived from the allegedly problematic epistemological status of the notion of causation, doubts which have been a standard part of most philosophical upbringings, surely the notion of causation is the obvious place to turn for an answer to the second question. What can be looking for, when we ask why a particular thing ocurred, other what brought it about? What can we be looking for, when we ask why a particular kind of transformation takes place, than for the causal story of how and why it takes place?

If causes are what we look for in explanations, we also have some purchase on the first, sceptical question—why must there

[1] Donald Davidson, "Mental Events" in his *Essays on Actions and Events*, Oxford University Press, 1980.

be explanations?—which becomes, why must the world be causally structured? I don't know how to show that there could be no such things as a world which is not causally structured. But I think one can argue that there could be no knowledge or experience of a world which is not causally structured. For knowledge of the world surely requires that it impinges upon our senses: it leaves its imprint upon us. (Even a philosopher such as Leibniz, who denies this, and has in its place 'pre-established harmony', does not deny that causality is involved, for he has it that God so arranges—so causes—our experience as to faithfully reflect the world.) It is also alleged that knowledge is (in part) a practical ability that must manifest itself in *action*—that there could not be an intelligent tree, an entirely passive knower—and action is ourselves impinging on the world. So a knowable world must have *some* causal structure; and explanation only arises when we take ourselves to know the facts of which we demanded explanation.

3. This perspective on explanation has no met with general approval. In the best-known modern account of explanations,[2] we hear about derivation from laws and nothing essential about causation. In other accounts, we hear about unification,[3] reduction of the unfamiliar to the familiar,[4] and so on. The reason is surely that, since Hume, we have lost our innocence about causation. It is thought of as problematic—as requiring, but resisting, satisfactory analysis in terms of regularities, laws, counterfactual conditionals, statistical correlations, or whatever—it is not something which we can take at face value, as an

[2] Carl G. Hempel, "Aspects of Scientific Explanation" in the book of the same name, Collier-Macmillan, London, 1965.

[3] Michael Friedman, "Explanation and Understanding", *Journal of Philosophy*, 1974.

[4] See, for example, P. W. Bridgman, *The Logic of Modern Physics*, New York, Macmillan, 1968, p. 37; William Dray, *Laws and Explanation in History*, New York, Oxford, 1964, pp. 79–80.

intrinsic way in which items in the world may be related. How, asks Hume, could we recognize such a relation? For (1) it is not discoverable by reason—it is not like a mathematical or logical relation; you can't deduce effects from causes; and (2) it is not present to the senses—it is not seen or felt, there is no "impression" of causation, as opposed to the items it allegedly relates. So, being epistemologically problematic, it is metaphysically suspect.[5]

4. Each of these humean contentions is itself problematic. Consider the first—that causal relations are not knowable *a priori*. The thrust of Hume's point is surely correct—one doesn't discover how the world works by reason alone—but there are nevertheless significant problems whith his claim. First, consider an argument of Davidson's.[6] Causation is a relation between things in the world (as Hume appears to allow). It is propositions, or relations between them, which are *a priori* or *a posteriori*. The epistemic status of a proposition asserting a causal relation between entities depends on how these entities are referred to. If we refer to *c* by 'the cause of *e*' then 'the cause of *e* caused *e*' is *a priori*. On these view, the famous Humean thesis that there are no logical relations between distinct existences is either false or category mistake. Logical relations hold between distinct *propositions*. If these count as 'existences' the thesis is false. If they are not the sort of 'existences' Hume had in mind, his thesis lacks clear sense—it all depends how you pick out these existences.

(Davidson's point is the mirror image of Quine's,[7] to the effect that there are no *de re* necessitiès, and hence no *dè re* contingencies: If we refer to 9 as '9' then, perhaps, it is necessarily

[5] David Hume, *An Enquiry Concerning Human Understanding*.

[6] Donald Davidson, "Causal Relations" in E. Sosa (ed.), *Causation and Conditionals*, Oxford Readings in Philosophy.

[7] W. V. O. Quine, "Reference and Modality" in *From a Logical Point of View*.

greater than 7; but if we refer to it by 'the number of planets', it is not necessarily greater than 7. Mainly due to the influence of Kripke,[8] *de re* modalities, *contra* Quine, are now widely accepted; but that does not damage Davidson's point, which is about the epistemic status, *a priori* or otherwise, of the statements in question.)

It is nevertheless tempting to think that Hume's case should not be brought down by an example that looks like a trick—after all, no substantive causal knowledge is contained in the sentence 'the cause of *e* caused *e*'. One might try to distinguish intrinsic descriptions of events, as they are in themselves, from extrinsic, relational descriptions, and restrict Hume's thesis to the former. But there is a deep point here, of which Davidson's example is a relatively trivial manifestation.

Prominent among our ways of characterising the things which cause and are caused, intrinsically so described, is: a change in the properties of an object—an object's becoming blue; becoming harder, or increasing in weight, say. Now focus on the properties: *blue, hard, weight.* To be blue is to be such as to *cause* (under certain conditions) certain visual sensations in human beings; a thing is hard to the extent that it cannot easily be *made* to change its shape, soft to the extent that its parts are easily displaced; to increase in weight is to be more resistant to *efforts to make it move*; and so on. Secondary qualities like *blue* are dispositions to *affect* us in certain ways. Primary qualities like hardness and weight, are such that to understand them one must (in the words of Gareth Evans) "master a set of interconnected principles which make up an elementary theory—of primitive mechanics—into which the properties fit, and which alone give them their sense... One must learn how bodies compete for the occupancy of positions in space, of the resistance

[8] Saul Kripke, *Naming and Necessity*, Blackwell, 1980, p. 40.

one body may afford to the motion of another, and so on".[9] In short, any property you care to think of is characterized in terms of its causal powers.

A. J. Ayer in *Probability and Evidence*, valiantly trying to defend Hume, is actualy aware of the difficulty of conceiving and describing a "bedrock of fact" purged of causal implications. Our ordinary means of describing the world, he allows, is "overcharged whith references to causal properties". To get to the "pure factual level" we need to subtract from our descriptions of things any logical implications about their powers.[10]

But it is not at all obvious that this can be done. A property may just be its potential for contributing to the causal powers of the things thet have it; so that if we abstract away from the causal consequences of a property, there is nothing left. The levels at which we describe the world, if this is the case, are causal all the way down.[11]

If this is so, the Davidson difficulty multiplies indefinitely: virtually any description has, conceptually, causal consequences. Of course, Hume is correct that most causal knowledge is *a posteriori* knowledge. But the interesting corollary of these considerations is that the reductionist programme is doomed: there is no lower level of fact to which causality can be reduced.

Let us turn to Hume's second epistemological difficulty: that he does not perceive causality. Again, if the previous point is correct—if the way we describe the world is causal all the way down, it is not surprising that a strong case can be made for the perception of a good deal of causality too. Thus Miss Anscombe: "As surely as we lerned to call people by name

[9] Gareth Evans "Things Without the Mind", in his *Collected Papers*, Oxford, 1985, p. 269.

[10] A. J. Ayer, *Probability and Evidence*, Macmillan, 1972, p. 115.

[11] See Robert Stalnaker, *Inquiry*, MIT Press, 1984, pp. 157–160; and also P. F. Strawson, "Causation and Explanation", in Bruce Vermazen and Merrill Hintikka (eds.), *Essays on Davidson, Actions and Events*, Oxford, 1985, pp. 115–136.

or to report from seeing it that the cat was on the table, we also learned to report from seeing it that someone drunk up the milk, or that the dog made a funny noise, or that things were cut or broken by the things that cut or broke them. ... Hume confidently challenges us to 'produce an instance wherein the efficacy is plainly discoverable by the mind, and its operations obvious to our consciousness or sensation'. Nothing easier: is cutting, is drinking, is purring not efficacy?"[12] We could add, do we not feel the force of the wind or the impact of a collision; as well as experiencing ourselves as bringing about changes as we re-arrange the furniture or cover a piece of paper with the marks of a pen?

Of course, we can be mistaken, or deluded, in these observations. But this is true of all perception. Indeed, focussing on mistakes helps strengthen the case that causality is integral to the character of perceptual experience. Consider this distinction: a visual illusion often persists even when we know it is illusory; the Müller-Lyer lines still look as if they are of different length even when we have measured them and discovered they are equal. On the other hand, if I make a non-deductive inference from what I observe, and then discover that I was wrong, I simply discard the belief. For example, having tried to phone you many times, I come to the conclusion that you are away; then I discover that your phone was out of order, though it rings normally. The belief that you were away is simply discarded; no illusion persists.

Now (taking an example from Peacocke),[13] suppose I'm watching a fork lift truck raising a metal box. As it seems. I am then told that the box is actually being pulled up from above by a magnet, the truck is exerting no force. The illusion still

[12] G. E. M. Anscombe, "Causation and Determination", in E. Sosa (ed.), *op. cit.*

[13] Christopher Peacocke, *Thoughts: An Essay on Content*, Blackwells, Aristotelian Society Series, 1985.

persists: it looks just as if the truck is lifting the box. Another example: a game on a video screen, on which "little men" move about and fire shots which, if they hit, eliminate other little men. Actually, we know, all that we are watching is the common effects of a lot of electronic circuitry. No causality runs from the one "man" to the other. But the illusion persists: it looks just as if the causality does so run.

5. If causality is so fundamental to the world as we know it, it is hardly surprising that attempts to analyse the notion in terms which do not presuppose it have been fraught with difficulties. The first hurdle for a regularity theory is the distinction between laws and accidental generalizations. Assume that this problem can be solved, or alternatively that it is deemed permissible to take the notion of a law as primitive. A modern regularity thesis has roughly the following form: *c* causes *e* iff *c*'s ocurrence, that is, there are laws and other truths about the situation from which one can deduce *e*'s ocurrence from *c*'s. Some of the remaining difficulties are

(a) the problem of effects: if flipping the switch is sufficient, given the laws and circumstances, for the light's going on, so the light's going may be sufficient, given the laws and the circumstances, for the flipping of the switch. (The thoery pronunces not only that *c* caused *e*, but that *e* caused *c*.)

(b) epiphenomena: the spots may be sufficient, given the laws and the circumstances, for the fever; the theory wrongly pronunces the spots as cause of the fever.

(c) pre-empted potential causation: the movement of the truck is sufficient, given the cause and the circumstances, for the movement of the box; but, contrary to the theory, it is the magnet which is causing the box to the move.

The problem of effects is probably the most serious. (If we could solve that, we might be able to solve the others by introducing

the notion of a continuous causal chain.) One way of solving the problem of effects is by adding to the analysis that the cause must be earlier than the effect. But such a solution by fiat is unsatisfactory. If simultaneous causation and backward causation, are impossible, they are not *trivially* impossible, a *blatant* contradiction in terms.

There are arguments on both sides in the literature on this matter, and those who try to show the impossibility of these things accept that they should be ruled out by deep features of the notion of causation, not at one-line proof. David Lewis is one philosopher who has defended the conceptual coherence of the time travel,[14] which can give rise for the following: we are visited by time-travellers from the 21st century. One of the things they tell us is how to build a time-machine; which eventually causes the time-machine to get built, which causes them to visit us and tell us how to build it—a closed causal loop! Mind boggling as this is, Lewis defends it from incoherence. Even if he's wrong, a satisfactory argument that he is wrong will not be trivial.

Another way of making the point: if causation is *defined* as undirectional, then the interesting question becomes why can't there be, if there can't, such a thing as "quasation", just like causation apart from its unindirectionality? Secondly, it has seemed an attractive idea to explain the direction of time as the (or the prominent) direction of causation, which is only worthwhile if causation is itself characterisable independently of time.

David Lewis[15] has tried to show that an analysis of causation in terms of counterfactual conditionals deals with the above three problems better then the regularity theory; the idea being

[14] David Lewis, "The Paradoxes of Time Travel", in his *Philosophical Papers*, volume 2, Oxford University Press, 1986, I am indebted in this discussion to Lewis's paper "Causation", also in this volume.

[15] In "Causation", *op. cit.*

(roughly) that when c causes e, rather than merely being followed by e, if c hadn't happened nor would e have happened. But he does not succeed (as has been shown by Eduardo Flichman in a recent article in *Crítica*).[16] Here is the example from which Lewis generalises, attemting to show the irreversibility of causation in normal cases. If the pressure had not been p, the barometer would not have read r (so, the pressure's being p caused the barometer to read r). What about the reverse? This is what he says:

> If the reading had been higher, would the pressure have been higher? Or would the barometer have been malfunctioning? The second sounds better: a higher reading would have been an incorrect reading. ... When [we suppose a higher reading], it is less of a departure from actuality to hold the pressure fixed and sacrifice the accuracy of the barometer, rather than vice versa [this remark deriving from Lewis's analysis of counterfactuals in terms of minimal departures from actuality]. It is not hard to see why. The barometer, being more localized and more delicate than the weather, is more vulnerable to slight departures from actuality.[17]

The first thing wrong with Lewis's discussion of this example is that he is mistaken about the facts. As Charles Travis put it to me, "nothing is more delicate, more vulnerable to slight departures from actuality, than the weather". Indeed, the truth in this remark has been given a name in the new science called Chaos theory: the "Butterfly Effect"—a butterfly stirring the air today in Peking can transform storms systems in New York;[18] whereas

[16] Eduardo Flichman, "The Causalist Program. Rational or Irrational Persistence?", in *Crítica* 62, 1989, pp. 29–54. I share Flichman's doubts about the possibility of an analysis of causation. Whereas he concludes from this that the notion is suspect and should be banished from serious thought, I conclude that it is simply too fundamental to be analysed in terms which do not presuppose it.

[17] Lewis, "Causation", *op. cit.*, pp. 168–169.

[18] See James Gleick, *Chaos*, Penguin, 1987, ch. 1.

barometers can be made as sturdily as we please. Even if Lewis were right, the point would not generalize to other examples. But crucially, as Flichman pointed out,[19] Lewis avoids one trouble some counterfactual only to embrace another. Lewis tell us that if the reading had been different, it is not that the preassure would have been different—rather the barometer would have been malfunctioning. But the reading's being *r* didn't cause the proper functioning of the barometer—quite reverse.

So conterfactual theories of causation do not get the structure of the concept right. Theories in terms of statiscal relevance also lack the required asymmetry. And so it goes.

6. Turn to Hempel's DN model of explanation.[20] The well known counterexamples to the claim that it is *sufficient* to explain why something happened, to deduce the fact that it happened from laws and other particular facts, exactly mirror the counterexamples to a modern regularity theory of causation. We might be able to deduce that the switch was flipped, from the fact that the light went on and some laws; the fever from the spots; the movement of the box from the movement of the truck; but in none of these case do we get explanations. Hempel's account fails whenever it fails to agree with the thesis that to explain is to state causes. This strengthens the link between causation and explanation.

7. If Hempel's account fails to give sufficient conditions, does it give neccesary conditions of explanation? Do we need to cite a law in order to give an adequate explanation? Hempel's answer is emphatically "Yes". "To the extent that a statement of individual causation leaves ... the requisite... laws indefinite, it is like a note saying that there is a hidden treasure somewhere."[21]

[19] Eduardo Flichman, *op. cit.*, section 2.

[20] Carl G. Hempel, "Aspects of Scientific Explanation", *op. cit.*

[21] *Ibid.*, p. 349.

The note may help you find the treasure if you go on working, but so long as you have only the note you have no treasure at all. David Lewis, whose thesis is that to explain why a given thing happened is to give information about its causal history, says in response, that it is, instead, like this: "A shipwreck has spread the treasure over the bottom of the sea, and you will never find it at all. Every dubloon you find is one more dubloon in your pocket, and also it is a clue as to where the next dubloons may be. You may or not want to look for them, depending on how many you have so far and on how rich you want to be".[22]

If having any treasure, as opposed to a mere note, does require knowledge or reasonable belief in some law which covers the case in question, we have very little explanatory information indeed about the ordinary everyday world of encounter. A child catches an infectious disease. His doing so is traced to his contact with another child at school; this being the only contact, we are sure that the contact explains the onset of the disease. But there were other children in the class, not, as far as we can tell, relevantly different from this one, who did not catch it. That is not to say that there is no law governing this case; but it is very implausible to claim that knowledge, even an inkling, of a law is needed to explain. Examples like that could be multiplied indefinitely; indeed, in the ordinary world of macroscopic interaction, in which "systems" are never completely "isolated" from outside influence, (as opposed to the behaviour of a pair of particles in a vaccuum) it is doubtful that we can ever subsume occurrences under laws which we have reason to believe are accurate.[23]

Moreover, our knowledge of laws being, by their very nature, insecure, if knowledge of laws were required for explanation, *all* our explanations should be extremely tentative. Yet our knowledge of why something got knocked over, and the like,

[22] David Lewis, "Causal Explanation", *op. cit.*, pp. 237.

[23] See G. E. M. Ascombe, *op. cit.*

though never infallible, is about as secure as any knowledge we have.

At least this much connection between explanation and laws might be thought to be preserved: causation presupose at least the *existence* of laws, and hence, whenever there is an explanation, there must be a covering law, whether we know it or not. Now the sort of grounding I have tried to give the notion of causation in our experience of low level facts does, I admit, presuppose that it behaves in a pretty regular way. We could not latch on the notion if it were an entirely capricious matter, what caused what. But I think that falls far short of showing that causation requires strict determinist laws, or even probabilistic laws properly so called. That is does not require strict deterministic laws is shown by the fact that it is quite proper to apply the notion in the case of probabilistic laws. Lewis and other have given this sort of example:

> Suppose you mischievously hook up a bomb to a randomizer—a genuinely chancy one, I say that works by counting clicks in a counter near a radioactive source. If you set the randomizer to a high probability, that makes it likely that your act of setting up the bomb will cause an explosion. If you set the randomizer to a low probability, that makes it less likely that your act will cause an explosion. But no matter how low you set the probability, if the bomb does chance to go off, then your act does cause the explotion. Suppose that improbable events can't be caused. Then if you set the randomizer low enough, that doesn't just make it unlikely that your act will cause the explosion: it makes it downright impossible: "Don't worry—set the randomizer below 17% and you can't possibly cause an explosion." Not so![24]

(Attachment to determinism dies hard. Von Mises once remarked that in the old days, pre-quantum theory, philosophers were fond of saying: Of course there's no evidence for determinism at the level of ordinary every day observation. But at the

[24] David Lewis, Appendix to "Causation", *op. cit.*, p. 176.

microscopic level, everything is determined by iron law. After the advent of quantum theory, they are fond of saying: well at that level, perhaps there is randomness, but all cancels out, and has no effect on determinism at the macroscopic level.)

Lewi's example establishes, I think, that there can be causation when the governing laws are probabilistic. We have bona fide probabilistic laws in cases such as radioactive decay, and in an example given by Salmon[25] of Compton scattering. Must all casuation be either like this or deterministic? I see no reason for confidence, let alone *a priori* assurance that he must be so. It is one thing to appeal to strict probabilistic laws in cases such as radioactive decay. It is another to say that in "the hurly burly of criss-crossing causal chains"[26] of the macroscopic world—no isolated systems, much outside interference—where there are no strict laws governing the case, there must be strict probabilistic ones. Statiscally significant correlations provide excellent methodology for discovering causal factors. I do not see that they must be seen as discovering laws, of either kind.

I made the point above that our confidence about particular causal facts does not derive from confidence in any particular law governing the case in question. But if we have no confidence in any particular law, what grounds our confidence that there *must be* a law.

A probabilistic law is not just any statiscal information that fills the gap when there is no deterministic law. It says that inder idealished conditions, without outside interference, a certain state S has a certain chance of developing in a variety of ways.

8. Three final remarks on matters that came up earlier in this Colloquium: high level laws, unification, and realism.

[25] Wesley Salmon, "Scientific Explanation: Causation *and* Implication", delivered at the X Simposio de Filosofía, Instituto de Investigaciones Filosóficas, Mexico, 1990. [See pp. 3–21 of this issue of *Crítica*.]

[26] See G. E. M. Ascombe, *op. cit.*

(1) It is not clear to me that the sorts of high level laws which are not causal in character—equivalence principles, conservation laws, principles of least time, etc.—explain why things happen (whether particular things or general kinds of things) at all. Here is what Hempel says about Fermat's principle: a beam of light travels from a point A in one optic medium to a point B in another. We wish to explain what it passed through point C. We invoke Fermat's principle of least time: the path taking least time from A to B passes through C.[27] But surely there is a strong inclination to deny that this explains why the beam passed through point C—as if, as Lewis says, it looks ahead, calculates the path of least time, and steers accordingly![28] I think the same could be said for principles of conservation of momentum, etc. Such principles are of course of immense value, as methods of calculating and predicting. Rather like functional explanation, I suggest, they imply that there is a causal explanation of the events they subsume; but it is they of which we could say that without an inkling of what it is, we have a note telling us there is explanatory treasure somewhere, but no saying where. To depart from Hempel is to depart from the equation of explanatory value and predictive value. Explanatory value is not all the value there is in science. I would say the same about quantum mechanics: immense predictive success; but holes in its capacity to explain.

(2) Connectedly, while unification—reduction of the number of principles we have to take as primitive—has obvious value, I am not convinced that, in itself, it makes for better explanations.

Imagine two possible worlds, each with their own fundamental kind or kinds of stuff, and each with their own Grand Unified Theory, and each eith their messy macroscopic causal interactions. Now combine these into one world. Allow the interactions

[27] Carl G. Hempel, *op. cit.*, p. 349.

[28] David Lewis, "Causal Explanation", *op. cit.*, p. 222.

between the two kinds of stuffs to be fairly minimal and particularly easy to understand. It is not obvious to me that we have worse explanations in this less unified world than we did in each world separately.

(3) Finally, let us ask whether the appeal to causality in explanation has any implications for realism or its denial. With drawals from realism come in different forms. One form is Kan- out of our concepts and mental equipment. On such a view, causality is a crucial component in our concepts and mental equipment. Claiming that all explanation of the natural world is causal [for us] is neutral to this sort of issue.

A quite different sort of anti-realism is the sort of fictionalism expounded by Van Fraassen.[29] Our theories tell us stories such that it is "as if" the world is this way. We are only ommitted to the truth of the observable consequences of these theories. Now, these theories can employ causality: it can be "as if" this causal transactions take place in the unobservable part of their domain. What is dubious is not this kind of anti-realist's right to employ the notion of causality, but his right to speak of 'explanations' at all.

Recibido: 2 octubre 1990.

[29] Bas Van Fraassen, *The Scientific Image*, Oxford, 1984.

RESUMEN

En tanto que el profesor Salmon argumenta en favor de la paridad entre causación y leyes (véase su ensayo "Scientific Explanation: Causation *and* Implication", en pp. 3–21 de este número de *Crítica*), yo argumento en favor de la prioridad: afirmo que la causación es esencial a la explicación de por qué suceden las cosas o por qué ciertas cosas son verdad; las leyes son un lujo, un elemento adicional optativo.

1. Explicar algo es hacerlo inteligible o susceptible de ser entendido. En este artículo sostengo que hay una estrecha conexión entre la explicación y la causación. Primeramente examino la explicación de ciertos fenómenos humanos —el lenguaje, las convenciones, la conducta humana en general y la vida mental. La aplicación de la noción de explicación a estas cuestiones es poco problemática, pues ellas no existirían si no fuese posible entenderlas.

2. Paso a considerar la pregunta "¿por qué tal y cual cosa es el caso?" para el caso del mundo no humano. ¿Hay algo que tenga que ser entendido? ¿En qué consiste este entendimiento? Argumento que la respuesta más obvia a estas preguntas recurre a la noción de causación.

3.¿Por qué esta noción es materia de controversia? Porque, desde Hume, la causalidad, en tanto que manera como se relacionan los sucesos en el mundo, ha sido metafísicamente sospechosa debido a los problemas epistemológicos que supone. Hume argumentó que no podemos conocer esa relación (a) *a priori* ni (b) mediante la observación.

4. Argumento que tanto (a) como (b) son problemáticas. En último término, cualquier descripción de "los hechos" tiene implicaciones causales.

5. Lo anterior explica el fracaso de los intentos de "analizar" la causalidad en términos que no la presupongan.

6. Examino la propuesta de Hempel y pongo de relieve que el fracaso de su intento de proporcionar una condición necesaria mediante la noción de "inferencias a partir de leyes", refleja el fracaso del análisis de la causación en términos de regularidades o leyes.

7. Pregunto si acaso Hempel proporciona condiciones necesarias para la explicación; esto es, si (a) tenemos que conocer leyes para poder dar una explicación y (b) si tiene que haber leyes (determi-

nistas o probabilistas) que gobiernen el comportamiento de lo que se pretende explicar. Contesto que "no" a ambas preguntas.

8. Finalmente, encuentro varias dificultades en la idea de que las llamadas "leyes de alto nivel" que no son causales (tales como las leyes de la conservación, los principios de equivalencia, etc.) explican por qué sucede algo.