I. Why Change Needs an Efficient Cause: How Aristotle Could Refute Hume

Abstract

Hume said that the otherness of cause and effect makes it epistemically necessary that dependence on an efficient cause cannot be epistemically necessary; for that otherness prevents the negation of dependence on a cause from being contradictory. My critique of Hume is distinguished from others by starting from the grasp of a kind of dependence other than on an agent. A motion newly occurring to an already existing subject is caused by—is nonidentical with and cannot exist without—its subject, though not by efficient causality. Both philosophic tradition and ordinary language use "cause" in a sense broad enough to cover the subject and the agent of change. Seeing that a change occurring to what is other than itself needs a cause of some kind refutes Hume's argument from otherness. (To my knowledge, this is the only reply to Hume based on Aquinas' (*De Pot*., 5.1) insight, which I was pleased to learn about later, that "The necessity of an effect's dependence on its cause is obvious in the case of . . . 'material' causes.") The question is no longer whether a change has any cause but whether a previously unchanging subject can be a change's sole cause. I show that, if the sole cause is supposed to be the subject as only potentially changing, the change is caused and has no cause. (I was pleased to learn later that Yves Simon (1969, 131-134) had said "The need for the efficient cause arises when the mind recognizes the insufficiency of explanation by the material cause. . . . If the only origin of being in act is being in potentiality, the origin of that addition of reality which distinguishes being in act from being in potentiality is nothing." But Simon did not use this to explain Hume's error.) And if the sole cause is supposed to be the subject as actually changing, the change unavoidably becomes a cause of itself. Even Hume (*Treatise*, 1, 3, 3) saw that something's having nothing for a cause or being a cause of itself is contradictory, if dependence on *some* cause is established first.

Consciously or unconsciously, our attempts to reform philosophy using post-Fregean methods have relied on assumptions other than those based on the Fregean revolution in logic. Often those assumptions derive from pre-Fregean philosophy. This chapter concerns a central presupposition that derives from Hume: our belief that we cannot know that what I will call a "principle of efficient causality" (PEC) is a necessary truth. The PEC defended here asserts that every change must have an efficient cause, though other formulations, such as Hume's "Whatever begins to exist must have a cause of existence" are acceptable. My language will for the most part not be post-Fregean but language that could have been used to refute Hume in his own time. Importantly, for example, I will define necessity in terms of contradictoriness, something's both being and not being what it is, not in terms of possible worlds.

1.

It might appear that causality has been a much discussed topic in recent philosophy.

In actuality, we have discussed it very little. Treatments of causality have discussed it from such logical and epistemic viewpoints as law-like and nonlaw-like universal statements, deterministic predictability, contrary-to-fact conditionals, and modal necessity. But causality is something ontological, not epistemic, logical, linguistic or psychological; it is a connection between one extracognitional thing and another, not of cognition to things, of one cognition to another, or of accoutrements of cognition to things, cognition, or other accoutrements of cognition. With a few notable exceptions, almost no post-Humous philosophers have discussed the ontological connection between things that I intend to show causality to be. (Here "thing" means an extracognitional reality, whether a reality is an entity, event, state of affairs, situation, condition, or a property of any these.)

Our acceptance of Hume's critique of the epistemic necessity of causality is, of course, the reason why we think that causality should be discussed first and foremost from the viewpoint of certain kinds of cognition, cognition with specific epistemic, logical, linguistic or psychological properties. In speaking of causality, Hume may have intended causality to be something that is ontologically "out there." But his arguments forced him to analyze causality in terms of *universality* in sequences of kinds of events (an event of kind F is always followed by one of kind G; or an event of kind G is always preceded by one of kind F), or by our *expectation* that an event of one kind will be preceded or followed by an event of a certain other kind. Outside of cognition, however, there are only individuals of kind F and kind G. Universality is a cognition-constituted relation, the relation between realities X and Y and some predicate "F" that results from our thinking that each of X and Y is accurately described by predicate "F." In short, universality is a logical concept. So regardless of any better intentions on Hume's part, causality becomes a relation, perhaps logical universality itself or perhaps a psychological expectation resulting from universality, between individual sequences of individual events resulting[1] from our seeing that predicates "F" and "G" are always true, respectively, of the prior and posterior members of sequences of events. The

[1] Both kinds of "resulting" would be clear cases of *effects* to those not misled by Hume.

logical relation expressed by "universal" is not just incidental to Hume's attempt to analyze causality. Making strict universality in sequences, as opposed to mere probability no matter how great, a requirement for causality is the only thing that saves Hume's account from the elementary fallacy, *post hoc ergo propter hoc*.[2]

Until we are programmed to think otherwise by our philosophic education, we believe that every change comes from an efficient cause, an agent. What, if anything, is the basis of that belief? That basis cannot be our, non-existent, observation that changes always embody universal laws. Our belief in the necessity of causes for change is far removed from any experience of universal regularity in sequences. Hume's account of causality is like a prejudice; you have to be taught it.

As children, we learn we can expect to find that a change resulted from a state of affairs brought into existence by a previous change. But children do not come to believe that all changes have causes by observing that all changes obey universal laws. In fact, for the vast majority of changes we experience, uncontrolled observation alone does not show that they are instances of universal laws. And when we make controlled observations, we do so because we assume the existence of causal connections. To identify which factors have a causal connection to the phenomena under study, we vary circumstances to systematically screen out factors that may exist but do not have a causal connection to the phenomena. Our belief that changes obey universal laws is a consequence (an *effect*) of our belief that, since what a change is results from what its cause(s) is, in the absence of interfering causes, a state of affairs similar in the relevant respects (which controlled observation is meant to reveal) to previous states of affairs will cause a change that is similar in certain respects to previous changes (see Appendix B).

Most changes we experience, both as children and adults, result from situations in which multiple causes, each obeying their own universal laws (whether we know it or not), combine to produce individual effects not covered by those laws. Only at a relatively mature

[2] I will leave it to others to explain how Hume could be a nominalist, in the classical sense, and still rely on beliefs about *universality* in sequences to analyze causality.

point in our intellectual development could we even form the view, much less have reason to believe, that everything we see as we look out a window resulted from the combined action of causes that obey universal laws. No universal law tells me that there should be a tree at that place on my lawn, that there should be a brown patch of grass three yards to its left, that a robin should be landing on its lowest limb at the same time that a dog starts barking, that the sky behind the tree should be cloudless today, and so on. Our daily experience is composed of such unique combinations, combinations we find to be supported by universal laws only after considerable reflection and/or investigation. Yet we believe that the changes bringing such states of affairs about have causes well before we have sufficient experience or have reflected sufficiently on experience to discern enough universal patterns for our belief that every change is caused to be explained by a belief that all events obey universal laws.

And even though it will turn out that every change *must* be explainable, ultimately, by causes governed by universal laws, at the level of pre-scientific experience there are *exceptions* to almost all the regular patterns we know. As attentive an empirical observer as Aristotle found strict universality only in astronomical phenomena; elsewhere nature acts "for the most part," acts with probability, not with the indefectibly needed to avoid the *post hoc ergo propter hoc* fallacy.[3] Paradoxically, what is much more "regular" than the strict universality Hume's explanation of our causal beliefs would need is probability with exceptions. At the level of everyday observation, exceptionless rules are the exception, not the rule. Only after much mature and sophisticated investigation, investigation directed by intelligence motivated and guided by causal beliefs we *already* have, can we explain those exceptions by deeper universal laws, laws that can rarely be drawn from ordinary experience alone. Since we can explain those exceptions by underlying universal laws only later, universality in sequences cannot account for our prephilosophic causal beliefs.[4] So the concept

[3] Aristotle, *Physics*, II, 5, 196b 10-11; 8, 199a 33-199b 18; *On the Heavens*, I, 3, 270b 14-15.

[4] A child's belief in causality wouldn't be explained even if she mistakenly formed some views like "All robins' nests are exactly alike." She could easily ask "*Why* are they all alike?"

of cause employed by our belief in the existence of causes cannot be that of regular concomitance. And the reason that we undertake investigations that will later yield universal patterns is that we already believe that there are causes for those investigations to find.

Hume's reduction of causality to something epistemic (in a broad sense that would include logic and psychology) is a consequence, not a premise, of his arguments. His critique of causal knowledge is multifaceted, but I will not have to deal with all of it. I intend to establish as a knowably necessary truth that every change has an efficient cause; a change without an efficient cause would be a contradictory reality. We will see that our knowledge of that necessary truth follows from our understanding of terms, but the truth concerns a condition holding in reality. It happens to be the case that, contrary to Hume, the understanding of terms that leads to knowledge of this necessary truth comes from sense experience, as we will see. But the important issue here is not where those ideas come from but that this PEC informing us about reality is necessarily true and knowably so.

2.

Hume's argument against the epistemic necessity of any PEC claims to prove more than that we do not know that efficient causes are necessary for changes; it claims to prove that we *cannot* know this. Necessity for Hume—and for almost all philosophers prior to our justified admiration for the computational power of possible world semantics— had to be shown by the contradictoriness of the opposite. Contradiction affirms and denies the *same*, affirms and denies that something is what it is; it says that A is not A. But when we deny the existence of a cause of A, we are not denying that A is A; we are denying the existence of something *other* than A. A's identity with itself can show us only that when A exists, A exists. To deny the existence of something other than A is not to deny that A is A. But when we deny the existence of a cause of A we are, *by definition*, denying the existence of something other than A. Otherness, not universality, is essential to the understanding of "cause" in Hume's critique of the epistemic necessity of "Whatever begins to exist must have a cause of existence":

The foregoing proposition is neither intuitively nor demonstrably certain.... As all

> distinct ideas are separable from each other, and ...as the ideas of cause and effect are evidently distinct, 'twill be easy for us to conceive any object to be non-existent this moment and existent the next, without conjoining to it the distinct idea of a cause or productive principle. The separation, therefore, of the idea of a cause from that of a beginning of existence...is so far possible, that it implies no contradiction nor absurdity.[5]
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> There is nothing in any object considered in itself which can afford us a reason for drawing a conclusion beyond it.[6]

A cause of X is supposed to be something distinct from X, since X's need for a cause is supposed to be a need for something other than itself. The necessary is that whose opposite implies a contradiction. But contradictions are affirmations and denials of the same, not of the distinct; they deny something's identity with itself, not its connection to what is other than itself. It appears, therefore, that no contradiction in X's lack of a cause can be known "intuitively" or by demonstration from what is known intuitively. Thus it is an *epistemically necessary* truth that a PEC cannot be epistemically necessary, that is, cannot be known by us to be necessarily true by the only methods open to us of knowing that a statement is necessarily true.

Hume's argument, however, is incorrect. Consider the following circumstance: Something, S, undergoes a change, Q, that S was not previously undergoing. From this description we know that S is something really distinct from Q, distinct from Q extracognitionally, since S once existed without Q's existing. We also know that Q is related to S such that Q does not exist without S; a change undergone by something does not exist unless the thing that it occurs to exists. A similar change could exist, but Q could not be a change occurring to S, if there is no S.

Since it would be contradictory for there to be a change undergone by S that was not

[5] David Hume, *A Treatise of Human Nature*, 1, 3, 3.

[6] Hume, *Treatise*, 1, 3, 12.

undergone by S, we know that between distinct realities Q and S there is necessarily a connection such that if S does not exist, Q does not exist. That is precisely the kind of connection Hume says cannot be known, a necessary, contradiction-implying connection between things that are nonidentical. (Again, Hume's argument does not specify the nature of what is not epistemically necessary, causality, except by the otherness of cause and effect.) In replying to Hume, then, we can speak of a necessary "causal" connection between A and B, if A and B are really nonidentical (nonidentical extracognitionally) and A cannot exist without B, where "cannot" means that if A exists and B does not, then something both is and is not what it is — A is not A, B is not B, or some third thing is and is not what it is.)

The causal connection between Q and S is not the type Hume thought he was discussing. He was thinking of "productive," that is, efficient causes. Mainly as a result of Hume, philosophers today use the word "cause" almost exclusively for efficient causes. But Hume's argument would exclude other connections that were regularly called "causal" in philosophical literature prior to Hume and, incidentally, are still called that in ordinary usage. In Aristotle's terminology, that which undergoes a change is a "material" cause, where "material" is not used synonymously with "physical" but in the sense of what something is made out of. If clay is the material out of which a statue is made, clay is the material cause of the statue and of the changes that were the coming into existence of the statue. Today, we still often call the material a thing is made out of a cause. "What *caused* that statue to be so easily broken?" "Its being *made out of* clay rather than granite." To avoid any issues associated with Aristotle's theory of "prime" matter, however, I will not use "material cause." Instead, I will call that which undergoes a change its "subject cause" since that which undergoes a change is still sometimes called the subject of the change; I will also refer to "subjective causality."

But ordinary language is not the question here. What is in question is whether there can be a necessary connection between the really distinct. That is what is essential to a "causal" connection from the standpoint of Hume's argument against such connections being epistemically necessary. A change occurring to something it has not always been occurring

to is a causal connection in the sense covered by Hume's argument, though Hume obviously failed to notice that. So the connection between a change and the subject of change is a counterexample to Hume's claim that nonidentity, otherness, between things excludes the possibility of our recognizing that a causal connection between them is necessary, in the sense that the opposite would be contradictory. Certainly, nothing excludes the possibility that, whether we know it or not, what some reality is involves a connection with some other reality such that if the second does not exist, the first does not exist.[7] And in the case of a change occurring to something it has not always been occurring to, nothing excludes the possibility of our knowing that what one reality, the change, is involves a connection with another reality, the subject of change, such that if the subject does not exist, the change does not exist.

When there is a relation of "not-existing-without" between distinct realities, I will say there is a relation of "dependence." Linguistic devices such as "If A does not exist, B does not exist," "A would not exist without B," "A cannot exist without B," etc. allow us to express beliefs about the existence of necessary causal connections but do not discriminate between the different kinds of conditions that can make those statements true. Statements like "A cannot exist without B" and "If B does not exist, A does not exist" could refer to a causal connection in either the effect-to-cause direction (from the dependent to the depended on) or the cause-to-effect direction (from the depended on to the dependent). In fact, three different kinds of connection can satisfy such statements. The reason A cannot exist without B can be (1) that B is a necessary effect of A, (2) that B is a necessary cause of A, or (3) that third thing C is a necessary cause of A, while both A and B are necessary effects of C (hence, when C exists, both A and B exist, and when either A or B exists, C exists). So there are three possibilities for a necessary causal connection. (The case of A and B being necessary effects of C, without C's being a necessary cause of A and/or B, is an instance of (1).)

[7] Nor does anything exclude the possibility of our recognizing that something we know has a specific relation to something else, even if we do not know what that something else is. When a quantity of any number is given in experience, we can know that there is another number which is related to it as its square, even if we do not know what that other number is.

In the S-undergoing-Q example, however, we have hypothesized that S existed without Q. That is enough for us to stipulate that "Q does not exist without S" refers to a connection in the effect, Q, to cause, S, direction. Since S can exist without Q, we can stipulate that S's existence does not "depend" on Q. So "Q does not exist without S" refers to the dependence of Q on S, but not vice versa. For if reality A can exist without reality B, we can stipulate that B is not a necessary cause of A, and A and B are not necessary effects of the same cause. But Q cannot exist without S, and we can also stipulate that no necessary cause of S also has Q as a necessary effect. So the necessary connection between Q and S is in the effect-to-cause direction. (These stipulations are not meant to state necessary and sufficient criteria for the use of "cause," "effect," "dependence" or any other terms. These and any later linguistic stipulations are intended only to be adequate for the uses made of terms in the specific arguments I offer, that is, adequate for grasping the soundness of those arguments.[8])

Something's relation of dependence is a relation of needing something, of requiring something, other than itself. For any dependent reality, there must be something other than that reality which satisfies, fulfills, that requirement. Of course, nothing prevents an effect from requiring a complex of realities other than itself. But for simplicity I will usually use the singular "a cause" or "the cause," where the context of the argument does not specifically call for an effect to be caused by a complex of realities. By so using the singular, I will not be excluding the possibility of an effect's depending on a complex of realities. Likewise for the sake of simplicity, when I refer to "a change," I will be assuming that the particular change in question is a change undergone by something, its subject, that has not always been undergoing it. An eternal process of change continuous in all respects, for example, is outside of the scope of the present arguments.

We have just begun to discuss causality, but already we know that Hume was wrong

[8] The misplaced search for necessary and sufficient criteria for the use of words is an idiosyncrasy of some post-Fregean methods that has only increased paradox and disagreement in philosophy.

to argue that the fact that cause and effect are, by definition, distinct realities prevents us from knowing any necessary connection between them. Hume's argument was against the very *possibility* of causal connections being knowably necessary. However, *ab esse ad posse valet*. So before having a philosophical demonstration of any other kind of necessary causal connection, we can know that we cannot rule out others a priori. Hume's argument against the possibility of epistemically necessary causal connections, like his interpretation of causality by universality, is already null and void. To establish a change's need for an efficient cause, we will have to ask whether the subject cause can be the ONLY reality other than itself that the change has for a cause, the only reality other than itself without which the change does not exist. But before showing that its subject cause cannot be a change's only cause, we are already at a place where we know that there is something, a change, that necessarily depends on a cause. So we know there is a sum total of realities other than the change without which the change would not exist but which do not depend on the change. But having to show that this sum total cannot consist of the subject cause alone is quite different from having to prove, against Hume, the possibility of knowing the necessary truth of the existence of such a sum total. That possibility has already been proven because its actuality has been proven.

3.

Our discussion of causal necessity is still embryonic. But the recognition that the necessary connection between a change newly occurring to something and the change's subject is causal, since the subject is something really distinct from the change, has already put us into an entirely different universe from Hume's. In fact, it puts us into two entirely different universes. First, the physical universe is now known to be a place where necessary causal connections reside; we know that it is even a place saturated with necessary causal connections. Second, we are in a different "universe of intelligibility." I am not referring to the fact that we can now ask whether, since changes occur to things that they were not previously occurring to, the subject of a change can be the only thing other than the change without which the change would not exist. Rather, there is a new universe of intelligibility

because the argument I have given exemplifies a mode of analysis far removed from Hume's, far removed from the modes of analysis in the empirical sciences, and far removed from the modes of analysis by which philosophy usually tries to understand empirical knowledge. This mode of analysis not only reveals far different truths about the universe but does so because it uses a different method of verifying statements, which is based on a different method of forming objective concepts.[9] (That method will be explained after we are familiar with more examples of the method.)

But one aspect of the method requires attention now, in order for us to epistemically appreciate the examples to come. Our grasp of the necessary truth that, unless its subject exists, a change occurring to something does not exist is itself *caused* by understanding the meanings of that truth's words. But "caused by an understanding of *meaning*" does NOT imply that those truths are "linguistic," or "conceptual," or "logical," or "relations of ideas," etc., in some reductive sense of these terms that would diminish the value of those truths for informing us about the way things exist extracognitionally (and so exist independently of language, or logic, or concepts, etc). The views about knowledge of necessary truth that I am opposing here are difficult to express more clearly than that because those views are innately murky. Somehow or other, the causal analysis "known true by understanding the meaning of its terms" is supposed to turn those meanings themselves into something linguistic, logical, conceptual or psychological in a reductionist sense. At that rate, what water is and what death is would be something intrinsically linguistic because they happen to be the *meanings* of "water" and "death," respectively.

Philosophers have long recognized that necessary truths are known as such from an understanding of the way their words are used. Yet only post-Humously have philosophers concluded that such truths must be "linguistic," or "logical," or "conceptual," etc. in some reductionistic sense. Usually, the meanings of the words employed are not logical or linguistic values. And the fact that necessary truths are known by understanding the meanings of

[9] Concepts in the sense, not of mental states, but of what we are made aware of by mental states. See Simon (2012, 2-3).

their words does not imply that those truths *mention* words instead of *using* them to refer to things other than words.

If we now do not believe that truths known from meanings can express how the world exists extracognitionally, the reason is that a contrary argument has now been found convincing. But I have met proponents of the "linguistic theory of the a priori," or other versions of this murky position, who are not aware of the argument without which their position would not have been accepted, much less considered all but self-evident (that is, known by the meanings of *its* terms---and if their position is not supposed to be known that way, how is it supposed to be known?) as it now is. That argument is the very one we have refuted: Hume's argument against the knowability of a PEC. Although Hume was not the first to make that argument, before he popularized it almost everyone believed that some version of a PEC was a knowably necessary truth. Therefore, before Hume's argument was accepted, it was believed that a truth known by the meanings of its terms could expand our knowledge of the extracognitional world beyond what we perceive of it. For when a change is perceived, we could know that an efficient cause of the change exists, even if the efficient cause is unperceived.

If the failure of Hume's argument against epistemic causal necessity had been recognized, therefore, the *cause* of our current infatuation with reductionist interpretations of knowable necessity would not have existed. We would have had no reason to abandon our "realist" interpretations of knowable necessity. But how can relations between *meanings* advance our knowledge of what exists outside of our current cognitions? Because they are connections between extracognitionally existing values such that one value is not able to exist without the other value's existing. Connections of that kind between meanings are not intrinsically linguistic, or conceptual (except in the sense of being objective concepts), or logical, etc; they are connections characterizing what things are extracognitionally *if anything characterizes what things are extracognitionally*.

Incidentally, those who are aware of the argument whose acceptance was the historical *cause* of the plausibility of the reductivist accounts of knowable necessity are themselves

familiar with a counterexample to those accounts: Hume's treatment of knowable causal necessity itself. For if Hume's argument was correct, it would show, not merely that we do not know causal necessity, but that it is *impossible* to know it and, therefore, that it is a knowably necessary truth that, given what our powers of knowing and the evidence available to them are, awareness of that evidence is unable to *cause* knowledge of the truth of statements affirming necessary causal connections. And whatever Hume or his victims thought the *cause* of that alleged knowledge of truth is, the value of that knowledge and of the evidence for it would hardly be constricted solely to being knowledge of linguistic, logical or psychological relations following from the mere stipulations of the meanings of the words in Hume's argument.

I have not yet shown that in addition to its subject cause a change occurring to something it has not always been occurring to needs an additional cause I am calling an "efficient cause." Nor have I been very specific about what an efficient cause is other than describing it as a cause in addition to the subject cause. There are reasons for not being more specific. First, a more detailed discussion would mostly be irrelevant to the argument I will make that another cause is always needed. Where more details are relevant, I will give them. Second, a more specific discussion now would obscure a very important *gnoseological* characteristic the knowledge that another cause is always needed has. Efficient causality works *very* differently when grasping a joke causes us to laugh, learning of a death causes us to grieve, knowledge of premises causes knowledge of the conclusion, a magnet moves an iron filing, one ball's striking another puts the second ball motion, light passing through a slit makes a wave pattern on a screen, etc. One *sine-qua-non* value of a PEC is that it tells us there is some other cause to look for in each case of change without a priori putting more than minimal limits on what to find when we look.

Since causality is a connection between what one reality is and what another reality is (a connection to which gnoseological values, like logical universality, contrary-to-fact conditionality, and so on, are related only as *effects* of what things are extracognitionally), we should not be surprised if the causality needed beyond the causality of the subject of

change turns out to have as many variations in specific details as the kinds of things that change and the kinds of changes they undergo. There would be something wrong if the foundational analysis of efficient causality's epistemic necessity did not leave plenty of room for more specific, and differing, information to be obtained about different cases of change by pursuing consequences of the same general law that every change must be brought into existence by a situation that was itself brought into existence by *some* previous change(s). That is what empirical science is mainly about, how efficient causality, along with subjective causality, works differently in all the vastly different kinds of change we know about.

4.

Still, we can learn more about efficient and subjective causality prior to further empirical investigation, and doing so will aid the understanding of our argument for a PEC. Consider a case where there is something, A, really distinct from either the change, Q, or the subject of the change, S, such that it is contradictory for A to be what it is and for the subject to remain what it was until then. Then, what A is and what the subject is without the change would together be causes of the subject's changing. To see how it could be contradictory for something to remain what it is when something distinct from it is what it is, assume that billiard ball A rolls until it hits stationary billiard ball S. Assume also that both balls have, as a matter of *contingent* fact, one of the properties we usually associate with them, the property of not being able to occupy the same space as the other, wholly or partially, at the same time. From this hypothesis about what A and S are, it follows that when A hits S, another change *must* occur; something must cease being what it is in some respect and become something else. Call ball A's being in motion change 1. In the hypothesized circumstances, A's contact with S is a situation in which another change, call it change 2, must occur[10]. When that contact occurs, it is contradictory for both A and S to remain what they are in all respects. At least one of them must cease being what it is, in some respect,

[10] Assuming that A and/or S remain in existence and are not completely annihilated. Creation ex nihilo and total annihilation would not be changes. What I mean by "change" requires something that undergoes the change and, hence, continues to exist after the change but in a new state.

and become something else.

For example, at the contact, A may simply cease moving and remain where it is. If so, A ceases to be a thing in motion; A ceases to be what it was in that respect. Or A may bounce off S, in which case A ceases to be a thing moving in one direction and becomes something moving in another. But if A neither stops nor changes direction, S must undergo some change that takes it out of A's path; S must move or shatter, for example. Since A's motion does not cease or change direction, B must undergo a change that prevents motion in a certain direction both existing and not existing at the same place at the same time. Motion in a certain direction would exist, since we are hypothesizing that A is moving in a certain direction at that place and time. And it would not exist, since we are hypothesizing that S is at rest at that time in a place that A cannot enter, since A and S cannot occupy the same place at the same time. But if S moves, for example, it has ceased to be something at rest; it ceases to be what it is in that respect and becomes something else, something in motion.

We can, of course, imagine A continuing to move in the same direction but passing through S. In that case, S would not cease being something at rest, but we would not have eliminated the first change's requirement that change 2 occur. For we assumed that A and S have the property of not being able to occupy the same place at the same time. If A passes through S, that characteristic must have changed; so change 2 would be the change from their not being able to occupy the same place to being able to do so. (Recall that the hypothesis stipulated that the property of not being able to occupy the same place at the same time was a *contingent* property; so it is a property able to change. If it is a *necessary* property, however, like a color's property of not being able to occupy the same place as another color, the necessity of the first change being followed by a subsequent change would be even more obvious.)

If change 2 did not occur in the situation at least one of the things in the situation would both be and not be what it is. Specifically, if neither A nor S changes, A both is and is not what it is. By hypothesis, A is something moving in the direction of S's space and some-

thing unable to occupy the same space as S. And it is contradictory for motion in a certain direction to exist and not exist at the same place, here, the place where A and S make contact, at the same time. If S does not change in a way that takes it out of A's way, A is either no longer moving in the direction of S's space or no longer something that cannot occupy the same space as S. In either case, the assumption that change 2 does not occur would require us to hold that A both does and does not possess at least one of its properties. So for one or more subsequent changes not to occur would be contradictory to the hypotheses.

The fact that the necessity of a subsequent change follows from this description of A's change of position is a counterexample to another claim of Hume, that the nonidentity between cause and effect excludes the possibility of our recognizing that a causal connection in the cause-to-effect direction is necessary. We know from empirical science that at least two subsequent changes will occur, equal and opposite to each other, but without knowing that, we could know nonempirically that at least one other change must occur. Of course, this counterexample against Hume assumes something about what A and S are. But if Hume meant only that we cannot see necessary connections in the cause-effect direction without knowing something about what things are, who would have ever disagreed?

And notice that science is constantly forming objective concepts of what things are, concepts like mass, energy, force, velocity, extension, momentum and acceleration, such that it would be impossible for one thing to remain what it is when something else is what it is, as expressed by those concepts. To believe that causality amounts to a *logical* relation of universality between, or a *psychological* expectation about, rather than an extracognitional connection between, what one reality is and what another reality is, is to believe in a kind of magic. Wittgenstein said that belief in the "causal nexus" was superstition. In fact, it is superstitious to entertain the belief that change happening to one reality can have nothing to do with, cannot require, that another change happen to something else. For why should it not sometimes be the case that, given that something is what it is, something else cannot remain what it is? Or better, *how* can it not sometimes be the case that, given what distinct realities, like moving ball A and previously stationary ball S, are when they make contact, at

least one of them cannot remain what it is? To believe in causality, in short, is simply to believe that what one thing is can have something to do with what another thing is. And why should it not be the case that the *universality* of a given truth about sequences is an *effect* of the following *cause*: that the realities involved in the sequences are what they are?

Empirical science tells us that under circumstances we can stipulate, for example, that nothing other than gravity and inertia is holding billiard ball S in place and S is struck by a billiard ball of equal mass moving at, say, 30 miles per hour, S cannot remain what it is with respect to being something at rest. It must cease being something at rest and become something in motion. And the occurrence of its ceasing to be what it is in this respect is caused by something else, the ball that strikes it, being what it is, a certain mass moving at a certain speed in a certain direction through a certain place. On the other hand, empirical science also tells us that, if the circumstances were otherwise the same except that, instead of billiard ball A hitting billiard ball S, a bowling ball moving at 100 miles per hour struck a robin's egg, one subsequent change would be the egg's being crushed, not its rolling away. For the scientist, causality is not the logical relation of universality between what two kinds of events are but an extralogical connection between *what one individual reality*, like a billiard or bowling ball rolling at a certain speed, *is* and *what another individual reality*, like another billiard ball or a robin's egg, *is*.[11] The connection is extralogical since a changed reality is required to be what it now is by what it was before the contact and otherwise still is and by the other reality's being what it is at the moment of contact, where "required" means on penalty of some reality both being and not being what it is.

The present analysis of causality, however, will leave aside what we know about change from empirical science, except for the pedagogical purpose of illustration or clarification. For instance, we know from empirical science that ball A's "action" on ball S would

[11] Only individuals exist extracognitionally. So individual causal event A/S necessitates individual effect Q. I can choose freely; for a rational appetite *is* determined by a universal object. Motives sufficient to cause me to choose X will do so unless I refrain from choosing X. If I refrain, I put myself in a state of consciously preferring the status quo, not by producing an act of choosing not-X, but just by *not* producing an act of choosing X when I could. S cannot refrain from Q.

require an equal and opposite action of S on A, but nothing in the hypotheses we have stipulated would tell us that. On the other hand, those hypotheses do require that at least one new change must occur at the time of contact.

It might seem that the billiard ball example of a subsequent change being necessitated by a prior change cannot tell us anything more about the possible infinity of subsequent change(s) that must occur. Not so. Let us represent the event of moving ball A's contacting stationary ball S by "A/S," and call the time of contact "*t*". There must be at least one new change undergone by ball A, ball S, or both. Whatever that change is, it will not be something abstract or general but a concrete individual change occurring at this place and time, the place and time of A/S. But not any of the infinite individual changes that A and S could undergo will do. It must be one of the possible changes that avoids the contradiction of motion in a certain direction occurring and not occurring at the same place and same time. For example, at *t*, S might change color. But a change in S's color would not avoid the contradiction of motion in a direction existing and not existing at the same place and time. So what the change is—the change that is causally necessitated by what A and S have been until *t*, and by what they are apart from undergoing that change at *t*—is limited by what A and S have been and now are otherwise than undergoing the change. In other words, what the causes of that change are place limiting conditions on what that change must be. Because of what A/S is, the subsequent change(s) must fulfill certain requirements. There are features the subsequent change(s) is required to have by what A/S is. And we know that without knowing anything more than that A\S would otherwise be the contradictory event of motion with a certain speed and direction both existing and not existing at the same place and time.

That is what efficient causality is, a connection between what one reality or set of realities (here A and S in contact as a result of change 1) is and what another reality (here subsequent change 2) is. A subsequent change required by A/S, of course, can and almost certainly will have other characteristics not required by A/S. If S is green, for instance, the subsequent change may be that a green ball moves out of A's way. But nothing that we

have hypothesized about event A/S requires that the subsequent change occur to something only if it is green. On the other hand, perhaps the A/S hypothesis requires the subsequent change to have some characteristic that our understanding of the hypothesis is insufficient to reveal to us. Considering the subsequent change with the sum total of characteristics, known or unknown, the change is required to have by what A/S is, we can say that what this change is *derives from* what A/S is, since those characteristics of the subsequent change are required by the characteristics that constitute what event A/S is.

Again, that is what efficient causality is, as far as we need to describe it here: What one reality now is as a result of a previous process of change requires that another reality cease being what it was in some way. To cause a change as efficient and subject causes, A and S cannot and need not *do* anything other than *be* what they are at *t*. The universe is wholly and entirely constituted by what existents are; so causal "transactions" cannot amount to anything more than things becoming, being and ceasing to be what they are. Efficient causality is not some invisible fluid flowing out of A into S. Efficient causality is the extracognitional incompatibility of A's being what it now is, as a result of a previous change in the universe, and S's remaining what it was. (Further analysis can show that change 2 *is* S's now having *something* of what A is at *t*—though having it in a different way, since "Whatever is received is received according to the mode of the receiver." The same heat that can burn paper can boil water. But A's "giving" something to S, and S's "getting" something from A, can amount to no more than A/S's being what it is.) Efficient causality is the incompatibility of reality X's being what it now is and of reality Y's remaining what it previously was in some respect, where "incompatibility" means that the opposite is contradictory. And science, especially physics, shows us that such incompatibilities are constantly happening throughout the universe; they are what make the universe work, which simply means that what things are makes the universe work.

Since we know that a subsequent change with some specific characteristics is required by what A/S is, having a concrete example of such a change in mind will be helpful in a discussion that, otherwise, needs to treat change very abstractly. So when I refer to the

billiard ball example in what follows, it will facilitate the discussion of efficient causality to assume that the further change necessitated by A/S is Q, the change of ball S from previously being stationary to now being in a state of locomotion taking it away from the place where it had been at rest. What previously stationary ball S now is includes the characteristic of being in motion in a certain direction. The description of A/S given so far does not necessitate the occurrence of this change as opposed to other changes that would avoid the contradiction of A's both being and not being in motion in a certain direction at the time and place of A/S. But if it were worth the trouble we could add to the description of what A/S is, with respect to the masses and shapes of A and S, A's speed, the friction of the surface S is resting on, etc., until it would contradict these hypotheses for S not to begin moving at the time of A/S. That effort would not be worth the trouble, however, since we have already shown that A/S will not necessitate just any further change but one with some characteristics determined by what A/S is.

Instead of describing the effect of A/S as S's moving in a certain direction, we know from Einstein that we could describe it as S and the rest of the universe being in a certain state of relative motion. And we could describe the change that brought A/S about as A and the rest of the universe being in a state of relative motion. We could describe any new motion as the universe's now having as a characteristic a certain state of relative motion between one of the universe's parts and the rest of the universe. In these terms, the epistemic necessity of an efficient cause means that when a new state of relative change, Q, is a characteristic of the universe, a previous state of relative change must have resulted in the existence a situation, A/S, such that what that situation is requires Q to now exist. The differences in these descriptions, however, will have no effect on the arguments to come. Since the states of relative motion between A, S, and the rest of the universe would not exist without A and S, those states have a causal dependence on A and S. So I will use the simpler, pre-Einsteinian, descriptions.

In point of fact, locomotions, changes in the relative positions of physical things, of things that at least contingently have the characteristic of not being able to occupy the

same space simultaneously, are constantly going on in the universe. So changes that necessitate not just any subsequent changes, but subsequent changes that avoid the contradiction of motion in a certain direction existing and not existing at the same place and time, are going on constantly. What those subsequent changes are is necessitated, to some degree at least, by what those previous changes are. So necessary causal connections are constantly occurring all around us. The necessity of those connections follows from what those changes, and what the things undergoing them, are; for if A/S occurs and a specific further change does not, something both is and is not what it is. The arguments still to be given do not assume that such changes are constantly occurring around us. But without going any further we know that it is reasonable to believe in natural necessity, since changes occur that have relations of dependence on what things are.

5.

I will now show that a change with a subject to which the change has not always been occurring, must have at least one other cause in addition to its subject cause. Changes can be continuous, as locomotions are, or instantaneous, as the change from being at rest to being in locomotion is. When I am referring to Q, the instantaneous change of S going from being at rest to being in motion, I will represent S's state by "S\Q"; when I am referring to M, S's continuous motion of which Q is the first instant, I will represent S's state by "S\M." It is instantaneous change Q that will be shown to need an efficient cause; continuous change M will need an efficient cause only in the sense that an efficient cause must exist at *t*, the time of the first instant of M.

Section 2 showed that, in Stephen King's phrase, Q is a "needful thing." Q has a need or needs for some thing(s) other than itself that must be satisfied. Q's need must be satisfied by what something other than Q is, where "by" means that Q has a causal dependence on what some other thing is in the sense we have established: If that thing does not exist, Q does not exist, on penalty of contradiction. So if the need is not satisfied, Q cannot exist; if Q exists, the requirement(s) of Q's causal dependence must be satisfied by what is other than Q.

The reason we know that Q has such a need is that Q is a change occurring to S, and a change occurring to S does not exist without S. When S is undergoing Q, Q's need for having S undergo it is satisfied. Our question is whether Q's need can then be satisfied solely by S; can S be the only thing that Q has as that which satisfies it's need for what is other than itself? In fact, the same hypothesis that already shows, against Hume, that Q is a needful thing, namely, that Q is a change occurring to something to which it has not always been occurring, will show that Q cannot have S alone as that which satisfies its need for the other. Q needs more than S.

By logic, if we know that Q needs something other than itself, we also know that Q needs some thing *or things* other than itself; some thing or things other than Q itself must satisfy the requirement(s) of Q's causal dependence. Q has the need for something undergoing it at time *t*, the time when Q actually exists. So we know that at *t* the universe must contain some thing or things that satisfy Q's need. But Q is itself something in the universe at *t*. So what the universe then is *with the exception of Q*, what the universe then is *apart from having Q*, must contain some things or things that satisfy Q's need. If Q exists, what the rest of the universe is apart from Q's now belonging to the universe, what the universe then is with the exception of Q itself, must contain some thing or things that satisfy Q's need(s) by what they are apart from Q. At a minimum Q's need is that S be what it is *in (*at least some*) respects other than undergoing Q*, in respects other than having Q as a feature, since Q itself is a feature of S at *t*.[12] For at *t* Q is (1) something really distinct from what the rest of S is, since the rest of S existed without Q, and (2) something that would not exist without what at least some of what the rest of S then is. Q's need is that some thing or

[12] If it seems odd to speak of an instantaneous change as a feature of something, recall that Q is the first instant of continuing motion, M, which is a feature of S (or a relative feature of S and the rest of the universe) if anything is. But since M has not always been occurring to S, M can be a feature of S iff Q belonged to M as its first instant, and so is the first instant of M's being a feature of S. My argument for a PEC will not rely on any particular ontology of "features;" all that matters is what S is and what Q is. But calling Q one feature of S as opposed to others, will aid in keeping straight the distinction between what S\Q is and what S is, as well as what the rest of the universe is, with the exception of what Q is.

things that are other than itself be what they are; Q must have, as that which satisfies its causal dependence, what some thing or things other than itself are. To be shown is that Q cannot *solely* have S as that which satisfies its causal dependence; what S is cannot be the sole satisfier of Q's need(s) for the other.

In speaking of Q's causal dependence on what is other, we have to use relational predicates, since those are the kind of predicates by which we link one extracognitional reality to another. (I have shown elsewhere[13] that the present analysis does not require the existence of relations as a kind of reality over and above the distinct realities they relate. In fact, however, the question of relations as a distinct kind of reality is not an issue here. If my refutation of Hume led to that conclusion, so be it; that conclusion would have been proven true *ipso facto*. But my analysis does *not* lead to that conclusion.) We call whatever it is that are linked, cognitionally or extracognitionally, by a relation, the relation's *terms*; they *terminate* the relation. So Q's relation of causal dependence must have a term or terms among the realities that populate the universe with the exception of Q itself. One way the rest of the universe provides for Q's need(s) is by having S as a part of the universe. Our question is whether the universe satisfies Q's relation of causal dependence solely by having S as a member, solely by what S is except for Q.

Now consider the hypothesis that A/S occurs, as stipulated in Section 4. At *t* there is something in the universe other than Q, event A/S, such that what the universe is apart from Q provides Q with something that undergoes it; what the universe is apart from Q satisfies Q's need that S undergo Q. At *t*, Q *derives from* A's being what it then is and from S's being what it then is otherwise than having Q as a feature. For A's striking S is incompatible with S's remaining what it has been until *t*. When A/S occurs, as opposed to when A and S were not in contact before *t*, S\Q cannot not occur. That is one way that what the universe is apart from Q can provide Q with something undergoing it. What A and S have

[13] Cahalan, 1985, 357-64. I believe in relations as a distinct mode of reality in some *other* cases.

been until *t*, and what A is and S *otherwise* is at *t*,[14] require that S ceases to be what it had been in respect to Q, where "require" means that if S does not cease being what it had been in that respect, at *t* something both is what it is and is not what it is.

The A/S hypothesis illustrates how what the rest of the universe is at *t*, apart from Q, can provide Q with something undergoing it, even though the universe did not provide Q with anything undergoing it prior to *t*. Here, "apart from Q," is not just a redundancy or an irrelevant academic abstraction. Q is in fact a feature of event A/S taken as a whole, because S belongs to event A/S, and Q is necessarily a feature of S simultaneously with the occurrence of A/S. We represented S's undergoing Q by "S\Q"; so A/S is also A/S\Q. But even though Q is necessarily a feature of A/S\Q, it is still what the rest of the universe is except for Q that requires S to undergo Q, and so it is what the rest of the universe is except for Q that satisfies Q's need. The rest of the universe provides Q with the needed subject cause actually undergoing Q.

And even though at *t,* Q's need for S to undergo it is satisfied by S, the requirement(s) of Q's relation of dependence is not satisfied solely by S's being what it then is apart from undergoing Q. What fulfills Q's requirement is what S is, apart from being something now undergoing Q, together with what A is. At *t,* what S is satisfies Q's requirement since what A, something else in the universe other than Q, is *causes* S to be something undergoing Q. So with A/S, what S is apart from having Q does not by itself satisfy Q's need for what is other than Q; and what the universe is does not provide for Q's need by containing S alone. At t, what the rest of the universe is satisfies Q's need but does not satisfy Q's need solely by S being what it is rather than by S and A being what they are.

Now remove A from the situation that exists at *t*; remove A from A/S. Do Q, and so S\Q still exist? Only if the requirement(s) of Q's causal dependence are then satisfied by what the rest of the universe is apart from Q. So if A is not replaced by something else that

[14] At *t*, A is a sphere at a certain place moving in a certain direction with a certain momentum. S is a sphere with a certain mass whose surface was, until *t*, at rest in the place where A's surface has reached. If S was still at rest in that place, something would be and not be what it is.

would require S to cease being what it is, Q could not exist unless Q's need is satisfied solely by what S is, except for undergoing Q. But by hypothesis, what S was before *t* did not satisfy Q's need, and, also by hypothesis, what S is at *t* is in all respects the same as what it was before *t* except that what-Q-is is now a feature of what S is. (For if S now differed in some other respect also, S would just be undergoing another change that, like Q, is causally dependent on what S was and still otherwise is.) If what-S-is is the same in all respects, does what S is at *t* except for having Q *by itself* satisfy the requirement(s) of Q's relation of dependence? S did not satisfy Q's need a moment ago, and what S now is, except for having Q, is the same as what it was a moment ago. By having S, what the universe is apart from Q did not provide Q with anything satisfying Q's needs a moment ago; does what the universe now is provide Q with something that satisfies its needs when the universe is the same in all the relevant respects as it was a moment ago? The "relevant respects" are, again, what S is and what the rest of the universe is, both then and now, apart from Q's being what it is.

There must be something *by which* Q's need is satisfied at *t*. That by which Q's need is satisfied must be what some thing or things are apart from Q itself. Before *t* what the universe was did not contain anything by which Q's need was satisfied. At *t* can the universe contain something by which Q's need is satisfied, when what the universe is at *t* is the same in all the relevant respects as when it did not contain anything by which Q's need is satisfied? Q's need for a subject cause is satisfied only when Q is actually occurring and so only when S is actually undergoing Q. Before *t*, the universe did not provide Q with anything whose intrinsic features satisfied Q's need to have something actually undergoing it. Now add Q to S. Q's need for something to be actually undergoing it is now satisfied, at least in part, by what S's intrinsic features are. But can Q's need now be satisfied *solely* by what S's intrinsic features are except for feature Q?

6.

No. Without adding any new hypotheses, we can see the contradictory nature of S's being Q's sole cause by examining the requirement(s) of Q's causal dependence a little

further.

Our hypothesis that Q has not always been occurring to S shows that what S's features are before *t* make S only an unfulfilled potency for Q. A change occurring to something to which it has not always been occurring, not only needs that thing to exist before the change, but places a demand of a causal character on what that thing is: It must a potency—but only a potency, an unfulfilled potency—for the change. That S must have been a potency for undergoing Q is not just a matter of the way we talk about change.[15] What S is, S's nature, must make it capable of that change, and not everything in the universe has such a nature. Not everything can undergo the change from not being in a state of spherical rotation with a certain speed, torque and direction to being in that state. Similarly, not everything's nature allows it to change, for example, from not burning to burning or not boiling to boiling. And that is not just a matter of the way we talk about things that burn and things that boil; it is a matter of what those things are. In each case, the current *actual* features of this thing, say, wood, as opposed to that thing, say, water, make it *potentially* a possessor of features, like burning, the other thing is not potentially a possessor of. So Q's causal dependence not only requires the existence of Q's subject cause, but also requires certain conditions on the part of what the subject cause is, the subject cause's *nature*, just as what A and S are hypothesized to be at *t*, the natures of A and S, place requirements on what the change that derives from A/S must be. Q's causal dependence requires that Q's subject cause's intrinsic features, except for Q, make that thing an unfulfilled potency for Q.[16]

[15] Nor can potencies and dispositions in general just amount to the truth of counterfactuals. See Cahalan, 1985, 228-32.

[16] This is verifiable, like our other arguments, by knowing the meanings of words like 'potency"—where "knowing the meaning" refers to awareness of what some extralinguistic value is, not to lexicological knowledge of the relation between those noises and those extralinguistic values. Likewise, verification "*by* definition" does not mean "by a lexicological relation between sign and signified." It means what the signified is known to be when it becomes the signified. A person who happens to think "and" is used the way "or" is used is not *ipso facto* using a nonstandard logic. And there can be behavioral evidence that someone is using "and" the way we use "or," "act" the way we use "potency," etc. We can have behavioral evidence that someone is using words in their exact opposite senses and also knows the same truths we express in ways

If the only cause for Q the universe contains is just an unfulfilled potency for Q, there is nothing by which Q's need for something to be actually undergoing it is satisfied. The opposite would be contradictory. Likewise, therefore, if the only cause for Q the universe contains is something that *in itself*, in what it is apart from Q, is just an unfulfilled potency for Q, there is nothing that satisfies Q's need for something to be actually undergoing Q by what that thing is *in itself*, by what it is apart from Q. The opposite would be contradictory. Of course, Q's need for S to be undergoing it is satisfied only when S is *actually* undergoing Q. At that time, by the definition of "potency," S is no longer only an unfulfilled potency for Q. But at that time, by our hypothesis that S existed before Q, what S is *apart from actually having Q,* what S is *by itself,* still amounts to only an unfulfilled potency for Q. For prior to *t*, S's intrinsic features made S only an unfulfilled potency for Q. But, also by hypothesis, what S is at *t* is the same in all respects, *apart from having Q*, as it was before *t*. So at *t*, what S is *by itself*, that is, with the exception of having Q, is only an unfulfilled potency for Q. (Again, "by itself" does not express an irrelevant academic distinction. It expresses a *causal* distinction made necessary—not just relevant—by Q's dependence precisely on something whose nature, whose what-it-is, is other than what Q is.)

It would be contradictory for a universe containing only something, S before event A/S, that, by what it is intrinsically, is just an unfulfilled potency for Q to be a universe containing something that, by what it is intrinsically, satisfies Q's need for something to be actually undergoing it. It is true that, by the definition of "potency," a potency for Q that is hypothesized to exist before *Q can*, is *able* to, undergo Q at later time *t*. But as a consequence of that definition and that hypothesis, at *t* the former unfulfilled potency for Q *cannot* be, is *not able* to be, *by what its features other than Q make it*, something that actually undergoes Q, and so something that *alone* satisfies Q's causal dependence on what the universe other than Q is. What S is except for having Q amounts to only an unfulfilled potency for Q, and it would be contradictory for:

contradictory to hers.

S to satisfy Q's need for S to be a fulfilled potency for Q solely *by S's being an unfulfilled potency for* Q,

which is what the features of S other than Q make S to be.

Q's causal need(s) must be satisfied by what something(s) other than itself is. And Q's causal need(s) must be satisfied both (1) when Q is actually occurring to S, and (2) by what things in the universe intrinsically are, apart from Q, when Q is occurring. Short of contradiction, a universe containing only an unfulfilled potency for undergoing Q does not provide Q with things other than Q that satisfy it's need(s) by what they are intrinsically, apart from Q. Although at *t*, S is no longer just an unfulfilled potency for Q, that means that what the universe then contains, except for Q, must also include something other than S and Q without which Q does not exist. For without an additional cause of Q, what the universe is *apart from Q* at *t* is the same in all respects as when it contained only an unfulfilled potency for undergoing Q, and so cannot provide thing(s) that satisfy Q's need(s) by what they are apart from Q.

This is what we have: (1) When Q occurs, there must be a sum total of things that, by the intrinsic features they have apart from Q, are that by which the requirement(s) of Q's causal dependence are satisfied. (2) By S's intrinsic features apart from Q, S is only an unfulfilled potency for Q. (3) So S's intrinsic features apart from Q cannot alone be that by which the universe provides for Q's need that S actually undergo Q.

With A/S, however, the universe still contains something, S, which by nature is merely an unfulfilled potency for Q, but the universe is no longer a place only with something whose nature makes it an unfulfilled potency for Q. The universe is now a place with something, A/S, that requires S to no longer just be what it is *by its own nature*; what S then is, apart from being something undergoing Q, and what A then is together require S to now be a fulfilled potency for undergoing Q. Q does not depend on S as on a mere unfulfilled potency for Q; it depends on S as something required to cease being a mere potency for Q by what A, which is other than both Q and S, then is, something in motion at the place where S was previously at rest. So with A/S, the contradiction of Q's causal dependence

being satisfied in a universe that contains only something whose nature makes it just an unfulfilled potency for Q is avoided. But it would be contradictory for a universe containing only something that (1) was not undergoing Q before *t* and (2) by nature is no more than an unfulfilled potency for undergoing Q, to also be a universe containing any thing or things that, by what they are apart from Q, now satisfy Q's need (a) that something that existed before Q (b) now actually undergo Q. For Q's needs to be actually satisfied, at *t*, by what the universe is apart from having Q, the universe must contain something else other than Q and other than S that, by what it is together with what S is, satisfies the causal dependence that belongs to what Q is.

A post-Humous opponent—let's call him Dave—might reply, however, that this analysis using the concepts of S's not satisfying Q's need *alone* because *by itself* S is only a potency for Q unfairly stacks the deck against S. For at *t* S is *not* alone; nor is S just what it is "in itself," that is, apart from Q. For S then has Q. S is no longer an unfulfilled potency for Q; it is then a fulfilled potency for Q. In effect, Dave thinks that the recognition that Q does not exist without S shows no more than that Q has a need for whatever it is about S that makes S, in itself, an unfulfilled potency for Q. For by definition, an unfulfilled potency for Q can later be a fulfilled potency for Q and so can later be something by which Q's need to have S actually undergoing it is satisfied.

Yes, but S's later being a fulfilled potency for Q is not the same, in terms of causal dependence, as Q's causal need(s) being satisfied at *t* solely by the features that make S an unfulfilled potency for Q. Rather, the fact that Q is then, by hypothesis, the only new feature of S confirms this argument for a PEC, instead of refuting it. For this way of avoiding one contradiction leads directly to another. To deny the necessity of an efficient cause, Dave would have to be saying, not that S satisfies Q's need by what S is without Q, but that S satisfies Q's need only by what S is when it has Q as a feature; S satisfies Q's need only by what S is with Q. So Dave is unintentionally making Q one of its own causes. He is making Q, not just the *effect*-term of the causal connection between Q and S, but an essential constituent of S as the sole *cause*-term, an intrinsic feature of S that is essential, not incidental,

to S's being the sole cause-term *by* its intrinsic features.

For Q is now the constituent of S that avoids the contradiction of the sole cause-term of Q's relation of dependence on the other being only an unfulfilled potency for Q. Since all S's other features still make S only an unfulfilled potency for Q, the presence of Q in Q's sole cause is what saves Q's sole cause from being a mere potency for Q. Something's being caused and having no cause would be a contradiction in *extracognitional* reality, like the contradiction of A/S occurring without S\Q occurring, not just the *logical* opposite of pleonasms like "S-with-Q is S-with-Q" or "S-without-Q is S-without-Q." (*Causal* necessity is not just logical necessity.) The sole term of Q's extracognitional relation of dependence on what is other than itself would be what-S-is. If Q is the feature of the term of Q's relation of dependence that avoids the extracognitional contradiction of Q's having nothing as the term of that relation, the features of what-S-is that extracognitionally terminate Q's relation of dependence-on what is other than Q include Q. Q is not just the effect-term of its relation of dependence; if Q was not part of its necessary cause-term, there would be no cause-term.

But as Hume knew, it would be contradictory for a thing to be a cause of itself. For otherness is the constituent of the values for which we happen to be using the noises "cause" and "effect" in this discussion; that is what made Hume's argument convincing in the first place. Relying on Q itself to solve the problem of how Q can have nothing but S as what satisfies Q's need for something other than Q, makes Q, contradictorily, a cause and effect of itself. (Contrary to Hume, otherness actually reveals the epistemic necessity S's not being Q's sole cause.)

We know that Q has a causal dependence that is satisfied, at least in part, by S's being what it is apart from Q, where "by" has the causal sense of being something other than Q that Q needs. If the requirement(s) of Q's causal dependence cannot be satisfied solely by what S is apart from Q, they could not be satisfied if, counterfactually, (1) what exists at *t* is not S alone but S with Q, and (2) nothing else, such as A, exists on which Q also depends. There are two possibilities. First, Q's causal dependence is now satisfied *by* the intrinsic features of sole cause S, where Q is one of the intrinsic features by which S

satisfies Q's need. S's intrinsic features now satisfy Q's need *by* Q itself being one of those features; Q is one of the sum total of whatever features of S are that by which Q's need for a cause is satisfied. For the term of Q's relation of *dependence-on* is a reality consisting of a set of features, and Q is a member of the set of features that the term Q's relation of dependence-on consists of. If so, Q is a cause of itself. Q is an intrinsic part of the sole thing by which Q's need is satisfied that is essential, not incidental, to Q's having its need satisfied by that sole term. For it would be contradictory for S without Q to be the sole cause-term of Q's relation of dependence. And the presence of Q in S would be constitutive of Q's sole cause-term not being a mere potency for Q. So the sole cause-term of Q's dependence on what is other than Q would include Q as part of that cause-term; Q is not just the effect-term.

Second, although S has Q at *t*, Q is not one of the intrinsic features of S by which S is the sole thing satisfying Q's causal dependence. Even though S is not alone at *t* since it has Q, if Q is not then one of its own causes, a term of its relation of dependence-on, its sole cause is still what S is apart from Q. If so, Q is caused by something and has nothing for a cause; Q has nothing that satisfies Q's dependence on what some other thing is. For what S is apart from Q makes S only an unfulfilled potency for Q. A thing whose intrinsic features make it only an unfulfilled potency for Q does not satisfy Q's need(s), does not terminate Q's relation of dependence-on, by what it is except for having Q. And if Q's causal dependence is not satisfied by what anything in the universe other than Q is, Q cannot exist.

So regardless of Dave's intentions, his statement that "It is S-with-Q and solely S-with-Q that satisfies Q's causal need at *t*" could be verified, given what has already been established about Q's dependence on S, by two and only two causal connections. Neither of those causal connections is possible on grounds of contradiction:

1. Q is an *effect* and only an effect (not part of its cause) of what S otherwise is apart from having Q. That leads to the contradiction that Q is caused and has no cause; for what is by its intrinsic features except for Q only an unfulfilled potency for Q does not satisfy Q's causal need by what it is apart from having

Q.

2. An effect, Q, is, contradictorily, a *cause* of itself. For it is what S is with Q, not what S is except for Q, but what S is including Q, namely, a fulfilled potency for Q, that Q's relation of dependence has for its term. The cause-term of Q's dependence-on*,* what-S-is, includes Q's as one of the features constituting S that which terminates Q's relation of dependence-on.

When A/S exists, on the other hand, Q is a feature of S, but is not a feature of the *complete* term of Q's relation of dependence-on what is other than Q; the complete term of Q's relation of dependence is what A/S is except for S's having Q. With A/S, S is a cause of Q, and S has Q as an intrinsic feature. But the causal status of Q's presence in S is *only* that Q is a necessary effect of (1) what S is otherwise than something having Q as a feature, together with (2) what A is; Q's presence does not make Q one of its own causes. What A/S is as a whole, except for Q, is that by which Q's need is satisfied. S is not a cause of Q solely by what it is otherwise than by having Q; nor is A the sole cause of Q. S is a cause of Q by (a) being what it is otherwise than by having Q, and (b) by being in contact with A given what A is at *t*, a certain mass moving at a certain speed in a certain direction. So Q is not caused solely by something that otherwise is just an unfulfilled potency for Q. S was an unfulfilled potency for Q, or else Q could not occur. But the only causal connection that makes S no longer an unfulfilled potency for Q is Q's being a necessary effect of cause A/S, and so being an effect of what-S-is without Q, not Q's being included in what-S-is as a cause of Q.

Now take away A as a cause of Q. If Q exists at *t*, its causal dependence still has to be satisfied by the nature, the what-it-is, of something other than itself. It cannot be satisfied by what S is apart from having Q, since apart from having Q, S is only an unfulfilled potency for Q. This is where Dave insists that at *t* S is *not* an unfulfilled potency for Q; S actually has Q. But if Dave thinks that it is S with Q, S as now having Q as an intrinsic feature, rather than what S is apart from Q, that satisfies Q's causal dependence, he is in fact, whether he intends to or not, making Q one of its own causes. For his only alternative to

making S with Q, the union of S and Q, be the sole term of Q's relation of dependence-on, is to make what S is without Q, an unfulfilled potency for Q, be the sole term. If the only candidate for satisfying Q's causal dependence by what it is apart from Q is something that, by what it is apart from Q, is merely an unfulfilled potency for Q, the universe is a place containing nothing that satisfies Q's causal dependence by what it is apart from Q. And if the presence of Q in S is what avoids that causal contradiction, we cannot avoid another contradiction, that Q is not just the effect-term but is part of the cause-term of its relation of causal dependence.[17]

Appendix A: After the (Instantaneous Change to the Billiard) Ball Is Over

A subject cause of an instantaneous change could be the sole cause of the continued existence of the result of that change, even though it cannot be the sole cause of the instantaneous change.

(I) Let us temporarily alter our example so that, Q, the instantaneous change occurring to subject cause S, is not the first instant of continuous motion, M, but the first instant of ball S's continuing to have a new shape, for example, S's now having a dent, D, where it did not have one before. Every change must begin with an instantaneous change, but the result of an instantaneous change could be a new feature of the subject cause that might remain unchanged for some time. So Q could be the first moment of the ongoing existence of D.

Ball S could not be the sole thing satisfying Q's causal dependence. But instantaneous change, Q, could make S sufficient to maintain D, the result of Q, in existence because S now possesses a feature whose continuing to exist does not require *another* change, and so another instance of efficient causation, but whose ceasing to exist would require another change, and so another instance of efficient causation. Until such a further change

[17] I am indebted to Lawrence Dewan, O.P. for pointing out Aquinas' view, mentioned in the Abstract, on the origin of the epistemic necessity of causal dependence. I am also indebted to James J. Sweeney for helpful comments.

occurs, however, the new feature would continue to exist in S, which is a cause of D since S is something nonidentical with D without which D does not exist. So the original instantaneous change, Q, was also the beginning of S's being the sole cause maintaining the result of the instantaneous change in existence.

Once a prior instantaneous change, Q_1, which begins the existence an unchanging feature, D, has occurred to a subject cause, S, S is in the same position relative to further change, Q_2, as it previously was relative to Q_1. Before Q_1 S actually possessed a number of features, but not the feature of undergoing Q_1 nor the ongoing feature of which Q_1 is the first moment of existence. So before Q_1, S alone was "sufficient" to maintain in existence unchanging features it had received from changes prior to Q_1, but not sufficient to alone be that by which Q_1 is caused. Among the features acquired from changes prior to Q_1 were features because of which S was a potential possessor of D, but only a potential possessor of D; a potency for D is just some feature or set of features because of which something that is not now D can become D. But if D is an unchanging feature, then by hypothesis, once a thing's potency for D is actualized, the thing does not require another change to remain D. Another change of becoming D could only occur to something that was merely potentially D. Since S does not require another change to remain D, the continued existence of D does not require a cause other than S. But a cause other than S is required for any change that would put S in a state to which S is now only in potency. So unless S has another change in state, there is no need for a further cause.[18]

It might be objected that if a change can make the subject a sufficient cause of the continued existence of D, nothing prevents the instantaneous change that is the beginning of D from making the subject a sufficient cause of that change. For the existence of the

[18] Again, what "features" are is not an issue. In the cases we are considering a feature can be extramentally distinct from what an entity having the feature otherwise is, since an instantaneous change—and so a feature whose first moment of existence is the same as the existence of the change—occurring to an already existing subject is nonidentical with its subject. Whatever features are, any complex of really distinct features is nonidentical with any single feature just as a whole is nonidentical with any of its parts. Both an instantaneous change, like the beginning of D's existence, and D are features of S distinct from the rest of S.

change is identical with the first instant of the existence of D. And since the existence of D makes the subject a sufficient cause of the continuation of D's existence, why can the first moment of D's existence not make the subject a sufficient cause of the first moment of D's existence? But it is one thing for the subject of D to be the sufficient cause of the continuation of D's existence; it is another thing for the subject to be the sufficient cause of its own *transition* from not having D to having D (or from having D to not having D). The first instant of D's existence is identical with the moment at which the transition from the subject's not having D to having D exists. The continuation of D's existence, however, is not the same as the continuation of the transition that existed at the first instant; that transition no longer exists while D continues to exist.

Once that transition occurs, the subject is a sufficient cause of the continuation of the new state because it is only the *change* in state that the subject is not sufficient for. The subject is not sufficient for its state of not having D to be followed by having D, or for the state of having D to follow the state of not having D. The features other than D that S possesses both before and after Q make S sufficient to be the sole cause of the continuation of D once D exists. But S is not sufficient to be the sole cause of the change that is the ceasing to exist of what the subject now is and the coming into existence of what the subject now is not. A thing that is now a mere potency for D is not sufficient to cause the change that will make the thing an actualized potency for D and so make the thing a sufficient cause of the continuation of D, once D exists as the actualization of a previous potency for D. (At *t*, Q must be causally dependent on ball A in order for ball S to also be among the things by which Q's dependence is satisfied. But after *t*, a causal dependence on A is not needed in order for S to remain in the state of which A caused the first instant, Q.)

Rather, S's sufficiency, when it has feature D, to be the sole cause of the continued existence of D is precisely why S is insufficient to be the sole cause of the change that brought feature D into existence. To become a sufficient cause of the continued existence of D means to become something that is only potential with respect to any further change that would be required for D cease to exist. When S is only potential with respect to a further

change, S is not sufficient to be the sole cause of that further change; otherwise S would be the sole cause the continued existence of D and of the ceasing to exist of D at the same time. So S would have to cause both the continued existence of D and the ceasing to exist of D at the same time. If the subject is a sufficient cause of a continuation of its features, it cannot at the same time be a sufficient cause for a change that would be the discontinuation of a feature or the coming into existence of a new feature.[19]

And prior to the existence of D, S was in the same position relative to a change that would bring D into existence as it is now relative to a change that would make D cease to exist. Therefore, S was then insufficient for the occurrence of the change that made S sufficient for the continued existence of D. So the subject's sufficiency to cause the continued existence of features like D, after D has come into existence, is *identical* with its insufficiency to cause the changes that would be either the coming to exist or ceasing to exist of features like D. To be sufficient to be the sole cause of D's continued existence, S must undergo a transition from not being sufficient to being sufficient. But S is not sufficient to be the sole cause of that transition. So for S to become a cause of that transition, another cause is necessary.

(II) Now let us return to our original hypothesis that Q was the first moment of continuing motion, M, and let us further specify that M is an inertial motion with a constant speed and direction. To remain in existence, does M require any cause other than S? Insofar as M's speed and direction are constant, they are like D, unchanging features that can remain in existence until a new change in speed and/or direction occurs. If such a change occurs, it must begin with a new instantaneous change that would require new efficient causation. But if such a change does not occur, our argument for a PEC does not give us any evidence that a cause in addition to S is necessary.

Except for the use of the word "inertial," the preceding paragraph does not depend

[19] Since other PECs are possible (see Appendix B), there might be other reasons why some sort of cause other than S was necessary for the continued existence of D. But knowing the truth of another PEC would require another argument demonstrating another causal connection than the argument in the body of this paper demonstrates.

on anything we have learned from science. Science tells us that any motion will continue at constant speed and direction unless a force intervenes to change the speed or direction. But we have not assumed that all motions will have constant speed and direction unless a cause intervenes. We have only assumed that M happens to have constant speed and direction, and from that assumption we have derived the conclusion that M will continue unless some cause other than S intervenes. And what if science had told us that we should consider a constant rate of acceleration, X, in S's speed to be a continuing feature of S that remains the same? Then, we would know that the instantaneous change that began this continuous constant rate of acceleration in S's speed required new efficient causation. And if the continuous rate of acceleration that began as X later changed to continuous rate Y, an instantaneous change beginning rate Y, and so new efficient causation, would be necessary. A continuous rate of acceleration might also require the continuous influence of an efficient cause, but no evidence so far presented in our argument for a PEC shows that.

In fact, we know from science that after any instantaneous change to S, the result, whether it is a "resting" state like a new shape or a state of motion like M, is constantly under causal influences working to change the result, unless other causal influences counteract the latter. Only in an absolute causal vacuum, where no gravitational or electromagnetic fields existed, could D and M not constantly be under causal influences.[20] Aristotle and his followers wondered about what causes kept projectiles in motion. If they were worried about the absence of perceptible efficient causes after the projectile separated from its projector, they had it almost backwards. The nature of the universe does indeed make the constant presence of imperceptible causation necessary. But contrary to Aristotle, science now knows that, at a minimum, causes like the four forces are always working—though not always successfully—against the constancy of speed and direction in projectile motion.

The beliefs of earlier Aristotelians in the reality of spatial relations and in "natural" places probably contributed to their problem with projectiles. After all, while S is motion

[20] Since an absolute causal vacuum is counterfactual, we need not puzzle here over how S in an absolute vacuum could be in motion relative to anything.

relative to the rest of the universe, the universe is changing *somehow*. So new states of affairs must be coming into real existence; otherwise the results of locomotions would be *nothing*. The most obvious candidate for what is new is S's spatial relations to other things in the universe. Motion M takes S from being 1-foot from point A to being 2-feet away, 3-feet away, etc. And when M stops, S is now at a place, point B, where it was not before. If S's being 3-feet from point A or being at point B are not realities, in what sense do locomotions bring new states of affairs into real existence?

Since there is no doubt that spatial extension exists (and to keep things simple let us abstract from extension in space-time here), there is no doubt that distinct places like points X and Y and Z exist as well as distinct extensions, like the extension between X and Y as opposed to that between Y and Z, and distinct amounts of extension, like the greater quantity of extension between X and Y and the lesser between Y and Z. The existence of different points, areas of extension, and quantities of extension allow us to *describe* those realities, to make those realities *objects of linguistically expressed knowledge*, by using relations of measurement that have existence only as *cognitional comparisons* of one reality, for example, the amount of extension between points X and Y, to another, for example, the amount of extension between the ends of a ruler. So we don't need to posit real relations in space in order for relations of measurement, including relations identifying places by 3-dimensional descriptions of their distances from other places, to be conceptual tools useful for knowing what things are.[21]

This way of avoiding real spatial relations, however, still leaves us with our problem: If the realities that changes newly bring into existence are not a distinct mode of being known as "relations," what are those realities? What is new in the universe when ball A is

[21] Universality is another cognition-constituted relation useful for knowing what things are extracognitionally, as in universal causal laws. The real problem with the way Hume uses universality to explain our causal beliefs, aside from its being counterfactual, is that it substitutes for the recognition that the universality of laws is itself an *effect* of what things are extracognitionally. As a result (effect), Hume's use is reductionisticly invalid in fact, whatever his intentions may have been

now at or moving through point X and is describable as so many feet from point Y? To answer this question, we do not need to give a complete ontological catalogue of the universe. We only to give at least one counterexample to the claim that if there are no spatial relations, there is nothing new in the universe during or at the end of motion M.

So as they say, "What's new?" When ball S is undergoing M, a continuous motion relative to the rest of the universe, the universe is in a continuously changing state of *disposition for the efficient causing of other changes*. At each moment, the universe is now something with an ability, which it did not have before, to be the efficient cause of new changes. That S has reached point X means that there is now a new causal disposition a certain 3-dimensional distance from points W, Y and Z. Being a certain distance from points W, Y and Z is what it is for S to be "at" point X, and when moving S is at point X, the universe is causally disposed at X in a way that it was not causally disposed before. So what's new at point X is S's causal disposition, or the universe's causal disposition, for the efficient causing of further new changes. Any newly acquired state of locomotion is a new disposition for efficient causality existing wherever the locomotion exists.

Explaining what is new as a result of changes in terms of dispositions for the efficient causing of other changes does not make any arguments for PECs circular. Those arguments do not presuppose the existence of efficient causality; they discover it. Once discovered, dispositions to be efficient causes of changes can serve as an answer to a different question, a question we did not have to answer before proving the existence of efficient causality: What is new in the universe as a result of changes in place? What new realities do the new cognitional relations measuring the new distance between S and points X, Y and Z inform us of? That those new realities are new efficient causal dispositions is not assumed by arguments for PECs; that is a further *conclusion* from those arguments. And even before drawing that further conclusion, we can know that a change must bring about *some* new reality without knowing anything more about that reality than that it must exist.

Causal dispositions, of course, are nothing but what-things-are, insofar as what one thing now is requires another thing to cease being what it has been in some respect until

now. If it were possible for S to be moving through a pure causal vacuum where no force fields existed, we could describe the new reality of a causal disposition now existing at point X, where it did not exist before, using a counterfactual about what would have to happen if ball A was also at point X at that time: a new change would occur, an instantaneous change occurring to either or both of S and A. If the change would have occurred to moving ball S, S would then be causally disposed in a new way. If the change had only been S's ceasing to move, the new state of affairs would have been the absence of a causal disposition in S that had been present until then.[22]

Since science tells us, however, that there is no absolute causal vacuum, we know that at every moment of continuous change M, S is causing *other new changes in other things* in the universe; either that or new changes are being caused in S by the rest of the universe. If M is the only change going on in the universe, then, when S is at point X, S is at a minimum in a gravitational field and in an electro-magnetic field that would not otherwise have all the characteristics they then have. S's being in motion is a causal state affecting whatever else exists at the place S now is, just as ball A's being in motion at the place in which ball S was, until then, caused S to undergo change Q. And Q is the beginning of a new continuous change. Until some other cause in the universe puts a stop to that new continuous change in S, S will at least cause variations in, and/or have variations in itself caused by, the force fields through which S moves. And if some other cause in the universe stops the new continuous change in S, the previous changes S caused in its environment during it's motion will go on causing changes in their environments, including the cessation of some previously started continuous changes.

And so (thus, in this way, that is how) it (the universe) *goes*.

[22] Counterfacuals are a kind of cognition-constituted object, but so are declarative statements. Again, being cognition-constituted does not prevent an object from helping us know what things are extracognitionally, as we saw above in the case of cognition-constituted relations of measurement—which is not to say that any counterfactual is automatically so helpful.

Appendix B: PECcadillos—Sketches of Other Proofs for PECs

Every effect depends on each of its causes either for its existence or for some necessary condition for existence. This statement about existence, of course, could be mere verbiage unless there is reason to believe that an existent is somehow really distinct from its existence, that is, unless there is reason to believe that the existence of something is somehow extracognitionally nonidentical with that of which it is the existence. In any mode of being, however, that comes about or can cease by change, existence must be distinct from essence. Such an essence is able to not to exist as well as exist; so it must be a capacity for existence; it must amount to a capability for existing. Such an essence has a potency-to-act relation to existence; potency and act are really distinct since nothing can be in potency and act in the same respect.

The essence/existence question has been much discussed, but mainly concerning Aristotelian "substances."[23] Discussions of the essence/existence distinction for substances usually presuppose the occurrence of substantial changes or at least the simultaneous existence of a multiplicity of substances. The above argument for a PEC, on the other hand, would cover all changes bringing into existence new accidental modes of being, whether or not there are changes that produce or destroy substances. It is beyond the scope of this study to investigate whether substantial changes occur or whether there is more than one substance in the universe. But I will say a few words about the possible distinction between essence and existence in substance(s) in preparation for discussing accidental changes in terms of the existence of accidents.

If a substantial essence is distinct from its existence, the existence would be a caused existence. It would depend on what is other than itself, the essence; for if the es-

[23] Which are *not* just individuals like tables and chairs. Aristotle classical Aristotelians would not consider a change bringing a chair into existence a substantial change. And while substance(s) is the ultimate subject of *logical* predication, it is that only as an *effect* of its being the ultimate bearer of extracognitional existence, which existence is a (nonefficient) *cause* of the accuracy of predicates and the truth of statements using them. Note that relative to everything else extracognitional, existence is an effect, not a cause, but with respect to cognition-constituted values like accuracy and truth extracognitional existence is a cause.

sence of, say, a human being is really distinct from the existence of a human being, the existence of a human being could not belong to the population of the universe if the essence of a human being did not belong to the population of the universe. ("Belong to the population of the universe" is a circumlocution that avoids asserting "exists" of existence. Still, we can and must be able to say "Existence exists," if it is not self-evident that whenever we can truthfully assert "X exists," X must be really distinct from its existence. For until we knew that substance X could not be identical with its existence, asserting that X exists could be asserting that an existence exists, as far as we know. Every affirmative truth presupposes the extracognitional identity of things that are cognitionally nonidentical, that is, distinct *as objects of cognition*. Even "A is A" has to use distinct tokens of "A" to make one A the object of distinct references. And note that in asking whether every existence is distinct from the essence that exists, or whether every existence is caused, finite, impermanent, physical, etc., we are not cognizing existence as the object of a categorical assertion of anything's existence, an assertion of the form "X exists." Nor are the direct answers to these questions assertions of that kind. Not only must we make existence an object of cognition in different ways, but some of the ways do not inform us that the object of cognition, existence, is actually identical with an extracognitional *cause* of a truth like "X exists." So "existence" and "exists" are *not* redundant in "Existence exists." In the subject, existence is cognized as a value that might always be finite, caused, changeable, etc., if and when that value is actually extracognitional.[24] But only by grasping that value as extracognitionally identical with the value that is cognized differently in the predicate, do we know that existence is actually extracognitional.[25])

[24] If essence is distinct from existence, extracognitional existence is always an act relative to the essence. The potency to which "actually extracognitional" is contrasted in the text is not the extracognitional potency for existence, essence, but a logical property, possibility in the logical sense, characterizing existence as object of cognition in questions like "Is existence always finite" and as the subject of "Existence exists." See Cahalan (1985, 214-225).

[25] In the psychological genesis of our cognitions of objective values, knowledge of truths like "X exists" comes before our ability to ask questions like "Is all existence finite," etc. See Cahalan (2006, 198-202)

So if and when we know that a substantial essence is distinct from its existence, the jaws of Hume's refutation of the epistemic necessity of efficient causality for existence are *ipso facto* broken; for essence would be a cause of existence. The relation between an essence and its existence would not be that of efficient causality, but as we have already seen, the relation to a specifically efficient cause is not the nub around which Hume's argument turns. That nub is otherness. If the existence of something depends on what is other than itself, that is a causal relation, on Hume's grounds. So the question is no longer, as for Hume, whether the existence is caused but whether the essence can be the sole cause of the existence.

An argument for a PEC about substantial existence, then, would begin the same way the argument for a PEC about a change occurring to something to which it has not always been occurring would begin: Once we know that the change requires something other than itself, the thing to which the change occurs, we know the change is caused. Likewise if we know that an existence depends on what is other than itself, the essence of which it is the existence, we know the existence is caused. In both cases, the question is not whether there is any cause but whether the first known cause can be the only cause. And in both cases, we know there is a potency/act relation between the cause, whether the subject of the change or the essence that has existence, and the effect, the change and the existence. So as in the case of change, the question concerning existence is whether that which in itself, apart from its existence, is only a potency for existence can be the sole cause of its existence. Hint: unlike the potency for the change, the potency for existence is *nothing* without existence.

In the case, however, of an accidental mode of being and its accidental existence, there is no doubt about the real distinction between them, even if the accident is not, like Q, a change or a result of change, like D or M. Some Aristotelians may have claimed that an accident's "act of existence" is a fourth reality distinct from the substance, the accident and the union of substance and accident, so that in S\Q there would be another mode of reality distinct from S, Q and S\Q itself. (Again, S is not an Aristotelian substance; the earth, or frozen water, or formerly living matter of which S is made would be a substance for Aris-

totle.) That fourth reality would be an act received by an accidental essence the way substantial existence is received by substantial essence. If there were such a fourth reality, a PEC for it would be proven the way a PEC for substantial existence would be proven. But even if, as I believe, such a mode of act is superfluous, we can know that an accident is really distinct from its existence. For whenever a substance has an accident, there is a sufficient candidate for the existence of the accident that is really distinct from both the accident and its substance: the accident's *union* with its substance. So in S\Q there is a sufficient candidate for the existence of Q that is really distinct from both Q and S: Q's *union* with S, S\Q itself, which is a reality that is, by hypothesis, nonidentical both with Q and S.

The union of Q with S, or of a substance and an accident, is not just a logical union; S\Q is not just a "mereological sum" of S and Q. Philosophers have puzzled over mereological sums, as they have over all philosophical questions, but we do not need to worry about that problem here. When anything undergoes a change, there is something new in extralogical existence, or something ceases to exist extralogically. In fact, that is the only way for something new to come into existence, short of creation *ex nihilo*. So a change and a continuing of a change are extralogical realities *if anything is*; S\Q must be an extralogical union, or nothing is. A change and its continuing result are features constituting what some instance of being—whether we consider being to consist of things, events, facts, states of affairs, conditions, or whatever—is insofar as it is an extralogical existent. If S\Q, a subject's undergoing a change, was just a mereological sum of S and Q, neither Q nor that of which Q is the first moment would be intrinsic to what the subject is, intrinsic to the subject's reality.

Although this analysis does not need to say anything more about mereological sums, it is relevant to note that the grounds on which induction allows us to *know* that

[it is unreasonable not to *believe* that

{The unity of an acorn is more than logical}]

are causal. Induction makes it unreasonable to believe that acorn_1 was not a causal unit (a structure whose parts are so connected that a specific change to part X requires a specific change to part Y) gave it a necessary connection with the coming into existence of a simi-

larly structured causal unit, $acorn_2$. Inductive evidence does *not* principally consist of repetition. It principally consists of varying circumstances to determine which circumstances do and do not contain causes of a certain repeatable kind of change. We examine variations in circumstances according to three already known necessarily true regulative principles for verifying inductive conclusions. The first two principles are ontological; the third is epistemic. First, what a change is must be caused by what a situation that was brought into existence by prior changes is. Second, similar causal circumstances will produce similar effects. And from our epistemic awareness that the goal of reason is certitude of truth about the extracognitional caused by awareness of extracognitional evidence sufficient to exclude the opposite from truth, we draw the third necessarily true regulative principle for inductions: It is unreasonable to believe in more kinds of causes than are necessary to produce the kinds of changes that experience informs us of; for the only evidence of extracognitional existence that we have are experience and (pace Hume) reasoning about what causes are necessary for that which we experience.

The latter regulative principle allows induction to verify without having to vary circumstances ad infinitum. For example, we can and do *know* that it would be unreasonable to test for whether oak trees make acorns only when Democrats are in the White House or there is peace in the middle east. Examination of past experience with acorns, as well as with governments and international conflicts, under the light of our first two regulative principles, offers no causal evidence for, and plenty of causal evidence against, any necessary causal connections specifically between changes of the kind(s) that immediately precede the coming into existence of acorns and changes of the kind(s) that immediately precede or follow the coming into existence of governments and international conflicts. Thousands of contingent causal connections, including the actions of a Democratic president or middle east extremist, can affect the sprouting of an individual acorn at a particular spot at a particular time. But induction can only apply necessarily true causal and epistemic principles to show that it is unreasonable not to believe in specific necessary causal connections between certain *kinds* of individuals. When an individual change occurs, we know that

among the things existing at the time of that change, as a result of previous changes, there must be things such that what they now are is incompatible with the new change's not occurring, incompatible with something's remaining what it had been until now in that respect. But varying the circumstances to learn about what individual(s) in this unique, unrepeatable circumstance caused the new change can tell us only about what kinds of individuals cause other changes similar in kind to that change.

End of digression. S\Q is an extracognitional union. So the existence of Q, that is, S\Q, depends on what is nonidentical with itself, S and Q. Since S\Q is nonidentical with S and Q but would not exist without S and Q, Q's existence, S\Q, has both S and Q among its causes. This gives us other ways of replying to the objection, at the end of Section 6, that it is not S alone, or what S is in itself, that satisfies Q's causal dependence at *t*, but S with Q. True, but since Q's existence is really nonidentical with Q, we know (1) that for Q to need a cause is for Q's existence to need a cause. And since each of S and Q is really nonidentical with S\Q and each is necessary for S\Q, we know (2) that S and Q are both causes of Q's existence, S\Q. So again the question now is not, as in Hume, whether S\Q depends on any cause distinct from itself, but whether S and Q can be S\Q's only causes? I will sketch arguments to the contrary.

S does not satisfy S\Q's causal need without Q, something distinct from both S and S\Q, as the objection at the end of Section 6 notes. But then, Q is a cause needed for S to actually satisfy S\Q's causal dependence; Q is a cause of S's actually satisfying S\Q's causal requirement(s). But S is also a cause needed by Q, since S is needed by Q's existence, S\Q. So Q's *existence* is needed for

[Q to satisfy S's need for

{something other than S, in order for

(S to satisfy the causal need of

<something other than Q, Q's *existence*>)}].

You see where this is going—in circles. Q is a cause of its existence. For

[to cause its existence,

{Q must also be a cause of

(S's being a cause of

<Q's existence>)}].

But

[Q can be a cause of

{S's being a cause of

(Q's existence only by

<Q's having existence>)}].

So S can be a cause of Q's existence iff Q's existence is one of its own causes.

While Q can be a cause of its existence, as a substance can be a cause of its existence, by what it is apart from its existence, Q cannot be a cause for anything other than its existence solely by what it is apart from its existence; for whatever is a cause of any reality other than its own existence needs existence in order to be a cause of that reality. When X is an effect, a cause of X must exist. In the case where effect X is an existence distinct from the essence that exists, X is the existence of one of X's own causes. In that case, X can avoid being its own cause iff the cause of which X is the existence is a cause of X merely by being a receptor potential with respect to X. A cause—of anything—is distinct from the effect; so it is a cause only *by* what it is in itself apart from the effect. Only a receptor of existence can be a cause of its own existence by what it is other than being an existent; for it then causes existence precisely by being, in itself, just a potency for existence. If it caused its existence by being more than what is, in itself, a mere potency for existence, it would cause its existence *by* being an existent. Its existence would be one of its own causes. So Q's existence would be one of the causes by which S actually satisfies the need of Q's existence for a cause. Q's existence would, contradictorily, be a cause of itself.

Q is not a cause of its existence *by* having existence; it is a cause of its existence by what it is apart from existence, that is, by the features that constitute Q a potency for existence really distinct from its existence. But Q is a cause of S's being a cause of S\Q both by

what Q is apart from existence *and* by Q's existing. So Q is a cause of

[its existence, S\Q, which existence is necessary for

{Q to be a cause of

(S's being a cause of Q's existence, which in turn is necessary for

<Q to be a cause of its existence>)}].

So if S and Q were the sole causes of Q's existence, Q's existence would be one of its own causes. By definition, a cause of X is something really distinct from X without which X does not exist; so without the existence of the cause, X does not exist. If effect X needs cause Y, but Y does not exist, effect X does not exist. Here the effect, Q's existence needs cause S, which itself needs existing Q as a cause of S's being a cause of Q's existence.

Also, a reality that is an effect cannot have nothing for its cause; it must have something that exists for its cause. And since a cause is distinct from the effect, whatever causes an effect that belongs somehow to the cause's reality satisfies that effect's need(s) by what that cause is apart from having the effect. So as a caused effect that belongs to its cause, existence can have nothing as one of the satisfiers of its causal need(s) only in the sense that the cause in question has that existence but would be nothing without that existence. Q's existence has Q for a cause, and without its existence, cause Q is nothing. So if Q's existence has Q as its sole cause, Q's existence is caused and has nothing for a cause. A thing that is a cause of its own existence, therefore, can have the existence it needs to be a cause only by receiving existence from another cause. For without a third reality to give the thing the existence, the existence would be caused, since it has the thing for a cause, and have nothing for a cause, since without the existence the thing is nothing.

(A substance that is a cause of its existence must receive existence from an efficient cause by receiving existence in itself. All accidents are distinct from their existence, that is, from their union with a substance. But they must receive existence from their efficient cause by receiving existence in another existent, their substance. As the potency/act distinction differs in the cases of the substances and accidents—a substance is nothing without existence but not without an accidental state of act—so the efficient causing of existence differs

in the cases of substance and accident. The existence of a substance is a state of act received in the potency that has the existence. So the substance's efficient cause gives the substance existence by giving it an act that is distinct from it. An accident is a potency for existence that acquires existence, not by being a potency that receives a distinct act, but by being a distinct state of act received in an already existing potency, its substance. So the accident's efficient cause gives the accident existence, not by giving the accident a distinct act that is received by it, but by giving the accident itself to an existing substance as an act distinct from the substance that is received by the substance.)

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