
Failure versus doom

THE POSSIBILITY OF KNOWING THAT A PHYSICAL LAW IS NOMOLOGICAL

Viewed in one way, Molnar's objection (see chapter 5, pp. 50-61) to the Regularity account can be seen as criticizing the claim that the existential proposition, that there is somewhere, somwhen a river of Coca-Cola, turns out to be physically impossible. In effect, this criticism says that the predicate "physically impossible" is being given too wide a range of application, that certain propositions that we would not intuitively expect to turn out to be 'physically impossible' do turn out so. To this, I have replied by saying that the sense in which Regularists use the predicate "physically impossible" is a weaker sense than what Molnar seems to have in mind. More specifically, if what in fact motivates his objection is his belief that there 'really could be' a river of Coca-Cola, the reply to be insisted upon is that the Regularity Theory does not in the slightest preclude the existence of such a river. Indeed, the Regularity Theory – in withholding physical possibility from rivers of Coca-Cola – asserts only what Molnar himself hypothesized: namely, that there *never* are any such rivers. It is a positive distortion of the Regularity Theory to take its assertion that something is physically impossible as equivalent to an assertion that that thing could not exist.

But there is another way to view Molnar's objection. We can imagine his objection being taken to support the following contention:

If "physical impossibility" is explicated to mean nothing more than "inconsistency with a timelessly true, contingent, universal material generalization," then there is no way for a Regularist to explain the difference between, on the one hand, a project that is undertaken but *fails* (e.g., an attempt to swim Lake Superior from east to west), and, on the other, a project that is undertaken but is *doomed* (e.g., an attempt to propel a rocket beyond the speed of light).¹

¹ The style, although not the specifics, of this particular extension of Molnar's argument was suggested to me by Jonathan Bennett.

Here the point is that, if we allow the predicate “physically impossible” to apply to a false proposition such as

P7 *Some specific person, a, swims Lake Superior from east to west*

then we seem unable to account for the felt difference between this proposition and the false proposition

P8 *Some specific rocket, b, is propelled beyond the speed of light*

How can a Regularist account for this difference?

To begin, I would wholeheartedly agree with critics that there is a difference between those projects that simply fail and those that are doomed. Projects that simply fail, I would say, are those whose descriptions (i) are false and (ii) are *not* incompatible with any timelessly true, contingent, universal material generalizations (i.e., physical laws), whereas those that are doomed are those whose descriptions (i) are false and (ii) *are* incompatible with one or more timelessly true, contingent, universal material generalizations.

Thus there is no problem of a Regularist’s being able to explicate a difference between a project’s simply failing and its being doomed. What problem there is, if any, would seem to lie only in the specific cases cited. Does my account attribute doom to cases that merely fail?; does it attribute mere failure to cases that are doomed?

There is no dispute between the Necessitarian and me about the second case cited. Both of us agree that any attempt to propel rocket *b* faster than the speed of light is doomed. We agree, that is, that *P1* – viz. that no mass travels faster than the speed of light – is a physical law. (Of course, as I said in Chapter 5, we disagree as to what properties, exactly, *P1* possesses that make it a physical law. But *that* disagreement does not carry over and infect either our specific agreement that *P8* is physically impossible, or our higher-order agreement that *any* attempt to propel a rocket beyond the speed of light is doomed.)

Now what about the first case? According to the Regularity account, does the false proposition *P7*, namely, that person *a* swims Lake Superior east to west, describe a project that

merely fails or one that is doomed? I am unable to answer this question straightaway. I need more information about the case. For, as it is described, there is nothing to suggest that *P7* is logically inconsistent with any timelessly true, contingently, universal material generalization. So it would seem, then, that there are two ways the answer might go. Let us examine each of them in turn.

Suppose, contrary to fact, someone succeeded in 1979 in swimming Lake Superior from east to west. Then the universal generalization

P9 No one (in the past, present, or future) swims Lake Superior from east to west

would be *false*. Therefore, according to the Regularity Theory, proposition *P7* would not be logically incompatible with a physical law, and no attempt (provided, of course, that it is described merely as an attempt, and not more specifically) before or after 1979 to swim Lake Superior from east to west would be doomed. Once again, the Necessitarian and I would agree as to the proper description to be applied; in this instance, it would be “mere failure” for any unsuccessful attempt. This leaves only one other alternative to be examined, namely, the case in which no attempt to swim Lake Superior from east to west is successful.

How many attempts need we consider? It turns out that the actual number of attempts is irrelevant. It makes no difference whether there are no attempts at all, exactly one attempt, or 10 million. Provided that there are no *successful* attempts (which of course will be trivially true if there are no attempts at all), the conclusion will be the same.² For illustrative purposes, I will concentrate on an example featuring exactly one attempt.

Suppose that in the entire course of the world’s history – past, present, and future – one and only one attempt is made to swim Lake Superior from east to west: In 1891, a swimmer is hauled

² I am sure that many of us harbor conflicting intuitions about the ‘zero-attempts’ case. If asked whether a project is doomed just because it is not undertaken, I think many of us would be inclined – like the Necessitarian – to reply that it is not. But against this is our common tendency to encourage our children, students, and one another by saying such things as “If you won’t even try it, you won’t get better / pass the exam / overcome your fear of water / etc., etc.” Here, our words would seem to reveal a Regularist sentiment: Projects that are not undertaken are *automatically* doomed. The moral: Beware of philosophers bearing intuitions.

exhausted out of the lake long before she reaches even the halfway point.³ Wouldn't I then be committed to saying that *P9* – that no one swims Lake Superior from east to west – because it is timelessly true, is a physical law? And that *P7* is incompatible with a physical law, and hence that the project that *P7* describes (i.e., swimming the lake) is doomed?

To this I would have to reply: Yes. Indeed, we can generalize this conclusion: Any project that is one of a kind and does not succeed is to be viewed as one that is doomed.⁴ Generalizing still more, we can say that if *all* – whether few or many – attempts at some project fail, then projects of that kind are doomed.

Doesn't this, finally, show the untenability of the Regularity account? I think not.

The argument in defense of the Regularity Theory takes the form of a challenge to the Necessitarian: "Why under the circumstances described – namely, the failure of the undertaking – do you wish to say that such a project is *not* doomed?" How shall the Necessitarian answer? We will examine one possible answer in this chapter and another in the next.

Presumably, one thing a Necessitarian might say in reply would be something of this sort:

One of a kind projects need not be doomed simply because they fail. Consider the example at hand namely swimming Lake Superior from east to west. This kind of project is not doomed even if the one attempt at swimming the lake was a failure. Surely the

³ Strictly speaking using Lake Superior in my examples violates the requirement laid down in Chapter 2 for unrestricted descriptive terms. This minor difficulty can be circumvented by replacing Lake Superior with any uniquely referring description of Lake Superior. We need not explicitly do so however. It suffices for the points we are making that in principle it can be done.

⁴ I would like to forestall both the objections (1) that *every* event (or project) is one of a kind and (2) that *no* event (or project) is one of a kind. The first objection might be thought to follow from the truth that every event has some description such that no other thing has precisely that description and the second objection from the truth that every event has some description such that at least one other thing also has that description. The conclusion that I am here deriving from the Regularity Theory is this: If a project under a certain description has but a single instance and that instance is a case of nonsuccess, then all projects of that description are doomed. Thus, although every project to swim Lake Superior is also a project to swim at least one thousandth of the way across Lake Superior, the latter *sort* of project need not be doomed even if the former sort is.

1891 undertaking could have turned out otherwise; that is, the statement that someone swims the lake is not incompatible with any physical law. In particular, *P9* – the statement that no one (ever) swims the lake – is not a physical law.

And then, growing expansive in his explanation, the Necessitarian might continue:

Understand that I am not challenging the hypothesis that *P9* is true. Clearly, *all* the evidence we have at hand, namely, the one unsuccessful attempt in 1891, is evidence that *P9* is true. And given that no one to date has managed to swim the lake, were I to argue that *P9* is false, I would have to be appealing to knowledge of future occurrences, and I hardly want to present myself as precognitive. No, the dispute between us is not whether *P9* is, in fact, true. Still less is it a question of whether we, who cannot operate *sub specie aeternitatis*, could ever discover the truth-value of this temporally unrestricted proposition. The issue at hand is only: “If this proposition *were* true, would it be a physical law, and would all attempts – past, present, and future – therefore be doomed?” And to this question, I reply: “No.” *P9* is not a physical law – could not be a physical law – for the simple reason that it is not nomologically necessary.⁵

Here the Necessitarian’s argument is very much in the tradition of his school. Other Necessitarians have professed similar insights: Molnar, as we have seen, as regards there being a river of Coca-Cola; and still others as regards such diverse phenomena as the occurrence of nickels among the coins in one’s pockets; the maximum life span of moas (now extinct); the color of ravens; etc. In each case, there have been Necessitarians who have championed the view that, even if certain universal material conditionals about these phenomena are true (e.g., No moa lives longer than fifty years; All ravens are black; etc.), these propositions are not physical laws.

⁵ Were it to be objected that I have set up a straw man in requiring the Necessitarian to promote an unlikely example, I plead innocence. I have tested this example on several ready-at-hand defenders of Necessitarianism and have in each case drawn the same reaction: *P9* is not a physical law. Be that as it may, if anyone thinks that the example is unfairly stacked (one way or the other), I invite him to substitute an example of his own choosing that he finds more congenial. For, in the end, the specific example is quite unimportant. The essential point is that the Necessitarian argument being examined in this chapter is to the effect that the Necessitarian claims to know of a proposition that the Regularist would say is a physical law (and whose truth is not being contested) that it is not nomologically necessary. All that is required for the debate to proceed is that there should be some such example. It is really of no particular concern – on either side of the debate – just which example is settled on.

It would seem, then, that some Necessitarians argue for an ability to detect whether an unrestricted, true, universal material conditional is nomological or not.

Whence could such knowledge arise? Whatever grounds the Necessitarian cites to support his knowledge claim must, of logical necessity, be either empirical or a priori. Can either of these modes provide the knowledge claimed?

Remarkably few Necessitarians have proposed that nomological necessity is empirically ascertainable. Undoubtedly the most optimistic among these few was Ducasse. He argued that necessity (later he came to call it “etiological” necessity, the necessity holding between a concrete cause and its effect) was *directly* observable. In a series of papers and books, beginning in 1924 and ending in 1966, he returned regularly to this theme, held to it steadfastly, and tried to defend it. For all his efforts, as I said in Chapter 3, he won few supporters. Indeed, his critics are legion. Even among Necessitarians, his views have not been taken up.

Von Wright is at once more cautious and more daring: more cautious in that he thinks that nomicity (as he calls it) can only be *inferred*; and more daring in that he tries to describe experimental procedures for “a dive under the surface of actual reality into the depths of unactualized possibilities” (1974, p. 37). His is a subtle and ingenious attempt to amalgamate Necessitarianism and the Manipulability Theory, the latter being the theory that “the concepts of cause and nomic necessity” ... “presuppose, are dependent upon” ... “the concepts of action and agency” (p. 48; quotation is slightly reordered for stylistic reasons). Von Wright advances Bacon-Hume-Mill’s Methods considerably; his insights are instructive, and his presentation is elegant. But there is one overriding fault: If his experiments are *actually* carried out, then their results must agree *identically* with those of the Regularity Theory; and if they are not implemented, then there are no results, and one is left with the same indeterminacy as to nomicity that the Regularist is left with as to timeless truth.

Von Wright asks how one can distinguish a merely true universal generalization from a nomic generalization. He proposes various tests for manipulating the antecedent conditions, trying to see what happens when one induces a new condition, suppresses an existing one, etc. (1974, parts 2 and 3). Suppose, for example, one is concerned to find out whether “Whenever *P*, then *Q*” is ‘merely’ true or nomically so. Suppose, then, that one brings it about that *P* on an occasion when *P* would not otherwise have occurred. (Plainly, there is a problem here of

explicating both ‘bringing it about that’ and ‘an occasion on which it would not otherwise have occurred’. Von Wright is sensitive to this need and offers explicata. We will not pause over these analyses because there are more serious problems to be remarked.) Having brought it about that P , when P would not otherwise have occurred, we observe that Q does *not* follow. According to von Wright, unless we wish to postulate some further, hitherto unnoticed, inhibiting condition, we will conclude that “Whenever P , then Q ” is not a nomic universal. And if, on the other hand, our inducing P had been followed by Q , we would have confirmation (although hardly verification) that “Whenever P , then Q ” is a nomological.

But this “dive” as it were “behind reality” is illusive. The results of this getting our feet (and bodies and heads) wet are identically the same results – save the honorific designation “nomic” – that the Regularist would attribute to these cases when he speaks, more simply, of these generalizations as being timelessly true or false simpliciter. That is, if the alleged Necessitarian experimental methodology yields positive results, then the Regularist will, according to the Regularity Theory, want to say that the proposition has been confirmed as being true and hence is (probably) a physical law; whereas if the experiment yields negative results, the Regularity Theory will say of the disconfirmed proposition that it is (probably) false and hence (probably) not a physical law.

Necessitarians believe that the test, or mark, of nomicity is a proposition’s ability to support a counterfactual conditional. And clearly von Wright’s project is designed to provide the experimental means of sorting out those propositions that do support counterfactuals from those that do not.

But the Regularist has no particular trouble accommodating counterfactuals within his theory as well, and he does so on the same experimental basis as the Necessitarian, but without attributing nomicity to universal propositions.

Suppose, for example, a researcher wants to find out whether a new medication XYZ causes blurring of vision. She proceeds along familiar lines. (There is no Necessitarian experimental methodology distinct from Regularist methodology.) She administers the compound to persons who would not otherwise have consumed it; she withholds it from a control group; she records the visual acuity of each group, particularly the test group, before and after ingesting the drug; she subjects her data to careful mathematical analysis; and she manages in due course to

convince us that the compound does indeed degrade vision. What can this experimenting show us about the *necessity*, and the ability to warrant a counterfactual, of the proposition that the compound XYZ degrades visual acuity? In particular, can it show us, as von Wright believes, that the proposition has a nomological necessity?

What is conceded by both parties to the dispute is that the connection between the two phenomena is (at least) regular. But can regular association suffice to warrant a counterfactual conditional?

It all depends on how ‘pervasive’ the regularity is. We can imagine the counterfactual at issue being challenged:

The experimental data show that, under certain laboratory-controlled conditions, drug XYZ induces visual impairment. But one cannot assume from these limited data that XYZ will impair vision under all circumstances. Perhaps there are foods or other drugs that if taken along with XYZ would block its effect, in much the same way, for example, that milk is antagonistic to the proper working of tetracycline.

The objection has merit. The universal conditional “Drug XYZ impairs vision” will support a counterfactual, for example, “If one were to take XYZ, one’s vision would be impaired,” only if the regularity between taking the drug and subsequent impairment of vision is pervasive, that is, *independent* of other conditions.

Laboratory data, of course, never suffice to establish pervasiveness, but they may well be indicative of pervasiveness. Often, it is reasonable to assume that a factual regularity *is* unconditional. Such knowledge, however, is never a priori; it comes about through our individual and shared experience of the world. Experience has taught us what we may reasonably (but never with certainty) regard as ‘similar’; as cases in which the assumption of pervasiveness has turned out to be confirmed. For example, we know empirically that the melting points of metals are independent of location, of the source of the applied heat (e.g., whether a gas flame or an electrical current), of the nationality of the artisan, etc. And likewise, it is by empirical means that we have come to know that there is an imperfect regularity between seeding clouds and subsequent rainfall.

Pervasive regularities can, and do, support counterfactual conditionals. Pervasiveness, however, need not be regarded as a modal property, that is, as any kind of nomic or ontic necessity.

For the Regularist, warranting the counterfactual “If one were to take XYZ, one’s eyesight would become impaired” depends on its being a physical law that taking XYZ is followed by visual impairment. This latter proposition will be a physical law provided the truth of the matter

is that there is no condition, *ABC*, that is antagonistic to the action of the drug. This is to say, the counterfactual is warranted if the physical law is of the form: “When one ingests *XYZ*, blurring of vision results”; and is not warranted if the physical law (i.e., the truth of the matter) is of the form: “Whenever one ingests *XYZ*, *provided ABC does not also obtain*, then blurring of vision results.”

What von Wright interprets as telling evidence of natural necessity, the Regularist interprets merely as evidence of the paucity of the class of *ceteris paribus* conditions, that is, as evidence of broad (encompassing) application of the proposition. Von Wright’s and the Regularists’ methodology for science is identical; the dispute lies wholly in their respective interpretations of the results of the application of this methodology. For von Wright, a discovered constancy amid the deliberate manipulating of experimental variables signals necessity; the same result for a Regularist shows only a universality with a particularly broad range of application; that is, it shows pervasiveness.

Other Necessitarians are far less sanguine than Ducasse and von Wright about the possibility of finding a test for nomicity.

We cannot ... ever find out of any given non-logical statement that it is in fact naturally necessary: the conjecture that it is remains a conjecture for ever (not merely because we cannot search our whole world in order to ensure that no counter instance exists, but for the even stronger reason that we cannot search all worlds that differ from ours with respect to initial conditions). (Popper 1959a, p. 433).

[“All worlds that differ from ours with respect to initial conditions,” remember, (Chapter 5, footnote 7), is Popper’s way of denoting all those possible worlds that have the same physical laws as the actual world.] Rescher reaches the same pessimistic conclusion.

No matter how massively the observational evidence may be amassed .it is clear upon reflection that this evidential basis must always be grossly insufficient to the claim actually made when we class a generalization as a law. ... It is obvious that this basis will be *deductively insufficient* because the evidence inevitably relates to a limited group of cases while the applicability of the law is unrestricted. Moreover the evidential basis will also be *inductively insufficient*. For inductive procedures are designed to warrant the step from observed to unobserved cases, whereas a law – whose very lawfulness arrogates to it nomological necessity and counterfactual force – not only takes this inductive step from observed to unobserved cases, but also takes the added step from actual to hypothetical cases. ... And the premiss for such an induction will obviously always be

unavailable. The evidential foundation for generalization [to a nomological] is thus afflicted by a double insufficiency, not only in the *deductive* mode, but also *inductively*. ... The basic fact of the matter – and it is a fact whose importance cannot be overemphasized – is that the elements of nomic necessity and hypothetical force are not to be extracted from the evidence. (1970, pp. 105-7; parenthetical gloss added)

Popper's and Rescher's criticisms are so incisive and uncompromising that the wonder is that they were penned by Necessitarians themselves and not by their critics. In Chapter 13, we will return to Rescher's special brand of Necessitarianism, but for the moment let us continue with Popper. Popper is unrelenting in exposing difficulties in his own Necessitarianism. Having argued against its empirical status, he goes on to reject any pretensions it might have to being known a priori.

I believe, ... the idea that there are necessary laws of nature, in the sense of natural or physical necessity ... metaphysically or ontologically important, and of great intuitive significance in connection with our attempts to understand the world. And although it is impossible to establish this metaphysical idea on empirical grounds (because it is not falsifiable) *or on other grounds*, I believe that it is true. (1959a, p. 438; italics added)

Popper gives no reasons for rejecting, as he does, an a priori ascertaining of nomological necessity. The possibility remains to be examined. Can one intuit, recognize, infer, or in any other way determine a priori that there are any nomological propositions? More specifically for our concerns, could one ever know a priori of any designated proposition that *it* is nomologically necessary?

The paradigm of a priori knowledge is analytic knowledge, knowledge gained through the analysis of the concepts figuring in a proposition. Might conceptual analysis provide the litmus test for detecting nomological necessity? Consider, again, the contentious *P9*, the proposition that no one (in the past, present, or future) swims Lake Superior from east to west. I am sure it is safe to presume that no Necessitarian would want to argue that one could have analytic knowledge of the nomological necessity, or lack of it, of *P9*. Indeed, it would be singularly implausible to argue of *any* putative physical law, (e.g., "Aluminum melts at 660° C") that its nomological necessity could be determined analytically. But if an analysis of concepts is not to provide the demarcation between nomological necessity and 'mere' timeless truth, what other a priori method is there? From here on, we must be particularly cautious.

If a proposition's being nomologically necessary is something knowable a priori, then this knowledge must lie in uncharted territory. But one suspects that there really is no such kind of nonanalytic a priori knowledge. If there were, it would be hard to explain why all Regularists,

most if not all scientists, and not a few Necessitarians themselves seem to lack it. Then, too, if such knowledge were seriously posited, it would be difficult to explain why every putative physical law that has come to be overthrown in the long history of science could have been mistakenly thought to have been nomological when in fact it was not.⁶ A far simpler hypothesis to explain the historical evolution is that persons were mistaken as to the empirically ascertained truth-values of these putative laws. The only other explanation is that these persons were mistaken as to *two* things: the truth-values *and* the modality. But if that hypothesis is advanced, then this supposed a priori ‘knowledge’ of nomological necessity is at least as unreliable as empirical knowledge, and – curiously – whenever we are wrong about the truth-value of a putative law, we have *also* made an error in our a priori reasoning about its modality.

Still, this is hardly an incontestable refutation of the existence of the requisite kind of a priori knowledge. Nonetheless, if such knowledge exists, it would seem to be bestowed on only a select few philosophers and not to be acquirable by the rest of us.

Where, exactly, have we now arrived? Even more to the point, how have we come to be discussing epistemological matters when we began by trying to find the proper analysis of the concept of a project’s being doomed?

The discussion has taken the turn it has because the Necessitarian claims to know that certain kinds of projects, contrary to what the Regularist says about them, would not be doomed even though they in fact fail. But a Necessitarian who chooses to argue in this fashion adopts a very different sort of argument from that of the Regularist.

Note that Regularists make no categorical claims whatever about the physical impossibility of any unique project. Our claims are purely conditional:

P10 If a project is one of a kind and if it does not succeed, then it is physically impossible, that is, doomed

⁶ I am here assuming that being true is a necessary but not sufficient condition for being nomological. If one wants to assume that some false propositions are nomological, this problem will present itself: Why, in overthrowing putative physical laws, do we always seem to do so because of a reconsideration of their truth-values, rather than of their modality? I.e., why is it that their modality always seems to be idle in the case of the rejection of putative physical laws?

A particular instantiation (specialization) of this would be the following:

P11 If one and only one attempt is made to swim Lake Superior from east to west and that project does not succeed, then that project is physically impossible, that is, doomed

The Necessitarian wants to deny *P10*, and one way of doing this (remember we will examine another way in Chapter 7) is to refute some proposition (such as *P11*) that is a specialization of *P10*. Thus, to refute *P10*, all the Necessitarian need do is to find a case, any one at all, in which a unique project fails but is not physically impossible. And to do the latter, all he need do (according to his theory) is to show that a true material conditional, whose antecedent describes the project and whose consequent expresses the failure of that project, (e.g., “Anyone who tries to swim Lake Superior does not succeed”), is not nomologically necessary. His claim, then, is not conditional, as is the Regularists’, but is categorical; he claims, of at least some failed projects, that they are unconditionally physically possible.

The Necessitarian thinks that what he wants to establish is relatively easy to do and has not one, but several, examples (concerning, e.g., moas, ravens, coins, etc.) at the ready. But these examples, when scrutinized, prove troublesome. It is one thing for a Necessitarian to present these as cases of propositions that are not nomologically necessary; it is quite another to explain how the judgment is arrived at and how it is to be justified. When pressed, no Necessitarian has offered a plausible explanation as to how it is possible, either empirically or a priori, to determine nomicity.

One Necessitarian, Taylor, seems totally unperturbed by this difficulty in the theory. He breezily dismisses the worries of the Regularists:

The dispute has been carried on in the spirit of ideology and debate. ... [Regularists] have adduced numberless irrelevancies, such as pointing out that ... no necessary connection is observable, that the empirical sciences presuppose no such idea, and so on. (1983, pp. 82-3)

Later, he describes a hypothetical situation in which we would (allegedly) withhold lawful status from a universally true conditional because we know that the connection is not, as he puts it, “necessary.” Quite rightly, he anticipates the question as to how we might acquire such knowledge. His answer, however, is extraordinary:

This observation [that we do not see any necessary connections] ... whether it is true or not, has no relevance to the question before us. The question is not how causes are known, but rather what they are. We began by assuming that we know, at least in some

instances, that certain things are causally [i.e. necessarily] connected. The most untutored person knows this. *How* these connections are known is an interesting question, but not the question we are asking. Our question is rather what one *means* when he affirms the existence of a connection that is thus so confidently known. (p. 86; parenthetical phrases added)

Few, if any, other writers on the subject share Taylor's indifference to the epistemological difficulties. If "the most untutored person" *knows* that there are necessary connections in nature, surely it is more than just an 'interesting' question to inquire where such knowledge originates.

Taylor argues that the question of how we might in practice determine that a natural necessity obtains is, in the end, 'irrelevant' to what a claim to that effect might *mean*. Now although this may sound at first like a standard rejection of the verificationist theory of meaning, it is really more problematic than that. For unless there is some determinate way to ascertain the nomological status of a proposition, the very attribution of meaningfulness to a claim that some particular proposition is nomological would seem to be without foundation. Nomological necessity is not a property like contingency that can be determined a priori; propositions bear their *logical* modalities of logical necessity (see Bradley and Swartz 1979, pp. 333-9). Nomological necessity is a property supposedly born only by a proper subset of contingent propositions. If it is to be meaningfully attributed to some contingent propositions and not to others, there must be distinctive conditions for its application. If none are specified, we must then be at a loss to understand what this property of nomicity is, or what a proposition attributing it to another proposition is supposed itself to mean. How, for example, is natural necessity supposed to differ from the property we invent on the moment and arbitrarily christen, let us say, "primal sovereignty"? If we don't specify under what conditions either nomicity or primal sovereignty is to hold, how shall we distinguish one from the other and either from sheer fiction?

For Regularists, Necessitarians' claims that they are able, on occasion at least, to determine of certain propositions that they are nomologically necessary appear to be cases of self-deception or of unrecognized dogmatism. Regularists are incapable of seeing how Necessitarians could possibly have the knowledge that they are here presupposing and using to attack the Regularists' theory.

Having made this point, the Regularist might then be moved to generalize on it:

No one can, in advance of one of its kind being actual, justifiably claim to have knowledge that a kind of event is physically possible. Some Necessitarians seem driven

to ascribing nomological necessity to physical laws because they seem to think that they know, in advance of empirical evidence, for at least some cases, what is physically possible and what is not. But no one has ever plausibly explained how such knowledge could be possible.

It would be easy to minimize the depth of the dispute on this particular issue. It would be easy to think that the Necessitarian has here simply overstated his case and that, with a little patching up, it can be made to work.

Couldn't the Necessitarian backtrack just a bit? For example:

All right, we Necessitarians do not *know*, in some strong sense of "know," that it is physically possible to swim Lake Superior. Likewise, we do not know that it is physically possible to make a river of Coca-Cola. But surely we have *excellent* empirical grounds to warrant our claim that these sorts of occurrences are physically possible. There have been, after all, similar sorts of things that have occurred and that we know about. We are in a position to perform a Reichenbachian 'cross-inductive' inference: Other persons have performed prodigious athletic feats, and calculations on body weight, oxygen exchange, and the like show that swimming Lake Superior is within human capability. And as to the river of Coca-Cola, all that really seems to bar its existence is someone's will to waste his money in that way. After all, there was a river of molasses in Boston on January 15, 1919.⁷

The first part of my reply will probably surprise the Necessitarian:

I agree with much of what you have to say. It certainly is consistent with everything we know that someone should swim Lake Superior and that there should be a river of

⁷ "Towering over the lunchtime loungers and this neighborhood of tenements and historical sites was a 90-foot-high metal tank, 282 feet in circumference ... used for storage of molasses by the Purity Distilling Company. With a low rumbling noise, followed by a series of sharp explosions, the tank burst open and a black flood of molasses poured into the streets. Faster than anyone could run, a wave of sticky syrup, initially 20 to 30 feet high, flowed through the streets, burying workmen, strollers, and lunchtime idlers. An estimated 2 million gallons of molasses, weighing some 27 million pounds, had been released from the burst tank. The flood knocked several buildings from their foundations and drowned or suffocated 21 people where they stood. Sections of the ruptured tank sliced through building walls and sheared off columns supporting an elevated train line. ... The odor of molasses hung over the city for a week, and the harbor remained brown-tinged for almost five months." (Cornell 1976, p. 235). Cornell offers a bibliography on the Molasses Disaster on p. 365.

Coca-Cola. Indeed, I will even go so far as to say that were there many attempts to bring these events about, it is probable that at least some of them would succeed. Moreover, I would even be willing to bet on their successful outcome.

But with the second part of my reply, we are at loggerheads again.

But we still disagree on the essential point, and really your invoking the probability of there being a river of Coca-Cola and the like is at cross purposes to our dispute. You are making an epistemological-cum-practical point, namely, that on the basis of what we know, such and such is probable, and indeed should be expected under certain easily conceivable circumstances. So long as I share the same data base as you, and subscribe to the same probability calculus, there can be no disagreement on these matters. But none of this answers, indeed it does not even address, the question of whether these sorts of events are physically possible. What may be highly probabilified by our knowledge, may – for all that – be false, indeed even be physically impossible. For example, on the basis of observing a variety of many metals, it would be perfectly reasonable to claim that it is physically necessary that all metals expand when melted. But this warranted inference has a false conclusion; antimony-tin, for example, contracts when melted. In short, you are confusing two quite different concepts: “physically possible” as used to describe those propositions that are consistent with what we take to be knowledge in science; and “physically possible” as used to describe those propositions that are consistent with actual physical laws (known and unknown).

DISCUSSION

Nec(essitarian): I am unsatisfied with where you have drawn the dividing line in the class of failed projects between those that are cases of mere failure and those that are (physically) doomed. Let’s look again at the case of the swimmer attempting to cross Lake Superior. In a way, you have made the case too easy for yourself, by having the one swimmer who attempts the swim fail miserably. What if, instead of falling far short of her goal, she came within a few meters? Suppose that she was within 30 meters of the western shore, when – horrors – a careless crew member in one of the boats in the welcoming flotilla tossed an anchor overboard and knocked her unconscious. Clearly her attempt failed. But, under the circumstances, namely, her having just about reached the finishing line while still swimming strongly, wouldn’t it be totally unreasonable to claim that the project was doomed?

Reg(ularist): You continue to read something stronger into “doom” than what I mean. When I say that a project is doomed, what I mean is that it is logically inconsistent with some universal proposition. Now because the swimmer’s attempt is, *ex hypothesi*, the only

attempt – past, present, and future – to swim the lake, and because it fails, it logically follows, then, that *every* attempt to swim the lake fails. But the latter proposition *is* a universal one; and hence the singular proposition, that the one attempt was physically possible, is false.

Nec: Your use of the term “doom,” although certainly consistent with our mutual agreement that it is required where a singular proposition is inconsistent with a physical law, seems misapplied in this instance. The reason is that we ought not to regard the proposition that no one ever swims the lake (even if true) as being a physical law. Compare this statement with the proposition that no mass travels in excess of 299,792 km/sec. This latter proposition *is* a physical law. But the universal generalization about no person swimming the lake is not a law. Its truth is, as we say, merely accidental.

Reg: I would agree with you if it weren’t for two facts.⁸ The first is, as we have seen in this chapter, that there is no known method – either empirical or a priori – for drawing the distinction you insist upon. This I regard as a powerful objection. If the distinction between nomicity and accidentalness were viable, then there ought to be some pretty clear means of determining it, or, at the very least, the outlines of such a means ought to be discernible. But not even the latter is at hand; and indeed many Necessitarians themselves, for example, Popper and Rescher, explicitly deny that such a means could exist.

The second fact is that the distinction you intuit can be explicated without any need to attribute occult, modal properties to certain universal truths.

Our objection to your finding nomicity empirically is not mere skepticism about an opponent’s claims. It is not that we fail to believe what you do it is rather that we believe that what you claim to be able to do cannot be done, by anyone. Moreover, we believe that the Regularity Theory is perfectly adequate to explain our empirical knowledge of the world, its laws, and counterfactual conditions. Such knowledge, all of it, comes about through our observing the world and finding out what sorts of things happen in it. If we feel reasonably confident in saying, for example, that it is (physically) possible to do some things that no one ever has, such as making a river of Coca-Cola, it is because similar sorts of things have already occurred in this world and we know of them empirically (e.g., the Molasses Disaster). Our reasonable confidence arises not from any knowledge that a certain universal proposition is not nomologically necessary, but rather through our knowledge that certain similar sorts of events have already occurred in this world.

⁸ There will be additional problems cited in Chapters 8 and 10.

Let's return to the two propositions, one, that no mass travels in excess of 299,792 km/sec., and two, that no person successfully swims Lake Superior. You have insisted that there is a difference between these two. There is. But I would not describe it as being the difference between nomicity and accidentalness. The difference is that the former has far more *epistemic warrant* than the latter. We have – by experimenting and theorizing – excellent grounds for believing that it is true that no mass travels in excess of 299,792 km/sec. We have far less evidence on which to base a comparable certainty in the case of a person's swimming Lake Superior. Indeed, failure to swim lakes, without further qualification, we already know is not a pervasive feature of this world. Most of us know of, and in some case know personally, persons who have successfully swum across lakes of considerable size. And certainly, had we been on one of the boats in the welcoming flotilla, we would have been quite irrational to believe, just before the anchor was thrown, that the swimmer would not make the shore within the next few moments. If asked to make a claim about the physical possibility of her success, all of us – whether Regularist or Necessitarian – would, if rational, say that on the evidence then available it certainly looked as if success were possible.

Regularists are no better or worse at predicting the future of the world than are other persons. Regularists will make the very same bets as Necessitarians as to what is and is not physically possible. We, like everybody else, go on the evidence available to us. If, however, at the end of time, we were to discover that no one has ever swum across Lake Superior, we would then have to conclude that the task was physically impossible (i.e., that it did not occur). But that we should eventually at the end of the world have to say that no one has ever swum the lake is perfectly compatible with our having rationally predicted otherwise on the less-than-complete history of the world we would have known earlier when we were watching the swim in progress and seeing the swimmer approaching her goal.

Nec: I agree that the epistemic problems inherent in claiming that there is a difference between nomicity and accidentalness are serious. But still I am unconvinced. For I want to insist that, even if it were *known* that (timelessly) there never *is* a successful attempt to swim Lake Superior, under the circumstances described – the swimmer's having been within a hairbreadth of her goal – it would be rational to assert that, in spite of all failures, the feat was still physically possible. The difference between the two propositions – that no one ever (past, present, or future) swims Lake Superior, and that no mass (past, present, or future) travels in excess of 299,792 km/sec. – is not *just* epistemological: There is an ontological distinction between these two propositions.