What follows is a composite version of two forthcoming papers: "Brute Necessity," forthcoming in *Philosophy Compass*, and "Brute Necessity and the Mind-Body Problem," forthcoming in *Brute Facts,* edited by Elly Vintiadis and Constantinos Mekios, Oxford University Press.

BRUTE NECESSITY

1. Introduction

In a good many recent papers (for example, Cameron 2008a and Kleinschmidt 2015) one encounters arguments to the effect that certain philosophical views are objectionable because they would imply that there are necessary truths for whose necessity there is no explanation.[1] That is, they imply that there are propositions p such that (i) it is necessary that p, but (ii) there is no explanation *why* it is necessary that p. For short, they imply that there are "brute necessities." Therefore, the arguments conclude, the views in question should be rejected in favor of rival views under which the necessities would be explained.

I found this idea initially surprising. Necessary truths are often regarded as paradigms of truths that either need no explanation or automatically have one, being in some sense self-

[1] Cameron espouses one such argument; Kleinschmidt identifies another and offers a reply to it.

explanatory. That is why the traditional argument from the contingency of the world to the existence of God, the argument *a contingentia mundi*, comes to rest with a necessary being: such a being is thought to need no further explanation.

On the other hand, mathematicians sometimes distinguish between "proofs that prove" and "proofs that explain." Since mathematical truths are one and all necessary, accepting such a distinction implies that there can be necessary truths for whose truth (and necessity) we have no explanation, and it suggests (though it does not imply) that there might be necessary truths for which there simply *is* no explanation.

These conflicting considerations have inspired the agenda for this paper, in which I explore the following questions among others: Do necessary truths need explanations? Are they even susceptible of explanation? What would the explanation of a necessary truth look like? Are some necessary truths explained by other necessary truths? Are some necessary truths in some sense self-explanatory? Are all necessary truths either self-explanatory or explained by others? Or are there some necessary truths that simply lack explanations—are there brute necessities? Finally, what is the bearing of answers to these questions on arguments from the avoidance of brute necessity? These questions are relevant to a good deal of recent metaphysics**,** but have yet to be pursued in a systematic fashion.

2. Arguments from the Avoidance of Brute Necessity

My attention was first drawn to arguments from the avoidance of brute necessity by Shieva Kleinschmidt in her critical discussion of Skow 2007 and McDaniel 2007, both of whom use an argument from bruteness to show that the shape of an object is not intrinsic to it, but is derivative from the shape of the region it occupies. Once alerted to this type of argument, I began noticing

or recollecting many other specimens of the same genus. I survey a representative sample of them here, beginning with the Skow-McDaniel argument.

Object shape. Consider the following principle: if object O exactly occupies region R and R is square, then O is square.[2] That certainly seems to be a necessary truth.[3] But *why* is it necessary? Why the pre-established harmony between the shapes of objects and the shapes of regions they occupy? Skow and McDaniel suggest that the principle is necessary because object shape is *defined* in terms of region shape: for an object to be square *is* for it to occupy a square region. Thus contrary to what we might at first have supposed, the shape of an object is not an intrinsic property of it. Instead, it is a property it inherits from a distinct entity, the region it occupies. That object shape is not intrinsic may be counterintuitive,[4] but we should accept it because it explains what would otherwise be an unexplained necessity.[5]

Haecceities. For those who believe in them, haecceities (or "thisnesses") are properties had essentially by their bearers and not possibly had by anything else. They are unshareable or incommunicable in the sense captured by the following formula, in which 'N' is the necessity operator:

$$N(x)(x \text{ has } F \rightarrow N(y)(y \text{ has } F \rightarrow y = x))$$

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[2] By 'exactly occupies' I mean the relation Parsons (2007) calls exact location, which he defines thus: x is exactly located at r =df for every region s, s overlaps r iff x is weakly located at s (i.e., s is not completely free of x). I sometimes omit the qualification 'exact'.

[3] It is closely related to the adage that a square peg won't fit a round hole, implying it with the help of the auxiliary assumption that nothing is both round and square. (If a square peg did fit a round hole, it would be a peg that simultaneously occupied a region R that was square and a region R' that was round, which is possible only if it simultaneously occupies two regions, one square and one round, or a single region that is both square and round, but in either case the peg would be both square and round.)

[4] "If we know what shape is," says David Lewis, "we know that it is a property, not a relation" (1986, 204).

[5] See Kleinschmidt for a finer-grained reconstruction of the argument.

But why should any property be like that, Robert Adams asks (1981). What explains the necessity involved in incommunicability? Why can't God use the same haecceity twice, letting it be possessed both by Castor and by Pollux?

Adams answers by saying that the necessity is explicable only if haecceities are conceived of in a certain special way: a haecceity must be taken to be the property of being identical with *a*, where *a* is an actually existing individual**.** He thus takes the threat of brute necessity to militate against a purely qualitative account of haecceities, as well as any account that would let there be haecceities of merely possible individuals.

Chad Carmichael gives a different explanation of why a given haecceity is necessarily incommunicable (forthcoming). He *defines* haecceities as properties that are incommunicable in the sense implied by the formula above, making it analytic that if a given property is a haecceity, it is incommunicable. That still leaves the question why a given property, such as my haecceity, is incommunicable. Carmichael answers by saying any given haecceity h should be defined self-referentially as "the property of having h as its haecceity." Thus by the definition of h, it is a haecceity, and by definition of haecceityhood, haecceities are incommunicable. In defining h as he does, Carmichael deliberately flouts the rule that all properties and relations must be well founded. What is of interest to me is that Adams and Carmichael both think the incommunicability of haecceities is a necessity calling for explanation, and each tries to provide the explanation with a controversial conception of how haecceities should be construed.

Mereological sums. According to classical mereology, for any objects *a*, *b*, and *c*, there is an object that is their sum—an object having *a*, *b*, and *c* as parts and no other parts not overlapping *a*, *b*, or *c*. This principle is generally advanced as a necessary truth by those who espouse it at

all. But why should it be necessary? Ross Cameron suggests that to avoid an unexplained necessity, we should accept a deflationary account of the existence of sums. The sum of *a*, *b*, and *c* must exist when they do because its existence is nothing in addition to theirs. He says similar things about impure sets such as {Socrates, Plato}. Summing up, he says

> If impure sets and mereological sums are extra elements of our ontology then there are unexplained necessary truths. If we want to say that the existence of some things is (necessarily) sufficient both for the existence of the sum of those things and for the existence of the set of those things then, if this is to be anything other than a brute necessity, we must adopt the view that impure sets and mereological sums are no addition of being: that they are an ontological free lunch. (2008a, 10)

That sounds like a perfect example of an argument from the avoidance of brute necessity. Before going on to further examples, though, I make three comments about this one.

First, there is an objection to Cameron's employing the strategy he does both about sets and about sums. These entities, he says, are nothing over and above the objects they have as members or parts. Well, I offer the following as an evident truth about the relation "is nothing over and above:" things that are nothing over and above the same things are the same as each other. Therefore, by Cameron's strategy, sets and sums would be the same things. But they are not, as they obey different laws (parthood being transitive and membership not, for example).[6]

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[6] My criticism here applies equally to D.M. Armstrong, who holds that internal relations are nothing over and above their terms, yet who presumably also allows that the same terms can sustain several internal relations (2004, 9). If "nothing over and above" is taken at face value to mean *identical with*, what I say in opposition is indisputable: things identical with the same things are identical with each other. Proponents of the "nothing over and above" strategy must therefore say how their relation can fall short of identity, yet not import an addition to being with its second relatum. Cameron has a go at this in Cameron 2014, suggesting that composition is a superinternal relation (a relation such that one relatum of it provides the ground both for the other relatum and for the obtaining of the relation itself) and maintaining that superinternal relations generate no additions to being. I counter with an argument from Markosian 2008: Consider a world containing two simple atoms a mile apart and nothing else. According to mereological nihilism, there are just two objects; according to mereological universalism, these two compose a third thing. How can three objects not contain an addition to being in comparison with two?

Second, some philosophers now flirt with the view that the sum of the xs *just is* the xs—a case of so-called one-many identity. (See Lewis 1991 and Cotnoir 2014 for discussion.) Those philosophers had better not also say that the *set* of the xs just is the xs, for the reason I just gave.

Third, one might think to reinforce Cameron's worry about how *a*, *b*, and *c* can give rise to an entity distinct from themselves by invoking Hume's principle that there can be no necessary connection between distinct existences. Cameron does just this on pp. 7-9 (and so for that matter does McDaniel in his argument). But if that principle is correct, a necessary connection between *a*, *b*, *c*, and a mereological sum distinct from them would not be *unexplained*—it would be *impossible*. The argument would not be an argument from the avoidance of brute necessity, but from the avoidance of bogus necessity.

Universals. David Armstrong invites us to consider the following necessary truth: if *a* resembles *b* in some respect, then *b* resembles *a* in some respect. What accounts for this necessity? If one analyzes resemblance as the sharing of a universal (as Armstrong does), the symmetry of resemblance is readily derivable from a truth of logic: if for some U, *a* and *b* both possess U, then for some U, *b* and *a* both possess U.[7] (The other properties of resemblance in a respect, such as transitivity and reflexivity, are similarly derivable; likewise the formal properties of total resemblance, analyzed as the sharing of all universals.) But if one refuses to countenance universals and takes resemblance as primitive, the necessity in question is a brute necessity, "a bed-rock and inexplicable fact" (Armstrong 1978, 49). This is the first explicit argument from brute necessity I know of.

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[7] Armstrong regards the sharing of a universal between two particulars as a case of generic identity between them. In his view, the derivation I have given may be characterized as a derivation of the symmetry of resemblance from the symmetry of identity.

Granting for the moment that it would be desirable to derive the properties of resemblance from an analysis of that notion plus purely logical principles, I do not think the analysis would have to invoke universals. One might analyze resemblance in a respect as ∃F(Fa & Gb) and total resemblance as (F)(Fa ↔ Fb). In those formulas we quantify into predicate place, but contrary to Quine, we do not need to be construed as quantifying over universals. For a defense of such non-nominal quantification and arguments that it carries no ontological commitment to universals, see Prior 1971 and Van Cleve 2015.

Armstrong's argument is generalizable in ways he may or may not condone. The following truths are all necessary truths about the symmetry of certain relations: if line 1 is parallel to line 2, then line 2 is parallel to line 1; if e is simultaneous with f, then f is simultaneous with e; if x looks the same way to S1 as to S2, then it looks the same way to S2 as to S1. Why are these truths all necessary? We could explain why by analyzing being parallel as having the same direction, being simultaneous as occurring at the same time, and looking the same way as presenting the same sense datum. Would Armstrong be prepared to accept directions, times, and sense data into his ontology?

Ironically, Cian Dorr has offered an argument from brute necessity *against* the existence of universals. (As we have already seen in the case of Cameron, arguments from brute necessity can be used to support deflationary as well as inflationary positions in ontology.) Those who believe in universals often believe in a relation of instantiation or exemplification connecting particulars with universals—if *a* is red, that is because *a* instantiates redness. Now consider the following scenario: *a* instantiates *b*, *b* instantiates *c*, and *c* instantiates *a*—a circle in instantiation. Nearly everyone would pronounce this absurd and impossible. But why? Whence

the necessity that there be no such circles? Dorr thinks there can be no explanation, at least not of the sort he favors—one drawing just on logic and real definitions. This is his principal argument for nominalism (Dorr 2008).[8]

Like Armstrong's argument, Dorr's argument can be generalized considerably beyond its stated conclusion. It may be used in connection with many other principles that prohibit some relation from running in a circle. It is impossible, many suppose, for *a* to cause *b*, *b* to cause *c*, and *c* to cause *a* (see e.g. Rowe 1968 and Tooley n.d.). But what would be the source of the necessity that things are never that way? It is not a truth of sheer logic, for there are plenty of true instances of 'aRb, bRc, and cRb'—let 'R' be 'is a neighbor of'. Suppose we bring in a Humean definition of causation containing the clause '*a* precedes *b*'. Then we could derive the impossibility of circular causation from the impossibility of circular precedence—but what would explain *that* impossibility, if it is one?[9]

Sometimes the impossibility of a circular structure involving a given relation can be derived from other logical properties of the relation—for example, transitivity along with irreflexivity.[10] But what makes it necessary that the relation is in question has those properties? It is seldom a matter of logic alone that a relation has the formal properties it does.

Here is another question facing Dorr's argument: how is nominalism supposed to avoid the brute necessity that instantiation never runs in a circle? In most arguments from brute necessity,

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[8] "We have stumbled on an argument in favour of nominalism . . . Only the nominalist . . . can adequately respect the idea that there are no brute necessities. I think this is quite a powerful argument. To anyone not antecedently convinced of the falsity of nominalism, the idea of a metaphysically necessary truth whose necessity does not flow from real definitions plus logic really should seem quite strange" (Dorr, 53).

[9] Gödel showed that in the general theory of relativity, there are configurations of matter that would beget closed loops in time (1949). More cautiously, he showed that if such loops are possible, there are configurations that would generate them (Tooley n.d.).

[10] This is not true in the case of instantiation, which is not transitive and (if Plato is right) not irreflexive.

the necessity of a certain truth is taken for granted, and the argument is that only the arguer's favored view can explain that necessity. In Dorr's argument, nominalism is meant not to explain the necessity, but to remove it—if there is no such thing as the instantiation relation, then we do not need to explain why it cannot run in a circle. But how is the necessity removed? One who says there are no (perfect) triangles must still admit that it is necessary that if anything is a triangle, then any two of its sides are greater in combined length than the third. Similarly, must not Dorr admit that it is necessary that *if a* instantiates *b* and *b* instantiates *c*, then *c* does not instantiate *a*?[11]

Dorr offers the following as an argument that there cannot be brute necessities, which he defines more narrowly than I do as necessities that do not follow from logic plus real definitions:

> The idea of a metaphysically necessary truth whose necessity does not flow from real definitions plus logic really should seem quite strange. A notion of necessity that allowed for such truths would seem uncomfortably like nothing more than an extra-strong variety of nomological necessity. But when something strikes us as impossible—say, the hypothesis that some duplicate of an electron is not itself an electron—we don't just think of it as ruled out by a "law of metaphysics": we feel that in some important sense the idea *makes no sense at all*. The notion of necessity involved in such intuitions is absolute: it must be something that could not be strengthened any further without changing its character in some fundamental way. It's hard to see how any notion of necessity weaker than the notion of reducibility to logical truth could be absolute in this way. (2008, 53)

I take the argument here to be the following:

1. Genuine necessity is absolute. It is necessity of the hardest kind, not anything like beefed-up nomic necessity.

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[11] A referee suggests that Dorr is not committed even to a conditional necessity here, since he rejects the ideology in terms of which it is formulated. But how then can he affirm that his opponents must endorse the necessity?

2. A brute necessity in Dorr's sense—a supposedly necessary truth whose necessity does not flow from definitions plus logic—would not possess absolute necessity.[12]

3. Therefore, brute necessities are not genuine necessities.

If that is his argument, Dorr, like Cameron, is dealing with necessities that threaten to be brute by repudiating their necessity, not by remediating their bruteness.

For my part, I regard most of the putative examples of brute necessity discussed in this paper —if o exactly occupies r, then o has the same shape as r; for any objects, there is an object that is their mereological sum; there are no circles in instantiation; a man just like a good man in all natural respects is good—as necessities of the hardest kind, regardless of whether they reduce to logic plus definitions. I would therefore reject the second premise in Dorr's argument.

Supervenience of the moral. G.E. Moore believed in the strong supervenience of moral properties on natural properties: if a man is good, that is because his being so is necessitated by some constellation of natural properties he possesses, such as courage and kindness, which implies that a man in some other possible world who was in all natural respects just like the first man would also have to be good. There are other philosophers who reject such necessitations of the moral by the natural, but who do believe in weak supervenience: although persons inhabiting *distinct* worlds need not be alike in their moral properties if they are alike in in their natural properties, persons in the *same* world who are alike in their natural properties must be alike in their moral properties. Simon Blackburn has raised a puzzle for the combination of weak supervenience without strong (1984, 182-87): if worlds are possible in which a man is

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[12] I am ignoring one other respect (besides "absoluteness") in which Dorr says brute necessities in his sense are not genuine necessities: unlike the necessities of logic plus definition, they have denials that make sense. For my part, I do not grasp the sense in which denials of logical laws do *not* make sense.

courageous and kind but not good (as allowed by the denial of strong supervenience), why are worlds not also possible in which one man is courageous, kind, and good and another in the same world is courageous, kind, and not good (as disallowed by weak supervenience)?[13] If a given natural profile does not necessitate any moral property, why does the having of the *same* natural profile by two persons or things necessitate their having the same moral properties? What accounts for this necessity? There is no good explanation, Blackburn contends, unless some form of moral anti-realism is true. In particular, moral ascriptions must be regarded as mere projections, which we have seen fit to make under a constraint of uniformity. Blackburn explicitly presents this argument for moral anti-realism as an argument from avoiding what would otherwise be an unexplained necessity (184-85).[14]

A philosopher like Moore who espouses the strong supervenience of moral properties on natural properties is not exposed to Blackburn's argument. As Mark Schroeder points out, however, the Moorean philosopher runs up in another way against the demand that necessities require explanation (2014). Moore held that goodness is a simple and unanalyzable property, not susceptible of any definition or reduction in naturalistic terms. So how can there be any

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[13] I use the terms 'strong' and 'weak' supervenience in Jaegwon Kim's sense (1984); Blackburn speaks instead of 'necessitation' and 'supervenience' respectively.

[14] In personal communication, Mark Schroeder and Blackburn himself have both suggested to me that the argument against the weak-without-strong combination might instead be run as an argument using Lewis's "patchwork principle" (Lewis 1983, 77 or 1986, 87-92): if a world is possible in which someone is B* and A (B* being the total package of natural properties and A some moral property) and a world is possible in which someone is B* and not A, then a "mixed" world is also possible in which one person is B* and A and another person is B* but not A. But if the patchwork principle is correct, the combination of weak supervenience without strong would be not just unexplained, but outright impossible. As in the Cameron argument when bolstered by Hume, we would be arguing from spurious necessity rather than unexplained necessity. Moreover, as Schroeder has pointed out to me, if the weak-without-strong combination is really impossible, it is hard to see how moral anti-realism is supposed to accommodate it!

explanation for him of why it is necessary that whatever has such-and-such natural properties is good? I return to this issue in section 12.

Arguments from brute necessity schematized. Having taking note of several examples of arguments from brute necessity, we may now schematize two forms such arguments might take. The strong form is

1. There are no brute necessities.
2. Unless X is defined thus (or unless view V is true), proposition P (which is admittedly necessary) would be a brute necessity.
3. Therefore, X is correctly defined thus (or view V is true).

If brute necessities are not only nonexistent but impossible, an argument of this form (if sound) would show that view V is not only true but necessarily so. That is quite in keeping with the thought that metaphysics, like mathematics, is a domain in which whatever is true is necessarily true.

The weak form is

1. We should minimize brute necessity. *Ceteris paribus*, a theory that countenances fewer brute necessities is better than one that countenances more.
2. Unless we define X thus (or unless view V is true), proposition P (which is admittedly necessary) would be a brute necessity.
3. Therefore, we should define X thus (or adopt view V). A theory that incorporates that definition or view is superior (*ceteris paribus*) to one that does not.

The weak form is weaker in its first premise and in its conclusion. It does not conclude outright that a certain definition or view is correct, but only that there is a presumption in favor of accepting it. I return to these forms in section 13.

3. The Hyperintensionality of Explanation

Quine disparages the idea of seeking explanations for logical truths on the ground that any logical truth is entailed by (and thus arguably explained by) any truth you choose to mention. He writes,

> Any sentence logically implies the logical truths. Trivially, then, the logical truths are true by virtue of any circumstances you care to name—language, the world, anything. (1970, 96)

The point can be extended to cover the explanation of necessary truths in general, as I show in Van Cleve 1999, 42.

Such a dismissal of our project would be premature, however, as it does not take into the account the possibility that the relation of grounding or explaining might be *hyperintensional*. A property or relation is hyperintensional iff in contexts in which it figures, a given formula and another necessarily equivalent with it may not always be swapped *salva veritate.* Or, not to make the definiens sound so metalinguistic, a relation R to a proposition or fact is hyperintensional if the following inference schema is not valid:

xRp, N(p ↔ q), therefore xRq.

A familiar example is belief. From the facts that Tom believes 1 = 1 and that necessarily, 1 =1 iff $\sin^2 x + \cos^2 x = 1$, it does not follow that Tom believes $\sin^2 x + \cos^2 x = 1$.

In recent years, a number of metaphysicians have propounded the idea that there is an important relation of grounding or explanation that is also hyperintensional (Fine 2012, Rosen 2010, Correia and Schnieder 2012). Let us express facts about grounding thus: pBq, meaning p because q (or if you prefer, 'the fact that q grounds/explains the fact that p' or 'the fact that p obtains in virtue of the fact that q's obtaining'). The hyperintensionality of 'because' then comes out in the facts (i) that from 'pBq' and 'N(q ↔ r)' you may not infer 'pBr' and (ii) from 'pBq'

and ‘N(p ↔ r)’, you may not infer ‘rBq’. Things that are necessarily equivalent may not be interchanged on either side of the ‘B’ operator.[15]

The hyperintensionality of explanation is a crucial presupposition of the issues I am investigating in this paper. The arguments canvassed in the preceding section take for granted that although some necessary truths have explanations, there are others that (unless we accept the arguer’s conclusion) would not have them. Well, suppose explanation were not hyperintensional but merely intensional (permitting the interchange of necessary equivalents in explanation contexts), and suppose we had an explanation ‘Np because q’ for some necessary truth p. Now take any other necessary truth r. By the so-called paradox of strict implication (not really a paradox, but a theorem provable in the weak modal system K), r is necessarily equivalent to p—any two necessary truths entail each other.[16] It follows from another principle of the system K—the axiom that if Np and N(p → r), then Nr—that Np and Nr are also necessarily equivalent. Therefore, if explanation were intensional, we would have not only *Np because q*, but *Nr because q*. In having an explanation for a given necessary truth, we would have an explanation for all, and the specter of brute necessity would never arise.

An important corollary of the hyperintensionality of explanation is that there is more to explaining than entailing: though entailing is necessary for explaining in the modal sphere, it is

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[15] Just now I formulated grounding statements using ‘B’ as a dyadic sentence operator. Grounding statements are sometimes formulated instead using a relational predicate and terms for facts as the relation’s relata, as in ‘the fact that q grounds the fact that p’. Though I prefer the operational formulation for reasons of ontology, I shall sometimes use the predicational or relational formulation for ease of expression. That means my ‘p’s and ‘q’s will be functioning sometimes as formulas (operational mode) and sometimes as terms (relational mode). I may even use the operational and predicational modes in the same sentence. For further explanation of the difference between the operational and relational modes, see Correia and Schnieder, 10-12; for defense of the operational mode, see Prior 1971, chapter 2.

[16] Notice that I am already slipping into the relational mode. To stay within the operational mode, I should say ‘it is necessary that p iff r’.

not sufficient for it. Otherwise, explaining would inherit the intensionality of entailing.[17] The extra strength of explanation wards off Quine's charge of triviality—that a necessary truth, being entailed by anything you please, would be explained by anything you please.

Although most contemporary metaphysicians have avidly embraced hyperintensionality (see Nolan 2014), the same cannot be said for philosophy as a whole. There are entire subfields that have not gotten the memo (or have chosen to ignore it). In formal epistemology, for example, practitioners still routinely assume that if two propositions are necessarily equivalent, then it is rational to believe one iff it is rational to believe the other to the same degree.

4. A Taxonomy of Positions

In this section I distinguish a variety of positions one might take in regard to (i) whether there are unexplained necessities and (ii) what form explanations of necessity might take when they exist.

First, though, we must ask what we mean by an unexplained necessity. Do we mean a necessary truth *p* such that there is no explanation for why *p*, or do we mean a necessary truth *p* such that there is no explanation for why it is *necessary* that *p*?

On certain assumptions, there would be no logical difference between these alternatives. One of the assumptions is the S4 axiom, Np → NNP. Another is the principle of strict implication (PSI), according to which a necessary truth is entailed by anything whatsoever, Np → (q => Np). Using these assumptions, we may argue as follows:

1. Np (assumption)

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[17] Proof, using 'q => p' for 'q entails p' and 'qEp' for 'q explains p': 1. Suppose q => p entails qEp (entailing is sufficient for explaining). 2. To show: qEp & p <=> r entails qEr (the intensionality of explaining). 3. Assume: qEp & p <=> r. 4. q => p (from 3 and the premise that explaining requires entailing). 5. q => r (4, 3, intensionality of entailing). 6. qEr (from 5 and 1). 7. qEp & p <=> r entails qEr (3-6, conditional proof). A quicker proof that entailing falls short of explaining would rely on the asymmetry of explanation: two propositions can entail each other, but two propositions never explain each other.

2. NNp (1 and S4)

3. Np is entailed by anything (2 and PSI)

4. In particular, p => Np

5. Np => p (the T axiom)

6. p <=> Np (4, 5)

7. Therefore, if Np, p <=> Np (1-6, conditional proof.

Having shown that, we might then claim that anything that explains p explains the equivalent Np, and anything that explains Np explains the equivalent p. But there's the rub: our claim would be true only on the assumption that necessarily equivalent items may be interchanged in the second slot of the context '___ explains . . .', and that is what we saw to be false in the preceding section if we go in for explaining necessary truths at all. Explanation in the realm of the necessary must be hyperintensional.

So our question remains: what should we mean by an unexplained necessity—a necessary truth *p* such that *p* is unexplained or such that *Np* is unexplained? The concern of the authors with whom I began is the latter. They are worried about philosophical views that would leave it unexplained why certain necessary truths are necessary, not why they are true.

Having settled that question, let us proceed to our classificatory scheme.

We make the first divide by asking whether a truth Np needs explanation or not, or perhaps better, whether it is *apt* for explanation or not. I take the term 'apt for explanation' from Shamik Dasgupta (2015). He says that an item that is not apt for an explanation is an item for which the

question 'why?' does not legitimately arise.[18] In characterizing a similar category, Ulrich Meyer observes, "The blame would fall on the person asking the question, not on our inability to answer it" (2012, 263). So our first divide is between (1) items not apt for explanation and (2) items apt for explanation. If we think the question why it is necessary that p is misplaced somehow, we will place Np in category (1). Dasgupta calls items in this category *autonomous*.

If an item is apt for explanation, we may ask whether it has one or not. That generates our first subdivision: (2A) items apt for explanation that do not have one (however unfortunate that may be) and (2B) items apt for explanation that do have one. Dasgupta calls all items that lack explanations brute, even if they are in the autonomous category. I prefer to reserve the term 'brute' for items in category (2A), items that need explanations but don't get them. At any rate, such items, if such items there be, seem to me to be the most brutish of the brute.[19]

If an item has an explanation, we may next ask whether it is explained by some other truth or whether it is in some sense self-explanatory. If it is explained by something else, there are further possibilities, depending on the status of that something else and what if anything explains it: our explanations may go round in a circle, they may regress infinitely, or they may come to rest with something either autonomous, truly brute, or self-explanatory. I say something about these possibilities below.

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[18] Dasgupta's topic in Dasgupta 2015 is what grounds truths about grounding. He thinks that truths about what grounds what are themselves grounded in truths about the nature of the grounded entity—truths to the effect that it is essential to the grounded entity that if the ground obtains, then the grounded obtains. Such essentialist truths he regards in turn as ungrounded and not even apt for being grounded. Of truths not apt for grounding, he says "the question of what grounds [them] does not legitimately arise" (576). In a later paper he says that why-questions regarding autonomous truths are questions that should not be raised in the first place, comparing them to requesting proofs for definitions (Dasgupta 2016, 384-86).

[19] Another way to distinguish the autonomous from the truly brute might be this: a brute fact has no explanation, and the lack of one is felt as an affront to our understanding; an autonomous fact has no explanation, but there is no felt affront.

What could it mean to call something self-explanatory? For further light on this matter, I think it helps to digress into epistemology, where many thinkers see the need for beliefs that are in some sense self-justified or self-justifying. It is often argued that not every justified belief can derive its justification from another, on pain of a circle or a regress, either of which would be objectionable. So there must be bedrock beliefs that do not get justification from others. Despite the contention of Wittgenstein in *On Certainty*, the bedrock beliefs cannot simply be *un*justified. They must in some sense be self-justified or self-justifying. But in what sense?

One thought is that a self-justifying belief is one that is *literally* self-justifying, standing in the relation of justifying to itself. It is puzzling, though, how anything could be like that. Indeed, the rationale for denying circles in justification is that the justifying relation is irreflexive as well as transitive; hence, there cannot be circles. But if the relation of justifying is irreflexive, there cannot be self-justifying beliefs, either; a self-justifying belief would simply be the smallest of all circles.

A more promising possibility is that self-justifying beliefs are beliefs that are justified, but not *by* anything. That is to say, they have the *status* of being justified (a favorable epistemic status), but they do not get this status by inheriting it from something else that has it. They do not have it because some other justified propositions stand in the "justifying" relation to them.

Now to say that a belief is not justified *by* anything (including itself) is not to say that is not justified *in virtue of* anything. There could well be further features of a belief in virtue of which it is justified: perhaps it is a noninferential belief formed by a reliable belief-forming process; perhaps it is an infallible belief that could not be held without being a true; perhaps it is a belief that does nothing more than reflect one's current sensory experience; there is no dearth of

proposals. In each of these cases, the belief would be said to be justified because it has the proposed feature F, but that does not mean the belief inherits its justification from any other proposition—not even the proposition that the belief has F.

These things having been noted, let us return to the notion of a self-explanatory proposition and look for parallels.

One possibility is to say that a self-explanatory proposition is one that stands in the relation of explaining or grounding to itself. But here as in epistemology, it is hard to take that possibility seriously. Nearly all authors who have discussed the formal properties of the grounding relation have said that it is irreflexive (see, for example, Bolzano, section 204, Rosen 2010, and Fine 2012—but see also Jenkins 2011 and Barnes 2018 for dissent or relevant discussion).

The next possibility is to hold that self-explanatory truths are not explained *by* anything—not by any other truths and not by themselves either. They are nonetheless *explained*—they have that favorable explanatory status, just as some beliefs have the status of being justified without being justified either by other beliefs or by themselves. Admittedly, this possibility sounds odder in the case of explanation than it does in the case of justification. It is hard not to hear the word 'explained' as a participle, presupposing an activity performed upon or a relation born to the explained thing.[20] In the philosophy of science literature on explanation, to say that p is explained is generally to imply that some q explains p. But perhaps in the philosophy of modality, things can be different; perhaps there can be a sheer status of being explained. The oddness of so speaking may be dissipated somewhat if we speak instead of a proposition's being

[20] To see that grammar is not decisive in these matters, though, note that we don't think a confused person must have been confused *by* someone. He might just be in a state of confusion.

"inherently understandable" or "intrinsically intelligible" or some such. With one caveat: the understandability here spoken of pertains not to *what the proposition says*, but *why it is true*.

The analogy between explanation and justification may be taken one step further.[21] If we call a proposition inherently intelligible, we are not saying there is nothing in virtue of which it has that status. There may well be. To mention just one possibility, the Scholastics spoke of propositions that were true *ex vi terminorum*, meaning that it is impossible to understand the proposition or the terms of which it is composed without seeing that the proposition is true. Perhaps propositions like this as well as the necessity of them are inherently intelligible in the desired way. I return to views in this vicinity in sections 6 and 7.

To sum up, we can make a threefold subdivision under the heading 'explained'. A necessary truth whose necessity is explained may be either such that (i) it is explained by something else or (ii) it is explained by itself or (iii) it is explained, but not *by* anything—it is just explained.[22] In case (iii), we may ask whether the proposition's inherent intelligibility (a) supervenes on something else or (b) does not supervene on anything else; it is just some sort of idiosyncratic glow.

We thus arrive at six categories in all: the autonomous (1), the truly brute (2A), the explained-by-something-else (2Bi), the literally self-explained (2Bii), the inherently intelligible

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[21] We should note disanalogies between explanation and justification as well. One I take to be this: one proposition may explain another even if the first is unexplained, but no proposition can justify another unless the first is justified. I explain why the cup fell off the table by saying John knocked it off, even if there is no explanation for his having done so. But I do not justify my belief that the world will end tomorrow by saying God told me so unless the latter belief is itself justified.

[22] According to Brad Skow, facts don't explain things—people do (Skow 2016). And when they do, they say *that R is a reason why P.* If we accept this regimentation of explanation in terms of reasons, how are we to understand the intrinsically explained? The reason why P is going to be either that P (impossible) or that Q, for some Q distinct from P. In neither case do we have intrinsic explainedness. I leave it for readers to consider whether this is a problem for Skow's regimentation or for the category of the intrinsically explained.

in virtue of some special feature (2Biiia), and the inherently intelligible but not in virtue of any special feature (2Biiib). The categories are displayed in the following diagram:

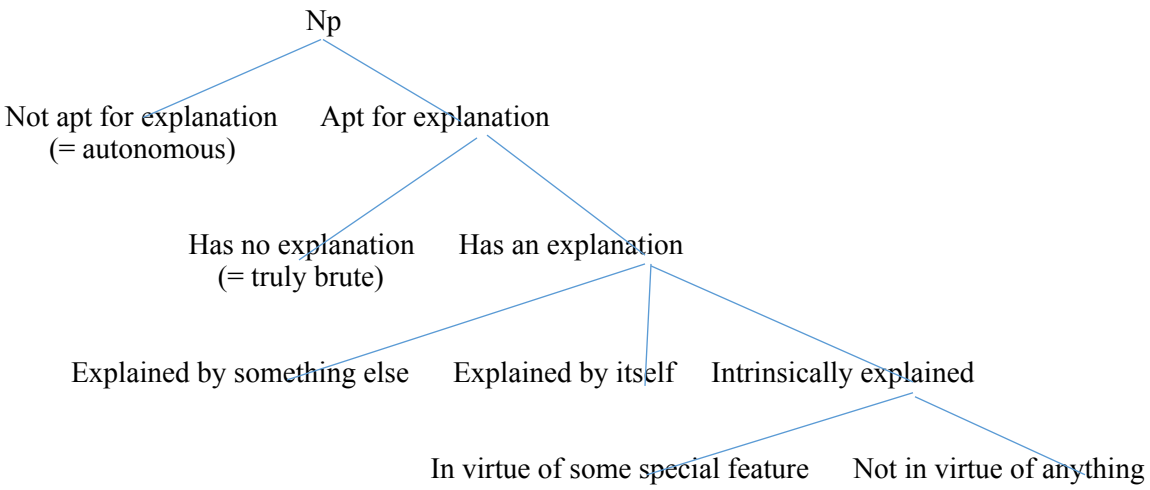

Figure 1

We must now ask how many possible views there are pertaining to the six categories and what these views amount to. How many possible ways are there in which necessary truths might be distributed through the categories? The answer is 2^6 or 64, since each of the categories might be either occupied or empty. Of these 64, six are monolithic views, according to which all necessary truths are in the same boat: they are all autonomous, or all brute, or all explained by something else, etc. There is one maximally eclectic view, according to which necessary truths are to be found in each of the six categories. And there are 57 varieties (!) of intermediate views, according to which more than one but less than all of the categories are occupied. I am not going to discuss all 64 views, but several of them are worthy of comment, especially the monolithic ones.

All necessary truths are autonomous, calling for no explanation. (I really mean: all truths of the form 'Np' are autonomous.) I think this view is a worthy contender. I put forth for consideration the following argument for it, employing the premise that all explanation is contrastive:

1. It needs explaining why P only if for some Q incompossible with P, it needs explaining why P rather than Q.
2. For all Q, it needs explaining why P rather than Q only if Q is possible.
3. If P is necessary, any Q incompossible with P is impossible.
4. Therefore, if P is necessary, it does not need explaining why P.

4 is not yet the desired conclusion, which is 'If P is necessary, it does not need explaining why P is necessary'. But the desired conclusion follows from 4 if we add the assumption that whatever is necessary is necessarily necessary.

The second premise of this argument might be controverted. Those who are impressed by explanatory proofs in mathematics (to be discussed in the next section) might say that it sometimes needs explaining why a given theorem is true rather than not true, even though there is no possibility of its not being true. Nonetheless, I think the argument worthy of consideration.

There are also arguments on the other side. If autonomy is characterized in terms of the illegitimacy of asking 'why?' it may seem puzzling why *any* truth should be regarded as autonomous. Why should it ever be illegitimate to ask a question?

All necessary truths are truly brute, being apt for explanation but not getting it. Perhaps some necessary truths are like this, but it is hard for me to believe that all of them are!

All necessary truths are explained by other truths. If this is so, our explanation of a given necessary truth must generate either a circle or an infinite regress—assuming, of course, that the explanation of why a given truth is necessary must itself be necessary, an issue to which I return in section 10.[23] The circle alternative may be dismissed forthwith, since as already noted, explanation is by near universal acclaim irreflexive and transitive. But the infinite regress alternative deserves further consideration.

Suppose someone answers the question, "Why is two plus two equal to four?" by saying, "It's that way because it *has* to be that way—there is no other possibility." That sounds reasonable, and it is a case of explaining p by reference to Np. If it is legitimate in this instance, why is it not legitimate generally and at higher levels as well? Assuming S4, when Np is true, NNp will also be true and citable as the explanation for Np. And so on up: NNp will be explained by NNNp, NNNp by NNNNp, and so on without.end.

Could that be a viable model of how every necessary truth might be explained by a further necessary truth? I mention two possible objections.

The first, owing to Bolzano, is that a truth cannot be grounded in a proposition more complex than itself (sections 209 and 221). The complex can be explained by the simpler, but never vice versa.[24] If this is right, you can explain a conjunction by reference to its conjuncts, but you cannot explain Np by NNp.[25]

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[23] If Np depended on the truth of its explanation or ground, not being true unless its explanans were true, one could give the following quick (but contestable) proof: the explanation of Np could not be contingent unless Np were itself contingent, which would contravene the S4 axiom Np → NNp.

[24] Bolzano's rule may hold for *grounding*, some may say, but not for *explanatio*n. This is one of several hints to be dropped in this paper that there are senses of 'explanation' in which explanation and grounding are not the same.

[25] Without accepting Bolzano's general prohibition on grounding the simpler in the more complex, perhaps some would say that NNp is grounded in Np rather than vice versa.

The second objection is based on Pruss's observation that infinite explanatory chains induce explanatory circles (2006). We can write out the infinite explanatory chain in staggered fashion like this:

NNp NNNNp NNNNNNp

Np NNNp NNNNNp etc.

Each proposition with an odd number of N's is explained by the proposition to its right and just above it; each proposition with an even number of N's is explained by the proposition to its right and just below it. It follows that the conjunction of all the top propositions (Even) explains the conjunction of all the bottom propositions (Odd) and vice versa.[26] But that violates the asymmetry of explanation. If we reject circles in explanation, we should therefore also reject infinite explanatory series. I return to this argument below.

All necessary truths are literally self-explanatory, explained by themselves. As I have already said, I don't believe any truths whatever are literally self-explanatory. If circles are bad, so is self-explanation.

All necessary truths are inherently intelligible, and they are so in virtue of some feature they possess. What might the feature be? Earlier I mentioned the Scholastics' status of being true *ex vi terminorum*; a cousin of it is the feature of being analytic, or true by virtue of meanings alone.

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[26] At least it follows on the assumption that if each conjunct in one conjunction is explained by some conjunct in another conjunction, then the first conjunction is explained by the second. To illustrate with the two-conjunct case, the principle says that if p explains r and q explains s, then p & q explains r & s. Bolzano saw fit to deny this assumption (or its analog for classes) in his theory of ground and consequence, answering *no* to the question, "whether a class of several grounds can be the joint ground of the class of their several consequences;" see sec. 210, p. 279.

Another who may have denied the assumption is Aristotle, who thought that if A and B have independent causes, but no common or agglomerative cause, then there is no explanation for the conjunction A & B; it is simply a coincidence. (Sorensen n.d.) Contrast Spinoza, who belittles those who want an explanation of the tile's falling and striking the man's head in addition to the wind that made the tile fall and the walk that brought the man to the spot (Spinoza 1677, Book I, Appendix). And note that whatever notion of explanation is in play for Aristotle cannot be metaphysical grounding, since a conjunction is fully grounded in its conjuncts.

Why is it necessary that all squares have four sides? Because a square by definition is a figure with four equal sides; it is part of the very meaning of 'x is square' to have four sides. Anyone who understands the proposition will immediately see that it is true and necessarily true as well. I explore analyticity as an explanation of necessity at greater length in section 6 below.

Perhaps some necessary truths placed in the autonomous category should really be placed in the present category. When people say the question 'why?' does not arise, I sometimes suspect they really mean that as soon as you ask it, the answer springs to mind. If so, we are dealing with the inherently intelligible rather than the autonomous.

All necessary truths are inherently intelligible, but *not* in virtue of some feature they possess. I find it hard to see what this status would amount to and what a plausible example of an item having it would be. Earlier I said such truths might light up with a special glow, but then wouldn't the glow itself be the feature on which inherent explainedness supervenes?

Even if it is coherent to suppose that some necessary truths belong to this last category, it is enormously implausible to suppose that all of them do. Fermat's Last Theorem, proved in 1994 after three centuries of trying and in a book over 150 pages long, does not light up with inherent explainedness (which I suggest pronouncing like 'blessedness'.)

Mixed positions. Of these, I think the most plausible is that some necessary truths are either autonomous or inherently intelligible, and all the rest are explained by their relation to these. I do not see any reason for putting some necessary truths in the autonomous category and others in the inherently intelligible category, so that means the most plausible mixed views are "some necessary truths are autonomous, and the necessity of the rest is explained by their relation to

these" and "some necessary truths are inherently intelligible, and the necessity of the rest is explained by their relation to these." I explore the second possibility in section 8.

5. Mathematical Explanation

There is a venerable tradition in mathematics, running from the ancient Greeks through the Port-Royal logicians and up to the present day, of distinguishing between proofs that prove and proofs that explain (Mancosu 2001). Although some regard the distinction as merely subjective (e.g., Resnik and Kushner 1987), Marc Lange defends its objectivity and undertakes to say what the distinction is based on (Lange 2014). He maintains that of two proofs of the same theorem, one may be explanatory and the other not, even if both proceed ultimately from the same axioms. And he maintains that some mathematical truths simply lack explanatory proofs. I examine his views here to see whether they give any purchase to the thought that some mathematical truths are brute necessities in the sense relevant to this article.

Though Lange does not go into the matter, the notion of explanation he seeks to elucidate must clearly be hyperintensional. For suppose the argument P, Q, therefore R is an explanatory proof (P and Q together explaining R) and the proof U, V, therefore R is not explanatory. The premises in a mathematical proof all being necessary truths, P and Q will be respectively equivalent to U and V (by the paradox or principle of strict implication). Therefore, if '___ explains . . .' were intensional, U and V would also explain R, which *ex hypothesi* they do not.

I begin with one of Lange's examples of the difference between a proof that merely proves and a proof that explains. The numerical portion of the keyboard of a standard calculator looks like this:

7	8	9

4	5	6
1	2	3

Let us designate as a "calculator number" any six-digit number whose digits are those expressed by the numerals in any column, row, or diagonal, taken first in one direction and then in the other. For instance, 123321 is a calculator number, and so is 321123. There are sixteen such numbers. It is easy to verify that every calculator number is divisible by 37; one need only perform sixteen acts of division. These sixteen operations constitute a proof by cases of the calculator theorem. Yet this proof is not felt as an explanation of why the calculator theorem is true—it is a proof by "brute force." More satisfying as an explanation is an algebraic proof showing that all calculator numbers have in common a property that requires being divisible by 37, namely, the property of being of the form $10^5a + 10^4(a + d) + 10^3(a + 2d) + 10^2(a + 2d) + 10(a + d) + a$ (Lange 487-488).

In work on the metaphysics of grounding, the terms 'ground' and 'explanation' are often used interchangeably, but there may be a discrepancy between the metaphysician's notion of ground and Lange's notion of explanation. Lange disparages proof by cases as nonexplanatory, but in the logic of grounding, it is sometimes said that the ground of a universal generalization lies in its instances, together with the "totality fact" that these are all the instances there are (Fine 2012, 60-62). Does that mean that not all grounding is explaining? No, for theorists of ground are free to say that it is only *accidental* generalizations that are grounded in their instances (Rosen, 118-21). Necessarily true generalizations may be grounded in something else, such as the natures of the properties they relate. There may nonetheless be a discrepancy between grounding

and explanation. Rosen and Fine think *all* necessary truths are grounded in the natures of their constituent properties (as we shall see in section 7), whereas Lange thinks not all mathematical truths have explanations. I return to this point at the end of this section.

Here is Lange's positive account of explanatory proof:

> What it means to ask for a proof that explains is to ask for a proof that exploits a certain kind of feature in the setup—the same kind of feature that is salient in the result. The distinction between proofs that explain why some theorem holds and proofs that merely establish that it holds exist only when some feature of the result being proved [e.g., symmetry] is salient. That feature's salience makes certain proofs explanatory. A proof is accurately characterized as an explanation (or not) only in a context where some feature of the result being proved is salient. (507)[27]

> Mathematical practice shows that an explanatory proof requires some feature of the result to be salient and requires the proof to exploit a similar noteworthy feature in the problem. (524)

Lange identifies three main features that might or might not be salient features of a given theorem: simplicity, symmetry, and unity. In the calculator number theorem, he says the salient feature is *unity*: the theorem holds of every single calculator number. An explanatory proof will therefore have to proceed from a feature common to all calculator numbers, some natural respect of resemblance among them, which happens in the algebraic proof adumbrated above, but not in the proof by cases.

Sometimes, of course, we do not know of any explanatory proof for a given mathematical truth. Lange asserts something stronger: sometimes there simply *is* no explanation for a given mathematical truth. He cites as an example the fact that in the decimal expansion of e, which begins 2.718281828 . . . , the run of digits '1828' is immediately repeated. The repetition is a

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[27] I haven't quite gotten on to Lange's use of the terms 'setup' and 'result'. These terms seem sometimes to refer to the antecedent and consequent of the theorem being proved (488), but other times to refer to premises and conclusion in the proof (507-508)

striking feature, but none of the various derivations of e's value operate with any similar feature in the setup. Therefore, there is no explanation for why that run repeats; it just does. He quotes mathematician Timothy Gowers as agreeing: "this phenomenon is universally regarded as an amusing coincidence, a fact that does not demand an explanation" (507-508).[28]

My main misgiving with Lange's account of explanatory proofs has to do with the centrality in it of the concept of salience. Nothing is intrinsically salient but salt. As Lange notes, extraterrestrials may not find the same features salient in a theorem that we do, and for them, the same proofs would not be explanatory (525). This relativity seems to me to betoken a lack of objectivity; it raises the suspicion that being explanatory in his sense is no more objective than being interesting.[29]

Even if being explanatory is somehow both relative and objective, it seems to me that possessing an explanatory proof or not cannot be equated with being explained or being brute in the sense of those terms important to me. A theorem that was unexplained in Lange's sense would not have to be brute in mine. It could belong instead to one of the five nonbrute categories; for example, it might be autonomous or it might be inherently explained. Or it might be explained by something else, perhaps following from things that are inherently explained by

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[28] In a similar vein, G.J. Chaitin is quoted by Mancosu as saying "I have found mathematical truths that are true for no reason at all . . . . they are accidental and random" (2001). Compare the attitude of Gowers and Chaitin with that of Hume in section IX of the *Dialogues Concerning Natural Religion*. Referring to the fact that any multiple of 9 has a digit sum that is also a multiple of 9 (thus 18 and 27 both have digit sums of 9; 99 has for its sum 18, a multiple of 9; and so on), he says, "To a superficial observer, so wonderful a regularity may be admired as the effect either of chance or design; but a skillful algebraist immediately concludes it to be the work of necessity, and demonstrates, that it must forever result from the nature of these numbers."

[29] Consider the waggish proof that all numbers are interesting: suppose some number were *not* interesting; then there would be a least number that was not interesting; but *that* fact about it would make the number interesting. The proof does not go through once 'interesting' is acknowledged to be relative to persons. One could not prove that all numbers are interesting to someone, for the least number of interest to no one would not *eo ipso* be interesting to anyone—there would not even have to *be* anyone.

way of entailments that are themselves inherently explained, even if the proof tracing these things did not amount to a Langean explanatory proof.[30]

The thought that some theorems have explanatory proofs and others do not is relevant to this paper in a second way. It suggests not only that some necessary truths are brute, but also that not all necessary truths are autonomous. If some mathematical truths have explanations, they are presumably apt for explanation. To evaluate this suggestion, we would have to delve deeper into what is meant by saying a truth is not apt for explanation. Does that status positively exclude explanations, or does it merely imply that no explanation is called for?

6. Truth in Virtue of Meanings

If those who find brute necessities objectionable think the remedy for them is to adopt definitions (such as the definition of object shape in terms of region shape) that make the necessities in question analytic, are they not in effect siding with the positivists against Kant and saying that there are no synthetic necessary truths? That seems implicitly to be the position of Skow and McDaniel, and it is explicitly the position of Dorr.[31] In my opinion, it is a dubious position to be committed to. Let me set out some of the reasons why. I apologize to readers of a certain age

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[30] On some points, I find Lange's account disappointingly inexplicit. Here are three ways of fleshing it out that go beyond anything he gives us:
D1. P is an explanatory proof of theorem T for person S iff (i) P is a proof of T and (ii) for *some* feature F of T that is salient for S, P traces F back to a similar feature in the setup.
D2. P is an explanatory proof of theorem T for person S iff (i) P is a proof of T and (ii) for *every* feature F of T that is salient for S, P traces F back to a similar feature in the setup.
D3. If P is a proof of theorem T and there is a feature F of T that is salient for person S, then P is an explanatory proof of T for S iff P traces F back to a similar feature in the setup.
D1 implies that if T has no feature salient for S, T has *no* explanatory proof for S. D2 implies that if T has no feature salient for S, then *any* proof of T is vacuously an explanatory proof of T for S. What if T has one salient feature that P traces to something similar in the setup and another that it doesn't? D1 would count P as explanatory while D2 counts it as nonexplanatory. To avoid choosing between D1 and D2, we could talk about degrees of explanatoriness or we could relativize explanatoriness to features as well as to persons. Finally, D3 is a conditional definition. If T has no feature salient for S, D3 is simply silent on whether P is explanatory.

[31] Dorr gives arguments of the strong form schematized above, pronouncing a ban on brute necessity and characterizing as brute any necessity not arising from definitions plus logic.

for rehearsing material from the 1950s and 1960s, but when old views rise from the ashes, it is sometimes necessary to resurrect old objections to them.[32]

Necessity undermined. A common slogan characterizing analytic truths is that they are true solely in virtue of the meanings of their constituent terms. "Terms"—are those nonlinguistic constituents of a proposition, like properties, or are they words? They must be words, since properties don't mean things; words do. To offer an explanation of necessity in terms of meaning, therefore, is to say something like this:

> It is necessary that all bachelors are unmarried because 'bachelor' means the same thing as 'unmarried man'.

Now the striking thing about the explanans in that statement is that it is contingent—in general, it is contingent that words mean what they do. But how can we explain why something is necessary by means of an explanans that is contingent? That is mysterious at best and impossible at worst. It is impossible if in such cases there is leftward entailment from explanandum to explanans as well as rightward entailment from explanans to explanandum, since nothing necessary ever entails anything contingent. The purported explanation of necessity would actually destroy it, like Kant's explanation of the necessity of mathematical truths in terms of the contingent constitution of the human mind (Van Cleve 1999, 37-41).

The threat of destruction is averted if we recast the explanandum as follows:

> The sentence 'all bachelors are unmarried' expresses a necessary truth because 'bachelor' means the same thing as 'unmarried man'.

Now explanandum and explanans alike are contingent, so there is no worry that necessity will be destroyed. By the same token, however, we are no longer explaining necessity—we are

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[32] A classical critique of various attempts to make all necessary truths analytic, still worth reading, is Pap 1958.

explaining why certain sentences express necessary truths, but not why the truths expressed are necessary.[33]

Logical truth. Look more closely at what is effected by the explanation given above. The fact that 'bachelor' means the same as 'unmarried man' implies that 'all bachelors are unmarried' means the same as 'all unmarried men are unmarried'. That in turn is a logical truth, having the form 'Everything that is F and G is F'. So what we have really done by invoking meanings is to reduce the original truth to a logical truth. (This point, that the contribution of definitions is to permit the transcription of antecedently given logical truths, goes back to Quine 1935.) Logical truths being necessary truths, we have thereby putatively explained the necessity of the original. But unless we are content with merely moving the bump of bruteness further down the carpet, we must now explain why logical truths themselves are necessary. Why is it necessary that every FG thing is an F thing? At this point, the serious advocate of necessity as grounded in analyticity makes a further appeal to meaning: the logical truths are true solely in virtue of the meaning of the logical words, such as 'every' and 'and' (Ayer 1936.) It is because 'and' and 'every' mean what they do that everything that is F and G is also F.

Sometimes the Ayer view is presented in company with the view that we stipulate the meanings of logical words by giving the truth tables for them, or perhaps by giving the introduction and elimination rules for them, which are said to be constitutive of their meaning.

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[33] Some may reply that we have not lost our original explanandum after all because *'all bachelors are unmarried' expresses a necessary truth* is equivalent by some sort of semantic descent to *it is necessary that all bachelors are unmarried*. But it is not. Compare *'snow is white' expresses a truth* and *it is true that snow is white*. These are not necessarily equivalent; either could be true without the other's being true. There are worlds in which it is true that snow is white, but the sentence 'snow is white' isn't there at all or expresses something false; there are also worlds in which 'snow is white' says that grass is green and grass *is* green, so the sentence 'snow is white' is true, yet snow is not white.

For example, we explain the meaning of '&' by giving the rules *from A and B you may infer 'A & B'* and *from 'A & B', you may infer both A and B*. A challenge to the meaning-as-constituted-by-rules view is presented by Prior's connective 'tonk', a cross between disjunction and conjunction, explained by the rules *from A infer 'A tonk B'* and *from 'A tonk B' infer A and B* (Prior 1960). Those rules will let you infer anything from anything, which is absurd. But what lets us avoid the absurdity, if meaning can be constituted by inference rules?

Exclusion of determinates under a determinable. An early proponent of necessity as analyticity was Leibniz, who believed that all necessary truths should be provable in finitely many steps from analyses of the relevant concepts or properties. Yet Leibniz also believed there were simple or unanalyzable properties, and as Russell pointed out in 1900, there are necessities relating simples to simples, which Leibniz could not accommodate.

The issue re-emerged in the debate in the 1950s over whether there are any definitions that would let you establish the analyticity and thereby explain the necessity of 'Nothing is both red and blue (in the same place at the same time)'. The issue concerns any determinates under a common determinable, such as round and square as well as red and blue.[34] Why can't anything be both round and square? The definition of object shape in terms of region shape does not answer the question, for we would need to know why a *region* can't be both round and square. The definition 'R is square =df R is not round & R is not triangular & R is not pentagonal & . . . ' is of doubtful worth, since (i) it would have to be infinitely long and (ii) it presupposes positive

[34] Red and blue are paradigm examples of determinates under a common determinable (color). Square and rectangular are related not as determinate to determinable, but as species to genus. I am actually unsure whether round and square count as determinates under a common determinable (shape) or only as species of a common genus. Either way, the problem I am about to describe arises.

definitions or understandings of some of the shapes—what would *they* be, and how would they underwrite shape incompatibilities? See Van Cleve 1999, appendix A, for further discussion.

Determinate-determinable relations. There is a similar issue concerning the relation of determinates to the determinables under which they fall. *Whatever is red is colored* is by most lights a necessary truth. But from what definitions may its truth be derived? The challenge is to fill in the blank in 'x is red =df x is colored & x is ___' without using 'red' itself. One may say that analytic truths need not always be founded in full definitions of the constituent terms; it is good enough if *part* of what 'x is red' means is that x is colored. But if being colored is part of what 'x is red' means, what is the rest of it? If the mereology of meaning is anything like real mereology, there should be another part that does not by itself amount to the whole,[35] but that does not seem to be the case here. What can you add to being colored to get being red, short of redness itself?

What do we gain by our definitions? Suppose we do define object shape in terms of region shape so as to make unmysterious the necessity of the truth that if O occupies R and R is round, then O is round. What have we gained? Didn't we know that what occupies a round region is round (and necessarily so) even before we adopted the definition? That is, didn't we know it even when we relied simply on our primitive grasp of what it is for an object to be round, which arguably makes no reference to regions? If so, there was something we recognized as necessary whose necessity was not the product of definition. By adopting the definition, we brought into

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[35] I have in mind something like the principle of weak supplementation, but weaker: if x is a proper part of w, then there is an item y such that $x + y = w$ and $y \neq w$.

play an analytic truth pertaining to a thick concept, but without eliminating or explaining the necessary truth that already pertained to the thinner concept.[36]

Other hard cases. Here are a few more hard nuts for the advocate of necessity as truth in virtue of meaning to crack: whatever has shape has size; a circle has the greatest area of all figures with the same perimeter as it; for any objects whatever, there exists a mereological fusion of them, having those objects as parts.[37] Another hard case is any *de re* modal truth—for example, the object I am now holding in my hand is necessarily such that it is extended. It is no accident that Quine, who thought that to the extent necessity makes sense at all it must reduce to analyticity, could not make sense of *de re* modality (Sider 2003).

7. Truth in Virtue of Natures

Having found little promise in the idea that all necessary truths or even some of them are grounded in the meanings of words, I now take up the idea that some or all necessary truths are grounded in the natures or essences of certain entities.[38] This idea, common in ancient and medieval philosophy, is now undergoing a revival, the linguistic turn in twentieth-century

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[36] Or would proponents of the shape argument like McDaniel and company be prepared to make the following speech? "*I* see why square pegs don't fit round holes, because I define object shape in terms of region shape; but if I took object shape and region shape both to be primitive, I would be utterly mystified as to why square pegs don't fit round holes. It would be too spooky to be true."

[37] This is the principle of mereological fusion, an axiom of standard mereology. Its truth is controversial, but if it is true at all, it is necessarily true. As part of his case for claiming that ontological disputes are verbal, Eli Hirsch maintains that the fusion axiom is trivially true given what its advocates mean by the existence of fusions (2005). For example, he says 'there exists an object that is the fusion of the cup on the table and the pitchfork in the barn' just means 'there is a cup on the table, and there is a pitchfork in the barn'. I uphold the fusion axiom myself, but I deny that it is true in virtue of Hirsch's way of translating it. Part of what the fusion axiom says is that if there is a cup on the table and a pitchfork in the barn, then there is an object such that *it* has those objects as parts. Hirsch's translation does not capture the *it*.

[38] Truths about meanings and truths about natures are the two varieties of "fixed fact" considered by Kleinschmidt as potentially explaining necessity.

philosophy having been superseded by a metaphysical U-turn. Whereas Quine once observed that "Meaning is what essence becomes when it is divorced from the object of reference and wedded to the word" (1951), contemporary metaphysicians would more likely say that essence is what meaning becomes when it is divorced from the word and wedded to the object.[39]

The "back to natures" movement is well exemplified in the work of Kit Fine (1994, 1995a, 1995b). Fine introduces the notation '$N_x p$', which might be given any of the following readings:

- ➢ it lies in the nature of x that p;
- ➢ it is true in virtue of the identity of x that p;
- ➢ it is essential to x that p.

As the N within the notation suggests, when it is true in virtue of the nature or essence of something that p, it is not only true that p, but *necessary* that p.[40] Essences thus give rise to necessities. But we are not to define essence in terms of necessity as is commonly done in modal logic, for instance, as 'it is essential to x to be F =df N(if x exists, then Fx)'. Instead, we are to take the notion of essence as primitive. The locution '$N_x Fx$' implies the modal definiens, but not conversely.

Fine introduces the '$N_x p$' notation because he thinks it enables us to make distinctions that cannot be made using just the resources of modal logic. Consider, for example, the notion of ontological dependence—of one thing's depending for its existence on another in an asymmetrical way. We might want to say that {Socrates}, the singleton set of Socrates, depends for its existence on Socrates, but not conversely. If we define the dependence of x on y modally,

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[39] The possibility of inverting Quine's dictum is noted in Almotahari,forthcoming—except that he probably interprets the inverted dictum as deflating essences rather than invoking them as language-transcendent explanatory factors.

[40] This is made explicit in the principle of strong essential grounding at p. 119n in Rosen.

N(x exists only if y exists), we shall have to say that the dependence of {Socrates} on Socrates is bidirectional, since it is also necessary that if Socrates exists, so does {Socrates}. But we can capture the desired asymmetrical relation by defining dependence as N_x(x exists only if y exists).[41]

'It lies in the nature of . . . that ___' is an operator that operates on a term (or several terms) in the first blank and a formula in the second to produce a formula.[42] There may sometimes be several entities in virtue of whose essences something is true, in which case we may need to employ several terms or a plural term: '$N_{x,y}$p' or 'N_{xs}p'. The entities might be properties as well as individuals; for example, we might say that it lies in the nature of the property of being triangular that all triangles have three sides.[43]

A key feature of 'N_xp' is that it is hyperintensional, just like the 'because' discussed in section 3.[44] From the fact that it lies in the nature of x that p, together with the fact that p is necessarily equivalent to q, we cannot infer that it lies in the nature of x that q.[45] For example, it lies in the

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[41] Fine actually favors a more complicated definition, but this one will serve to indicate the uses of the idea.

[42] In this it is like the truthmaker operator, 'x makes it true that p', but there are significant differences between the two notions. For one (as I am about to discuss), 'it lies in the nature of x that p' is hyperintensional, whereas 'x makes it true that p' is not.

[43] Fine suggests in one place that 'N_xp' might be defined as 'N_Fp' where F is the property of being identical with x.

[44] Can we define one of these operators in terms of the other? A natural first thought for a definition in one direction would be 'pBq =df q & $N_p(q \rightarrow p)$'. A natural first thought for a definition in the other direction would be 'N_xp =df for some H, pB(x has H)' (cf. Rosen, 119, n.10). However, we would need to stipulate on the right that H is part or all of x's nature, perhaps making the definition circular. Fine doubts that it is possible to define either notion in terms of the other; see the final section of Fine 2012.

[45] This is one of the places where I have used 'p' first as a formula and then as a term in the same sentence. For formulas all the way, I could rephrase the second clause as 'the fact that it is necessary that p if and only if q'. For terms all the way, I could restate the whole thing as 'From the fact that the fact that p obtains in virtue of what it is to be x together with the necessary equivalence of p and q, we cannot conclude that q obtains in virtue of what it is to be x'. If I strove for uniformity throughout, this paper would be harder for me to write and you to read.

nature of triangularity that triangles have three sides,[46] and their having three sides is necessarily equivalent to two's being even, but it does not lie in the nature of triangularity that two is even.

Statements of the form 'N_xp' are worldly counterparts of the linguistic philosopher's definitions; they are *real definitions*, to use an old term resurrected by Fine. At any rate, they are *partial* real definitions, if we can make sense of that notion; they do not have the two-way feature of definitional equivalences or definitional identities. We could not use 'N_xp' to convey the complete real definition of x unless the conjunction of all p such that N_xp exhausted the nature of x.

As noted above, when it lies in the nature of a certain entity that p, it is necessary that p. We could go further and say that at least some necessary truths are necessary *because* it lies in the nature of certain entities that they are true. And we could go further still and say that *all* necessary truths are necessary because it lies in the nature of certain entities that they are true. Fine and Rosen both take this further step; they hold the following thesis:

If Np, then Np because $\exists x N_x p$.[47]

As the positivists held that all necessity is anchored in meanings, Fine and Rosen hold that all necessity is anchored in the natures of things.[48]

The Fine-Rosen way of grounding necessity has one big advantage over the positivists' way. We saw that the positivists were in danger of destroying necessity rather than explaining it, since

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[46] It is a curiosity of English that 'triangular' is defined as having three sides, not three angles.

[47] In Rosen's notation, if Np is true, then [Np] ← [$\exists x N_x p$]. He attributes to Fine the conjecture that necessary truths are not only grounded in "true by nature" truths, but reducible to them (Rosen 121).

[48] I pause to note an interesting possible corollary of the Fine-Rosen view. Suppose the traditional cosmological argument proves that there is a necessary being, who some men call God. If it is necessary that God exists, then by the Fine-Rosen thesis, it lies in the nature of something—presumably God himself—that God exists. This sounds like a vindication of Kant's contention that the cosmological argument for the existence of God presupposes the ontological argument. See Kant, A603/B631-A609/B637 and Van Cleve 1999, 200-203 for further discussion.

their grounding facts were facts about meanings, and it is contingent that words mean what they do. But it is *not* contingent that objects have the natures, identities, or essences that they do; if it lies in the nature of x that p, then of necessity it lies in the nature of x that p. So the "nature first" philosophers are better placed than the positivists to explain necessity.[49]

If it is necessary that objects have the essences they do, what explains *that* necessity? What explains why it is necessary that it lies in the nature of x that p?[50]

If Fine and Rosen stick by their guns, they will say this:

If NN_xp, then NN_xp because $\exists yN_yN_xp$.

That is, when N_xp is necessary, that is because it lies in the nature of something that N_xp. Moreover, since existential truths are grounded in their instances and grounding is transitive, they should also say

If NN_xp, then NN_xp because N_yN_xp, for some y.[51]

Now for all that has been said, y could be an entity distinct from x. Plausibly, though, the entity would be x itself, giving us

If NN_xp, then NN_xp because N_xN_xp.

That is, if it is necessary that it lies in the nature of x that p, that is because it lies in the nature of x that it lies in the nature of x that p. Another way to read 'N_xN_xp' is 'it is essential to x that it is

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[49] I leave it to the reader to consider how the "nature first" philosophers are placed to deal with analogs of the other objections I mentioned for the positivists, as well as others unique to them. Is it easier to see how it lies in the natures of red and blue that nothing has both colors at once than it is to see how definitions could secure this result? Can it plausibly be said that it lies in the nature of conjunction that if *A & B* holds, so does *A*? What is conjunction (the operation rather than the symbol) that it may have a nature, and is there really such an entity? Should we worry that it lies in the nature of contonktion that *A* implies *A tonk B* and *A tonk B* implies *B*, making it a necessary truth that any A implies any B?

[50] Jack Spencer has suggested the following interesting answer to me: NN_xp simply because N_xp. I cannot accept that answer for reasons that emerge in note 83.

[51] Rosen does say it on p. 117.

essential to x that p'. Fine explicitly accepts such higher-order essences (1995a, theorem 6ii). It is clear that there will be an infinitely ascending sequence of them, since each essentialist fact is necessary and every necessity is grounded in an essentialist fact.

Now let's add a principle of Rosen's to the mix, the principle he calls Essential Grounding: whenever it is essential to x that p, p holds *because* it is essential to x that p, which we may write thus: if $N_x p$, then p because $N_x p$ (119). If a derivation of this principle were wanted, I would suggest this: $N_x p$ grounds Np, so it also grounds plain p. (I say this even though it is not in general true that whatever grounds something grounds anything it entails.) But one could also accept Rosen's principle as plausible in its own right without any derivation. If it lies in the nature of x that p, how could it not be true that p because of that?

Now by Fine's principle in the paragraph before last, whenever we have any of the following we have everything to the right of it:

$N_x p$; $N_x N_x p$; $N_x N_x N_x p$; etc.

That is not yet a series in which item holds because the next one does. By Rosen's principle, however, whenever we have any item in the Fine sequence, we also have the item I now write directly below it, giving us another infinite sequence:

p because $N_x p$; $N_x p$ because $N_x N_x p$; $N_x N_x p$ because $N_x N_x N_x p$; etc.

We have now arrived at what Dasgupta calls explanation by infinite iteration.[52] An initial necessary truth is explained by an essentialist fact, which is itself necessary; each essentialist fact is then explained by a higher-order essentialist fact in an unending sequence.

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[52] Dasgupta 2015, section IX. It is from Dasgupta that I learned how to combine Fine and Rosen to get this result.

We have seen explanation by infinite iteration before in section 4: Np because NNp because NNNp and so on. There I raised two objections to it: it explains the simpler by the more complex, and it induces circular explanation. If those objections have any force, they apply equally well here. For anyone who thinks they lack force, I offer a third objection in section 10.

Is there any alternative for explaining essentialist facts? Dasgupta rejects Fine's principle that if it is essential to x that p, it is also essential to x that this is so.[53] He gives a different account of the status of essentialist facts, namely, that they are autonomous. That it is essential to a kind of thing that p (for example, essential to conferences that they occur when people congregate and behave in certain ways) is not the sort of thing that is apt for any explanation. Explanatory sequences come to an end with essentialist facts of this sort. Using the term 'brute' more liberally than I do (for anything lacking an explanation, even if it is not apt for one), he calls his view "brute essentialism."[54] It is a point in its favor that it avoids infinite explanatory iteration.

To end this section, I hark back to Plato's *Phaedo* (1953, 100b-102c and especially 105c), where Plato is discussing why the sun and other hot things are hot. Because they contain fire, the naturalist philosophers of his day would say—that is a sophisticated scientific explanation. But Plato is partial to another explanation, which he calls his "safe and stupid" explanation—that hot things are hot simply because they partake of Hotness, the Form. If we don't give the safe and stupid explanation about the sun, we will arguably have to give it sooner or later about something else, like fire. Why is fire hot? Because it partakes of Hotness. And why is Hotness itself hot? Here, perhaps, we may give another safe and stupid answer—Hotness is hot simply

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[53] P. 591. He notes that the principle is plausible for consequentialist essences (which are closed under entailment), but not for constitutive essences.

[54] In his 2016, Dasgupta changes his terminology, reserving 'brute' as I do for things apt for explanations but lacking them.

because it lies in its nature to be hot, and there is no further explanation to be had.[55] In homage to Plato, I shall sometimes call explanations in terms of natures safe and stupid explanations, meaning no derogation thereby.

8. Inherent versus Derived Necessity

I have commented so far on the prospects of some of the monolithic views, but have said little about any of the mixed views. In this section I explore the prospects of what I take to be the most promising of the mixed views—the view that some necessary truths have their necessity explained by reference to others, while the others (or a privileged subset of them) have their necessity in some intrinsically explained way. For such a view to be tenable, we must be able to draw a distinction between inherent and derived necessity, which may appear at first sight to be problematic.[56]

I claimed in section 4 that a chain of explanation for a given necessary truth cannot run on either infinitely or in a circle, but must come to rest with some necessary truth whose necessity is either (a) brute, (b) autonomous, or (c) intrinsically explained. For the sake of discussion in this section, I shall assume that the ultimate explainers are in category (c). Let me introduce a shorter term for the status of being intrinsically explained or inherently intelligible: *I-status*. I shall assume that I-status supervenes on some other feature, and for the sake of definiteness I shall assume it is a feature we can characterize using Fine's $N_x p$ operator, namely, the feature of being

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[55] Actually, Plato seems to have countenanced a different explanation—that Hotness is hot because it exemplifies what arguably has to be a distinct Form of Hotness, thereby giving rise to the Third Man regress. See Sharvy 1986 for further discussion.

[56] The need for a similar distinction arises in trying to understand the philosophy of Spinoza. According to Spinoza, God alone is a necessary being who exists by his own nature (*Ethic*s, Book I, Propositions 7, 11, and 24), but all of the modes also exist necessarily, their existence necessarily flowing from God's (Proposition 29). To distinguish the modal status of the modes from that of God, we evidently need a distinction between inherent and derived necessity.

true in virtue of the natures of p's own constituents. Now if Fine and Rosen are right, *all* necessary truths are true in virtue of the natures of *some* entities: Np only if $\exists x N_x p$. But I-status belongs (on the assumption I am making) only to those necessary truths that are true in virtue of the nature of their *own* constituents. When it lies in the natures of p's own constituents that p is true, I shall say that p is not only necessary, but inherently necessary. What we must do next is make sense of derivative necessity.

As a first shot, we could say that a proposition has derivative necessity if it is necessary but not inherently so, and it bears an appropriate relation to propositions that are inherently necessary. What relation? At a minimum it would have to be entailment, but that is not enough. Any necessary proposition is entailed by anything whatever, so any proposition of the form Np (being necessary itself by S4) would be entailed by anything with inherent necessity. So if just one proposition were inherently necessary, all necessary propositions would have derived necessity, and if having derived necessity sufficed for being explained, there would be no brute necessity. That seems too cheap a way to rid ourselves of brute necessity.

The obvious solution to this problem is to say that a proposition has derived necessity not when it is merely entailed by something with inherent necessity, but when it is *I-entailed* by something with inherent necessity.[57] A proposition p I-entails a proposition q when the proposition *p entails q* has I-status, which on current assumptions means it also has inherent necessity, being true in virtue of the natures of its own constituents.

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[57] Another solution would be to say that propositions have derived necessity when they are necessary *because* they are entailed by propositions that are inherently necessary, but I find it somewhat obscure how this solution would be implemented independently of the one I am about to discuss.

The question that now arises is this: is I-status closed under I-entailment? In other words, from Ip and I(p => q), does it follow that Iq? If the answer were yes, there would be no such thing as derived necessity: anything we supposed to have it would actually have inherent necessity.[58] We could not implement a mixed view in which some truths are inherently necessary, some are derivatively necessary, and every necessary truth is one or the other.

Fortunately, however, it is possible to return an answer of *no* to the closure question. Let us suppose that the property A is defined as the conjunction BC and that the property B is defined as the conjunction DE. That would make 'All As are Bs' analytic; if the definition is a "real definition," it would mean that it lies in the nature of As that all As are Bs, and the proposition that all As are Bs would have I-status. The proposition that all Bs are Ds would have I-status for the same reason. What about the proposition that all As are Ds? It follows from, and is arguably I-entailed by, the propositions that all As are Bs and all Bs are Ds. *But it does not itself have I-status.* At any rate, it does not have the feature on which I have supposed I-status to supervene: it does not lie (immediately) in the nature of As (or any other immediate constituents of all As are Ds) that all As are Ds.

The two parentheticals make explicit assumptions I have left unspoken until now. There may be a kind of transitivity or chaining whereby we can say that if it lies in the nature of As that they are Bs and it lies in the nature of Bs that they are Ds, then it lies in the nature of As that they are Ds. But this will not be *immediate* lying in; it will be lying in mediated by B. Similarly, there may be a sense in which if A is a constituent of all As are Ds and A is defined as BC, then B is a constituent of all As are Ds; but B will not be an *immediate* constituent of all As are Ds. When I

[58] The proof is immediate: Suppose q has derived necessity, i.e., ~Iq & ∃p(Ip & I(p => q)). By closure, Iq. Derived necessity would actually be a contradictory status.

suggested above that I-status supervenes on a proposition's having its truth lie in the natures of its own constituents, I meant having its truth lie *immediately* in the natures of its own *immediate* constituents.[59]

For anyone willing to take such a fine-grained approach to lying-in and constituency, there is room for the following mixed view: there are some necessary propositions whose necessity is inherent and whose explainedness is intrinsic, owing to their being true in virtue of the natures of their own constituents; there are other necessary propositions whose necessity is derived and whose necessity is explained by their relation to propositions in the former class.

Kment's approach. Boris Kment (2014, 189-92) offers an account of the explanation of necessity by reference to essences that is instructively different from the one I consider in this section. Kment gives a definition of metaphysical necessity equivalent to the following: a proposition is metaphysically necessary iff it is true in all worlds with the same metaphysical laws as ours, where the metaphysical laws include essential truths such as 'it lies in the nature or essence of being F that . . . '.[60] He says the necessity of any necessary truth may be explained by appealing to the definition of metaphysical necessity plus facts guaranteeing that the truth in question satisfies the definiens. For instance, the necessity of *if gold atoms exist, they have atomic number 79* is explained by the definition of metaphysical necessity together with the fact

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[59] My discussion in this paragraph is modeled on Fine's observation in 1995b that it lies in the nature of {Socrates} to contain Socrates and in the nature of Socrates to be a human being, but it does not lie immediately in the nature of {Socrates} to contain a human being. In Fine's terms, containing something human is part of the consequential essence of {Socrates} and also part of the mediate constitutive essence of {Socrates}, but it is not part of the immediate constitutive essence of {Socrates}.

Nicholas Stang notes that Kant's predecessors Wolff, Baumgarten, and Leibniz all operated with a notion of *in se* necessity, which is somewhat similar to what I am calling inherent necessity (2016, 15 and 20). As Stang explains it, i*n se* necessity is demonstrability from definitions of the constituent concepts of the proposition. It is not as tight as my notion of inherent necessity, however, for Stang does not require that the constituency relation be immediate (22).

[60] See Kment's section 7.4 for discussion of why Kment prefers to put the definition differently, though equivalently.

that it lies in the essence of being a gold atom that if gold atoms exist, they have atomic number 79. The difference I wish to highlight is this: whereas I have proposed truth in virtue of the essences of a proposition's constituents as giving rise to intrinsic explainedness (or self-explanatoriness in a broad sense), Kment treats it as a case of explanation by reference to *other* truths—the definition of necessity plus a proposition guaranteeing that the definiens is satisfied.

I have two questions about Kment's account. First, in several places he says that a key part of any explanans for metaphysical necessity will be "a fact about what the metaphysical laws are." This suggests that the explanans will contain facts of the form 'it is a metaphysical law that L' But his examples just contain the laws themselves, not statements to the effect that they *are* laws. Which way should it go? Second, Kment presents explanations of necessity as taking the form of sound arguments whose premises include essentialist truths (or other metaphysical laws). But would the argument's being sound suffice for its being a good explanation? No, for if you replace the conclusion with any other true proposition of the form 'Np', the resulting argument will still be a sound argument, but no longer an explanatory one. Kment has not gone far enough with the hyperintensionalism he espouses elsewhere (e.g., 5-6 and 157). He needs to tell us something more about the relation of explanans to explanandum—perhaps that it is essential to the explanans that it is true only if the explanandum is?

9. Identity and Necessity

Identities are sometimes put forward as being truths that explain certain correlations, even necessary correlations, without needing explanation themselves. Why is the firing of C-fibers

necessarily accompanied by pain? Because pain *is* the firing of C-fibers (Hill 1991, 22-26).[61] Why does phenomenal representation necessarily depend on tracking? Because phenomenal representation *is* tracking (Pautz 2014, 156-59). Why is awareness of pain necessarily present when and only when pain is present? Because pain *is* the awareness of pain; more generally, sensations are self-reflexive, being identical with their own objects (Hossack 2006). These contentions give us two questions to explore in this section: (i) *do* identities explain necessities, and (ii) what, if anything, explains the identities themselves?

Jaegwon Kim has argued that identities never explain anything (2005, 132). He offers the following specimen of a purported explanation using an identity: Tully is wise; Tully = Cicero; therefore, Cicero is wise. He claims that the fact described by the conclusion is the very same fact as the fact described by the first premise, so there is no movement from one fact to another as is required in a genuine explanation. I agree with Kim about this particular example, for the following reason in addition to the one he gives: if it were an explanation, so would be the explanation moving from 'Cicero is wise' to 'Tully is wise,' contrary to the asymmetry of explanation. In my opinion, however, there are other explanations involving identity premises that are perfectly genuine explanations. One such is arguably 'Tully = Cicero; therefore, Tully is wise iff Cicero is wise'—an explanation of a biconditional rather than of one side of it from the other.[62]

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[61] Hill's argument is explicitly an argument for the type identity of sensory states and physical states as the best explanation of the correlation between them. I believe he would also say that the identity explains the *necessity* of the correlations..

[62] Block and Stalnaker give another example: the identity of Mark Twain and Samuel Clemens explains why Twain and Clemens did all the same things (Block and Stalnaker 1999, 24).

That identities explain necessary correlations as well as biconditionals is, in my opinion, also a plausible claim. It may be illustrated in the pain/awareness of pain case by the following proof (which follows a pattern not discussed by Kim):

1. The property of being in pain = the property of being aware of being in pain (identity premise).

2. x is in pain (assumption for conditional proof).

3. x has the property of being in pain (2, Platonic Ascent).

4. x has the property of being aware of being in pain (1, 3, Leibniz's Law).

5. x is aware of being in pain (4, Platonic Descent).

6. (x)(if x is in pain, x is aware of being in pain) (2-5, conditional proof and universal generalization).

7. N(if the identity premise is true, then (x)(if x is in pain, x is aware of being in pain)) (1-6, conditional proof and necessitation).

8. N(the identity premise is true) (1 and the necessity of identity).

9. N(x)(if x is in pain, then x is aware of being in pain) (7, 8, transfer of N across N conditionals).

By a similar proof, we could establish the converse of 9 (strictly speaking, the necessary universality of the converse of the conditional embedded in 9). We would thereby have explained a necessary correlation by reference to an identity—or at least derived a necessary correlation from an identity. We could do same for necessary psychophysical correlations.[63]

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[63] Kim has identified another approach to identity and psychophysical correlations, which he attributes to Smart and others (136-139). In this approach, identities do not *explain* psychophysical correlations—they *exclude* them, since nothing can be "correlated" with itself. When we propound an identity, we do not explain a correlation; we show that "the correlation vanishes, leaving nothing to be explained" (139).

I reply as follows to the "identities remove correlations" strategy: We have a *mere* correlation when for some F and G, (i) (x)(Fx ↔ Gx) and (ii) the property of being F ≠ the property of being G. Identities rescind mere correlations because they cast out the second conjunct. But they do not do away with the first conjunct; they leave it there as something to be explained, and arguably they explain it.

There are also cases outside the mind-body arena in which we may exploit an identity to show why some necessary truth is necessary. Anyone who believes in substantival space, a vast object containing places as parts, will hold as Newton did that places cannot move. They are necessarily immoveable. But why? There is a good answer that I once heard attributed to Aristotle: a place is its own place.[64] Motion, by definition, is change of place, so for a place to move, it would have to come to be in a new place. To come to be *in* a new place, it would have to come to be *identical with* a new place, but nothing can change its identity.[65] So places cannot move.

Another explanatory identity entertained by some metaphysicians nowadays is *supersubstantivalism*, the view that (i) there are substantival places and (ii) every material thing is identical with the place it occupies. This would explain why it is necessary that two material things cannot occupy the same place: they would have to *be* the same place and thus not be two. It would also give an alternative explanation to one of the necessities with which this paper began: if an object O occupies R and R is square, then O is square. This would be true because O *is* R; there would be no need to distinguish between primitive region shape and derivative object shape.[66]

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[64] The attribution turns out to be mistaken, as I learned from Morison 2002. If Aristotle had held that a place is its own place, he would have had an easy answer to Zeno's paradox of places: that a thing must be in a place, which must itself be in a place, and so on ad infinitum. Instead of giving the easy answer, Aristotle denies that everything that is somewhere is in a place. He does hold that places are immovable, though. The relevant passages are in Physics IV 1-5.

[65] If x and y exist at t1 and x is not identical with y then, x cannot come to be identical with y at t2. This is provable from Leibniz's Law just as the necessity of identity is.

[66] For the record, I think supersubstantivalism is an untenable view. A simple objection to it is that things can move but places cannot. To be sure, supersubstantivalists can cook up senses in which it is true to say that a red ball rolled from here to there—perhaps redness successively pervaded without spillover a certain sequence of spherical places—but that is not genuine movement; it is movement only in the sense in which spring moves north along the Appalachian Trail. Moreover, it is abandoning supersubstantivalism as originally enunciated for the view that things are constructions out of sequences of places. Alternatively, supersubstantivalists could resort to 'qua' talk (the object qua thing can move, the object qua place cannot), but that is nothing but a subversion of Leibniz's Law.

One more example of an identity adopted to explain a family of necessities is the "composition is identity" doctrine of some contemporary metaphysicians. Why must a whole always go where its parts go and vice versa? If the parts of a whole collectively weigh so much, why must the whole itself weigh that much? Why must there be only one whole composed of a given plurality of parts? Because the whole simply *is* its parts, say proponents of composition as identity. See Cotnoir 2014 for exposition and Cameron 2014 for critical discussion.[67]

The second question to be taken up in this section is the following: given that some necessities are explained by identities, what explains the identities themselves? Are they autonomous— the sorts of things that don't need explanation, as Pautz and Hill both say? Are they explained by further truths? Or are they explained in some intrinsic way, not by reference to any deeper explanantia? Assuming identities are not simply brute, these are the analogs for identity of the most promising possibilities canvassed in section 4.

The first possibility, which I do not rule out, is that identities are autonomous. But why? The answer had better not be that identities are themselves necessary. They are, of course.[68] But if that exempted them from the need for explanation, it would also exempt the necessities they are

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[67] For the record again, I think the view that a whole is identical with the parts composing it is untenable. The simplest objection to it (which kept David Lewis from endorsing it and which its proponents realize they must address) is that the whole is one thing, the parts many. Cameron mentions others; for example, that the view implies mereological essentialism, which in his view is false.

Mereology is a fertile field for purported necessities that threaten to be brute. There is the phenomenon countenanced by Markosian of "brute composition"—if several things compose a further thing when they are related in a certain way, it is necessary that they do, but there is no principled answer as to why (2008). There is the family of truths sometimes grouped together under the head "mereological harmony"—for example, if space is infinitely divisible, so must be the matter occupying it and conversely. Saucedo is averse enough to brute necessity to reject these necessities rather than accept them as unexplained (Saucedo 2011).

[68] At any rate, any identity that holds at all holds necessarily so long as its relata exist. In my opinion, the best reason for this is not the metalinguistic proof based on rigid designators, but the metaphysical proof based on Leibniz's Law given in Kripke 1971, weakened to reflect the proviso about existence. I learned from Burgess 2014 that the proof from Leibniz's Law was first given by Quine.

brought in to explain. *All* necessities would be autonomous, and the specter of brute necessity would never arise. There would be no occasion for arguments from bruteness.

The second possibility is that identities are explained when they are derived from other truths, which might themselves include identities. In explaining the difference between intuition and deduction, Descartes gives the example of deducing 2 + 2 = 3 + 1 from 2 + 2 = 4, 3 + 1 = 4, and the transitivity of identity, three premises known by intuition (Descartes, 7-8). Perhaps a more plausible example of an identity known only deductively would require more steps or a less obvious conclusion.[69] But in any case, the question would arise whether these are cases in which an identity is *explained* by reference to other identities or simply cases in which an identity is *known to hold* on the basis of other identities. Perhaps all identities, even those known to us only by the mediation of many premises, are explained in some more immediate way. Indeed, at least some identities must arguably have intrinsic explainedness, on pain of circle or regress in Descartes's procedure.

Well, that argument would be too quick, since both circle and regress could be avoided if some identities were explained by nonidentities. Does that ever happen? It may appear that we open up that possibility when we give principles of individuation like these:

For wholes or sums, A = B iff every part of A is a part of B and conversely.

For things generally, A = B iff every property of A is a property of B and conversely.

But Alexis Burgess has argued that any attempt to ground the identities on the left in the facts on the right is really grounding them in further identity facts (Burgess 2012). To say every property had by A is had by B is to invoke a totality fact, a fact to the effect that the properties on a certain

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[69] Here is an example I like better than Descartes's, thanks to Erica Baron: Why does .999… = 1? Because: 3 x 1/3 = 1; 1/3 = .333…; therefore 3 x .333…= 1; 3 x .333 … = .999…; therefore, by transitivity, .999…= 1.

list are *all* the properties A has, which is to say: for all P, if A has P, then P = P1 or P = P2, etc. And so it is to ground an identity fact about the original items in identity facts about properties.

How would the further identity facts be grounded? Burgess mentions the possibility of grounding the identity of properties the same way one level up, in terms of the community of all *their* properties, but he points out that that would presuppose a further totality fact and with it further facts about the identity of the properties at the higher level. "We can keep going like this for as long as we like," he says, "but the notion of identity will keep re-appearing" (94). If things do go on like that forever, we have an infinite explanatory regress of the sort already impugned above.

Perhaps enough has now been said to motivate the third possible way in which identities might be explained: they have I-status. But I-status supervening on what? Two possible answers are truth in virtue of meanings (or analyticity) and truth in virtue of natures. I have expressed doubts above about the thesis that all necessities are analytic, but could identities be? Well, I doubt that, too, especially if we are talking about individual identity and not just property identity. Terms referring directly to individuals do not have definitions. As Timothy Williamson notes, the necessity of identity is unwelcome to logical positivists, since it breaks the connection between necessity and analytical truth (2013, 205-206).

The more promising answer is the safe and stupid answer: identities are true in virtue of the natures of their relata. A theorem of Fine's logic of essences is that if x = y, then $N_x(x = y)$, also

provable in the form $N_y(x = y)$. Identities are grounded in the nature of the identical relatum and diversity in the natures of the diverse relata.[70]

We have seen so far that identities might be regarded as having I-status and that at least some necessities may be explained by identities. More sweeping views about identity and necessity are advocated by Armstrong and Rayo, both of whom link *all* necessities with identities or kindred truths.

Armstrong on partial identity. Armstrong holds that all necessary truths have as their truthmakers universals standing in relations of identity, diversity, or partial identity (1977, chapter 10**).** Transposing his view into the idiom of grounding, one could suggest that all necessary truths are grounded in truths about relations of identity, diversity, or partial identity between universals.

A challenge Armstrong considers against his view is this: it is necessary that whatever has a mass of one kilogram does not have a mass of (exactly) one pound, but how can he account for this necessity? (1977, 144-45). Armstrong "parses" weighing a kilogram thus: x weighs a kilogram iff for some y and z, x is composed of y and z, y weighs a pound, and z weighs a kilogram minus a pound. This is supposed to show that weighing a pound is in some sense part

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[70] Perhaps some would see the need to add the existence of the identical or diverse items to the ground. Indeed, Burgess has considered the alternative, proposed in Nolan 2005, that identity and diversity are grounded *simply* in what exists. As Burgess puts it,

1. Every fact of the form A = A is grounded in the corresponding fact that A exists.
2. Every fact of the form A ≠ B is grounded in the facts that A exists and B exists.

Burgess then combines 1 and 2 into 3:

3. A = B (or ≠ B, as the case may be) is grounded in the fact(s) that A and B exist.

The puzzle of Burgess's title may now be put like this: how can the same facts ground identity in some cases and distinctness in others?

I think the puzzle is a typographical illusion. In case 1, A = B, and the ground is the fact that A exists (a.k.a. the fact that B exists). In case 2, A ≠ B, and the ground is the two facts (not just one listed twice) that A exists and that B exists. The ground is not the same in the two cases.

of weighing a kilogram, keeping the way open for the view that necessity is always grounded in identity, diversity, or partial identity. But Armstrong's purported equivalence, which would have to be a necessary equivalence, is suspicious. It stands or falls with the additivity of mass—the principle that if y has mass m and z has mass n, then the mereological sum y + z has the arithmetical sum m + n as its mass. It is contestable whether that principle is necessary on three grounds. First, mass additivity is derivable in Newtonian mechanics, but only with the help of principles whose own necessity is contestable, such as force additivity (McQueen 2015). Second, in relativity physics, the additivity of mass in the relevant sense (that is, rest mass) does not hold at all (McQueen). Third, according to Jonathan Schaffer, it is conceivable that mereological sums of parts with mass should have *zero* mass. So the necessity of the kilogram-pound exclusion principle has yet to be explained in accredited Armstrongian fashion.

'Just is' statements and 'why' questions. In *The Construction of Logical Space* (2013), Agustin Rayo introduces two notions that are highly relevant to issues in this paper: 'just is' statements and why-closure.

Suppose someone says, "I see clearly *that* things composed of water are composed of H_2O, but I want to know *why* things composed of water are composed of H_2O." Rayo would reply, "What can you possibly mean by asking 'why?' Your demand for an explanation makes no sense. For something to be composed of water *just is* for it to be composed of H_2O" (54-56).[71]

When a question like the one above about water and H_2O makes no sense—when the demand for an explanation is illegitimate—Rayo says that the statement p in 'why p?' is why-closed (or

[71] Rayo has confirmed to me that there is a mistake in the first inset sentence on p. 55. It should read, "I can see clearly that the world satisfies φ's truth-conditions, but I wish to better understand why the world is such as to satisfy them."

as I shall sometimes put it, the question 'why p?' is closed). Clearly, the notion of why-closure is in the same ballpark as the notion of autonomy I have been using. Some things are not apt for explanations ≈ the demand for explanations is illegitimate ≈ the question why they are true does not make sense.[72]

'Just is' statements are statements of the form 'for it to be the case that φ *just is* for it to be the case that ψ'. Examples from Rayo's list on p. 3 are

(1) For Susan to be a sibling *just is* for her to share parents with someone else.

(3) For such-and-such a mental state to be instantiated *just is* for thus-and–such brain states and environment conditions to obtain.

(6) For there to be a table *just is* for there to be some things arranged tablewise.

He says that he understands such statements as symmetrical, unlike 'because' statements. In Rayo's view, 'just is' statements are the primary closers of 'why' questions; every time we adopt one, we close a theoretical gap (viii) and relieve ourselves of having to explain something (37). We eliminate an explanandum, not by denying its truth, but by denying that it is something there is any sense in explaining.

Rayo holds implicitly that there is never any sense in asking why any necessary truth is necessary. If p is necessary, it is a consequence of 'just is' statements and the question 'why p?' is therefore senseless (p. 55).[73] But when p is necessary, Np is also necessary, so the question 'why Np?' is also senseless.

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[72] I'm not sure how literally to take 'makes no sense.' Noting that Rayo thinks 'just is' statements cannot generally be established *a priori*, Daniel Greco raises the following challenge: if it is literally unintelligible to us how a given 'just is' statement could be false (as Rayo seems to say on pp. 20-21), how can we the assess the probability of it and its competitors in relation to our evidence, or do any of the other things that would be involved in coming to know it empirically? (Greco 2014)

[73] I don't quite see how this follows from the rest of Rayo's apparatus, but Rayo does assert it.

Rayo's views make for interesting comparisons and contrasts with those of the identity explainers of necessity discussed above. Like them, Rayo sees identity or 'just is' statements[74] as having an important role in dealing with 'why' questions. But unlike the identity advocates, Rayo does not see 'just is' statements as providing explanations; he sees them as removing the need or even the sense for explanations.

Advocates of identity explanations of necessity may wish to take a leaf or two from Rayo's book. But not too many! There is a side of Rayo's overall view that will not sit well with most of those who are in the business of trying either to answer or to close questions in the realm of the necessary. Rayo is a Carnapian intensionalist—he has no room for a hyperintensional 'because' and more generally, no room for distinctions that cut more finely than modal distinctions. He espouses the following principle linking 'just is' statements with necessary equivalences:

> *Linking principle*: A 'just is' statement ⌜for it to be the case that φ *just is* for it to be the case that ψ⌝ is true just in case the corresponding modal statement ⌜(φ ↔ ψ)⌝ is true. (49)

Wherever you have a 'just is' statement, you have a corresponding necessary equivalence *and vice versa.* Now any two necessary truths are necessarily equivalent; it is necessarily true that Fermat's Last Theorem holds iff 2 + 2 = 4. Therefore, by Rayo's principle, what it is for Fermat's Last Theorem to be true *just is* (or is no different from) what it is for it to be the case that 2 + 2 = 4. They have the same truth conditions; that is, both require the same thing of the world in order to be true, namely, nothing at all. (52-53)

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[74] 'Just is' statements are closely akin to identity statements, but are not quite the same thing. The identity sign, '=', is a relational expression flanked by terms; the 'just is' operator, 'for it to be the case that __ just is for it to be the case that ….', is a dyadic operator whose slots are filled by sentences or formulas.

Here is a further application of the linking principle quoted above: given that 'just is' statements are necessary when true, what it is for a given 'just is' statement to be true is no different from what it is for any other 'just is' statement to be true. For example,

> What it is for it to be the case that (1)—
> for Susan to be a sibling *just is* for her to share parents with someone else—
> *just is* for it to be the case that (6)—
> for there to be a table *just is* for there to be some things arranged tablewise.

Restating the point using Rayo's suggested 'thereby' terminology (p. viii), for Susan to be a sibling *just is* for her to share parents with someone else, and *thereby* for there to be a table *just is* for there to be some things arranged tablewise.

I surmise that many who invoke identity statements or their kin to eliminate brute necessities in metaphysics would want them to be a special subset of necessities, not coextensive with necessary equivalences at large as they are for Rayo.

10. Reductive Accounts of Necessity

By a reductive account of necessity, I mean an attempt to say in some other terms what it is for a truth to be necessary (not counting 'it is not possible that it is not the case that p'). I am partial myself to the view that necessity is simply unanalyzable, but there are a number of attempts on the market to analyze it. The most familiar are versions of the Leibnizian view that to be necessary is to be true in all possible worlds; the worlds might be construed as concrete particulars à la Lewis (1986) or as abstract states of affairs à la Plantinga (1974).[75] There are other proposed reductions worth mentioning. There is the view that necessity may be understood in terms of the counterfactual conditional A N→ B, a necessary truth being one that would hold

[75] Plantinga's reduction is actually better regarded as a reduction of possible worlds than of modality at large, since he needs to stipulate that his states of affairs are possible.

no matter what: Np iff T N→ p, where T is a tautology (Jacobs 2010). There is the view that it is necessary that p iff (i) p and (ii) no being has the power to bring it about that not-p (Pruss).[76] These two are reductions of necessity to some other broadly modal feature. The Fine view discussed in section 7 that necessities are always grounded in the natures of things could be held in a reductive form: to be necessary is to hold in virtue of the essence of something (or some things).[77] In this section I explore the bearing of such reductive accounts on explaining necessity. One's first thought would be that they make any necessary truth explainable by citing its possession of the property to which necessity gets reduced, but the matter requires a closer look.

Let me first say how I understand the relations among reduction, grounding, and supervenience. The weakest of these is supervenience. To say that A properties supervene on B properties is to say that of necessity the following is the case: for any item x and any A property **A**, if **A**x then (i) for some B property **B**, **B**x, and (ii) necessarily, for any y, if **B**y, then **A**y.[78] For short, everything with an A property has some B property that entails it. A thesis of reduction goes beyond a thesis of supervenience in at least one and possibly two ways. First, whereas supervenience permits "multiple realization"—a given A property might be anchored in any of

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[76] What Pruss actually gives us is an analysis of possibility: ◊p iff (i) p v (ii) ~p and some being has the power to bring it about that p. What I have given is the account of necessity that would make it the dual of possibility as analyzed by Pruss.

[77] The view of the positivists that all necessity is born of analyticity could also be held in a reductive form. As a first pass, it might be put thus: Np iff 'p' is analytic, which would be a reduction of Quine's second grade of modal involvement to the first (Quine [1953] 1966). However, the first pass won't do, since a definition using free variables is tacitly equivalent to its universal closure, which means that in the reduction formula I just gave we would be quantifying into quotation. Better would be 'Np iff any sentence expressing that p would be analytic'. That puts considerable weight on the notion of expressing; we couldn't let truths be expressed just by calling out numbers (in the manner of the Vaudeville comedians who cracked each other up by calling out their jokes by number).

[78] This is strong supervenience in the sense of Kim (1984); for weak supervenience, delete the inner necessity operator.

many B properties, **B**x entailing **A**x but not conversely—reduction provides equivalence or mutual entailment between each A property and some B property, N(**A**x iff **B**x).[79] Second, a reductive thesis (in metaphysical matters, though not generally when one scientific theory is said to be reduced to another) is typically advanced as holding for conceptual reasons: it holds in virtue of the meaning, nature, or analysis of the commodity being reduced. A believer in mere supervenience need take no stand on the conceptual issue.

Turning now to grounding theses, they, too, are stronger than supervenience theses, implying them but going beyond them. They go further in claiming that the grounded fact is not merely entailed by the grounding fact, but holds *because* of it, **A**x because **B**x. That, as we have seen, is no mere upshot of **B**x's entailing **A**x. We may also note that nothing in the definition of supervenience excludes the possibility of mutual supervenience, but mutual grounding is out of the question.

So grounding and reduction are both stronger than supervenience, but how are they related to each other? At the abstract level at which I have so far characterized them, they are not strictly comparable; you could have either without the other. For a case of reducibility without grounding, consider the properties of being a three-sided figure and being a three-angled figure. They are necessarily coextensive and thus mutually reducible, but it does not seem right to say that a figure has one of these properties because it has the other; they are on a par. Cases of reduction by way of identity, to be discussed shortly, are also cases in which there is no asymmetrical relation of grounding. For a case of grounding without reduction, consider a

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[79] Kim has shown that under certain closure assumptions for families of properties, supervenience gives rise to the two-way entailments of a reductive thesis (1984). The closure assumptions are controversial, however, and should not always be made. See Van Cleve 1990 for discussion.

disjunction with one true disjunct: the disjunction holds because its true disjunct does, but there is no two-way entailment here. Or consider Moore's view about goodness: a thing's being good is grounded in some natural feature of it, but there is no conceptual reduction of goodness to any constellation of natural properties—no two-way entailment between goodness and anything natural and no entailment holding for conceptual reasons.

Lewis analyzes necessity as truth in every possible world: for it to be the case that Np is for it to be the case that every possible world is a world in which p. Armstrong objects to this analysis by posing a Euthyphro question: if it is necessary that p, is it necessary because p holds in every world, or does p hold in every world because it is necessary? He finds the latter answer more plausible, noting that the former answer amounts to "a giant regularity theory" (2004, 95-96). If those are the only answers, I'm with Armstrong: necessity explains the pattern of truth across worlds, not conversely. So much the worse for Lewis's analysis, Armstrong concludes. But note what he is presupposing: that if A is correctly analyzable as B, then A holds *because* B holds. Since in the case at hand, the "because" runs in the opposite direction, and since "because" is asymmetrical, he takes Lewis's analysis to be mistaken.

Armstrong's presupposition—that in a correct analysis, the analysandum holds because the analysans holds—is shared by several other writers on analysis, including Rosen and Richard Sharvy (1972). Rosen calls it the grounding-reduction link (122-23). But there is another conception of analysis, championed by Moore, under which the link does *not* hold and is in fact positively excluded. I have in mind the view that if the property of being F is analyzed as the property of being G and H, then for something to be F *is* for it to be G and H; more generally, if the proposition that p is correctly analyzed as the proposition that q, then the proposition that p is

the very same proposition as the proposition that q (Moore 1942, especially p. 664). Other adherents of the identity conception of analysis are A.N. Prior ([1968] 1976, 196) and Ted Sider (2003, 185). If there is a symmetrical relation of identity between analysandum and analysans, there cannot also be an asymmetrical relation of grounding; the identity conception thus excludes the grounding-reduction link. If being a bachelor *just is* being an unmarried man, then no one is a bachelor *because* he is an unmarried man. If Lewis espoused his analysis of necessity as a Moorean identity, he could sidestep Armstrong's Euthyphro objection; there would be no "because" in either direction.[80] Of course, he would quickly incur, as Moore confessedly did, another problem— the paradox of analysis. The paradox is that a correct analysis is always trivial, being equivalent to 'A is equivalent by analysis to A'.

Here is a quick way to develop the paradox of analysis, using Prior's notation 'Ipq' for 'the proposition that p is the very same proposition as the proposition that q'. I shall also use one of Prior's laws for Ipq: Ipq → Iδpδq, where δ is any operator forming a sentence out of a sentence (1971, 53-54). Finally, I shall use 'Apq' for 'the proposition that p is correctly analyzed as the proposition that q'. Suppose Apq. Then Ipq. Letting δ_ be the operator Ap_ and using Prior's law, we then obtain IApqApp—the proposition that *p is correctly analyzed as q* is the very same proposition as the proposition that *p is correctly analyzed as p*. Moore endorses a key consequence of Prior's law when he says that no one can know that the analysandum concept applies without knowing that the analysans concept applies.

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[80] In fact I think Lewis would take another way out. By identifying any proposition with the set of worlds in which it is true, he abolishes all hyperintensional distinctions. There is only one necessarily true proposition, and propositions true in all the same worlds are identical. Hence he cannot admit a hyperintensional 'because'—if p holds because q and q is necessarily equivalent to r, then p holds because r.

Incidentally, Prior's 'Ipq' has the same syntax as Rayo's 'just is' operator—it is a dyadic sentential connective.[81] But it is a more elite affair; 'Ipq' implies 'N(p ↔ q)', but unlike 'for it to be the case that p *just is* for it to be the case that q', it is not implied by 'N(p ↔ q)' in return.

To summarize the discussion in this section to date: Grounding and analytical reduction are both stronger than supervenience. Their abstract characterizations leave open the possibility that they are not strictly comparable, either of them capable of holding with or without the other. But there is one conception of reduction, taking aboard the reduction-grounding link, that would make reduction *entail* grounding. And there is another conception of reduction, the identity conception, that would make reduction *exclude* grounding.

Let us now return to our topic: the bearing of analytical reductions on the explanation of necessity. I said at the outset that a natural thought would be that if Np is analyzed as Fp, then one has an automatic explanation of the necessity of any necessary truth: Np because Fp. But that was too hasty. On the identity conception of analysis, that explanation would be excluded! What the analysis would do for us is just give us another way of restating the analysandum; if it helps, instead of asking 'Why Np?' we could ask 'Why Fp?'—why, for instance, is it true in every world that p? We would then have the various options distinguished in section 4 for explaining the necessity (which is to say, the Fness), and there would be no guarantee that there is any explanation.

The range of options would be narrowed, though, if we go with the grounding conception of analysis. For the remainder of this section, let's operate with that conception.

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[81] It is also comparable to the "factual equivalence" of Correia and Schneider 2012, 16.

If we give a grounding reduction of Np, are we giving one of the monolithic views on the explanation of necessity? We are giving a view that is monolithic in one sense—it says all necessity is of a piece. But it need not be a monolithic view in my sense, as it could instead be a "mixed" view. That would be the case, for example, if our reduction was of Np to $\exists x N_x p$ à la Fine, and we drew a distinction between inherent necessity and derivative necessity as proposed in section 8.

We saw in section 7 that unless we accept some necessary truths, the essentialist ones, as either brute or autonomous, Fine's view gives rise to explanation by infinite iteration.[82] Is something similar true of any reductive account? I now argue that the answer is yes.

Suppose Np is analyzed as Fp. Whatever else it may be or do, analysis or reduction gives rise to necessarily true biconditionals, so we have N(Np iff Fp). A point urged in more than one place above is that anything in terms of which necessity is explained or analyzed must itself be necessary—we cannot explain the necessary in terms of the contingent. Hence if we have Np, we also have NFp. (This is all the more clearly true on a reductive account, on which entailment explicitly runs not just from Fp to Np, but from Np to Fp. Any contingency in Fp would therefore infect Np, contrary to the S4 axiom, to which I hold fast.) So what explains NFp? Obviously, for a view that reduces N to F it is going to be FFp—which must itself be necessary, and on it goes. The pattern that is emerging is

Np. So Fp. Moreover, NFp. So FFp. Moreover, NFFp. So FFFp. Etc.

Clearly, the Fs pile up ad infinitum. We have

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[82] The mixed view mentioned at the end of the previous paragraph would not have to give rise to explanation by infinite iteration. It could hold that *all As are Bs* is necessary because it lies immediately in the nature of As that all As are Bs, and that things so lie is a necessary truth that is autonomous. So perhaps the view would have to be more mixed than I have so far acknowledged: it would have to involve derived necessities, inherent necessities, and autonomous necessities.

Fp & FFp & FFFp & FFFFp & etc.

But that is not yet an infinite explanatory chain. To get that, we need one more assumption. We need a generalization of Rosen's principle of essential grounding, if $N_x p$, then $pBN_x p$, (119) which we used to beget an infinite explanatory chain in section 7. The generalization is this: if Np is analyzed as Fp, whatever F may be, then if Fp, p because Fp: Fp → pBFp. Not only does Np hold because Fp: plain p holds because Fp. I find this principle plausible; it amounts to the idea that whatever makes something necessary also makes it true.[83] Now let's apply the Fp → pBFp formula to the series above, writing under each item of the form Fp the corresponding item of the form pBFp. We then get

pBFp & FpBFFp & FFpBFFFp & FFFpBFFFFp & etc.

And there we have it: each F truth holds because a truth with one more F holds. This is no surprise; it is nothing more than the idea that if necessity is grounded (for instance) in truth in all worlds, which is itself a necessary affair, then a thing is true in all worlds because it is true in all worlds that it is true in all worlds, and so on. Cameron accepts the latter regress as entirely harmless (2010, 146-47). But it is problematic if there is anything to the Pruss proof that infinite explanation begets circular explanation.[84]

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[83] Here is a little scenario to illustrate the implausibility of denying it. Suppose, like Descartes, you believe that necessary truths are such only by courtesy of God's decrees, but you do *not* think the unadorned truth of what is necessary is likewise dependent on God's decrees. You would then be countenancing the following speech by God: "I can't do anything about whether p is true. But by gum, given that p is true, I can see to it that it is necessary!"

Anthony Nguyen has pointed out to me that anyone who embraces the principle NpBFp → pBFp must reject all instances of NpBp (e.g., N(2 =2) B 2 = 2) on pain of getting cases of pBp. That consequence seems perfectly acceptable to me.

[84] Cameron could sidestep the problematic "because" regress by saying the possible worlds analysis gives an identity, not any *because* business. But then he could not say as he does that every step in the regress is *explained* by the next.

It behooves us, then, to revisit the Pruss proof. I see two ways in which it might be evaded. First, we might deny the conjunction principle needed to say that the conjunction of the even members in the infinite sequence explains the conjunction of the odd members and vice versa. As noted above, Bolzano did deny that principle. But Fine propounds a principle with some of the same power, namely, Cut, which implies that if p, q, r, . . .ground a conjunction, a grounds p, b grounds q, c grounds r, . . . then a, b, c, … ground the conjunction (2012, 56). Using this principle extended to the infinitary case, we could derive that the even conjuncts together ground the conjunction of the odds and the odd conjuncts together ground the conjunction of the evens. Perhaps that is as bad as the mutual grounding of the two infinite conjunctions. Second, we might deny that there is anything bad about mutual grounding when the grounding propositions are both infinite. At any rate, there is nothing bad about it if there is no mutual grounding between any finite components of the two conjunctions.[85] Symmetrical grounding would be permitted in the infinite case if it does not arise before that. I leave it to the reader to judge the merits of these suggestions.

For those not persuaded by the Pruss proof, I offer another reason for rejecting explanation by infinite iteration: it violates the principle, accepted by many metaphysicians, that the relation of grounding must be well founded (Schaffer, 2010, Bennett 2011). That is, there cannot be infinitely descending chains of grounds and what grounds them in which nothing is grounded by any fundamental fact. The objection here is not to infinity as such. An infinite upward or outward grounding chain, such as the following one, would be fine: P partially grounds the conjunction P & Q, which in turn partially grounds the conjunction (P & Q) & R, and so on.

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[85] That mutual grounding might be allowable between infinite propositions has been proposed to me by Stephen Maitzen and Duncan MacIntosh.

What would not be fine is an infinite downward or inward chain, such as the following: P is the conjunction of Q and R, grounded in its conjuncts; Q is the conjunction of S and T, grounded in its conjuncts, and so on. This is a conjunction with no atomic or ultimate constituents, which I take to be out of the question. Direction matters.[86] In explanation by infinite iteration, we regress infinitely in the direction of the grounds, not the groundeds, never reaching anything fundamental.[87]

Speaking of Pruss as we did several paragraphs back, let's confront his own reductive account of necessity with the generalized Rosen principle. His candidate for the Fp to which necessity reduces is 'p & no agent can make it the case that not p.' Applying the generalized Rosen principle (Fp → pBFp) to this, we get:

pB(p & no agent can make it the case that not p).

That violates the strong irreflexivity of "because"—nothing can be true in virtue of itself and something else (Rosen 115). We have to choose between Pruss reduction and generalized Rosen, and I prefer Rosen.

Indeed, I favor something even stronger in one respect than generalized Rosen: if Np reduces to Fp, then not only is plain p true because Fp—it is true *only* because Fp, in a sense implying that p *entails* Fp. This principle is of interest because we can use it to show *without invoking S4*

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[86] The point that upward regresses (in the direction of the groundeds) are harmless while downward regresses (in the direction of the grounds) are problematic is also made in Cameron 2008 and Dixon forthcoming.

[87] Here is another example to show that infinity as such is not the problem: To answer the question "What grounds grounding facts?" without flouting the requirement of well-groundedness, Karen Bennett proposes that a fact of the form *B grounds A* is grounded by B itself. This gives rise to an infinite series in which B grounds each of *B grounds A*, *B grounds (B grounds A), B grounds (B grounds (B grounds A))*, and so on. There are ever wider grounded facts without end, but all are grounded in the same ground, B, which may be fundamental (Bennett 2011).

that any purported reduction of necessity to some contingent factor F eliminates necessity rather than reducing it. Here's how:[88]

1. Np → (p => Fp) (from the reduction of Np to Fp and my strengthening of Rosen)
2. ◊~Fp (contingency of factor F)
3. Np (assumption for reductio)
4. ◊~p (from 1, 2, 3, and the uncontroversial principle that ◊ is transmitted across entailment).
5. ~Np (from 4).

I find the first premise entirely plausible. If you say p owes its necessity to factor F, you should also say it owes its truth to factor F. For example, if Kantians think geometrical truths owe their necessity to the form of human sensibility, they should also say their very truth so depends. If positivists say necessity is made by and depends on meanings, they should also say (and did say) that the truth of what is necessary likewise so depends.

But in case anyone thinks my strengthening of Rosen is too strong, I can make do with something weaker. Hale (2002) and Cameron (2010) consider an argument for the conclusion that any source of necessity must itself be necessary that uses the following premise, which we may call the grounding-counterfactual link: if X because Y, then ~Y N→ ~X. (The relevant instance for them is 'if Np because q, then ~q N→ ~Np'.) Now the relation N→, though weaker than =>, is strong enough within Lewis's theory of counterfactual conditionals to transmit possibility. (See Cameron 2010, 140 for an explanation of this.) Hence if we suppose ◊~q, we may infer ◊~Np and thus (in S4) ~Np. I propose combining Hale with Rosen as follows: By

[88] I give such a proof in Van Cleve 1994, where 1 is called the Strengthened Dependency Premise. It is not strictly stronger than Rosen's principle of essential grounding, but it is stronger in one dimension, since pBFp does not entail p => Fp.

generalized Rosen, if we have Np holding because Fp, then we also have p holding because Fp. By Hale, we then have ~Fp N→ ~p, which I can use in the argument above instead of p => Fp.

To be upfront, I should say that Hale and Cameron object to the principle 'if X because Y, then ~Y N→ ~X'. As Cameron puts it, "It is not in general true that if that which explains some true proposition p were lacking then p would be false, because in general it is the case that p *might* have been true for some other reason" (2010, 142). He is right, of course. If the disjunction X v Y is explained by X's being true, we cannot infer that had X not been true, the disjunction would not have been true. If X had not been true, maybe Y would have been true—or maybe it already is true (a case of overdetermination). But in our present context, I think we may safely rely on the grounding-counterfactual link. We are in a context in which Fp has been proposed as the analysis of Np. Anyone who *analyzes* Np as Fp surely wishes to say that Fp is the one and only possible source of Np. And in that case, we may infer that if the source had been lacking, so would the necessity and along with it the truth of p.

The upshot is that we may safely give the following argument:

0. Np is analyzed as Fp.
1. If Np is analyzed as Fp, then we have each of
   a. NpBFp (by the grounding conception of analysis)
   b. pBFp (from a and the generalized Rosen principle)
   c. ~Fp N→ ~p (from b together with 0 according to the discussion above)
2. ~Fp N→ ~p (from 0 and 1 with consequent c)
3. ◊~Fp (contingency of factor F)
4. ◊~p (from 2, 3, and the principle that ◊ is transmitted across N→).

5. ~Np (from 4)

I said above that I hold fast to S4, but this argument shows that we do not need S4 to establish that any factor that analyzes necessity had better itself be necessary.[89]

Marc Lange has offered another argument free of S4 for the conclusion that whatever makes it the case that something is necessary (or is responsible for its being necessary) must itself be necessary (Lange 2008). His argument relies on the premise that a truth is necessary iff it would hold under every possible circumstance (in symbols, Np iff for any C such that ◊C, C N→ p) and this in turn iff it holds in every possible world. I reproduce here two of his other premises and his own short gloss of the argument:

(7) If F is responsible for C N→ A, then had C obtained, F would have been responsible for A

(8) In any possible world: F is responsible for A only if F.

> Intuitively, the argument is that if F is responsible for A's necessity, then F is responsible for A's holding in all possible worlds; and so (by (7)) in any possible world, F is responsible there for A's holding; and hence (by (8)) F holds in any possible world; and so F is necessary." (Lange 2008: 125-26)

It seems to me that Lange's argument rests on a contestable inference, namely, that from

F makes it the case that in all worlds w, A holds in w

to

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[89] The argument may make do with weaker assumptions yet. In place of 2 we may put the might-be conditional '~Fp ◊→ ~p', which plausibly follows from 'pBFp' at line b. An instance of this move (from 'pBFp' to '~Fp ◊→ ~p') would be 'if triangles have angle sums of 180 degrees because our form of intuition is Euclidean, then if our form of intuition were not Euclidean (e.g., if it were Lobachevskian instead), triangle sums might not have angle sums of 180 degrees'. As Hale notes (303), possibility transmits across might-be conditionals just as it does across would-be conditionals, so we would still reach the same conclusion at 5.

Hale denies that 'X because Y' commits one to '~Y ◊→ ~X' when X is necessary, appealing to the feature of Lewis semantics whereby would-be conditionals with necessarily true consequents are automatically true, which implies that might-be conditionals with impossible consequents are automatically false. But it is possible to construct alternative semantics for counterfactual conditionals that drop the Lewis feature, but still validate the transmission of possibility across might-be conditionals. (Thanks to Daniel Nolan for pointing this out to me.) And even if the transmission principle is not generally valid, it seems plausible in the context in which I am now using it.

In all worlds w, F makes it the case in w that A holds

The second proposition implies as desired that F holds in all worlds just as A does and is therefore necessary, but I question the inference to it. Mightn't God, ensconced in some world where he exists, make it true that A holds in all worlds, even ones where he does not exist? Or to take a less controversial example, consider this analog: an able electrician makes it the case that at all times t when the button is pushed, the doorbell rings; it doesn't follow that at all times t when the button is pushed, the electrician makes it the case that the doorbell rings. He might do his work on one occasion and then retire or die.

Perhaps there is a way around my objection to Lange's argument; in that case, I accept it as welcome reinforcement of what I am contending for here.[90]

To summarize, analytic reductions of necessity seem initially to promise an automatic uniform explanation for the necessity of any necessary truth: Np because Fp. But that promise is fulfilled on only one of two leading conceptions of analysis: analysis as giving the ground of the analysandum rather than something identical to the analysandum. Moreover, a grounding analysis of necessity is tenable only if the analysans holds of necessity when it holds; otherwise necessity would be destroyed rather than explained. That means a reductive analysis of necessity launches an infinite explanatory regress. If the Pruss proof is correct, such a regress would violate the asymmetry of explanation, and in any case, it would violate the well-foundedness of explanation.[91] Unless there is some mistake in these arguments, we must hold that some

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[90]Another objection to Lange is that he assumes that if Np is equivalent to some proposition q, then whatever is responsible for Np is responsible for q. That goes against the hyperintensionality of the relevant grounding relation.

[91] Here is one more place where some may think that explanation and grounding come apart: grounding must be well founded, but explanation need not be.

necessary truths are not necessary *because* of anything—they are just necessary. We must regard them as either brute or autonomous.[92]

11. Brute Necessity and the Mind-Body Problem

According to mind-body dualism, mental events and physical events are distinct events connected by contingent psychophysical laws. An argument sometimes leveled against such dualism is that it gives rise to inexplicabilia: either the psychophysical laws themselves ("nomological danglers," as Feigl called them (1958)) or the mental facts that emerge in accordance with them would be brute facts. Better to identify the mental with the physical and eliminate the mystery.

No, say dualists and emergentists; better to embrace brute facts with natural piety. Here is Samuel Alexander:

> The higher quality emerges from the lower level of existence and has its roots therein, but it emerges therefrom, and it does not belong to that lower level, but constitutes its possessor a new order of existent with its special laws of behaviour. The existence of emergent qualities thus described is something to be noted, as some would say, under the compulsion of brute empirical fact, or, as I would prefer to say in less harsh terms, to be accepted with the "natural piety" of the investigator. It admits no explanation. ([1920] 1979: 46)

When I first started working on this paper, I thought it potentially usable as a backhanded defense of Alexander's attitude. If even in the realm of necessary truth we must accept brute

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[92] In (1987) 1993, Simon Blackburn propounds a dilemma for any theory that attempts to explain facts of the form 'it is necessary that p' by way of an analysis of necessity in term of truth conditions. If the analysans is contingent, "the original necessity has not been explained . . . so much as undermined." If the analysans is necessary, there will be a "bad residual 'must'" (53). I have argued in this section that the contingency horn is indeed lethally sharp. What of the necessity horn? There is no problem simply with giving an explanation of the form *Np because Fp* where Fp is itself necessary. But there *is* a problem if we require that any necessity we introduce must itself be explained, for then we launch one of the regresses discussed in this section. So I take the Blackburn dilemma as showing not that we must go expressivist about necessity (as he thinks), but that some objective necessities must be unexplained, be they brute or autonomous. For further discussion of Blackburn's dilemma, see Van Cleve 1999, 41-43, Hale 2002, and Cameron 2010.

facts, then we should not boggle at accepting them in the empirical realm, where there is no expectation that things will be tractable to our intellects.

Imagine my sense of irony, then, when I learned that some writers invoke brute necessities in defense of physicalism, not dualism. I have in mind in particular Jonathan Schaffer, who has defended physicalism against the "explanatory gap" problem by saying *gaps are everywhere*, even in places where few are mindful of them (2017).

The explanatory gap problem may be put thus: we cannot see any reason why a person whose C-fibers are firing should be in pain, or why a person whose cortex is processing the signals from incoming light of a certain wavelength should be having sensations of red. There is a great gulf between these states, and any connection between them is a mystery to us. From the existence of the gap, some go on to conclude that the mental is not identical with the physical or in any way necessarily connected with it. The suppressed premise, of course, is that no necessary truth can be a mystery to us.

Enter Schaffer with the contention that even between phenomena whose linkage most people take for granted there is an explanatory gap. Consider, for example, the separate existence of atoms of H, H, and O, and the existence an H_2O composite, taken merely as a mereological sum.[93] Even between these facts there is an explanatory gap, which might be taken to consist in any of the following: it is logically possible to have the atoms without the sum; it is not inconceivable that you should have the atoms without the sum; it is not *a priori* false that you have the atoms without the sum. To bridge the gap, you need a metaphysical grounding principle, to the effect that whenever you have H, H, and O, you thereby have an H_2O composite. The

[93] Schaffer really does mean a mere mereological sum, such as might consist of atoms a galaxy apart with no chemical bonding, rather than an H_20 molecule.

principle might well be metaphysically necessary, but it is opaque to us; the original gap still subsists between its antecedent and its consequent. Schaffer's moral is that we should not infer the absence of necessary connections from the presence of explanatory gaps. If physical-to-mental connections are mysterious, that does not make them any different from a great many other connections that are metaphysically necessary or may be, for all we know.

If we use *p* for a representative physical fact, *m* for a representative mental fact, and 'E' as an operator to express the monadic status of being explained, we might put the anti-physicalist argument Schaffer is rebutting as follows:

1. If N(p → m), then E(p → m).[94]
2. ~ E(p → m).
3. Therefore, ~N(p→ m).

Schaffer may be seen as denying premise 1, both in the physical-to-mental case and in many other instances. He is in effect affirming the existence of many cases of N without E—in other words, of brute necessities.[95] He is not saying that *all* necessity is brute, for he finds no bruteness in purely logical connections, such as that running from the existence of the atoms *plus* the truth of an appropriate metaphysical bridge principle to the existence of the composite. But outside the purely logical, he is wont to find gaps.

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[94] Perhaps the consequent could be expressed more perspicuously by the dyadic pEm (p explains m), just as N(p→q) can be expressed as 'p necessitates q'. However, there cannot be a general equation of E(p →q) with pEq, as may be seen by considering the case where p and q are the same proposition. pEp is impossible, while E(p → p) is (arguably) possible.

[95] In section 4 I said a brute necessity is a proposition p such that Np & ~ENp. In denying 1, Schaffer gives us only Np & ~Ep. However, it is plausible that whenever we have an explanation for Np, we also have one for p, in which case Schaffer is giving us cases of Np & ~ENp after all.

To be sure, believing in Np & ~ENp need not be believing in bruteness; it could be believing in autonomy. But no one who speaks of explanatory gaps, as Schaffer does, is contemplating autonomy.

Joseph Levine, who introduced the phrase 'explanatory gap' into the contemporary literature (1983), also denies premise 1. He explicitly says that what he proposes to infer from Kripkean considerations about the conceivability of fiber-firing without pain is not any lack of identity or necessity between them, but only an explanatory gap. Clearly, then, he does not affirm premise 1.

I classify Schaffer and Levine as brute necessitarians because both of them hold there can be explanatory gaps between things that are connected with metaphysical necessity. It is noteworthy, though, that Schaffer and Levine both use broadly epistemic criteria for the presence of a gap. Two of Schaffer's marks of a gap between X and Y are the conceivability of X without Y and (what is the same thing in some accounts of conceivability) the non-*a priori*-notness of X without Y. Levine suggests that it is the conceivability of fiber firing without pain that underlies the felt gap between them. These suggestions give us occasion to take up the following question: what is the relation between high or low epistemic status and high or low explanatory status?

By 'explanatory status', I do not mean something's capacity to explain other things, but its own status as explained or not, intelligible or not. So our questions are these: If a proposition has a high epistemic status for us—for example, if we can see *a priori* that someone whose C-fibers are firing must be in pain—is there no puzzle about why it is true? Conversely, if a proposition has a low epistemic status for us—for example, if we *cannot* see *a priori* that a certain connection holds—does that mean the holding of it is unexplained?

To take the first question first, does having a high epistemic status imply having a high explanatory status? Evidently not. I know as certainly as I know anything that something exists (because I know that I exist), but that something exists rather than nothing is sometimes regarded

as the ultimate mystery. "Yes," may come the reply, "but the real question is whether there can be high epistemic status without high explanatory status in the realm of the necessary." Can we have that? I could have a proof that proves some theorem, but no proof that explains it. But that is inconclusive, since there might *be* a proof that explains it, and even if there is not, the theorem might have a ground other than an explanatory proof of the sort characterized in Lange 2014. So I regard it as unsettled whether there can be high epistemic status without high explanatory status in the realm of the necessary.

The converse question is more important for Schaffer's argument. Could something have high explanatory status without having high epistemic status? There is the following possibility to consider: some truth is explained because it stands at the end of a chain of I-entailments starting from premises having I-status, yet the truth is not the least bit obvious. Perhaps that is the case with Fermat's Last Theorem; I do not know whether it might also be the case with mental-physical identities.[96]

Let's get back to the argument from gaps and Schaffer's response to it. The first premise affirms that where there is a necessary connection between X and Y, there can be no explanatory gap between them. Schaffer demurs, and I agree with him, if only for another reason: the connection might be autonomous. The second premise claims there is an explanatory gap between the physical and the mental. Schaffer accepts this premise, and so do I (though with doubts based on the I-chain possibility). But here I pause to note a possible corollary: the mental is not *grounded* in the physical. At least it is not if we conceive of grounding as Fine does:

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[96] An interesting question I do not pursue here is the following: must a proposition with I-status have high epistemic status?

> [With grounding] we have as strict an account of the explanandum as we might hope to have. … If there is a gap between the grounds and what is grounded, then it is not an explanatory gap. (Fine 2012: 39)

However, the absence of grounding is compatible with the presence of a necessary connection. So that brings us to the conclusion: there is no necessary connection between the mental and physical. This Schaffer denies, having paved the way for doing so by his denial of premise 1.

Note what Schaffer concedes: that it is conceivable that there should be *p* without *m*, as in the case of zombies who share our physical states, but are utterly lacking in mentality. From this premise, some philosophers, notably David Chalmers, argue straightaway to dualism, bypassing any explanatory gap. The overall dialectic may be portrayed as follows:

It is conceivable that p & ~m; i.e., it is not *a priori* false that p & ~m or *a priori* true that p → m

↓

There is an explanatory gap between p and m

↓

It is not necessary that p → m.

Schaffer accepts the top line and the implication to the second line; what he denies is the implication from the second line to the third. But Chalmers would argue *directly* from the first line to the third, bypassing the idea of explanatory gappiness: (i) it is conceivable that p & ~m; therefore, (ii) it is possible that p & ~m; equivalently, it is not necessary that p → m; therefore, (iii) what it is for it to be the case that p is not the same as what it is for it to be the case that m. It is incumbent on Schaffer to reject the direct argument as well, and I take it he would do so by denying the conceivability-to-possibility step

To wrap up this section, I do not see gaps everywhere Schaffer does. I am happy to say that it is true *a priori* that if you have H, H, and O, you also have H_2O (that is, H + H + O, since the issue is the composite and not the molecule).[97] (This is my affirmation of the synthetic *a priori* again.) I do sense a gap between brain activity and the sensation of red. Might there nonetheless be a necessary connection between them? Schaffer says yes—but it turns out that what he means by this is that it might be a metaphysically necessary law that when you get the brain activity you get the red. The metaphysical necessity of laws he characterizes thus: they hold in all worlds with the same laws as our own. That, it seems to me, trivializes the claim that metaphysical laws are metaphysically necessary.[98] Let us suppose instead that we understand metaphysical necessity as necessity of the hardest or strictest kind. Might it be metaphysically necessary that when there is brain activity of a certain kind, there is a sensation of red? I don't know. But if the answer were yes, should we regard this as a case of brute necessity?

I feel the pull toward so regarding it, but there are other possibilities to consider. Perhaps psychophysical necessities are autonomous—perhaps all necessities are autonomous. Perhaps there is an I-chain leading from propositions with I-status to psychophysical necessities, though no human mind has yet been able to trace it. Or perhaps psychophysical necessities are explained precisely because they are derivable from psychophysical identities, as explored in section 9.

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[97] In defense of the gap between the three atoms and the composite, Schaffer notes that van Inwagen holds (1990: 81-82) that atoms never compose anything except when they compose a living being—and who wishes to say that a reputable philosopher's position is *a priori* false? But that, methinks, is taking charity and deference too far.

[98] Schaffer reports that some of his readers suspect him of being an emergentist. I see why, if he offers no further gloss on the metaphysical necessity of psychophysical laws.

On this last point—the purported explanation of necessary psychophysical correlations by psychophysical identities—there is a striking contretemps between the positions of Pautz and Hill on one side and Levine and other mysterians on the other (even though all are in the camp Chalmers calls "type B materialists"). Pautz and Hill cite it as a virtue of identities that they explain psychophysical correlations and the necessity of them to boot. Levine claims that psychophysical identities can coexist with an explanatory gap between their terms. The identification of pain with C-fiber firing, he says, "leaves the connection between it [pain] and what we identify with it [C-fiber firing] completely mysterious . . . a brute fact" (Levine, 357). Joining with him is Janet Levin, who holds that even though phenomenal states *are* neural states, the explanatory gap will always be with us, owing to the purely recognitional and nondiscursive nature of our concepts of phenomenal states (Levin 2007).

The tension I sense may perhaps be conveyed to the reader by asking the following question: can a correlation (or the necessity of one) be explained by an identity if the identity itself is unexplained, as presumably it is if an explanatory gap separates its terms? In the philosophy of science, we are willing to regard Kepler's laws as adequately explained by Newton's (or Newton's by Einstein's) even if for the highest law there is no explanation. But can it be that way in the philosophy of mind and modality? Can we appreciate the mindset of someone who makes the following speech?

> I totally understand why pain necessarily happens when C-fibers fire—it's because they are the same thing. But as to *why* they are the same thing, don't ask me—I have no clue.

To the extent that nothing makes the identity intelligible to us (as Levin and Levine suggest), the situation is even worse. Suppose I wonder why a genie always comes out when I rub a certain

lamp. If someone says the genie *must* come out when I rub the lamp because the emergence of the genie *is* the rubbing of the lamp—well, that is even more perplexing. The explanans is more mystifying than the explanandum.[99]

13. Brute Necessity in Ethics

That there are necessary truths in ethics is affirmed by Price, Kant, Moore, and Russell among others. I focus here on the views of Moore, who affirms as unequivocally as anyone that there are unexplained necessities in ethics. Let us review three Moorean tenets.

First, Moore holds that some moral truths are *necessary.* Statements about what has instrumental value—value as leading to something else of value—are contingent, including as they do a causal component, but statements about what is intrinsically valuable are necessary.[100] He also holds that value is strongly supervenient: of necessity, whenever a thing or state of affairs is good, it possesses some natural property that *necessitates* its being good.

Second, Moore would say (in contemporary parlance) that something's being good is *grounded* in its possession of some natural property. Mooreans speak after all not just of good-necessitating properties, but of good-*making* properties.

Third (and most famously), Moore denies that such necessitating and grounding relations hold in virtue of any *analysis* of moral properties. Propositions linking value to natural properties are one and all synthetic (section 6, p. 58). To maintain otherwise is to commit the naturalistic fallacy and to run afoul of the Open Question Argument.

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[99] I am not going back on my claim in section 9 that necessary correlations can be derived from identities. I am saying that derivation may only yield a relation of potential explanation, whereby we would have an explanation for the conclusion provided we had one (or did not need one) for the premise.

[100] Moore, sections 15-17 and 90. For an account of the pressure toward saying intrinsic value must be necessary, see Schroeder, section 5 and especially p. 18.

The Open Question Argument may be formulated as follows, where N is any natural property proposed as a definition or analysis of *good*:

1. If *good* were analyzable in terms of N, it would not be an open question whether N things are good.

2. But such questions are always open. One can suppose that something is N and still wonder: is it good?

3. Therefore, *good* is not analyzable in terms of N.[101]

Some would respond to Moore's argument by saying his standards for analysis in premise 1 are too strict—in fact, they lead right into the paradox of analysis. It is hard to see how any analysis of any property could survive the open question challenge unless it were an analysis that gave back as analysans the very property that went in as analysandum, which is precisely the paradox of analysis—an analysis, if true, is trivial. It is no accident that many years later, Moore confessed that his conception of analysis gave rise to the paradox (1942).

Others would respond to Moore's argument by saying that even if its conclusion is true, moral properties are nonetheless reducible to or identifiable with natural properties in a way that does not require analytical reduction. The reduction could be effected by a necessary but *a posteriori* identity, of which Kripke's "water is H_2O" is a paradigm. Such is the position of the new naturalists in ethics, also known as new wave moral semanticists or Cornell realists.[102] For them I raise just one question: granted that they are not vulnerable to the Open Question Argument,

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[101] The flavor of the argument is conveyed in the following quotations: "Whatever definition be offered, it may be always asked, with significance, of the complex so defined, whether it itself is good" (sec. 13, p. 67). "But whoever will attentively consider with himself what is actually before his mind when he asks the question 'Is pleasure (or whatever it may be) after all good?' can easily satisfy himself that he is not merely wondering whether pleasure is pleasant" (sec. 13, p. 68). The phrase 'open question' occurs on p. 72, where Moore equates 'this is not an open question' with 'the very meaning of the word decides it.'

[102] See Boyd 1988 for defense and Horgan and Timmons 1992 for discussion. Horgan and Timmons claim the new realists face an Open Question Argument of their own.

does their view offer an explanation for why it is necessary that N things are good? Or does it involve an explanatory gap just like the one some find between fiber firing and pain?

For my purposes, what is interesting about the Open Question Argument is that if sound, it may be used to refute not only naturalist analyses of *good*, but also the thesis that truths of the form *necessarily, N things are good* are true in virtue of the natures of either goodness or N.[103] Not only is goodness not definable so as to make it analytic that N things are good; it does not even lie in the nature of goodness (or of N) that N things are good. I say this because it seems plausible that natures are as effective as definitions in closing questions. If it lies in the nature of either N or G that N things are G, the question 'this is N, but is it G?' is closed.[104]

So Moore cannot approve of even the safe and stupid answer to the question "why is it necessary that N things good?"[105] For better or worse, his conception of goodness seems to make him a prime proponent of brutality in ethics.

Well, that verdict would be too hasty. There are four explanatory statuses for necessary truths that I have not ruled out: (i) bruteness, (ii) autonomy, (iii) being explained by other necessary truths, and (iv) being intrinsically explained. As for (iv), the main supervenience basis for

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[103] Is the view that truths about goodness do not hold in virtue of the nature of goodness already implied by Moore's view (61) that goodness is simple? No; but perhaps the simplicity view does imply that there are no truths that hold because it is *part* of what it is to be good that they hold.

[104] What I am saying in this paragraph requires qualification: If it lies *immediately* in the nature of either N or G that N things are G, the question 'are N things G?' is closed. But couldn't it lie *mediately* in the nature of N or G that N things are G, in which case the question might not be closed? Well, if it lies mediately in the nature of N or G that N things are G, then there is a mediating property M such that (i) it lies immediately in the nature of M or G that M things are G, and (ii) it lies immediately in the nature of M or N that N things are M. (The argument I am giving works just as well if there is a series of mediators and not just one.) Case I: M is a natural property. Then clause (i) is ruled out by the Open Question Argument. Case II: M is a moral property. Then clause (ii) is ruled out by the Open Question Argument. So the Open Question Argument rules out that it lies in the nature of N or goodness, either mediately or immediately, that N things are good. Thanks to Nina Emery for getting me to address this point.

[105] The position I am attributing to Moore is also attributed to him by Rosen: goodness is both necessitated by and grounded in natural properties, but these relations of necessitating and grounding do not hold in virtue of the natures of either the moral or the natural properties (p. 121 and section 13).

intrinsic explainedness I have considered is truth by virtue of natures, which is precisely what I have suggested Moore cannot allow for the fundamental truths of ethics. But perhaps there could be some other supervenience base I have not discussed. As for (iii), it seems possible to explain some ethical truths by reference to others in the case of statements of instrumental value, but not when we reach statements of intrinsic value. If we eliminate (iii), however, we are still left with with (ii) as well as (i). Perhaps Moore would be an advocate of autonomy rather than brutality.

Let me make clear what I am and am not attributing to Moore. First, he is as sure as anyone that it is necessary that friendship (for instance) is good; this is one of the self-evident truths about what possesses intrinsic value. We have here another putative case in which high epistemic status is not accompanied by high explanatory status. Second, Moore is not committed to saying that *all* necessity is either brute or autonomous. He might still hold that *all figures with three sides have three angles*, though synthetic, is *a priori* and true in virtue of the natures of the properties its relates.

No room to wonder why. Reflection on the Open Question Argument suggests another way in which we might think about intrinsic explainedness (by which I mean I-status rather than its base). Might we say that a proposition Np is intrinsically explained when there is no room to wonder why it is necessary that p? That would be characterizing I-status as something like the complement of O-status or Moorean openness.[106]

In what sense might there be "no room" to wonder why something is the case (at least if you understand p)? For those who think I-status supervenes on being derived from 'just is' statements taken in Prior's strict way (rather than Rayo's loose way), there might *literally* be no

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[106] A careful examination of the relation of I-status to O-status would have to consider the relations among wondering whether p, wondering why p, wondering whether necessarily p, and wondering why necessarily p.

room. Wondering why it is necessary that siblings share parents would be the same as wondering why it is necessary that siblings are siblings, and that is arguably impossible. *No room* would mean *no possibility*. (Except for those who have been thinking about the topics of this paper for too long!)

For those who think I-status does not always supervene on Prior-style identities, "no room" would have to mean something else. A natural thought is that no one who understands what it is to be the case that p (say, that triangles have three sides) *should* wonder why it is necessary that p; they positively *ought not* to wonder this.[107] *No room* would be a normative status.[108] It is an interesting question what this normative status would supervene upon. But a question of greater moment arises when we reflect that such a normative truth presumably holds necessarily if it holds at all. What explains *that* necessity? Why is it necessary that no one should wonder why p? Could it with any plausibility be said to lie in the natures of wondering, oughtness, whyness, or the constituents of p? And if not, have we not got on our hands another necessity in the normative sphere that is either autonomous or brute?[109]

13. Autonomy Revisited

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[107] Because the thing has an obvious explainedness about it or because the thing is not apt for explanation? I'm not quite sure I've characterized I-status as opposed to autonomy. See section 4 on the fine line between these two.

[108] Compare Rosen: "Anyone who knows the nature of disjunction . . . should find it totally unmysterious that our original disjunctive fact [p v q] is grounded in the truth of its true disjunct" (131).

[109] Another possibility is that normative claims (or even modal claims more generally) are not apt for explanation because they are not even apt for truth. Exploration of that possibility would take far more space than I can give it here, but I cannot forebear mentioning one objection to expressivist views about necessity. Suppose one holds (i) that claims of the form 'Np' are neither true nor false (as in the view attributed to Wittgenstein in Forbes 1985, 219-220). One must surely allow (ii) that the p component in such claims is a content with a truth value; otherwise what would one be evincing one's attitude toward? But then one cannot make sense of iterated modalities. The inner 'Np' in 'NNp' would have a truth value according to (ii) and no truth value according to (i). (I model this objection on an objection to expressivist theories of epistemic evaluation developed in chapter 5 of Cuneo 2007.)

The whole point of the category of the autonomous is to make room for propositions whose necessity is unexplained, but not on that account brute. I have used the phrase "not apt for explanation" as a short characterization of this status, but the phrase itself may not be apt. It may suggest that autonomous items are not even the sort of thing that can be explained, or that they are for some other reason incapable of being explained, but that is not what I intend.[110]

Surmising from my "nonaptness" characterization that an autonomous proposition would be a proposition whose necessity is not susceptible of explanation (symbolized below as Np but ~◊ENp), Jonathan Kvanvig has observed that a proof can be given analogous to Fitch's "paradox of knowability" for the conclusion that if all necessity is explainable, all is explained (personal communication). The paradox of knowability is this: it is provable that if there is a single proposition that is in fact unknown, then there will be propositions that are unknowable. Contraposing, if everything is knowable, everything is known. The analogous "paradox of explainability" would run as follows:

1. Suppose (p)(Np → ◊ENp).
2. Suppose ∃p(Np & ~ENp).
3. Np & ~ENp—instance of 2.
4. N(p & ~ENp)—from 3 and the noncontingency of being explained or not.
5. ◊EN(p & ~ENp)—from 1 and 4.
6. In some world w, EN(p & ~ENp)—from 5.
7. In some world w, ENp & ~ENp—from 6 and the fact that EN is distributive and factive.

But 7 is impossible. Hence

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[110] Brian Talbot has pointed out to me that just as "apt for truth" is not the same as "can be true" (for even necessary falsehoods have truth values), so "apt for explanation" is not the same as "can be explained."

8. ~∃p(Np & ~ENp), i.e., (p)(Np → ENp)—from 2-7, reductio.

9. (p)(Np → ◊ENp) → (p)(Np → ENp)—from 1-8, conditional proof.

That is, in the realm of necessity, if everything is explainable, everything is explained.

What is the significance of this conclusion? If we equate the autonomous with the unexplainable, another way of stating it would be 'if some necessities are brute, then some are autonomous'. That might seem to be a defense of the category of the autonomous. But as was said above, I do not wish to equate the autonomous with the unexplainable.

To see why, let us first note that if we have the noncontingency of explanatory status as a premise as we do in the argument above, we can reach its conclusion directly without using the Fitch strategy. Assuming Np & ~ENp, we would get Np & N~ENp by the noncontingency premise. That in turn implies ∃p(Np & ~◊ENp), completing a conditional proof of the contrapositive of 9. Moreover, by this route, we can prove something even stronger than 9, viz.,that every truth whose necessity is explainable is a truth whose necessity is explained. ('Every F is a G' is stronger than 'If everything is an F, everything is a G'.)

Given this result, if we equated the autonomous with the unexplainable, it would turn out that nothing is brute. Anything that satisfied one half of the definition of bruteness (being unexplained) would fail to satisfy the other half (being apt for explanation). I do not wish to banish bruteness that easily.

Instead of thinking of autonomous items as being insusceptible of explanation, one may prefer to think of them as items not *needing* explanation, which is compatible with their sometimes getting it. A putative parallel with epistemology may again help. Some things that are self-evident may nonetheless receive justificatory arguments, as when the transitivity of

identity is derived from Leibniz's Law. That isn't really the precedent we seek, however. When we read it back into explanation theory, what we get is 'explained by something else & also self-explanatory (= inherently explained)', rather than 'explained by something else & also autonomous'. The autonomous is supposed to be a distinct category from the inherently explained, a matter of not calling for explanation rather than intrinsically having it.

Let us try one last parallel with epistemology. Chisholm once suggested that foundational propositions could be thought of in either of two ways, as being self-justifying or as being neither justified nor unjustified. He said the first status is comparable to the prime mover that moves itself, the second to the prime mover unmoved. But if we think of foundational propositions the second way, what distinguishes them from any old unjustified propositions? His answer was that they are capable of functioning as evidence for other things (Chisholm 1966, 29-30). If we pursue the analogy, then, we would say that autonomous necessary truths are necessary truths that are or may be unexplained themselves, but which are capable of explaining other necessary truths. They are the unexplained explainers in the realm of necessity.

I find this suggestion at best incomplete. What about two necessary truths can make one but not the other fit for explaining others? Must this difference not supervene on some deeper difference, and what would it be? That one of them has I-status and the other not? But then the autonomous would again be collapsing into the inherently explained, from which it is supposed to be a distinct category.

More needs to be done by way of elucidating autonomy and making clear how it is a separate category from bruteness on the left and inherent explainedness on the right. I hope others or I will carry the project further.[111]

14. Conclusion

Having surveyed a number of views on whether necessary truths have or need explanations and what these explanations might look like, let us now consider the bearing of these views on arguments of the type that launched this paper—arguments from the avoidance of brute necessity.

As noted, such arguments may take either strong or weak forms, schematized as follows:

Strong

1. There are no brute necessities.
2. Unless X is defined thus (or unless view V is true), proposition P would be a brute necessity.
3. Therefore, X is defined thus (or view V is true).

Weak

1. We should minimize brute necessity. *Ceteris paribus*, a theory that countenances fewer brute necessities is better than one that countenances more.
2. Unless we define X thus (or unless view V is true), proposition P would be a brute necessity.
3. Therefore, we should define X thus (or adopt view V). A theory that incorporates that definition or view is superior (*ceteris paribus*) to one that does not.

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[111] After noting the role of identities in explaining psycho-neural correlations, Block and Stalnaker observe, "Identities don't *have* explanations" (Block and Stalnaker 1999, 24). Kim expands on their point as follows: "Identities are not themselves subject to explanatory challenges—that is, they are not the sort of thing that can be, or need to be, explained. As long as it makes sense to ask "Why is pain identical with [C-fiber firing]?," the explanatory gap will remain open. Block and Stalnaker understandably take the view that identities are not explainable" (Kim 2005, n. 31). I find in Kim's remark three different tacks one might take in unpacking autonomy: autonomous items can't be explained, they need not be explained, there is no sense in asking for an explanation of them.

The weak form is weaker in its first premise and in its conclusion. It does not conclude outright that a certain definition or view is correct, but only that there is a presumption in favor of accepting it.

I don't myself see much rationale for giving a weak version of the argument if you are not prepared to give the strong. If there are any brute necessities at all, or if it is even possible for there to be brute necessities, the main reason for keeping their number down evaporates; if you accept a single brute necessity, you may as well accept a million. Compare: if you accept a single contradiction, you may as well accept a million, rather than going to the lengths of the para-consistent logicians to confine them.

Now let's consider the bearing on arguments from bruteness of several of the major positions either advocated or left unrefuted in this paper.

All or some necessities are brute. I do not like this position, but I have not conclusively ruled it out. I have flagged ethics as one arena in which some philosophers may find and accept brute necessities, and the mind-body problem is another. (Think of philosophers who say there is an explanatory gap beween physical facts and mental facts even though physical facts necessitate mental facts, as in Levine 1983.) Obviously, the existence of brute necessities would make the strong argument unsound, but the weak form would remain standing—unless it has no rationale apart from the strong.

All or some necessities are autonomous. I have argued that truths about natures or essences are best regarded as autonomous (section 7), and in some moods I think that all necessities are autonomous (see the argument from contrastive explanation in section 4). If all necessities are

autonomous, premise 2 in both the weak and the strong arguments is false. If only some necessities are autonomous, premise 2 in each argument will require further examination, depending on the case at hand.

Perhaps arguers from the avoidance of brute necessity could accept the category of the autonomous and still reach their conclusions by taking a page from Rayo. "You should accept our view," they may say, "precisely in order to secure autonomy rather than bruteness. Our aim is not to explain things, but to remove the need for explanations, and this we do by accepting 'just is' statements—for example, for an object to be square just is for it to occupy a square region."

In reply, I repeat my suggestion that necessity as such may make for autonomy, even when it does not flow from a 'just is' statement. I also note that there are necessities that do not seem to flow from 'just is' statements and for which the question why they are necessary is therefore not closed for Rayo's reason. *There is a prime number greater than seven*—what removes the need to explain why that is necessary? For there to be a prime number greater than seven *just is* for . . . what? There doesn't seem to be a statement especially suited for filling the blank—unless you accept Rayo's intensionalism, in which case *any* necessary truth can fill the blank**.**

All necessities are explained by higher-order necessities, Np by NNP and so on forever. I cited three arguments against this possibility: Bolzano's argument, the Pruss proof, and the argument from the well-foundedness of grounding. But perhaps there are ways around these arguments. If so, and if explanation of any necessity by a higher-order necessity were allowed, premise 2 of both the weak and strong arguments would be false. Regardless of whether we

define object shape in terms of region shape, the necessity that a region and an object occupying it have the same shape would be explained by the fact that it is necessary that this necessity hold.

All necessary truths are grounded in the fact that it lies in the natures of their constituents (or of some entities) that they hold. This is the safe and stupid view, and it supports the first premise of the strong argument. If qualified to admit essentialist truths or truths about natures as autonomous (so as to avoid explanation by infinite iteration), it would still support the first premise. In either case, however, the second premise could now be challenged in some of its intended applications. Consider the argument for shape extrinsicism. The safe and stupid view implies that the necessity that an object exactly occupying a square region be square holds in virtue of the natures of some entities, but which entities? The shape extrinsicist would say it is true because it lies in the nature of square objects to occupy square regions, but there are other possibilities to consider. One of them, recommended by Kleinschmidt, is that it lies in the nature of the exact occupancy relation that if O exactly occupies R, O is square iff R is square. Or consider the argument for the nothing-over-and-aboveness of mereological sums. The necessity that the sum $a + b$ exists if a and b exist might be explained by saying that it lies in the nature of $a + b$ (or perhaps in the natures of a, b, and +) that $a + b$ exists if a and b do. As far as I can see, that explanation works regardless of whether $a + b$ is something over and above a and b. Finally, consider Armstrong's argument that we should believe in universals so we do not have to accept the symmetry of resemblance as a brute necessity, or Dorr's argument that we should disbelieve in universals so we do not have to accept the impossibility of circles in instantiation as a brute necessity. Both authors see reduction to logical truths by means of definitions or analyses as an approved method of explaining necessities. But why are logical truths necessary? If Dorr

and Armstrong desired only to minimize bruteness and not eliminate it, they could accept logical truths as brute necessities. I rather suspect that they would prefer to say logical truths are either autonomous, true by virtue of the meanings of their terms, or true by virtue of the natures of their constituents. But then why can't whichever of these statuses they claim for logic be claimed directly for the allegedly brute truths—for example, that it lies in the nature of resemblance to be symmetrical or of instantiation not to go round in a circle?

In conclusion, arguments from brute necessity are an inconclusive lot. Before they can establish their conclusions, there are several alternatives that need to be considered and ruled out, including necessities that are truly brute, necessities that are autonomous, necessities that are explained by higher-order necessities, and necessities that are explained by appeal to the natures of constituent terms other than the arguer's chosen constituents. These are things to be brooded about before the arguments in question are bruited about.[112]

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[112] For comments on earlier versions of this paper, I am indebted to Matt Davidson, Janet Levin Adam Pautz, Mark Schroeder, two anonymous referees, and colloquium audiences at Dalhousie University, Washington University in St. Louis, the University of Missouri at Columbia, and MIT.

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