From Constitutional Necessities to Causal Necessities*

Jessica Wilson†

Draft: February 6, 2010

Humeans and non-Humeans commonly and reasonably agree that there may be necessary connections (“necessities”, for short) between entities that are identical—e.g., Hesperus and Phosphorus, water and H$_2$O—or merely partly distinct—e.g., sets and their individual members, fusions and their individual parts, instances of determinates and determinables, members of certain natural kinds and certain of their intrinsic properties, and (especially among physicalists) certain physical and mental states. Humeans maintain, however, as per “Hume’s Dictum”, that there are no necessary connections between entities that are wholly distinct; and in particular, no necessary causal connections between such entities (even when the background conditions requisite for causation are in place). The Humean’s differential treatment appears principled, in reflecting that commonly accepted necessary connections involve constitutional relations (involving, roughly, existential ontological dependence between certain entities), whereas wholly distinct entities (notably, causes and effects) do not constitute each other in this sense. I’ll argue, however, that the appearance of principle is not genuine, as per the following conditional:

Constitutional $\rightarrow$ Causal: If one accepts certain constitutional necessities, one should accept certain causal necessities.

This result provides needed leverage in assessing the two main frameworks in the metaphysics of science, treating natural kinds, causes, laws of nature, and the like. These frameworks differ primarily on whether Hume’s Dictum is taken as a working constraint on theorizing; and it has proved difficult for either side to criticize the other without presupposing their preferred stance on the dictum, hence talking past one another. The arguments for Constitutional $\rightarrow$ Causal are based, however, in general and independent considerations about which facts in the world might plausibly warrant our beliefs in constitutional necessities involving (in particular) broadly scientific entities. The Humean can respond to these arguments, which reveal a deep tension in their view, only at attendant costs of implausibility and adhocery. The non-Humean framework doesn’t face any such tension between constitutional and causal necessities, however, and so in this respect comes out ahead.

*Please note that this is work in progress. Thanks to participants of the AHRC Metaphysics of Science conference ‘Nature and its Classification’, Helen Beebee, Benj Hellie, Nigel Leary, Francis Longworth, and Jonathan Schaffer, for helpful comments.

†Department of Philosophy, University of Toronto; jessica.m.wilson@utoronto.ca

1Somewhat more precisely, Hume’s Dictum states that there are no metaphysically necessary connections between wholly distinct, intrinsically characterized entities. See Wilson forthcoming for further precisifications and interpretive options.
1 Constitutional necessity

1.1 Schaffer on necessities of identity vs. causal necessities

As motivation for the seemingly principled way in which Humeans may distinguish between constitutional and causal necessities, I want to first consider a proposal made by Schaffer (2004), that aims to provide a principled basis for accepting necessities of identity (a limiting case of constitutional necessity) while rejecting casual necessities.

Schaffer, like Hume, intuits that actual causes might have different effects; that, e.g., it is possible that like charges attract. Hume assumed that conceivable was a sure guide to possibility; but in a post-Kripke climate, what force should intuitions of causal contingency have? After all, some (e.g., Wiggins) intuited that identities were contingent—that Hesperus might not have been Phosphorus, or that water might not have been $H_2O$—but they were wrong; hence such intuitions of contingency are either mistaken or misdescribed. Why shouldn’t intuitions of causal contingency receive a similar treatment? Indeed, Shoemaker (1998) advocates a Kripkean redescription strategy, in defending his causal necessitarian view:

Let the law be that strychnine in a certain dosage is fatal to human beings. We can grant it to be imaginable that ingesting vast amounts of what passes certain tests for being strychnine should fail to be fatal to what passes certain tests for being a human being, but deny that this amounts to imagining a human being surviving the ingestion of that much strychnine. (p. 62)

Schaffer rejects Shoemaker’s suggestion on grounds that, unlike the case of identity, there is no compelling “independent reason” for questioning intuitions of causal contingency:

The Kripkean manoeuvre is compelling for water = $H_2O$ because there is an identity, and identities are necessary [Kripke 1980: 97–105]. Hence any conception of water being $XYZ$ can only be an illusion. But the relation between [e.g.,] charge and Coulomb’s law is governance rather than identity, and hence no comparable compulsion to necessity exists. There is no independent reason for thinking that any misdescription is taking place. (p. 218)

The sort of independent reason Schaffer has in mind (confirmed in p.c.) is one that (as per the talk of “compulsion”) is effectively a proof of the sort available for the case of identity. In fact, Kripke does not rely on this proof, mentioned only in the second edition preface to Naming and Necessity), in arguing that intuitions of the contingency of identity are mistaken (he rather appeals to semantic intuitions exercised in consideration of hypothetical scenarios). But in any case it remains that there is a compelling, broadly logical proof of the necessity of identity, while there is not (we may assume) any such proof

---

2 Or so the story goes. I hedge here since it seems to me a live possibility that in the first instance, the term ‘water’ is intended (e.g., by hydrologists and ordinary language users) to mark a broadly functional, higher-level kind, such that ‘being $H_2O$’ isn’t in fact part of the meaning of ‘water’. That said, I’m happy to allow that higher-level natural kind terms may incorporate lower-level aspects of actual reality as part of their intended meaning, and here grant for the sake of argument that water is such a term.

3 Hence it is that Schaffer does not find it necessary to consider any of the broadly metaphysical and epistemological considerations that Shoemaker raises in support of his causal view of properties.
for the necessity of causal connection; so Schaffer’s proposal does provide a principled basis for accepting identities of necessity while rejecting causal necessities.

On the other hand, Schaffer’s proposal doesn’t show how Humeans are generally within their rights to accept constitutional necessities, holding between entities that are not wholly distinct. As above, Humeans and non-Humeans reasonably agree that there may be necessary connections between entities that are not wholly distinct, including, e.g., sets and their individual members, fusions and their individual parts, instances of determinables and determinates, members of certain natural kinds and certain of their intrinsic properties, and (assuming non-reductive physicalism) certain physical and mental states. But the relations at issue in such necessities—set membership, parthood, the determinable/determinate relation, essential instantiation, realization—hold between distinct entities, and so the proof of the necessity of identity does not apply to them. Moreover, in none of these cases is there any compelling proof of their necessity. There is no proof from the axioms of set theory to the conclusion that sets are necessarily constituted by their members; set theory is silent on the modal individuation of sets. Nor is there any proof from the axioms of mereology to the conclusion that fusions are necessarily constituted by their parts. In other cases of commonly accepted constitutional there is not even a set of candidate axioms characterizing the relation at issue from which we might try to derive the associated modal conclusion.

Rather, to the extent that anything resembling proof is involved in establishing such necessary connections, it is of one or other broadly non-logical variety, associated with metaphysical investigation into the entities or associated concepts at issue, as involving contemplation of hypothetical scenarios, transcendental arguments, or (perhaps concurrently with the previous approaches) inference to the best explanation of the various semantic, scientific, and philosophical facts. There are, of course, disputes both about how to implement these strategies and over the status of the results so gained (e.g., as a priori or not, as defeasible or not). These disputes aside, it remains that these sorts of “proofs”, which are the very life-blood of philosophical theorizing, are, while often convincing, not the sort to compel assent, in anything like the way a broadly logical proof is able to do.5

4One might wonder if such constitutional necessities might be understood as cases of partial identity, with the proof of the necessity of the connection in question grounded, somehow or other, in that available for the case of identity. But it is unclear how the indirect proof would go, and in any case accounts of the above relations in terms of partial identity are in short supply (with Baxter’s 1988 and 2001 accounts of parthood and instantiation and parthood being notable exceptions) and generally seen as unacceptably revisionary (requiring, e.g., rejection of Leibniz’s law). Some suggest that parthood is analogous to partial identity (see Lewis 1991, Sider 2007); but it is even less clear how the necessity of a relation that is merely analogous to (partial) identity can be grounded in that of identity. So there is little hope of gaining the necessity of the above constitutional relations by forcing them into the mold of identity. Concerns about “compelling proof” aside, similar remarks applies to the mereological principles floated in Cameron (forthcoming), as providing Humean-friendly reason to accept necessary connections between “overlapping” entities. In fact, Cameron doesn’t think such principles—most promisingly, compositional essentialism—are true, since on his very general understanding of parthood, wholes and parts may come apart (e.g., a cup might exist through a change in its composing molecules). I don’t think these cases bear on the parthood relation targeted by classical mereology, but even supposing compositional essentialism were generally true there is little reason to think that constitutional relations can generally be forced into the mold of mereology.

5Again, so the story goes. If logic is permeable to empirical or other considerations (as per Quine
To sum up: Schaffer’s criterion of compelling proof warrants accepting necessities of identity while rejecting causal necessities, but fails to warrant acceptance of many constitutional necessities that Humeans and non-Humeans alike commonly and reasonably accept. In assessing this result, it’s important to keep in mind that Humeans are not supposed to be in the business of denying constitutional necessities. Constitutional necessities involve necessary connections between entities that are not wholly distinct; hence—at least on the face of it—do not fall under the purview of Hume’s Dictum, which dictum effectively characterizes the Humean’s view. Relatedly, part of the indirect motivation for Hume’s Dictum surely lies in its seeming that one can accept it without having to generally reject all or most commonly accepted constitutional necessities. As such, a better way for a Humean to resist taking intuitions of causal contingency to be mistaken would be to identify a principle that makes general room for constitutional necessities (including but not restricted to necessities of identity), while excluding causal and other necessities between wholly distinct entities, as Hume’s Dictum requires.

1.2 Constitutional necessity

A principle seemingly able to do this work isn’t hard to find. As above, commonly accepted necessary connections between not-wholly-distinct, intrinsically characterized entities are cases of constitutional necessity (where identity is understood as a limiting case of constitution). The Humean may correspondingly suggest that constitutional necessity is the only sort of necessity between intrinsically characterized entities. In other words, they may endorse:

Constitutional necessity: Intrinsically characterized entities are necessarily connected just in case (i) the entities are not wholly distinct, and (ii) at least one entity constitutes the other.

What is it for entities to be constitutionally connected? For present purposes it will suffice to work with a rough general account, according to which a constitutes b only if the existence of b is ontologically dependent on the existence of a (for short: b is existentially ontologically dependent on a). The rough account should be interpreted as allowing for variations on the theme, reflecting the ontological categories of the entities involved—e.g., for properties the ontological existence claims are best seen as involving tokens of the types in question. Note that this understanding of constitution is neutral on the order of metaphysical priority, or relative fundamentality, of the entities involved: there is no presupposition that constituting entities are somehow more fundamental than (alternatively: serve as the truthmakers for claims about) constituted entities. For example, being scarlet is existentially ontologically dependent on being red, but on some accounts determinates are more fundamental than (serve as the truthmakers for claims about) determinables. For this reason, while I agree with Cameron forthcoming that necessary connections acceptable to the Humean must be grounded in ontological dependence, I disagree that the dependence in question should be further cashed in terms of truth-makers.

1951/53) then even a broadly logical proof may fail to be absolutely compelling.
identity. Second, the principle entails Hume’s Dictum, since it rules out necessary connections between wholly distinct entities (as per (i)). Third, the principle does not countenance as necessary any and all connections between entities that are not wholly distinct: it is moreover required that the entities be constitutionally connected (as per (ii)). As such, the principle doubly warrants the Humean’s rejection of causal necessities, since (all parties agree) causes and effects are wholly distinct, and neither constitutes the other.

Constitutional necessity, if true, would provide the Humean with a general, principled basis for accepting constitutional necessities while rejecting causal necessities; conversely, it is hard to see what other sort of principle would do the general trick. Endorsement of Constitutional necessity, (or some principle in the ballpark) thus appears to provide the best case for Humeans being able to have their constitutional necessities and Hume’s Dictum, too. I will now argue, however, that a closer look at what facts might plausibly justify our belief in certain commonly accepted constitutional necessities indicates that Constitutional necessity is false, for these facts presuppose that there are certain causal necessities.

Before continuing, I want to highlight a difference between my upcoming argument, and Bird’s (2001) argument aiming also to show that acceptance of certain constitutional necessities invokes commitment to certain causal necessities. Bird focuses on a necessity of identity, holding between salt and NaCl. Roughly speaking, Bird argues that the truth of Coulomb’s law is implicated both in the holding of the relevant ionic bonds between Na and Cl, and in the dissolution of these bonds in water; hence a world where salt exists is a world where Coulomb’s law is true; hence a world where salt dissolves in water. Concerns may be raised about this argument (see, e.g., Beebee 2002) but for present purposes my concern is with the scope of its conclusion. Bird grants that fundamental causal laws are contingent, and aims only to show that if certain fundamental laws are in place, then certain non-fundamental laws are necessary. Consequently, Humeans can grant his conclusion, restricting their denial of necessary connections to those holding between wholly distinct entities that are sparsely, as well as intrinsically, characterized. This is, as it happens, how Lewis understands his thesis of Humean supervenience: only the fundamental constituents of the Humean mosaic are subject to Hume’s Dictum; other entities receive different treatments but (as per the supervenience claim) both non-fundamental entities and laws necessarily follow once the contingent fundamental facts and laws are in place. Bird’s conclusion thus doesn’t provide leverage sufficient for a comparative assessment of Humean vs. non-Humean frameworks in the metaphysics of science. My argument aims to apply to constitutional necessities involving fundamental (or not obviously non-fundamental) as well as non-fundamental entities, with the associated consequent leverage for assessing Humeanism.

7How might we be justified in believing that entities are constitutionally connected, when they are? I won’t here provide a general answer, on the Humean’s behalf or otherwise. Shortly, however, I will consider what facts about the entities at issue in certain commonly accepted constitutional necessities might plausibly justify our belief in these necessities.
2 From constitutional necessities to causal necessities

My interest here is with competing Humean vs. non-Humean frameworks in the metaphysics of science, so let us consider three representative claims, expressing certain constitutional necessary connections between broadly scientific entities:

(N1) Necessarily, anything that is scarlet is red.

(N2) Necessarily, anything having a certain mean molecular kinetic energy (MMKE) has a certain temperature.

(N3) Necessarily, anything that is an electron is negatively charged.

N1–N3 express necessary connections between broadly scientific entities that are either identical or not wholly distinct, in being connected by way of the determinable-determinate relation (N1), identity or realization (N2), or natural kind constitution, where members of a natural kind essentially have an intrinsic property (N3). In each of these cases it is plausible that the entities at issue stand in constitutive relation: (instances of scarlet) existentially ontologically depend on (instances of) red; samples of salt existentially ontologically depend on samples of NaCl; (token) electrons existentially ontologically depend on (instances of) negative charge.

None of these claims is unassailable. Most saliently, one might reject N1 on Quinean grounds, N2 on anti-Kripkean grounds, and N3 on anti-essentialist grounds. Such sceptical positions are rare, however, among those aiming to elucidate the nature of natural reality, and moreover are treated, by Humeans and non-Humeans alike, as orthogonal to acceptance or rejection of Hume’s Dictum. Hence it is that Humeans and non-Humeans alike are typically happy to accept analyticities such as N1 and realization or identity-based conditional claims such as N2. (Note also that N2 is the sort of claim that, when involving certain physical and mental states or properties, physicalists of both Humean and non-Humean persuasions accept.) One may wonder whether Humeans should balk at acceptance of N3, on grounds that negative charge is somehow fundamentally dispositional, in a way at odds with Hume’s Dictum. Answer: no. Lowe (2006), for example, endorses Hume’s Dictum as applied to causal necessities, and also endorses N3 (“all of a kind’s nature may be essential to it in the simplest cases, such as that of the kind electron”); and Lewis’s (1986, p. 1) remark that “there might have been altogether different

---

8One may wonder if being negatively charged is an intrinsic property. Answer: yes, on all standard accounts of “intrinsic”. So, for example, an entity could be negatively charged even if it was a “lonely” entity (the only entity existing at a world). More specifically, the having of this property by an entity does not entail that the entity stands in any causal relation R to another entity. Hence Lewis (1986, p. 77) says, “We tend to think that positive and negative charge are perfectly natural intrinsic properties of particles”.

9Alternatively, N2 might be rejected on grounds that temperature is strongly emergent from, rather than identical to or realized in, MMKE. A similar option is available to those denying that mental states are physically realized; however, it seems reasonable to assume that temperature is not strongly emergent.

10On the subject of anti-essentialism: one may wonder if Lewis, a paradigmatic contemporary Humean, is committed to anti-essentialism as a consequence of his counterpart-theoretic account of the truth of de re modal claims. Answer: no, not in any sense relevant to the present discussion. On Lewis’s counterpart theory, there are appropriate contexts in which N3 (as well as N1 and N2) is true, and the discussion to follow may be seen as restricted to such contexts.
laws of nature; and instead of electrons and quarks, there might have been alien particles, without charge or mass or spin but with alien physical properties that nothing in this world shares” (my emphasis) is clearly indicative of Lewis’s acceptance of (a context in which) N3 is true. Crucially, Humeans and non-Humeans agree that negative charge is a (good candidate for a) fundamental intrinsic property of fundamental entities; what they disagree about is whether or not such an intrinsic property is essentially dispositional. Each position is, on the face of it, compatible with maintaining that it is necessary that electrons have the intrinsic property in question. Relatedly, Humeans have good reason to insist (or at least hope) that they are within their rights to accept N3 while accepting Hume’s Dictum, for as previously suggested, it is one thing to maintain that wholly distinct natural entities are entirely “loose and separate,” and quite another to maintain that fundamental natural entities have no essential intrinsic properties.¹¹

What I now want to consider is: what facts about the entities at issue in N1–N3 are plausibly cited as justifying our beliefs in these constitutional necessities? It is common to separate metaphysical and epistemological questions, but the question I am asking has both metaphysical and epistemological aspects. What I am asking is: what metaphysical facts are plausibly cited as justifying our beliefs in N1-N3? More specifically: what metaphysical facts about the entities at issue in N1-N3 are, first, such that their holding would plausibly ground the truth of the associated claim, and second, such that we are plausibly in position to justifiably believe these facts to be in place?¹²

Call the sort of facts that would answer my question the “justificatory” facts. I’ll now argue that the non-Humean has metaphysically informative and epistemologically plausible accounts of the justificatory facts at issue in N1-N3, which accounts presuppose that there are causal necessities. By way of contrast, the Humean, in rejecting causal necessities, can only offer accounts of the justificatory facts at issue in N1–N3 that are metaphysically unilluminating and epistemologically implausible. The best accounts of what metaphysical facts are plausibly cited as justifying our beliefs in certain constitutional necessities thus presuppose that there are causal necessities. I will conclude that Constitutional → Causal is true: if one accepts any of the above constitutional necessities (or any of the multitude of variations on their themes), one should accept causal necessities.

2.1 The non-Humean’s accounts
Let us start with the non-Humean’s accounts of the justificatory facts at issue in N1–N3. Necessarily, anything that is scarlet is red. Claims about the connections in paradigmatic cases of the determinable/determinate relation are typically thought to be justified a priori, given competence with the constitutive terms or concepts. This much doesn’t settle the question of what the justificatory facts are at issue in N1, however. As Williamson

¹¹This claim moreover commits one to denying that there are any fundamental natural kinds, given that membership in any fundamental natural kind requires, at least in part, the essential having of certain intrinsic properties.

¹²This question presupposes a broadly realist semantics and ontology for N1–N3. This assumption begs no questions here, since Humean and non-Humean parties to the present debate are all realists, and indeed, scientific realists. See, e.g., Lewis 1970 and Bird 2007.
(2007) notes, to say that a truth is analytic or otherwise a priori itself leaves all the epistemological questions open:

[Metaphysical accounts of analyticity, as truth in virtue of meaning, or in virtue of synonymy with a logical truth] provide no reason to regard analytic truths as in any way insubstantial. Even if core philosophical truths are analytic in such a sense, that does not explain how we can know or justifiably believe them. (p. 53)

Relatedly, to say that a truth is analytic or otherwise a priori leaves all the metaphysical questions open:

[A]nalytic truths are not supposed to be always about words or concepts, even if words or concepts are supposed to play a special role in explaining their truth. The sentence ‘Vixens are female foxes’ is in no useful sense about the word ‘vixen’ or any other words; it is about vixens, if anything. (pp. 48-9)

N1 is similarly not about words or concepts, but about certain natural properties, to which we can ostend. So, granting that the truth of N1 may be established by attention to linguistic or conceptual phenomena, the questions remain: first, what metaphysical facts about the entities at issue in N1 are such that expressions for or concepts applying to these entities incorporate their necessary connection, and second, how might such facts be revealed in a priori deliberation, of whatever variety? An account of the justificatory facts at issue in N1 aims to answer both these questions.

The non-Humean’s answer to the first question, concerning the metaphysical ground of N1, begins by registering three plausible claims, with which the Humean can agree. First, we have knowledge of the actual causal profiles of being red and being scarlet—that is, of what effects these properties, when instanced in certain circumstances, can enter into producing (notably, though of course not exclusively, as relevant to various of our experiences).13 If we like, we can say that the actual causal profile of a property specifies the causal powers actually had or bestowed by the property, so long as such talk of powers is understood in metaphysically neutral fashion, as simply a way of registering the facts about actual causal potentialities. Second, we actually individuate these properties, as with most broadly scientific properties, by reference to their actual causal profiles: barring haecceitistic exceptions,14 properties differing with respect to their causal profiles are different properties. Third, the causal profile of being red is actually contained in the causal profile of being scarlet: any effect that an instance of red can bring about in certain circumstances, in virtue of being red simpliciter, is an effect an instance of scarlet can bring about when in those circumstances, reflecting that to be scarlet is to be red, in a specific

13 Of course, at any given point of inquiry we may not be in complete and completely accurate possession of all the actual causal profiles, but what follows won’t turn on such issues, nor on the further complex and broadly scientific matter of how causal profiles are assigned to broadly scientific entities (similarly when considering N2 and N3). Note also that the claim that color properties have actual causal profiles doesn’t entail anything about whether colors are functionally characterizable in non-qualitative terms; perhaps the production of certain qualitative experiences is an irreducible part of the causal profiles at issue.
14 Such as being Barack Obama, a case I’ll discuss further down the line.
way. These claims support the claim that actually, anything that is scarlet is red. The non-Humean will additionally maintain, compatible with their denial of Hume’s Dictum, that the actual causal profiles of being red and being scarlet are modally stable, such that these properties, when instanced in other worlds, have causal profiles that are the same as their actual profiles. As such, the causal profile of being red will be necessarily contained in the causal profile of being scarlet, supporting the claim that necessarily, anything that is scarlet is red. Such facts about a necessary overlap in modally stable causal profiles provide a metaphysically straightforward and informative ground for the truth of N1.

The non-Humean answers the second question, concerning our epistemological access to the metaphysical ground of N1, as follows. As above, we have access to and actually individuate being scarlet and being red, as instanced throughout space and time, in terms of their causal profiles. Justified belief in N1, however, requires access to modal facts—in particular, facts about how these properties are individuated in modal contexts. How can a priori investigation reveal these individuation conditions, and the associated facts grounding N1? Here the non-Humean can appeal to the default assumption that our terms and concepts for broadly scientific properties incorporate the individuation conditions that we actually use, as applying not just throughout space and time, but also modally. This assumption, appropriately generalized to any broadly scientific entities, is key to the non-Humean’s strategy for handling N1–N3, so let’s set it off here:

**The default assumption:** Other things being equal, our terms and concepts for broadly scientific entities incorporate the conditions we actually use to individuate these entities, as applying not just throughout space and time, but also modally.

This assumption is reasonably considered the default, on grounds of being the simplest and most straightforward extension of our actual individuation conditions for broadly scientific properties to modal contexts. Of course, here as per usual, the default assumption might be overturned, given good reason; hence the caveat “other things being equal”. I will later argue that there isn’t any good reason on the Humean’s table. For the present my point is simply that, given the default assumption and the fact that we have knowledge of the actual individuation conditions of being scarlet and being red, the non-Humean has an epistemologically plausible story to tell about how a priori investigation into the terms or concepts for these properties can result in justified belief in N1.

Necessarily, anything having a certain mean molecular kinetic energy (MMKE) has a certain temperature. N2 may differ from N1 in being an a posteriori necessity (such that, given that MMKE is actually identical to or actually realizes temperature, MMKE is

---

15 Moreover, there is plausibly a proper containment (focusing on individual powers: proper subset) relation between the power profiles of being red and being scarlet, reflecting that in virtue of being more determinate, instances of being scarlet can do some things that instances of being red can’t do. Hence it is, as per the usual understanding of the determinable/determinate relation, that the entailment in the direction from being red to being scarlet does not go through.

16 This claim is compatible with some degree of variation in causal profile, so long as it is principled and contained.

17 Additional motivation for the default assumption might advert to the parallels between claims about future possibilities and other modal claims.
necessarily so identical with or so realizes temperature.\footnote{Constitutional realization claims, if understood as \textit{a posteriori} necessities, might be best seen as analogous to essence claims of the sort at issue in N3, such that if it turns out that MMKE actually realizes temperature, it necessarily does so.} Alternatively, one might suppose that the necessity at issue is purely \textit{a priori}, with empirical investigation entering only into the “concept-formation” stage. Either way, the non-Humean’s account of the justificatory facts at issue in N2 will be relevantly similar to that they provide for N1. Even supposing that N2 is supposed to be, or to follow from, an \textit{a posteriori} necessity, it will still be the case that (as per the usual understanding of the epistemology of such necessities) empirical investigation is required mainly to establish that the entities \textit{actually} stand in the relation at issue; so far as the modal aspect of the claim is concerned, this is still a matter of broadly \textit{a priori} deliberation. So, for example, while empirical investigation is needed to determine that (as the case may be) MMKE is identical with or realizes temperature, it is \textit{a priori} that \textit{given} that MMKE is identical with or realizes temperature, this is necessarily the case. Such an epistemological stance on \textit{a posteriori} necessities reflects what, post-Kripke, is a minimal departure from the traditional empiricist view that what is necessary is \textit{a priori}. Indeed, this stance was endorsed by Kripke himself: on his preferred account, the modal aspect of \textit{a posteriori} necessities (whether expressing identities or natural kind essences) is established by \textit{a priori} consideration of how concepts or terms for the relevant entities are applied in hypothetical scenarios (not, note, by relying on the broadly logical proof of the necessity of identity—though that would be another \textit{a priori} route to the modal aspect of identity claims).

Given all this, what is the non-Humean’s answer to the first question, concerning the metaphysical ground of N2? Their answer will be along lines similar to that given for N1, starting with three claims that the Humean can accept. First, the non-Humean will claim that we associate the properties (or states) \textit{having a certain MMKE} and \textit{having a certain temperature} with certain actual causal profiles. Second, as above the non-Humean will claim that (barring haecceitistic exceptions) we actually individuate broadly scientific properties (state types) via these actual causal profiles. Third, the non-Humean will claim that we have knowledge of the fact that the causal profile of \textit{having a certain MMKE} is identical with or contained in the causal profile of \textit{having a certain temperature}. The previous claims support the claim that actually, anything that has a MMKE has a temperature. The non-Humean will additionally maintain, compatible with their denial of Hume’s Dictum, that the causal profiles of \textit{having a certain MMKE} and \textit{having a certain temperature} are modally stable, such that these properties (state types), when instanced in other worlds, have causal profiles that are the same as the properties actually have. As such, the causal profile of \textit{having a certain temperature} will be necessarily identical with or contained in that of \textit{having a certain MMKE}, supporting the claim that necessarily, anything that has a MMKE has a temperature. Such facts about a necessary overlap in modally stable causal profiles provide a straightforward and informative metaphysical ground for the truth of N2.

The non-Humean’s answer to the second question, concerning our epistemological access to the metaphysical ground of N2, also proceeds as in the case of N1; that is, by reference to \textit{The default assumption}, according to which, other things being equal,
our terms and concepts for broadly scientific property or state types incorporate modal individuation conditions that are the same as those which actually individuate them throughout space and time. Given this assumption, and the fact that we have knowledge of the actual individuation conditions of having a MMKE and having a temperature, the non-Humean has a plausible epistemological story to tell about our access to the metaphysical facts grounding N2.

_Necessarily, electrons are negatively charged._ Like N2, N3 might be seen as an _a posteriori_ necessity; alternatively, perhaps N3 is _a priori_, and the empirical facts enter simply into forming the concepts at issue. Either way, the non-Humean’s account of the justificatory facts proceeds along the same lines as for N1 and N2. First, the non-Humean will claim that we have knowledge of the causal profiles of the particular type _electron_ and the property type _being negatively charged_. (Though causal powers and profiles are usually associated with properties, we can and do also associate powers and profiles with particular types. Claim three expresses one straightforward way in which the causal profiles of particular and property types are related.) Second, they will claim that we actually individuate tokens of the particular type _electron_ by reference to the associated causal profile, and actually individuate tokens of the property type _being negatively charged_ in terms of the associated actual causal profile. Third, they will claim that we come to learn, as a matter of empirical fact, that the causal profile associated with _being negatively charged_ is contained in the causal profile associated with _electron_. These claims in turn support the claim that actually, every electron is negatively charged. The non-Humean will again maintain, compatible with their denial of Hume’s Dictum, that these causal profiles are modally stable, providing support for the claim that necessarily, every electron is negatively charged. And once again, the non-Humean can tell a plausible epistemological story about how this modal stability is revealed in _a priori_ deliberation, by appeal to _The default assumption_, according to which our modal principles of individuation incorporate the actual such principles to which we uncontroversially have access.

### 2.2 The Humean’s accounts

Next, let’s turn to what accounts the Humean can give of the justificatory facts at issue in N1–N3. I’ll engage in some comparative assessment along the way.

_Necessarily, anything that is scarlet is red._ Let’s start by asking: can the Humean implement the non-Humean’s strategy of appeal to a modally stable overlap in causal profiles of the properties involved? On the face of it, no. After all, according to Hume’s Dictum, there are no causal necessities; hence the causal profiles of properties are not modally stable; hence notwithstanding that the causal profiles of these properties actually overlap (as Humeans will agree), the Humean has no reason to suppose that they necessarily overlap.

The Humean might nonetheless attempt to locate the necessity of N1 in a necessary overlap of causal profiles, in two ways.

---

19This claim registers the general fact that causal profiles of particular types can be factored into or distributed over the causal profiles of property types.
First, the Humean might suggest that the necessity at issue in N1 is grounded in its being the case that whatever causal profile being scarlet happens to have at a world, this causal profile would contain that of being red. The suggestion is, however, a non-starter: given that, as per Hume’s Dictum, there are no modal restrictions on the causal profiles of either being scarlet or being red, there is no reason to think that the causal profile of being red will necessarily be contained in the causal profile of being scarlet. (I won’t bother revisiting this strategy when discussing N2-N3.)

A second, somewhat more principled way of implementing the “overlap” strategy would be to maintain that color properties are not subject to Hume’s Dictum, properly understood. Recall that Humeans might respond to Bird by restricting the application of Hume’s Dictum to sparse (natural, fundamental) properties—allowing, in particular, that non-fundamental (e.g., functional or structural) properties can have stable modal profiles. If Hume’s Dictum is so restricted, and if color properties are non-fundamental (e.g., functional/structural), then the Humean could maintain that the properties being scarlet and being red have modally stable, necessarily overlapping causal profiles.

But colors are not obviously non-fundamental structural properties (see, e.g., Campbell 1993, Yablo 1995, Watkins 2002). To be sure, many Humeans are also physicalists, who will suppose that color properties (at least, understood as appearance properties that are at least partly psychological) are not fundamental. Pending the outcome of debate on the nature of colors, however, there is no guarantee that the Humean can tell the sort of metaphysically informative, epistemologically plausible story that the non-Humean can tell about the justificatory facts concerning N1. And in any case, the non-Humean’s story will retain the advantage that it does not antecedently require commitment on whether colors are fundamental (or, relatedly, to physicalism).

A different metaphysical account of the necessity at issue in N1, having nothing to do with overlapping causal profiles, is available to the Humean. Here the account of the justificatory facts appeals to quiddities—primitive identities, that are the property equivalent of haecceities—of the properties at issue.20 The suggestion applied to N1 would be that being scarlet and being red have certain quiddities, which are, as it happens, necessarily connected. Quiddities float free of causal profiles, just as haecceities do; hence the poset of necessarily overlapping or otherwise connected quiddities would provide a metaphysical ground for the necessity of N1, even granting (as per Hume’s Dictum) the modal instability of the properties involved. And presumably properties may have quiddities, whether or not they are fundamental.

Indeed, proponents of Hume’s Dictum often suppose that properties have quiddities (see Lewis 2001, Armstrong 1989, p. 44, and Schaffer 2004), as needed, presumably, to ground trans-world identity of properties in the absence of a stable causal profile. But there are problems with a quiddity-based account of the justificatory facts at issue in N1, from both a metaphysical and epistemological point of view. An account of the necessary connection at issue in N1 in terms of necessarily connected quiddities is metaphysically unilluminating, since there is nothing in the nature of quiddities (being primitive property identities) which indicates that, much less illuminates why, being scarlet and being red are

20Here and throughout, I assume that the quiddities to which the Humean may appeal are non-causal, in not being associated with specific causal powers or profiles as any part of their nature.
A quiddity-based account is also epistemologically implausible. What we seek in an account of the justificatory facts is not only metaphysical illumination, but also a plausible story about our access to the relevant metaphysical facts. But there is not, so far as I can tell, any plausible story to be told about our epistemological access to facts involving quiddities, much less to facts about overlapping quiddities. We don’t actually perceive quiddities (perception being a causal affair), nor can I see how we might have access to such entities via conceivability, rational insight, or any form of modal perception or intuition. Nor will it help if we allow (as I think we should) that a priori deliberation may incorporate principles of abductive explanation, with the outcome of such deliberation being something like a theoretical inference to the best explanation; for there doesn’t appear to be any theoretical motivation for quiddities. Science provides no such motivation: to the extent that the relevant terms receive scientific definitions, these are exclusively in terms of their actual causal profiles.21 And, at least at present, there isn’t any philosophical motivation for incorporating non-causal quiddities into the expressions or concepts for the entities at issue—at least, no philosophical motivation independent of antecedent commitment of HD, the appropriateness of which we are presently investigating. The best attempt at independent motivation for quiddities, due to Armstrong (1983), has the form of an argument by analogy:

[S]woyer [...] argues that properties must have ‘essential features’ [namely] the relations of ‘nomic implication’ which properties have to other properties. But why need properties have essential features at all? Perhaps their identity is primitive. To uphold this view is to reject the Principle of the Identity of Indiscernibles with respect to Properties. Properties can be different, in the same way that, many of us would maintain, ordinary particulars can just be different although having all their features in common [...] properties can be their own essence. (p. 160)

More to the present point, to allow that properties have a primitive identity is to reject the Distinctness of Discernibles: properties can be the same in spite of having completely different causal profiles, Armstrong suggests, just as ordinary particulars can be the same in spite of having completely different properties. But the analogy, hence the argument, fails (see Wilson 2005). There is an “inference to the best explanation” case for thinking that some broadly scientific particulars have haecceitistic natures; in particular, we have actual experience of persons persisting through relatively extreme changes in their properties (as when a single human moves from infancy to adulthood)—experience of which the thesis that particulars have haecceities is, perhaps, the best explanation. But we do not, in either ordinary or scientific contexts, experience or posit properties as persisting through any but very minor changes in their actual causal profiles (haecceitistic exceptions, such as being Barack Obama, aside). There is no parallel motivation for thinking that properties have an identity independent of their causal profile, hence nothing to explain, such that the posit of quiddities would be the best, or at any rate a reasonable, explanation. So the analogy fails, and with it what independent philosophical motivation

---

21Again, allowing for some principled and contained variation.
exists for non-causal quiddities, and for taking the necessity at issue in N1 to be grounded
in such quiddities.

This exhausts the Humean’s available options, it seems, so far as providing an account
of the justificatory facts at issue in N1. There are two: ground N1 in a necessary over-
ap in the causal profiles associated with being red and being scarlet, or ground N1 in a
necessary overlap in (non-causal) quiddities associated with these properties. The first
strategy (also endorsed by the non-Humean) would provide a metaphysically informative
and epistemologically plausible account of the justificatory facts, but at the cost (which
the non-Humean does not have to pay) of commitment to the controversial view that
colors are structural, non-fundamental properties. The second is metaphysically unillu-
minating (why do the primitive identities of being scarlet and being red overlap?) and
epistemologically implausible. I conclude that the non-Humean has a better account of
the justificatory facts at issue in N1 than the Humean.

Variations on the above themes apply to the cases of N2 and N3—only in these cases
the Humean’s options are yet more limited.

Necessarily, anything with a certain mean molecular kinetic energy (MMKE) has a certain
temperature. Again, prima facie, the Humean is not in position to implement the non-
Humean’s strategy of grounding the necessity at issue in N2 in a necessary overlap in
causal profiles. Moreover, here there is no hope of achieving such a necessary overlap via
commitment to the properties at issue being non-fundamental structural properties, for
having a certain MMKE is not appropriately seen as a structural property; rather, it is a
mere mathematical average of an additive intrinsic property (kinetic energy) of whatever
fundamental entities compose molecules. As such, even the “sparse” Humean is committed
to having a certain MMKE—and indeed, to all properties that are additive functions of
intrinsic properties of fundamental entities, such as having a certain mass—being such as
to have modally unstable causal profiles.

As such, it appears that the only available Humean account of the justificatory facts
at issue in N2 is one appealing to a necessary overlap in quiddities, which option is,
as above, metaphysically unilluminating and epistemologically implausible. Again, the
non-Humean does better.

Necessarily, electrons are negatively charged. Again, the Humean’s endorsement of
Hume’s Dictum appears to prevent their giving an account of the necessity at issue
in terms of a necessary overlap in causal profiles. And as with N2, there is no hope
here of implementing this strategy by appeal to the non-fundamentality of the entities
involved, for being an electron and being negatively charged are fundamental broadly sci-
centific entities—the sort of entities to which Hume’s Dictum is supposed to apply (that
is, the sort of entities whose causal profiles may modally vary), if any are.

Hence it seems that the Humean can ground N3 only by appeal to a purported quid-
dity associated with being negatively charged standing in some necessary connection to
(haecceities of?) electrons, which account is again both metaphysically unilluminating
and epistemologically implausible. Again, the non-Humean does better.
3 From constitutional necessities to causal necessities

Let’s recap and draw some conclusions. The most promising case to be made in support of the Humean’s differential treatment of constitutional and causal necessities is one appealing to *Constitutional necessity*, according to which the only necessities are constitutional necessities. But a closer look at what facts might plausibly justify certain constitutional necessities involving broadly scientific entities indicates that *Constitutional necessity* is false. In particular, in each of N1–N3, the best account of what facts about the entities involved are plausibly cited as justifying the constitutional necessity at issue presupposes, contrary to Hume’s Dictum, that entities involved have distinctive, modally stable causal profiles—that is, that there are necessary causal connections between wholly distinct, intrinsically characterized entities.

These considerations indicate that the following conditional is true:

\[
\textit{Constitutional} \rightarrow \textit{Causal}: \text{If one accepts certain constitutional necessities, one should accept certain causal necessities.}
\]

What is the bearing of this result on a comparative assessment of the Humean and non-Humean frameworks in the metaphysics of science?

To start, it is worth noting that the considerations supporting *Constitutional* → *Causal* are relatively independent of the dispute between Humeans and non-Humeans. The overall dialectic is as follows: there are certain constitutional necessities, holding between broadly scientific, not-wholly-distinct entities, that are very commonly accepted, and that in any case Humeans are not in the business of denying and typically suppose they can accept; Humeans and non-Humeans are then invited (so to speak) to provide their best account of the justificatory facts supporting these constitutional necessities; independent considerations indicate that the non-Humean’s account of these facts is in each case metaphysically informative and epistemologically plausible, while for N1, the Humean’s best account (appealing to a necessary overlap in causal profiles) is purchased at the price of commitment to a controversial account of colors, and for N2 and N3, the Humean’s best accounts (appeal to quiddities) are both metaphysically unilluminating and epistemologically implausible. We should accept the holding of those metaphysical facts that enter into the best account of the justificatory facts concerning claims we accept; hence if we accept certain constitutional necessities, we should accept certain causal necessities.

Given that the constitutional necessities at issue involve broadly scientific entities, this result seems to favor non-Humeanism over Humeanism, so far as the metaphysics of science is concerned. We can more firmly establish this bearing by noting that the Humean has only two options for responding to the result, each of which is quite unattractive.

The first is to deny *Constitutional* → *Causal*, maintaining acceptance of constitutional necessities such as N1–N3 by insisting on retaining the Humean’s less-than-satisfactory accounts of the justificatory facts. Such a response obviously comes at a cost in plausibility of the Humean’s view. By way of contrast, the non-Humean’s endorsement of N1-N3 comes at no such cost to their view.

The second response is for the Humean to reject constitutional necessities such as N1–N3 (which again are ubiquitously multiplied). Any such denial also comes at a cost for
the Humean, since constitutional necessities along lines of N1–N3 are highly plausible and commonly accepted—indeed, are typically rejected only by those endorsing various kinds of skepticism about analyticity, about a posteriori necessities, or about essential properties of even the benign sort associated with natural kinds. Relatedly, as noted, proponents of Hume’s Dictum have typically supposed that its application to causal necessities doesn’t require rejecting constitutional necessities as regards to such entities. To the extent that Humeans respond to Constitutional→Causal by rejecting any constitutional necessities undermining their endorsement of Hume’s Dictum, their position seems not only extensionally incorrect but ad hoc. By way of contrast, the non-Humean is under no pressure to reject any of these constitutional necessities, and moreover their acceptance is naturally situated in their overall metaphysics.

The Humean fares worse than the non-Humean, no matter how they respond. I conclude, then, that Constitutional→Causal provides needed leverage in a comparative assessment of Humean vs. non-Humean frameworks in the metaphysics of science, in the non-Humean’s favor.

References


Cameron, Ross, forthcoming. “From Humean truthmaker theory to priority monism”. Nous.


