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# A Puzzle about Material Constitution & How to Solve it:

## *Enriching Constitution Views in Metaphysics*

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### 1. Two Intuitions and a Puzzle

"Constitution" may be a philosophical term of art, but the idea of one thing's being materially constituted by another thing (or other things) is one that ordinary folk are perfectly familiar with. When we talk explicitly of something's being made up of, being made of, consisting of, or being composed of a material thing or things, we appeal to the concept of material constitution. Sentences that ascribe relations of material constitution can elicit widespread intuitions. Consider (A) and (B):

(A) The liquid in this glass is constituted by molecules of water.

(B) The statue in front of me, David, is constituted by a piece of marble.

(A) and (B) are not only perfectly intelligible sentences but sentences that would be widely agreed to express propositions that could be true, given their utterance in the right sorts of everyday context. For (A) such a context could be one in which there is a glass of water before speaker and hearer, and the speaker is explaining to a chemically naïve hearer what is in the glass. For (B) such a context could be one in which the speaker is standing before Michelangelo's David marveling at the aesthetic power of what Michelangelo has managed to produce through the artistic medium of sculpture. If our speakers had used 'is made of', 'is made up of', 'consists of', or 'is composed of' in place of "is constituted by" in (A) and (B), they would normally be taken to have said (roughly) the same thing as they actually say in uttering (A) and (B).

There is no puzzle in this. A puzzle does arise, however, when we turn to consider two sentences, (A*) and (B*), that are entailed or strongly supported by (A) and (B), respectively:

(A*) The liquid in this glass *is nothing more than* molecules of water.

(B*) The statue in front of me, David, *is more than simply* a piece of marble.

(A*) is derived from (A), and (B*) from (B), by substituting the italicized phrase for "is constituted by". Again, both (A*) and (B*) are perfectly intelligible, and the contexts already specified for (A) and (B) are ones in which each could be uttered to express a truth. For some, this will occasion no surprise, since they would take (A*) to be a paraphrase or entailment of (A), and (B*) to be a paraphrase or entailment of (B). The puzzle is how (A*) and (B*) could *both* say something true, given their relationship to (A) and (B).

For those with more fine-grained views of meaning resistant to the claims above concerning the relationship between (A) and (A*), and (B) and (B*), a version of the puzzle remains. For the truth of (A*), even if not equivalent to or implied by (A), is at least supported by (A) in that someone who held (A) would be reasonably justified also in holding (A*). Likewise, for (B) and (B*). Someone who held that a certain liquid is materially constituted by (is made of, consists of, is composed of) molecules of water would have reason also to *endorse* some kind of deflationary view of a glass of that liquid and its molecular constituents. Yet someone who held that a statue is materially constituted by (is made of, consists of, is composed of) a given piece of marble would have reason to *reject* such a view of the relationship between the statue and its constituent. The puzzle, again, is how both of these things could be true.

This paper resolves the puzzle by articulating a particular account of the metaphysics of material constitution. While I shall build on the work of other constitution theorists — especially the recent work of Lynne Baker[1] — what is distinctive of my approach is the idea that there are *two* notions of constitution.[2] The first of these, what I shall call *compositional constitution,* makes (A) and thus (A*) true; the second of these, what I shall call *ampliative constitution,* makes (B) and thus (B*) true. We might view this as regimenting or precisifying folk uses of the concept of material constitution and allied notions.

My broader goal is to develop constitution views in several novel and philosophically interesting ways, using our initial puzzle as a touchstone. While the paper is not intended as a defense of constitution views in metaphysics in general and does not offer a comparison of such views with alternative metaphysical frameworks, such as four-dimensionalism or conventionalism about ontology — tasks for another occasion — it is certainly relevant to such defenses and comparisons. For these tasks are complicated by the general idea of this paper, implying as it does that constitution views encompass a richer range of metaphysical options than has been entertained by proponents of constitution theories, as well as by those favoring alternative metaphysical frameworks.

## 2. Compositional and Ampliative Constitution

One difference between (A) and (B) is that (A) relates one entity to a plurality of entities, while (B) relates one entity to another (single) entity. While this observation provides a useful start on thinking about the original puzzle, note that the contrasting intuitions elicited by (A) and (B) are shared by sentences with a diverse range of referring expressions in them.[3] Along with (A), consider the following sentences:

1. See Lynne Rudder Baker, *Persons and Bodies: A Constitution View* (New York: Cambridge University Press, 2000); "Why Constitution is Not Identity", *Journal of Philosophy* 94 (1997): 599–621; "Unity Without Identity: A New Look at Material Constitution", *Midwest Studies in Philosophy* 23 (1999): 144–65; "On Making Things Up: Constitution and its Critics", *Philosophical Topics* 30 (2002): 31–51; "Précis" and "Replies" in a book symposium in *Philosophy and Phenomenological Research* 64 (2002): 592–98 and 623–35; and "When Does a Person Begin?", *Social Philosophy and Policy* 22 (2005): 25–48.

2. For a recent overview of the principal analyses of material constitution that have been offered, as well as a sketch of his own "deflationary view", which holds that "there is no deep metaphysical relation of constitution, as distinct from material coincidence" (p. 708), see Ryan Wasserman, "The Constitution Question", *Noûs* 38 (2004): 693–710. The view I develop here is as much an alternative to the single-concept analyses that Wasserman surveys as it is to the skepticism about constitution that Wasserman's deflationary view expresses.

3. Such diversity pervades the literature on constitution. For a small sampling of the range of uses of "constitution" in motivating examples in the recent

(1) This [piece of marble] is constituted by some marble (or a material body).

(2) Adam's body is constituted by organic molecules.

(3) The organic molecules in this cell are constituted by physical particles.

(4) This chain is constituted by metal links.

The terms in these sentences include demonstratives, mass terms, count nouns, and plural referring expressions. Like (A), each of (1) - (4) readily admits of a deflationary reading of material constitution:

(1*) The piece of marble is nothing more than some marble (or a material body).

(2*) Adam's body is nothing more than organic molecules.

(3*) The organic molecules in this cell are nothing more than physical particles.

(4*) This chain is nothing more than metal links.

It is easy enough to construct simple, everyday contexts in which each of (1) – (4) could be uttered so as to be true, each of which would also be a context in which, respectively, (1*) – (4*) would be true. For example, (3) and (3*) might be true when uttered in the context of a teacher's explaining that organic chemistry has a physical basis, or in motivating the discipline of biochemistry, even if she might use "are made up of" rather than "are constituted by" in expressing the proposition that (3) expresses.

The same general point is true of (B): it belongs to a larger family of sentences, each of which readily admits of the reading of "is constituted by" that I have ascribed to (B):

(5) Adam is constituted by organic molecules.

(6) Michelangelo's David is constituted by some marble.

(7) This gene is constituted by a sequence of DNA.

(8) This island is constituted by a particular landmass.

In each of these cases, as with (B), it is easy to construct a familiar context that generates intuitions that the particular thing constituted is *something more than* its material constituent or constituents, which again can be referred to by a singular or plural term, or a count or a mass noun. For example, (7) and its derivative (7*)

(7*) This gene is more than simply a sequence of DNA.

might both be uttered truly in a context in which various functional features of that gene (*e.g.*, its essential regulatory or inhibitory roles) were under discussion. The puzzle, again, is why this intuitive difference exists between (A) and (1) – (4), on the one hand, and B and (5) – (8), on the other.

Given that these contrasts at least motivate the idea that there may be distinct concepts of constitution at work here, the next step is to provide a capsule statement of what I take to be the crucial difference between those concepts, one that suggests distinct analyses.

When some particular entity *y* is *compositionally* constituted by some entity *x* or some entities *the x*s, *y*'s existence is necessitated sim-

philosophical literature, consider the following (where it is explicit in the context that the "is" used is the "'is' of constitution"): 'that heap of fragments there is the jug you saw the last time you came to this house', 'the jug is the coffee pot', 'The soufflé you are eating is flour, eggs and milk', 'The portico is wood and stucco' (David Wiggins, *Sameness and Substance Renewed* [New York: Cambridge University Press, 2001], pp. 34–37); 'This ring is gold', 'A human body is a collection of cells' (E. J. Lowe *Kinds of Being: A Study of Individuation, Identity and the Logic of Sortal Terms* [Oxford: Blackwell, 1989], p. 3); "Pieces of paper constitute dollar bills; pieces of cloth constitute flags; pieces of bronze constitute statues … strands of DNA constitute genes" (Baker, *Persons and Bodies*, p. 21); "Genes are constituted by DNA molecules" (Baker, "Unity Without Identity", p. 147); "Suppose a wall is composed of stones. Then they also constitute it … " (Peter Simons, *Parts: A Study in Ontology* [Oxford: Clarendon Press, 1987], p. 239); "The cells which constitute an organism at one time can be an entirely different batch from those which constitute it at a different time" (Fred Doepke, *The Kinds of Things: A Theory of Personal Identity Based on Transcendental Argument* [La Salle, IL: Open Court, 1996], p. 199).

ply by the state that $x$ itself is in or the precise way in which the $x$s are arranged. On this view, constituted entities are *nothing more than* their material constituents, and the necessitation relation reflects a way in which an entity that is compositionally constituted is intuitively "close to" its constituent(s). It is in this sense that the liquid in a glass can be constituted by molecules of water, molecules by particles, chains by connected metal links, and a human body by an aggregate of cells.

By contrast, when some particular entity $y$ is *ampliatively* constituted by some particular entity $x$ or some entities *the* $x$s, $y$ is an entity whose existence is not necessitated by that of $x$ or the $x$s, whatever intrinsic state $x$ is in or however the $x$s are arranged. This is the conception according to which constituted entities are *more than simply* their material constituents arranged in certain ways, and although there is some kind of necessitation involved in ampliative constitution, as we will see, the difference here from compositional constitution indicates a way in which an entity that is ampliatively constituted is intuitively "distant from" its constituent(s). It is in this sense that statues are constituted by pieces of marble, human persons by their bodies, genes by sequences of DNA, and islands by landmasses, for simply arranging such constituents will itself never be sufficient to produce the entities they constitute. In each case, something more is needed.

The remainder of the paper explores the contrasts between these two kinds of material constitution, an exploration guided by three desiderata, and draws out some broader implications. In brief the desiderata are:

> *Make sense of everyday ontology*. The notion(s) of constitution should allow us to understand the ontology of the full range of everyday individuals, such as people, animals, artifacts, and natural objects.
>
> *Achieve the twin ideals of sparseness and completeness*. We want an account of what there is that is both sparse in that it neither includes what there isn't nor double-counts what there is, as well as complete in that it doesn't leave out anything that exists.
>
> *Adopt a realist view of ontology*. Many of the objects recognized in our everyday ontology exist independently of how we conceive of those objects, and of the theories we entertain about them.

Although these can be construed as independent desiderata, I shall refer to them collectively as *Common Sense Ontology*. Much could be said about them (including the trade offs and tensions between them), and any broader defense of the metaphysics of constitution would surely do so.[4]

### 3. Material Constitution

As forms of material constitution, compositional and ampliative constitution share several features that derive from the motivations for recognizing a relation of material constitution in the first place.

The first of these features is that each relates objects or aggregations of objects that are spatially and materially coincident for some extended period of time, $\mathfrak{p}$, where one object or a plurality of objects is the (completely) material constituent of the other.[5] Two or more entities are spatially coincident during $\mathfrak{p}$ just if they occupy exactly the same space during $\mathfrak{p}$, and they are materially coincident during $\mathfrak{p}$ just if they share exactly the same matter during $\mathfrak{p}$. Two or more flight paths can share some of the same space, and two roads can share some of the same matter, in cases where they overlap (spatially or materially, respectively). Spatial and material coincidence involve complete or to-

4. Here is one germane issue about Common Sense Ontology. One might wonder what these desiderata imply about the view that *persons* should receive some special kind of metaphysical treatment. While there are respects in which persons occupy a special place in everyday ontology, I do not think it is part of our commitments that persons must be treated distinctively. Thus, Common Sense Ontology is compatible with the metaphysics we develop to deal with persons being general enough to apply to other cases. For a version of this idea, see Dean Zimmerman's "Material People", in Michael Loux and Dean Zimmerman (editors), *The Oxford Handbook of Metaphysics* (New York: Oxford University Press, 2003), esp. section 1.4.

5. I follow Kit Fine, "The Non-Identity of a Thing and Its Matter", *Mind* 112 (2003): 195–234, at 197–98, in appealing to both spatial and material coincidence here, rather than spatial coincidence alone.

tal overlap, and in the case of constitution such overlap is for at least the duration of the constitution relation. (Whether or not we should, in turn, understand material coincidence in terms of the sharing of parts is something I shall discuss shortly.) Thus, the liquid in a given glass and the particular molecules of water that constitute that liquid are both spatially and materially coincident throughout the time those molecules constitute the liquid; the piece of marble that constitutes the statue David coincides spatially and materially with David so long as David is constituted by that piece of marble. Such coincidence need not hold either before that period — say, before the piece of marble has been sculpted to form David — or after that period — perhaps when David has been destroyed and all the remaining marble squashed into a cube.

The second of these features is that, despite this spatial and material coincidence, these entities have distinct conditions of existence, which is to say that it is possible for one of them to exist without the other's existing. More particularly, it is possible for the constituent entity or entities to exist without the constituted entity's existing. Thus, the very molecules of water that constitute the liquid in my glass might not do so — they might be frozen, for example, or scattered over the table as the result of a spill. And even if a piece of marble is created just when David is created (say, by joining together two pre-fabricated pieces of marble), so that David and that piece of marble exist for just the same time period, it is still possible to destroy the statue without destroying (but merely changing) that piece of marble. Such familiar considerations provide reason to hold that, whatever the relation between David and this piece of marble is, it is not strict identity.[6] Similar reasoning implies that the same is true of the liquid in a glass and the molecules of water that constitute it.

This suggests two necessary conditions for some entity $y$ to be either ampliatively or compositionally constituted by some entity $x$, or some entities *the* $x$s, during some time period $\mathfrak{p}$:

> COINCIDENCE: $x$ is completely material in itself, or the $x$s are completely material in themselves, and $y$ is spatially and materially coincident with $x$ (the $x$s) during $\mathfrak{p}$.
>
> DISTINCTNESS: it is possible for $x$ (the $x$s) to exist without there being anything of $y$'s type that is (even partially) spatially and materially coincident with $x$ (the $x$s).

I shall propose that our two concepts of constitution differ in what conditions they accept in addition to these, and that this difference itself turns on precisely how composition and the part-whole relation enter into the analysis of constitution. Since many would take Coincidence itself to imply that entities in a relation of constitution share, at least at some level, all of their parts, and would to that extent at least require some account of composition and the relation between parts and wholes, let me first say something about this before moving on to discuss compositional and ampliative constitution in turn.

I have said that for two entities to materially coincide for some time $\mathfrak{p}$ is for them to share exactly the same matter during $\mathfrak{p}$, an analysis that makes no mention of the sharing of parts. If this is sufficient as an account of what material coincidence is, as I think it is, then since it does not mention the relation between parts and whole, one can include Coincidence as a necessary condition on constitution without appealing to the sharing of parts or the part-whole relation.[7]

6. For standard arguments to this effect, see Mark Johnston, "Constitution is Not Identity", *Mind* 101 (1992): 89–105; Lynne Rudder Baker, "Why Constitution is Not Identity"; and Kit Fine, "The Non-Identity of a Material Thing and Its Matter". For further, recent discussion of Fine's arguments, see Bryan Frances, "The New Leibniz Law Arguments for Pluralism", *Mind* 115 (2006): 1007–1022; Jeffrey King, "Semantics for Monists", *Mind* 115 (2006): 1023–1058; and Kit Fine, "Arguing for Non-Identity: A Response to King and Frances", *Mind* 115 (2006): 1059–1082.

7. Although Lynne Baker's eschewal of mereology in her *Persons and Bodies* (see pp. 179–85) is one of the more strongly contested features of her account of constitution, note the mereological element in her "Unity Without Identity", p. 149. For a sense of the debate here, see the exchange between Baker and Dean Zimmerman: Zimmerman, "*Persons and Bodies*: Constitution Without Mereology?", *Philosophy and Phenomenological Research* 64 (2002): 599–606; Baker, "Replies"; and Zimmerman, "The Constitution of Persons by

Since ideas and formal theories that appeal to the part-whole relation have been influential in metaphysics in general and in discussions of material constitution in particular, even were one to accept that we have an adequate non-mereological understanding of material coincidence, one might well wonder why avoiding an appeal to something called "mereology" is a virtue in this context. Here it is important to distinguish what, modifying a convention introduced by Peter Simons (1987: 5–6), I shall call (small-m) mereological views, which are any views that appeal substantially to the relation between parts and wholes, from (big-M) Mereological views, which are specific, often formally articulated theoretical frameworks, the best-known of which are Lesniewski's "calculus of manifolds", and Leonard and Goodman's "calculus of individuals". The chief reservations that proponents of constitution views have expressed about appeals to part-whole relations are reservations about Mereology, in these classic and more recent formulations.

One such reservation turns on the assumption of standard Mereology that there is *one* part-whole relation, and correspondingly one theory that articulates that relation's formal properties.[8] Yet we appeal to part-whole relations in a wide variety of contexts, and it is at best controversial to assume that there is a single relation that is referred to across these contexts. In a recent survey article, Achille Varzi gives a representative sampling of the kinds of context in which part-whole relations that relate "material bodies, events, geometric entities, or geographic regions … as well as numbers, sets, types, or properties" are invoked, making it clear that "[M]ereology assumes no ontological restriction on the field of 'part'."[9] Consider three examples where mereological relations are invoked:

(9) My arm is part of my body.

(10) The number one is part of the set of odd numbers.

(11) Tibbs the cat is part of the fusion of cats.

In accordance with the generality of Mereology, all of these appeals to mereology are treated as referring to a single part-whole relation, one governed by certain formal principles. Yet an arm is a *physical component* of my body, the number one an *element* in the set of odd numbers, and an individual organism a *member of* a species. *Prima facie*, these relations are distinct. The concern is that any theory that treats them uniformly will be as prone to generating confusion in projects that fall under the umbrella of Common Sense Ontology as would any approach that treated the following sentences as articulating a single "is" relation:

(12) Cicero is Tully.

(13) The statue is the clay.

(14) A cat is an animal.

Just as we have learned to distinguish identity (12), material constitution (13), and instantiation (14) — amongst other relations that 'is' might be used to refer to — perhaps we need also to recognize distinct relations that 'is part of' can be used to refer to. In the context of analyzing material constitution, better to start with a conception of material coincidence that remains neutral about whether 'constitution' and 'coincidence' apply univocally across domains beyond the material.

A related concern in this context is that the ways in which Mereological theories characterize "the" part-whole relation make that relation ill suited for articulating a notion of *material* coincidence and so material constitution. Consider two examples.

First, classical extensional Mereology construes the part-whole rela-

Bodies: A Critique of Lynne Rudder Baker's Theory of Material Constitution", *Philosophical Topics* 30 (Spring 2002): 295–338.

8. I take this to be at the root of the reservations expressed by both Lowe, *Kinds of Being*, pp. 93–94, and Baker, *Persons and Bodies*, pp. 179–85, and "Replies", 624–26; and to underlie much of Peter Simons's sustained discussion of problems with Mereology in *Parts*, chapter 4.

9. See Achille Varzi, "Mereology", *Stanford Encyclopedia of Philosophy* <http://plato.stanford.edu/archives/spr2007/entries/mereology/>. The quotations appear in Section 1 of the article.

tion as a partial ordering, *i. e.*, as reflexive, asymmetrical, and transitive. Yet it is very counter-intuitive to view the relation referred to in (9) and (11) as reflexive, since material things are not usually viewed as parts of themselves. A common response to this objection is that Mereology allows a definition of a notion of a proper part in terms of this notion of part, with identity being the limit of the part-whole relation. If this is to serve an analysis of material coincidence, however, and in turn in an analysis of material constitution, it entails that we view identity as the limit of material coincidence. Perhaps that is an acceptable view of material coincidence (and perhaps even of material constitution), but in light of the attention given by constitution theorists to *distinguishing* constitution from identity, it would seem prudent to avoid building this into one's view of constitution from the outset.

Second, a central component in extensional Mereological theories is the claim that entities with exactly the same proper parts are identical. David Lewis refers to this as the *uniqueness of composition*, and it stands in *prima facie* tension with the idea that there can be distinct objects that materially coincide, at least if that notion of coincidence is to be understood in terms of Mereology.[10] Again, this provides some reason for foregoing the formal power of Mereology in explicating a notion of material coincidence distinct from that of identity.

Although I have been expressing caution about using Mereology to explicate the notion of material coincidence, and so about viewing material constitution in general through the lens of Mereology, mereology does have some place in one concept of material constitution — namely, that of compositional constitution.

## 4. Compositional Constitution

Suppose that we accept Coincidence and Distinctness as necessary conditions that any concept of constitution must satisfy:

> COINCIDENCE: $x$ is completely material in itself, or the $x$s are completely material in themselves, and $y$ is spatially and materially coincident with $x$ (the $x$s) during $\mathfrak{p}$.
>
> DISTINCTNESS: it is possible for $x$ (the $x$s) to exist without there being anything of $y$'s type that is (even partially) spatially and materially coincident with $x$ (the $x$s).

At an intuitive (and metaphorical) level, I have suggested that compositional constitution implies a relatively high degree of "closeness" between constituted and constituent entities. A natural additional condition for a concept of compositional constitution that explains or cashes out this metaphor of closeness is *Intrinsic Necessitation*:

> INTRINSIC NECESSITATION: $x$ is in some intrinsic state(s), or the $x$s that compose $y$ are arranged, during $\mathfrak{p}$ such that $x$ itself, or the $x$s themselves, necessitate the existence of $y$.

This condition partly demarcates a concept of constitution that accounts for the intuitions about (A) and (1) – (4) with which we began. In particular, Intrinsic Necessitation provides an explanation of why there is a sense in which constituted entities are nothing more than their constituents, one that goes beyond whatever explanation is provided for this by Coincidence. And insofar as Intrinsic Necessitation is a condition that does not hold of the concept of constitution appealed to in (B) and (5) – (8), it also provides part of a robust solution to the original puzzle concerning the difference between (A*) and (B*).

Like identity, compositional constitution is transitive. Yet the Distinctness condition makes the relation of compositional constitution irreflexive, and so different from identity. What of symmetry? Both Distinctness and Intrinsic Necessitation are formulated in asymmetrical terms — in terms of what is possible *for constituents* and in terms of what states or arrangements of those constituents necessitate, respectively — but this itself doesn't entail the asymmetry of the resulting relation. To ensure that compositional constitution is asymmetric, and so comport with intuitions about (A) and (1) – (4), we need the converse of Distinctness to fail:

10. For the uniqueness of composition, see David K. Lewis, *Parts of Classes* (New York: Oxford, 1991), p. 74; and for Lewis's view of composition as a form of identity, see pp. 81–87. See also Peter van Inwagen's spirited discussion of this latter view in his "Composition as Identity", *Philosophical Perspectives* 8 (1994): 207–220.

> CONSTITUENT NECESSITATION: whenever *y* exists, there must be something of *x*'s type that is (at least partially) spatially and materially coincident with *y*.

This suggests a second dimension to the "closeness" between constituents and what they compositionally constitute: that they, or something of their type, are necessitated by the existence of what they actually constitute.

To illustrate how these two conditions apply to a concrete example, and to bring out some of the implications of this view of constitution, consider (A) again:

(A) The liquid in this glass is constituted by molecules of water.

Intrinsic Necessitation entails that during the period of constitution ℘, those molecules are so arranged as to necessitate the existence of the liquid in this glass. Such an arrangement might involve their spatial location in the glass in the lattice structure typical of liquids. There may be several such arrangements, and so (A) may be made true by their *succession* during ℘. Note, however, that any such arrangement or succession of arrangements do not *themselves* compositionally constitute the liquid in this glass, since they will fail to satisfy Distinctness.[11]

This final point is an important result of the analysis of compositional constitution I am offering, in part because the corresponding claim is *not* true of ampliative constitution, as we will see. The claim itself may seem counterintuitive or obscure due to my reliance on common (but casual) talk of *arrangements* as putative constituents. Since arrangements of plural entities are just ways those constituents are organized or structured, their *way of being*, much as intrinsic states of an individual constituent are ways *that* entity is, we might restate and clarify what I have said by considering (A′), which expresses a constitution claim that I am committed to rejecting:

(A′) The liquid in this glass is constituted by water molecules *arranged just so.*

Here the italicized trailing phrase directs us specifically to "the arrangement" entailed by Intrinsic Necessitation's application to (A). In less reified language, my point is that *that very arranging of water molecules* cannot be a constituent of the liquid in this glass, and that is because it is not possible to have that very arranging of water molecules, that very way of being those water molecules, without having the liquid in this glass. We can precisely explain why in terms of the analysis of compositional constitution. Consider the way of being the water molecules referred to in (A′) as a putative compositional constituent of the liquid in this glass. Setting aside questions of whether Intrinsic and Constituent Necessitation even make sense were such "arrangings" to be considered constituents, there would be an inconsistency between the former of these conditions and Distinctness. There is a way of being any plural constituent that necessitates the existence of what they constitute (in accord with Intrinsic Necessitation), but for that very reason, while the plural constituents themselves may satisfy Distinctness, that "arrangement" cannot. The same is true of a succession of arrangements.

If the direction of Intrinsic Necessitation is from constituent to constituted entity — from bottom to top, as it were — then the direction of Constituent Necessitation, conversely, is from top to bottom. It entails that it is not possible for there to be the very liquid in this glass without there being at least some molecules of water that spatially and materially coincide with that liquid at least partially. Likewise, for the constituents in each of (1) – (4) (some marble, organic molecules, physical particles, and metal links), each of which must spatially and materially coincide (at least partially) with the entity they constitute (respectively, a specific piece of marble, Adam's body, organic molecules in a particular cell, and a particular chain) whenever that constituted entity exists. Just how partial this spatial and material coincidence must be likely varies from case to case. But since a constitution relation can

11. The same is true of the intrinsic state(s) of individual constituents mentioned in Intrinsic Necessitation, but I will focus here on plural constituents for the sake of clarity.

obtain when constituents are impure or mixed — as when a little coffee is added to some water, or when Adam's body undergoes some revamping through the replacement of a hip with metal components — a stronger, general condition that requires *complete* coincidence cannot be justified.

With Intrinsic and Constituent Necessitation in place, we can now return to the question of the place of mereology in understanding compositional constitution. Consider first cases in which an entity is compositionally constituted by a plurality of entities, such that, in accord with Intrinsic Necessitation, there is some arrangement of those entities that itself necessitates the existence of that constituted entity. Here these constituent entities can be thought of individually as the smaller *physical parts* of the constituted entity, and collectively, once they are composed in the right way, as all there is materially to that entity. Since compositional constitution is a strict partial ordering, like the notion of a proper part in Mereology, we might look to rewrite our two distinctive conditions in terms of part-whole relations as follows:

> INTRINSIC NECESSITATION*: the proper parts that compose $y$ are so arranged during $\mathfrak{p}$ that they themselves necessitate the existence of $y$.
>
> CONSTITUENT NECESSITATION*: whenever $y$ exists, there must be proper parts of $x$'s type that are (at least partially) spatially and materially coincident with $y$.

For the same reason given earlier, it would be a mistake to view the arrangements of proper parts mentioned in Intrinsic Necessitation* to be *themselves* compositional constituents, on pain of inconsistency with Distinctness.

Whether there are adequate mereological reformulations of Intrinsic Necessitation and Constituent Necessitation in full turns on whether such formulations do justice to the other case that these conditions subsume, where an entity is compositionally constituted by something else, such as a piece of marble by some marble, or by a material object. My own sense is that it is at best awkward to recast the full version of at least Intrinsic Necessitation in terms of mereology, largely because it is strained to view masses, stuffs, and completely materially coincident entities as parts (proper or not) of what they constitute. Friends of Mereology, classical or contemporary, will no doubt disagree. What we can agree about, I suppose, is that if there can be physical constituents that are not themselves physical parts, then a mereological account will be at best only a partial view of compositional constitution.

## 5. Ampliative Constitution and the Many-Many Problem

Lynne Baker's recent, detailed account of constitution is, in the terms I am using here, ampliative, and it is explicitly non-mereological.[12] I suspect that Baker herself would readily accept something like Common Sense Ontology, for she views constitution as forming a part of a pluralistic, commonsense metaphysics that applies ubiquitously. On Baker's view, constitution is to be understood principally in terms of the notions of spatial coincidence and existence conditions: one entity constitutes another (roughly) when they are spatially coincident yet they possess distinct conditions of existence. Before turning to refinements on this rough idea in a moment, consider a problem that any account of ampliative constitution, especially one that accepts Common Sense Ontology, must face.

This is what I call the *many-many problem*,[13] the problem of specifying, of the many putative entities there are in the world (*e.g.*, statues, works of art, valuable artifacts, works by Michelangelo) just which are constituted entities and just which are constituents of those entities (*e.g.*, pieces of marble, aggregates of elementary particles, undifferentiated stuff). If there is a statue David in addition to the piece of marble that constitutes it ("Piece"), then is there also a work of art ("Art"), a valuable artifact ("Val"), and a sculpture by Michelangelo

12. See the references in n. 7 above, for discussion of this aspect of Baker's view.

13. The remainder of this paragraph and the following three paragraphs summarize a line of argument that I develop more fully and generally in my "Material Constitution and the Many-Many Problem", *Canadian Journal of Philosophy*, in press.

("Mick"), *in addition to* David? David is spatially and materially coincident with any of these other entities, and such pairs of entities also satisfy Distinctness. Similar points can be made with respect to David and various entities that putatively constitute it: there is Piece, let us suppose, but are there *in addition* smaller marble chunks, some undifferentiated stuff, and an aggregation of elementary particles, all of which satisfy both Coincidence and Distinctness?[14]

Any account of what constitution is should provide some guidance as to *when* that relation holds between two or more entities, and so when it does not hold, and thus must face the many-many problem. If we accept cases in which one material entity constitutes another, how can we resist an explosion of our ontology that leads us to include other entities that are also constituents or constituted entities in those very cases?

The many-many problem is not simply a version of a standard objection to the appeal to ampliative constitution, namely, that its invocation abandons the sparseness explicit in Common Sense Ontology in implying that, say, when we face Michelangelo's David there is both a statue and a piece of marble present before us — two objects, rather than one.[15] The many-many problem presupposes that admitting both statues and pieces of marble in one's ontology does not violate this aspect of Common Sense Ontology; it asks, rather, for a principled answer to the question of just which entities exist to stand in a relation of ampliative constitution in any given case.

The problem is perhaps better conveyed graphically and with the other paradigm example used in the literature. Consider Table 1. Assume that a person is constituted by a human body. Then why doesn't that human body also constitute all of the other entities in the top row of the table? And why isn't that person also constituted by all of the other entities in the bottom row of the table?

| person | living thing | member of *Homo sapiens* | moral agent |
|---|---|---|---|
| human body | biochemical molcules | causal network of bodily systems | an aggregate of cells |

Table 1

The many-many problem is this: of the many entities we can view as putatively standing in a relation of ampliative constitution in any given instance, which in fact exist to stand in this relation? Since the problem is predicated on the supposition that persons are not simply human bodies in a certain state, and more generally that the familiar deflationary strategies for maintaining a "one-thing" rather than a "two-thing" ontology do not work, we cannot appeal to such strategies in addressing it.[16] This makes the many-many problem a hard problem.

There are resources within Baker's own view of constitution to construct one natural line of response to this problem, a response with affinities to the Aristotelian view that there are certain kinds of ontologically privileged thing in the world: substances. On Baker's view, constitution holds between instances of what she calls *primary kinds*, where a thing's (unique) primary kind tells us what that thing is most fundamentally or essentially. "Person" is the primary kind for anyone reading this paper, and "human body" the primary kind of the chunk of matter that we each typically refer to with the expression "my body", according to Baker. Thus, a solution to the many-many problem should be developed in terms of which putative entities are instances of pri-

14. This expression of the many-many problem in terms of what exists *in addition to* a given constituent suggests that it doesn't arise, or at least is much less pressing, for compositional constitution, which seems intuitively correct.

15. This sort of objection is common, and has been pressed by Eric Olson in several discussions of Baker's views. See his Review of Baker's *Persons and Bodies*, *Mind* 110 (2001): 427–30, and "Thinking Animals and the Constitution View", e-symposium on Baker's *Persons and Bodies*, http://host.uniroma3.it/ progetti/ kant/field/bakersymp.htm.

16. I borrow talk of "one-thing" and "two-thing" ontologies from Karen Bennett, "Spatio-Temporal Coincidence and the Grounding Problem", *Philosophical Studies* 118 (2004): 339–71, who owes it, in turn, to Steve Yablo. For discussion of the standard deflationary responses, see the works referred to in n. 6 above.

mary kinds. In Table 1, person and human body are primary kinds; the other putative entities are either identical to one or the other of these (perhaps moral agents are identical to persons), "modes" of those primary kinds (perhaps living things are "modes" of bodies), or not properly conceived of as kinds of entities at all (perhaps aggregates of cells).[17]

Although this strategy for addressing the many-many problem has some *prima facie* appeal in the case of persons and their bodies, it is fatally flawed as the basis for a general response to that problem; this flaw, in turn, highlights a respect in which the appeal to primary kinds restricts the applicability of the resulting account of ampliative constitution. The flaw can be conveyed succinctly by returning to the other paradigm example of ampliative constitution, that of David (the statue) and Piece (the piece of marble). Consider Table 2 as a depictive mnemonic for how the many-many problem applies here:

| David | Art<br>*work of art* | Val<br>*valuable object* | Mick<br>*sculpture by Michelangelo* |
|---|---|---|---|
| Piece | smaller marble chunks | undifferentiated stuff | an aggregate of elementary particles |

Table 2

The limitations of the appeal to primary kinds to solve the many-many problem should be apparent in this case. For here the very supposition that statue is *the* primary kind, and the other putative entities are non-primary in some way, cries out for some justification. The type of dependence that exists between entities and their "modes" does not hold between David and any of Art, Val, or Mick, yet the distinct conditions of existence for each of these entities implies that they are non-identical. Here the lack of generality to the appeal to primary kinds becomes apparent, for it is difficult to see what in the world could make David (rather than Art, Val, or Mick) an instance of a primary kind. Thus, an appeal to primary kinds cannot itself solve the many-many problem after all.

We can express the initial problem, the response implicit within Baker's own framework, and why that response doesn't work in terms of the analysis developed so far, in a way that extends that analysis. I have argued that any adequate notion of constitution must satisfy two conditions, Coincidence and Distinctness. Perhaps with a quibble about my appeal to *material* coincidence (though one that is appeased, I hope, by my divorce of this notion from Mereology), Baker would seem to concur. Ampliative constitution also requires that there be some sense in which constituents necessitate what they constitute. But in contrast with the notion of compositional constitution, this necessitation is *extrinsic*:

> EXTRINSIC NECESSITATION: $x$ (the $x$s) is (are) in extrinsic conditions during $\wp$ that themselves necessitate the existence of $y$.

Again, Baker herself would seem to concur, given how she presents, defends, and clarifies her own appeal to the conditions in which a given entity is instantiated. Pieces of paper have to be in "dollar-friendly" circumstances, and pieces of marble in "statue-friendly" circumstances, if they are to constitute (respectively) dollars and statues. More precisely, such a piece of paper has to exist within a currency system that produces and recognizes such pieces of paper as having the value of a dollar, and be itself produced and recognized by the appropriate authorizing sources. A piece of marble that constitutes a statue must be produced through recognized artistic means, practices, and intentions, and perhaps for some or other appreciative audience. We can debate precisely what such conditions are (or even whether there are precise conditions), but there is no dispute that they concern matter extrinsic to the constituent itself.

17. Baker herself, however, is content to consider at least some aggregates as belonging to primary kinds, such as the aggregate of molecules that constitute a river of water. See *Persons and Bodies*, p. 171–72, and "Precis", p. 593, for example.

The many-many problem arises because even though these three conditions alone determine a constitution relation between entities such as dollar bills and pieces of paper, statues and pieces of marble, and even persons and their bodies, many other constituents for each of these constituted entities, and many other constituted entities for each of these constituents, satisfy all three conditions. In light of this, we need some other further constraint on ampliative constitution. Baker's account in effect provides something like *Primary Kinds* as such a constraint:

> PRIMARY KINDS: $x$ and $y$ must be instances of distinct primary kinds, where a primary kind is what an entity is most fundamentally or essentially.

The problem with this strategy of response is that there seems no way to articulate what the primary kinds are of many of the entities that we might naturally appeal to in expressing sentences that appeal to ampliative constitution, as Table 2 illustrates. We can see the depth of the problem here more vividly perhaps by returning to (5) – (8):

(5) Adam is constituted by organic molecules.

(6) Michelangelo's David is constituted by some marble.

(7) This gene is constituted by a sequence of DNA.

(8) This island is constituted by a particular landmass.

While I have argued that it is far from obvious what the primary kind of even such a paradigm example as Michelangelo's David is, the same point holds of all of the examples that feature in these sentences. Baker is explicit that her account of constitution aims only to capture a relation that holds between individual things, and so would dismiss (6) outright as expressing a true relation of constitution, and may say the same about the plural constituents in (5).[18] The requirement that "things" here be instances of primary kinds would also seem to make her account inapplicable to both (7) and (8), or at least beckon an answer to the question of what unique primary kinds a sequence (or strand) of DNA and a landmass belong to. Again, we have a variation on the general many-many problem: why is the primary kind of a particular gene, for example, *gene*, rather than (say) replicating molecule, nucleic acid, or inherited developmental resource? If (5) – (8) are properly viewed as relying on a concept of ampliative constitution, as I have been arguing, then the many-many problem highlights a way in which the addition of Primary Kinds to an analysis of that concept results in a view that departs significantly from the constraints specified by Common Sense Ontology.

## 6. The Relational/Intrinsic Constraint

Underlying the appeal to primary kinds, and the idea of ampliative constitution more generally, is the admittedly vague intuition that entities that are, in some sense, fundamentally different must bear a relation weaker than identity to one another. A statue is a fundamentally different kind of entity from a piece of marble, a person a fundamentally different kind of entity from a material body, and a gene a fundamentally different kind of entity from a strand of DNA. We can capture this intuition, however, without restricting our account of constitution to primary kinds or some other type of privileged ontological entity, and so develop constitution views more fully in keeping with Common Sense Ontology. The additional necessary condition we need is what I shall call the *Relational/Intrinsic (R/I) Constraint*:

> R/I: $y$ is relationally individuated and $x$ (the $x$s) intrinsically individuated.

The resulting view of ampliative constitution, together with the view of compositional constitution articulated, provides an enriched set of

18. For Baker's restriction to individual things, see *Persons and Bodies*, pp. 33–34, which is my basis for thinking that she may deny that constitution can relate an individual thing to a plurality of things, as in (5), despite her consideration of at least some aggregates as instances of primary kinds (see the previous note).

resources for thinking about material constitution and introduces a promising strategy for addressing the many-many problem.

I begin with a rationale for the R/I Constraint. A standard charge made against constitution views is that when *x* putatively constitutes *y*, *y* is simply identical with *x* in a certain intrinsic state. While I have assumed the robustness of standard replies to this kind of charge, the view I have developed acknowledges that there are cases of constitution that imply that there is a sense in which *y* is nothing more than *x*. The modal tie between coincident entities provided by both Constituent and Intrinsic Necessitation means that the corresponding concept of constitution, compositional constitution, in effect spells out the precise sense in which *y* is nothing more than *x*. But what of the parallel charge that in some cases y *is* simply *x in certain extrinsic conditions* — a statue, identical to a piece of marble in "statue-favorable" conditions, or a person identical to a human body in "person-favorable" conditions? Here an appeal to Distinctness will take us some way, as before, but a powerful way to avoid this charge would be to insist not simply that *x* and *y* satisfy Distinctness but that *y*'s existence conditions themselves include facts about the world beyond the spatial boundary that it shares with *x*. That is, these conditions should form part of *y*'s nature: they should, in part, metaphysically determine *what it is to be a* Y. This is just to say that *y* must be relationally individuated. But as a material constituent of *y*, *x* is individuated by what lies within *y*'s physical boundary; it is intrinsically individuated. Hence, we arrive at the R/I Constraint, that when *y* is ampliatively constituted by *x*, *y* must be relationally individuated and *x* intrinsically individuated. This is true whether "*x*" here refers to an unquestionable individual entity (a particular landmass, a piece of marble), to a perhaps more questionable individual entity (a sequence or strand of DNA), to a mass of matter (some marble), or to a plurality of entities (organic molecules).

Although the R/I Constraint is simple to state and is motivated by the above reasoning,[19] it will pay to attend further to the issue of why it is a necessary condition on ampliative constitution. Note first that R/I is in fact satisfied by each of (B) and (6) – (8). But what of (5)

(5) Adam is constituted by organic molecules.

which concerns the ampliative constitution of a person? If the R/I Constraint on ampliative constitution is accepted, (5) would seem to entail that persons (or perhaps "human animals") are relationally individuated, a consequence that many will deny. On both "biological" and "psychological" approaches to personal identity, what Adam is, most fundamentally, whether this is, respectively, a human animal or a person, is viewed as determined by his intrinsic properties. "Biological views" hold that Adam is a human animal who happens to have certain psychological and other properties, where some of these make Adam a person for some part of his existence. "Psychological views" take Adam to be a person, where persons are individuated by their psychological properties.[20] Proponents of the biological view consider "personhood" to be a phase sortal, referring to a state that a human animal enters and eventually leaves during its life. Were proponents of the psychological view to recognize that the very states and capacities they view as individuating persons *are* relational, as I believe a general externalist view of the mind entails,[21] they would show that the biological approach was mistaken about personhood. They would also adopt a view of the relationship between persons and their bod-

19. This is not to suggest that analyzing the distinction between intrinsic and relational properties itself is trivial: far from it! For a recent attempt, see Rae Langton and David Lewis, "Defining 'Intrinsic'", *Philosophy and Phenomenological Research* 58 (1998): 333–45; and discussions of it, especially Theodore Sider, "Maximality and Intrinsic Properties", *Philosophy and Phenomenological Research* 63 (2001): 357–64.

20. For the general contrast between biological and psychological approaches, as well as the articulation of a particular biological approach, see Eric Olson, *The Human Animal: Personal Identity Without Psychology* (New York: Oxford University Press, 1997).

21. For recent defenses of externalism congenial to such a view of persons, see Andy Clark, *Natural-Born Cyborgs: Minds, Technology, and the Future of Human Intelligence* (New York: Oxford, 2003), and Robert A. Wilson *Boundaries of the Mind: The Individual in the Fragile Sciences: Cognition* (New York: Cambridge University Press), esp. chs. 4–8.

ies, and of persons and other material entities, that abided by the R/I Constraint. On such a view, it is very clear why persons are something more than not only the matter that constitutes them but any arrangement of that matter.[22]

The R/I Constraint suggests a range of domains in which we should expect to find ampliative constitution — those concerning artifacts, biological kinds, persons, and social groups — since entities in each of these domains are typically individuated by relational properties. Roughly, but I hope informatively: artifacts are individuated by their *intended or ascribed function*, biological kinds by their *history* (either phylogeny or etiology) or *natural function*, persons by their *intentionality*, and social groups by *practices and conventions*. To take an example from each of these domains, suppose that a hammer, a member of *Canis familiaris*, a person, or a city council is constituted, in some particular instance, by some entity or entities individuated intrinsically: the hammer by a lump of metal, the dog and the person by (different) masses of biological matter, and the city council by particular individuals. Hammers, dogs, persons, and city councils are each individuated by distinctive relational properties, while these constituents are not, and this is true more generally of the kinds of entity in each of the corresponding domains. Any view of ampliative constitution incorporating R/I provides the basis for explaining why each of these entities is something more than its constituents arranged in a certain way: the constituents are simply *there* in the matter itself, while the entities they constitute require in addition the existence of something beyond that constituent matter.

22. As an aside on Olson's views, note that despite Olson's own antipathy towards the notion of constitution (*e.g.*, *The Human Animal*, pp. 101–102), there are at least two ways in which something close to those views admits of interpretation within the framework I have articulated here. On the one hand, if we were to think of human animals as individuated by their intrinsic properties, the relata in (5) would satisfy all four necessary conditions for *compositional* constitution. On the other hand, if we were to take human animals to be individuated by their relational properties (as I am myself inclined to do, since I think they are individuated in part by their history), then the relata in (5) would satisfy all four necessary conditions for *ampliative* constitution.

Are there pairs of entities that stand in a relation of ampliative constitution where either the constituent is relationally individuated or the constituted entity is intrinsically individuated? If so, the R/I Constraint is mistaken. Consider first examples of the latter kind.

*Prima facie* plausible candidates of this kind are difficult to think of and would violate *both* conditions for ampliative constitution. Such examples would violate Extrinsic Necessitation, which requires that there be extrinsic conditions that necessitate the existence of the constituted entity, since no intrinsically individuated entity can be so necessitated. I suspect that the only remotely plausible examples here will involve entities that are both individuated intrinsically. The broader view of constitution articulated here suggests a general strategy of response to any such putative counterexamples, a strategy that is independent of the particular analysis given of ampliative constitution: to argue that precisely because both entities are individuated in terms of what lies within their common physical boundary, if they stand in a relation of constitution, it is compositional rather than ampliative.

Consider now putative counterexamples of the former kind, the most plausible of which are those involving pairs of entities both of which are relationally individuated. By contrast with the case just discussed, putative counterexamples here are easy to generate: examples in which a person is ampliatively constituted by a living thing, a statue by a person, or an exotic theme park by the island that it exactly occupies. I think that the right thing to say about such examples is that *all* of these entities are ampliatively constituted by something (or some things), such as a human body or a landmass, that is intrinsically individuated, but that none of those relationally individuated entities constitutes any of the others; rather, they are merely spatially and materially coincident with one another. While pairs of such entities bear the *something other than* relation to one another (since they satisfy Distinctness and have different necessitating conditions), they do not stand in the *something more than* relation. There are two reasons for adopting this position.

The first is that, at an intuitive level, while the members of each of

these pairs of entities are distinct, they readily elicit the "nothing more than" intuitions that cases of *compositional* constitution elicit. Using a metaphor I have used before, such pairs of entities are "too close" to one another to stand in a relation of constitution that is ampliative. This metaphor can be unpacked (as before) in terms of Constituent Necessitation: there is *prima facie* plausibility to the claim that the existence of each of the putative constituents is necessitated by the particular entity that it constitutes: a living thing by that person, a person by a person-statue, and an island by that particular exotic theme park. The suggestion here is not that these entities stand in a relation of compositional constitution (they don't, since they can't satisfy Intrinsic Necessitation), but that our intuitions about them are confused, caught between a rock and a hard place.

The second reason articulates part of the basis of this confusion: that although such pairs of entities can be spatially and materially coincident, it is unclear whether they satisfy Coincidence, which requires in addition that constituents be *completely material in themselves*. Landmasses, bodies, pieces of marble, organic molecules, physical particles, as well as aggregations of any of them, are uncontroversially completely material in themselves. But is this true of the islands, persons, and statues that they can, in some circumstances, ampliatively constitute? Intuitively not, since they are completely material in virtue of being constituted by such uncontroversially completely material entities. Since this will be true of any relationally individuated entity that is materially constituted, such entities are ill suited to serve as material constituents.

### 7. Constitution as a Many-Many Relation

The many-many problem is a hard problem, one that, I have argued, cannot be solved by an appeal to primary kinds and that motivates an alternative development of the concept of ampliative constitution. While I do not have a full solution to the problem, I do want to indicate what can be said about it within the framework structured by the concepts of compositional and ampliative constitution.

First, consider what this framework implies about the entities mentioned in Tables 1 and 2. It is relatively easy to construct contexts in which any entity in the upper row of either of these tables — call them, respectively, the *person row* and the *statue row* — satisfies all four conditions (including R/1) for being ampliatively constituted by any entity in the lower row — call them, respectively, the *body row* and the *marble row* — of the corresponding table, and vice-versa.

Consider the person-row entities: persons, living things, members of *Homo sapiens*, and moral agents. In the last section I argued that persons were relationally individuated. Living things are individuated in part by properties such as having a metabolism, bearing adaptations, and having certain types of history; species membership is likewise determined by, amongst other things, phylogenetic history and reproductive isolation; and moral agents, whatever else they are, essentially have intentional mental states and interact with other social beings. All of these are relational properties of the individual entities that have them.[23] Conversely, the body-row entities — human bodies, aggregates of cells, causal networks of bodily systems, and biochemical molecules — are intrinsically individuated. The same is true of the entities in Table 2: all of the statue-row entities — David, Art, Val, and Mick — are individuated relationally, while all of the marble-row entities — Piece, smaller marble chunks, undifferentiated stuff, and an aggregate of elementary particles — are individuated intrinsically. Thus, all of these examples satisfy R/1.

They also satisfy Extrinsic Necessitation. This is true even of constituents that are "arrangements". In fact, not only is there no incoherence in viewing both Extrinsic Necessitation and R/1 as applying to arrangements, but there is no resulting inconsistency between Distinctness and Extrinsic Necessitation, as when, discussing com-

23. The relational nature of many biological kinds is widely recognized in the philosophy of biology. On organisms, see Robert A. Wilson, *Genes and the Agents of Life: The Individual in the Fragile Sciences: Biology* (New York: Cambridge University Press, 2005), especially chs. 3–4; on species, see the essays in Marc Ereshefsky (editor), *The Units of Evolution: Essays on the Nature of Species* (Cambridge, MA: MIT Press, 1992).

positional constitution, we saw there was between Distinctness and Intrinsic Necessitation. Thus, consider (15):

(15) David is constituted by an aggregate of elementary particles *arranged just so*.

The constituent here, like an aggregate of elementary particles itself, is individuated intrinsically. And inserting this constituent into Distinctness and Extrinsic Necessitation yields (16) and (17), both of which not only make perfect sense but are consistent:

(16) It is possible for an aggregate of elementary particles arranged just so to exist without there being a statue that is (even partially) spatially and materially coincident with that arrangement.

(17) An aggregate of elementary particles arranged just so is in extrinsic conditions during ♇ that themselves necessitate the existence of David.

Since what necessitates the existence of David are extrinsic conditions (in accord with Extrinsic Necessitation), the necessitation relation specified in (17) allows for the possibility specified in (16), which would obtain just if those extrinsic conditions were absent. In general, there is always a way of being the material constituent(s) of a relationally individuated entity that does not itself necessitate the existence of that entity itself.

This seems to leave us stuck with the explosion of instances of ampliative constitution that is at the heart of the many-many problem. Yet how we should view this "explosion" turns in part on what kind of relationship exists between putative constituents, and what kind there is between putative constituted objects, *i.e.*, on the relations between entities *within* each of the rows of Tables 1 and 2.

On my view of ampliative constitution, there can be no relations of ampliative constitution between either any body-row or any marble-row entities, or between any person-row or any statue-row entities, since none of these satisfy R/I. In the former cases, this is because *no* body-row or marble-row entities are relationally individuated; in the latter cases, this is because *all* person-row and statue-row entities are relationally individuated. If there is a constitutive relation between such within-row entities, it must be *compositional* constitution.

Is there a relation of compositional constitution here? For the constituent body-row and marble-row entities, yes. In fact, the compositional constitution is well suited for providing an account of how there can be many constituents for any given entity without ontological amplification. Consider the body-row entities. A human body is compositionally constituted by a causal network of bodily systems, which in turn bears that relation to aggregates of cells, which in turn bears that relation to biochemical molecules. In each case there are arrangements of the level *n* entities that necessitate the existence of entities at any level higher than *n* (Intrinsic Necessitation); likewise, the existence of an entity at level *m* necessitates the existence of at least some entities at any level lower than *m* (Constituent Necessitation). The same will be true of the marble-row entities. Since I have motivated compositional constitution by appeal to the intuition that an entity might be nothing more than its constituent(s), this tempers at least one half of the many-many problem, the half that concerns the putative one-many relation between entities and their constituents.

What of the other half of the problem, the one that concerns the one-many relation between a given constituent and the entities it constitutes? As I argued at the end of the previous section, since any two relationally individuated entities violate Intrinsic Necessitation, they cannot stand in a relation of compositional constitution. There I also questioned whether such entities satisfy Coincidence, rather than simply being spatially and materially coincident, since it seems doubtful that they are completely material in themselves. If that is right, then neither person-row nor statue-row entities can compositionally or ampliatively constitute anything else. Thus, the relationship between entities in each of these rows lies beyond the ken of a theory of constitution; we are left noting simply that they are spatially and materially coincident.

In summary, the response to the many-many problem is threefold. First, there is a clear sense in which ampliative constitution is a many-many relation. Second, since the constituents in this relation stand in the ancestral of the relation of compositional constitution to one another, the putative explosion in ontological commitments that this implies is at most only at the level of putatively constituted entities. And third, since there is a relation of neither compositional nor ampliative constitution between these entities, just what we should say about them lies outside of the theory of constitution itself. Whether this response can be developed into a more complete solution to the many-many problem is a task for another occasion.

## 8. Conclusion

I began with a puzzle about material constitution and a sketch of its solution; the details of that solution, occupying the core of the paper, result in an enriched view of constitution. To recap, return to the contrast between (A) and (B), one that, I have argued, represents a more general contrast between uses of "is constituted by" and cognate expressions, such as "is made of", "is made up of", "consists of", or "is composed of", and that was exemplified by a range of other appeals to material constitution (*e.g.*, in sentences (1) – (8)):

(A) The liquid in this glass is constituted by molecules of water.

(B) The statue in front of me, David, is constituted by a piece of marble.

The puzzle was why (A) could be readily and naturally interpreted as implying that the liquid in the glass is *nothing more than* molecules of water, while just the opposite was true of (B), which is readily and naturally interpreted as implying that David is *something more than* a piece of marble. The solution to that puzzle that I have suggested is that (A) and (B) draw on different concepts of constitution, compositional and ampliative constitution, concepts with distinct overall analyses that share two necessary conditions, Coincidence and Distinctness:

> COINCIDENCE: $x$ is completely material in itself, or the $x$s are completely material in themselves, and $y$ is spatially and materially coincident with $x$ (the $x$s) during $\mathfrak{p}$.
>
> DISTINCTNESS: it is possible for $x$ (the $x$s) to exist without there being anything of $y$'s type that is (even partially) spatially and materially coincident with $x$ (the $x$s).

A pair of further necessary conditions characterize each of compositional and ampliative constitution. The concept in (A), compositional constitution, has Intrinsic and Constituent Necessitation as distinguishing necessary conditions, both of which admit at least partially of a mereological formulation:

> INTRINSIC NECESSITATION: $x$ is in some intrinsic state(s), or the $x$s that compose $y$ are arranged, during $\mathfrak{p}$ such that $x$ itself, or the $x$s themselves, necessitate the existence of $y$.
>
> CONSTITUENT NECESSITATION: whenever $y$ exists, there must be something of $x$'s type that is (at least partially) spatially and materially coincident with $y$.

Since both of these conditions further temper any putative implication of Distinctness that $x$ and $y$ are (really) separate entities — that is, further than Coincidence does already — they articulate a concept of constitution that narrows the ontological gap between constituents and what they constitute, which is just what one might expect of a concept underlying the "nothing more than" intuition elicited by (A). In fact, the gap here is so narrow that the individual constituents (in certain intrinsic states) and the plural constituents (arranged just so) specified by Intrinsic Necessitation can *never* themselves satisfy Distinctness.

By contrast, the concept in (B), ampliative constitution, has Extrinsic Necessitation and R/I as distinguishing necessary conditions, conditions that direct one not to the part-whole relation but to contextual and relational features of both the constituent and the entity it constitutes.

EXTRINSIC NECESSITATION: $x$ (the $x$s) is (are) in extrinsic conditions during $\natural$ that themselves necessitate the existence of $y$.

R/I: $y$ is relationally individuated and $x$ (the $x$s) intrinsically individuated.

Since both of these conditions further temper any putative implication of Coincidence that $x$ and $y$ are (really) strictly identical entities — that is, further than Distinctness does already — they articulate a concept of constitution that widens the ontological gap between constituents and what they constitute, which is just what one might expect of a concept underlying the "something more than" intuition elicited by (B). In fact, the gap here is so wide that no matter what intrinsic state an individual constituent is in, and no matter how a plural constituent is arranged, they will *always* satisfy Distinctness.

One of the implications of the view defended here is that "is constituted by" and cognate expressions introduce a potential ambiguity in the sentences in which they feature.[24] Consider (B) again. In contrast to the context of utterance for (B) with which I began the paper — one in which the speaker is reflecting on the aesthetic power of Michelangelo's sculptures — one might imagine a context in which the speaker is trying to convince a hearer that there is no magical or mystical property that imbues Michelangelo's David with its aesthetic grace, and says (B), where this might best be paraphrased not as (B*) but as (B‡):

(B‡) The statue in front of me, David is *nothing more than* a piece of marble.

In this context, however, (B) is plausibly taken to rely not on ampliative but on compositional constitution. If the account of the difference between ampliative and compositional constitution provided here is correct, there is a corresponding shift across these two contexts in how the constituted entity, the statue David, is conceptualized. In the original context in which (B) and (B*) are used to express the same thought, David is thought of as an entity whose nature is not simply a function of how its constituents are organized or arranged, as we might expect of something that is relationally individuated. By contrast, in the context sketched here in which (B) and (B‡) are used to express the same thought, David is thought of as an entity whose nature *is* a function of such organization or arrangement — not a metaphysically adequate thought about David (as opposed, say, to the piece of marble that constitutes it), but one that allows a conversation to proceed and typifies a common epistemic shortcut that facilitates communication.

How widespread ampliative constitution so articulated is will turn on just how widespread relational individuation is. My own view, implicit in the discussion of the virtues of the R/I constraint in section 6, is that relational individuation is prevalent, and includes many biological and artifactual kinds as well as social and non-living kinds of thing.[25] If that view is correct, then ampliative constitution may hold between entities in many domains. Together with the ubiquity of compositional constitution, this gives the view articulated here the kind of ontological reach that a view according with Common Sense Ontology should have.

Finally, if the "two concept" view does provide a framework that systematically makes sense of conflicting intuitions concerning material constitution, and allows us to make some progress in thinking about related problems such as the many-many problem, then the distinction between ampliative and compositional constitution will not only find a place in the toolkit that proponents of constitution views in

24. This ambiguity, in turn, creates the potential for equivocation in arguments that rely on "the" notion of constitution. For a discussion of such potential in the context of a discussion of whether constitution is transitive, see my "The Transitivity of Material Constitution", MS.

25. For an exploration of how one might adapt Baker's constitution view to individuals and collectives in the social domain, see my "Persons, Agency, and Constitution", *Social Philosophy and Policy* 22 (Summer 2005): 49–69.

metaphysics carry with them; perhaps it will also win a few converts to constitution views more generally.[26]

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