6 Material Constitution

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Everyday life and discourse is shot through with puzzles of material constitution. We often wonder what kind of material makes up certain physical objects. Of a traffic sign on the road, for instance, we might ask whether it is made of aluminum or steel. Seemingly implicit in such a question is a distinction between the sign, on the one hand, and the piece of metal that constitutes it, on the other hand. But what could be the basis for distinguishing the sign from that particular hunk of matter? Then again, consider the criminals who profit from melting down stolen copper pipes. If such pipes were nothing more than the portions of copper of which they were made, then we should say that the pipes persist in molten form. Yet, quite the contrary, we think that melting is a way of destroying these pipes.

Such examples confirm that even our pre-philosophical intuitions about material constitution strain in opposite directions. On the face of it, it seems bizarre to suggest that a physical object is something distinct from the particular piece of material of which it is made: surely what we see when we see a traffic sign is not multiple objects simultaneously occupying the same space. If this commonsense thought is correct, then the relationship between a physical object and the hunk of matter that makes it up is one of identity: the object *just is* its constitutive matter. But how are we to reconcile this thought with the equally intuitive thought about the copper pipes? If the portion of copper but not the pipe survives the melting process, then it cannot be that the pipe and the copper were one and the same thing, since prior to the melting, the portion of copper instantiated the ability to survive melting down while the pipe did not. A moment's reflection on this example, then, seems to suggest exactly the opposite of the lesson drawn from the traffic sign example: material constitution is *not* identity.

Sustained reflection on cases like these has played an integral role in contemporary discussions of material constitution. Here we will focus on two such puzzles—one concerning a clay statue, the other a tailless cat. Though different in important respects, both examples qualify as puzzles of material constitution because each presents a case in which two objects seem to share all of the same parts and yet relate to those parts in different ways.[1] Other notable

puzzles include the Ship of Theseus, the "paradox of increase" (also known as the "growing argument"), and the case of Lumpl and Goliath.[2] Nearly all of these puzzles are centuries old, having been first introduced by ancient Greek philosophers (e.g., Epicharmus, Chrysippus) and later revived and, in some cases, modified by medieval (e.g., William of Sherwood, Peter Abelard), modern (e.g., Thomas Hobbes, Thomas Reid), and contemporary (e.g., Allan Gibbard) philosophers.[3]

Clay statue

Consider a sculptor who one morning begins to work with a particular lump of clay; call it "Lump." By the afternoon she has molded Lump into a figurative statue; call it "Statue." Dissatisfied with her creation, the sculptor crushes her work in the evening, destroying Statue but leaving Lump intact. Now ask yourself: is Statue one and the same thing as Lump? At first it seems that the answer is obviously yes. The sculptor appears to devote the day to working on just one thing: something that was amorphous in the morning, shaped in the afternoon, and amorphous again in the evening. Even when Statue is on the scene in the afternoon, it shares all of its physical properties with Lump: weight, shape, location, height, and so on. Yet further reflection seems to reveal that Lump and Statue differ in important respects. The most obvious difference is that Lump exists at times when Statue does not: both in the morning and in the evening. And since Statue and Lump cannot be one and the same thing if they differ in even one of their properties (e.g., the property *having existed in the morning*), we are left puzzled. If Statue and Lump are identical (as our ordinary ways of thinking and speaking suggest), then how are we to account for their apparent differences? But if common sense is systematically incorrect and Statue and Lump are not identical, then just what *is* the relationship between an object and its constitutive matter? And why would common sense lead us astray?

Tibbles the cat

Tibbles is a normal housecat. But whereas "Tibbles" refers to the whole cat, let "Tib" name a proper part of Tibbles—specifically, everything but his tail. Tib, in other words, is Tibbles's tail-complement, incorporating everything to which "Tibbles" refers *except* the tail. Notwithstanding the strangeness of naming a tail-complement, it is clear enough that the referents of these names are nonidentical: Tibbles weighs more than Tib, Tib has one fewer appendage than Tibbles, etc. Now consider what happens when a minor accident results in the loss of the tail. Since none of Tib's parts are affected, there seems no reason to

deny that Tib survives the accident. But what about Tibbles? Either he survives or he does not. If he survives, then the accident results in two, wholly coincident, tailless cats. But not only would it be strange if the *destruction* of a whole's proper part were responsible for the *creation* of a second whole of the same kind, the prima facie impossibility of two objects of the same kind simultaneously occupying the same space strongly suggests that Tibbles does not survive the accident.[4] Yet if Tibbles does not survive, then we are left with the implication that things cannot survive the loss of even inessential proper parts. And that would be truly bizarre, for it would mean that you will not survive your next finger clipping, nor I my next haircut.[5]

Philosophers have engaged these puzzles from a variety of angles and have generated a large scholarly literature in the process. In the next four sections we will review four prominent strategies for addressing the problem of material constitution. Each of these strategies has been developed and defended by multiple philosophers. It is almost inevitable, therefore, that the scholarly literature should be marked by both discrepancies in presentation and intramural debates over matters of detail. But while we shall occasionally register these disagreements, for the most part emphasis will be placed on the broad outlines of, and some of the more prominent objections faced by, each general approach. The first such approach affirms the possibility of multiple objects sharing the same space at the same time (see "The Orthodox View: Coincident Objects"). On this view, "constitution" names a phenomenon in need of explaining rather than a problem in need of solving. According to the second strategy, the problem of material constitution dissolves in the light of a previously unrecognized possibility, viz. that a single object can be an instance of two kinds while nevertheless instantiating the essential properties of only one of those kinds (see "Dominant Kinds"). For advocates of the third approach, the problem of material constitution is best answered by denying the very existence of at least one of the objects involved in each of the cases described earlier (see "Nihilism"). The fourth and final strategy involves revising our commitment to Leibniz's Law and its standard conception of identity, without both of which the problem of material constitution seems not to arise in the first place (see "Revising the Logic of Identity").[6] I will conclude with some very brief reflections on the likely directions of future research.

The Orthodox View: Coincident Objects

Rather than reject the possibility of coincident objects like Statue and Lump (in the afternoon) and Tibbles and Tib (after the accident), advocates of what has become the standard response to the problem of material constitution *affirm* it. On their view, nonidentical objects *can* share all of the same parts at the same

time; things can compose two objects at once. Thus, Tibbles survives the loss of his tail and is nonidentically colocated with Tib; Lump and Statue are non-identical and yet both present in the afternoon. While this strategy is pursued in different ways, all those who defend the orthodox account are committed to denying the "identity assumption":

(IA) $(\forall x)(\forall y)(\forall p)(\forall t)$ [(the ps compose x at t & the ps compose y at t) $\rightarrow x = y$],

where "the ps" refers to an object's parts. In other words, wholly coincident, nonidentical objects are possible.[7]

By affirming this possibility, advocates of the orthodox account face the task of explaining the relationship between coincident objects. If it is not identity, what is it? Their answer: *constitution*.[8] The constitution relation may be distinguished from identity by the fact that, unlike identity, constitution is asymmetric. Whereas from the fact that a is identical with b it follows that b is identical with a, if a constitutes b, then it is not the case that b constitutes a.[9] Thus, for instance, it is held that Statue is constituted by Lump, but not vice versa.[10]

But why should we agree that Statue and Lump are nonidentical in the afternoon, when they share all of the same parts? The constitutionalist's answer is that they belong to different kinds: whereas Statue is a work of art, Lump is a piece of clay. It is this difference in kind-membership that explains the fact that Lump can (and does) survive squashing, while Statue cannot (and does not): unlike statues, lumps of clay just are the sort of thing that can survive even drastic reshaping. (Imagine melting down the copper that makes up the Statue of Liberty, reshaping it into the form of a mule and then trying to reassure the American public that the Statue of Liberty persists nevertheless.) The difference in kinds corresponds to a difference in sortal properties: Statue instantiates the property *being a work of art* but not the property *being a piece of clay*; conversely, Lump instantiates the property *being a piece of clay* but not the property *being a work of art*. This difference in kind-membership explains why Lump instantiates various modal and temporal properties that Statue lacks, including the properties *being able to survive reshaping* and *having existed in the morning*. Ultimately, then, despite sharing all of their parts, Statue and Lump are nonidentical because they differ in their sortal, modal, and temporal properties.

As the orthodox account, constitutionalism has been challenged from a variety of different angles. Here we will consider three of these objections.

The grounding problem

We can approach the first by noting the prima facie peculiarity of sortal properties like *being a work of art*. The instantiation of primitive, intrinsic properties

(e.g., shape, size) can be explained in terms of the organization of an object's parts. But for coincident objects that share all of their parts, the instantiation of nonprimitive properties cannot be explained this way. Statue's instantiation of the sortal property *being a work or art*, for example, cannot be determined by the organization of its parts, since Lump's parts are organized in precisely the same way. Likewise for modal and temporal properties. Those who defend the orthodox view, then, must explain how it is that, despite their many similarities, coincident objects nevertheless instantiate different nonprimitive properties. This objection is known as "the grounding problem."[11]

Various answers to this problem have been offered. Karen Bennett (2004), for example, recommends a way of regarding sortal and modal properties as primitive. Ryan Wasserman (2002) contends that, contrary to appearances, coincident objects do differ in their parts and that this fact explains the difference in nonprimitive properties. Perhaps the most provocative reply to the grounding problem is due to Lynne Rudder Baker (2000), who argues that the difference in nonprimitive properties reflects a difference in relational properties. On Baker's view, Statue's status as a work of art consists in its being related to an artworld; it is the sort of thing whose existence is intended by an artist, given a title, exhibited in galleries, discussed by critics, and so on. In this way, *being a work of art* is a relational property. By contrast, *being a piece of clay* is a nonrelational property because it requires only that a particular atomic structure be intrinsic to a piece of matter.

The mereology problem

The second objection to the orthodox view directly attacks the very possibility of colocated objects by reminding us that we typically do not distinguish between a whole object, on the one hand, and the sum of its parts, on the other. Indeed, it would seem that the orthodox view conflicts straightforwardly with the "principle of mereological extensionality":

(ME) $(\forall x)(\forall y)$ $[x = y \leftrightarrow (\forall z)(z$ is a part of x $\leftrightarrow z$ is a part of $y)]$.[12]

If ME is correct, then any complex object is equivalent with all of its parts. So, since they share all of the same parts, there simply is no basis for distinguishing between, say, Tibbles and Tib. To insist on the distinctiveness of coextensive objects is to engage in a kind of absurd double-counting. Call this "the mereology problem."

Various engagements with the mereology problem have featured in recent discussions of the constitution view.[13] Short of simply rejecting ME, arguably the most radical reply to this problem involves disambiguating different senses

of the "is a part of" locution in ME.[14] From the fact that x and y share all of their material parts, advocates of this strategy insist, it does not follow that $x = y$ because x and y may differ in their *non*material parts. The challenge then becomes how to cash out a plausible conception of nonmaterial parts. Among the options here is Michael Rea's (1998) Aristotelian proposal that we construe material objects as hylomorphic composites of form and matter and that we count among its parts an object's nonmaterial form. On this view, despite sharing all of their material parts, Statue and Lump are nonidentical because Statue but not Lump has the form *artwork* as a nonmaterial part. Another option would be to follow Laurie Paul (2002) in claiming that material objects are mereologically composed of their properties. In any case, despite allowing their proponents to endorse both the orthodox view and ME (suitably modified), proposals like Rea's and Paul's face significant criticisms, not least from those who regard as bedrock their commitment to the wholly material nature of objects like cats and statues.

The arbitrariness problem

While the mereology and grounding problems have generated sizable scholarly literatures, the last objection we shall consider has received less attention. First raised by Ernest Sosa (1987, sec. H.1) and recently reinvigorated by Ted Sider (2001, pp. 154–8), the "arbitrariness problem" charges that the constitution view lacks any principled grounds for restricting the number of objects present in cases of material constitution to the constituted (e.g., Statue) and constituting (e.g., Lump) objects only. If, for example, the aggregate of material simples that make up both of these objects is itself an entity of some sort, then matters quickly grow complicated, with not only the Statue–Lump relationship requiring explanation, but also the Simples–Statue and the Simples–Lump relationships. Nor does there seem to be any nonarbitrary reason to disqualify additional and even more bizarre objects. At the core of this objection is the thought that it is little more than anthropic hubris to presume that reality is carved up in such a way that all existing objects correspond precisely with human sortal concepts like *artwork, cat, lump of clay,* and so on. Sider directs this objection to David Wiggins in particular, but it may be that an answer can be developed, whether based on resources marshaled from Wiggins (2001, ch. 5) or otherwise.[15]

Dominant Kinds

If the problems facing the constitutionalist account of material constitution seem insurmountable, we might reconsider how the puzzle cases were described

and reject one or more of the assumptions built into these descriptions. In the clay statue case, for instance, it is assumed that Lump survives from the morning, through the afternoon, and into the evening. The constitutionalist is led to explain the relationship between Statue and Lump only once it is taken for granted that both exist. According to the dominant kinds view, however, we should deny that Lump survives the creative process. On this view, Lump ceases to exist when it is shaped into a work of art. Only one object exists in the afternoon, viz. Statue. Consequently, no explanation of relationship between nonidentical objects is required.[16]

On its face, the suggestion that Lump exits the ontological stage in the afternoon seems highly implausible. After all, lumps of clay are able to survive reshaping, and all that the sculptor does is to reshape Lump. To appreciate the dominant kinds view, then, it will help if we step back from the standard presentation of the clay statue case. To begin, let us provisionally set aside the labels "Lump" and "Statue." Let us further agree that at least one thing exists in the afternoon—possibly two (or more), but at least one. Call whatever thing(s) exist(s) in the afternoon "ϕ." Now, just as in everyday contexts we would accept "soup can" and "piece of aluminium" as equally true descriptions of the object in one's kitchen's pantry, so too "lump of clay" and "work of art" are equally true descriptions of ϕ. The problem emerges only when it is acknowledged that contradictory properties seem to be instantiated where ϕ is: considered as a lump of clay, ϕ instantiates the property *able to survive reshaping*, whereas considered as a work of art, ϕ instantiates the property *unable to survive reshaping*. And recall from above the constitutionalist's thought that modal properties like these are associated with sortal kinds: objects of the kind *work of art* being unable to survive reshaping, objects of the kind *lump of clay* being able to survive reshaping. But since one thing cannot be both a work of art and a lump of clay if this means being both able and unable to survive reshaping, the inference that at least two things must be located where ϕ is seems inescapable.

Dominant kind theorists, however, resist precisely this inference by rejecting the principle on which it is based. On this view, an object can be an instance of a sortal kind without instantiating the modal properties associated with members of that kind. In the case at hand, ϕ can be *both* a work of art and a lump of clay while being *either* able *or* unable to survive reshaping. Whether ϕ is or is not able to survive reshaping depends on which of the sortal kind concepts—*work of art* or *lump of clay*—is ϕ's primary, or "dominant," kind. According to Michael Burke's formulation of this view, when a single object satisfies more than one sortal kind concept, its dominant concept is "the one whose satisfaction entails possession of the widest range of properties" (1994b, p. 610). Because an object can satisfy *lump of clay* merely by instantiating particular physical properties, and because an object can satisfy *work of art* only

by instantiating both physical properties and aesthetic properties, in a case like φ's where both concepts are satisfied, *work of art* dominates *lump of clay*. Consequently, φ is unable to survive reshaping. Returning now to the original case, this is why Lump goes out of existence in the afternoon: not because the lump of clay itself ceases to exist, but because the sortal concept satisfied by Statue comes to dominate.

Several objections to the dominant kinds view (sometimes called "sortal essentialism") have been raised.[17] Jonathan Lowe (1995), for instance, blanches at the peculiarity of the dominant kind theorist's claim that something as durable as Lump—able to survive infinitely many other rearrangements of its atoms—could be destroyed so easily, by one particular reshaping, viz. one that molds it into a statue.[18]

Another objection focuses on the notion of dominance itself—specifically, Burke's criterion for determining which kind concept is dominant. On Burke's view, every composite object (that is not a mere aggregate) satisfies at least two sortal kind concepts—possibly more—although only one of these is the dominant kind that determines that object's modal properties (and more generally its persistence conditions) (1994b, p. 608). Thus, while the container of chicken noodle soup satisfies both *soup can* and *piece of aluminium*, the former is its dominant sortal because *soup can* is the concept whose satisfaction entails possession of the widest range of properties. But what if the Campbell's Soup container in question were also a Warholesque work of pop art? Between *work of art* and *soup can* it is not at all obvious which concept has associated with it the wider range of properties. Nor is it clear how one would go about measuring such a thing. On the face of it, Burke's view seems to presume a stepwise hierarchy of sortal kind concepts, no two of that entail possession of equally wide ranges of properties by the single object which satisfies them. This is possible, of course, but it seems both artificial and unrealistic.

Although Burke acknowledges the vagueness of his criterion of dominance, after surveying what he takes to be a representative range of cases, he insists that it is serviceable. As he puts it, the criterion's "vagueness seldom prevents a clear-cut decision," and except in atypical cases "its rulings are the ones we want" (1994b, pp. 604 and 610). Rea also endorses the dominant kinds view, but he disagrees with Burke on this last point, charging both that "there seem to be many cases which are clearly not atypical and which are nevertheless such that Burke's criterion does not give us a clear decision" and that "there seem to be many obviously non-atypical cases in which Burke's criterion gives us the *wrong* decision" (2000, p. 184). The problem with Burke's account, Rea argues, is that it determines an object's dominant kind based solely on a comparison of the various kinds of which that object is a member. According to Rea, the object's essential properties must also contribute to this determination. In place

of Burke's criterion of kind dominance, then, Rea proposes the following alternative (ibid., p. 187):

> (KD) For any x, K is x's dominant kind just in case (i) x is essentially a K, and (ii) for any kind K' such that x is essentially a K', x's being a K entails x's being a K'.

Rea then argues that this alternative formulation not only gives clear and correct answers to the key examples, but also respects the intuition that kind concepts can sometimes dominate and other times be dominated. While few have attacked it, the jury remains out on whether this modification will satisfy all critics of the dominant kinds view.

Nihilism

Whereas the dominant kind theorist dissolves the problem of material constitution by showing how a single object can exemplify multiple kinds, the nihilist *rejects* the problem by denying the very existence of one or more of the objects concerned. Various formulations of and rationales for this response have been offered. Here we shall consider two.

Extreme nihilism

The view we might call "extreme nihilism" insists that the only objects that exist are those without proper parts: mereological simples. Objects with proper parts—composite objects—do not exist, on this view. If extreme nihilism is correct, then there are no cats, tail-complements, statues or lumps of clay, in which case the demand for how to explain the relations between such things disappears. Under the headings of "nihilism" or "mereological nihilism," this view is often attributed to the early work of Peter Unger (1979a, 1979b). But in fact Unger's position was not quite this stark. His view would be more aptly labeled "*conditional* extreme nihilism," since he held only that *if* composite objects exist, then they fail to satisfy our ordinary sortal terms.[19] Unger's defense of this claim relies on what he calls the "sorites of decomposition" argument.

(1) There is at least one stone.
(2) For anything there may be, if it is a stone, then it consists of many atoms but a finite number.
(3) For anything there may be, if it is a stone (which consists of many atoms but a finite number), then the net removal of one atom, or only a few, in a

> way which is most innocuous and favorable, will not mean the difference
> as to whether there is a stone in the situation.
>
> (Unger 1979b, p. 120)

Unger claims that the preceding propositions are jointly inconsistent. If, following proposition (3), one or more atoms are removed until none remain, (3) tells us that a stone would nevertheless be present. Yet this prediction contradicts (2), since the stone that allegedly remains would consist of no atoms. From this Unger concludes that (1) ought to be rejected, and along with it our commitment to other ordinary objects, so long as these objects are thought to satisfy sortal terms (e.g., "stone," "statue," "cat"). The only composite objects immune to this argument are those with precise existence conditions, like "physical object," since removing atoms from a physical object always leaves either a composite physical object or a simple physical object, and in the latter case removal of the last atom results in no object. Thus, Unger's conditional conclusion: if composite objects exist, they will not be the objects to which we customarily refer.

Modest nihilism

Unger (1990) has since abandoned his extreme nihilist view. But its close cousin—what we might call "modest nihilism"—is defended by Peter van Inwagen (1981, 1990), among others.[20] Like the extreme nihilist, the modest nihilist accepts the existence of mereological simples and denies the existence of (most) composite objects. The modesty emerges from van Inwagen's answer to what he calls "the special composition question" (1990, ch. 2). The special composition question asks, "when is it the case that there exists an object y such that the xs compose y?" The answer, according to van Inwagen, is "if and only if the activity of the xs constitutes a life" (1990, p. 82). For the modest nihilist, in other words, the only composite objects that exist are living organisms.

Van Inwagen's argument for this position relies on his *rejection* of what he calls the "doctrine of arbitrary undetached parts":

> (DAUP) For every material object M, if R is the region of space occupied by M at time t, and if sub-R is *any* occupiable sub-region of R *whatever*, there exists a material object that occupies the region sub-R at t. (van Inwagen, 1981, p. 123)

In essence, DAUP claims that for any given sub-region of an area occupied by a material object, a smaller object exists that occupies just that sub-region. But according to van Inwagen, if DAUP were true, then prior to the accident not only does Tibbles exist, so too does Tib. Assuming it is possible for a cat to

survive the loss of his tail, the accident causes Tibbles to become one and the same thing as Tib. But since two things cannot become one thing, *either* a cat cannot survive the loss of its tail *or* Tib did not exist in the first place. Faced with this choice, van Inwagen contends, clearly it is the commitment to the existence of Tib that should be abandoned. And because this commitment followed only from our provisional acceptance of DAUP, it must be that DAUP is false.

In sum, then, the problem of material constitution simply does not arise for the modest nihilist. Inanimate composite objects do not exist, so that rules out Statue and Lump (and with them any need to explain their relationship). Living organisms like Tibbles do exist, but arbitrary undetached parts like Tib do not, so again no problem arises.[21]

Both forms of nihilism—extreme and modest—have generated vast literatures and spirited debates. They have also been subjected to a variety of criticisms, not least what David Lewis (in a different context) once termed "incredulous stares" (Lewis, 1973, p. 86). "Surely," this stare would say if it could speak, "it is just delusional—a philosopher's fantasy—to deny the existence of something as patently real as Statue." In its most forceful form, this incredulity may reflect a Moorean objection of the form, "any argument whose conclusion denies the existence of ordinary objects must rely on premises which are less plausible than the rejection of the conclusion itself."

Modest nihilists like Trenton Merricks and van Inwagen have tried to answer this objection by offering paraphrases of existential claims and commitments concerning everyday objects.[22] Roughly, the idea here is that, even though nihilists reject the existence of statues and tables per se, the truth-conditions for a proposition like "there is a statue over there" are the same as they are for "there are mereological simples arranged table-wise over there." While this paraphrastic strategy allows us to retain our ordinary ways of talking, such talk is loose and imprecise at best. At worst, some critics have charged, these paraphrases do not blunt the Moorean charge after all.[23]

Revising the Logic of Identity

In the clay statue case, we noted that Statue and Lump differ with respect to various types of properties: temporal properties, modal properties, kind properties, and so on. We then inferred from these differences that Statue could not be identical with Lump. Likewise in the case of Tibbles the cat, we granted that, prior to the accident, "Tibbles" and "Tib" referred to nonidentical objects on the grounds that Tibbles and Tib differ in their weight, number of appendages, and so forth.

The conception of identity at work here is of a relation that is absolute, permanent, and necessary. And the principle that licenses an inference from a difference in properties to numerical nonidentity is Leibniz's Law (sometimes

referred to as "the indiscernibility of identicals"). Leibniz's Law describes a kind of constraint on the identity relation: *identical individuals cannot differ in any of their properties*. In other words, *it is a necessary condition for two things to be identical that they share all of their properties.* Expressed more carefully still, Leibniz's Law asserts the following:

> (LL) For all x and y, if x is identical with y, then x and y share all of the same properties.[24]

If LL were false, then the inferences from property differences to nonidentity would not go through.

According to one broad line of thought, the problem of material constitution is not a problem about material objects per se—clay statues, tailless cats, and the like. Rather, the apparent problem arises from a misunderstanding of the logic of identity. On this view, instead of seeing the problem of material constitution as the unavoidable consequence of LL's application to these cases, it is the slavish adherence to LL and/or its attendant conception of identity that should be abandoned. As with many philosophical problems, the question here is what should be held fixed, and those who advocate revising the logic of identity submit that if the application of LL results in the conclusion that Statue and Lump are nonidentical, then so much the worse for LL and the conception of identity on which it relies. What should be inferred from the fact that Statue and Lump do not share all of their properties, in other words, is *not* that Statue and Lump are nonidentical. Rather, since Statue and Lump *are* identical (in some sense yet to be specified), it must be LL that is mistaken (for reasons yet to be explained). Seen in this way, the burden facing these revisionary logicians is the justification of their rejection of LL and the explanation of their alternative conception of the identity relation. According to the three most notable strategies for meeting this burden, identity (a) can be a contingent relation, (b) is never absolute but always relative to a kind, or (c) can be a temporary relation. We will consider each view in turn.

Contingent identity

In defending the contingency of identity, Gibbard (1975) advances the following claim:

> (CI) $(x = y)$ & $\lozenge\, [(x$ exists & y exists$)$ & $x \neq y]$.

In other words, even if x and y are identical, it is possible that they might not be. What the alleged nonnecessity of identity has to do with LL becomes

apparent once we register that each and every thing is necessarily identical with itself: self-identity is a property that everything necessarily instantiates. Conjoined with LL, then, *x*'s instantiation of the property *being necessarily identical with x* generates the result that *x* is identical with *y* just in case *x* has the property of being necessarily identical with *y* and *y* has the property of being necessarily identical with *x*. Consequently, if LL is true, then it seems that CI must be false. Put the other way round, if Gibbard is correct that the identity relation is not necessary but contingent, then this would seem to justify the rejection of LL.

Gibbard's overarching aim is to demonstrate how Saul Kripke's (1971, 1980) attacks on the contingency of identity, while largely successful, nevertheless fail to dispense with all contingent identities. In making this case, there emerges in Gibbard's discussion an alternative to Kripke's theory of proper names as rigid designators (very roughly, the view that proper names refer to the same things even in contexts that express possibility and necessity). So if CI is true, then its implications extend well beyond the problem of material constitution. Nevertheless, Gibbard's case for CI turns crucially on an example involving material constitution, and this case has subsequently influenced debates concerning not only the problem of constitution in particular, but also the logic of identity and the semantics of proper names in general.

In Gibbard's example—a twist on the standard clay statue case—a sculptor's statue of the infant Goliath is prepared in two pieces: a top part (above the waist) and a bottom part (below the waist). Once the two halves have been completed independently, the sculptor sticks them together, simultaneously bringing into existence both a new piece of clay and a new statue. To the statue thus created the sculptor gives the name "Goliath," and to the new lump of clay she gives the name "Lumpl." Afterwards, the statue is smashed, simultaneously annihilating Goliath and Lumpl both. Unlike our original clay statue case, then, in the Lumpl and Goliath example, the statue and the piece of clay persist during exactly the same window of time. Describing this example, Gibbard insists,

> the statue and the piece of clay are identical. They began at the same time, and on any usual account, they had the same shape, location, color, and so forth at each instant in their history; everything that happened to one happened to the other; and the act that destroyed the one destroyed the other. If the statue is an entity over and above the piece of clay in that shape, then statues seem to take on a ghostly air. (Gibbard, 1975, p. 191)

But, Gibbard continues, if

> the statue and the piece of clay are the same thing, then their identity is contingent. . . . For suppose I had brought Lumpl into existence as

> Goliath, just as I actually did, but before the clay had a chance to dry, I squashed it into a ball. At that point . . . the statue Goliath would have ceased to exist, but the piece of clay Lumpl would still exist in a new shape. Hence Lumpl would not be Goliath, even though both existed. (Gibbard, 1975, p. 191)

In this way, Gibbard concludes, the example of Lumpl and Goliath gives us a prima facie plausible instance of CI.

Of course, constitutionalists and others will object that, although they share all of their intrinsic, relational, and temporal properties, Lumpl and Goliath nevertheless differ in their modal properties (*being able to survive squashing* and *being unable to survive squashing*, respectively) and that these modal properties, in turn, ground Lumpl's and Goliath's different sortal properties (*being a lump of clay* and *being a statue*, respectively). Gibbard's reply is that, contrary to our ordinary ways of thinking and speaking, objects do not instantiate modal properties like those that allegedly distinguish Lumpl from Goliath. This is a convenient turn in Gibbard's argument, since the property of *being necessarily self-identical* is also a modal property. If objects lack even this property, then CI does not violate LL after all.

One's satisfaction with Gibbard's defense of contingent identity will depend on whether one accepts his alternative construal of our attributions of modal properties to material objects and ultimately his non-Kripkean theory of how proper names function in modal contexts. Very roughly, on Gibbard's view, a proper name cannot refer to an object *simpliciter*; a proper name refers only to an object considered under a sortal concept. In this way, "Goliath" and "Lumpl" each refer to the same thing but in different ways: "Goliath" to the object considered as a statue, "Lumpl" to the same object considered as a lump of clay. The attribution of modal properties to the referents of proper names, then, proceeds only via the sortal concepts under which those referents are considered. Thus, the claim "Lumpl but not Goliath is able to survive squashing" neither differentiates two objects (one of which can, the other of which cannot, survive squashing) nor attributes to one object a property impossible to instantiate (viz. *being both able and unable to survive squashing*). Indeed, on Gibbard's view, nothing per se instantiates or fails to instantiate the property *being able to survive squashing*; there are only sortal concepts under which a thing may be considered that make the attribution of this property true or false. Ultimately, then, it would seem that the prospects for CI depend on the appeal of Gibbard's account of how proper names function in modal contexts. And, though certainly not all, many metaphysicians have been reluctant to abandon their commitment to the view that modal properties are instantiated by material objects themselves.

Temporary identity

The second strategy relies on a distinction between different senses of "numerical identity." The first sense—what we can call "strict" numerical identity—is the equivalence relation depicted in LL and other standard characterizations of numerical identity. On this strict understanding, it is true that Statue and Lump are nonidentical. But there is another sense of numerical identity that we can call "temporary" identity, according to which x and y can be identical at one time and nonidentical at another time. Indeed, on this view, x and y cannot coincide at a time without being (temporarily) identical at that time. Thus we can say, for instance, that after its tail is removed, Tibbles and Tib are temporarily identical despite being strictly nonidentical. Likewise, though strictly nonidentical, Statue and Lump are nevertheless temporarily identical while they occupy exactly the same space.

There is something appealing about the idea of temporary identity. When first confronted with the clay statue case, for instance, one might well be tempted to respond, "But why should we insist on the nonidentity of Statue and Lump *in the afternoon* simply because of what will happen to them *later in the evening*?" (Sider, 2001, p. 166). But while it nicely captures this intuitive response, the temporary identity view has attracted few adherents besides its two principal exponents, André Gallois (1998) and George Myro (1986). The objections voiced against Gallois's more recent presentation have been fairly technical in character—involving competing formulations of LL, the debate between three-dimensionalists and four-dimensionalists, and the debate between A-theorists and B-theorists about time.[25]

Relative identity

A third approach is associated principally with the work of Peter Geach.[26] Geach and fellow advocates of "relative identity" reject LL because they deny that there is any such thing as absolute identity. On this view, identity is not the bare relation reflected in "$x = y$"; such assertions are incomplete on this view. Rather, identity is always relative to a sortal kind concept (e.g., *artwork, cat*), as reflected in such claims as "x is the same F as y" ($x =_{\overline{F}} y$) and "x is not the same G as y" ($\sim[x =_{\overline{G}} y]$), where "$F$" and "$G$" serve as placeholders for predicates denoting sortal kind concepts. Indeed, the possible truth of the conjunction of these two claims represents the hallmark thesis of the relative identity view, viz.

(RI) ◊ (x and y are the same F but different Gs),

where "same *F*" and "same *G*" reflect relative identity relations and where "x and *y* are different *G*s" is understood to mean that "*x* and *y* are *G*s but *x* and *y* are not the same *G*."

If the relative identity thesis is correct, then the traditional puzzles of material constitution are inaccurately formulated. From a relativist perspective, it makes sense neither to affirm nor to deny flatly that, say, Statue is identical with Lump, for there is no such relation as identity *simpliciter* or nonidentity *simpliciter*. The nonidentity *simpliciter* of Statue and Lump cannot be inferred merely from the fact that they differ in various respects: though not the same piece of clay as Lump, Statue is nevertheless identical with Lump relative to the sortal concept *artwork*. Likewise for Tibbles and Tib, who, despite their different histories (one once had a tail, the other did not), are nevertheless one and the same cat: though different individuals, Tibbles and Tib are the same cat.

But despite the expansive literature it has generated, relativism about identity (like the temporary identity view) has gained little currency either as an account of identity in general or as a solution to the problem of material constitution in particular.[27] Most of the resistance to this view's application to the problem of material constitution, however, is grounded in alternative theories of the same problem. For instance, since the relativist solution ("different individuals but same cat") does not apply unless Tibbles and Tib exist, the modest nihilist's rejection of DAUP—and with it the existence of such things as tail-complements—amounts to an indirect rejection of relative identity. Likewise for the dominant kinds theorist, who, without denying Tib's existence, nevertheless denies that Tib survives the accident. In addition, Wiggins (1980, 2001)—Geach's most strident critic over the years—denies that Tibbles and Tib could be the same cat, since he denies that Tib is a cat at all (2001, pp. 173–5).

Future Research

Future research regarding the problem of material constitution is needed in at least three areas. First, despite the fairly entrenched positions surveyed here, philosophers are still uncovering previously unexplored wrinkles of the problem of material constitution. For instance, in a recent article, Laurie Paul (2010) locates and develops three new puzzles at the intersection of the problems of material constitution and mereological composition. A second area where further research may be needed concerns how theories of material constitution are extended to particular cases. In weighing which theory best accounts for the clay statue case, for instance, discussions have generally assumed a top-down character—the assumption being that the conclusions drawn about Statue's relation to Lump will apply (*mutatis mutandis*) to similar examples of art objects. It may be, however, that examples (or types of examples) are *sui*

generis, such that the analysis of the concept *work of art* as it applies in the case of a traditional, representative clay statue does not extend to applications of the same concept in, say, experimental, nonrepresentative works of installation art.[28] Finally, and not unrelated, the apparent intractability of many metaphysical problems—including the problem of material constitution—has philosophers in a reflective mood about the business and methods of metaphysics itself. Further work at the level of meta-metaphysics is needed to evaluate the status of the debate over material constitution (see "Research Problems and Methods" in this volume). Is it, for instance, merely a verbal dispute? Can it ever be resolved? If so, what sort of argument or piece of evidence do we lack? And if not, why not?[29]

Notes

1 This is Michael Rea's informal gloss (1997, p. xxi). In fact, as he has demonstrated (Rea, 1995, pp. 526–8), the problem of material constitution can be characterized more formally than this, as the product of a set of individually plausible and yet jointly incompatible assumptions. Thus construed, any solution to the problem will involve the rejection of at least one of these assumptions. While informal, the current discussion is intended to be consistent with this formal presentation.

2 While the Ship of Theseus example is widely known and the Lumpl and Goliath case will be discussed later (see "Revising the Logic of Identity"), the "paradox of increase" is perhaps less familiar. In this connection, see Chisholm (1976, pp. 157ff.) and Olson (2006).

3 See Rea (1997, pp. xv–xx) for a helpful overview of the provenance of these puzzles.

4 For a defense of the claim that it is impossible for two objects of the same kind to occupy the same place at the same time, see Wiggins (1968).

5 This example—sometimes called the "body-minus argument"—was introduced in the contemporary literature by Wiggins (1968), but the puzzle is an ancient one. Chrysippus raised the same questions with an analogous case involving a human being named "Dion" and his right-foot-complement named "Theon." A sample of recent discussions of the Dion and Theon puzzle includes Burke (1994a), McGrath (2005), and Olson (1995, 1996).

6 The most notable account not discussed here involves four-dimensionalism, according to which material objects are not wholly present at every moment at which they exist. Rather, by consisting of earlier and later temporal parts, objects are temporally as well as spatially extended. In the jargon of this literature, material objects do not endure through time; they *perdure*. Those who advocate four-dimensionalism include Lewis (1976), Quine (1963), and Sider (2001). Because four-dimensionalism represents an ontological framework whose impetus and challenges extend far beyond its application to the particular problem of material constitution, I have elected to set aside this view here and to operate (without defense and tacitly) within the standard three-dimensionalist framework, according to which objects are wholly present at every moment they exist. Readers interested in four-dimensionalism in general are encouraged to consult the chapter by Nick Effingham in this volume ("Endurantism and Perdurantism"). Readers interested in the application of the four-dimensionalist framework to the problem of material constitution in particular should see especially Sider (2001, ch. 5).

7   The name "the Identity Assumption" is due to Rea (1997, p. xxiii). Wiggins (1968) adds the further qualification that being of different kinds is a necessary condition of material colocation. He rejects the possibility that nonidentical things of the same kind can be colocated. Also, and while the meaning of "compose" is contentious, in this context, "the ps compose x" should be understood as the claim "the ps are all parts of x, no two of the ps overlap, and every part of x overlaps at least one of the ps" (likewise *mutatis mutandis* for "the ps compose y"); see van Inwagen (1990, pp. 28ff.).

8   As the standard response to the problem of material constitution, this view has many defenders. Among the most notable are Baker (1997, 2000, 2007), Doepke (1982), Fine (2003), Johnston (1992), Lowe (1989, 1995), Thomson (1983), and Wiggins (1967, 1968, 1980, 2001).

9   While this is an intuitive description of the constitution relation, some defenders of this view deny that constitution is asymmetric. On their view, it is the case both that Lump constitutes Statue and that Statue constitutes Lump. (For Paul, the question of how to explain this asymmetry presents a challenge analogous to that posed by the grounding problem [see below]; she calls it "the asymmetry puzzle" (2002, p. 583).) Among constitutionalists there is also some dispute over whether the relation is reflexive—whether, in other words, objects constitute themselves. I shall not engage these intramural disagreements here.

10 An incisive discussion of the constitution relation is given by Wasserman (2004).

11 The grounding problem is variously presented, but see especially Burke (1992), deRosset (2011), Olson (2001), and Zimmerman (1995).

12 ME corresponds to a fundamental set-theoretic axiom according to which two sets are identical just in case they share all of the same members. It differs from IA principally in that IA is temporally quantified.

13 In addition to those discussed here, see especially Doepke (1982), Johnston (1992), and McDaniel (2001).

14 The door to this strategy was opened by Johnston (1992, pp. 92ff.), who pointed out that it is unclear what kinds of parts ME is supposed to concern.

15 In this connection, see also Bennett (2004) and Olson (2007, pp. 65ff.).

16 A similar view (*mutatis mutandis*) about the case of Tibbles is advanced in Burke (1994a). In the interest of simplicity, I shall focus in this section on the application of the dominant kinds view to the clay statue case.

17 In addition to those mentioned here, other critical discussions can be found in Carter (1997), Noonan (1999), Olson (1997), Sider (2001, pp. 161–5), Stone (2002), and Burke (2004).

18 Rea (2000, p. 180) denies sharing the intuition that this is a peculiar way of destroying an object.

19 This wrinkle is often overlooked in presentations of Unger's early work. Sider (2001, p. 187) is one of the few to correct the record. Interesting discussions of Unger's sorites argument and its relation to subsequent debates about vagueness are given in Elder (2000) and Thomasson (2007, ch. 5).

20 Modest nihilism is also defended by (Merricks, 2001), whose view is roughly that if inanimate composites existed, they would be causally redundant; but since causal interactions among inanimate composites are not overdetermined by those objects' proper parts, inanimate composite objects do not exist. In the interest of simplicity, however, I will concentrate here on van Inwagen's line of argumentation.

21 In connection with the case of Tibbles and DAUP, see also Olson (1995) and Parsons (2004).

22 See, for example, Merricks (2001, ch. 7) and van Inwagen (1990, chs 10, 11, and 13).

23 Regarding this last charge, see McGrath (2005).

24 The converse of this principle, "the identity of indiscernibles," holds that it is a *sufficient* condition for the identity of *x* and *y* that they share all of the same properties. That is: for all *x* and *y*, if *x* and *y* share all of the same properties, then *x* is identical with *y*.

25 See, for instance, discussions in Hawley (2001, pp. 154–6), Hawthorne (2003, pp. 123–8), and Sider (2001, pp. 165–76).

26 See Geach (1967, 1972, 1980). Related views and relevant discussions can be found in Chandler (1971), Chisholm (1969, 1976), Griffin (1977), Noonan (1980), and Quine (1963). Deutsch (2007) and Noonan (1997) provide especially insightful overviews of the debate concerning relative identity.

27 Regarding relativism's wide-ranging implications for the philosophy of language, philosophical logic and mathematics, see, for instance, Dummett (1981, 1993), Gupta (1980), Hawthorne (2003), Perry (1970), and Wiggins (1980, 2001).

28 One arena where the particularities and nuances of the applied context have received greater respect is the debate over personal identity. See, for instance, Olson (2007, ch. 3), as well as the relevant sections from the chapter by David Hershenov in this volume ("Personal Identity").

29 Many thanks to Eric Olson for helpful comments on an earlier draft of this chapter.

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