Composition as a *Kind* of Identity

Phillip Bricker
University of Massachusetts Amherst

Abstract

Composition as identity, as I understand it, is a theory of the composite structure of reality. The theory's underlying logic is irreducibly plural; its fundamental primitive is a generalized identity relation that takes either plural or singular arguments. Strong versions of the theory that incorporate a generalized version of the indiscernibility of identicals are incompatible with the framework of plural logic, and should be rejected. But weak versions of the theory that are based on the idea that composition is merely *analogous* to (one-one) identity are too weak to be interesting, lacking in metaphysical consequence. I defend a moderate version according to which composition is a *kind* of identity, and argue that the difference is metaphysically substantial, not merely terminological. I then consider whether the notion of generalized identity, though fundamental, can be elucidated in modal terms by reverse engineering Hume's Dictum. Unfortunately, for realists about worlds, such as myself, who understand Hume's Dictum in terms of duplicates, the elucidation never gets off the ground; for non-realists, the elucidation may succeed in capturing some general notion of identity, but it's characterization is too general to target the particular notion of identity, tied to classical mereology, that is the object of my theorizing. In the end, I have little to offer the skeptic who claims not to understand the relevant notion of generalized identity, or not to take it to be compulsory in providing an account of the structure of reality.

Composition as a *Kind* of Identity

I. Introduction

The situation is untenable. Something that I take to be absolutely obvious is rejected by many, if not the majority, of my philosophical peers. No, I don't mean my belief in possible worlds or mathematical entities. I understand full well how my peers can disagree with me about that. I speak rather of my belief in:

> **Unrestricted Composition**: For any things whatsoever, there is something that those things compose: a *fusion* of those things.

Unrestricted Composition follows with perfect clarity from my understanding of the notion of composition. It baffles me to no end how this notion, which I grasp so clearly, can elude so many other philosophers.[1]

Because no one who means what I do by 'composition' could coherently deny Unrestricted Composition, I am faced with a problem of interpretation. Either such a denier and I are talking past one another, or the denier is deeply confused. (To think that *I* might be the one who is deeply confused would be self-undermining, and is not an option.) Sometimes I think it is the former, for example, when the denier claims that composition only occurs when the components are "cohesive" or "causally integrated".[2] Here, I suppose, the denier is trying to capture the contextually restricted application conditions for ordinary uses of the word 'object'; and I can understand that project well enough. Sometimes I think it is the latter, for example, when the denier claims that whether or not composition occurs is a brute fact, or is a contingent matter.[3] On my understanding of composition, this makes

---

[1] Peter van Inwagen has often been praised for introducing the *Special Composition Question*, roughly: What has to happen in order for some things to compose another thing? But if the answer is, as I think – *nothing* – focusing on the Special Composition Question was a big mistake. With its suggestion that something *does* have to happen, it sent a horde of philosophers in search of an account where none is needed. Van Inwagen asks, and gives his own answer to, the Special Composition Question in *Material Beings*.

[2] Some such views are discussed and rejected in *Material Beings.*

[3] Ned Markosian defends brutal composition in "Brutal Composition." Ross Cameron defends the contingency of composition in "The Contingency of Composition." More recently, he claims only that brute, contingent composition is at least coherent, or conceptually possible; see "Composition as Identity Doesn't Settle the Special Composition Question," pp. 534, 550. But he seems to mean something weaker by 'coherent' than I do. I grant that, in some sense, I understand what it means to say that composition sometimes occurs and sometimes does not, just as, in some sense, I understand what it means to say that the operations of conjunction

about as much sense as claiming that it is a matter of brute contingency whether a thing is identical with itself; and I know of no other understanding of composition under which it makes better sense. Sometimes I am not sure what to think, as when I am confronted by the nihilist who rejects all composite objects.[4] For in one respect the nihilist and I are in agreement: we both have a deflationary notion of "composite object". But, unlike the nihilist, what I think is deflationary about "composite object" is the operation of composition, not the object composed; I do not recognize any interesting metaphysical sense in which composite objects are less "real", or less "fundamental", than their parts. Be all that as it may, I can't help but wonder: is there something I can do to help these philosophers latch on to the deflationary notion of composition that I so clearly grasp?

David Lewis famously wrote: "I myself take mereology to be perfectly understood, unproblematic, and certain." (*Parts of Classes*, p. 75) As best I can tell, my own notion of composition is precisely the same as Lewis's. And, like Lewis, when called upon to elucidate this notion to those who don't fully grasp it, I find it natural to call upon some version of the doctrine of "composition as identity". But composition as identity has not found many adherents: strong versions of the doctrine are rejected as being incoherent, weak versions as being too weak to be interesting. In what follows, I have a modest goal and a hope. The *goal* is to lay out clearly what I take the doctrine of composition as identity to be. I hold to a *moderate* version of the doctrine: although the many-one relation of composition, unlike the one-one relation of identity, does not satisfy a principle of the indiscernibility of identicals, it nonetheless is a *kind* of identity and not merely *analogous* to one-one identity. The *hope* is that, once laid out, the doctrine will force itself upon you as being true. But I will settle for less: an understanding of the notion of generalized identity of which composition is a species. For those philosophers who claim still not to understand, I will consider in the final sections whether the notion can be elucidated in modal terms. That project faces serious obstacles, but perhaps something will be learned from the exercise.

II. Composition as Identity: Informal Characterization

The idea behind composition as identity is supposed to be simple:

> The whole "is nothing over and above" its parts. Talking about the whole and talking about the parts that compose it are just different ways of talking about "the same portion of reality". If portions of reality are what our terms, both singular and plural, refer to, then it follows that 'the whole' and 'its parts' co-refer; and so the whole is identical to its parts.

---

and disjunction sometimes apply to propositions and sometimes do not. What I don't, and can't, understand is how these things could be true.
[4] Nihilism has been defended by Dorr and Rosen in "Composition as a Fiction," by Cameron in "Quantification, Naturalness, and Ontology," and, most recently, by Sider in "Against Parthood."

Perfectly clear, right? Maybe not. For I also grant that there is a sense in which the whole *is* something over and above its parts. How, then, do I get you to understand the intended sense in which it is identical to its parts? And to say that a plural term refers to *a* portion of reality, rather than to portion*s* of reality, just begs the very question at issue: whether identity statements between plural and singular terms are ever meaningful and true. So if you didn't understand my notion of composition as identity before I trotted out the above explanation, it seems unlikely you will understand it after.

Perhaps I can get you to understand by example. Consider Baxter's six-pack:

> Someone with a six-pack of orange juice may reflect on how many items he has when entering a "six items or less" line in a grocery store. He may think he has one item, or six, but he would be astonished if the cashier said "Go to the next line please, you have seven items". We ordinarily do not think of a six-pack as seven items, six parts plus one whole. (Donald Baxter, "Identity in the Loose and Popular Sense," p. 579)

Counting is tied to identity: since we don't count the six-pack as a seventh item, we must be taking the six-pack, the whole, to be identical to its parts – not with each of the parts individually, of course,[5] but with the parts taken collectively. Perfectly clear, right? Maybe not. Our reluctance to say that there are seven items could more simply be explained by a quantifier domain restriction in ordinary contexts: include either the parts or the whole in the contextually determined domain, but not both. That makes room for extraordinary contexts where we *do* count the whole as something additional to the parts. How many squares are in the following diagram?
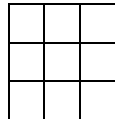
The answer "fourteen" is certainly permitted. Indeed, intelligence tests sometimes contain questions of this sort, and *only* the answer 'fourteen' would be marked as correct. Apparently, rejecting composition as identity is considered a sign of intelligence!

III. The Formal Theory: Adding Generalized Identity to Classical Mereology

Let's get serious. Perhaps I can better elicit an understanding of "composition as identity" by providing a formalized theory with precisely formulated axioms and definitions. Perhaps the generalized notion of identity of which composition is a species can then be understood implicitly by way of the axioms and theorems that

---

[5] I say 'of course'. But there are accounts of composition as identity that, by denying principles I take to be undeniable, hold that a whole is identical to *each* of its parts. See, most notably, Baxter "Many-One Identity," pp. 202-3.

involve it. In any case, it will be worth our while to consider the theory in some detail. I will couch the theory within a framework of plural logic. The framework I have in mind adds to first-order predicate logic (with identity): plural terms, both variables, 'xx', 'yy', etc., and constants, 'aa', 'bb', etc.; plural quantifiers '$\exists xx$', '$\forall xx$', etc.; a relation '$\prec$' for 'is one of' that links singular and plural terms; and predicates and functors that may take plural arguments, interpreted to apply collectively rather than distributively.[6]

   The most straightforward approach is to start with classical mereology, and then add theses that characterize the intended generalized identity relation. If we take the parthood relation, 'P', to be primitive, we can characterize *Classical Mereology* (or *CM*) by the following three theses (and accompanying definitions):

   Transitivity of Parthood (TP). $(x\mathrm{P}y \,\&\, y\mathrm{P}z) \rightarrow x\mathrm{P}z.$[7] (Any part of a part of a thing, is a part of that thing.)

Say that two things *overlap* iff some thing is a part of them both: $x\mathrm{O}y \leftrightarrow_{\mathrm{def}} \exists z(z\mathrm{P}x \,\&\, z\mathrm{P}y)$. Say that a thing x is a *fusion* of yy (or yy *compose* x) iff each of yy is part of x and every part of x overlaps at least one of yy: $x\mathrm{F}yy \leftrightarrow_{\mathrm{def}} \forall z(z \prec yy \rightarrow z\mathrm{P}x)$ $\& \, \forall w(w\mathrm{P}x \rightarrow \exists z(z \prec yy \,\&\, z\mathrm{O}w))$.[8] The second thesis asserts that fusions are unique:

   Uniqueness of Composition (Unique). $(x\mathrm{F}zz \,\&\, y\mathrm{F}zz) \rightarrow x = y.$ (For any things, those things have at most one fusion.)

The third thesis asserts, what was already introduced above, that any plurality of things has a fusion:

   Unrestricted Composition (Unrestriced). $\forall xx \exists y \; y\mathrm{F}xx.$ (For any things, those things have at least one fusion.)

Given the second and third theses, a totally defined fusion operator can be introduced that can take either plural or singular arguments: fus $xx = y \leftrightarrow_{\mathrm{def}} y\mathrm{F}xx$; fus $x = y \leftrightarrow_{\mathrm{def}} x = y$.

   Now, add to this language a special symbol, '$\doteq$', to be understood (putatively) as expressing a generalized identity relation that can take either singular or plural arguments. (I do not use '=' to avoid the appearance of impropriety.) When both arguments are singular, '$\doteq$' expresses familiar one-one identity; when one or both

---

[6] I assume throughout that plural logic is legitimate and fundamental; in particular, it is not to be understood as singular logic plus set theory. For a presentation and sturdy defense of plural logic, see Oliver and Smiley, *Plural Logic*.

[7] Outermost universal quantifiers taking wide scope will often be omitted for readability.

[8] There are other less standard definitions of being a fusion; but nothing I want to say will depend on choosing this one. See Simons, *Parts: A Study in Ontology*, for various alternative formulations of classical mereology.

arguments are plural, '≐' will be said to express *many-one* or *many-many* identity, respectively. It will be convenient, in presenting theses about generalized identity, to make use of schematic letters **X**, **Y**, etc. to be replaced uniformly either by singular variables x, y, etc. or by plural variables xx, yy, etc. Then, the fundamental relation between generalized identity and mereology is captured by:

>   **Generalized Identity (GI).** $\mathbf{X} \doteq \mathbf{Y} \leftrightarrow \text{fus } \mathbf{X} = \text{fus } \mathbf{Y}$.

GI comprises four theses that, when simplified and combined, become:

>   **Many-Many.** $xx \doteq yy \leftrightarrow \text{fus } xx = \text{fus } yy$.
>   **Many-One.** $xx \doteq y \leftrightarrow \text{fus } xx = y$; $x \doteq yy \leftrightarrow x = \text{fus } yy$.
>   **One-One.** $x \doteq y \leftrightarrow x = y$.

Needless to say, **GI** must not be taken to be a *stipulative* definition of '≐'. In that case, adding **GI** to classical mereology would just be classical mereology with a new abbreviation. Rather, the idea is that '≐' expresses a notion antecedently understood – what I have suggestively called "being the same portion of reality" – and that **GI** is a substantial claim about how that notion relates to mereology. Sometimes, it will be useful to have a neutral word to express generalized identity: when $xx \doteq y$, or $xx \doteq yy$, I will say that the x's *coincide* with y, or the x's *coincide* with the y's.

It follows immediately from **GI** that '≐' is an equivalence relation, where the *relata* may be singular or plural or mixed:

Equivalence.
>   **Reflexive.** $\mathbf{X} \doteq \mathbf{X}$.
>   **Symmetric.** $\mathbf{X} \doteq \mathbf{Y} \rightarrow \mathbf{Y} \doteq \mathbf{X}$.
>   **Transitive.** $(\mathbf{X} \doteq \mathbf{Y} \,\&\, \mathbf{Y} \doteq \mathbf{Z}) \rightarrow \mathbf{X} \doteq \mathbf{Z}$.

Note that **Equivalence** comprises fourteen theses in all: two under **Reflexive**, four under **Symmetric**, and eight under **Transitive**. (Some of these can be derived from others, but I am not interested in economy here.)

Finally, it follows immediately from **Many-One** that:

>   **Fusion:** $xx \doteq \text{fus } xx$.[9]

---

[9] We also, of course, have **Weak Fusion:** $x\mathrm{F}yy \rightarrow x \doteq yy$. Often **Weak Fusion** by itself is called "composition as identity" (e.g., Sider "Consequences of Collapse," p. 212). But that nomenclature has the potential to mislead. As a number of philosophers have noted (see especially Cameron, "Composition as Identity Doesn't Settle the Special Composition Question"), **Unrestricted Composition** does not follow logically from **Weak Fusion**. But **Unrestricted Composition** is an essential component of the doctrine of composition as identity as I see it; it flows from the

Let *CM´* be the extension of classical mereology that adds '≐' to the primitive of mereology, 'P', and adds **GI** to the axioms **TP**, **Unique**, and **Unrestricted**.

It will be useful to have before us a stock example to illustrate the theory, and to have around for future reference. Consider a deck of cards, *d*. The deck is composed of 52 cards, $c_1, c_2, \ldots c_{52}$. Call this plurality of cards, *cc*. Then, *d* = fus *cc*, and so, by **Many-One**, $cc \doteq d$. We can say, if not quite in ordinary English: "the cards *are* the deck"; "the deck *is* the cards". (Or we can instead use the technical term introduced above and say "the cards *coincide* with the deck"; it matters not.) The deck is also composed, let us suppose, of some enormous number of molecules, *mm*. Then: *d* = fus *mm* and $mm \doteq d$. By **Transitive**: $mm \doteq cc$. That is, a many-many identity holds between the molecules and the cards: the cards *are* the molecules; the molecules *are* the cards. Many-many identity must not be confused with plural identity: the *x's* are *plurally identical* with the *y's* iff every one of the *x's* is one of the *y's* and every one of the *y's* is one of the *x's*. Plural identity entails many-many identity, but not vice versa. Plural identity and many-many identity are different but compatible ways to generalize the relation of one-one identity so that it applies to plural arguments. It is important, therefore, to speak of *a* generalized identity relation rather than *the* generalized identity relation.

IV. The Formal Theory: Composition as Identity

Now that the theory has been provided in full, the doctrine of composition as identity is perfectly clear, right? Problems remain. The first is a problem of formulation: the "axioms" of the theory *CM´* contain theses that are supposed to *follow* from the doctrine of composition as identity, not be assumed at the start. Thus we should not start with mereology and then expand it to arrive at the doctrine of composition as identity. We should start with the conception of reality that underlies composition as identity, and show how classical mereology follows from this conception under appropriate definitions. Only then can it be claimed that composition as identity explains classical mereology.

Let us, then, reverse direction. We take ≐ as our only primitive, putatively to be understood as a relation of generalized identity, and formulate axioms intended to characterize the composite structure of reality. It is this theory that I will call *composition as identity*, or *CAI* for short. The notions of parthood and fusion will be defined in terms of generalized identity, and classical mereology will then be derived. To start, we want ≐ to be an equivalence relation; for only then can it capture a notion of "same portion of reality". The first axiom, then, is **Equivalence**. We also want ≐, when applied to single things, to reduce to one-one identity. So we take **One-One** to be the second axiom.[10] We then define the fusion relation as: $x\mathbf{FY} \leftrightarrow_{\text{def}} x \doteq \mathbf{Y}$. That is, when one thing and many things coincide – are the same

underlying conception of reality. (More on this below.) I prefer therefore to apply the phrase 'composition as identity' to an entire theory, and not to any one thesis.
[10] If I were not supposing that one-one identity is a primitive in our logical system, I would instead take **One-One** to be a definition of one-one identity.

portion of reality – the one thing fuses the many things. Finally, we define parthood by: $x\mathrm{P}y \leftrightarrow_{\mathrm{def}} \exists xx(xx \doteq y \ \& \ x \prec xx)$.

To prove that parthood, so defined, is transitive, we need an axiom guaranteeing that, in an appropriate sense, reality is transparent:

Transparency. $(\mathbf{X,Y} \doteq \mathbf{Z} \ \& \ \mathbf{W} \doteq \mathbf{X}) \rightarrow \mathbf{W,Y} \doteq \mathbf{Z}$.[11,12]

Say that some things *divide* some thing or things if the former coincide with the latter, every one of the former is part of some one of the latter, and every one of the latter has one of the former as a part:

$xx\mathrm{D}\mathbf{Y} \leftrightarrow_{\mathrm{def}} xx \doteq \mathbf{Y} \ \& \ (\forall x \prec xx)(\exists y \prec \mathbf{Y}) \ x\mathrm{P}y \ \& \ (\forall y \prec \mathbf{Y})(\exists x \prec xx) \ x\mathrm{P}y$.

Transparency ensures that whenever the x's divide the y's and the y's divide the z's, the x's divide the z's. It follows that the composite nature of a thing – that is, the ways of dividing a thing – depends in turn on the composite natures of the things that divide that thing. **Transparency** fails, for example, if reality has *levels* where things of one level can be divided into things of the next level down, but cannot be divided into things of a level lower than that.

Uniqueness of Composition follows trivially from the axioms introduced: if $x\mathrm{F}zz$ and $y\mathrm{F}zz$, then $x \doteq zz$ and $y \doteq zz$, and so $x = y$ by **Equivalence** and **One-One**.

To derive **Unrestricted Composition**, we need the fundamental underlying idea that every many is also a one: every plurality of things coincides with some single thing.

E Pluribus Unum (EPU). $\forall xx \exists y \ xx \doteq y$.[13]

Unrestricted Composition now follows immediately from **EPU** and the definition of fusion.

Finally, we need to prove that the definition of fusion in terms of parthood given by classical mereology can be derived as a theorem. That is, we need to prove:

$x\mathrm{F}yy \leftrightarrow [\forall y(y \prec yy \rightarrow y\mathrm{P}x) \ \& \ \forall w(w\mathrm{P}x \rightarrow \exists y(y \prec yy \ \& \ y\mathrm{O}w))]$.

---

[11] I use a comma to form compound plural terms in the obvious way:
$x \prec \mathbf{Y,Z} \leftrightarrow_{\mathrm{def}} x \prec \mathbf{Y} \ \mathrm{v} \ x \prec \mathbf{Z}$, where '$\prec$' is '=' when the second argument is singular.

[12] *Proof of transitivity of parthood.* Suppose $x\mathrm{P}y$ and $y\mathrm{P}z$. That is to say:
$\exists xx(xx \doteq y \ \& \ x \prec xx)$ and $\exists yy(yy \doteq z \ \& \ y \prec yy)$. But then (1) $xx, yy \doteq z$. For, since $yy \doteq z$ and $y \prec yy$, we have $y, yy \doteq z$. And then (1) follows by **Transparency** and $xx \doteq y$. But we also have (2) $x \prec xx, yy$, because $x \prec xx$. Putting (1) and (2) together gives: $x\mathrm{P}z$.

[13] The phrase '*e pluribus unum*' has instead been applied to the formation of sets from their elements rather than, as here, to the formation of wholes from their parts. See, e.g., Burgess, "*E Pluribus Unum*: Plural Logic and Set Theory."

For the left-to-right direction, I propose we take as an axiom that reality has a particulate structure: whenever some things *xx* coincide with some things *yy*, there exist some things *zz* that divide both *xx* and *yy*. We have, then, a necessary condition on being the same portion of reality:

Particulate. $xx \doteq yy \rightarrow \exists zz(zz\mathrm{D}xx \ \& \ zz\mathrm{D}yy)$.

To get a sense of what **Particulate** demands of reality, consider how it might fail. Suppose some object divides into a top half and a bottom half, and into a right half and a left half, but has no other parts. Then reality would fail to have a particulate structure. **Particulate** (together with the other axioms) demands that the object also divide into a top-right corner, a top-left corner, a bottom-right corner, and a bottom-left corner.

Note that, if reality has an atomic structure, then it has a particulate structure, but not necessarily vice versa. For example, if everything is composed of particles, and each of those particles in turn is composed of more particles, and so on ad infinitum, then reality is particulate without being atomic. Although it is controversial whether or not we can know a priori that reality is atomic, that reality is particulate cannot, in my view, coherently be denied. If *xx* and *yy* have no common division, there is nothing to tie them to a single "portion of reality"; having a common division is in part constitutive of being the same "portion of reality".

For the right-to-left direction, we need a supplementation axiom, an axiom that guarantees the existence of differences when portions of reality do not coincide. When restricted to singular arguments, we have: if $x \neq y$, then either *x* has a part that does not overlap *y*, or *y* has a part that does not overlap *x*. Generalizing to plural arguments, we have a sufficient condition on being the same portion of reality:

Difference. $\sim xx \doteq yy \rightarrow \exists z[(\exists x \prec xx)z\mathrm{P}x \ \& \ (\forall y \prec yy)\sim z\mathrm{O}y)] \lor \exists z[(\exists y \prec yy)z\mathrm{P}y \ \& \ (\forall x \prec xx)\sim z\mathrm{O}x)]$.

Portions of reality cannot differ unless some portion of reality makes the difference. That portions of reality are, in this sense, *extensional* is again in part constitutive of "portion of reality" and cannot, in my view, coherently be denied. But, or so it seems, it has often been denied: states of affairs and structural universals are among the entities that, *prima facie*, would violate **Difference** were they to exist.

That completes the formulation of *CAI* that takes $\doteq$ as primitive and includes as axioms **Equivalence**, **One-One**, **Transparency**, **E Pluribus Unum**, **Particulate**, and **Difference**.[14] Now, finally, is composition as identity, and how it explains classical mereology, perfectly clear?

---

[14] Proof of: $x\mathrm{F}yy \leftrightarrow [\forall y(y \prec yy \rightarrow y\mathrm{P}x) \ \& \ \forall w(w\mathrm{P}x \rightarrow \exists y(y \prec yy \ \& \ y\mathrm{O}w))]$.
Left-to-Right. Suppose $x\mathrm{F}yy$; that is, $x \doteq yy$. To prove the first conjunct, consider any $y \prec yy$. Since $x \doteq yy$, $y\mathrm{P}x$. To prove the second conjunct, let $w\mathrm{P}x$; that is, $\exists xx(xx \doteq x \ \& \ w \prec xx)$. By **Equivalence**, $xx \doteq yy$. By **Particulate**, $\exists zz \ (zz\mathrm{D}xx \ \& \ zz\mathrm{D}yy)$.

V. Preliminary Skirmishing

I expect the following complaint:

> The doctrine of composition as identity is supposed to embody a picture of the structure of reality that *explains* classical mereology. But *CAI* and *CM´* are interderivable: when definitions are added to the axioms, they are broadly logically equivalent.[15] It seems, then, that *CAI* is just the same theory as *CM´*, reformulated; and, surely, a theory cannot explain itself! We might as well just take the familiar formulation of classical mereology as fundamental, and be done with it.

In response, I say, *CM´* and *CAI* are different theories, both metaphysically and conceptually. Metaphysically, they attribute different fundamental structures to reality in virtue of having different primitives. According to *CM´*, the parthood relation is fundamental to reality, and facts about generalized identity (if any) are grounded by facts about parthood. According to *CAI,* the generalized identity relation is fundamental, and facts about parthood are grounded by facts about generalized identity. The two theories conflict over what grounds what, reversing the order of explanation.

Conceptually, *CM´* and *CAI* occupy different neighborhoods in conceptual space, and thus have different explanatory potentials; for the theories differ as to how reality would be were the theory to be false. *CM´* has as its closest neighbors in conceptual space theories that posit alternative "parthood" relations. For example, if **Transitivity of Parthood** fails, we may have a theory of sets or classes that takes membership to be a "parthood" relation. In contrast, *CAI* has as its closest neighbors in conceptual space theories that posit alternative "composite structure" to reality; the composition relation falls out of that composite structure. For example, if **Transparency** fails, the composite nature of a thing is not determined by the

---

Since zzDxx, $(\forall x \prec xx)(\exists z \prec zz)\ zPx$. So, $(\exists z \prec zz)\ z$Pw. But then, since zzDyy, $(\forall z \prec zz)(\exists y \prec yy)\ zPy$. So, $(\exists y \prec yy)\ z$Py, and thus $(\exists y \prec yy)\ y$Ow.
Right-to-Left. Suppose $\sim x$Fyy; that is, $\sim x \doteq yy$. Suppose also that $(\forall y \prec yy)\ y$Px. By **EPU**, $\exists v\ v \doteq yy.\ v \neq x,$ so by **Difference** either $\exists z(z$P$x\ \&\ \sim z$O$v)$ or $\exists z(z$P$v\ \&\ \sim z$O$x)$. But the second disjunct is false. For consider any $zz \doteq yy$, and consider any $z \prec zz$. By **Particulate**, $\exists ww\ (ww$D$zz\ \&\ ww$D$yy)$. So, $(\exists w \prec ww)\ w$Pz because wwD$zz.$ Moreover, $(\exists y \prec yy)\ w$Py because wwDyy. But then wPx by **TP**, and so zO$x.$ Therefore, the first disjunct is true (changing variables): $\exists w(w$P$x\ \&\ \sim w$O$v)$. But since $(\forall y \prec yy) \sim wOy$ follows from $\sim w$O$v\ \&\ v \doteq yy$, we have $\exists w(w$P$x\ \&\ (\forall y \prec yy) \sim wOy)$, which is just what we needed to prove.
[15] I say theories are *narrowly* logically equivalent if the axioms of each logically imply the axioms of the other; theories with different primitives are never narrowly logically equivalent. I say theories are *broadly* logically equivalent if the axioms plus definitions of each logically implies the axioms plus definitions of the other.

composite nature of the parts of that thing. If **Particulate** fails, then different ways of dividing a thing may have no common sub-division; reality has no *grain*. These conceptual differences between *CM´* and *CAI* allow *CAI* to gain explanatory purchase on *CM´*, notwithstanding that they are broadly logically equivalent.[16]

Of course, that is not to say that the explanation will be fully satisfying. In particular, doubts about **Unrestricted Composition** will, for many philosophers, just transfer over to doubts about **E Pluribus Unum**. Even if one grants that the truth of *CAI* could explain the truth of *CM´*, that just invites the obvious question: why accept *CAI*? And, I do not see much point in seeking an even more fundamental theory to explain *CAI*. With *CAI,* we have hit rock bottom.

Does it help to point out that $\doteq$ is to be understood as a generalized identity relation? Could we then say, based on our prior understanding of identity, that the axioms of *CAI* can be seen to be true? Perhaps. For example, **Transparency** and **Particulate** could then be seen as instances of the substitutivity of identicals; and **E Pluribus Unum** – *arguably* – could be seen as an instance of the universality of identity. But, in any case, we first need a reason to think that $\doteq$ *is* a generalized identity relation, and not just a generalization of identity – that is, not just a relation that has identity as a special case. Indeed, every reflexive relation – e.g., having the same mass as, being at least as massive as – could be said to have identity as a special case. But, surely, not every reflexive relation is a *kind* of identity, or a generalized identity relation.

Might the interpretation of $\doteq$ as generalized identity be forced upon us by the formal system, by the axioms of *CAI* together with the interpretation of plural logic? It is easy to disabuse oneself of that idea. For even if one held that plural terms *in some sense* co-refer with singular terms, nothing but an *aggregative bias* could lead to the conclusion that plural terms refer to the plurality's fusion. Indeed, if we interpret $\doteq$ to mean "have the same intersection" rather than "have the same fusion", and similarly interpret the other notions by substituting their duals, then the axioms of *CAI* still come out true. (Well, almost; we would need either to posit a "null element", an element that is a part of every element, for **EPU** to come out true, or substitute a qualified version of **EPU**.) It may seem counterintuitive to interpret plural terms as, in some sense, referring to their intersection rather than their fusion, but nothing about the framework of plural logic forces one interpretation over the other. *CAI*, considered as a formal system, no more supports the thesis that composition is identity than the thesis that intersection is identity.

It should come as no surprise that *CAI*, when considered as a formal system, cannot force an interpretation of $\doteq$ as generalized identity. When considered as a formal system, *CAI* (or *CM´*) merely posits that its domain has a certain structure – the structure of a complete Boolean algebra with no minimal element – and there is more to interpretation than structure. But, still, it seems legitimate to place some

---

[16] What counts as an explanation is a disputed matter, but I take it that not all explanations in metaphysics are grounding explanations: an explanation may enhance our understanding by revealing objective relations between the concepts involved without reducing the *explanandum* to something more fundamental. See also fn. 32 below.

demands on *CAI*. My claim that ≐ in *CAI* is a generalized identity relation is only plausible if the axioms and theorems of *CAI* capture whatever features are essential to identity relations. If we take one-one identity to serve as our paradigm, those features are two: the universality of identity and the indiscernibility of identicals.[17] The universality of identity is the thesis that everything is identical with something; the indiscernibility of identicals is the thesis that identicals have all of their properties in common. Let us say that the doctrine of *strong composition as identity* holds that these two theses, appropriately reconfigured, apply to generalized identity. Have these theses already been incorporated into *CAI*?

Consider first the universality of identity. On its face, there are two ways to generalize the universality of one-one identity within the framework of *CAI*, and both have already been accounted for. The universality of *many-many* identity follows immediately from an instance of **Reflexive**: from ∀*xx xx* ≐ *xx* it follows that ∀*xx* ∃*yy xx* ≐ *yy*. The universality of *many-one* identity, although it cannot be derived from **Reflexive**, is given directly by **EPU**: ∀*xx* ∃*y xx* ≐ *y*. Neither generalization follows logically from the universality of one-one identity; both, however, are natural ways of generalizing to the plural framework. Any of these versions of universality *could*, I suppose, be denied. The universality of one-one identity would fail if, *per impossibile*, some thing failed to "constitute a unit", and thereby failed to be identical to anything, even itself. The universality of many-one identity would fail if, *per impossibile*, some things (collectively) failed to "constitute a unit", and thereby failed to coincide with any single thing. On the deflationary notion of composition embodied in *CAI*, the second denial is no more coherent than the first.[18] In any case, with respect to the issue at hand, there can be no doubt that *CAI* incorporates generalizations of the universality of identity among its axioms and theorems; if anything, some might think, it incorporates too much universality.

Consider next the indiscernibility of identicals. The usual way to incorporate the indiscernibility of identicals into a system such as *CAI* that lacks quantification over properties is as an inference schema:

Substitutivity of Identicals (Sub Id). **X** ≐ **Y** ⊢ φ(**X**) ↔ φ(**Y**)

where 'φ' is any open sentence in the language that has the appropriate sort of variable free. Since **Sub Id** is not generally valid in *CAI*, let us add it explicitly and call the resulting theory *strong CAI*. There is no doubt that **Sub Id** is a generalization of the substitutivity of identicals for one-one identity:

---

[17] In the formal presentation of identity theory, the two features are often taken to be reflexivity and the indiscernibility of identicals. But reflexivity derives jointly from universality and the indiscernibility of identicals; universality is more fundamental.

[18] The universality of one-one identity is captured by Quine's slogan "no entity without identity". The universality of many-one identity, "no entities without (collective) identity", is no less compulsory on my picture of reality. I say a bit more in support of this below.

$x = y \vdash \varphi(x) \leftrightarrow \varphi(y)$. But if **Sub Id** is required to uphold the claim that $\doteq$ is a generalized identity relation, then that claim is in serious trouble. *Strong CAI* should be rejected.

VI. Against Strong Composition as Identity

Some predicates that take plural arguments can be added to the language of *CAI* without making trouble for **Sub Id**. If the deck of cards weighs 100 grams, then the cards that compose the deck (collectively) weigh 100 grams, and the molecules that compose the deck (collectively) weigh 100 grams.[19] But such predicates are rather special. Many predicates, when added to the language of *CAI*, produce counter-instances to **Sub Id**, notably numerical predicates. The cards that compose the deck are 52 in number, but neither the deck itself, nor the molecules that compose the deck, are 52 in number. Call predicates that provide counter-instances to **Sub Id** *slice-sensitive* predicates. (Other terms in use are "count-sensitive" and "set-like"). Whether or not a slice-sensitive predicate applies to a portion of reality is relative to how the term referring to that portion of reality slices it up.[20]

One might hope to save *strong CAI* by simply banning the offending predicates from the language, but the problem goes deeper. **Sub Id** together with basic principles of mereology and plural logic lead to what Sider ominously calls:

> **Collapse.** yPfus $xx \leftrightarrow y \prec xx$. (Something is part of the fusion of the x's iff it is one of the x's.)

Collapse, of course, is unacceptable. For example, it would require that anything that is part of the fusion of the cards is itself one of the cards. But molecules are parts of the fusion of the cards without being cards. Collapse is to be avoided at all cost.[21]

Is there a way to reject **Sub Id** while holding on to the claim that $\doteq$ satisfies the indiscernibility of identicals? That is, is there a way of rejecting the formal system *strong CAI* while holding on to the doctrine of strong composition as identity? Perhaps we can call upon the familiar distinction between the substitutivity of

---

[19] I skirt grammatical issues involving plural verbs by supposing that both 'weigh 100 grams' and 'weighs 100 grams' are represented by a single predicate in *CAI* that takes either singular or plural arguments. I do not, however, suppose that all predicates in *CAI* are thus polymorphous.

[20] Thus, Lewis writes in rejecting a version of strong composition as identity: "Even though the many and the one are the same portion of Reality … we do not really have a generalized version of the indiscernibility of identicals. It does matter how you slice it – not to the character of what's described, of course, but to the form of the description. What's true of the many is not exactly what's true of the one. After all they are many while it is one." (Lewis, *Parts of Classes*, p. 87)

[21] In "Consequences of Collapse," Sider details a parade of absurd consequences of **Collapse**. But if the question is whether or not to accept *strong CAI*, the parade can be cut short: one absurdity is as bad as a thousand.

identicals as a semantic, language-relative principle and the indiscernibility of identicals as a metaphysical, or logical, principle, since it is only the latter that, we are now considering, is an essential feature of identity relations. Perhaps, then, violations of **Sub Id** always involve predicates that fail to express genuine properties, or that express different properties with different occurrences. In that case, we could say that, although there are slice-sensitive *predicates*, there are no slice-sensitive *properties*. Violations of **Sub Id** would not carry over to violations of the indiscernibility of identicals.

To illustrate the strategy, consider how the counterpart theorist rejects coincident entities without running afoul of the indiscernibility of identicals. We have before us (as per usual) a statue of Goliath made of clay. Call the statue 'Goliath', the lump of clay 'Lumpl', and suppose that Goliath and Lumpl came into existence and went out of existence together. Now, it is natural to think that there is a single object before us that is both the statue and the lump of clay; that is, that Goliath is identical to Lumpl. But how can that be? Aren't there properties that Lumpl has and Goliath lacks? For example, Lumpl, but not Goliath, *could have survived a squashing.* It then follows from the indiscernibility of identicals that Lumpl and Goliath are *not* identical. But wait: if the predicate 'could have survived a squashing' expresses different modal properties when applied to 'Lumpl' and when applied to 'Goliath', the inference to non-identity is invalid. We have a violation of the Substitutivity of Identicals in English, to be sure: Goliath is identical to Lumpl; Lumpl could have survived a squashing; it is not the case that Goliath could have survived a squashing. But we have no violation of the indiscernibility of identicals, no *property* that Lumpl has but Goliath lacks.

The counterpart theorist diagnoses the situation as follows.[22] A *de re* modal claim such as '*a* could have φ'ed' is to be analyzed in terms of a counterpart relation: some counterpart of *a* φ's, where the quantifier 'some counterpart' ranges over *possibilia*. But there are multiple counterpart relations; different counterpart relations are needed for the evaluation of *de re* modal claims in different contexts. In particular, there is a counterpart relation, call it the *s-counterpart* relation, under which counterparts of statues are always statues; with respect to this counterpart relation, the object before us is essentially a statue and could not have survived a squashing. There is a different counterpart relation, call it the *l-counterpart* relation, under which counterparts of lumps of clay are always lumps of clay (but need not be statues); with respect to this counterpart relation, the object before us is not essentially a statue and could have survived a squashing. When we use the name 'Goliath', we typically (though not invariably) evoke the s-counterpart relation. So interpreted, 'Goliath could have survived a squashing' falsely attributes the property *has an s-counterpart that survives a squashing* to the object before us. When we use the name 'Lumpl', we typically evoke the l-counterpart relation. So interpreted, 'Lumpl could have survived a squashing' truly attributes the property *has an l-counterpart that survives a squashing* to the object before us. Sometimes both

---

[22] See especially Lewis "Counterparts of Persons and their Bodies" and *On the Plurality of Worlds,* §4.4.

counterpart relations are needed for the interpretation of a single sentence, such as 'Lumpl, but not Goliath, could have survived a squashing'. The best way of capturing this in a semantic or pragmatic theory need not detain us. What matters is that we explain the violation of the substitutivity of identicals (in English) in a way that does not involve a violation of the indiscernibility of identicals. How we consider the subject of the predication determines in part what modal property is attributed to the subject by the modal predicate.

Now, let's see if this strategy can be applied to slice-sensitive predicates, such as 'are 52 in number'. We have a failure of **Sub Id**, to be sure: the cards $\doteq$ the deck; the cards are 52 in number; but it is not the case that the deck is 52 in number. But if 'are 52 in number' does not express a single property when applied to 'the deck' and when applied to 'the cards', we have no violation of the indiscernibility of identicals. Let us say, then, that the property expressed by a numerical predicate depends in part on how the portion of reality referred to by the subject term is sliced. For any portion of reality, there are as many slicings as there are ways of dividing the portion into non-overlapping parts. Thus, we define: **X** are a *slicing* of **Y** iff fus **X** $\doteq$ **Y**, and **X** do not pairwise overlap.[23] There are numerous different slicings of the deck. Which slicing is relevant to the application of a slice-sensitive predicate depends, typically though not invariably, on how the subject of the predication is referred to. Referred to as 'the deck', the relevant slicing is just the deck itself; referred to as 'the cards', the relevant slicing is the 52 cards. Once we make this relativity to slicings explicit, we see that there is no violation of the indiscernibility of identicals: the portion of reality referred to by 'the deck' and 'the cards' has the property *being 52 in number relative to slicing $c_1, …, c_{52}$,* and fails to have the property, *being 52 in number relative to slicing d*. Just as in the modal case considered above, the property expressed by a predicate depends in part on how the subject of the predication is being considered; but now the different ways of considering the subject are given by the different slicings rather than the different counterpart relations.[24]

Now, at long last, is the doctrine of composition as identity, with its claim that $\doteq$ is a generalized identity relation, perfectly clear? No, we have taken a wrong turn. The analogy between the modal case and the plural case is spurious in a crucial respect. In the modal case, the counterpart theorist supposes that there is a full reduction of the modal to the non-modal. When the underlying theory of modality is presented in a fundamental language that quantifies over *possibilia*, the indiscernibility of identicals will be reflected in that language by a valid rule of substitutivity of identicals. In the plural case, however, there is no reduction of the plural to the singular, no more fundamental language in which we can escape all violations of substitutivity. For the fundamental predicate of plural logic, 'is one of', is itself a slice-sensitive predicate that expresses a slice-sensitive relation. So there

---

[23] We might want to drop the second condition to allow "double counting" in special contexts, in which case the term 'slicing' should be replaced.

[24] Compare Frege's claim that "a statement of number contains an assertion about a concept." (*The Foundations of Arithmetic,* §46) For Frege, numerical predications hold or fail to hold relative to concepts where concepts provide the slicing.

can be no escaping violations of the indiscernibility of identicals, or failures of substitutivity of identicals, in the fundamental language. If the doctrine of composition as identity, with its claim that $\doteq$ is a generalized identity relation, requires that a generalization of the indiscernibility of identicals hold, then composition as identity is dead.

We can put the problem in the form of a trilemma. *First horn*. Leave 'is one of' (and its ilk) out of the fundamental logical framework. But that is just to abandon plural logic. And without plural logic, the doctrine of composition as identity (as I understand it) cannot even be stated. So this is not an option. *Second horn*. Put 'is one of' into the fundamental logical framework. But then 'is one of' is a fundamental relation that is slice-sensitive in its second argument. Slice-sensitive *properties* that violate the indiscernibility of identicals are then close at hand. For example, the cards have the property, *having the ace of spades as one of them*, but the deck does not. Strong composition as identity has been abandoned. *Third horn*. Include 'is one of' in the fundamental logical framework in relativized form, like other slice-sensitive predicates. That is, the fundamental relation of plural logic is represented by a three-place predicate: x is one of yy relative to slicing zz. But this predicate, although no longer slice-sensitive in its second argument, is slice-sensitive in its third argument. For example, although the ace of spades is one of the cards relative to the card slicing, it is not one of the cards relative to the deck slicing; and, again, violations of the indiscernibility of identicals are close at hand. Again, strong composition as identity has been abandoned.

Did we perhaps go astray in the implementation of the strategy? Should we have taken slicings to be *sets*, rather than *pluralities*? Say that 'mem x' is a plural term that denotes the members of x if x is a set. We can define: x is a *slicing* of **Y** iff x is a set, fus mem $x \doteq$ **Y**, and mem x do not pairwise overlap. Then, indeed, the three-place relativized 'is one of' - x is one of yy relative to slicing z – is no longer slice-sensitive. But this effectively reduces 'is one of' to 'is a member of': x is one of yy relative to slicing z iff x is a member of z; the second argument drops out. It gets plural logic back only by letting sets and set membership do all the work that plural terms and 'is one of' were called upon to do. And that project cannot succeed. To give just one reason: we can refer collectively to all the sets, and predicate properties of them collectively (e.g. that they can be well-ordered), even though there is no set of all sets.[25] Strong composition as identity should be rejected.[26]

---

[25] Nor would it help to introduce proper classes, or even more outré class-like entities. See Lewis, *Parts of Classes*, pp. 65-9.

[26] My reason for rejecting strong composition as identity is essentially the same as that of Sider in "Parthood": that it is incompatible with the framework of plural logic. But I wanted to tell the story in my own way. (Sider no longer accepts this reason because he now rejects the framework of plural logic; see *Writing the Book of the World*, pp. 208-15.)

Philosophers who employ versions of this strategy in defense of strong composition as identity include Bohn, Wallace, and Cotnoir. (See Bohn, "Unrestricted Composition as Identity"; Wallace, "Composition as Identity: Part 2"; and Cotnoir, "Composition as General Identity.") Each of these views deserves a

VII. Composition as *Merely Analogous* to Identity

Now what? It is common at this point, supposedly following David Lewis, to retreat to the claim that composition is *analogous* to identity. Lewis presents five aspects of the analogy. The first is ontological innocence: if one is ontologically committed to some thing, one is thereby also ontologically committed to anything identical to that thing; similarly, if one is ontologically committed to some things, one is thereby also ontologically committed to the fusion of those things. The second aspect is what I called universality: if some thing exists, then automatically something identical to that thing exists; similarly, if some things exist, then automatically their fusion exists. The third aspect is uniqueness: two different things are never both identical to some thing; similarly, two different things are never both the fusion of some things. The fourth and fifth aspects have to do with how the character and location of a thing, or things, determines the character and location of anything that is identical to that thing, or is a fusion of those things. Lewis concludes: "This completes the analogy that I take to give the meaning of Composition as Identity."[27]

  It is natural at this point to wonder: is that all there is? Wasn't composition as identity introduced to provide support for various controversial theses about mereology? But if composition is merely *analogous* to identity, how can it do any explanatory work? We have the following dilemma. Either the controversial theses of mereology – ontological innocence, unrestricted composition, uniqueness of composition – are included among the aspects of the analogy, or they are not. If they are included (as Lewis clearly does), then composition as identity as we are now understanding it presupposes those controversial theses, and does not support them. If they are not included, then we have only an "argument from analogy" to support the controversial theses; and such arguments are notoriously weak. (Indeed, in my view, they lack epistemic force altogether in a priori domains.) Either way, we have done little or nothing to explain why the controversial theses should be accepted.[28]

---

separate extended discussion, but here I can just say, summarily, that they all seem to me to be subject to the difficulty adumbrated above: when cashed out at the fundamental level, they must either reject basic principles of plural logic, or restrict the indiscernibility of identicals, or both.

  Baxter is often taken to hold strong composition as identity – and, indeed, his view is quite strong – but since he rejects the indiscernibility of identicals, his view is not strong composition as identity as herein characterized, and so is outside the scope of the current argument. See his "Discernibility of Identicals".

[27] Lewis, *Part of Classes*, p. 87. In "Parthood", Sider adds three additional aspects to the analogy: identity and composition are both *absolute*, *cross-categorial*, and *precise*.

[28] Yi argued early on in "Is Mereology Ontologically Innocent?" that the view that composition is analogous to identity does nothing to support the ontological innocence of mereology. But, oddly, he interpreted Lewis as intending that the

Sider contrasts strong composition as identity, which he calls "fun and interesting", with the view he attributes to Lewis that composition is analogous to identity, which he calls "wimpy, dreary, and boring". ("Consequences of Collapse," p. 217) I'm not sure how a view that leads to absurdity can be fun and interesting. (Perhaps the way jumping out of a plane without a parachute is fun and interesting?) But, in any case, if all there is to Lewis's view is that composition is analogous to identity, then Sider's assessment of that view as "wimpy, dreary, and boring" would seem to be hard to deny.

VIII. Composition as a *Kind* of Identity.

But wait: there is more. Prior to specifying the aspects of the analogy that he takes to give the meaning of composition as identity, Lewis writes:

> "The mereological relations are something special. ... They are strikingly analogous to ordinary identity, the one-one relation that each thing bears to itself and to nothing else. So striking is this analogy that it is appropriate to mark it by speaking of mereological relations – the many-one relation of composition, the one-one relations of part to whole and of overlap – as kinds of identity. Ordinary identity is the special limiting case of identity in the broadened sense." (Lewis, *Parts of Classes*, pp. 84-5)

Although Lewis does not include the claim that composition is a kind of identity when he states what he "takes to give the meaning of Composition as Identity", it is a substantial component of his view nonetheless. Certainly, he does not retract or qualify the claim when explicating the analogy between composition and identity; and the claim is repeated elsewhere in his body of work.[29] Moreover, the claim that composition is merely analogous to *one-one* identity is fully compatible with taking composition to be (literally) a *kind* of identity if one-one identity is itself one of many kinds of identity. Let us take *weak composition as identity* to be the view that composition is merely analogous to one-one identity; it does not include the claim that composition is a kind of identity. Let *moderate composition as identity* be the view that composition is a kind of identity as well as being analogous to one-one identity. (Both weak and moderate composition as identity, I will suppose, endorse the formal system *CAI*; they differ with respect to the underlying picture that motivates and interprets *CAI*.) It is moderate composition as identity that Lewis held,[30] and that I want to defend. For all that weak composition as identity says, the

analogy provide such support, ignoring that Lewis explicitly included ontological innocence as an aspect of the analogy.
[29] See especially "Many But Almost One," pp. 177-9; see also "Events", p. 256.
[30] See also Bohn, "David Lewis, *Parts of Classes*." Bohn and I are in agreement that Lewis has often been wrongly understood as holding only weak composition as identity. Still, we are faced with an exegetical puzzle. Early in the section on "Composition as Identity", he writes: "The 'are' of composition [as in, 'the parts *are* the whole'] is, so to speak, the plural form of the 'is' of identity. Call this the Thesis

analogy between composition and identity might be "accidental"; it might fail to reflect the natural order. But if composition is a kind of identity, and the kinds of identity themselves form a natural kind, then the analogies are not merely "accidental"; they have a deeper significance.

How should Lewis's "broadened sense" of identity be understood? There is no question what Lewis means by it: it is the mereological relation of overlap generalized to apply to plural arguments.[31] If we introduce the symbol '$\dot{\doteq}$' to express this relation, we have: $\mathbf{X}\dot{\doteq}\mathbf{Y} \leftrightarrow_{\text{def}}$ fus $\mathbf{X}$ O fus $\mathbf{Y}$. Strict one-one identity has been broadened along two dimensions: singular to plural, and total overlap to partial overlap. What has hitherto been called generalized identity is a kind of identity that has been broadened only along the former dimension: $\mathbf{X}\doteq\mathbf{Y}$ entails $\mathbf{X}\dot{\doteq}\mathbf{Y}$, but not vice versa. We can call generalized identity and composition *total* identity relations; broadened identity, overlap, and parthood are *partial* identity relations. One could, I suppose, say that the partial identity relations are not, properly speaking, identity relations, any more than a half brother is, properly speaking, a brother. I do think that generalized identity is the fundamental kind of identity in terms of which the family of identity relations, total and partial, is to be

---

of *Composition as Identity*. It is in virtue of this thesis that mereology is ontologically innocent …" (p. 82). How can this be squared with his later claim that the ontological innocence of mereology is part of what "gives the meaning of Composition as Identity"? (p. 87) It is common to suppose that Lewis weakens what he takes to be the thesis of composition as identity between the beginning and end of the section, and then somehow missed that he can no longer take composition as identity to support ontological innocence. (For example Burgess, in "Lewis on Set Theory" writes: "It is difficult, also, to see how Lewis can be acquitted of question-begging when he argues that one respect in which there is analogy is in ontological innocence".) But I find that interpretation wholly implausible. Rather, I think that when Lewis says that the analogy "gives the meaning of Composition as Identity", he is not taking back his earlier characterization quoted above; he is not saying that the thesis of composition as identity is to be *defined* as: the five aspects of analogy hold. I am not entirely sure what he had in mind by "gives the meaning", but all of the following are plausible alternative readings that are compatible with Lewis not having to retract his claim that mereological innocence holds in virtue of composition being a kind of identity: the analogy "gives significance to composition as identity"; the analogy "provides substantial support" for composition as identity; and (as he explicitly says) the analogy makes it "appropriate to speak of the mereological relations" as kinds of identity. Uses of "gives meaning to" that do not entail "provides the definition of" are altogether common.

[31] Based on the above quoted passage, Megan Wallace seems to identify Lewis's "broadened sense" of identity with Butler's "identity in the loose and popular sense". She writes: "Identity in this broadened sense is presumably how we understand personal identity over time, qualitative similarity or type-hood, and (as Lewis suggests) the composition relation." (Wallace, "Composition as Identity: Part 1", p. 806) But I know of no reason to think Lewis would include non-mereological relations that sometimes are confused with identity as kinds of identity.

analyzed, a view reflected in my formal theory *CAI*. But whether the partial identity relations are, properly speaking, identity relations is a terminological decision of little consequence.

But might not the entire difference between weak and moderate composition as identity be a terminological decision of little consequence? Sider, for example, writes: "Whatever else one thinks about identity, Leibniz's Law [my "Substitutivity of Identicals"] must play a central role." ("Parthood", p. 56) Once Leibniz's Law is seen to fail for composition, and strong composition as identity is thereby rejected, Sider never seriously considers the idea that composition is a kind of identity. What I have called "kinds of identity" he calls relations of *intimacy*, and he then goes on to consider how relations of intimacy such as parthood and composition are to be understood. If the only difference between us is that what I call "(partial or total) identity" he calls "intimacy", then weak and moderate composition as identity are just terminological variants of one another. What's in a name?

Before answering that question, a brief recap is in order. I argued that the theory *CAI* can be said to explain classical mereology because its primitive notion, $\doteq$ ("same portion of reality as"), is more fundamental than the notion of parthood that mereology (typically) takes as its primitive. We are now asking: what is added to this explanation by holding to the claim that $\doteq$ is a *kind* of identity, a generalized identity relation, as opposed to just claiming that it is a special relation of intimacy that is in some ways analogous to (one-one) identity? What can *moderate* composition as identity provide that *weak* composition as identity cannot?

And here, I think, it is generally supposed that, for a defender of moderate composition as identity, the answer must be that taking $\doteq$ to be a kind of identity does additional explanatory work; it can explain why the analogies hold, and in particular why universality holds, why every plurality coincides with some single thing. But, as already noted, with universality we have hit rock bottom: there is nothing more fundamental in terms of which it can be explained. If explanations in metaphysics must always provide grounds, then it is not about explanation. What, then, does moderate composition as identity have to offer?

There is only one possible answer. It is not about explanation (in the sense of grounding); it is about understanding, about getting our mind right. That is to say, it is about getting the order and classification of our concepts to line up properly with the structure of reality.[32] Because taking composition to be a kind of identity is not introduced to ground the analogies with (one-one) identity, it is perfectly proper to hold both that composition as a kind of identity gives reason to accept the analogies

---

[32] As mentioned in fn. 16, I do not accept that all explanations in metaphysics are grounding explanations. There are other notions of explanation that are concerned with "unification" or "systematization" rather than "grounding", notions that are commonly applied to mathematics but apply no less to metaphysics. On these notions of explanation, a global conceptual re-orientation can be "explanatory" without providing new grounds. Taking the various relations of mereology to be of a kind with one-one identity is explanatory in this sense. For accounts of explanation in mathematics, see Kitcher, *The Nature of Mathematical Knowledge*, and Lange, "What are Mathematical Coincidences (and Why Does it Matter?)".

and that the analogies give reason to take composition to be a kind of identity. These claims are not in conflict; indeed, they mutually reinforce one another. Such interlocking circles enhance understanding.

Perhaps an analogy would be useful. Consider the belief, common in pre-Cantorian days, that the following feature is essential to the notion of cardinal number as applied to sets (or pluralities): if an element not already a member of a set is added to that set, then the set increases in number. Whoever holds that belief is making a kind of mistake, one that is not merely terminological. They are taking a feature of the finite cardinal numbers to be a feature of cardinal numbers generally. Historically, this mistake hindered the development of the Cantorian theory of infinite cardinality. Similarly, though less momentously, taking the indiscernibility of identicals to be essential to identity relations blinds one to natural generalizations that should inform our metaphysical picture of reality.

Indeed, calling composition a kind of identity is not metaphysically inert. It matters whether our terminology reflects the true order and classification of our concepts. Consider two examples. First, to see composition as a generalized identity relation is to see mereology as part of logic, a logic more general than either first-order predicate logic or first-order plural logic.[33] And once we see mereology as logic, it is natural, even inevitable, to see it as necessary and a priori. Further, seeing composition as a logical operation naturally constrains how composition should be understood. For, say I, whether a logical operation applies should not be a matter of brute contingency, or a vague matter. So moderate answers to Van Inwagen's special composition question go by the board in favor of one of the two extremes. If composition occurs at all, then composition is unrestricted. For a second example, consider the debate between priority monists and pluralists. As often characterized, this is a debate over whether the parts are prior to the whole or the whole is prior to the parts. But if composition is a kind of (total) identity, and kinds of (total) identity are all symmetric, then the debate so characterized makes no sense; the mereological relations between objects, by themselves, are irrelevant to questions of priority. The only way in which it could make sense to speak of some objects being prior to others is derivatively from the properties and relations that they instantiate, and whether those properties and relations are fundamental. Now, I am not saying the thesis that composition is a kind of identity has these (and other) metaphysical views as consequences; for I have not attempted to give precise formulation to the thesis. Rather, I am saying that there is a substantial unified picture with the idea that composition is a kind of identity at its core, a picture that differs profoundly from what comes from weak composition as identity, and merely taking mereological relations to be relations of intimacy.[34]

---

[33] Lewis writes, when introducing the framework of plural logic and mereology: "I would have liked to call it "logic"... But that is not its name, and, with names, possession is nine points of the law." (*Parts of Classes*, p. 62) Armstrong writes: "mereology may be thought of as an extended logic of identity, extended to deal with cases of partial identity." (*A World of States of Affairs*, p. 18)

[34] Or so it seems. But it is hard to say, in the final accounting, just how much Sider's view (in "Parthood"), which is couched in terms of intimacy, differs from my own

If I were doing philosophy on a desert island, I might be content to end my train of thought here. But I can't help but want my philosophical peers to see the light as I have seen it, to get their minds right. And yet I suspect that, to this point, I have made few if any converts. Perhaps the doubters will grant that, *if* composition is a kind of identity, where these kinds of identity are all unified together along with one-one identity to form a natural kind, *then* the various analogies will have been shown not to be accidental, and to reinforce one another. But why believe the antecedent? What unifies these various kinds of identity into a single natural kind? Failing an answer to that question, I cannot hope to change many minds.[35]

IX. Elucidating Generalized Identity: The Humean Strategy

Try this. As a steadfast Humean, there is no principle more central to my metaphysical outlook than the prohibition against necessary connections. The prohibition, of course, is not absolute; after all, any thing is necessarily connected with itself. Perhaps our understanding of when necessary connections are and are not prohibited can inform our understanding of generalized identity relations. Thus, consider Hume's Dictum as traditionally formulated:

> **Hume's Dictum.** There are no necessary connections between distinct existences.

The notion of "distinct" that is relevant here, as Humeans know, is not the denial of one-one identity; for example, a whole and one of its parts do not count as distinct. Rather, the relevant notion of "distinct" is linked to the very notion that we are at pains to elucidate, the "broadened sense of identity". And that suggests the following strategy. Although it is customary for the Humean to take the notion of distinct as given and use Hume's Dictum to delimit the scope of metaphysical possibility and necessity, perhaps we can turn this around. That is, perhaps we can instead use our pre-theoretic understanding of metaphysical necessity to elucidate the relevant notion of distinct, and the broadened sense of identity. Call this the *Humean strategy*.

Three things about this strategy should be emphasized at the outset. First, the strategy is useless to non-Humeans. If you tell me that it is absolutely necessary that you could not have existed without your parents, you do not thereby have an unusually broad notion of identity according to which you *are* your parents. Rather,

---

view, couched in terms of kinds of identity. Both of us believe that there is a single underlying picture that unifies the various analogies between composition and identity. In describing his picture, he says: "the intuitive picture of the intimacy of parthood demands that we adhere as closely as possible to strong composition as identity ..." (p. 72) Will that picture lead to metaphysical views at odds with my own picture of the intimacy of parthood as a *kind* of identity? I'm not sure.

[35] Sider ("Parthood", p. 69) puts the challenge as follows: "Without strong composition as identity, it seems impossible to express what is special about parthood in a single, precise thesis." I am asking whether that challenge can be met.

you have exited the conversation. I have nothing more to offer you. Second, if like me you reject primitive modality, then you must see this as a project of elucidation, not analysis. But that has been the project from the start: the notion of generalized identity that is the primitive of *CAI* is fundamental, and so not analyzable in terms of necessity or anything else. Even fundamental notions need to be understood, and often we best understand them by invoking less fundamental notions. The order of understanding need not match the order of analysis. All that is demanded is that, once the notion of necessary connections is analyzed (say in terms of *possibilia*), the analyzed notion coheres with the intuitive notion with which we began. Third, I do not assume that the broadened sense of identity that is relevant to Hume's Dictum is just mereological overlap generalized to apply to plural arguments. *I* believe that; but to suppose it at the start would risk alienating my already diminished audience. And, indeed, it is not an essential component of the view that composition is a kind of identity. Thus, I allow that Humean's may differ as to what necessary connections they claim to understand. For example, I allow that Humeans may hold that sets stand in necessary connections to their members, and so, in the broadened sense, are identical with their members, even though sets are not mereologically composed of their members. Hume's Dictum, by itself, does not rule out unmereological modes of composition.

The Humean strategy of using the notion of necessary connections to elucidate general relations of composition and identity is suggested indirectly by some remarks of David Lewis in a critique of Armstrong's states of affairs ontology. I start with some stage setting.[36] In previous critiques, Lewis had made two complaints. The first complaint was that Armstrong's states of affairs violate "a twofold principle of the uniqueness of composition: there is only one mode of composition; and it is such that, for given parts, only one whole is composed of them." (Lewis, "A Comment on Forrest and Armstrong," p. 92) Armstrong holds instead that states of affairs have some unmereological mode of composition that allows different wholes to be composed of given parts. For example, if R is a relational universal that is not necessarily symmetric, and a and b are particulars such that both a has R to b and b has R to a, then there are two states of affairs composed unmereologically of a, R, and b. Lewis's second complaint was that Armstrong's states of affairs violate Hume's prohibition against necessary connections, which Lewis formulated roughly as: "Anything can coexist with anything else, and anything can fail to coexist with anything else." (Lewis, *On the Plurality of Worlds*, p. 88) (Here, Lewis understood 'anything else' as 'anything mereologically distinct'.) For example, the state of affairs of a's having F cannot exist without the particular a existing, even though the state of affairs and the particular are mereologically distinct. The problem, for Lewis, is that such necessary connections are unintelligible.

But then, in a later critique, Lewis writes:

"But now I think that the second complaint subsumes the first. For we *can* explain how [the states of affairs] are constructed out of their constituents,

[36] See my "Truthmaking: With and Without Counterpart Theory" for a fuller discussion of Lewis's critique of Armstrong's states of affairs ontology.

provided we define the "construction" simply in terms of the necessary connections themselves. Then indeed the requisite mode of "unmereological composition" has been explained – but in a way that does nothing at all toward excusing or explaining the necessary connections." (Lewis, "Truthmaking and Difference-Making," p. 611.)

The idea, as I understand it, can be fleshed out as follows. Whenever the *x*'s compose *y* (or *y* is "constructed out of constituents" the *x*'s), there are necessary connections between the *x*'s and *y*. Since, for the Humean, composition relations are the *only* source of necessary connections, we can use the necessary connections to define a *general* notion of composition as follows:

> *Def.* *x*x *compose y* iff, necessarily, every one of *x*x exists iff *y* exists.

We can then use this general notion of composition to define a general notion of being a component of:

> *Def.* *x* is a *component* of *y* iff, for some *xx*, *x* is one of *xx* and *xx* compose *y*.

It then follows immediately that: *x* is a component of *y* iff, necessarily, *y* exists only if *x* exists.[37] And from this it follows that the relation, is a component of, is reflexive and transitive (given that necessity is at least S4). Thus, the definitions together with the relevant facts of necessity lead to a very minimal general theory of composition.[38]

   Note that it is built into the theory that whenever composition holds, it holds necessarily (again given that necessity is at least S4). That is, the theory presupposes what might be called "compositional essentialism". But the theory leaves open whether there are multiple "modes of composition", some of which fail to satisfy analogues of the mereological axioms **Unique** and **Unrestricted.** These, and analogues of the various supplementation axioms, are not justified by **Hume's Dictum** alone. Indeed, the theory leaves open whether there is any such thing as mereological composition: if mereological essentialism is rejected, then the fusion operation of mereology won't count as a mode of composition, and all composition will be unmereological. In any case, our little theory, even in its undeveloped state, provides an explication of Lewis's idea that, if we could understand the necessary

---

[37] *Proof. Left-to-right.* Suppose some things, one of which is *x*, compose *y*. Then, necessarily, *y* exists iff each of those things exists. And so, necessarily, if *y* exists, then *x*, which is one of those things, exists. *Right-to-left.* Suppose, necessarily, if *y* exists, then *x* exists. We need to find some *xx* such that *x* is one of *xx* and *xx* compose *y*. Consider any *yy* that compose *y*. (There always is such *yy*, since everything composes itself.) Then add *x* to *yy* to get the desired *xx*.

[38] See Kit Fine's "Towards a Theory of Part" for a very different and more developed and discriminating general theory of composition. Fine is not concerned, as I am here, with finding a single thesis to characterize when composition of any mode takes place.

connections between mereologically distinct things, then we could understand unmereological composition. And it shows why Lewis thinks the Humean objection to states of affairs subsumes the mereological objection.

Put unmereological composition to one side. Our focus here is to generalize the general notion of composition defined above to total and partial identity relations that take either plural or singular arguments. It appears to be altogether straightforward.

> *Def.* **X** is *totally identical with* **Y** iff, necessarily, every one of **X** exists iff every one of **Y** exists.

We can say that a relation *R* is a *kind* of total identity iff whenever **X***R***Y**, **X** is totally identical with **Y**. (We might want to add that *R* is a somewhat natural or fundamental relation to rule out gruesome strengthenings of total identity.) We have, then, that any mode of composition is associated with a kind of total identity. Whether $\doteq$, the basic notion of *CAI*, is a kind of total identity will depend, once again, on the status of mereological essentialism. If we allow that there are sets and that a set exists if and only if its members exist, then the relation, having the same urelements, will be a kind of total identity among the sets. Note that, in this case, because uniqueness of composition fails, we have things that are totally identical without being one-one identical; for example, {a, {b}} and {{a}, b}.

Defining a generalized partial identity relation appears to be equally straightforward. First, we need to generalize the relation 'is a component of' to take pluralities in its second argument place: *x* is a *component* of *yy* iff, for some *xx*, *xx* are totally identical with *yy*, and *x* is one of *xx*. (Note that, if there are multiple modes of composition, then one thing may be a component of another, or of others, due to a mixing of modes; for example, if forming wholes from parts and forming sets from members are both modes of composition, and *a* is a part of *b* and *b* is a member of *c*, then *a* is a component of *c*.) Second, we simply take partial identity to be overlap – having a component in common – generalized to apply to plural arguments:

> *Def.* **X** is *partially identical* with **Y** iff, for some *z***,** *z* is a component of both **X** and **Y**.

We can say that a relation *R* is a *kind* of partial identity relation iff whenever **X***R***Y**, **X** is partially identical with **Y**. (Again, we might want to add that *R* is a somewhat natural or fundamental relation.) Whether $\doteq$, generalized mereological overlap, is a kind of partial identity will depend, again, on mereological essentialism. The difference between total and partial identity, on this view, corresponds to different senses of 'necessary connection'. Say that **X** and **Y** are *strongly* necessarily connected iff **X** is totally identical with **Y**, *weakly* necessarily connected iff **X** is partially identical with **Y** but not totally identical with **Y.**

We now see how the generalized identity relations – the kinds of identity – can be characterized in a unified way that does not resort to an appeal to analogies with one-one identity. The analogies, those that still hold in this general setting, flow from the characterization. In particular, tying the generalized identity relations to

necessity puts the ontological innocence of composition, supposedly the hallmark of composition as identity, in a new light. It does not rest on an analogy with one-one identity. Rather, it rests on what Armstrong calls "the doctrine of the ontological free lunch", the idea that entities whose existence is necessarily entailed are no "addition to being". (*A World of States of Affairs*, pp. 12-3) But I, for one, think that the dispute over the ontological innocence of mereology has generated more heat than light. (That is why, unlike Lewis, I did not feature it centrally in my presentation of composition as identity.) Quinean methods of scoring ontological commitments, counting by one-one identity, are perfectly legitimate for some purposes. Lewisian methods of scoring, counting by generalized identity, are fit for other uses. One need not choose between them.[39] But I can say this. If I accepted unmereological modes of composition, I would take them to be on a par with mereological composition with respect to ontological innocence. For example, if I believed in sets and held that sets were composed of their members, I would think that set formation and mereological composition were on a par with respect to innocence; a set and its members, no less than a whole and its parts, would comprise the same portion of reality.

But I don't believe in sets, or other entities unmereologically constructed. Although the necessary connections involved in such belief are compatible with the above account of kinds of identity, and with **Hume's Dictum** broadly construed, they are not compatible with my strict standards of intelligibility. They violate my Humean scruples. It appears, then, that I can only hope to communicate my understanding of kinds of identity if I can get you to accept **Hume's Dictum** *as I understand it, with my own understanding of necessity*. And that thought leads to a more pressing issue. Is the above characterization of generalized identity in terms of necessary connections even compatible with my own modal metaphysics, according to which necessity is analyzed in terms of possible worlds? When recast in that framework, can it even meet the minimal condition of extensional adequacy without going around in a circle?

X. Against the Humean Strategy

I am a realist about possible worlds. Like Lewis, I hold that possible worlds are concrete and do not overlap. And, like Lewis, I analyze modality in terms of possible worlds and their parts.[40] How, in this framework, should the Humean prohibition against necessary connections be understood? (I will focus on the strong necessary

---

[39] But which method of scoring, one might ask, is the right way to calculate the ontological costs of a theory? Don't we need an answer if we are to give prescriptions for theory choice in metaphysics? I think not. Ontological economy, however characterized, should play no role in theory choice. See my "Realism Without Parochialism."

[40] My view differs from Lewis's in various respects, most notably, in my acceptance of absolute actuality; but the differences will not matter for what follows. For Lewis's account of possible worlds, see *On the Plurality of Worlds*. For a summary of ways that my own view differs from Lewis's, see my "Concrete Possible Worlds."

connections associated with total identity, since the weak necessary connections associated with partial identity can be defined in terms of the strong.) I do not say: entities are (strongly) necessarily connected just when any world that contains one contains the other. That would make it trivially true that any two actual entities are necessarily connected. I do not say: entities are (strongly) necessarily connected just when any world that contains a counterpart of one contains a counterpart of the other. Counterpart relations were introduced to capture ordinary claims of necessity *de re*, and I do not want to deny that, in ordinary contexts, we may truly claim that mereologically distinct entities are necessarily connected – for example, that you cannot exist without your parents. The notion of necessity *de re* that is relevant to **Hume's Dictum** requires a special interpretation. Like Lewis, I understand the prohibition against necessary connections in terms of duplicates. I say, *roughly*: entities are (strongly) necessarily connected just when any world that contains a duplicate of one contains a duplicate of the other.[41]

Unfortunately, attempting to make the analysis less rough uncovers an insurmountable obstacle with the Humean strategy. When generalized to apply to plural as well as singular arguments, the most straightforward rendition is this:

> **NC1. X** is *strongly necessarily connected* with **Y** iff, for every world *w*, duplicates of every one of **X** exist at *w* iff duplicates of every one of **Y** exist at *w.*

The problem, however, does not arise from the generalizing; it occurs already for singular arguments. Thus suppose that *a* and *b* are duplicates but are not totally identical. Since *a* and *b* are not totally identical – not the same portion of reality – they should not be strongly necessarily connected according to the Humean. But **NC1** gets this wrong: any world at which a duplicate of *a* exists is a world at which a duplicate of *b* exists because any duplicate of *a* is also a duplicate of *b*. The following fix immediately suggests itself:

> **NC2. X** is *strongly necessarily connected* with **Y** iff, for every world *w*, if both **X** and **Y** have duplicates existing at *w*, then the duplicates of **X** are distinct from the duplicates of **Y***.*

Out of frying pan and into the fire! Even ignoring the problem what 'distinct' can mean here without going in a circle, the analysis now gives the wrong result when *a* is (totally) identical with *b*. If there is a world with just one duplicate of *a* (or *b*), then it turns out according to **NC2** that *a* (or *b*) is not strongly necessarily connected with itself. The problem is quite general: no analysis that refers only to duplicates of **X** and duplicates of **Y** on the right-hand side of the analysis can successfully

---

[41] For Lewis's interpretation of **Hume's Dictum** as a principle of recombination in terms of duplicates, see *On the Plurality of Worlds*, pp. 88-9. For a fuller treatment of principles of recombination, and plenitude more generally, see my "Principles of Plenitude." Entities are *duplicates*, roughly, iff they have all of their (qualitative) intrinsic properties in common. See *On the Plurality of Worlds*, pp. 61-3.

distinguish the cases where **X** are totally identical with **Y**, and where **X** are duplicates of **Y** but not totally identical with **Y**. When necessary connections are analyzed in terms of duplicates, **Hume's Dictum** becomes in effect a prohibition against necessary connections between the intrinsic natures of things, not between the things themselves. And that is not an interpretation of **Hume's Dictum** that allows it to be reverse engineered to provide an understanding of generalized identity.

As best I can see, the only way to capture an interpretation of **Hume's Dictum** that makes identicals, but not distinct duplicates, necessarily connected is to treat the case where **X** and **Y** are totally identical as a special case, resulting in a disjunctive analysis:

> **NC3.** **X** is *strongly necessarily connected* with **Y** iff, *either* **X** is totally identical with **Y**, *or*, for every world *w*, if both **X** and **Y** have duplicates existing at *w*, then the duplicates of **X** are not totally identical with the duplicates of **Y**.

That, indeed, is the analysis of necessary connections that I endorse.[42] But on that analysis it is plain that the notion of necessary connection presupposes the very notion we were hoping it could elucidate, indeed, presupposes it twice-over, in both disjuncts. Moreover, the necessity of identity relations, and mereological essentialism, are just built into the analysis from the start; they do not amount to substantial claims about the space of possible worlds.[43] I conclude, then, that there is no way to use **Hume's Dictum** to further an understanding of kinds of identity, or their kin, within my own modal framework.

---

[42] It generalizes to plural arguments the notion of necessary connection that was incorporated in the principle (B1) that I endorsed in "Principles of Plenitude".

[43] How can I say that I accept the necessity of identity while at the same time invoking counterpart theory to reject coincident entities? I say: "Goliath is identical with Lumpl, but not *necessarily* identical with Lumpl." Isn't that a rejection of the necessity of identity? No, not in any way that is relevant to fundamental metaphysics. It is speaking with the vulgar. It is providing a semantics for statements of necessity that captures ordinary, superficial ways of speaking. Counterpart theorists speak out of both sides of their mouth, but without losing track of which side is speaking metaphysics. The content of the claim that everything is necessarily identical with itself is given neither by counterparts nor duplicates; it amounts to no more than the claim that everything is identical with itself. The same goes for mereological essentialism, and the necessity of total and partial identity relations. I invoke counterpart theory to speak with the vulgar, to be able to say, for example, that you might have existed without your hands, or your heart. But when I say, doing metaphysics, that you couldn't exist without your parts, what I say cannot be understood in terms of counterparts or duplicates; it merely reiterates that you *are* your parts.

XI. Concluding Remarks

Where does that leave us? Return to Lewis's claim that, if we could understand the necessary connections between mereologically distinct things, then we could understand *un*mereological composition. Perhaps. But it doesn't follow that an understanding of mereological composition derives from an understanding of the necessary connections between a thing and its parts. On my modal metaphysics, such necessary connections are simply stipulated. For me, then, mereological composition and the associated kinds of identity are basic – not just in the order of analysis, but in the order of understanding. My understanding of **Hume's Dictum** depends upon a prior understanding of generalized identity to delimit the scope of the Humean prohibition. But I need not lament the failure of the Humean strategy. I already understand the theory *CAI* with the relation $\doteq$ interpreted as a kind of identity.

But enough about me. This was supposed to be about you. As I said at the start: I want to find a way to get you to latch on to the deflationary notion of composition that I so clearly grasp. And if you do not share my realist metaphysics of possible worlds, you may still find merit in the Humean strategy of understanding composition in terms of necessary connections. Even so, however, I fear it may not help much with understanding what *I* mean by kinds of identity. The Humean strategy is a victim of its own generality: because it is compatible with there being multiple modes of composition, it can provide at most a partial understanding of the mereological mode of composition that is my target. If you failed to understand why **Unrestricted Composition** or **Uniqueness of Composition** should hold, even after enduring my presentation of *CAI* and moderate composition as identity, embracing the Humean strategy will make you none the wiser. This final attempt at fostering mutual understanding will end in failure.

Acknowledgments

References

Armstrong, David. *A World of States of Affairs.* Cambridge: Cambridge University Press, 1997.

Baxter, Donald. "Identity in the Loose and Popular Sense." *Mind* 97 (1988): 575-82.

Baxter, Donald. "Many-One Identity." *Philosophical Papers* 62 (1988): 193-216.

Baxter, Donald. "Discernibility of Identicals." *Journal of Philosophical Research* 24 (1999): 37-55.

Bohn, Einar. "David Lewis, *Parts of Classes.*" *Humana Mente* 19 (2011): 151-8.

Bohn, Einar. "Unrestricted Composition as Identity." In *Composition as Identity*, eds. Donald Baxter and Aaron Cotnoir. Oxford: Oxford University Press, 2014.

Bricker, Phillip. "Concrete Possible Worlds." In *Contemporary Debates in Metaphysics,* eds. Dean Zimmerman, Ted, and John Hawthorne. Oxford: Blackwell, 2008.

Bricker, Phillip. "Truthmaking: With and Without Counterpart Theory." In *A Companion to David Lewis,* eds. Barry Loewer and Jonathan Schaffer. Oxford: Blackwell, 2014.

Bricker, Phillip. "Principles of Plenitude." In *Modal Matters: Essays in Metaphysics.* Oxford: Oxford University Press, forthcoming.

Bricker, Phillip. "Realism Without Parochialism." In *Modal Matters: Essays in Metaphysics.* Oxford: Oxford University Press, forthcoming.

Burgess, John. "*E Pluribus Unum*: Plural Logic and Set Theory." *Philosophia Mathematica* 3 (2004): 193-221.

Burgess, John. "Lewis on Set Theory." In *A Companion to David Lewis,* ed. Barry Loewer and Jonathan Schaffer. Oxford: Blackwell, 2014.

Cameron, Ross. "The Contingency of Composition." *Philosophical Studies* 136 (2007): 99-121.

Cameron, Ross. "Quantification, Naturalness, and Ontology." In *New Waves in Metaphysics*, ed. Allan Hazlett. Basingstoke: Palgrave Macmillan, 2010.

Cameron, Ross. "Composition as Identity Doesn't Settle the Special Composition Question." *Philosophy and Phenomenological Research* 84 (2012): 531-54.

Cotnoir, Aaron. "Composition as General Identity." In *Oxford Studies in Metaphysics, vol. 8*, eds. Karen Bennett and Dean W. Zimmerman. Oxford: Oxford University Press, 2013.

Dorr, Cian and Gideon Rosen. "Composition as a Fiction." In *The Blackwell Guide to Metaphysics*, ed. Richard Gale, 151-57. Oxford: Blackwell, 2002.

Fine, Kit. "Towards a Theory of Part." *Journal of Philosophy* 107 (2010): 559-89.

Frege, Gottlob. *Die Grundlagen der Arithmetik: eine logisch-mathematische Untersuchung über den Begriff der Zahl.* Breslau: W. Koebner, 1884. Translated as *The Foundations of Arithmetic: A logico-mathematical enquiry into the concept of number*, by J.L. Austin, Oxford: Blackwell, 2nd rev. ed., 1974.

Kitcher, Philip. *The Nature of Mathematical Knowledge.* Oxford: Oxford University Press, 1984.

Lange, Marc. "What are Mathematical Coincidences (and Why Does it Matter?)." *Mind* 119 (2010): 307-40.

Lewis, David. "Counterparts of Persons and their Bodies." *Journal of Philosophy* 68 (1971): 203-11.

Lewis, David. "Events." In his *Philosophical Papers, vol. II*, 241-69. Oxford: Oxford University Press, 1986.

Lewis, David. "A Comment on Forrest and Armstrong." *Australasian Journal of Philosophy* 64 (1986): 92-3.

Lewis, David. *On the Plurality of Worlds*. Oxford: Blackwell, 1986.

Lewis, David. *Parts of Classes*. Oxford: Blackwell, 1991.

Lewis, David. "Many But Almost One." In *Ontology, Causality, and Mind: Essays on the Philosophy of D.M. Armstrong*, eds. Keith Campbell, John Bacon, and Lloyd Reinhardt. Cambridge: Cambridge University Press, 1993.

Lewis, David. "Truthmaking and Difference-Making," *Nous* 35 (2001): 602-15.

Markosian, Ned. "Brutal Composition." *Philosophical Studies* 92 (1998): 211-49.

Oliver, Alex and Timothy Smiley. *Plural Logic*. Oxford: Oxford University Press, 2013.

Sider, Theodore. "Parthood." *Philosophical Review* 116 (2007): 51-91.

Sider, Theodore. *Writing the Book of the World*. Oxford: Oxford University Press, 2011.

Sider, Theodore. "Against Parthood." In *Oxford Studies in Metaphysics, vol. 8*, eds. Karen Bennett and Dean W. Zimmerman. Oxford: Oxford University Press, 2013.

Sider, Theodore. "Consequences of Collapse." In *Composition as Identity*, eds. Donald Baxter and Aaron Cotnoir. Oxford: Oxford University Press, 2014.

Simons, Peter. *Parts: A Study in Ontology.* Oxford: Oxford University Press, 2000.

Van Inwagen, Peter. *Material Beings*. Ithaca, NY: Cornell University Press, 1990.

Wallace, Megan. "Composition as Identity: Part 1." *Philosophy Compass* 6/11, 2011: 804-16.

Wallace, Megan. "Composition as Identity: Part 2." *Philosophy Compass* 6/11, 2011: 817-27.

Yi, Byeong-uk. "Is Mereology Ontologically Innocent?" *Philosophical Studies* 93, 1999: 141-160.