

FAILURE OR BOREDOM: THE PENDULUM OF COMPOSITION AS IDENTITY

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ABSTRACT

This paper provides new arguments for the following claim: either (i) strong composition as identity cannot retain the full strength of both the logical principles of one-one identity (namely, *Equivalence* and *Leibniz's law*) and its semantical principles (namely, *Coreferentiality*) or (ii) it only delivers cases of boring composition in that it entails mereological nihilism.

I. COMPOSITION AND IDENTITY: LOGIC AND SEMANTICS

There is a renewed interest in the metaphysical thesis known as *Composition as Identity* (CAI)—roughly the thesis that a whole and its (proper) parts (considered collectively) are one and the same entity.¹ And rightly so: CAI is a fairly attractive thesis inasmuch as it promises (i) ontological parsimony, (ii) a reductive analysis of such a controversial notion as composition² in terms of a (allegedly) well-understood one, that is, identity, (iii) a straightforward explanation of some (problematic) metaphysical facts—to mention just one, inheritance of location.³ Several objections have been raised against CAI,⁴ and just as many attempts to defend it against those very charges have been set forth.⁵ *Composition as Identity* comes in a number of versions; here, I will focus on the so-called *strong version*. According to strong CAI, core logical principles of orthodox one-one identity can be extended to

composition.⁶ The relevant logical principles are as follows:

- (1) **Equivalence.** Identity is an *equivalence relation* (in fact, it is the smallest equivalence relation on the universal domain);⁷
- (2) **Leibniz's law.** Identity obeys *Leibniz's law*⁸—in particular, it obeys the principle of *Indiscernibility of Identicals*.⁹

As concerns (2), Sider (2007, p. 57) has it that “defenders of Strong Composition as identity must accept *Leibniz's law*; to deny it would arouse suspicion that their use of ‘is identical to’ does not really express identity.” More in general, the idea is thus expressed by Wallace: “Hybrid Identity is transitive, reflexive, symmetric, and it obeys *Leibniz's law*—the exception is that the hybrid identity relation allows us to claim that many things can be identical to a singular thing” (Wallace 2011a, p. 810).

It should be noted that (1) and (2) are not completely independent. Symmetry and transitivity can be proved.¹⁰ In effect, first-order

logic with identity is routinely axiomatized with reflexivity and a schema corresponding to *Leibniz's law*.

Carrara and Lando (2016) have recently argued that a genuine relation of identity must also respect a further, and commonly neglected, *semantic* principle—that is, *Coreferentiality*:

- (3) **Coreferentiality.** The terms of a true identity statement must be coreferential.

According to Carrara and Lando,

this feature of standard identity should be extended by the backers of strong CAI to composition. If a relational predicate is allowed to combine two terms standing for different things in a true statement, then it does not express a genuine identity relation. And if that relational predicate expresses composition, then composition cannot be legitimately regarded as an identity relation. Thus, coreferentiality should be seen as a constraint on the debate on strong CAI. (2016, pp. 120–121)

Carrara and Lando (2016) offer an in-depth analysis of a particular defense of CAI, that is, of Cotnoir's theory of *composition as generalized identity* as developed in Cotnoir (2013), and argue that in such an approach, *Coreferentiality* fails.

In this paper, I set forth an argument for the following thesis: *either* (i) strong composition as identity cannot retain the full strength of both the logical principles of one-one identity and its semantical principles (I shall call this the *Failure* argument), *or* (ii) it only delivers cases of boring composition in that it entails mereological nihilism (I shall call this the *Boredom* argument).

Following an approach that has become standard, I will make use of plural logic and of standard mereological notions defined in terms of parthood. In what follows, “double signs” such as *uu*, *xx* are plural constants and variables, whereas *u*, *x* are singular ones, *x < y* abbreviates “*x* is part of *y*” and *x < yy* abbreviates “*x* is one of the *yy*.” Proper parthood, overlap, and fusion are defined as usual:

- (4) **Proper parthood.** $x << y =_{df} x < y \wedge x \neq y$
 (5) **Overlap.** $x \circ y =_{df} \exists z(z < x \wedge z < y)$
 (6) **Fusion.** $F(x, yy) =_{df} \forall z(z < yy \rightarrow z < x) \wedge \forall y(y < x \rightarrow \exists w(w < yy \wedge y \circ w))$

CAI is simply defined as follows:

- (7) **CAI.** $\forall x \forall yy(F(x, yy) \rightarrow x = yy)$

Where “=” stands for “identical in the very same sense of identical, familiar to philosophers, logicians, and mathematicians, in which I am identical to myself and $2 + 2$ is identical to 4” (Sider 2014, p. 211).

2. FAILURES

In this section, I advance the twofold *Failure* argument. I will start with logic (§ 2.1) and conclude with semantics (§ 2.2).

2.1 The Logical Failure

The first part of the *Failure* argument deals with logical shortcomings of CAI.¹¹ I aim to argue that identity cannot both be an *equivalence* relation and obey *Leibniz's law*. In particular, given CAI, if identity is an equivalence relation, then the left-to-right direction of the following bi-conditional fails:¹²

- (8) $\forall xx \forall yy(xx = yy \leftrightarrow \forall z(z < xx \leftrightarrow z < yy))$

Informally, (8) is the claim that the *xx* and the *yy* are identical iff there is one-one identity between the members of the *xx* and the members of the *yy*. Consider my body, *b*, its molecules, *mm*, and its atoms, *aa*. We have that (i) $F(b, mm)$ and (ii) $F(b, aa)$. By CAI, (iii) $b = mm$ and (iv) $b = aa$. By symmetry and transitivity, (v) $mm = aa$ and by the left-to-right direction of (8), it follows that (vi) each of the molecules is an atom, which is false.¹³

Yet another independent argument in favor of the failure of the left-to-right direction of (8) comes from *Collapse*:¹⁴

- (9) **Collapse.**
 $\forall x \forall yy(F(x, yy) \rightarrow \forall z(z < yy \leftrightarrow z < x))$

Collapse has it that something is in a given plurality iff it is part of the mereological fusion of that plurality. Given this principle, can

a defender of CAI effectively claim that my body is the fusion of my molecules? Surprisingly, she cannot. For (9) would entail that all parts of my body are molecules, which is false.¹⁵ According to Sider (2007), this would be reason enough to abandon CAI. Calosi (2016) and Loss (2017) argue that *Collapse* entails mereological nihilism. This is quite a threat. Given that the arguments above depend crucially on *Collapse*, it seems advisable to undercut the CAI-*Collapse* link.¹⁶ And the argument from CAI to *Collapse* crucially depends on the left-to-right direction of (8). In order to appreciate this, consider first *Plural covering* (Sider 2014):

(10) **Plural covering.**

$$\forall x \forall y (y < x \rightarrow \exists ww (F(x, ww) \wedge y < ww))$$

Plural covering states that if y is part of x , there are some ww that have y among its members and that compose x . Assume $y < x$ and let ww be those things that are either x or y . Clearly, $y < ww$. Furthermore, $F(x, ww)$, for each of the ww is part of x —for (in turn) $\forall z (z < ww \rightarrow (z = x \vee z = y))$ holds—and each part of x overlaps a ww —that is, x itself. The two claims, $y < ww$ and $F(x, ww)$ establish the consequent of (10), Q.E.D.

Plural covering, together with the left-to-right direction of (8), entails Collapse. Assume the antecedent of (9), that is, assume $F(x, yy)$, and assume that $z < yy$. Then, $z < x$ follows by the very definition of fusion—which proves the left-to-right direction of (9). As for the right-to-left direction, assume that $z < x$. By *Plural covering*, (i) there are ww such that (ii) $F(x, ww)$ and (iii) $z < ww$. By CAI (v) $x = ww$ and (vi) $x = yy$. By symmetry and transitivity, we have (vii) $ww = yy$ and by the left-to-right direction of (8), (iii) and (vii), we conclude that (viii) $z < yy$ —which gives us the right-to-left direction of (9), Q.E.D.

To sum up the upshot of this second argument: the rejection of the left-to-right direction of (8) is required in order to avoid *Collapse* and its pernicious consequences.¹⁷

Now, the point is that (8) is just an instance of *Leibniz's law* for plural identity, in particular, of the *Indiscernibility of identicals*.¹⁸ Thus, if identity is an equivalence relation, no strong CAI can retain the full strength of both the logical principles in (1) and (2).

Before moving on to semantical failure, one further remark is in order. The argument about the failure of the *Indiscernibility of identicals* could be mistaken for an instance of *classic indiscernibility arguments against CAI*. Wallace (2011a, p. 808) mentions different arguments of this sort and sets forth a general template that all such arguments fall under. In particular, they all depend on the following premise: “For some property R , either ($o_1, o_2, o_3, \dots, o_n$ have R and O does not) or (O has R and $o_1, o_2, o_3, \dots, o_n$ do not)” (Wallace 2011a, p. 808), where O is the fusion of (o_1, o_2, \dots, o_n). But the ones I offered are not arguments of this kind. They do not mention any property that the parts have whereas the whole does not; nor do they mention any property that the whole has whereas the parts do not. The first argument focuses only on singular proper parts of the whole, whereas the second argument focuses on the dangers that come from collapsing $<$ to $<$.

Thus, the arguments cannot be resisted by straightforwardly applying the strategy in Wallace (2011a)—that is, by sharply distinguishing between *distributive* predications and *collective* ones.

2.2 The Semantical Failure

The second part of the *Failure* argument focuses on the semantics of identity. Logical failure entails semantical failure—that is, failure of *Coreferentiality*. This should not be unexpected, for *Leibniz's law* is intimately related with *Substitutivity of coreferential expressions*.¹⁹ And *Substitutivity of coreferential expressions* is in turn a test for *Coreferentiality*. To appreciate this intimate connection—and the overall intimate connection between all such notions and

identity—consider the following classic passage from Quine (1961a):

One of the fundamental principles governing identity is that of *substitutivity*, or, as it might well be called, that of *indiscernibility of identicals*. It provides that, *given a true statement of identity, one of its two terms may be substituted for the other in any true statement and the result will be true.* (Quine 1961a, p. 129; emphasis in the original)

I will assume the following notion of substitutivity, in order to make the link with coreferential expressions explicit:

- (11) **Substitutivity of coreferential expressions.** The substitution of one coreferential expression for another does not affect the truth value of a sentence in *non-opaque* contexts.

Suppose now that the left-to-right direction of (8) fails, as the argument from logical failure is taken to show. Then we have cases in which all of the following hold: (i) $xx = yy$, (ii) $z < xx$, (iii) $\sim(z < yy)$. Claim (i) gives us a true identity statement. By *Coreferentiality*, the two terms xx and yy should be coreferential. Hence, substitution in non-opaque contexts should preserve truth. But given (ii) and (iii), it does not. Hence, the terms are not coreferential and *Coreferentiality* fails.

This concludes the *Failure* argument.

3. AGAINST FAILURE

I will now consider some of the ways the argument(s) may be resisted. I aim to address, in particular, some ways that have been attempted in the literature, albeit in those cases, the aim was to defend strong CAI from related yet different charges than the ones I raised. The arguments involve restricting the *Substitutivity of coreferential expressions* (§ 3.1), and relativizing the “one of” predicate (§ 3.2). I find these attempts to resist the *Failure* argument unsuccessful. However, I will put forward a suggestion that *does* help resist that argument (§ 3.3). It turns out that this helping hand feeds boredom. Or so I will argue.

3.1 Restricting

The first strategy is to restrict the *Substitutivity of coreferential expressions*. In particular, Hovda (2014) suggests that friends of CAI could endorse the following weaker substitutivity schemas:

- (12) *One – One* $x = y \rightarrow (\varphi(x) \leftrightarrow \varphi(y))$
One – Many $x = yy \rightarrow (\varphi(x) \leftrightarrow \varphi(yy))$
Many – One $xx = y \rightarrow (\varphi(xx) \leftrightarrow \varphi(y))$
Many – Many $xx = yy \rightarrow (\varphi(xx) \leftrightarrow \varphi(yy))$

provided φ is free of $<$.

This would block the last step in the semantic failure argument directly. Also, given the connection between *Substitutivity of coreferential expressions* and *Leibniz’s law*, any restriction of the former yields a corresponding restriction of the latter. As a consequence, it would also result in undermining the logical failure argument. The problem with such a move is that a restriction of the substitutivity schema would bring forth a source of *discernibility*—hence making us depart from a genuine identity relation. In fact, any restriction of the substitutivity schema with respect to an arbitrary predicate F entails that the references of the two terms in a true identity statement are F -discernible.

Hovda himself acknowledges the point: “It might be argued that the symbol $= [\dots]$ does not express genuine identity, since some instances of the original SID [i.e., substitutivity of identicals] axioms fail” (Hovda 2014, p. 209). This is just another way to claim that the *full strength of Leibniz’s law* is a *non-negotiable requirement* for any relation that is supposed to qualify as an identity relation.²⁰

3.2 Relativizing

Relatedly, Bohn (2014) suggests that the arguments against CAI in Yi (1999) and Sider (2007) fail insofar as they misapply the *Indiscernibility of identicals*. In particular, they fail to make justice of some hidden relational structure implicit in predications involving $<$: “The phrase ‘Genie is one of . . .’ does not express the same property in ‘Genie is one of

the Genie' as it does in 'Genie is one of Tom, Jerry'" (Bohn 2014, pp. 146–147).

To bring forth this implicit relational structure, Bohn suggests to add an argument place to $<$ thus turning it into a three-place predicate $<_{rel}$ whose third argument place is filled by a particular concept that expresses the relevant target of relativization. Actually, Bohn is not so explicit when it comes to the $<$ -predicate. But he writes:

In all cases of predication whose truth depends on a unique kind of 'division' or 'decomposition' of the value of the subject term, the properties and relations hold relative to concepts not of concepts. This way the road to paradoxes is immediately blocked: having a property F, or standing in a relation R, relative to C_1 , but not having it or standing in it relative to C_2 is no paradox. A formula of the form $F(x_1, \dots, x_n, c_1) \& \sim F(x_1, \dots, x_n, c_2)$ is no contradiction. (Bohn 2014, p. 146)

The hope is that in relativizing the $<$ -predicate to concepts, one can avoid the "paradoxes" brought forth by the *Failure* argument, such as the claim that each molecule is an atom. Carrara and Lando (forthcoming) develop this suggestion at length.

It is not easy to grasp clearly the range and consequences of this relativization strategy, nor to assess whether this suffices to block the argument in § 2. Consider once again the case of my body, its molecules and atoms, and focus on one molecule m_1 . One can find it intuitively correct to claim that m_1 is one of the *molecules* relative to the concept "molecule," while it is not one of the *atoms* relative to the concept "molecule." If so, relativization à la Bohn would not solve the problem at hand. Consider the relativized version of (8),²¹ that is:

$$(13) \quad xx = yy \leftrightarrow \forall z (<_{rel} z xx c \leftrightarrow <_{rel} z yy c)$$

where " $<_{rel} z xx c$ " is to be read as " z is one of the xx relative to concept c ."²² The example above would still ensure that the left-to-right direction of (13) fails.²³ And failure of the

left-to-right direction of (13) would still yield the following:

- (i) $mm = aa$;
- (ii) $<_{rel} m_1 aa c_m$ (molecule m_1 is one of the molecules mm relative to the concept "molecule");²⁴
- (iii) $\sim (<_{rel} m_1 aa c_m)$.

Claim (i) would still give us a true identity statement and claims (ii)–(iii) would ensure that substitutivity fails, so that mm and aa would not be coreferential. So both the logical and semantical failure seem untouched.

As I pointed out already, Carrara and Lando (forthcoming)²⁵ provide an extensive analysis of this relativization strategy. According to such an analysis, all of the following come out true:

- (iv) $<_{rel} a_1 aa c_a$;
- (v) $<_{rel} a_1 mm c_a$;
- (vi) $\sim (<_{rel} m_1 aa c_a)$;
- (vii) $\sim (<_{rel} m_1 mm c_a)$.

In these cases, *Leibniz's law* and *Substitutivity* are indeed safe. But once again, this does not seem enough to block the argument.

First, these cases are not analogous to the one we started with. The problematic point was not whether a *molecule* is one of the *atoms* relative to the concept of *atom*, but rather whether it is one of the *atoms* relative to the concept of *molecule*.

Second, how to interpret (v)? What does it mean that an atom a_1 is *one of the molecules relative to the concept of atom*? A natural suggestion, followed by Carrara and Lando themselves, exploits Lewis's notion of a "*portion of reality*" (Lewis 1991, p. 81). The plurality mm is a given portion of reality—one that can be "carved up" by the concept "atom" c_a , and a_1 is *part of* that portion of reality. Yet this is embarrassing, for it amounts to saying that something is among a given plurality that can be "divided" according to different concepts *if it is part of the mereological fusion of that plurality*. Given that if something is among a given plurality, it is part of the mereological

fusion of that plurality (by definition of fusion), what we have here is basically the *Collapse* principle once again. And we saw how problematic that might be. As a matter of fact, this last argument sheds some light on the problematic case (i)–(iii) we started with. Suppose we want to save *Leibniz’s law* and *Substitutivity*. Since (ii), that is, $\langle_{rel} m_1 mm c_m$ seems uncontroversial, we should have

(viii) $\langle_{rel} m_1 aa c_m$.

as well. But what does molecule m_1 ’s being one of the atoms under the “molecule” concept mean? On the natural reading that we are exploring here, it means the following: m_1 is part of the fusion of the aa , and the latter is a portion of reality that can be carved up by the “molecule” concept. But this will lead into the claws and fangs of *Collapse*.

In order to save at least *Substitutivity*, the defender of the strategy I am considering might at this point insist that the relativization of the \langle -predicate renders the context opaque. It is not immediately clear why this should be the case. It is upon the defender of this option to independently motivate the claim that the context is opaque. To my knowledge, there is no such argument in the literature.

3.3 Pluralities and Plurals Expressions

There is yet another strategy to resist the Failure argument—one that I take to be the most promising.²⁶ The strategy stems from some remarks on pluralities and plural expressions to be found in Sider (2014). I will present but a sketch of such a strategy, for its thorough development would inevitably lead to subtle questions about the logic and metaphysics of plural expressions that lie beyond the scope of this paper.²⁷ In effect, I do not need to put forward a thorough development, for *I will simply take for granted, for the sake of the argument, that this strategy is successful*. That is, I will take for granted that the strategy in question succeeds in blocking the *Failure* argument. My point is

that the same strategy also opens the door to a further argument—one that I will call the *Boredom* argument. I present it in the final section.

Recall the argument for logical failure,²⁸ in particular, the case of my body b , composed by the molecules mm and atoms aa . CAI entails that $aa = mm$. The plural *Leibniz’s law* in turn entails that the pluralities aa and mm have the same members. From this, I concluded in § 2 that each atom is a molecule (or each molecule is an atom), that is false. However, the last claim follows only given (an)other implicit assumption(s). Let A be the predicate “being an atom”—to be defined in terms of parthood in § 4, and let M be the predicate “being a molecule.” Then, the implicit assumption(s) are the following:²⁹

(14) $\forall x(x \langle aa \rightarrow A(x))$

(15) $\forall x(x \langle mm \rightarrow M(x))$

Informally, claims (14) and (15) amount to the very plausible claims that every member of the plurality of atoms is an atom, and every member of the plurality of molecules is a molecule. Claims (14) and (15) are not only plausible in themselves. They follow from the orthodox *Comprehension principle* for Plural Logic:

(16) **Comprehension principle.**

$\exists xF(x) \rightarrow \exists yy\forall z(z \langle yy \leftrightarrow F(z))$

where F is any predicate. However, as Sider (2014) points out, *Collapse*—and thus CAI—are in tension with the orthodox *Comprehension principle*. Sider goes on to put forward a weaker comprehension principle that is indeed compatible with *Collapse*.³⁰ *Collapse* also implies that plural referring expressions do not function as one would expect. In fact, one would expect that the plural expression aa functions in such a way as to make (14) true. But this is not the case. As Sider writes, defenders of CAI

must be very careful with the locution “the xx .” To take one example: defenders of composition as identity often describe their view as imply-

ing that a person is identical to her subatomic particles. *But, given Collapse, the plural term 'her subatomic particles' denotes nothing.* (Sider 2014, p. 216; emphasis added)³¹

Now, in the light of this, we *could* conclude that the semantical failure still goes through. For surely, $b = aa$ is a true identity statement, and b does refer, whereas aa does not. Thus, the expressions are *not* co-referential.

To give CAI the best fighting chance, I suggest we should adopt a heterodox understanding of pluralities. My rough suggestion is that the plurality xx of things that are F should contain not only things that are F as members, but also parts of things that are F , and arbitrary fusions of those parts. The suggestion is rough in various respects. It does not consider whether we should admit, for example, *all* parts of everything that is F as members of the plurality, or whether we should allow *all* fusions of those parts, and so on. Its relation to a comprehension principle that is compatible with *Collapse* should also be explored. As I said already, I am afraid these details deserve an independent scrutiny. To be as charitable as possible, I will simply grant that this strategy works in resisting the *Failure* argument. In particular, it entails that (14) and (15)—though plausible at first sight—are in fact *false*. So it is not possible to conclude that each molecule is an atom—and vice versa. This is because the plurality aa of atoms contains (some) molecules as members, and the plurality mm of molecules contains (some) atoms. On top of that, I suggest that we should take plural expressions to refer to pluralities that are understood along the previous lines.

Once this suggestion is taken on board—and perhaps, fully developed—one can even hope that the relativization strategy I put forward in § 3.2 could work as a “recovery strategy.” That is to say that relativization becomes a strategy to explain how we can go around claiming things such as (14) and (15)—and the like—that are, strictly speaking, false.

This strikes me as something worth pursuing for defenders of CAI.

4. BOREDOM

So let me grant for the sake of argument that the heterodox account of pluralities and plural expressions I suggested in § 3.3 undermines the *Failure* argument against CAI. The upshot is that defenders of CAI can indeed hold on to *Leibniz's law in its full strength*, and to the *Substitutivity of coreferential expressions*. I will now provide a new argument from CAI to *mereological nihilism* that depends crucially on both. This is what I call the *Boredom* argument, for reasons that will be obvious. The argument is particularly interesting because it does not depend on *Collapse*.³² Thus, it is a threat to versions of CAI that do not fall prey to that principle, such as the one in Cotnoir (2013). The argument goes as follows.³³ Define atom as usual, that is, something that does not have proper parts:

$$(17) \text{ Atom. } A(x) =_{df} \sim \exists y (y \ll x)$$

Mereological nihilism is the following thesis:

$$(18) \text{ Mereological nihilism. } \forall x (Ax)$$

CAI and *Plural covering* entail the following problematic claim, to the effect that if x is part of y , then x is y :

$$(19) \forall x \forall y (x < y \rightarrow x = y)$$

Assume the antecedent of (19). Then, by *Plural covering*, there are zz such that (i) $x < zz$ and (ii) $F(y, zz)$. By CAI (iii) $y = zz$. Given *Leibniz's law* (in its full strength) and the *Substitutivity of coreferential expressions*, we can substitute y to zz in (i), given (iii)—hence obtaining (iv) $x < y$. The most natural reading³⁴ of (iv), “ x is one of the y ”—where both x and y are singular variables—is that x is identical to y . If so, the consequent of (19) is established, Q.E.D.

Mereological nihilism follows from (19). Suppose it is not the case. Then there is at least a non-atomic composite object—say y .

Let x be one of y 's proper parts. By definition of proper part, we have that (i) $x < y$ and (ii) $x \neq y$. On the other hand, it follows from (i) and (19) that (iii) $x = y$. Contradiction. Q.E.D.

Note that the controversial part of the argument is the interpretation of the formula $x < y$ in the proof of (19). This formula does not contain any plural expression. So the argument—absent any other compelling reasons to the contrary—is untouched by the considerations about pluralities and plural expressions in § 3.3.

I just argued that there is a new argument from CAI to *Mereological nihilism*, independent of *Collapse*. And notice that *Mereological nihilism*, independently from any discussion about *Leibniz's law*, *Coreferentiality*, *Collapse*, and the likes, entails CAI.³⁵ Everything is a fusion of itself. So every atom fuses itself. A fusion of something with itself is just that very thing. Thus, every atom is a fusion that is strictly identical with the thing(s) it fuses. Given *Mereological*

nihilism, there are no other fusions beside atoms. Hence, every fusion is strictly identical with the thing(s) it fuses. This is just CAI.

Where does all this leave us? As far as I can see, it leaves us here. Defenders of CAI can (i) restrict *Leibniz's law*—but then it is unclear whether composition *is* identity indeed. This, I argued, amounts to “Failure.” Or (ii) they can put forward a heterodox account of pluralities and plural expressions and hold on to the full strength of *Leibniz's law*. But then they end up with atoms alone. If there are only atoms, composition *does occur*, one might insist. And, given the previous argument, it *is* identity, she could go on, so that CAI *is* vindicated. I shall grant this. But, I would add, in this case, composition is *boring*.³⁶ Or, to put it differently, this amounts to “Boredom.”

I will then adapt my conclusion from a classic:³⁷ *Composition as Identity* swings like a pendulum backward and forward between failure and boredom.

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NOTES

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1. See, for example, Baxter and Cotnoir (2014). For an introduction to the debate, see Cotnoir (2014).
2. See, for example, Tsai and Varzi (2016). They write: “What is clear, however, is that short of some principle concerning mereological summation, *the notion of composition* that has shaped the recent debate on atomism and on other fundamental mereological issues *is defective*” (p. 235; emphasis added). As for other examples, consider the controversies about the General and Special Composition Questions. To put it roughly, the General Composition Question asks What is composition? It seems that defenders of CAI have a straightforward answer: it is identity. On the other hand, the Special Composition Question asks What are the necessary and sufficient conditions under which the yy compose a further object? Some have argued that CAI entails *Mereological universalism*, for example, Bohn (2014). Some have argued that it entails *Mereological nihilism*, for example, Calosi (2016), and Loss (2017). In either case, CAI would also provide an answer to the Special Composition Question. For a different take, see Cameron (2012).

3. That is to say, the whole is where its parts are: its location is *fixed* by the location of its parts. Defenders of CAI have, once again, a straightforward explanation of inheritance of location: the whole is where its parts are because the whole *is* the parts. And they are where they are.
4. See Lewis (1991); McDaniel (2008); Sider (2007); van Inwagen (1994); Yi (1999), to mention a few.
5. See, among others, Bohn (2014); Cotnoir (2013); Hovda (2008; 2014); Wallace (2011a; 2011b).
6. In contrast with the weaker thesis, according to which composition is *analogous* to identity. The *locus classicus* is Lewis (1991, pp. 72–87).
7. An equivalence relation is a relation that is *reflexive*, *symmetric*, and *transitive*.
8. *Leibniz's law* is supposed to hold for both orthodox one-one identity and for plural identity. Plural identity is traditionally defined as follows: $x = y =_{df} \forall z (z < xx \leftrightarrow z < y)$. See, for example, Oliver and Smiley (2013, p. 109).
9. The converse, that is, the so-called *Identity of indiscernibles*, is far more controversial and will be set aside here.
10. See Quine (1961b).
11. I am indebted to Fabrice Correia for several discussions.
12. In fact, plural identity is just a strengthened variant of (8). See endnote 8. If the argument in the text is on the right track, it follows that friends of CAI should be revisionary about standard plural identity, which could be considered a non-negligible cost of the theory in itself. See Carrara and Lando (forthcoming) for a discussion.
13. For similar remarks, see Hovda (2014).
14. See Sider (2007; 2014).
15. See, for example, Sider (2014, p. 216). I will provide an argument to resist this claim in § 3.3.
16. But see § 4.
17. Note that, accordingly, Cotnoir's theory of generalized identity does not entail *Collapse*, exactly because of this—though Cotnoir's argument against *Collapse* is set against the background of another proof of the principle—that is, the one in Sider (2007).
18. Note that Baxter (1988a; 1988b; 2014) and Turner (2014) suggest that the *Indiscernibility of identicals* should be abandoned also in orthodox one-one identity cases. If this is conceded, the argument in the paper does not represent any serious threat for strong CAI.
19. A more common label is perhaps, *Substitutivity of identicals*. I am using *Substitutivity of coreferential expressions* because, strictly speaking, it is expressions that are substituted. And their identity is not at stake. Thanks to an anonymous referee.
20. Carrara and Lando (2016) explore yet another strategy to resist the semantical failure. *Composition as Identity* suggests a pluralistic attitude toward identity: as we saw, we have one-one identity, one-many identity, many-one identity, and many-many identity. Cotnoir (2013) proposes generalized identity as well. Once a pluralistic attitude toward identity is adopted, it might be argued, a pluralistic approach should be adopted when it comes to *Coreferentiality* as well. For every notion of *n*-identity, we could define *n*-coreferentiality, and claim that two terms are *n*-coreferential iff the referents of *n*-coreferentiality are *n*-identical. The problem with this move is the one that was pointed out by Carrara and Lando (2016, pp. 126–127) already. *Coreferentiality* would be trivialized and would not provide any constraint at all. I do not have anything new to add here, so I will leave it at that.

21. Notation follows Carrara and Lando (forthcoming).
22. See later on for a particular instance.
23. One might reply that *identity should be relativized as well*. Baxter (2014, p. 246) comes close to this position. I will not enter these details here—see Carrara and Lando (forthcoming) for discussion. I will simply assume that *genuine identity is not relative*.
24. The same reading applies in all the other cases.
25. I am highly indebted to Massimiliano Carrara and Giorgio Lando here.
26. This entire section is the result of a suggestion of an anonymous referee of this journal.
27. In fact, I am working on these developments myself, together with Thomas Sattig.
28. I suspect that similar considerations bear upon the Collapse argument—Sider (2007) and Yi (1999), and to the Collapse-related arguments, that is, the arguments in Calosi (2016) and Loss (2017). In what follows, I will simply assume that it is so, for the sake of argument.
29. For the sake of simplicity, I will use the two-place relation.
30. He also notes that it is possible to derive *Plural covering* from that weaker principle.
31. Notation adjusted.
32. The arguments in Calosi (2016) and Loss (2017), on the other hand, crucially depend on *Collapse*.
33. I am indebted here to Rafał Gruszczyński and Achille Varzi.
34. This is the reading given in, for example, Lesniewski's ontology. For a defense, see, for example, Simons (1982; 1985). Thanks to Kevin Mulligan and Peter Simons for this. I grant that there may be other readings such that the desired conclusion does *not* follow. It is up to the defender of CAI to come up with a reading of the problematic formula that does not entail the more problematic conclusion.
35. The following argument is due to Calosi (2016).
36. Note that the expression “boring composition” is sometimes used with a different meaning in the literature, for example, in Schaffer (2003); or Borghini and Lando (forthcoming). According to Schaffer and to Borghini and Lando, cases of boring composition are cases in which “characteristic properties of all the parts supervene on the characteristic properties of the whole” (Schaffer 2003, p. 505). Mereological nihilism is boring in this sense, too, given reflexivity of supervenience. But it is even *more* boring when it comes to composition.
37. Arthur Schopenhauer, *The World as Will and Representation*.

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