

# Counting on Strong Composition as Identity to Settle the Special Composition Question

Joshua Spencer

## Abstract

Strong Composition as Identity (SCAI) is the thesis that necessarily, for any  $x$ s and any  $y$ , those  $x$ s compose  $y$  iff those  $x$ s are non-distributively identical to  $y$ . Some have argued against this view as follows: if some many things are non-distributively identical to one thing, then what's true of the many must be true of the one. But since the many are many in number whereas the one is not, the many cannot be identical to the one. Hence (SCAI) is mistaken. Although I am sympathetic to this objection, in this paper, I present two responses on behalf of the (SCAI) theorist. I also show that once the defender of (SCAI) accepts one of these two responses, that defender will be able to answer The Special Composition Question.

# Counting on Strong Composition as Identity to Settle the Special Composition Question

Joshua Spencer

## 1. Introduction

Strong Composition as Identity (SCAI) is the thesis that:

Necessarily, for any  $x$ s and any  $y$ , those  $x$ s compose  $y$  iff those  $x$ s are identical to  $y$ .<sup>1</sup>

This is a very strange view.<sup>2</sup> In conjunction with the highly plausible claim that there's at least one composite object, (SCAI) entails a revisionary thesis about identity, namely that there are some many things that are collectively, but not individually, identical to

---

<sup>1</sup> Some people might prefer a version of composition as identity that is contingent rather than necessary. That's fine with me. However, please note that a contingent version of composition as identity can, at best, give a contingent answer to The Special Composition Question. Thanks to an anonymous referee for suggesting that some might prefer the contingent alternative.

<sup>2</sup> (SCAI) is considered by Lewis (1991) before he seemingly rejects it in favor of a view that's far less radical. (SCAI) has been discussed by Armstrong (1989) and (1997), Bohn (2011), (2014a) and (2014b), Cameron (2007) and (2012), McDaniel (2010a), Merricks (1999) and (2005), Sider (2007), van Inwagen (1994), Wallace (2011a) and (2011b), and Yi (1999a) among others. A variant of this view, going by a similar name, has been defended by Baxter (1988a) and (1988b). Moreover, Composition as Identity is the subject of a recent volume of papers edited by Cotnoir and Baxter (2014). Some of these authors have been critical of (SCAI) and others have been sympathetic. Many have stepped forward as mere hypothetical defenders.

one thing. That is, in other words, that some many things are *non-distributively* identical to one thing. The entailment is fairly obvious. Suppose that there is a composite object, *y*, an object composed of many *x*s. That is, suppose there is a *y* such that many *x*s compose it. By (SCAI) there is a *y* such that those *x*s are identical to it. But it's not the case that *each* of the many *x*s is identical to *y*. For otherwise, by the symmetry and transitivity of identity, each of the many *x*s would be identical to one another and would not, contrary to the supposition be *many*. So, those many *x*s are non-distributively identical to *y*.

This fact is the centerpiece of several powerful objections to (SCAI), one of which appears to be suggested in this quotation from David Lewis:

... even though the many and the one are the same portion of Reality, and the character of that portion is given once and for all whether we take it as many or take it as one, still we do not really have a generalized principle of 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. The number of the many is six, as it may be, whereas the number of the fusion is one. ... (Lewis 1991: 87)

It's not obvious whether Lewis intends to be putting forward a powerful objection to (SCAI) or merely noting an important consequence of the view.<sup>3</sup> In any case, one might *take* it as an objection. For one might think that if, as (SCAI) seems to entail, there are

---

<sup>3</sup> See Bohn (2011) for an extensive discussion of Lewis.

some many things that are genuinely non-distributively *identical* to one thing, then those many and that one *must* obey the characteristic principles of identity, including an indiscernibility principle: If some many things are non-distributively identical to one thing, then what's true of the many must be true of the one. But since the many are many in number whereas the one is not, the many cannot be identical to the one. Hence (SCAI) is mistaken.<sup>4</sup>

Although I am sympathetic to this Lewis-inspired objection, I do think there is room for the (SCAI) theorist to maneuver and, in fact, room enough to maneuver without giving up on indiscernibility as a characteristic principle of identity. Moreover, once the defender of (SCAI) accepts one of the responses that I'll be suggesting here, that defender will have more resources for advancing (SCAI) against its distinctive compositional rivals. In particular, the response I suggest will help the defender of (SCAI) to settle the seemingly intractable Special Composition Question: For any things whatsoever, what are the individually necessary and jointly sufficient conditions under which those things compose something or other?<sup>5, 6</sup>

---

<sup>4</sup> A version of this argument is also considered by McKay (2006: 38)

<sup>5</sup> (SCAI) is not an answer to The Special Composition Question. Rather, it is at best an answer to the General Composition Question. Whereas The Special Composition Question asks, for any xs, under what metaphysically necessary and sufficient conditions do those xs to compose something or other, The General Composition Question asks, for any xs and any y, under what metaphysically necessary and sufficient conditions do those xs compose that particular y. Both of these questions are formulated by van Inwagen (1990) (though, in the text above, I follow more closely the formulation of Markosian (1998a), (1998b), (2008), and (2014)). The first of these questions has received quite a bit of attention whereas the second has received very little. One might find this surprising since, given how closely they are related, one might think that answers to the second question should settle answers to the first. There might be a neglected strategy for answering (SCQ) lurking about: first find the best answer to (GCQ) and

I must say, some have already claimed that (SCAI) settles The Special Composition Question.<sup>7</sup> In particular, they claim that (SCAI) entails Unrestricted Composition, the view that for any things whatsoever, there is something they compose. Indeed, if (SCAI) did entail Unrestricted Composition, I would take that as a significant strike against the view. However, I do not think the (SCAI) defender should be convinced by these arguments and I think they should reject the putative entailment. Ross Cameron (2012) has argued, convincingly in my opinion, that the (SCAI) defender

---

then see what (SCQ) answer it entails. But Peter van Inwagen (1990: 46-47) has argued that answers to (GCQ) do not in general entail *informative* answers to (SCQ) even if they do entail answers to (SCQ). Van Inwagen, though, has a particularly restrictive view of what makes an answer to (SCQ) informative and I will be following Markosian's (1998a) less restrictive notion of informativeness in what follows. In fact, though I won't argue for this claim here, it is my opinion that no correct answer to The Special Composition Question can be informative in the strict sense. The best we can hope for is an answer that meets Markosian's notion of informativeness.

<sup>6</sup> The fact that (SCAI) settles The Special Composition Question can be added to a long list of strengths which may be advanced together to make a strong cumulative case for (SCAI). Here is a list of three such strengths: First, Armstrong (1989) and (1997), Baxter (1988a) and (1988b), Hawley (2014), Lewis (1991), and Sider (2007) have all suggested that (SCAI) captures the intuition that mereology is ontologically innocent and, relatedly, that counting the parts of an object while also counting the whole object is, in some sense, double counting. Second, Wallace (2011a) has pointed out the, in my opinion, underappreciated fact that if (SCAI) is true then we can explain how the material parts of an object collectively occupy the same region as the whole they compose without violating a plausible ban on co-location. And, third, I (2013) have shown that if (SCAI) is correct, then there is a straightforward answer to The Simple Question (under what conditions is a material object a mereological simple): Necessarily, a material object is a simple iff all the things it's identical to are one in number.

<sup>7</sup> See, in particular, Merricks (2005) and Sider (2007)

need not accept Unrestricted Composition.<sup>8</sup> It is a virtue of the case that I'll be making here that the answers I'll be advancing on behalf of the (SCAI) defender are perfectly compatible with the view that composition is restricted.

In this paper, I will carefully formulate and explain the Lewis-inspired objection. I will then suggest two plausible responses to that argument on behalf of the (SCAI) defender. Finally, I will show how those responses can be mustered by the (SCAI) defender to answer The Special Composition Question. The answers I provide to The Special Composition Question are finitely long and involve no mereological vocabulary.<sup>9</sup> So, in at least one sense developed in the literature, they are informative answers. Admittedly, what it takes for an answer to be informative is a controversial issue. I believe, however, that no correct answer to The Special Composition Question can be more informative than one that is finitely long and involves no mereological vocabulary. But, unfortunately, I do not have the space to develop a defense of this weak notion of informativeness here. So, the reader may take my conclusion to be conditional. If the defender of (SCAI) accepts this particular notion of informativeness, then she may provide an informative answer to The Special Composition Question once she has provided an answer to the Lewis-inspired objection.

## *2. "What's true of the many is not exactly what's true of the one"*

The Hammering Man is a sculpture that stands outside the Seattle Museum of Art. It is at least partly composed of a steel body, a swinging aluminum hammer wielding arm, and

---

<sup>8</sup> Cameron has also addressed one of these arguments in (2007), but I do not find his case in this earlier paper as convincing. Cameron himself seems to favor his more recent defense over his earlier defense (2012).

<sup>9</sup> See Markosian (1998a) for a more detailed explanation and defense of this notion of informativeness.

a motor that generates that swinging motion. For simplicity, let's suppose that The Hammering Man is wholly composed of those three parts: the steel body, aluminum hammer wielding arm, and motor. Some people might find this example ontologically suspect, perhaps because they find artifacts in general suspect or because they find contemporary works of art suspect. If you count yourself among the suspicious, then you are welcome to choose a more appropriate example and reformulate the argument found below. Be warned, though, that if you choose as your example something like a cat and the *billions* of cells that compose it, your example might become unwieldy. Moreover, since any example of a composite object will do for our purposes, I suggest you set your reservations aside and focus on the wieldy example given. With these facts in mind, we can formulate the Lewis-inspired argument as follows:

1. The Hammering Man is composed of a steel body, an aluminum hammer wielding arm, and a motor.
2. If (1) and SCAI is true, then The Hammering Man is identical to the steel body, the aluminum hammer wielding arm, and the motor that together compose it.
3. The Hammering Man is one in number.
4. The steel body, aluminum hammer wielding arm, and motor that compose The Hammering Man are three in number.
5. So, The Hammering Man is not identical to the steel body, aluminum hammer wielding arm, and motor that together compose it. [3, 4 by Plural Indiscernibility of Identicals]
6. So, CAI is not true. [1, 2, and 5]

The premises of this argument seem straightforward and intuitively correct. We'll return to some of the key premises in the next section. The validity of this argument relies on two assumptions. First it relies on the assumption that a particular characteristic principle of identity, namely the Indiscernibility Principle, is correct. Anyone who accepts that many things can be identical to one, like the (SCAI) theorist, should also accept that the many and the one obey the characteristic principles of identity and moreover, those characteristic principles must be formulated to accommodate many-one identities. Now, obviously, the opponents to (SCAI) need not accept the coherence of any such formulations. But that's beside the point. We should think of this argument as an ad hominem. The (SCAI) theorist should accept a plural formulation of the Indiscernibility of Identicals and, once she has, she is subject to the argument above. Keeping that in mind, we might formulate the Plural Indiscernibility of Identicals as follows: for any  $x$ s and any  $y$ , if those  $x$ s are identical to  $y$ , then whatever is true of those  $x$ s is also true of  $y$ .

Second, the validity of the argument relies on the fact that no things are both one in number and three in number. Once we accept, along with the indiscernibility principle above, that no things can be both one in number and three in number, the argument goes through. For, from premises (3) and (4) and the plural indiscernibility principle, it follows that if the Hammering Man is identical to the steel body, aluminum arm, and motor, then the steel body, aluminum arm, and motor are both three in number and one in number. But, since no things can be both three in number and one in number, the sub-conclusion follows; namely, (5) that the Hammering Man is not identical to the steel body, aluminum arm, and motor. But if they are not identical to The Hammering Man, then by premise (2), it follows that either (SCAI) is not true or the steel body, aluminum arm, and motor don't compose The Hammering Man. By premise

(1), though, the steel body, aluminum arm, and motor *do* compose The Hammering Man. So, the conclusion immediately follows; (6) (SCAI) is not true.

Is it true that being one in number and being three in number are incompatible? Well, that depends on what's meant by the claims that something is one in number and that some things are three in number. One plausible view is adapted from a somewhat standard Russellian account of numerical quantification. Let's start with one. Please be patient, though, as we encounter some misleading grammar that results from limitations of the English language. We might say that something is one in number or, and here's where we first feel the confines of our grammar, some things are one in number just in case there is an  $x$  among it (so to speak) or them and anything among it or them is identical to that  $x$ . We can formulate this using our standard first-order logical apparatus, augmented with plural variables and an interpreted two-place relation, ' $x$  is among  $x$ s'. To keep things simple we'll allow our plural variables to be satisfied by single things. We can think of single things as degenerate pluralities.<sup>10</sup> Here, then, is our definition of 'being one in number':

(ONE)  $x$ s are one in number =df  $\exists x(x \text{ is among those } x\text{s} \ \& \ \forall y(y \text{ is among those } x\text{s} \rightarrow y=x))$

Now, let's consider three. We might say that some things are three in number just in case there are an  $x$ ,  $y$ , and  $z$  each of which is among the things in question and all of which are pairwise distinct from one another and, moreover, any  $w$  that's among the things in question is either identical to  $x$  or to  $y$  or to  $z$ . Here is our formal formulation:

---

<sup>10</sup> Yi (2014) has argued that English plurals in fact work this way.

(Three) *xs* are three in number =df  $\exists x\exists y\exists z((x \text{ is among } xs \ \& \ y \text{ is among } xs \ \& \ z \text{ is among } xs) \ \& \ (x \neq y \ \& \ x \neq z \ \& \ y \neq z) \ \& \ \forall w(w \text{ is among } xs \rightarrow (w=x \vee w=y \vee w=z)))$ <sup>11</sup>

We'll call the views of numerical predication that analyze numerical predication quantificationally in something like the way suggested above "Russell-Style Accounts".<sup>12</sup>

It's easy to show, given these definitions, that no things are both one in number and three in number. For suppose otherwise. Suppose that there are some things—henceforth known as *as*—that are both one in number and three in number. By the first definition, there is something—namely *b*—that is among those *as* and anything among those *as* is identical to *b*. But, by the second definition, there are three things—*c*, *d*, and *e*—that are each among those *as* and that are pairwise distinct from one another. Well, since anything among those *as* is identical to *b*, it must follow that *c*, *d*, and *e* are each identical to *b*. But by the symmetry and transitivity of identity, it follows that *c*, *d*, and *e* are all identical to one another. This contradicts the claim that *c*, *d*, and *e* are pairwise distinct from one another. Hence, our supposition that there are some things that are both one in number and three in number is mistaken. Nothing is both one in number

---

<sup>11</sup> Some (SCAI) theorists introduce a notion of partial identity, which is equivalent to mereological overlap. They may take distinctness to be non-partial identity rather than non-identity. Hence they may resist the numerical definitions given above. I will not pursue this kind of objection in this paper. Thanks to an anonymous referee for this suggestion.

<sup>12</sup> The Russell-Style Account suggested above, which uses plural variables, is not exactly Russell's own account.

and three in number. And, moreover, given these Russell-inspired analyses, the argument above is valid.

### *3. One Need Not be the Loneliest Number*

One way to respond to the Lewis-inspired argument involves rejecting the Russell-Style Accounts of numerical predication introduced above. Although Russell-Style Accounts have a strong pedigree, heredity alone can't establish they're right. Since the Lewis-inspired argument is only as strong as the Russell-Style Account that underwrites the inference to line (5), it is incumbent upon the defender of the argument to support that account. I think, however, Russell-style accounts face serious objections. In this section, I will discuss what I take to be one of the strongest objections and introduce one alternative account of counting.

Consider the following case, discussed by Nathan Salmon (1997). Suppose that there are two oranges on the table. I cut one of them in half and eat one half of it while returning the remaining half to the table. We might then ask: *exactly* how many oranges are on the table? The correct answer, it seems, is there are exactly one and a half oranges. Right? Not so fast! If Russell-Style Accounts of counting are correct, then the correct answer is, counterintuitively, that there is exactly one orange. After all, the half orange isn't an orange, it's a half-orange.<sup>13</sup> At best, if the Russell-Style Accounts are correct, then when we say that there is exactly one and a half oranges, we've answered the original question and then given some superfluous information, namely that there is

---

<sup>13</sup> If the half orange is an orange, then given the Russell-Style Accounts there are (counterintuitively) two oranges on the table! So, regardless of whether we count the half-orange as an orange, the Russell-Style Accounts give us a counterintuitive answer to the question. I will be ignoring this horn of the dilemma for the remainder of the paper.

also a half orange on the table. Moreover, that superfluous information might be false. After all, there might be an infinite number of half oranges on the table, a pair for each of the infinite ways of slicing the remaining whole orange.<sup>14</sup> So, if Russell-Style Accounts are right, then what seems like the obviously correct answer to a straightforward question turns out to be, at best, an answer with some superfluous and maybe even false extra information. Counterintuitive indeed!

One might partly respond to the worry expressed above by claiming that, when we say there are one and a half oranges on the table, we are saying that there is one orange and one detached orange half. Then, it might be claimed, we have answered the question when we say that there are exactly one and a half oranges on the table and given some *true* extra information. Moreover, given the norms of conversation, that extra information might not be superfluous after all. There are many ordinary circumstances when it might be perfectly appropriate to tell someone who has asked about the exact number of oranges on the table that there is an undetached orange half in addition to a whole orange. Suppose, for example that a chef is prepping desserts, each one of which requires a half orange. If that chef were to ask her sous chef exactly how many oranges are on the table, the sous chef would mislead the chef if he were simply to say that there is exactly one orange on the table and neglect to say anything about the half orange as well. The sous chef would mislead the chef into believing that there are only enough orange halves for two desserts when in fact there are enough for three.

---

<sup>14</sup> I say that the superfluous information *might* be false rather than that it is false because, as we will see later, the notion of a count might preclude one from legitimately counting both the whole orange and its various undetached halves at the same time.

The response is strong, but more complex cases can be given. Suppose that there is a 100 millimeter diameter orange on the table.<sup>15</sup> I slice the orange into circular orange slices. I take the ring of peel off the largest slice, keeping it intact, and return that ring to the table. There's now a ring of orange peel exactly the same size as the diameter of the orange on the table. We might ask, then, the following question: exactly how many millimeters of orange peel are on the table? Since the diameter of the orange was 100 millimeters, the correct answer seems to be that there are exactly  $100\pi$  millimeters of orange peel on the table (or approximately 314.159 millimeters of orange peel on the table). But if Russell-Style Accounts are right, then the correct answer is that there are exactly 314 millimeters of orange peel on the table. At best, when we say that there are  $100\pi$  millimeters of orange peel, we have answered the question and given an infinite amount of seemingly superfluous additional information. We have said that there are exactly 314 millimeters of orange peel on the table and said, additionally, that there is one  $1/10$  millimeter segment of orange peel, and one  $5/100$  millimeter segment of orange peel, and one  $9/1000$  millimeter segment of orange peel, and so on. Moreover, the extra information might be false! There are, for example, lots of  $1/10$  millimeter segments of orange peel, one for each way of cutting out a  $1/10$  millimeter segment out of the whole.<sup>16</sup> Although we appealed to detached orange halves in our response to the original orange case above, we cannot appeal to detached segments of orange peel here; the orange peel was kept intact, and so there are no detached segments.<sup>17, 18</sup>

---

<sup>15</sup> Or maybe it's a grapefruit cleverly disguised as an orange. It doesn't matter. I don't want to get distracted by math or pomology.

<sup>16</sup> Although, again, the notion of a count might help here.

<sup>17</sup> An anonymous referee has pointed out to me that there are two different questions that might be conflated in this objection: How long is the orange peel? And, how many (non-overlapping) 1 millimeter

Puzzles like the ones introduced above might motivate some to give up on the Russell-Style Accounts (Salmon 1997). One simple alternative is the view that there are irreducibly plural numerical predicates. When we say, for example, that the steel body, aluminum arm, and motor of The Hammering Man are three in number, we are predicating of those things together that they are three in number.<sup>19</sup> These plural

---

segments of orange peel are there? No claim about how to properly answer the first question can be part of a legitimate objection to Russellian-Style Accounts of counting. The second question, moreover, can be answered by the Russellian by saying that there are 314 non-overlapping 1 millimeter segments of orange peel (and, if the conversational context permits, saying that there are additional, smaller, non-overlapping segments as well). However, I think the question asked in the text is different from both of these questions. The question asked in the text is the following: How many millimeters of orange peel are there? This question is asking us to count something rather than measure something. So, it is different from the first question above. Moreover, this question is asking us to count the millimeters of orange peel rather than the 1 millimeter segments of orange peel. So, it is different from the second question above as well. Admittedly, a strong case might be made for the assimilation of my question with one of the two questions distinguished above.

<sup>18</sup> The Russell inspired accounts of numerical claims also have trouble with numerical claims involving negative number and numerical claims involving various orders of infinity. For example, suppose I have overdrawn my bank account by 20 dollars. I *might* say that there are -20 dollars in my bank account. Or suppose there's a young philosopher who is just beginning to understand the difference between dense and continuous time. We might tell her that there are a countable infinity of instants in a second if time is merely dense and there are an uncountable infinity of instants in a second if time is continuous. But it's not even clear that these claims can be analyzed using anything like the Russell inspired methods. Admittedly, the example involving an overdrawn bank account might be dealt with by analyzing the troublesome claim as one about owing the bank 20 dollars rather than a claim about having a negative number of dollars. The example involving different orders of infinity might be dealt with if we analyze those claims using a language that allows for infinite and transfinite formulas.

<sup>19</sup> See Yi (1999b) and McDaniel (2013) for discussions of similar views.

numerical predicates are irreducible in two ways. First, they are irreducibly plural in that they cannot be analyzed away using only non-plural predicates.<sup>20</sup> Second, they are irreducibly numerical in that they cannot be analyzed away using non-numerical vocabulary such as quantifiers and identity. This second fact bars any quantificational analysis of numerical predication, like Russell-Style Accounts.

Admittedly, there is something weird about this alternative account of numerical predication. There are some numerical claims that seem to be both true and necessary. For example, consider the claim that if some things are three in number, then they are at least one in number. That seems both true and necessary. Moreover, focusing on an example that is pertinent to this discussion, no things are both three in number and one in number. This claim also seems to be both true and necessary. On the Russell-Style Accounts, these claims turn out to be logical truths and their necessity can be explained by that fact. But, on the alternative account of numerical predication just suggested, if these claims are necessarily true, then their necessity cannot be explained by logic. If their necessity cannot be explained at all, then we seem to have brute necessary connections between the seemingly distinct numerical properties expressed by the numerical predicates in question. That would be a bad consequence and a strike against the alternative account.

But necessary truths need not be explained by logic. Some necessities can be explained by appealing to conceptual entailments. For example, it's necessary that

---

<sup>20</sup> The Russell-Style account of numerical predication introduced in the previous section *is* irreducibly plural. It introduces a predicate that applies to pluralities which is analyzed in terms of at least one relation that involves is itself irreducibly plural (the 'among' relation). However, more traditional Russell-inspired accounts of counting are not irreducibly plural. On these more traditional accounts, numerical predications are higher order predications.

everything blue is extended and that necessity can be explained by conceptual entailments.<sup>21</sup> It is notoriously difficult to tell whether or not something is a conceptual entailment. So, it might not be surprising to learn that some of these numerical claims that seem to be both true and necessary are neither necessary nor true. In particular, maybe some things can both be one in number and three in number. Moreover, we will have arrived at a plausible response to the Lewis-inspired argument. Although the premises of the argument are true, the conclusion does not follow. In particular, the sub-conclusion that (5) The Hammering Man is not identical to the steel body, aluminum hammer wielding arm, and motor, does not follow from the premises that (3) The Hammering Man is one in number and that (4) the steel body, aluminum hammer wielding arm, and motor are three in number. This is true even if we accept the Plural Indiscernibility of Identicals. For it will follow from (3) and (4) by the Plural Indiscernibility of Identicals that if The Hammering Man is identical to the steel body, aluminum arm, and motor, then The Hammering Man is both one in number and three in number. But, since being one in number and being three in number are compatible, it will *not* follow that The Hammering Man and its pertinent parts are not identical to one another.

Finally, recall that The Hammering Man was just an arbitrary example; we could have used any composite object whatsoever in formulating the Lewis-inspired argument. So, if the defender of (SCAI) accepts that The Hammering Man is both one in number and three in number in order to slip through the clutches of the Lewis-inspired argument, then she should accept, generally, that for any composite thing and parts that compose it, that individual thing is both one in number and  $n$  in number, where  $n$  is the number of those parts; she should accept that the composite is  $n$  in number because it is

---

<sup>21</sup> Thanks to an anonymous referee for this point.

identical to its parts, which are  $n$  in number. Moreover, since the (SCAI) theorist accepts that every composite object is identical to its parts, given the Plural Indiscernibility of Identicals, she should also accept that any parts of an individual object are both  $n$  in number, where  $n$  is the number of those parts, and one in number; she should accept that those parts are one in number because they are identical to the thing they compose, which is one in number. Now the defender of (SCAI) shouldn't be completely arbitrary about numbering things. A composite is many because it is identical to its parts and its parts are one because they are identical to the things they compose. But there's no reason for an object that has no parts to be more than one in number and there's no reason for some many things that fail to compose anything to be one in number. So, the individual things that are more than one in number are just those individual things that are composite and the many things that are one in number are just those many things that compose an individual.

With all that in mind, it's clear that the defender of (SCAI) is in a position to answer The Special Composition Question. Using only plural variables, in order to avoid illegitimate presuppositions or unnecessary redundancy, we may formulate the thesis of Composition *by* Identity-1, or (CBI<sub>1</sub>), as follows:

(CBI<sub>1</sub>) Necessarily, for any  $x$ s, those  $x$ s compose something or other iff there are some  $y$ s such that those  $x$ s are identical to those  $y$ s and those  $y$ s are one in number.<sup>22</sup>

---

<sup>22</sup> Composition by Identity is equivalent to the following thesis, which we might call Composition by Oneness:

So, if the defender of (SCAI) is willing to accept something like this alternative account of numerical predication and accept that some seemingly necessary truths are neither necessary nor true, then she will be well positioned to reject the Lewis-inspired argument *and* provide an answer to The Special Composition Question.

### 5. Counts

Some people will find the objections to Russell-Style Accounts of numerical predication unconvincing and some people will find the rejection of seemingly necessary truths, like the claim that no things can be both three in number and one in number, unappealing

---

(CBO) Necessarily, for any  $x$ s, those  $x$ s compose something or other iff those  $x$ s are one in number.

One might think that (CBO) has some advantages over (CBI<sub>1</sub>). First, some people believe that a correct answer to The Special Composition Question should give, for any things, the conditions in virtue of which they compose something or other. If the conditions provided by (CBO) are better in that respect, then it will have an advantage over (CBI<sub>1</sub>). I take no stand on whether (CBO) or (CBI<sub>1</sub>) provides more plausible conditions in virtue of which composition occurs. Second, a good answer to The Special Composition Question is supposed to be informative in the sense that one should be able to state it using non-mereological vocabulary. If (SCAI) is true, then perhaps the identity relation and the composition relation are one and the same. And, if those relations are one and the same, then (one might think) any answer to The Special Composition Question that involves identity will violate the informativeness constraint. Hence, (CBO) would be a better answer than (CBI<sub>1</sub>). I reject this line of reasoning. Even if the composition relation and the identity relation are one and the same, nevertheless, an answer that uses identity *vocabulary* may be informative. And, moreover, I am skeptical of the claim that (SCAI) entails that the composition relation and the identity relation are one and the same. For a more detailed discussion of these issues see my (2013).

(to say the least). Is there, one might wonder, a way to defend (SCAI) from the Lewis-inspired argument without abandoning at least the spirit of the Russell-Style Accounts of numerical predication and without rejecting something like those seemingly necessary truths? Well it turns out the answer is yes!<sup>23</sup>

It will be best to start out by introducing a notion, adopted from Donald Baxter: the notion of *a count*. A count is a special domain of quantification. Suppose we have a room full of oranges and we are asked to count the things in the room. Well, we can count those things in all sorts of acceptable ways. We can count the individual oranges; or we could count the individual orange molecules; or we could count the various atoms. Each of these domains (the domain of oranges, the domain of orange molecules, and the domain of atoms) is a count of the things in the room. By contrast, one unacceptable way of counting the things in the room would be to count the oranges *and* the orange molecules *and* the atoms all together. That would be double counting! The domain that includes the oranges, orange molecules, and atoms is not a count.<sup>24</sup>

When we ask a “how many?” question, we should answer that question relative to a count. Let’s focus again on the room full of oranges. We might ask how many things are in that room. One might answer that the number of things in the room, under one count, is twenty four. The number is twenty four under a count that happens to include

---

<sup>23</sup> The view presented in this section is very similar to the view developed by Aaron Cotnoir (2013). Both views are inspired by Donald Baxter (1988a) and (1988b).

<sup>24</sup> We can also get at the notion of a count by using mereological vocabulary. But be wary! When we introduce the notion of a count by using mereological vocabulary, we are not giving a definition or even a partial definition. We are simply providing a necessary condition, which might help convey the concept of a count. So, then, here is our condition: Necessarily, a domain happens to be a count only if none of the members of the domain overlaps with any of the other members of the domain and anything whatsoever overlaps with at least one member of the domain.

just the *oranges* in the room; or one might answer that the number, under a distinct count, is some odd billion. The number is some odd billion under a count that happens to include just the *orange molecules* in the room. Both of these are correct answers to the question “how many things are in the room?” though one might be more appropriate than the other, depending on the circumstances.<sup>25</sup>

Now we can analyze these count relative numerical predications in a Russell-like-way. First, we introduce several quantifiers, each one of which corresponds to, and has as its domain, a count. These are the count quantifiers.<sup>26</sup> We might say, then, that some things are one in number, under a particular count (under *c*), just in case there’s some *x* amongst them, under *c*, and for any *y* amongst them, under *c*, *y* is identical to *x*. Using quantifier that are superscripted to indicate their count, we can formulate the definition of our first numerical predicate as follows:

---

<sup>25</sup> The notion of a count might sound like it has some affinity with Carnapian frames of reference (Carnap, 1956). But I intend this view to be a version of ontological realism rather than some kind of Carnapian relativism. It does not follow from anything I’ve said, for example, that if there is a count under which there are twenty four things in the room, then there must also be a count under which there are eight things in the room. There might be a count under which there are oranges in the room and yet no count under which there are tri-oranges in the room. After all, there might not be, in any sense, things that are composed of three oranges. Thanks to the audience at Themes from Baxter II for pushing me to clarify this distinction.

<sup>26</sup> One might even endorse a kind of ways of being view according to which each of the quantifiers that corresponds to a count is a way of being whereas quantifiers that do not correspond to counts are not. For an introduction to contemporary theories of ways of being see McDaniel (2009), my own (2012), and Turner (2010).

(ONE\*)  $xs$  are one in number, under count  $c = \text{df } \exists^c x(x \text{ is among those } xs \ \& \ \forall^c y(y \text{ is among those } xs \rightarrow y=x))$

Similarly, we can say that some things are three in number, under a  $c$ , just in case there is, under  $c$ , an  $x$ ,  $y$ , and  $z$  each one of which is among those things and for any  $w$  among those things, either  $w$  is identical to  $x$  or to  $y$  or to  $z$ . Again, we can formulate this definition as follows:

(THREE\*)  $xs$  are three in number, under count  $c = \text{df } \exists^c x \exists^c y \exists^c z ((x \text{ is among } xs \ \& \ y \text{ is among } xs \ \& \ z \text{ is among } xs) \ \& \ (x \neq y \ \& \ x \neq z \ \& \ y \neq z) \ \& \ \forall^c w (w \text{ is among } xs \rightarrow (w=x \vee w=y \vee w=z)))$

One nice aspect of this Russell-Style Account of numerical predication is that we can accept that, in some sense, it is both true and necessary that no things can be both three in number and one in number. What we can accept is that no things, under a particular count, can be both three in number and one in number, under that count. This is both true and necessary. Moreover, its necessity can be explained by the fact that it's a logical truth.<sup>27</sup>

One last thing, before we return to the Lewis-inspired argument. We can introduce an absolutely unrestricted and non-relative existential quantifier simply by taking the disjunction of all the count-relative quantifiers<sup>28</sup>:

---

<sup>27</sup> The proof that nothing can be both one in number and three in number, under a particular count, is straightforward and follows closely the proof given at the end of section 2.

<sup>28</sup> Plural quantifiers will also be restricted to a count and a similar definition for an unrestricted plural quantifier can be given.

(Unrestricted-E)  $\exists x\varphi =df \exists^{c1}x\varphi \vee \exists^{c2}x\varphi \vee \exists^{c3}x\varphi \dots$

And given the duality of existential and universal quantification, we can introduce an absolutely unrestricted and non-relative universal quantifier:

(Unrestricted-U)  $\forall x\varphi =df \sim\exists^{c1}x\sim\varphi \ \& \ \sim\exists^{c2}x\sim\varphi \ \& \ \sim\exists^{c3}x\sim\varphi \dots$

Notice, though, that these non-relative quantifiers allow for double counting. We might, then, say that there are, full stop, billions and billions of things in the room (some of which are oranges and some of which are orange molecules and some of which are atoms, and so on). But it would, in most circumstances, be conversationally inappropriate to answer a “how many?” question by counting up the things in the domain of this absolutely unrestricted quantifier. This absolutely unrestricted quantifier can be useful, though, especially when one wants to formulate certain philosophical questions or views. For example, mereological questions (like The Special Composition Question) and mereological theses (like (SCAI)) are formulated using this absolutely unrestricted quantifier. In fact, I will use the unrestricted and non-relative quantifier when I formulate an answer to The Special Composition Question below and I will indicate the quantifier in English with the phrase ‘for any *x*s whatsoever’.<sup>29</sup>

---

<sup>29</sup> At this point, the view that I am introducing differs from Baxter’s own version of Composition as Identity. Baxter prefers to introduce two notions of identity: intra-count identity and cross-count identity. The first is a relation that obtains between an object, *x*, and an object, *y*, that appear in the same count. For example, the orange I plucked from the tree is (intra-count) identical to the orange that grew on the lowest hanging branch of my tree. The second relation, though, is one that obtains between a thing or

Now, with all of this in mind, we are in a position to respond to the Lewis-inspired argument. Premise (3) says that The Hammering Man is one in number and premise (4) says that the steel body, aluminum arm, and motor are three in number. But these numerical claims are not made relative to a count. Moreover, there is no count that includes The Hammering Man *and* its various parts. For if there were such a count, then any answer to a “how many” question given relative to that putative count would involve unacceptable double counting. So, the numerical predications in premises (3) and (4) must be made relative to counts and they must be made relative to distinct counts. We might say, for example that (3\*) The Hammering Man is one in number, under count  $c_1$  (a count that happens to include whole installation statues like The Hammering Man); and we might say that (4\*) the steel body, aluminum arm, and motor are three in number, under count  $c_2$  (a count distinct from  $c_1$  that includes large parts of installation statues). Of course, by The Plural Indiscernibility of Identicals, it follows that if The Hammering Man is identical to the steel body, aluminum arm, and motor, then

---

things that appear under one count and a thing or things that appear under another count. For example, some particular orange molecules are (cross-count) identical to an orange. Only the first identity relation, Baxter claims, obeys an indiscernibility principle. But it is the second relation that Baxter uses in his formulation of Composition as Identity. Baxter, then, can respond to the Lewis-inspired argument by claiming that it is ambiguous. If the arguer, on the one hand, intends to use intra-count identity throughout, then the argument is sound and the conclusion is true. But that spells no trouble for composition as identity. On the other hand, if the arguer intends to use cross-count identity throughout, then the argument is invalid; it employs a false indiscernibility principle. That’s all fine, I suppose, but it isn’t really a defense of (SCAI) and it requires introducing a second identity relation that I’m sure most of us are quite unfamiliar with. I hope to defend (SCAI), retain the indiscernibility principle, and avoid introducing multiple identity relations. For more details on Baxter’s view and his cumulative case against the Indiscernibility of Identicals see his (1988a), (1988b), (1989), (1999), and (2001).

The Hammering Man is one in number, under count  $c_1$ , and three in number, under count  $c_2$ . But being one in number, under one count, and three in number, under a distinct count, are perfectly compatible. So, the subconclusion that The Hammering Man is not identical to its parts just does not follow.<sup>30</sup>

Admittedly, the objector might insist that the numerical predications in (3) and (4) should be read as non-relative numerical predications. Such predications can be introduced, in the Russell style, using the non-relative and absolutely unrestricted quantifier discussed above. In fact, we introduced such predications in section two under the names '(ONE)' and '(THREE)'. That's all well and good. But, then, I think the defender of (SCAI) should reject premises (3) and (4) of the argument. Focusing on premise (3), she can claim that The Hammering Man is not one in number. Rather, The Hammering Man is at least four in number! Why? Well, remember that the unrestricted and non-relative quantifiers introduced above allow for double counting, since a thing and its parts are all in the domain of the non-relative quantifiers. Since The Hammering Man is identical to the steel body, aluminum arm, and motor, anything that's among the latter things is also among the former. Since, the steel body, aluminum arm, motor are among themselves and they are identical to The Hammering Man, it follows (strangely) that they are each among The Hammering Man. But The Hammering Man itself is among

---

<sup>30</sup> An anonymous referee has pointed out to me that this same sort of response might be made by someone who defends the view that there are irreducibly plural numerical predications and, indeed, the sort of suggestion that follows has been made by Wallace (2011b). Instead of relativizing the predication to a count, one simply introduces complex numerical predications that include noun phrases that impose explicit quantifier restrictions. So, instead of saying that there are 24 things in the room under a count, one that happens to include the oranges in the room, we simply say that there are 24 oranges in the room. This suggestion also allows one to respond to the objectionable brute necessities by adopting a Russell-Style Account of irreducibly plural complex numerical predications.

The Hammering Man. So, now we have four things that are pairwise distinct from one another and each among The Hammering Man. So, using the unrestricted and non-relative quantifiers introduced above, it follows that The Hammering Man is at least four in number! The defender of (SCAI) can explain why someone might think that (3) and (4) are true by noting that they are very similar to (3\*) and (4\*), which are true and more natural readings of our claims about numbers. So, even if the objector insists on using the unnatural absolutely unrestricted and non-relative quantifier, the Lewis-inspired argument is unsound.

Now that we have the notion of a count at our disposal, we can give an answer to The Special Composition Question. We can call this view ‘Composition by Identity-2’ or ‘(CBI<sub>2</sub>)’ for short.

(CBI<sub>2</sub>) Necessarily, for any *xs* whatsoever, those *xs* compose something or other iff there is a count *c* and there are, under *c*, some *ys* such that those *xs* are identical to those *ys* and those *ys* are one in number, under *c*.

Here’s an argument for (CBI<sub>2</sub>). Choose some arbitrary possibility and focus on some arbitrary objects in that possibility—henceforth, *as*. Let’s also focus on what those things are like in that possibility. Suppose those *as* compose something or other—namely *b*. Let’s consider the left-to-right direction first. Clearly, *b* must appear under some count or other—let it be *c*<sub>1</sub>. Now, *c*<sub>1</sub> can’t include any of those *as* or any other parts of *b*; for otherwise *c*<sub>1</sub> would violate the no-double-counting constraint on counts. How many in number is *b* under that count? Well, there is certainly something, under *c*<sub>1</sub>, that is among *b*. That something is *b* itself. Moreover, since none of the parts of *b* are among *b*, under count *c*<sub>1</sub>, it must be that anything, under *c*<sub>1</sub>, that is among *b* is identical to *b*

itself. Hence,  $b$  is one in number, under  $c_1$ . Since the plural variables can be satisfied by a single thing, a degenerate plurality, and since those  $as$  were arbitrary objects in an arbitrary possibility, we have established the left-to-right direction of our necessary biconditional.

Now consider the right-to-left direction. Choose, again, some arbitrary possibility and focus on some arbitrary objects, and what they are like, in that possibility— $as$ . Suppose that there is a count—let's say  $c_2$ —and some things under  $c_2$ —namely  $bs$ —that those  $as$  are identical to and let's also suppose that those  $bs$  are one in number, under  $c_2$ . Now, consider an arbitrary count that includes those  $as$ — $c_3$ . Either (i) those  $as$  are several in number, under  $c_3$ , and each one is identical to those  $bs$  or (ii) those  $as$  are several in number, under  $c_3$ , and they are non-distributively identical to those  $bs$  or (iii) those  $as$  are one in number, under  $c_3$ , and they are identical to those  $bs$  (ignoring our misleading grammar).

Option (i) cannot be right. Remember that, by supposition, those  $bs$  are one in number, under count  $c_2$ . But, clearly, those  $as$  cannot be several in number, under some count, and each one identical to those  $bs$  if those  $bs$  are one in number. For suppose otherwise. Then there would be, under  $c_3$ , some number of things— $a_1 \dots a_n$ —and  $a_1$  would be identical to those  $bs$  and  $a_2$  would be identical to those  $bs \dots$  and  $a_n$  would be identical to those  $bs$ . Then, by the transitivity and symmetry of identity,  $a_1 \dots a_n$  would all be identical to one another and would not, contrary to what option (i) says, be several in number, under  $c_3$ .

So, that leaves us with options (ii) and (iii). But if, as option (ii) says, those  $as$  are several in number, under  $c_3$ , and they are non-distributively identical to those  $bs$  (which recall are one in number, under  $c_2$ ), then it seems that there is, under  $c_2$ , something among those  $bs$  that those  $as$  are non-distributively identical to; by (SCAI) those  $as$

compose that thing and hence compose something or other. If, as option (iii) says, those *as* are one in number, under  $c_3$ , and they are identical to those *bs* (which recall are one in number, under  $c_2$ ), then we have a simple one-one identity. But, by any theory of composition, a simple one-one identity implies composition. So, those *as* compose something or other. It seems, then, that regardless of whether option (ii) or (iii) is correct, those *as* compose something or other. Since those *as* were arbitrary objects in an arbitrary possibility, we have established the right-to-left direction of the necessary biconditional.

## 6. Conclusion

There are at least two plausible responses to the Lewis-inspired objection to (SCAI). One might reject the standard Russell style accounts of numerical predication and claim that *being one in number* and *being three in number* are compatible properties. Or, alternatively, one might relativize numerical predications to special domains known as counts. Given either response, the defender of (SCAI) has resources that can be used to settle the seemingly intractable Special Composition Question. Thus we have not only a successful defense of (SCAI) from one of the more powerful objections that it faces, but also a significant benefit that can be weighed in favor of the view.<sup>31</sup>

---

<sup>31</sup> Thanks to Ross Cameron, Aaron Cotnoir, Hud Hudson, Shieva Kleinschmidt, Kris McDaniel, and Chris Tillman for discussing the ideas of this paper with me. Thanks also to an audience at the Themes from Baxter II conference in Ligerz, Switzerland, for helpful comments on an early draft of this paper. Finally, special thanks to two anonymous referees for this journal who provided extensive and very helpful comments on two earlier drafts.

## Bibliography

- Armstrong, David (1989) *Universals: An Opinionated Introduction* (Cambridge: Westview Press).
- (1997) *A World of States of Affairs* (Cambridge: Cambridge University Press).
- Baxter, Donald (1988a) "Identity in the Loose and Popular Sense." *Mind* 97: 575–82.
- (1988b) "Many-One Identity", *Philosophical Papers* 17 (3):193-216.
- (1989) "Identity Through Time and the Discernibility of Identicals", *Analysis* 49 (3):125 - 131.
- (1999) "The Discernibility of Identicals", *Journal of Philosophical Research* 24:37-55.
- (2001) "Loose Identity and Becoming Something Else", *Noûs* 35 (4):592–601.
- Bohn, Einar Duenger (2011) "Commentary on Parts of Classes", *Humana.Mente*, 19: 151-158.
- (2014a) "From Hume's Dictum via Submergence to Composition as Identity or Mereological Nihilism", *Pacific Philosophical Quarterly* 95 (3): 336-355.
- (2014b) "Unrestricted Composition as Identity", in *Composition as Identity*, Aaron Cotnoir and Donald Baxter eds., (Oxford University Press).
- Cameron, Ross P. (2007) "The Contingency of Composition", *Philosophical Studies* 136 (1):99-121.
- (2012) "Composition as Identity Doesn't Settle the Special Composition Question", *Philosophy and Phenomenological Research* 84 (3):531-554.
- Carnap, Rudolf (1956) "Empiricism, semantics, and ontology", in *Meaning and Necessity: a study in semantics and modal logic* (University of Chicago Press), 2nd edition., pp. 203–221.
- Cotnoir, Aaron J. (2013) "Composition as General Identity", *Oxford Studies in Metaphysics Vol. 8*. 294-322.

- Cotnoir, Aaron J. and Baxter, Donald L. M (eds.) (2014) *Composition as Identity* (Oxford: Oxford University Press).
- Hawley, Katherine (2014) "Ontological Innocence", in Donald Baxter & Aaron Cotnoir (eds.), *Composition as Identity* (Oxford: Oxford University Press).
- Lewis, David (1991) *Parts of Classes* (Oxford: Basil Blackwell).
- Markosian, Ned (1998a) "Brutal Composition", *Philosophical Studies* 92 (1998a): 211–49.
- (1998b) "Simples", *Australasian Journal of Philosophy* 76: 213-226
- (2008) "Restricted Composition," in John Hawthorne, Theodore Sider, and Dean Zimmerman (eds.), *Contemporary Debates in Metaphysics* (Basil Blackwell), pp. 341-363.
- (2014) "A Spatial Approach to Mereology," in Shieva Kleinschmidt (ed.), *Mereology and Location* (Oxford University Press), pp. 69-90.
- McDaniel, Kris (2009) "Ways of Being." In David Chalmers, David Manley and Ryan Wasserman (eds.) *Metametaphysics: New Essays on the Foundations of Ontology*. Oxford: Oxford University Press. 290-319.
- (2010) "Composition as Identity Does Not Entail Universalism", *Erkenntnis* 73 (1):97-100.
- (2013) "Existence and Number", *Analytic Philosophy* 54 (2):209-228.
- McKay, Thomas J. (2006) *Plural Predication*. (Oxford University Press).
- Merricks, Trenton (1999) "Composition as Identity, Mereological Essentialism, and Counterpart Theory", *Australasian Journal of Philosophy* 77 (1999): 192–5.
- (2005) "Composition and Vagueness", *Mind* 114: 615–637.
- Salmon, Nathan (1997) "Parts, Wholes, and Numbers", *Philosophical Perspectives* 11: 1-15.

- Sider, Theodore (2007) "Parthood", *Philosophical Review* 116: 51-91.
- Spencer, Joshua (2012) "Ways of Being", *Philosophy Compass* 7/12: 910-918.
- Spencer, Joshua (2013) "Strong Composition as Identity and Simplicity", *Erkenntnis* 78: 1177-1184
- Turner, Jason (2010) "Ontological Pluralism." *The Journal of Philosophy* 107: 5-34
- van Inwagen, Peter (1990) *Material Beings*. (Ithaca: Cornell University Press)
- (1994) "Composition as Identity", *Philosophical Perspectives* 8: Logic and Language. 207-220. Reprinted in Peter van Inwagen (2001) *Ontology, Identity, and Modality: Essays in Metaphysics* (Cambridge: Cambridge University Press).
- Wallace, Megan (2011a) "Composition as Identity: Part 1", *Philosophy Compass* 6 (11): 804-816.
- (2011b) "Composition as Identity: Part 2", *Philosophy Compass* 6 (11): 817-827.
- Yi, Byeong-uk (1999a) "Is Mereology Ontologically Innocent?" *Philosophical Studies* 93: 141-60.
- (1999b) "Is Two a Property?" *Journal of Philosophy* 96 (4):163-190.
- (2014) "Is There a Plural Object?" In Donald Baxter & Aaron Cotnoir (eds.), *Composition as Identity* (Oxford: Oxford University Press)