Counting by Identity: A Reply to Liebesman

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DISCUSSION NOTE

COUNTING BY IDENTITY: A REPLY TO LIEBESMAN

David Liebesman argues that we never count by identity, generalizing from an argument that we don't do so with sentences indicating fractions or with measurement sentences on their supposed count readings. In response, I argue that measurement sentences are not covered by the thesis that we count by identity, in part because they don't have count readings. Then I use the very data that Liebesman appeals to in his argument that we don't count by identity using measurement sentences, in order to rebut his argument that we don't count by identity using sentences indicating fractions.

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1. Introduction

Counting the *F*'s by identity requires distinguishing them, before placing them in one-to-one correspondence with an initial segment of the numbers from 1 through *m* in their canonical order, and giving 'there are *m F*'s' as the counting result – the answer to 'how many *F's*?'. Anyone such as Cantor [1895] or Frege [1894], who purports to explain the application of numbers to such things as sets (or classes or extensions), via the establishment of a one-to-one correspondence between the former and members of the latter, presupposes that we count by identity.

David Liebesman [2015] argues that we never count by identity. First he argues that we don't count by identity with sentences like (1):

(1) Two and a half oranges are on the table.

Then he argues that sentences like (2) have count readings (henceforth 'individuative readings') as well as measure readings, and that we don't count by identity when we use such sentences with their individuative readings:

(2) Two litres of water are in the jug

Having argued that we don't count by identity using sentences like (1) and (2), he proceeds to argue that we never count by identity. Rather than considering this further argument, I will simply describe and rebut his arguments that we don't count by identity using sentences like (1) and (2). In particular, I will use the very data that Liebesman appeals to in his argument that we don't count by identity using sentences like (2), as the basis of my rebuttal of his argument that we don't count by identity using sentences like (1).

2. Measurement sentences

To motivate the claim that there are individuative readings of measurement sentences, Liebesman appeals to data like that concerning the contrast between (3) and (4), in which the distributive marker 'each' occurs, and in which adjectives occur between a lexical numeral and a container word:

(3) Two expensive glasses of wine are on the table. They cost ten dollars each.

(4) Two expensive glasses of wine are in the sauce. They cost ten dollars each.

Assuming there is wine in the sauce but no glasses, (4) requires a measure reading according to which:

[[Two glasses] of expensive wine] are in the sauce.

In contrast, (3) requires an individuative reading, according to which:

> [[Two] [glasses of expensive wine]] are on the table.

Following Susan Rothstein [2011], Liebesman claims:

> This ambiguity is clear with terms like ‘glass’, which on the measure reading, designates a property of quantities of liquid, and, on the individuative reading, designates containers that hold those liquids [2015: 32].

As for the measure reading:

> ‘Volume in glasses’ is a function from some quantity of liquid to its volume as given in the conventional scale determined by ‘glasses’:
>
> [[two glasses]] = λx. Volume-in-glasses (x) = 2 [ibid: 33].

Looking at Rothstein’s account [2011: 9], one can see that this function is in turn the value of the function designated by ‘glasses’:

> [[glass]] = λn. λx. Volume-in-glasses(x) = n glasses.

Strictly speaking then, the designatum of ‘two glasses’ on its measure reading is not ‘a property of quantities of liquid’, but the characteristic function of the class of quantities with the measure value of 2 on the scale determined by the unit *glasses.* I will return to this point.

Liebesman uses constructions similar to (3) to detect data which he takes to show that unit terms have individuative readings too:

> (5) Two litres of refreshing water are in the jug. I’m going to drink each of them and quench my thirst.

I must say that I find (5) somewhat infelicitous. But putting this to one side, Liebesman’s idea is that the occurrence of (6) in (5) requires an individuative reading, due to the occurrence in (5) of adjectives and distributive markers:

> (6) Two litres of water are in the jug.

For this reason, Liebesman maintains that its truth conditions are predicted by the thesis that we count by identity. He then makes the following assumptions about the truth conditions of (6), on its individuative reading:

(I) 'in the jug' is a first-order predicate true of all and only those entities that are in the jug,

(II) 'liter$_{\text{individuative}}$' is a first-order predicate true of quantities,

(III) quantities are values of first-order variables,

(IV) 'water' is a first-order predicate true of all and only quantities of water.

(V) 'liter$_{\text{individuative}}$ of water' intersects the semantic values of 'liter$_{\text{individuative}}$' and 'water'.

To motivate (II), Liebesman describes a scenario in which litres of water are poured into five separate gallon jugs, and half-litres of water are poured into five further gallon jugs. He claims:

> In true utterances of 'that's a litre', the demonstrative 'that' cannot be heard as referring to a container. Rather, the demonstrative must be referring to the quantity of liquid held within the gallon containers. Furthermore, we must read 'litre' individuatively, because I can follow my individual proclamations with a sentence containing a distributive operator: e.g. 'each quantity on the right is a litre'.
>
> This shows that there is a sense of 'litre' on which it is a first-order predicate true of quantities that are one litre in volume… true of all and only quantities that measure 1 litre in volume [ibid: 35].

Here the idea is that the function referred to by 'liter$_{\text{individuative}}$' is true of all and only those quantities that '1 liter' is true of on its measure reading. Liebesman then argues that the thesis that we count by identity, together with (I) – (V), predicts that (6) will have the following truth conditions:

(7) $\exists x\ \exists y$ [liter$_{\text{individuative}}$ of water(x) & liter$_{\text{individuative}}$ of water(y) & $x \neq y$ & in the jug(x) & in the jug(y)]

Finally, he argues that (6) does not in fact have these truth conditions, by envisaging the following scenario, in which he claims (7) is true and (6) is false: Paul mistakenly thinks that John has poured the water from two (full) one-litre bottles into a gallon jug, when in fact John has poured in just over one-litre of water. Paul utters (5), in which (6) occurs with its individuative reading. This utterance is false. But (7) is true, because

> there is a quantity of water that has its spatial boundaries at the bottom of the bottle and just below the top, such that its volume is exactly one litre. There is a non-identical quantity of water (largely overlapping the first) that has a boundary just above the bottom, goes all the way to the top, and is such that its volume is exactly one litre. In fact there are myriad such quantities, all of them non-identical, and each of them witnessing the truth of [(6)] [ibid: 36].

Thus, Liebesman reasons, (7) is true when (6) is false, contrary to what he claims is predicted by the thesis that we count by identity.

I was just at pains to emphasize that Liebesman appeals to individuative readings of unit terms, and to assumptions (I) – (V), to derive the truth conditions of (6). However, as I will now explain, I am very dubious of (II) and (III), and doubtful that there are individuative readings of unit terms at all, and correspondingly doubtful that they are covered by the thesis that we count by identity.

Consider again Liebesman's scenario, in which litres of water are poured into five separate gallon jugs, and half-litres of water are poured into five further gallon jugs. I submit that contrary to Liebesman's claim, 'that's a litre' *can* be used to refer to the salient jug and say of it that it contains a litre of liquid. Further, even if 'that' could not be so used, it would not follow that it *must* be used to refer to the salient quantity, since there is another plausible option. Suppose that Iceland's strongest man, Elmar Geir Unnsteinsson, is required to carry a large bale of hay a fixed distance, before repeating the exercise with two further bales of hay. Before doing so he beats his chest and announces: 'that's three hundred pounds, that's three hundred pounds and that's three hundred pounds! I will bear each upon my back!' This is naturally heard as referring to the demonstrated bales and saying of each of them that it's three hundred pounds in weight. Likewise, 'that's a litre' is naturally heard as referring to the demonstrated body or sample of water in the jug and saying of it that it's one litre in volume. So Liebesman's example does not show that 'litre' must be read individuatively, since it can be read as saying of *a body or sample* that it measures one litre in volume.

Once this point is appreciated, another comes into view. In Liebesman's scenario, in which litres of water are poured into five separate gallon jugs, and half-litres of water are poured into five further gallon jugs, (8) is true on its measure reading:

(8) There are seven and a half litres of water on the table.

Further, it is also true that there are ten samples of water on the table, five of which measure one litre, and five of which measure one half of a litre. But this does not require a separate individuative reading of (8). Rather, there is just one measure reading, on which all of this is true, since the ten samples of water on the table measure seven and a half litres. To think otherwise is to fall into what Stephen Neale calls "a scene-reading trap" [2007: 85].

Having explained why I am doubtful that there are individuative readings of unit terms, I now turn to (III): the claim that quantities are values of first-order variables. In my view, quantities of a dimension such as volume or length are not objects, but generic or determinable properties of objects. Further, in order to make determinations of such determinables, we use units of measurement like *litre* as functions from numbers to determinate quantities [Salmon 1987], where a given number is the number of times one must accumulate the standard unit of quantity in order to make a determination, and a determinate quantity is the quantity thus accumulated. Some of this can be accommodated in the semantics of measurement readings by the machinery that Liebesman appeals to, since, as we have seen, it can categorize 'litre' on its measurement reading as designating a function from numbers to functions:

$$[[\text{litre}]] = \lambda n.\ \lambda x.\ \text{Volume-in-litres}(x) = n \text{ litres.}$$

The values in the range of this function are measurement functions like the one described earlier (*c.f.* p. 3). But this has the unfortunate consequence that '2 litres' does not designate the determinate property that should be the value of the *litre* function for 2 as argument, but the characteristic function of the class of quantities that measure 2 litres. Further, since the members of this class will differ in counterfactual scenarios in which these quantities have different spatial boundaries, and classes are individuated by their members, the designatum of '2 litres' will differ in the aforementioned counterfactual scenarios as well. This is excessively counterintuitive, since intuition tells us that '2 litres' is a rigid designator. The mistake here is of thinking of quantities as objects with spatial boundaries that can vary across times and possibilities, rather than as properties that remain fixed. If the latter view is correct, then quantities are not values of first order variables.

To conclude this part of my discussion, Liebesman is wrong to say that the claim that we count by identity predicts that (6) will have the truth conditions of (7), because assumptions (II) and (III) needed to generate this prediction are false. Furthermore, if quantities are not objects with spatial boundaries, then one should also deny Liebesman's claim that (7) is true in the scenario he envisages because there are myriad litres in the jug, all of them non-identical, and each of them witnessing the truth of (7). Rather, there are myriad ways of subdividing the water in the jug into samples each measuring one litre.

3. Fractions

Now I turn to Liebesman's argument that we don't count by identity with sentences like (1):

(1) Two and a half oranges are on the table.

The first part of his argument for this claim closely resembles an argument due to Nathan Salmon [1997], and is as follows. Intuitively, (1) is true if I place three oranges on the table, before cutting off and eating one half of an orange. However, (1) is false, assuming that we count by identity. For either the half of an orange on the table is an orange on the table, or it is not. On the one hand, if it is an orange on the table, then, by the above procedure for counting by identity, there are three oranges on the table. And on the other hand, if it is not an orange on the table, then, by the same counting procedure, there are two oranges on the table. Either way, (1) is false, assuming that we count by identity. So, Liebesman reasons, the above procedure for counting by identity provides the incorrect truth conditions for (1), showing that we don't follow this procedure for counting when we use sentences like (1).

The aforementioned contrastive data about partitioning terms, on which Liebesman draws during his discussion of measure terms, can also be used to rebut this argument. The contrastive data show that some occurrences of nouns like 'orange' and 'bagel' can require a measure reading, despite the fact that by their grammatical status they are count occurrences demanding an individuative reading, because they occur with the plural suffix and within the scope of numerals. To see this, contrast (8) with (9):

(8) The two oranges on the table cost a dollar each.

(9) The two oranges in the sauce cost a dollar each.

Since there are not

[[two] [oranges]] in the sauce,

we need the measure reading instead, according to which there are

[[two orange's worth] of orange] in the sauce.

Further, since it is hard to believe that count occurrences of 'orange' are lexically ambiguous, it seems plausible that 'oranges' semantically expresses its individuative reading, but can be used to convey the measure reading in certain conversational contexts.

My next claim is that the presence of a fraction of an orange on the table contributes to a conversational context in which a measure reading is required. This is even so if one asks 'How many oranges are on the table?' In the presence of a fraction of orange, it is natural to up the ante to a more precise but non-literal standard for knowing how many, according to which there are two and a half oranges on the table. However, it remains the case that *literally* or *strictly speaking* (1) is false and a less obvious answer is true: two oranges are on the table. So, I claim, counting by identity provides the correct truth conditions for (1).

Anticipating this sort of line, Liebesman expresses skepticism that (1) is literally false but felicitous when we are not speaking strictly:

> Loose speech is of no help here. Our judgments about [(1)] remain, no matter how much we lower our voice, pound the table, insert the word 'seriously', or engage in whatever other practices we can in order to speak non-loosely [ibid: 25].

But this fails to acknowledge a perfectly good explanation of why we judge (1) to be true and 'two oranges are on the table' to be false: the latter carries the false (scalar) implicature that there is nothing else orange-related on the table. Further, Liebesman's rhetorical characterization does not address my point, which is not so much about loose speech, as that an expression like 'orange' that is neither ambiguous nor indexical, can nevertheless be used in a special way in accordance with our interest in measuring, instead of in accordance with its strict meaning. This is because conversations give rise to contexts —perhaps even registers— in which the dictates of expression semantics can be temporarily ignored in accordance with our interests.

The contextually required measure reading that I have in mind is given in terms of a unit that is introduced in context, in reference to an instance of a sortal-kind, the quantity of which is being measured. On this view, 'How many oranges are on the table?' is like 'How many glasses of wine are in the sauce?' or 'How many blocks is the distance to Central Park?' However, instead of asking for a measure of distance in New York City blocks, the first question asks for a measure of volume in terms of the unit *an orange's worth of orange*. Further, while there is plausibly a convention that a block is a variable unit of measurement for distance, the convention governing 'orange' seems to be rather different. In my view, what a measure reading of a count noun gives us is a somewhat variable unit that is introduced in context, in accordance with the following rule: Let any count noun 'F' designate an *F*'s worth of *F*, where the context determines the dimension and, in certain cases, how much an *F*'s worth is.

A possible objection to this line is that it will not work for all count nouns. This is because things like pumpkins and cakes can vary a great deal in size. So, in a context in which there many pumpkins in the yard of various sizes, as well as one half of a pumpkin, a speaker will have no idea how much pumpkin is a pumpkin's worth. In which case, as Salmon [1997] points out, saying 'there are twenty seven and a half pumpkins in the yard' is, arguably, not answering with a measure of volume. In response I would say that this objection shows too much, since the same is also true of New York City blocks, and nobody doubts that a block is a variable unit of measurement for distance. For example, North-South blocks are about two hundred and sixty feet, while east-west blocks are about seven hundred and fifty feet, while blocks on diagonal streets like Broadway are different again. So a measurement in blocks can also be variable and imprecise.

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