The Study of Meaning
An Introduction to Semantics and Pragmatics

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Chapter 5

Mass and count nouns

We have so far only considered *count nouns*, which have certain grammatical properties (which we will review below), such as having singular and plural forms. English, and many other languages, also have nouns that are called *mass nouns*, which are characterized by different grammatical properties. What is interesting about the mass-count distinction among nouns is the fact that this grammatical distinction seems to correlate with their semantic properties—which is in fact reflected in the terminology itself. However, it turns out that it is not at all trivial to state what the semantic correlate of the mass-count distinction is in a general way, as we will discuss below.

5.1 The grammatical mass-count distinction

Let us first define what mass and count nouns are in terms of their grammatical properties. We list five diagnostics for English here.

1. Mass nouns, but not count nouns, can appear completely bare as arguments to verbs and other predicational expressions, as illustrated in (5.1). (Recall that '*' in front of an expression means the expression is ungrammatical.)

   (5.1)   a.   *I gave him $\left\{ \begin{array}{l} \text{book} \\ \text{table} \\ \text{turtle} \end{array} \right\}$.   (Count)

   b.   I gave him $\left\{ \begin{array}{l} \text{rubber} \\ \text{cardboard} \\ \text{air} \end{array} \right\}$.   (Mass)

   These examples have relevant nouns in object position, but the same difference is generally observed in other argument positions as well. As this fact should be obvious to the typical reader of this book, we will omit examples here.
   Note that the above examples with count nouns become acceptable when these nouns bear plural morphology, as in (5.2), but this test is to be applied to completely bare forms that do not even have plural morphology.

(5.2) I gave him $\left\{\begin{array}{l}\text{books}\\\text{tables}\\\text{turtles}\end{array}\right\}$.

2. Among English *determiners*—which are (typically small) words that appear in front of a noun phrase—we can find ones that are only compatible with (singular) count nouns. These include, 'a(n)', 'every', and 'each', as shown in (5.3).

(5.3) a. $\left\{\begin{array}{l}\text{a}\\\text{every}\\\text{each}\end{array}\right\}\left\{\begin{array}{l}\text{book}\\\text{table}\\\text{turtle}\end{array}\right\}$ (Count)

    b. *$\left\{\begin{array}{l}\text{a}\\\text{every}\\\text{each}\end{array}\right\}\left\{\begin{array}{l}\text{rubber}\\\text{cardboard}\\\text{trash}\end{array}\right\}$ (Mass)

Most other determiners, including 'all', 'the', 'no', and 'any', are simply insensitive to the mass-count distinction, and can combine with both types of nouns.

Mass nouns require expressions 'piece'—which are sometimes called *classifiers* (see the next chapter for more discussion)—in order to combine with determiners like 'a', 'every', and 'each', as in 'a piece of rubber' and 'every piece of cardboard'. Note that not all mass nouns sound fine with 'piece', as in '*a piece of gasoline', although 'gasoline' is fine with another classifier such as 'a can of gasoline'.

3. The third diagnostic for the mass-count distinction is similar in nature to the one we have just seen: Numerical expressions like 'one' and 'two' can directly modify count nouns (singular for 'one' and plural for all others), but not mass nouns, as illustrated in (5.4).

(5.4) a. one $\left\{\begin{array}{l}\text{book}\\\text{table}\\\text{turtle}\end{array}\right\}$ (Count)

    b. *one $\left\{\begin{array}{l}\text{a}\\\text{every}\\\text{each}\end{array}\right\}$

Figure 5.1: Results of Experiment 3 of Barner & Snedeker 2005 (taken from p 54). Bars indicate mean proportions of answers corresponding to number-based interpretations.

very important feature of the design is that the experimenter will know be able to know which interpretation the participant had in mind by simply looking at the answer choice. It should be stressed that which interpretation a person has is otherwise not directly observable. Primary empirical data in the study of meaning is such semantic and/or pragmatic intuitions that native speakers have that cannot be directly observable to linguists, and they need to be somehow 'externalized' so that they can be observed, recorded, and analyzed. This experimental task is a good example of how this is done.

Barner & Snedeker's experiment was run on two types of participants: 16 adults, who were all undergraduate students at Harvard University, and 12 children, who were aged between 4;0 and 4;5 (these mean, 4 years and 0 months and 4 years and 5 months, respectively). Each critical trial used one of four hybrid nouns: 'stone', 'string', 'paper', and 'chocolate'. Across all trials, each participant saw only mass uses of these nouns or only count uses of these nouns. Thus, this experiment had four experimental conditions, crossing two factors, Mass vs. Count and Adult vs Child, and different conditions had different participants.

Figure 5.1 summarizes the average proportion of choices of the person who had three tiny objects (as opposed to the person who had one large object), which corresponds to the number-based interpretation (as opposed to the volume-based interpretation), in each of the four experimental conditions. Looking first at the results of the adult participants, which are the two bars on the left, the interpretive effect of mass-count is very clear: If the hybrid nouns are used as count nouns, the adult participants almost always chose the person with three small objects, while when they were used as mass nouns, they almost always chose the person with one large object. This is entirely in line with the prediction of the Contextual Individuation Hypothesis, as stated above.

Furthermore, the data from the child participants is largely in line with the

adult results, although a little bit messier, which is not very surprising given that they tend to be sloppier than adults (especially towards the end of the experiment when they start to feel tired and tend to lose attention). This shows that at least at four years of age, children are already adult-like with respect to the interpretive effect of mass-count shift for hybrid nouns. If the Contextual Individuation Hypothesis is true, what children need to learn is a relatively simple pragmatic rule about when to use mass nouns and count nouns, so this experimental result is not at all surprising.

5.3.3 Problems

We have just seen some attractive features of the Contextual Individuation Hypothesis. In particular, it seems to fare better than the Mapping Hypothesis in some respects. However, unfortunately, this hypothesis, too, is not without problems. We will discuss two issues below.

Firstly, it is expected under the Contextual Individuation Hypothesis that the mass-count properties of nouns should be more or less stable across languages. This is because according to the hypothesis, it is contextual salience (or relevance) that determines whether a given noun should be used as a count noun or mass noun, and it is reasonable to expect that conversational salience (or relevance) should not vary so much across different speech communities, especially among those speech communities that belong to the same cultural sphere, for example, modern Western society. However, this prediction is not borne out. For instance, 'information' is always used as a mass noun in English, and according to the Contextual Individuation Hypothesis, that's because people are not so interested in individuating information. However, 'information', in French is very often used as a count noun (We put aside how to define the grammatical mass-count distinction with linguistic tests in French here, but there are such tests). Does this mean that French speakers, unlike English speakers, are more often interested in individuating information than English speakers? That seems to be unlikely. To be concrete, there are bilingual English-French speakers, and such speakers always use 'information' in English as a mass noun, but have no problem using 'information' in French as a count noun, despite the fact that their conversational interests are unlikely to change considerably according to the language they chose to speak. Similarly, 'furniture' in English is a mass noun, but the corresponding word 'meuble' in French is a count noun. Does this mean that English speakers are less interested in counting pieces of furniture than French speakers are? Suppose that there are English speakers and French speakers, as well as bilingual French-English speakers, in the same IKEA store. It can be observed that everyone speaking English always uses 'furniture' as a mass noun and everyone speaking French always uses 'meuble' as a count noun. Strictly speaking, we should gather such data by running an experiment like this, but evidence suggests that what is described here is very likely to be what will happen in such an experiment. If so, this goes against the Contextual Individuation Hypothesis, as it shows that mass-count is not always a matter of context.

Secondly, even within English, we can find evidence that it is not always conversational interests that determine mass-count. As a matter of fact, English speakers do often use phrases like 'pieces of information' and 'pieces of furniture', which for all intents and purposes function as 'count noun phrases', so to speak. The problem here is that even in contexts where such expressions are used, 'information' and 'furniture' in English are never used as count nouns, contrary to what is expected under the Contextual Individuation Hypothesis. In other words, nouns like 'information' and 'furniture' are simply always mass nouns, regardless of the context of use. Such rigidly mass nouns abound in English, and examples include 'mail', 'luggage', 'change' (in the sense of coins), 'laughter', 'spaghetti', 'garlic', 'footwear', 'carpeting', 'wildlife', 'gear', 'software', 'equipment', 'advice', 'evidence', etc. Importantly, English does have nouns that can be used as count nouns that are very similar in meaning to these rigidly mass nouns, e.g., 'letter', 'suitcase', 'coin', 'laugh', 'noodle', 'onion', 'shoe', 'carpet', 'animal', 'tool', 'application', 'machine', 'suggestion', 'testimony', etc. This suggests that the fact that the nouns in the former list are rigidly mass nouns does not seem to be due to factors like what speakers are interested in or consider more relevant in conversations, but rather, is simply an idiosyncratic grammatical property of these particular nouns that essentially needs to be memorized.

It is interesting to notice that some of these rigidly mass nouns describe objects that are intuitively countable, e.g. 'furniture' and 'footwear'. Such mass nouns are sometimes called *object mass nouns* (or *fake mass nouns*) in the literature. Barner & Snedeker 2005 report on an interesting experiment that compares object mass nouns with canonical mass nouns (which are called *substance mass nouns* in Barner & Snedeker 2005) as well as with count nouns. The task of the experiment is the same as their other experiment that used hybrid nouns that we reviewed above. That is, the participant hears a sentence of the form *Who has more N(s)* and is asked to pick one of two people, one of whom has one larger instance of objects or stuff describable by the noun, while the other one has three small instances. As in the experiment with hybrid nouns, the answer choice indicates whether the participant understood the question to be about the number of objects or the volume of objects. In this version of the experiment, they compared the following three types of nouns.

(5.24) a. Who has more furniture/clothing/jewelry/silverware/mail?
                                                    (Object mass noun)
          b. Who has more shoes/candles/cups/plates?   (Count noun)
          c. Who has more toothpaste/ketchup/butter/mustard
                                                    (Substance mass noun)

The results obtained from 16 undergraduate students at Harvard University and 16 children aged 4;1–4;6 are summarized in Fig. 5.2 As is clear from these results, the object mass nouns were interpreted in the same way as the count nouns by both adults and children. That is, participants overwhelmingly preferred number-based interpretations to volume-based interpretations. By con-
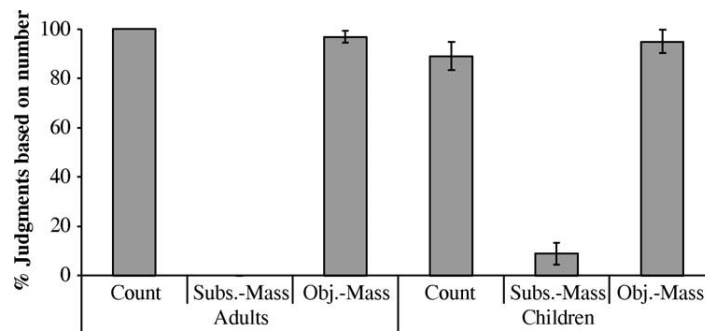
Figure 5.2: Results of Experiment 1 of Barner & Snedeker 2005, taken from p. 51. Bars indicate mean proportions of answer choices based on number-based interpretations.

trast, substance mass nouns showed the opposite tendency. Clearly, these results contradict the Contextual Individuation Hypothesis, according to which object mass nouns and substance mass nouns should behave similarly.

5.4 Summary and further directions

In this chapter, we discussed two hypotheses regarding the interpretive correlate of the grammatical distinction between mass and count nouns, namely, the Mapping Hypothesis and the Contextual Individuation Hypothesis. We went over several empirical issues that each of them faces. A particularly problematic observation for these hypotheses is the existence of object mass nouns such as 'furniture' and 'kitchenware', which are rigidly mass nouns that describe clearly countable and discrete objects. They clearly show that nouns describing countable and discrete objects are not always count nouns.

Importantly, this means that the acquisition of the mass-count distinction cannot be as simple as it would be under these hypotheses. In particular, there does not seem to be a reliable generalization about which nouns are object mass nouns, and it basically needs to be memorized on a case-by-case basis which nouns describing countable objects can be used as count nouns and which such nouns cannot be.

At this point one might wonder if the converse generalization holds. As we have just discussed, not all nouns describing countable objects can be used as count nouns, but do count nouns always require some contextually salient way of counting? There are some scholars who have countenanced a hypothesis similar to this, including Barner & Snedeker 2005, but there are some nouns that seem to pose issues for this hypothesis. For instance, 'cloud(s)' is often used to describe uncountable instances, despite the fact that it is a count noun. To sharpen this intuition, consider the following hypothetical trial of the comparative task that Barner & Snedeker 2005 used in their experiments. You are presented with two pictures of the sky. One of them has one large cloud covering 80% of the picture. The other picture contains three small clouds, which to-

gether cover about 20% of the sky. Now you are asked, Which picture has more clouds? It seems to be not unreasonable to choose the first picture, meaning that this plural count noun, 'clouds', does not behave like the canonical plural count nouns that Barner & Snedeker 2005 tested in their experiments.

Similarly, it is interesting to compare 'potato' and 'apple' in this respect. While 'potato' certainly has a mass use, it also has a plural count form, 'potatoes', and this plural count form can be used to talk about any type of potato, from whole potatoes to sliced potatoes, and even mashed potatoes, including very smooth mashed potatoes that are clearly uncountable. On the other hand, the plural count noun 'apples' can never be used to count apple slices or apple purée. Rather, it is pretty much always used for whole apples, and all other forms of apple are described by the mass version of the noun 'apple'. As far as we can see, this difference between 'potato(es)' and 'apple(s)' does not follow from anything.

Given these observations, it seems reasonable to conclude that it is impossible to state the interpretive effects of mass-count in a very general way in the form of 'All count nouns mean X and all mass nouns mean Y'. Rather, it seems that there are at least multiple groups of nouns for which the interpretive effect of mass/count needs to be understood separately. For instance, we seem to observe a relatively clear interpretive effect for hybrid nouns, but that does not generalize to object mass nouns, which are simply always mass nouns. Furthermore, as we have just discussed, both 'potato' and 'apple' are hybrid nouns, but their count forms seem to not function in the same way, which further muddies the waters.

All in all, the empirical facts about the interpretation of mass-count are very complex and rich, and accordingly an empirically adequate theory of it needs to have an appropriate degree of complexity. It is fair to say that such an empirically adequate theory of mass-count is yet to be established. It should also be noted that the empirical complexity of the phenomenon implies that the acquisition of the mass-count distinction in English must be quite complicated as well with a lot of lexical idiosyncrasies that simply need to be memorized. How children actually manage to successfully acquire the mass-count distinction is very much a topic of ongoing research. For those of you who find these research questions interesting, there are some further reading material mentioned in the Further reading section below.

5.5 Further reading

Mass-count is a very interdisciplinary topic, and has been of great interest not only for linguists but also for philosophers and psychologists. Consequently, the literature is both copious and diverse. The following two overview articles offer accessible summaries of linguistic theories of mass-count, and contain useful references.

- Gennaro Chierchia. 2007. Language, thought and reality after Chomsky. In Jean Bricmont & Julie Franck (eds.), *Chomsky notebook*, 142–169. New York:

Columbia University Press

- Peter Lasersohn. 2011. Mass nouns and plurals. In Claudia Maienborn, Klaus von Heusinger & Paul Portner (eds.), *Semantics: An International Handbook of Meaning*, vol. 2, 1131–1153. de Gruyter

A recent book by Rothstein (2017) gives a more detailed review of the literature, as well as the author's original taken on the issue. This book, however, requires some familiarity with compositional semantics.

- Susan Rothstein. 2017. *Semantics for counting and measuring*. Cambridge: Cambridge University Press. https://doi.org/10.1017/9780511734830

[more to be written]

Exercises

Q1. As discussed above, there are pairs of mass and count nouns in English that describe the same or similar things but nonetheless differ in the mass-count status. Here are some examples.

mass		count
footwear	vs.	*shoes*
garlic	vs.	*onions*
corn	vs.	*beans*
software	vs.	*app(lication)s*
advice	vs.	*suggestions*
knowledge	vs.	*beliefs*

Come up with two such pairs that are not mentioned here or in the main text, and show their grammatical mass/count status by applying the four grammatical tests discussed in Section 5.1.

Q2. We say that a noun N refers divisively if the following is true. Whenever something is describable by N, its parts are also describable by N.
Imagine hypothetically that English had a noun, say 'wug', that refers divisively. This means that whenever something x can be described as wug (or a wug, if it's a count noun), any two parts y and z of x can be described also as wug (or as wugs).

   A. Does the noun *man* refer divisively?

   B. Does the noun *water* refer divisively?

   C. Argue against the following two ideas by raising counter-examples.
   - All count nouns refer divisively, and all mass nouns don't refer divisively.
   - All mass nouns refer divisively, and all count nouns don't refer divisively.

   D. Can you come up with any noun that refers divisively? Is it a mass or count noun?

   E. Can you find both mass and count nouns that refer divisively?

Q3. Noun phrases like 'bottle of wine' are said to be ambiguous between the *container reading* and the *measure reading*. In the container reading, 'bottle of wine' describes bottles that contain wine, while in the measure reading, it describes amounts of wine that can fill a bottle, without necessarily implying the existence of a concrete bottle. In terms of sets, we can express these two readings as follows:

(5.25) a. **Container reading**:
$[\![\text{bottle of wine}]\!]^M = \{\, x \mid x \text{ is a bottle that contains wine} \,\}$

  b. **Measure reading**:
$[\![\text{bottle of wine}]\!]^M = \{\, x \mid x \text{ is an amount of wine that can fill a bottle} \,\}$

Thus, 'bottle of wine' describes bottles under the container reading, and it describes wine under the measure reading.

We can see that the measure reading exists based on the following examples.

(5.26) a. Bob drank a bottle of wine.
  b. Chris spilled a bottle of wine on the floor.

The most natural reading of (5.26a) is that Bob drank wine, rather than Bob drank a bottle. Similarly, (5.26b) is most naturally read as saying that Chris spilled wine, rather than that he spilled a bottle, which doesn't make much sense.

A. Construct one sentence where the container reading (5.26a) is more natural than the measure reading (5.26b). Describe the two readings in words and explain why the container reading is more natural than the measure reading.

B. The sentence in (5.27) is ambiguous between the container and measure readings.

(5.27) David bought a bottle of wine.

Does the measure reading of (5.27) entail its container reading? If not, give a concrete example scenario where the measure reading is true but the container reading is false.

C. Does the container reading of (5.27) entail its measure reading? If not, give a concrete example scenario where the container reading is true but the measure reading is false.

Q4. If you speak a language other than English, try to find a pair of synonymous nouns that differ in mass-count, like 'furniture', a mass noun in English vs. 'meuble', a count noun in French. Motivate your answer with examples illustrating their mass/count status with grammatical tests. As mentioned in Section 5.1, you need to find grammatical phenomena in your language that distinguish mass and count nouns, and use them as tests, but for some languages, you might not be able to find reliable tests.

Bibliography

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