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**Introduction**

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**1. The syntactic mass-count distinction**

The mass-count distinction is a syntactic distinction that is generally taken to go along with a semantic distinction. As such, it appears to reflect a conceptual, cognitive, or ontological distinction and relates to philosophical and cognitive notions of unity, identity and counting. The mass-count distinction is certainly one of the most interesting topics in syntax and semantics that bears on ontology and cognitive science. In many ways the topic remains under-researched, though. This volume aims to contribute to some of the gaps in the research on the topic, in particular the relation between the syntactic mass-count distinction and semantic/cognitive distinctions, the mass-count distinction and the distribution and role of numeral classifiers, abstract mass nouns, object mass nouns (*furniture, police force*), and the application of semantic mass-count distinctions to categories lacking a syntactic mass-count distinction (such as verbs and clauses).

There are a range of criteria that define the syntactic mass-count distinction. Foremost is the inability of mass nouns to participate in a singular-plural distinction. Mass nouns do not come with a plural (unless, of course they have been turned into count nouns, with a corresponding change in meaning):

(1) a. cherry, cherries

b. rice, \* rices

A second criterion is the inability of mass nouns to allow for numeral and other count quantifiers:

(2) a. ten cherries / exactly ten cherries / a few cherries / many cherries

b. \* ten rice / exactly ten rice / a few rice / many rice

Mass nouns may instead take nonnumerical quantifiers:

(3) much / little wood

Unlike count nouns, mass nouns disallow both singular quantifiers:

(4) a. every / each / a cherry

b. \* every / each / a rice

Generally mass quantifiers are taken to have a different semantics from count quantifiers, though there is also the view that count and mass quantifiers like *many* and *much* are simply allomorphs, not differing in meaning (Bale / Gillon, this volume).

A further criterion distinguishing mass nouns and count nouns is that mass nouns do not allow for ranking, unlike count nouns:

(5) a. the first / second tree

b. \* the first / second wood

Moreover, mass NPs do not permit *one*-anaphora, unlike singular count NPs:

(6) a. John ate a cherry, and Bill ate one too/ \*some too

b. John ate rice, and Bill ate \*one too/ some too

There are also lesser known lexical semantic criteria that distinguish mass and count nouns. One of them is that predicates of size or shape are inapplicable to mass nouns when targeting the entire quantity, and that in adnominal and predicative position:

(7) a. \* the round wood

b. the round piece of wood

c. \* the large water

d. the large amount of water

(8) a. \* The wood (ok The piece of wood) was round.

b. \* The water (ok The amount of water) was large.

Predicates of size and shape are applicable to certain types of mass nouns, namely object mass nouns such as *furniture* and *luggage*, nouns whose denotations to consist in pluralities of individuals (atoms). However, predicates of size and shape have only a distributive reading with object mass nouns, applying to the individuals that make up the denotation of those mass nouns. Thus (9) is acceptable as long *round* and *large* apply to individual pieces of furniture:

(9) a. round furniture

b. large luggage

(9a, b) fail to have a ‘collective’ reading with round and large applying to the maximal quantity of furniture or luggage.

Furthermore, verbs that correspond to the quantifiers or modifiers inapplicable to mass nouns are equally inapplicable to mass nouns. First, matching the applicability of numerals, the verb *count* is hardly acceptable with mass NPs, as opposed to plural count NP (Moltmann 1997):

(10) a. ??? John counted the wood.

b. John counted the pieces of wood.

The same holds for related expressions *numerous* and *outnumber*:

(11) a. ??? The luggage is numerous.

b. The pieces of luggage are numerous.

(12) a. ??? John’s luggage outnumbers Mary’s.

b. John’s pieces of luggage outnumber Mary’s.

Second, matching the applicability of ranking modifiers, the verb *rank* does not apply to mass NPs, but only to plural NPs. This also holds for the somewhat related verbs *list* and *enumerate*:

(13) a. ??? John ranked the art.

b. John ranked the pieces of art.

(14) a. ??? John listed the clothing.

b. John listed the pieces of clothing.

(15) a. ??? Mary enumerated the weakness of the paper.

b. Mary enumerated the points of weakness of the paper.

Lexical generalizations of this sort go against a view on which the mass-count distinction for object mass nouns is a merely syntactic distinction and object mass nouns can have the very same semantics as corresponding plural mass nouns.

Mass nouns have the general ability to undergo syntactic shifts to count nouns, with corresponding shifts in meaning. Typical count uses of mass nouns are those on standard packaging (16a) and on taxonomic readings (16b):

(16) a. John ordered three waters (= servings)

b. This region produces two wines (= types)

Conversely, certain count nouns can be converted into mass nouns, with a shift in meaning sometimes called ‘the universal grinder’ (Link 1983):

(17) John put some apple in the salad.

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There is certainly a connection between the individual and a quantity it is made of. This connection is a topic of controversy (with some philosophers maintaining identity, others difference between the two). Certainly, for the semantics of the count-mass shift a function is needed mapping an individual to the material that constitutes it (Link 1983).

The notion of a singular count noun is closely related to the notion of a sortal, which plays a central role, but the two notions do not coincide (Grandy 2007, Pelletier 1979). *Thing, object, quantity*, for example are singular count nouns, but not sortals.

**2. Approaches to the semantic mass-count distinction**

Two sorts of approaches to the content of the mass-count distinction can be distinguished: the extensional mereological approach and the integrity-based approach.

The first approach distinguishes singular count, plural and mass nouns in terms of properties of their extensions, which are generally formulated in terms of extensional mereology (Link, 1983, Krifka 1989, Ojeda, 1993, Champollion / Krifka 2017, Champollion 2017). Mass nouns, it is generally agreed, have extensions that are cumulative, that is, the fusion of two elements in the extension of a mass noun N is again in the extension of N (Quine, 1960). Cumulativity, though obtains also for the extension of plural nouns. Divisiveness has been proposed a as a distinguishing property of mass noun extensions, that is for any element x in the extension of a mass noun N a proper part of x is again in the extension of N (Chang 1973). Cumulativity and divisiveness together define homogeneity. Divisiveness , however, is problematic in that it raises the minimal parts problem for all mass nouns (Butn 1985). It is particularly implausible for object mass nouns, such as *furniture, police force, luggage*, *personnel*. Object mass nouns form a rather large class in English, and they challenge extensional mereological characterizations of mass nouns. Singular count nouns are generally atomic, that is no element x in the extension of an atomic noun N has a proper part that is again in the extension of N. Mass nouns are generally not atomic, with the exception of object mass nouns, which are.

The peculiarity of object mass nouns also manifests itself in comparisons: *more wine* involves measurement of quantities, whereas *more furniture* is generally evaluated in terms of more pieces, rather than, say volume (Barner and Snedeker 2005). The latter, though does not hold when the functionality of the individuals plays no role (more fruit can be evaluated by volume as well as pieces) (Cohen, this volume). More measurements of other mass-nouns, two sorts of measure functions need to be distinguished extensive (additive) measure functions for dimensions such as weight and volume and intensive (non-additive) measure functions for dimensions such as heat (Lønning, 1987, Krifka, 1998, Tovena 2001),

Atomicity is also problematic for count nouns. Nouns such as *string, stone, entity, sum*, *collection* are not atomic, permitting proper parts of elements in their extension to be in their extension again (Rothstein 1990, Moltmann 1997). Let me call this the ‘divisiveness problem’ for count nouns.

The extensional mereological account also faces limitations in that particular quantities or pluralities may display a semantically relevant division into substructures, often based on linguistically provided information. Thus, (17a) has a distributive reading with different subgroups of students gathering, and (17b) one on which John compares the jewelry in one box to the jewelry in another box for the different boxes (Moltmann 1997):

(18) a. The students gathered.

b. John compared the jewelry in the boxes.

Such readings require augmenting the semantics of plurals and mass nouns with contextually given partitions (Gillon 1987, Moltmann 1997).

The second approach to the semantic mass-count distinction distinguishes mass nouns and count nouns in terms of properties of entities in their extensions, such as having a boundary or integrity of some form, a notion that goes back to Aristotelian notion of form (Simons 1987). A version of the approach can be found already in Jespersen’s (1924) characterization of mass nouns: ‘There are a great many words which do not call up the idea of some definite thing with a certain shape or precise limits. I call these ‘mass-words’; they may be either material, in which case they denote some substance in itself independent of form, such as silver, quicksilver, water, butter, gas, air, etc., or else immaterial, such as leisure, music, traffic, success, tact, commonsense’ (Jespersen, 1924, p. 198).

A situation-based version of the approach is developed in Moltmann (1997, 1998), where count nouns are taken to characterize entities as integrated wholes of one sort of another in situations of reference, whereas mass nouns specify entities as not being integrated whole in situations of reference. The second approach deals with the divisiveness problem in that that parts of a stone or of a string are generally not integrated whole in the relevant situation. Moreover, the approach permits subgroups or subquantities to have integrity in situations of reference, setting up another level of structure besides the one imposed by the noun itself.

The second approach may be considered unsatisfactory because of the vagueness of the notion of integrity and difficulties of applying it to count nouns such as amount, patch, or *collection.*

There is something unsatisfactory about both approaches to the mass count distinction and that is that both take quantities and pluralities to be entities, entities making up the extension of mass nouns and plural nouns respectively. If they are entities, however, they should be countable, which they are not. Thus (19a) and (19b) cannot have readings where the verb *count* targets contextually individuated subquantities or subgroups):

(19) a. John counted the jewelry in the boxes

b. John counted the students

For plurals, the recent approach of plural reference avoids the problem by taking pluralities to be pluralities as many (plural reference) rather than pluralities as one (see Moltmann 2017 and references therein).

**3. Numeral classifiers**

Numeral classifiers are a category of expressions that have an individuating function, making it seems, counting and quantifying possible (Cheng and Sybesma 1999, Borer 2005). They play an important role in classifier languages such as Chinese, which lack a syntactic mass-count distinction. Classifier languages include most East and Southeast Asian languages, some Australian aboriginal languages and some native American languages. In general, in classifier languages numerals are obligatorily followed by a classifier that indicates the semantic class of the host noun (Allan 1977, Downing, 1996, Senft, 2000a, Aikhenvald, 2003). Classifiers often convey properties of shape, as in the Mandarin Chinese examples below:

(20) a. yi zhang zhi/lian/chuang

one CL-flat paper/face/bed

b. yi tiao shengzi/she

one CL-long-thin rope/snake

A common view is that all nouns in classiﬁer languages are mass or better number-neutral, which means that entities in the extension of nouns (in those languages) can be counted only in virtue of the presence of a unit-specifying classifier.

Generally two sorts of classifiers are distinguished: sortal classifiers and mensural classifiers. A ‘sortal classiﬁer’ is a classiﬁer which speciﬁes units in terms of types of entities (sorts), whereas a ‘mensural classiﬁer’ is a classiﬁer which speciﬁes units in terms of quantities (Lyons 1977). Sortal classiﬁers actualise individuation condition already belonging to the concept to which they apply, making them linguistically visible (Bisang 1999). Mensural classifiers create units by applying external scales. In English, measure phrases such as *one slice* in *one slice of bread* and *three cups* in *three cups of milk*, have the function of mensural classifiers (Lehrer, 1986).

Classifiers come in a range of categorisation devices, which differ among other things in their grammatical status, degree of grammaticalisation, meaning, and conditions for use (Aikhenvald 2003). In some languages, classiﬁers are morphemes or words that select nouns or verbs in syntactic constructions for counting or quantifying entities. Classifiers can also be noun categorisation devices that are syntactically associated with verbs, but categorise nominal subjects or objects.

Classifiers in classifier languages require more complex syntactic structures of noun phrases. One recent proposal is that of Zhang (2013), where besides the functional projections NumP that represents number and QuantP that hosts quantiﬁers, the structure below DP contains a unit phrase ‘UnitP’ that ensures the applicability of a numeral, and a delimitative phrase ‘DelP’ that conveys delimiting information related to size and shape. For the syntax of classifier phrases, Borer (2005) goes beyond classifier languages and takes nouns to always be number-neutral even in languages like English. She posit a functional head ind for numerals classifier phrases which is present both in Chinese classifier constructions and in English measure phrases. Ind moreover serves to host singular and plural morphology in languages with a mass-count distinction such as English, where nouns are now considered number-neutral. Borer’s view has been challenged, though, by languages that allow classifiers to go together with count syntax. The syntactic structure of classifier systems and the generalizations they are based on continues to be a widely debated topic in syntax. Particular challenging to the general debate is the variation of classifier languages that there are and that maye behave rather differently from Chinese.

**4. Contributions in this volume**

The mass-count distinction and the related topic of classifier languages raise a range of questions that the contributions will contribute to.

One general question is, what grounds the mass-count distinction, what cognitive or ontological distinction does go along with. Srinivasan and Barer in their contribution to the volume approach the question from an empirical cognitive perspective, dealing with the phenomenon of object mass nouns as well as minimal pairs of a count and a mass noun that appear to stand for the very same entities (English) *hair* (mass), Italian *capelli* (count)), quantitative comparisons (which for count nouns are number based, but for mass nouns may be measurement or number-based), and the acquisition of counting. They argue that countability conveyed by count nouns does not just depend on syntactic and lexical representation, but that additional conceptual and pragmatic factors come into play. Treves and Rothstein’s contribution falls within the same topic. Making use of a neural network and crosslinguistic findings, they argue against the common view of a binary distinction between semantic mass and count markers to correlate with the syntactic mass-count distinction; instead they favor a graded distribution of correlations. They also argue that crosslinguistically there are different ways for a noun to be situated on a graded scale between pure count and pure mass. Finally, they argue against a strict correlation between mass count syntax and (standard) semantic distinctions, and in favor of viewing the syntactic mass-count distinction as encoding a perspectival contrast between entities presented grammatically as countable and entities presented a contextually non-countable.

Another auestion that the mass-count distinction raises is the question of the classification of categories of number itself. Most of the literature is focused on the distinction between mass, singular count, and plural. Ojeda in his contributions elaborates with a range of crosslinguistic illustrations the richness of categories of number and gives a general account of their content using extensional mereology. The categories Ojeda discusses include the dual, co-dual, paucal, and multal, and the universal number, a category of nouns that apply to both individuals and pluralities. The latter, surprisingly, is found in English as well, as Ojeda points out, namely in roots of nouns (which are used in compounds such a *one-car garage, two-bedroom apartment, three-pound package*).

The mass-count distinction with its opposition to classifier systems such as that of Chinese is not at all as clear-cut at all from a crosslinguistic perspective, which is what Bale and Gillon’s contributions is about. Bale and Gillon show that Western Armenian lacks a mass-count distinction, yet has plural marking with a completely optional use of classifiers. Morever, they gives examples of languages (Ch’ol and Mi’gmaq) where classifiers are required by the use of certain numerals, but not nouns themselves. They suggest that the syntactic mass-count distinction may not go along with a semantic distinction at all, but rather is on a par with gender-marking.

The mass-count distinction has primarily been studied with respect to nouns for concrete objects, but not abstract nouns, such as *hope* and *joy*. Zamparelli’s contribution focuses on abstract mass noun and the productive countability shifts they may undergo. Hinterwimmer’s contribution is a study of abstract mass nouns and their distinctive semantic behavior with respect to both mass and count quantifiers.

Mass nouns in English include one notoriously tricky subcategory, that of object mass nous or aggregate mass nouns, mass nouns whose denotations appear to consist in pluralities of well-distinguished individuals, such as *furniture, police force, footwear*. Cohen’s contribution, which is on object mass nouns, points out that object mass nouns are obtained by various active morphological processes in English, French, and Hebrew and that this has consequences for how the semantics of such nouns is to be viewed. She suggests a perspectival semantics of object mass nouns, on which common functionality is emphasized and individual members are backgrounded.

Object mass nouns are also the focus of the contribution of Rothstein and Pires de Oliveira. Rothstein and Pires de Oliveira point out a fundamental difference in the way object mass nouns in comparatives behave in English and Portuguese Brazilian. Whereas in English object mass nouns in comparatives are compared strictly numerically (*John has more furniture than Bill*), in Brazilian Portuguese such comparison may involve counting as well as measurement. Rothstein and de Oliveira give a semantic explanation for this difference.

It is common to classify the domain of events into mass and count. In particular VPs are generally classified as atelic (unbounded) and thus as mass or as telic (bounded) and thus as count. Moltmann’s contribution challenges this and similar classifications. She argues that verbs with respect to their Davidsonian argument place always classify as number-neutral, and so more generally for any syntactic categories lacking a syntactic mass-count distinction. This is reflected particularly well in the fact that verbs generally require event classifiers for count quantifiers to apply (*time(s)).* Verbs thus pose similar difficulties as object mass nouns for the standard object-based and extension-based approaches to the semantic mass-count distinction and motivate an alternative approach based on primitive notion of unity.

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