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On the Semantics and the Ontology of the Mass-Count Distinction

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ABSTRACT

The mass-count distinction is a morpho-syntactic distinction among nouns in English and many other languages. *Tree, chair, person, group,* and *portion* are count nouns, which come with the plural and accept numerals such as *one* and *first*; *water, rice, furniture, silverware,* and *law enforcement* are mass nouns, which lack the plural and do not accept numerals. The morpho-syntactic distinction is generally taken to have semantic content or reflect a semantic mass-count distinction. At the center of the *semantic mass-count distinction* is, in some way or another, a notion of being one or being a single entity, the basis of countability. There is little unanimity, however, of how the notion of being a single entity is to be understood and thus what the semantic mass-count distinction consists in. The question of the content of the mass-count distinction and thus the notion of a single object relates to broader philosophical issues, such as the question whether predicates apply to things as such or things under a part-structure related perspective, the question whether language involves an ontology at an intermediary level distinct from that of reality or even nonlinguistic cognition, and the question whether the semantics of mass nouns requires different logical tools than the ones used in standard semantic analyses (as has been argued for plurals by proponents of plural logics). In what follows, I will give a general presentation of the phenomenon of the mass-count distinction as well as an outline of current approaches to the mass-count distinction that ought to be of particular interest to philosophers. The focus will be on very general features and motivations of semantic theories of the mass-count distinction which lend themselves to more philosophical discussions, rather than the details of the various formal developments. I will mainly discuss extension-based and integrity-based approaches, which have been most widely adopted, but which both face significant challenges. I will briefly mention a third approach, the reference-based approach, whose aim is to overcome those challenges, by taking mass reference to be more primitive than singular and plural reference and not to be reducible to the latter.

1 | Criteria for the Mass-Count Distinction

The following are standard diagnostics for the mass-count distinction in English and other languages that display a morphosyntactic mass-count distinction (Pelletier and Schubert 2012; Moltmann 1997; Doetjes 2012; Chierchia 1998, 2010; Rothstein 2017).¹ First of all, count nouns such as *tree, table, rice grain,* and *portion* come with the plural, but mass nouns such as

water, furniture, and *rice* don't. Verbs in turn show singular or plural agreement with a count noun phrase (count NP) as subject, but singular agreement only when the subject is a mass NP (*A house was built, Many houses were built, Water has evaporated, * Water have evaporated*).²

Mass and count nouns differ also with respect to the determiners, quantifiers, and anaphora they permit, as well as

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with respect to the predicates or readings of predicates with which they are compatible. Most importantly, count nouns permit numerals (*one, two,...*), but mass nouns don't (*two bags, *two luggage, one cup, *one silverware*). Count NPs, moreover, support count anaphora such as *one* and *another*, but not so mass NPs (*John took a cup, and Mary took another, *John took some silverware, and Mary took another*). Count nouns allow for ordinals *first, second, ...* (*the first house, the second chair*), but not mass nouns (?? *the first wood, ?? the second furniture*). Count nouns go with count quantifiers such as *many, few*, and *several*, mass nouns with mass quantifiers such as *much* and *little*. A lesser-known criterion is the use of so-called light nouns, in particular *number* and *amount* (Kayne 2005, 2010). Count nouns go with the light nouns *number* and *couple* (*a great number of tables, a couple of cups, *a great number of furniture, *a couple of silverware*); mass nouns go with *amount* and *deal* (*a large amount of furniture, a good deal of stuff, *a large amount of trees, *a good deal of objects*).

There are also predicates that distinguish between mass NPs and count NPs. First of all, cardinal numerals as well as *many* and *few* can be used as predicates, applying only to plural, not mass NPs (*The professors were ten in number / were few. ??? The law enforcement was ten in number / was few*). *Numerous* applies only to plural NPs and not mass NPs (Kuhn 2020); by contrast, predicates like *plenty* apply to both (*The chairs were numerous / plenty, The furniture was plenty / ??? numerous*). A criterion philosophers use more than linguists is the applicability of the predicates *is one of the N* and *are among the N* to count NPs, but not mass NPs; the latter instead allow only for *is some of the N* (McKay 2016) (*This cup is one of the cups Mary owns, The two children are among the children admitted to the school, This rice is some / *among / *one of the rice that was in the container*).

There are other predicates that distinguish between singular count, plural and mass NPs. Thus, verbs expressing cardinal- and ordinal-number-related actions *count, rank, list, and enumerate* generally apply only to plural NPs (*John counted/ranked / listed / enumerated the pieces of gold*), but not singular count or mass NPs (?? *John ranked / listed / enumerated the gold*) (Moltmann 1997, 2021). However, the inapplicability of those predicates to singular count and mass NPs is not strict: *Joe counted the class, Mary counted the clothing before packing and Mary ranked the furniture* are not strictly impossible (if clearly not as good as with plural NPs such as *the students, clothes, or the pieces of furniture*). Yet such examples become worse when, for example, *class* is replaced by *art collection* and *furniture* by *decor*. By not being strictly excluded with singular count and mass NPs, number-related predicates contrast with numerals, which are impossible with any singular count and mass nouns whatsoever (**ten class, *three clothing, *one furniture*).³ The selection of predicates like *count* and *rank* is driven by conceptual meaning, not by syntax or the content of count categories. This brings up an important, yet underexplored issue, namely that count categories are not the only way of specifying entities as single objects; lexical meaning, to an extent, may do that job as well, and that may, sometimes, lead to discrepancies.⁴ This is part of the grammatical-conceptual divide, which manifests itself in semantic mismatches between syntactic and lexical meaning in a range of different linguistic areas and whose consequences for formal semantics are yet to be

explored (Roy and Copley 2022). Predicates of size and shape (*large, big, round, long*) do not apply to the things described by plural nouns and mass nouns (*the large students* cannot mean “the large group of students”; *the long wood* cannot mean “the long piece of wood”), as opposed to the individuals described by singular count nouns (Moltmann 2004).

Not all languages display a morphosyntactic mass-count distinction. In particular, Chinese does not (at least on the more common view).⁵ Instead of making use of a singular count category, Chinese requires the presence of numeral classifiers for the application of numerals (numeral-classifier-N). Classifiers can also be found in languages that do have a morphosyntactic mass-count distinction. English *two loafs of bread* comes close to a classifier construction, with *loaf* acting as classifiers permitting the application of the numeral *two* to a mass noun. English also displays a classifier construction with adverbials such as *two times* (in *John fell two times*), where *times* acts like a numeral classifier permitting the application of numerals to verbs, which do not come with a morpho-syntactic mass-count distinction (Landman 2006; Moltmann 1997, chap. 5, to appear b). The topic of classifier languages is of considerable complexity and controversy. Recent research in fact indicates that the generalization based on Chinese and European mass-count languages is much too simplified and fails to apply to a great range of languages (Bale and Gillon 2020; Kulkarni, Rothstein, and Treves 2020).⁶ However, some general assumptions are safe to retain, such as that numeral classifiers *may* have the same sort of unity-conveying function as singular count nouns.⁷ Let me call both count nouns and classifiers (at least when acting that way) *count categories*.

The question arises whether English count NPs and Chinese NPs with classifiers are really that distinct. Borer (2005) has given an analysis of the morphosyntactic mass-count distinction on which count NPs in English are assimilated to classifier phrases in Chinese, proposing that count NPs are distinguished from mass NPs by the presence of an implicit classifier *ind*. On that analysis, whereas the mass NP *the water* has the structure [_{DP} *the* [_{NP} *water*]], the count NP *the man* has a structure that includes a classifier phrase (CIP) headed by *ind* [_{DP} *the* [_{CIP} *ind* [_{man}]]. The category *ind* hosts singular or plural morphology in English and numeral classifiers in languages such as Chinese. If plural and mass NPs differ syntactically in the presence of classifier phrases, this permits a purely syntactic account of the selection of numerals: numerals require the syntactic presence of a (silent or overt) classifier. Borer's account does not apply to number-related predicates such as *is among them* and *is numerous*.⁸ It permits a purely syntactic explanation of some of the phenomena associated with mass-count distinction, without making use of a notion of unity as an ontological notion associated with count categories. It thus highlights the possibility that particular mass-count diagnostics may not involve a semantic condition at all, but are just a reflection of the morphosyntactic distinction.

Rothstein's (2017) account of the selection of numerals falls under such an approach as well. Rothstein argues for a distinction in semantic type between count nouns and mass nouns: mass nouns denote sets; by contrast, count nouns denote sets relative to contexts, sets of contextually given entities,

which ensure atomicity for count nouns such as *sequence* (Section 2.2). Thus, a count noun *N* applies to an entity *d* only relative to a context *k* in which *d* counts as an atom with respect to *N* (a context being a restricted set of entities). Atomicity, as a semantic characteristic of count nouns (Section 2.2), will then hold only relative a context *k*. The semantic type distinction among mass nouns and count nouns again permits an account of the selection of numerals based on semantic type (and that means, ultimately, syntactic selection): count quantifiers and numerals only select nouns whose denotation is a relation between entities and contexts. Classifiers semantically map sets onto relations between entities and contexts, thus making count quantifiers applicable formally.

There is a difficulty for both Borer's and Rothstein's account of the morphosyntactic mass-count distinction, and that is that there are NPs that seem to be neutral between mass and count, for example the pronouns *what* in *What did John eat, the pie, soup or beans? What* would have to be assigned multiple syntactic structures or semantic types. Another difficulty is conjunctions of plural and mass NPs, as in *John took the wood and the stone*. Conjunction is standardly not considered possible for expressions of different categories or semantic types. Rothstein moreover faces a problem with modifiers of conjunctions of mass and plural NPs as in *the wood and the stones in the garden*, which would have to be of multiple semantic types. Rothstein finally is forced to assume that verbs are assigned multiple types for all their argument positions since verbs generally take both count and mass NPs (with the exception of those that are number-related predicates like *count*).

There is also a view according to which the mass-count distinction is merely a syntactic distinction without semantic content. Thus, given a range of observations about the way the mass-count distinction manifests itself across languages. Bale and Gillon (2020) take the view that the mass-count distinction merely plays a role for syntactic agreement, similar to gender in languages like German. I will set such a view aside. Let us instead turn to semantic approaches to the mass-count distinction, with their philosophical importance.

2 | Three Approaches to the Content of the Mass-Count Distinction

2.1 | The Basic Question

The mass-count distinction as a morphosyntactic distinction is generally taken to have semantic content, that is, to reflect a *semantic mass-count distinction*.⁹

At the center of the semantic mass-count distinction appears to be the property of being a single entity or of unity, which is the basis for counting. The notion of being a single entity or of being one (and thus being countable) is, intuitively, the distinctive feature of the content of count nouns as opposed to mass nouns. A characterization of the semantic mass-count distinction to that effect can already be found in Jespersen (1924), who first introduced the mass-count distinction.¹⁰ It is largely shared by

any approach to the semantic content of the mass-count distinction.

Quite independently of the topic of the mass-count distinction, the notion of unity has played a central role in the history of philosophy. It pertains to the question as to what distinguishes an entity from the collection of its parts, what constitutes the unity of matter and form, what constitutes the unity of a proposition and distinguishes it from a mere sequence of propositional constituents, and what constitutes the unity of conscious experiences.¹¹ The problem of unity regarding the relation of parts to the whole is one of the oldest problems in metaphysics and was at the center of discussion already in antiquity (Parmenides, Plato, Aristotle).¹² It continues to be an important topic in metaphysics about which there is little unanimity.

The basic question that the mass-count distinction raises for philosophers thus is:

How is the notion of a single entity to be understood that is conveyed by count nouns, but not mass nouns?

Linguists dealing with the mass-count distinction usually adopt a particular formal identification of the notion of a single object, namely as an atom with respect to a set, that is, a noun denotation (and perhaps a context). An entity *x* is *an atom with respect to a set X* iff there is no proper part of *x* that is in *X*. However, it is questionable whether the notion of an atom provides the notion of unity or being a single thing (Section 2.1). The alternative, more aligned with the Aristotelian, philosophical tradition, is to identify the property of being a single object with that of an integrated whole (perhaps relative to a situation). But there are also significant challenges to that view, as we will see. Another alternative that has been suggested is to draw a distinction between singular reference and (irreducible) mass reference, parallel to that between singular and plural reference (reference to several individuals at once).

One may argue that semanticists, as linguists, in fact should not make a theoretical decision regarding a notion that is a philosophers' task to clarify, that is, the notion of a single object. But the mass-count distinction itself seems to bear on the notion of a single object and may impose conditions on how that notion should be conceived. After all, the mass-count distinction figures centrally in the choice of philosophers' examples and seems intimately connected to our intuitions about what makes something a single thing. This also means that generalizations surrounding the mass-count distinction that linguists have established may add significantly to the range of intuitions to be taken into account in the philosophical discussion of the notion of unity.

In what follows, I focus on approaches that take singular count nouns, plural nouns and mass nouns to denote sets of entities, which is the view most commonly adopted in natural language semantics.¹³ Following common terminology, I will call the entities in the extension of singular count nouns *individuals*, the entities in the extension of mass nouns *quantities*, and the entities in the extension of plural nouns *pluralities*, leaving open, though,

whether those entities are of different ontological types.¹⁴ Even though useful, this terminology is actually misleading. Unlike what the singular count noun *quantity* suggests, there is a sense in which the elements in the extension of mass nouns (*water*) are neither “one” nor “many,” and unlike what the singular count noun *plurality* suggests, elements in the extension of plural nouns (*students*) are not single entities made up from individuals, that is, they are not pluralities as “one,” but rather pluralities as “many.” I will come to this issue at Section 5.

I will adopt the view on which plural nouns denote sets of sums of entities (Link 1983), as below, where \oplus is the sum formation operator mapping a nonempty set of one or more entities to its sum, and $[]$ is the function mapping an expression to its extension¹⁵:

- (1) For a count noun N , $[N_{\text{plur}}] = \{x \mid \exists X(X \neq \emptyset \ \& \ X \subseteq [N_{\text{sing}}] \ \& \ x = \oplus X)\}$.

That is, the denotation $[N_{\text{plur}}]$ of a noun N in the plural consists in the set of entities that are sums of nonempty subsets of the extension of N in the singular.

Two main approaches to the semantic mass-count distinction can be distinguished:

1. *the extension-based approach*

On this approach, the semantic mass-count distinction consists distinctive properties of the overall extensions of nouns (rather than properties of the entities in the extensions).

2. *the integrity-based approach*

On this approach, the semantic mass-count distinction consists in a distinction in the properties conveyed by count nouns and mass nouns: count nouns convey properties of unified wholes (properties of integrity); count nouns do not.

The extension-based approach is originally due to Quine (1960) and has become particularly influential in natural language semantics in the tradition of the application of extensional mereology to the semantics of plurals and mass nouns in Link (1983) (see Pelletier and Schubert 2012; Doetjes 2012; Champollion and Krifka 2017). The integrity-based approach has traditionally been taken by philosophers (starting with Aristotle), though also by linguists such as already Jespersen (1924) and then in particular cognitive semanticists such as Langacker (1987) and Jackendoff (1991). The entities in the extension of nouns on the second approach need not be considered “real” objects, but entities as we conceive of them, which accords with cognitive semantics as well as the earlier movement of gestalt theory. A particular version of the integrity-based approach is the theory of situated part structure of Moltmann (1997, 1998, 2005), on which part structures are relativized to situations, permitting situations to track the contributions of the integrity-based content of count nouns or syntactic constructions.

The extension-based approach goes along with the construal of the notion of a single object as an *atom* with respect to a noun extension. Atoms (relative to a noun extension) make up the

extension of singular count nouns, but not (or not generally or necessarily) the extension of mass nouns, or so the view.¹⁶

The integrity-based approach takes a single object to be an integrated whole (of some sort). That is, entities need to fulfill particular *unifying conditions of integrity* in order to count as one, such as having a form or a boundary or being maximally self-connected. On that approach, count nouns convey properties of integrated wholes, whereas mass nouns do not.

The situation-based version of the integrity-based approach restricts unifying conditions to situations. Its motivations come from the aim of covering a greater range of data than other approaches to the mass-count distinction. Most importantly, this concerns the sensitivity of predicates to situated part structures, part-structure-sensitive perspective shifters, and phenomena involving structured pluralities and quantities.

The mass-count distinction bears on the relation between language, cognition and reality. As such it raises a range of question. Does the mass-count distinction reflect a cognitive ontology distinct from reality (Langacker 1987)? Does it reflect a language-driven ontology distinct from the ontology reflected in cognition and in reality (Rothstein 2017; Moltmann 2021)? Does it reflect two levels of language-driven ontology, that of grammar (count categories) and that of conceptual meaning (the functional-conceptual divide)? Does the mass-count distinction even implicate a different conception of reality altogether, namely a view of linguistic idealism on which reality is shaped by language, unity being imposed on reality, rather than the other way around (Moltmann, to appear a). These questions await further re-examination in view of the wealth of linguistic findings surrounding the mass-count distinction.

In philosophy the mass-count distinction has traditionally been regarded an ontological distinction among different types of entities, between entities and stuff (Steen 2016). As a metaphysical distinction it also figures in philosophical discussions of the distinction between events and processes (Stout 2018). Most contemporary approaches to the mass-count distinction in linguistics, though, embrace discrepancies between the ontology reflected in grammar (the morphosyntactic mass-count distinction) and the ontology at the level of cognition or reality. In particular, the use of a count noun (but not a mass noun) conveys a notion of unity (and hence countability) which need not align with the individuation of entities at the level of reality or language-independent cognition. This gives rise to the view that unity is “made available” or “introduced,” rather than being determined by the way things are or are conceived or by particular properties of the overall extension of nouns. Singular count nouns and numeral classifiers thus are *unity-introducing* expressions.

In what follows, I will give a brief discussion of the two approaches focusing on their general features and challenging cases without going into greater formal detail regarding particular elaborations.¹⁷ Then I will briefly discuss a third approach, the reference-based approach, which aims to overcome particular challenges for the other two approaches.

2.2 | The Extension-Based Approach

On the extension-based approach to the mass-count distinction, the semantic distinction between singular count, plural and mass nouns consists in different properties of their overall extensions, formulated in terms of extensional mereology, by which I basically mean mereology using part-of relations, but not properties defining integrated wholes.¹⁸

In extensional mereology, in general, different part relations are distinguished for the domains of pluralities (including single individuals) (\leq_i), of quantities (\leq_m), and the domain of parts of individuals. The part relations themselves are usually taken to be transitive, reflective, antisymmetric, and closed under sum formation (i.e., least upper bound). The latter accounts for the fact that the sum of two pluralities is again a plurality and the sum of two quantities is again a quantity. Formally, this means that the domain of individuals and pluralities (E, \leq_i) and the domain of quantities (M, \leq_m) are complete joint-semilattices (Link 1983).

The distinction among different part relations is needed if part structures are solely based on a transitive relation among parts and entities sharing the same parts are identified (uniqueness of sums). Otherwise, a branch that is a part of a tree may count as part of the plurality of the trees, and the gold that constitutes a ring will be part of the collection of rings of which the ring is a part.

The distinction among different part relations raises conceptual and empirical issues (Moltmann 1998). Whether one part relation or another applies to two entities appears to depend on how the entities are described (with mass nouns or count nouns), making those relations language-dependent. Moreover, there are linguistic contexts which appear to require a single, neutral part relation (*part of what Mary ate, the apple/the beans/the rice*).¹⁹

A common version of the extension-based approach distinguishes count nouns and mass nouns in terms of cumulativity, atomicity, and divisiveness of their extensions, as below, where “<” is the proper-part relation and \oplus the operation of sum formation applying to a set:

- (2) *The semantic mass-count distinction on the extension-based approach*
 - a. For a singular noun N, [N] is atomic.
 - b. For a mass noun N, [N] is cumulative and [N] is divisive.
- (3) a. A set Y is *atomic* iff $\forall x(x \in Y \rightarrow \forall y(y < x \rightarrow \neg y \in Y))$
 b. A set Y is *cumulative* iff $\forall X(X \neq \emptyset \ \& \ X \subseteq Y \rightarrow \oplus X \in Y)$
 c. A set X is *divisive* iff $\forall x(x \in Y \rightarrow \forall y(y < x \rightarrow y \in Y))$ ²⁰

That is, a set is atomic just in case all its elements fail to have proper parts that are also in the set. A set is cumulative just in case all its nonempty subsets have sums that are also in the set. A set is divisive just in case the proper parts of each of its elements are also in the set. Divisiveness poses the notorious minimal-parts problem (H_2O molecules no longer count as water), and therefore is sometimes not adopted.²¹

There are two main issues for the extension-based approach. One of them is so-called “object mass nouns” such as *clothing, luggage, hardware, jewelry, faculty, furniture, population, personnel, law enforcement*. Object mass nouns form a significant class of mass nouns whose lexical content appears to describe well-individuated entities, but which behave as mass nouns in a number of respects (no plural, singular agreement with the verb, incompatibility with numerals, selection of mass determiners and the light noun *amount*, rather than *number*). Yet, unlike other mass nouns, object mass nouns permit predicates of size and shape (*the big/bulky furniture*) and are not impossible with predicates of counting (as we have seen).

There is a significant degree of arbitrariness in the choice of object mass nouns or count nouns across languages as well as within the same language, with mass nouns and count nouns often competing for the same items (*clothes—clothing, shoes—footwear, leaves, foliage, police—police force, hair—ital. capelli* (plural), *dishes—German Geschirr* (mass). as well as granular nouns such as *rice* (vs. *rice grains*) (Chierchia 1998; Rothstein 2017). The extension-based approach on its simple version in (4) does not offer an account of pairs of this sort, which will have the very same extensions.²²

Another problem for the extension-based approach is that atomicity does not hold for certain types of count nouns:

- (4) a. Sequence-type nouns: *sequence, line, fence, wall*
 b. Entity nouns: *entity, being, thing*
 c. Collection nouns: *collection, sum, group*
 d. Portion nouns: *portion, quantity, amount*

A part of a sequence may still be a sequence, and likewise for a fence and a wall, which means that sequence-type nouns do not have atomic extensions (Rothstein 2017). A part of an entity is still an entity and thus the count noun “entity” is not atomic, and since the sum of two entities is again an entity; in addition, “entity” is cumulative (Moltmann 1997, 19; 1998, 81). The same holds for portions, quantities, and amounts, as well as for sums, (unstructured) collections and groups.²³

Definite NPs with one of the nouns in (4) are generally used in contexts in which they refer to a unique (often maximal) object (*the sequence Joe wrote down, the fence Mary had built, the collection of things in the room, the portion of wine in the bottle*). This led Rothstein (2017) to propose that count nouns are to be relativized to a contextually given set, so that atomicity will have to obtain just with respect to that set rather than the entire extension of the count noun.²⁴ However, NPs with a noun of one of the classes in (4) can also be used so as not to describe atoms relative to a contextually given set. Thus, sentences of the following sort are entirely unproblematic semantically, if somewhat deviant pragmatically:

- (5) a. Mathematically speaking there is not just one line, but infinitely many lines on this piece of paper.
 b. There are lots of portions of wine in this bottle.
 c. There are lots of collections of things on this desk.

The semantics of natural language does not exclude such uses of count nouns. The use of count nouns in such ways may be

“technical,” and in fact *quantity* and *portion* have been introduced as terms to specifically refer to any mass noun referent whatsoever (Cartwright 1970, see Section 2). However, technical usage is legitimate usage of language and needs to be covered by the semantic theory as well.

The association of the notion of an atom with countability or being a single object is rather problematic in the first place: even if there are infinitely many lines or just two lines, one contained in another, they can still be counted. Similarly, there is no problem counting parts of fences and walls, subportions, subquantities, etc. Being an atom relative to a set has little to do with being a single object and in that sense being countable. The identification of the notion of a single object with the notion of an atom (relative to a set) is in fact quite puzzling, widespread though it is in natural language semantics.

2.3 | The Integrity-Based Approach

On the integrity-based approach, the semantic mass-count distinction consists in that count nouns, but not mass nouns, describe entities as having a boundary, form, or more generally conditions defining a unified or integrated whole. The notion of an integrated whole played an important role already in Aristotle’s metaphysics and plays a central role in Aristotelian metaphysics to this day.²⁵ The notion has more recently been advocated by Simons (1987) in the context of formal mereological theories. It was subsequently introduced to natural language semantics in my work in Moltmann (1997, 1998, 2005) and applied to the mass-count distinction as well as a range of other linguistic phenomena. Langacker (1987) within his approach of cognitive semantics made use of the notion of boundedness: count nouns denote what he calls a “bounded region,” a region that is bounded in some dimension or respect, at a possibly a merely cognitive level.²⁶

A very general formulation of the integrity-based approach is this:

- (6) *The integrity-based approach to the content of the mass-count distinction*

Singular *count nouns* apply to entities that come with a form, boundary or more generally integrity; *mass nouns* don’t.

The integrity-based approach is formulated in terms of the entities which count nouns and mass nouns describe: count nouns apply only to integrated wholes, whereas mass nouns apply to entities lacking integrity. However, there is a reason to prefer a different formulation of the integrity-based approach, namely on which count nouns convey properties that imply integrity of some sort, whereas mass nouns do not. Such a reformulation in terms of properties conveyed by count and mass nouns, rather than entities to which nouns apply, would account for the following fact: relational mass nouns such as *support*, *content* (as a mass noun) and *property* (in the sense of possession) may apply to individuals (integrated wholes); they just do not do so in virtue of conveying properties of integrated wholes. Likewise,

quantities, entities that (generally) lack essential integrity, may be referred to with relational count nouns such as *target* and *object*, as in *object of thought*.

Mass nouns may apply to entities that are merely accidental integrated wholes. The gold on the table is as much of an integrated as the ring from which it is made. This suggests that singular count nouns describe entities as essential integrated wholes. However, this may not be correct. There are singular count nouns that appear to characterize accidental integrated wholes, such as the head nouns in *the (loose) collection*, *the queue (of people)*, *the collection of stuff on the desk* (again a motivation for the theory of situated part structures (Moltmann 1997). Alternatively, one might argue that such count NPs refer to integrated wholes with a weak degree of individuation, lacking conditions of reidentification over time (which would permit the application of the existence predicate *exist*).

An important issue for the integrity-based approach is, of course, how exactly is the notion of form, boundary or integrated whole is to be understood? While cognitive semanticists such as Langacker (1987) stay with an intuitive notion of boundedness, the issue of a formal definition of the notion of an integrated whole has been addressed by Simons (1987). While not aiming to give a full definition of form or integrity, Simons defines a simple notion of an integrated whole as a maximally interconnected entity, an R-integrated whole:

- (7) For a non-formal symmetric relation R, an entity z is an *R-integrated whole* iff for any x and y, $x < z$, $y < z$, $xR_{\text{trans}}y$ and no entity w, $\neg w < z$, $xR_{\text{trans}}w$, where R_{trans} is the transitive closure of R (that is, $xR_{\text{trans}}y$ iff for some entities x_1, \dots, x_n , $xRx_1, x_2Rx_3, \dots, x_nRy$).

The relation R may be a kinship relation, a relation of collaboration, or spatial or temporal contiguity, in which case an R-integrated whole will be an entity maximally connected in space or time. A special R-integrated whole is an FF-integrated whole, based on a property F, where the relation FF is defined as $xFFy$ iff Fx and Fy . This means that maximal entities consisting only of parts that share a property are integrated wholes as well. More complex forms of integrated wholes may require various connecting relations as well as possibly functional roles that parts of the whole may play. Count nouns, so the view, may display a great range of different conditions of unified wholes.

Object mass nouns pose a significant challenge for the integrity-based approach to the mass-count distinction, just as they did for the extension-based approach. Object mass nouns like *furniture* appear to convey properties of collections of integrated wholes. The property-based formulation of the integrity-based approach, though, offers a potential way of handling object mass nouns if object mass nouns are taken to convey complex properties composed of homogenous properties of function or quality that are not individuating and “backgrounded” properties of collections of integrated wholes.

Apart from their apparent role in distinguishing mass nouns and count nouns, conditions defining objects as integrated wholes clearly are at play in specific phenomena surrounding

the mass-count distinction, in particular in the choice, the formation, and the meaning of count nouns that are minimally distinguished from their mass noun correlates. It is manifest particularly with nouns that have both a mass and a count version. The count noun *apple* generally refers to whole apples (*John put an apple in the salad*), the mass noun *apple* (*John put more apple in the salad*) to pieces of apple or whatever the outcome of the “universal grinder” (Pelletier and Schubert 2012). The noun *part* comes with a count and a mass version (Moltmann 1998). The count version implies the part being a whole, possibly with a particular functional role (??? *the rice was a part of the meal*); the mass nouns does not imply that (*the rice was part of the meal*). While verbs themselves are not marked for mass or count in English, count nominalizations of verbs are chosen when the verb describes bounded events (*death, completion*), mass nominalizations when the verb describes actions or states (*rain, love*).²⁷ Non-technical uses of the count nouns *thing* and *object* generally imply that the entity referred to is an enduring integrated whole, contrasting in that respect with the mass nouns *stuff* and *matter*.

2.4 | The Situation-Based Variant of the Integrity-Based Approach: The Theory of Situated Part Structures

According to the formulation of the integrity-based approach in (6), count nouns describe entities as integrated wholes. This leaves open whether the entities are in fact integrated wholes or just come out as such in the situation of reference, the situation that keeps track of the descriptive content used to refer to entities (whether that amounts to essential or accidental properties). The theory of situated part structures (Moltmann 1997, 1998, 2005) is a version of the integrity-based approach which captures such a dependence on a situation. On that theory, the semantic mass-count distinction is considered a distinction between situation-relative properties. The theory of situated part structures has been motivated by the following linguistic phenomena that specifically involve part structures in situations.

First, distributivity and part structure-sensitive semantic selection may take contextually relevant divisions (partitions or just covers) of a plurality or quantity into account.²⁸ Thus, (8a) permits a reading on which John evaluated particular, contextually relevant groups of students, and (8b) one on which compares those groups:

- (8) a. John evaluated the students.
b. John compared the students.

The choice of the description can enforce a particular contextual division. Thus, (9a, b) have readings on which *weigh* and *compare* in target the maximal quantity of silver and the maximal quantity of gold (FF-integrated wholes), (9c) has a reading on which John compared the male to the female students, and (9d) on which John compared the portions of liquid in the different containers²⁹:

- (9) a. John weighed the silver and the gold.
b. John compared the silver and the gold.

- c. John compared the male students and the female students.
d. John compared the liquid in the different containers.

Standard semantics based on extensional mereology does not allow pluralities and quantities to be structured, unless it relativizes reference or the application of predicates to a contextually given division of the plurality or quantity. The theory of situated part structures, by contrast, relativizes part structures of pluralities and quantities to situations, situations that represent linguistic and, to an extent, non-linguistic information. Predicates (or distributive readings of predicates) then do not apply to entities, but pairs consisting of entities and situations.

Second, there are part-structure-sensitive modifiers such as *whole* and *individual*, to which the object-based account is inapplicable. *Whole* has the effect of shifting the perspective of an entity to one on which it is viewed as a plurality of parts, making distributive readings available that generally are unavailable with singular count NPs, as seen in the contrast between (10a) and (10b).³⁰ *Individual* in (10c) has the effect of blocking a reading on which the predicate takes into account contextually relevant subgroups of students:

- (10) a. The whole collection is expensive.
b. The collection is expensive.
c. John compared the individual students.

The theory of situated part structures deals with such cases by having *whole* and *individual* shift the reference situations: *whole* in (10a) removes properties that define an entity as an integrated whole in the reference situation, and *individual* ensures that no proper subgroups are integrated wholes in the reference situation (with the effect that only the individual members count as relevant parts of the plurality). The theory of situated part structures rests on the view that information based on lexical meaning and syntactic construction may play the same sort of role as the mass-count distinction itself.

As an integrity-based approach, the theory of situated part structures takes the semantic mass-count distinction to consist in that (singular) count nouns convey properties of integrity of some sort, whereas mass nouns don't, but now relative to a situation. The theory of situated part structures distinguishes singular count, plural, and mass nouns semantically as follows:

- (11) *The semantic mass-count distinction within the theory of situated part structures*
a. If N is a singular count noun, then for an entity x and a situation s such that $\langle x, s \rangle \in [N]$, x is an integrated whole in s .
b. If N is a mass noun, then for any entity x and any minimal situation s such that $\langle x, s \rangle \in [N]$, x is not an integrated whole in s .

The restriction to a minimal situation in (11b) rules out that other information in the reference situation defines the referent of a mass NP as an integrated whole. (11a) permits referents of singular count nouns to be accidental integrated wholes, (11b) allows referents of mass NPs to be integrated wholes on the basis of the information in the reference situation, for example

being a maximal quantity of silver or a maximal quantity of gold as in (9a, b).

The central assumption of the theory of situated part structures is that predicates do not apply to entities as such, but entities in *reference situations*, that is, situations associated with the use of NPs that carry information about the integrity of entities or their parts provided by lexical content or syntactic construction.³¹ Entities may then be integrated wholes in a reference situation on the basis of linguistic information not tied to the use of count nouns, for example by being sums of individuals or quantities sharing a property.

Though no account has been developed explicitly, the theory of situated part structure may have an option dealing with object mass nouns. This is if situations are allowed to “leave out” or to “background” essential properties defining referents of nouns as integrated wholes, representing the function or overall quality of the relevant collection instead.³² Situations then would have a perspectival status, rather than being on a par with possible worlds.³³

3 | The Distinction Between Being an Integrated Whole and Being One

3.1 | Two Kinds of Predicates Applying to Plurals or Quantities

There is one general problem with the integrity-based approach, and the theory of situated part structures in particular, and that is that it fails to distinguish two properties that must be kept apart:

1. the property of having unity (being countable)
2. the property of being an integrated whole (perhaps in a situation).

This distinction bears on the metaphysical distinction between a structured plurality that counts as “many” and a single thing that has the same structure and composition, yet counts as “one” rather than “many.” It also bears on the distinction between a maximal quantity of a sort as a single thing and as mere “stuff.”

The problem manifests itself first of all with the treatment of “superplurals,” NPs that refer to pluralities of pluralities. Distributive interpretation and predicates like *compare* can take into account contextually given subgroups as in (8a, b). However, number-related predicates like *count*, *list* and *enumerate* as well as numerals can target only individual members of a plurality (Moltmann 2016, 2021). (12) can only mean that John counted, enumerated, or listed the individual students, not contextually given student groups:

- (12) John counted / enumerated / listed the students.

In addition, numerals can never apply to subgroups, but only to individual members of pluralities. Thus, *two* in the examples below can apply only to individuals, not subgroups:

- (13) a. The men and the women, the *two* never met.
b. The students are *two* in number.

Similarly, numerals cannot target distinguished subquantities of a quantity. *Two* in (14b, c) cannot count the clothing as one thing and the food as another:

- (14) a. John compared Sue and Mary – he had never compared the two.
b. ??? John compared the clothing and the footwear – he should not compare the two.
c. ??? The clothing and the footwear are two in number.

Subgroups may be integrated wholes in the relevant situation, enabling distributive readings and a particular understanding of part-structure-sensitive predicates. But those subgroups do not count as single things, given the application of number-related predicates.³⁴

This motivates the following distinction between two types of predicates: predicates that may take contextually given divisions of a plurality or quantity into account and predicates that care only about individuals or individual members of a plurality (Moltmann 2016, 2021)³⁵:

- (15) a. *Predicates applicable to contextually given divisions of quantities and pluralities*
Compare, gather, embrace, similar, related, connected, rate
b. *Number-related predicates*
Cardinal and ordinal numerals, list, rank, enumerate, numerous, count

Of course, number-related predicates can relate to parts of a plurality referred by collective nouns, which then count as single entities (*the groups of students, the decks of cards*).

3.2 | Portion, Collection, and Entity Nouns and the Basis of Unity

Sequence, entity, collection, and portion nouns were a challenge for the notion of an atom in extensional mereological approaches, and they are a challenge for the integrity-based approach as well, on their more technical uses. The integrity-based approaches when relativized to a context (i.e., a situation) may adopt a similar strategy as the extension-based approach: the situation of reference for *the sequence Mary wrote down* will contain just the maximal sequence Mary wrote down, which will be an R-integrated whole. Thus, the entities described by the nouns in (4) relative to a situation of reference may come out as integrated whole in such a situation.³⁶ Similarly, *the portion of wine John drank* would stand for an entity in a situation of reference that qualifies as an integrated whole, namely an FF-integrated whole, being a maximal quantity of wine John drank.

However, maximality alone does not guarantee being one. There is no difference in integrity between “the portion of wine John drank” and “the wine John drank”; the only difference is that what is described as a “portion of wine” is a single thing, but not

what is described just as “wine.”³⁷ That portion nouns, unlike mass nouns, stand for entities that count as one is apparent from the applicability of *is one of* or *among* and of *one*-anaphora (McKay 2016), as well as predicates of counting:

- (16) a. The portion of rice John just ate is one of the portions of food he ate today.
 b. The portion of rice John just ate is among the portions of food he ate today.
 c. ??? The rice John just ate was one of/among the portions of food he ate today.
- (17) a. This is a quantity of rice; that is one too.
 b. ??? This is rice. That is one too.
- (18) a. The quantities of water in that container are uncountable.
 b. ??? The water in that container is uncountable.

Likewise, collection nouns need not convey any unifying conditions of what is being referred to. Yet, collection nouns contrast semantically with the corresponding plural NPs, allowing for *is one of*-predicates and *one*-anaphora, and thus refer to things that are “one,” rather than “many”:

- (19) a. The bunch of papers Mary proposed as readings is different from the one I proposed.
 b. ??? The papers Mary proposed as readings is different from the one I proposed.
- (20) a. The collection of things that remained in the house is one the various collections of things I need to get rid of.
 b. ??? The things that remained in the house are one of the various collections of things I need to get rid of.

Similar observations can be made for entity nouns. *Thing* on an ordinary usage is generally associated with a contextually given form of essential integrity of an enduring entity (which it is also why it is called a “dummy sortal”). However, *thing* can be used in a technical way, not implying any form of integrity. This is even more obvious for nouns like *entity* and *being*. There is nothing wrong with using *entity* in contexts such as *the entities in the extensions of mass nouns*, which are not supposed to describe things with any form of integrity.

The fact that NPs with portion, collection, and entity nouns do not on all of their uses convey a form of integrity of their referent means that the integrity-based approach can ultimately not be correct. Singular count nouns carry a notion of unity or being a single entity without that being reducible to unifying conditions of integrity (or, for that matter, atomicity relative to a concept).

4 | Unity as Primitive

If the notion of unity or being one is not grounded in entities meeting conditions of integrity, one might consider unity a primitive property, which then makes up part of the content of count categories. As such, it may be considered either a feature of entities (on a plenitudinous conception of reality) or else a feature of entities in situations.

This first view may align with a view of linguistic idealism (Gaskin 2021), on which reality is shaped by our linguistic access to it. That is, unity will be mind-imposed, more precisely, imposed through the use of count categories, rather than being grounded in worldly or perceived conditions of integrity (Moltmann, to appear a).

The first view might also be pursued with a plenitudinous or permissive conception of (mind-independent) reality, rich in spatio-temporally coincident entities (Eklund 2008; Fairchild 2020). That is, for any entity that is a single thing, reality would also contain one minimally different from it in not being a single thing (and vice versa). Entities referred to as “clothes” and as “clothing” will thus be distinct entities, as will be entities referred to as “the loaf of bread” and as “the bread” and entities referred to as “the portion of rice” and as “the rice.” The ontology reflected in the mass-count distinction is then a language-driven ontology and to be distinguished from the ordinary ontology, which is based on language-independent conditions of individuation. Semantic selection would target the language-driven ontology, though the ordinary ontology may be available for other semantic purposes. Given such an ontology, using a count category will mean selecting a single entity rather than its non-single correlate. Part-structure-modifiers will be expressions that characterize an entity ontologically. “The students that share a room” and “the individual students” would be distinct entities, as would be “the exhibition” and “the whole exhibition” (Moltmann 2021).

Many philosophers will have reservations about adopting such a permissive ontology and may prefer to view distinctions such as that between “the clothes” and “the clothing,” “the students that share a room” and “the individual students,” as well as “the exhibition” and “the whole exhibition” a matter of perspective rather than ontology. If situations are taken to represent perspectives, then an account in terms of situated part structures augmented by a notion of primitive unity permits an alternative that is less involving ontologically. The characterization of the mass-count distinction would then be as in (9), except that “integrated whole” is replaced by the notion of primitive unity. Crucially, one and the same entity may have unity in one situation and lack it in another situation, something that semantic selection will care about. The situations of reference will just contain what is strictly given by the description used to refer to entities, in particular information about being a single object.

Taking the notion of unity to be primitive is not a novel proposal. Link’s (1983) account of the notion of an individual is precisely of that sort. Like any extensional mereological account, Link distinguishes the *i*-part relation \leq_i relating individuals to pluralities (sums) from the part relation holding among the parts of an individual. An individual *d* is defined as an entity that bears the relation \leq_i to itself, that is an atom with respect to \leq_i , and that is an *i*-part of any sum of a set of which it is a member.

The notion of unity as primitive can also be found in Priest’s (2015) notion of a gluon, a part of an object that guarantees its unity, by being both identical and not identical with the object itself. Priest’s gluon theory, though, is applicable only to the relation between a whole and the plurality of individuals

that are its parts and not to the relation between a single object and the matter from which it is made up.

5 | The Reference-Based Approach to the Mass-Count Distinction

There is a general issue for all the approaches to unity so far presented, and that is they all treat quantities as single things. The metalanguage describing the semantics of mass nouns and count nouns uses the same individual variables for individuals, quantities and pluralities alike, and thus pluralities and quantities come out as single entities just like individuals, and that even if they are not atoms or integrated wholes. However, pluralities are not “one,” but “many,” and quantities are neither “one” nor “many.”

This problem has been recognized for pluralities for quite some time: a definite NP like *the ten students* does not refer to a plurality of students as a single thing; rather it refers to a plurality “as many.” The alternative proposal that has been developed for plurals is that *the ten students* plurally refers to each of the 10 students at once (Yi 2005, 2006; McKay 2006; Oliver and Smiley 2013). The semantic difference between definite singular count NPs and definite plural NPs is thus a difference in reference: singular reference as opposed to plural reference (reference to several individuals at once). Plural reference formally goes along with the development of plural logic, which uses plural variables (“xx,” “yy,” “zz”) as distinct from variables for individuals (“x,” “y,” “z”), that is, variables that can take several individuals as values at once.

The distinction between one and being many in terms of singular and plural reference has found wide acceptance among logicians (even if linguists still largely adhere to the mereological view of pluralities as sums).³⁸ This raises the question whether a reference-based approach could also account for the distinction between individuals and quantities: *the wine* would involve mass reference as distinct from singular reference with *the portion of wine* and from plural reference with *the portions of wine*. The idea of mass reference as distinct from singular and plural reference has so far hardly been pursued in the literature, though, with the exception of McKay (2016).³⁹ McKay argues for irreducible mass reference (and mass quantification) making use of mass variables as distinct from individual variables as well as plural variables. A kind-relative parthood relation “is some K of” (for a kind K) is reserved for mass variables (and distinguished from a parthood relation “are among” for pluralities and a parthood relation applying to individuals and their constituting matter). Various conditions are imposed on that part relation (transitivity, unrestricted composition, constant basis over time), which are the same conditions as obtain for the plural parthood relation “are among,” except that the latter part relation also obtains between individuals and pluralities. Individuals, the semantic values of individual variables, do not always permit composition under a relation “is the same K as,” for some kind K (two people do not compose to make another person) and individuals, unlike quantities, allow, in principle, for a replacement of parts over time.⁴⁰ Unlike for plural reference, which involves a clear semantic distinction between

reference to one and reference to many, what is distinctive about mass reference on McKay's formal proposal is just the choice of terms and the particular kind-dependent part predicate (“is some K of”) applicable to them. This, though, raises the same issues as approaches to the mass-count distinction that make use of a distinction in terms of semantic type (Rothstein 2017). It is yet to be seen whether a non-ontological, reference-based approach to the mass-count distinction is a real option.

6 | Conclusion

The mass-count distinction is an important topic in linguistics, where it has generated a huge amount of recent empirical work.⁴¹ With the notion of unity being at the center of the content of the mass-count distinction, the distinction is also of considerable interest to philosophers, who for centuries have been concerned with the same or related issues of unity. The distinction between being one and being neither one nor many appears to be at the heart of the distinction. It is not clear, though, whether current approaches to that distinction in formal semantics, what I distinguished as extension-based and integrity-based approaches, truly capture that distinction. The distinction certainly calls for the development of an account that avoids a reduction of mass reference to singular reference to “quantities.”

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Endnotes

¹ Not all languages share the same diagnostics, though. There may not be a single set of mass-count diagnostics that applies across languages, but rather various sorts of sets, and they may determine a gradual distinction, rather than a binary one (Kulkarni, Rothstein, and Treves 2020; Bale and Gillon 2020). This has led to some researchers just focusing on particular diagnostics and a semantic or syntactic account of them.

² Note that there is singular agreement with plurals with a measure phrase as in *Two pounds of apples will be enough for the salad*.

³ Of course, when mass nouns are coerced into count nouns on a subkind reading, for example, numerals become acceptable (*one carpeting is used for the livingroom, a very different carpeting for the study*).

⁴ See also Barner and Snedeker (2005).

⁵ More recently, there has been some controversy whether Chinese nouns lack a mass-count distinction. See Doetjes (2012) and Cheng and Sybesma (1999) for a view that differs from the standard view.

⁶ See also Grimm (2018) for a more differentiated view of the morphosyntactic mass-count distinction and correlating scales of individuation.

⁷ This matches Greenberg's idea of classifiers as a multiplicands: “all” the classifiers are ... merely so many ways of saying “one” or, more accurately, “times one”, see Greenberg (1990 [1972], 172).

- ⁸ Borer (2005) gives an extension-based account of the interpretation of *ind*. Thus, here account is not a purely syntactic account of the mass-count distinction. The semantics of *ind* does not play a role for the selection of numerals, though, for her.
- ⁹ Sometimes “mass-count distinction” is used in just the semantic sense. For examples, some scholars talk about verbs displaying a mass-count distinction, when verbs do not in fact come with a morphosyntactic mass-count distinction.
- ¹⁰ Thus, Jespersen (1924) calls count nouns “countables” or “thing-words.”
- ¹¹ Unity also plays a role in issues such as what distinguishes a proposition from the merely collection of its propositional constituents, what distinguishes an artifact from its constituting matter and content-based facets, and what distinguishes consciousness from a collection of subjective experiences.
- ¹² See the more recent discussion in Priest (2015).
- ¹³ Thus, I will set aside a view on which mass nouns denote kinds or qualities (Ter Meulen 1981). At the end of the paper, when discussing the reference-based approach, I will come to the view on which plurals enable plural reference, rather than standing for sums and likewise mass nouns stand for things that are neither one nor many.
- ¹⁴ The term “quantity” was first used in this sense by Cartwright (1970). See also Ter Meulen (1981) and Pelletier and Schubert (2012).
- ¹⁵ Here plurality is treated as inclusive, that is, sums of singleton sets, individuals, also count as pluralities. This is plausible for plural NPs as in *the number of Mary’s children* or *How many children do you have?* See Farkas and de Swart (2020) for a discussion of inclusive and exclusive plurality.
- ¹⁶ While this is the notion of an atom most commonly used by semanticists, it is actually not the notion that Link (1983) uses: for Link, an atom rather is an entity *d* that has no proper parts that stand in the plural-specific part relation, the *i*-part relation \leq_i , to *d*-. See Section 4. The notion of an atom relative to a noun extension makes sense only if the notion is defined in terms of a different part relation than \leq_i , namely the part relation holding among parts of individuals. Otherwise, any entity *d*- in the extension of a singular count noun *N* comes out as an atom by the mere fact *d*- is not a plurality and thus is unable to have proper parts standing in the relation \leq_i to it, that is, by the mere fact that *d*- is not in the extension of the plural of *N*.
- ¹⁷ There are also approaches to the mass-count distinction that do not fall within those approaches, such as Chierchia (2010). I will set them aside as far as they do not address the particular issues this paper focuses on, the notion of a single object.
- ¹⁸ Extensional mereology generally assumes extensionality or the uniqueness of sums. That is, two entities are identical if they share the same parts. If entities are also constituted by conditions of integrity, extensionality or the uniqueness of sums will no longer obtain.
- ¹⁹ Extensionality (sameness of entities that share the same parts) and unrestricted sum formation has frequently been criticized as inadequate when applied to the ontology of ordinary objects. However, extensional mereology when applied to plurals is supposed to capture a different, language-driven ontology.
- ²⁰ Divisiveness is due to C.-Y. Cheng (1973). See also Ter Meulen (1981).
- ²¹ An alternative move is to take divisiveness to not apply to an ontology of the real, but to how we perceive things or just how we talk about things: we perceive or talk about water as if it was divisive even if it is in fact not (Bunt 1985).
- ²² There are developments within the extension-based approach that aim to account for object mass-nouns, for example, Landman (2020).
- ²³ Note that NPs with portion nouns classify as singular count NPs, by the various syntactic and semantic criteria (Khruzman et al. 2015): they come with the plural and select count determiners (*many, few, three*).
- ²⁴ Zucchi and White (2001) address a related issue, the fact that NPs like “a sequence,” “a twig,” etc. do not lead to homogenous predicates that would allow for the application of *for*-adverbials, as in (ia). They also note that “some peas” does not lead to a homogenous predicate, as in (ib):
- i. For two hours, John constructed sequences/ ??? a sequence.
 - ii. ??? For one hour, John ate some peas.
- Their formal proposal does not target the mass-count distinction, but the interaction with temporal-measure adverbials, and (ib) makes clear that the phenomenon is in fact a distinct one.
- ²⁵ See, for example Koslicki (2008).
- ²⁶ An intuitive characterization of the mass-count distinction in terms of form or boundary can already be found 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, common-sense” (Jespersen 1924, 198).
- ²⁷ This is a simplification, though. See Barner, Wagner, and Snedeker (2008) for a detailed discussion of event nominalizations.
- ²⁸ See also Grimau (2021) for a discussion of such phenomena.
- ²⁹ In Moltmann (1997) it is assumed that in (9a, b, c) being an FF-integrated whole in the reference situation is what determines the division of a plurality or quantity. But this does not seem quite correct: with *the silver and gold* and *the male and female students* in (9) the relevant readings are much harder to get, yet the reference situations would involve the same FF-integrated wholes. Rather what matters for making divisions of pluralities or quantities available is the choice of distinct definite NPs (Moltmann 2016).
- ³⁰ *Whole* actually has two readings. On a second reading, *whole* has the opposite effect, ensuring that the entity in question is regarded “as a whole,” which triggers a collective reading, see Moltmann (2005) for a unified analysis of the two readings of *whole*. On the second reading, *whole* naturally applies to mass nouns as well (*the whole furniture won’t fit into the lorry*).
- ³¹ Note that reference situations do not depend on speaker’s intentions, in the way resource situations in Situation Semantics do, that is, situations meant to constitute the domain of quantification for quantificational NPs (Barwise and Perry 1983) (see also Elbourne (2005) for a similar use of situations). For the constitution of reference situations on the basis of the linguistic material used it is tempting to use the notion of exact truthmaking of Fine’s (2017) truthmaker semantics, that is, the relation that holds between a situation and a sentence just in case the situation makes the sentence true and is fully relevant for the truth of the sentence. Situations as “exact truthmakers” would serve to keep track of the linguistic material being used.
- ³² See also Cohen (2020) for suggestions to that effect.
- ³³ This will also account for the observation that object mass nouns and plural nouns reflect not just a semantic, but also a cognitive difference (Wisniewski, Imai, and Casey 1996).
- ³⁴ The applicability of the verb *count* shows the same, though *count* is rather marginal with conjunctions of singular count NPs in the first place, preferring a plurality whose members are not listed explicitly:
- i. ? John counted John and Mary, so he counted two.
 - ii. ??? John counted the (ten) men and the (ten) women, so he counted two.
 - iii. ??? John counted the wine and the water, so he counted two.
- ³⁵ The distinction between *gather* and *numerous* has recently been discussed by Kuhn (2020) as a distinction between mass and count—in

the sense of the semantic, not the morphosyntactic mass-count distinction.

³⁶ Langacker (1987, 59) already discussed sequence-type nouns. For him sequence-type nouns are count nouns since they describe bounded regions. Boundedness for Langacker needs to hold only in one dimension. A sequence or line is bounded in one dimension in a three-dimensional space, which suffices for fulfilling the condition imposed by count nouns. Thus, an integrity-based approach does not necessarily have an issue with sequence-type nouns in the first place.

³⁷ Sconstrast (2017) discusses degree uses of NPs with the head noun *amount*:

(i) John drank the amount of wine Bill drank.

But this is not the reading that portion and collection nouns generally exhibit.

³⁸ But see, for example, Nicolas (2008) and Moltmann (2016) for an adoption of plural reference in natural language semantics.

³⁹ See also Laycock (2006) for a view that goes in a similar direction.

⁴⁰ This, though, holds only for the “first level” of quantities denoted by object mass nouns, such as *furniture*, *foliage* etc., not the individuals that make up them up.

⁴¹ See the recent edited volumes Moltmann (2020), Filip (2021), and Kiss, Pelletier, and Husiç (2021).

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