Countability in the nominal and verbal domains

Hana Filip and Peter Sutton

Abstract

This course examines the grammatical and semantic phenomena tied to countability. Countability is a cross-categorial notion which is indirectly reflected in the syntax and semantics of various expressions of quantity and number. In English, for instance, count, but not mass, nouns, are straightforwardly used in count cardinal constructions: *three apples* vs. *#three rice(s)*. Similarly, we have: *jump twice* (telic) vs. *#swim twice* (atelic). Our main focus is on the mass/count distinction among nouns, but we also explore similarities/differences with parallel phenomena in the verbal domain, where countability matters to the telic/atelic distinction and the semantics of the grammatical im/perfective aspect. This course will introduce participants not only to classic analyses of these phenomenona in mereology/lattice theory and its enrichments with event semantics, but also to cutting edge analyses relying on mereotopology, vagueness, gradience, overlap, probability theory, that have all begun to emerge as recurrent themes in countability research across domains.

Contents

1 Background

For number marking languages (e.g. English), the mass/count distinction is robustly manifested in the possibility of directly combining nouns with numeral phrases, without any meaning shifts or classifier phrase, as the following contrast illustrates: *three cats* vs. *#three mud(s)* vs. *three buckets of mud*. In English, the mass/count distinction is also manifested in the distributional patterns with other categories like quantifiers: e.g., *each*, *every*, *few*, *many* select for count nouns, while *little*, *much* for mass. Similarly, in the verbal domain, telic (event) predicates can be straightforwardly combined with cardinal count adverbials, while atelic (process) ones cannot, unless first shifted into a suitable telic interpretation: e.g., *knock three times*, *run to work three times* are felicitous compared with *?run three times*, which is acceptable just in case an implicit measure phrase (*run* [x-distance/for x-time] *three times*) can be given by an interpreter to individuate running chunks that can be then subjected to counting with *three times* (see Filip (2011, 2012) for discussion). What such parallels are taken to indicate is the fundamental structural analogy "mass:count = process:event" (Bach, 1986; Mourelatos, 1978; Taylor, 1977).

In contemporary semantics, countability is mostly explored using mereology theory, starting with the pioneering work of Hoeksema (1983) and Link (1983). The decisive step was taken by Link (1983) whose

goal was to analyse mass terms and plurals, capturing both the similarities between MASS and PLURAL as well as differences between MASS and COUNT. Assuming a sortal distinction between mass and count nouns (also Quine (1960), Link (1983) proposes that the domain of entities from which nouns take their denotations has a join semilattice algebraic structure that captures mereological part-whole relations (*join* represents the mereological sum operation). Count nouns take their denotations from an atomic join semilattice, whose atoms correspond to the meanings of singular forms (*one apple*), and non-atomic elements (plural/sum individuals) to the meanings of plural forms (*(two) apples*). The atomic join semilattice is then a plurality structure, on which a counting operation is defined. Mass nouns take their denotation from a disjoint non-atomic structure, on which counting is not defined. Bach (1986) enriches Link's lattice theory with a Davidsonian event semantics which allows a formal representation of the "mass:count=process:event" analogy (see above), where event (telic) predicates take their denotation from an atomic domain, while process (atelic) predicates from a domain structured as non-atomic semilatices, paving the way for the influential mereological approach to aspectual composition (Filip, 1997; Krifka, 1989, a.o.).

1.1 Countability in the nominal domain

The mereologically-based properties that initially characterized the mass/count and process/event (aka atelic/telic) distinctions (Bach, 1986; Filip, 1997; Krifka, 1989; Mourelatos, 1978; Taylor, 1977) have since then shaped the debates about their nature. Several common themes have emerged in recent research, all of which are concerned with modifications and extensions of the mereological tools in order to provide a more comprehensive and adequate coverage of the relevant data. For example, take divisibility: Suppose a noun N, and an interpretation function $\mathcal{I}$. N is divisible iff, if $a \in \mathcal{I}(N)$ and $b \sqsubseteq a$, then $b \in \mathcal{I}(N)$. (Any part of a noun denotation is in that denotation.) At first blush, mass nouns are divisible, and count nouns are not. Yet, as is well-known, "heterogeneous" mass nouns like *fruitcake* are problematic (Taylor (1977)) (a sultana is a part of fruitcake, but not itself fruitcake), and even "homogeneous" mass nouns like *water* are, too. Given such challenges, researchers have sought to identify more basic semantic properties on which to ground the count/non-count distinction. Furthermore, concern grew that positing differently structured domains for mass and count nouns was unsatisfactory in that (a) it named the distinction rather than explained it; and (b) it could not account for cross and intra-linguistic variation exemplified by pairs such as *fence*$_{count}$/*fencing*$_{mass}$, or *meubilair*$_{mass}$-*meubel(s)*$_{count,\ Dutch}$ (Landman (2011)).

Context-sensitivity first became prominent in shifts between count and non-count interpretations, which in the nominal domain are known as "packaging" and "grinding" (Pelletier, 1975; Pelletier and Schubert, 1989/2002), as in *Three waters, please* and *After the accident, there was windshield all over the road*, respectively. More recently, it has become relevant also to the characterization of basic (non-shifted) meanings of nouns. Based on observations by Zucchi and White (1996, 2001) (and others cited therein), Rothstein (2010) focuses on count nouns like *fence* or *ribbon* that are not "naturally atomic", in contrast to *boy* or *apple*, but can be individuated and counted only relative to a context. For example, one can describe the fencing around a rectangular field as *one fence*, but also as *four fences*. Chierchia (2010) proposes that mass nouns are context-sensitive with respect to quantity. For example, the command *Clean the mud off your shoes* can be obeyed in many contexts by brushing the shoes in question, but in a scientific "clean room" context, even a tiny speck of mud counts as *having mud on your shoes*. Landman (2011) proposes that, even on a single intension, prototypical mass nouns (*water*) only have minimal parts relative to a context, whereas others (*cat, furniture*) have minimal parts that are fixed by the intension.

Vagueness features prominently in the characterization of mass nouns, which are taken to be *vague* regarding their minimal parts or atoms (Chierchia, 1998, 2010; Rothstein, 2010). Chierchia (2010) claims this sort of vagueness is present in mass nouns, and that degrees of vagueness can predict how much intralinguistic variation a noun displays. Similarly, Rothstein (2010) hypothesises that inherent vagueness in specifying atoms makes counting is impossible.

The *overlap* and *connectedness* relations have most recently been proposed as grounding the mass/count

distinction, based on the intuition that the minimal elements in the denotations of count nouns are discrete, but those of mass nouns are overlapping (Krifka, 2007; Landman, 2011). Landman (2011) sharpens our understanding of mass nouns by defining a line between "aggregate" mass nouns (Payne and Huddleston, 2002) like *kitchenware*, his *Neat-Mass* nouns, and *Mess-Mass* nouns like *water, mud*. The latter have overlapping minimal parts ("minimal generators"), while the former have non-overlapping *minimal generators* (such as a teacup, a saucer), but overlap with respect to what may "count as one" (a teacup *and* saucer may count as one piece of *kitchenware*). Cross-linguistically, the semantic domain carved out by *Mess-Mass* nouns corresponds to mass morpho-syntax, but that carved out by *Neat-Mass* nouns exhibits variation in mass/count encoding: e.g., *furniture*$_{mass}$=*huonekalu*$_{count,\ Finnish}$. Grimm (2012) uses a mereotopological model and proposes that the countability of nouns relies on different strengths of "*self-connectedness*", leading him to the rejection of the binary mass/count distinction. For example, *foliage*$_{mass}$ carries an implication of spatial clustering or connectedness in a way that *leaves*$_{count}$ does not. There is a growing consensus that a simple binary mass/count distinction must be amended or rejected. Landman (2011) introduces a tripartite Mess-Mass, Neat-Mass, Count distinction. Grimm (2012) argues that countability can be understood as a scale of individuation; his empirical evidence includes languages with a third grammatical class between MASS and COUNT. Building on this, Sutton and Filip (2015) argue that neither vagueness (Chierchia, 2010) nor overlap (Landman, 2011) alone can ground the countability noun classes and account for cross- and intralinguistic variation in mass/count encoding. They propose a probabilistic dual-source account of the mass/count distinction based on vagueness and (non-)overlap that predicts four semantic countability classes, two of which allow for cross- and intralinguistic variation.

1.2 Countability in the verbal domain

The mereological approaches to countability in the verbal domain, following the foundational studies of (Bach, 1986; Mourelatos, 1978; Taylor, 1977), focused on the phenomena falling under "aspectual compositionality" (Dowty, 1979; Verkuyl, 1972): i.e., systematic interactions and constraints between verbs and their Incremental Theme argument in the derivation of telic and atelic interpretations of complex predicates. To this goal, Krifka (1989, 1998) introduces two mereologically-based cross-categorial types of *cumulativity* and *quantization*, as basic properties of predicates of eventualities and objects. Quantized predicates (count nouns and telic predicates) are derived from cumulative ones (basic mass nouns and process verbs) by means of an extensive measure function which determines what counts as 'one' (countable entity) in their denotation. Assuming that aspectual composition follows from the meaning of verbs entailing a homomorphism h (structure-preserving mapping) between the mereologically structured denotation of their *(Strictly) Incremental Theme* and event arguments, the mappings predict the following "aspectual" correlations: a quantized Theme (*two apples*) – a quantized/telic predicate (*eat two apples*); a cumulative Theme (*apples/soup*) – a cumulative/atelic predicate (*eat apples/soup*).

Filip (1993/1999, and elsewhere) explores aspectual compositionality in the context of mutual interactions between (im)perfective verbs and their Incremental Theme arguments in Slavic languages, and introduces *scale* into the mereological toolkit in order to account for the influence of Path-PPs and Result-PPs on the count (telic) and telic (non-count) interpretation of complex predicates: *Mary waltzed into the room, The earthquake shook the books off the shelf; The ice-cream melted into a gooye mess*. Generally then, there is a growing agreement (Filip, 1993/1999, 2005; Filip and Rothstein, 2005; Kratzer, 2004; Krifka, 1998)) that one key source of the count/non-count distinction in the verbal domain is a homomorphism *h* (structure-preserving mapping) between eventualities and some suitable "measurement scale" (introduced by an Incremental Theme argument, a Path-PP or Result-PP) which determines what is to count as "one" individuated event in the denotation of a complex verbal predicate, possibly also modulo linguistic and extralinguistic context, and pragmatic principles of interpretation. In addition, as Filip (1992, 2000, 2005, a.o.) argues, the requisite "measurement scale" may have its source in the lexical semantics of certain verbal prefixes in Slavic languages. Such verbal prefixes function as word-internal operators that interact with the (im)perfective semantics of

verbs they form, exhibit complex interactions with the countability properties of complex verbal predicates, and serve as triggers of scalar implicatures (Zinova and Filip, 2014).

This generalized and context-sensitive perspective on telicity opened up new debates on the possibility of integrating mereological and scalar theories of telicity (Beavers, 2012; Filip, 2008; Kennedy, 2012; Rappaport Hovav, 2008, a.o.). The main data points of scalar theories are degree achievements, based on vague gradable adjectives, and their variable telicity behavior in dependence on context: *The soup cooled for / in ten minutes* (Jennifer Hay, 1999; Kearns, 2007; Kennedy and Levin, 2008). The common denominator of mereological and scalar theories of telicity is the representations of measurement (scale), formalized as sets of objects (degrees) ordered with respect to a dimension (extent, volume, weight, etc.). This shifted focus to how the lexical semantic properties influence the division of labor between compositional and contextual aspects of interpretation, and the role of vagueness and context in computing what *counts as one* in the denotation of verbal predicates, which all echo some of the recent developments in the countability theories in the nominal domain.

2 Tentative outline

Monday: Introduction and Background: Classic mereological approaches to the mass/count distinction in nouns and the telic/atelic distinction in verbs; the key diagnostic tests that distinguish these classes; lattice theoretic semantics and event semantics; some of the main challenges and problems for these accounts

Tuesday: Nouns I: Detailed introduction to major themes in recent analyses of the mass/count distinction in nouns, including context-sensitivity , mereotopology (Pelletier, 1975; Rothstein, 2010), merotopology (Grimm, 2012), vagueness (Chierchia, 1998, 2010)

Wednesday: Nouns II: Detailed look at three recent proposals, (Chierchia, 2010; Landman, 2011; Sutton and Filip, 2015): evaluate whether vagueness (Chierchia, 2010), non-overlap (Landman, 2011) alone can account for cross- and intralinguistic variation; introduce and motivate the dual-source (vagueness and (non-)overlap) account of Sutton and Filip (2015).

Thursday: Verbs: Introduction to latest approaches to the telic/atelic distinction, focusing on the comparison and possible integration of mereological and scalar theories.

Friday: Review and Comparison: This last session will review material from the previous four days, with a focus on what commonalities and differences there are in the semantic analysis of countability between the nominal and verbal domains.

3 References

Emmon Bach. The algebra of events. *Linguistics and Philosophy*, 9(1):5–16, 1986.

John Beavers. Lexical aspect and multiple incremental themes. In V. Demonte and L. McNally, editors, *Telicity, Change, State: A Cross-categorical View of Event Structure*, pages 23–59. OUP, 2012.

Gennaro Chierchia. Plurality of mass nouns and the notion of "semantic parameter". In *Events and Grammar: Studies in Linguistics and Philosophy Vol. 7*, pages 53–103. Kluwer, 1998.

Gennaro Chierchia. Mass nouns, vagueness and semantic variation. *Synthese*, 174:99–149, 2010.

David Dowty. *Word Meaning and Montague Grammar*. Reidel, Dordrecht, 1979.

Hana Filip. Aspect and interpretation of nominal arguments. In C.P. Canakis, G.P. Chan, and J.M. Denton, editors, *Proceedings of the Twenty-Eighth Meeting of the Chicago Linguistic Society*, pages 139–158. University of Chicago, Chicago, 1992.

Hana Filip. *Aspect, Situation Types and Noun Phrase Semantics*. Thesis, University of California at Berkeley 1993. Published as Aspect, Eventuality Types and Noun Phrase Semantics, 1999. New York/London: Garland Publishing, 1993/1999.

Hana Filip. Integrating telicity, aspect and np semantics: The role of thematic structure. In *Formal Approaches to Slavic Linguistics (FASL) III. The College Park Meeting 1994*, pages 61–96. Michigan Slavic Publications, Ann Arbor, 1997.

Hana Filip. The quantization puzzle. In *Events as Grammatical Objects*. CSLI, Stanford, 2000.

Hana Filip. Measures and indefinites. In Gregory N. Carlson and Francis Jeffry Pelletier, editors, *References and Quantification: The Partee Effect*, pages 229–288. CSLI, Stanford, 2005.

Hana Filip. Events and maximalization. In *Theoretical and Crosslinguistic Approaches to the Semantics of Aspect*, pages 217–256. John Benjamins, Amsterdam, 2008.

Hana Filip. Aspectual class and aktionsart. In Claudia Maienborn, Klaus von Heusinger, and Paul Portner, editors, *Semantics: An International Handbook of Natural Language Meaning*, pages 1186–1217. Mouton de Gruyter, Berlin and New York, 2011.

Hana Filip. Lexical aspect. In *The Oxford Handbook of Tense and Aspect*. OUP, Oxford, 2012.

Hana Filip and Susan Rothstein. Telicity as a semantic parameter. In James Lavine, Steven Franks, Hana Filip, and Mila Tasseva-Kurktchieva, editors, *Formal Approaches to Slavic Linguistics (FASL 14). The Princeton University Meeting*, pages 139–156. MI: University of Michigan Slavic Publications, 2005.

Scott Grimm. *Number and Individuation*. PhD Dissertation, Stanford University, 2012.

Jack Hoeksema. Plurality and conjunction. In Alice G. B. ter Meulen, editor, *Studies in Modeltheoretic Semantics*, pages 1–63. Foris Publications, 1983.

Beth Levin Jennifer Hay, Christopher Kennedy. Scale structure underlies telicity in "degree achievements". *Semantics and Linguistic Theory*, 9:127–144, 1999.

Kate Kearns. Telic senses of deadjectival verbs. *Lingua*, 117:26–66, 2007.

Christopher Kennedy. The composition of incremental change. In V. Demonte and L. McNally, editors, *Telicity, Change, State: A Cross-categorical View of Event Structure*. OUP, Oxford, 2012.

Christopher Kennedy and Beth Levin. Measure of change: The adjectival core of degree achievements. In L. McNally and C. Kennedy, editors, *Adjectives and Adverbs: Syntax, Semantics and Discourse*, pages 156–182. OUP, 2008.

Angelika Kratzer. Telicity and the meaning of objective case. In J. Guron and J. Lecarme, editors, *The Syntax of Time*, pages 389–424. MIT Press, Cambridge, MA, 2004.

Manfred Krifka. Nominal reference, temporal constitution and quantification in event semantics. In R. Bartsch, J. van Benthem, and P. van Emde Boas, editors, *Semantics and Contextual Expressions*, pages 75–115. Foris, Dordrecht, 1989.

Manfred Krifka. The origins of telicity. In S. Rothstein, editor, *Events and Grammar*, pages 197–235. Kluwer, Dordrecht, 1998.

Manfred Krifka. Masses and countables: Cognitive and linguistic factors. CASTL Workshop, "The Syntax and Semantics of Measurement" University of Tromsø, 2007.

Fred Landman. Count nouns – mass nouns – neat nouns – mess nouns. *The Baltic International Yearbook of Cognition*, 6:1–67, 2011.

Godehard Link. The logical analysis of plurals and mass terms: A lattice-theoretic approach. In P. Portner and B. H. Partee, editors, *Formal Semantics - the Essential Readings*, pages 127–147. Blackwell, 1983.

Alexander Mourelatos. Events, processes and states. *Linguistics and Philosophy*, 2:415–434, 1978.

John Payne and Rodney Huddleston. Nouns and noun phrases. In Geoffrey Pullum and Rodney Huddleston,

editors, *The Cambridge grammar of the English language*, pages 323–524. Cambridge University Press, 2002.

Francis Jeffry Pelletier. Non-singular reference: Some preliminaries. *Philosophica*, 5(4):451–465, 1975.

Francis Jeffry Pelletier and Lenhart K. Schubert. Mass expressions. In D. Gabbay and F. Guenthner, editors, *Handbook of Philosophical Logic Vol. 10*, pages 1–87. Kluwer, 1989/2002.

W. V. Quine. *Word and Object*. The Mit Press, 1960.

Malka Rappaport Hovav. Lexicalized meaning and the internal temporal structure of events. In Susan Rothstein, editor, *Theoretical and Crosslinguistic Approaches to the Semantics of Aspect*. John Benjamins, 2008.

Susan Rothstein. Counting and the mass/count distinction. *Journal of Semantics*, 27(3):343–397, 2010. doi: 10.1093/jos/ffq007.

Peter Sutton and Hana Filip. Vagueness, countability, and non-overlap: A type-theoretical approach. ms Heinrich-Heine-Universität Düsseldorf, 2015.

Barry Taylor. Tense and continuity. *Linguistics and Philosophy*, 1:199–220, 1977.

Henk Verkuyl. *On the Compositional Nature of the Aspects*. Reidel, Dordrecht, 1972.

Yulia Zinova and Hana Filip. Meaning components in the constitution of russian verbs: Pre-suppositions or implicatures? *Proceedings of Semantic and Linguistic Theory*, XXIV, 2014.

A. Zucchi and M. White. Twigs, sequences and the temporal constitution of predicates. In T. Galloway and J. Spence, editors, *Proceedings from Semantics and Linguistic Theory VI*. 1996.

A. Zucchi and M. White. Twigs, sequences and the temporal constitution of predicates. *Linguistics and Philosophy*, 24(2):223–270, 2001.

4 Contact Information

Hana Filip (Full Professor, Heinrich-Heine-Universität Düsseldorf)

filip@phil.hhu.de

http://user.phil-fak.uni-duesseldorf.de/~filip

Department of Linguistics
Institute of Language and Information
Building 24.53, Floor 00, Room 94
Heinrich-Heine-Universität Düsseldorf
Universitätsstr. 1
40225 Düsseldorf, Germany

Tel: +49 (0)211 81-12554 (Dept. Office)
Tel: +49 (0)211 81-13443
Fax: +49 (0)211 81-11325 (Dept. Office)

Peter Sutton (Postdoctoral researcher, Heinrich-Heine-Universität Düsseldorf)

peter.r.sutton@icloud.com

http://www.peter-sutton.co.uk

Department of Linguistics
Institute of Language and Information
Building 24.53, Floor 00, Room 85
Heinrich-Heine-Universität Düsseldorf
Universitätsstr. 1
40225 Düsseldorf, Germany

Tel: +49 (0)211 81-12554 (Dept. Office)
Tel: +49 (0)211 81-10384
Fax: +49 (0)211 81-11325 (Dept. Office)