

## Lecture 12: The Event Argument, Aspect and Quantification

1. Landman’s Chapter 1: The Davidsonian theory of event arguments .....	1
1.1. The Modifier Argument.....	2
2. Mass-Count and Process-Event.....	7
2.1. The Mass-Count distinction.....	7
2.2. Link’s atomic/non-atomic lattices for mass/count/plural.....	8
2.3. Processes and Events and Verbal Aspect.....	9
3. Extending Link’s semantics to Eventualities.....	10
3.1. Parallels with Mass/Count. (Bach 1986) .....	10
3.2. The Incremental Theme .....	10
Examples.....	11
3.3. Mass-Count and Process-Event Interactions.....	12
3.4. Stage-level and individual-level predicates.....	12
3.5. The ontology of entities and events.....	13
3.6. Type-shifting, Sort-shifting, and Markedness.....	13

**No assigned reading. Suggested readings are mentioned throughout. The main sources for this handout:**

**Part 1:** Landman, Fred. 2000. *Events and Plurality: The Jerusalem Lectures*: Studies in Linguistics and Philosophy v.76. Dordrecht: Kluwer

**Part 2:** From Filip (1999), Partee (1997, 1999) : about the parallels and interaction between the part-whole (“mereological”) structure of the event domain and the nominal domain, and consequences for the interaction of aspect and quantification.

**Reminder: All homework due at the last class, May 26. Bring all paperwork needed for ocnka or zacet on May 26. Review requirements for ocnka or zacet on the syllabus (given out day 1, also available online:**

[http://people.umass.edu/partee/RGGU\\_2005/RGGU05\\_formal\\_semantics.htm](http://people.umass.edu/partee/RGGU_2005/RGGU05_formal_semantics.htm)

### 1. Landman’s Chapter 1: The Davidsonian theory of event arguments

(Landman 2000) is a book devoted to the study of the interaction of events and plurality. The first three chapters are an excellent introduction to the motivation for and recent work in the semantic treatment of the “event argument.” Here we present the main ideas from Chapter 1, about the Davidsonian theory of event arguments, where Landman presents and evaluates arguments from (Parsons 1990) and some of his own.

The Davidsonian theory is actually a cluster of theories about **relations**, their **arguments**, and their **modifiers**.

- (1) a. Jones buttered the toast
- b. Jones buttered the toast slowly in the bathroom with a knife.

Classical (Montague 1973, Thomason and Stalnaker 1973): The verb *butter* expresses a 2-place relation of type  $\langle e, \langle e, t \rangle \rangle$ , and adverbs are functions from verbs to verbs (he’ll bring VP adverbs into the picture later; for what he says in this chapter, it doesn’t really matter whether they are verb to verb or VP to VP functions.)

- (2) a. BUTTER(j,t)
- b. ([WITH(k)(IN(b)(SLOWLY(BUTTER))))](j,t) i.e. (ADV (ADV (ADV (V))))(j,t)

(Davidson 1967), for non-statives:

- (3) a.  $\exists e$  [BUTTER(e,j,t)]
- b.  $\exists e$  [BUTTER(e,j,t)  $\wedge$  SLOWLY(e)  $\wedge$  IN(e,b)  $\wedge$  WITH(e,k)]

Three noteworthy differences: BUTTER becomes a 3-place relation with an event argument; the event argument is existentially quantified; and the modifiers are predicates of the event argument, added conjunctively.

The **neo-Davidsonian theory** (Higginbotham 1983) (Parsons 1990), goes further in two directions (separable; not everyone does both): central property is that the original arguments of the verb are also peeled off into conjuncts, by means of  $\theta$ -roles. Secondary extension is in applying the theory to all verbs including statives.

- (4) a.  $\exists e$  [BUTTER(e)  $\wedge$  AGENT(e)=j  $\wedge$  THEME(e)=t)]
- b.  $\exists e$  [BUTTER(e)  $\wedge$  AGENT(e)=j  $\wedge$  THEME(e)=t)  $\wedge$  SLOWLY(e)  $\wedge$  IN(e,b)  $\wedge$  WITH(e,k)]

Three salient features shared by Davidsonian and neo-Davidsonian theories:

- 1. Extra implicit event (or state) argument.
- 2. Modifiers are predicates of the event argument.
- 3. At the sentence level, we find  $\exists e$ .

Parsons 1990 gave three kinds of arguments in favor of the (neo-) Davidsonian theory, and these three kinds of arguments are examined in this chapter, with Landman’s assessment. They are: (i) The Modifier Argument, which Landman considers the strongest and examines in most detail. (ii) Argument from explicit event reference, which Landman considers not so plausible except insofar as it is connected to the modifier argument. (iii) Argument from the semantics of perception verbs, which Landman finds more complex and not conclusive.

#### 1.1. The Modifier Argument

Start with adjectives (and predicative PPs), then look at similarities and differences in the case of adverbials.

- (5) a. John is a blue-eyed, blond, forty-year-old American with a beard, in his midlife crisis, dressed in a suit.

Classical analysis: stacking all the modifiers (see (5b) in the book), since all are analyzed uniformly as  $\langle \langle e, t \rangle, \langle e, t \rangle \rangle$  (really an intensional variant thereof; keep extensional types here just for simplicity). [Why analyzed as functions? because some adjectives MUST be analyzed as functions from properties to properties (*former*, *alleged*), and people believed in uniformity of category-type correspondence.]

**Problems:**

1. **Permutation**
2. **Drop**

- (5) c. John is a forty-year-old, blond, blue-eyed American, dressed in a suit, with a beard, in his midlife crisis.
- d. John is a blue-eyed, forty-year-old American, in his midlife crisis.

**Exceptions:**

**Real:** with *former, alleged, potential* – the intensional modifiers.

**Apparent:** *tall, large, small, wide, old* (in the sense of age)

For the latter case, (Kamp 1975) gave arguments that they should be analyzed as vague intersective (i.e.  $\langle e, t \rangle$ ) modifiers rather than as intensional modifiers. Their vagueness involves a comparison class, and the context has to help provide one. The accompanying noun is often the most salient cue, but not always, as illustrated in an example from (Kamp and Partee 1995).

- (8) a. My 2-year-old son built a really tall snowman yesterday. [corrected examples]  
 b. The D.U. fraternity brothers built a really tall snowman last weekend.

If these vague adjectives are considered to have invisible relativization to a contextual parameter that sets ‘how tall is tall’, i.e. where the ‘positive extension’ of the adjective cuts off, then apparent violations of Permutation and Drop for these adjectives are only apparent, not real. They result from changing the sentence in such a way that our most natural assumptions about the contextual standards will shift, and therefore we are interpreting the modifiers differently in the premise and the conclusion. When we make the standards explicit, we see that the arguments are indeed valid. There is no analogous way to ‘save’ the arguments in the case of the really intensional modifiers.

- (9) a. Jumbo is a small [for a pink elephant] elephant.  
 b. Jumbo is a pink small [for a pink elephant] elephant. From 9a, a case of Permutation.  
 c. Jumbo is a small [for a pink elephant] elephant. From 9a, a case of Drop.

Okay, so we see that Permutation and Drop hold for a large class of modifiers. How do we account for this? With noun N and modifiers A, B, C, we have the structure:

- (10) a.  $A(B(C(N)))(x)$

And we want to account for the fact that this entails all permutations of the modifiers, and all instances of Drop, and of combinations of Drop and Permutation.

Standard response: Different adjectives are subject to different Meaning Postulates. For example,

**Subsectivity:** A meaning postulate for all these modifiers could say that for each (relevant) modifier A and any simple or complex noun [common noun phrase] N,  $A(N)(x)$  entails  $N(x)$ .

This allows outer modifiers to drop one at a time, but it doesn’t accomplish Permutation, and it doesn’t allow the drop of “middle” modifiers in a sequence.

A way to be able to drop middle modifiers:

**Monotonicity.** If  $A(N)(x)$  and N entails M, then  $A(M)(x)$ .

Example of how it works. Let N be the complex noun in 5i, M that in 5j, and let A be *blond*. Since 5i entails 5j, it follows with monotonicity that 5k entails 5l. [Question for the class: what does entailment mean between common noun phrases? This is analogous to the generalizing of conjunctions across types in Partee and Rooth.]

- (5) i. blue-eyed forty-year-old American  
 j. forty-year-old American  
 k. blond blue-eyed forty-year-old American  
 l. blond forty-year-old American

But this still won’t suffice to get the full range of permutation facts. And in fact no meaning postulates that only mention single modifiers can get all the permutation facts, *unless* they in effect define the modifiers in terms of a different (potential) lexical item, like the meaning of the corresponding predicative adjective.

What we need, and what the classical theory in fact assumes, is the meaning postulate of **Intersectivity**.

**Intersectivity:** For every (intersective) adjective A and every simple or complex noun N there is a corresponding adjective meaning  $A_p$  of type  $\langle e, t \rangle$  such that

$$A(N)(x) \text{ iff } (A_p \cap N)(x).$$

Alternatively, still viewing the original A as a function of type  $\langle \langle e, t \rangle, \langle e, t \rangle \rangle$ , we can represent its meaning as follows:

$$A := \lambda P \lambda x. P(x) \wedge A_p(x)$$

Thus a modifier structure like (11a) together with intersectivity ends up with an interpretation like (11b) [where you now have the  $A_p$  versions of the adjectives, which Landman doesn’t mark in these formulas: his shifts are implicit], and filling in an argument j gives (11c).

- (11) a.  $A(B(C(N)))$   
 b.  $\lambda x. N(x) \wedge C(x) \wedge B(x) \wedge A(x)$   
 c.  $N(j) \wedge C(j) \wedge B(j) \wedge A(j)$

Since this is a conjunction, it entails any combination of Permutation and Drop. I.e. Intersectivity entails the properties Permutation and Drop.

What’s crucial for the analysis:

1. The modifier of the noun is **conjoined** with the noun.
2. The modifier is a **predicate** of the same type as the noun. (Only like types conjoin)
3. The argument of the noun is also the argument of the modifier.

Okay, so now let's look at adverbial modifiers. How much is the same? What's different?  
 And where we find Permutation and Drop, how can we capture them?

Restrictions on the domain of the discussion: ignore intensional adverbs like *allegedly*, *possibly*. And ignore purely syntactic restrictions on the positions in where certain types of adverbs can occur (restrictions which might limit Permutation for reasons unrelated to semantics).

Then we do find entailments of the Permutation and Drop kinds. (these are descriptive terms; how to analyze their basis is the challenge.)

- (12) a. Brutus examined Caesar quickly in the back through his toga with a stethoscope.  
 b. Brutus examined Caesar quickly with a stethoscope in the back through his toga.  
 c. Brutus examined Caesar quickly in the back with a stethoscope.

We can make the same argument as with adjectives. The situation is even worse, because Monotonicity is not valid for adverbs. Compare the valid (13) with the invalid (14).

- (13) a. Every Yankee is an American.  
 b. John is a 40-year-old Yankee.  
 c. Therefore John is a 40-year-old American.
- (14) a. If you talk to a crowd, you move your thorax.  
 b. John talks to the crowd through a megaphone.  
 c. Therefore John moves his thorax through a megaphone. [Invalid]

Another principle that's valid for intersective adjectives but not for adverbs (of the relevant class, those that do show the patterns of Permutation and Drop):

"condensing" (no name in Landman):  $A(P)(x)$  and  $B(P)(x)$  entail  $A(B(P))(x)$

- (15) a. John is a blond American and John is a blue-eyed American.  
 b. Therefore John is a blond blue-eyed American. [valid]
- (16) a. Brutus examines Caesar with a stethoscope and Brutus examines Caesar in the back.  
 b. Therefore Brutus examines Caesar with a stethoscope in the back. [invalid]

We will have to account for the differences, but let's start, like Parsons, worrying about how to capture the similarities. Let's follow the lead of the analysis of intersective adjectives and assume the same basic analysis, one with the following properties:

1. Adverbial modifiers are **conjoined** with the predicate they modify.
2. Hence adverbial modifiers are themselves predicates of the same type as the verb.
3. The argument of the adverbial modifier is also the argument of the verb.

Problem: what argument can we be talking about? In the case of the noun, we had a 'referential argument' as the argument of all these  $\langle e, t \rangle$  predicates. But the verb or VP is normally taken to be an argument of its SUBJECT, and following that assumption will get us into big trouble.

If Brutus examined Caesar quickly in the back through his toga with a stethoscope, we might try to say that Brutus was quick, and maybe that Brutus was with a stethoscope (but those certainly seem 'accidentally almost ok') but we certainly can't say that Brutus was 'in the back' or that Brutus was 'through Caesar's toga'.

These problems might conceivably be fixed via meaning postulates; the absurdity of natural language paraphrases doesn't always mean the analysis is impossible.

Worse: the invalid inference in (16) will come out valid.

Why? [That's a thought question for you. The answer is in Landman's book (which is in the RGGU Linguistics collection) on p. 9]

Some more problems, then we get to the solution via the Davidsonian analysis, where the implicit event argument for verbs is analogous to the referential argument for nouns.

*stab* (or *examine*): classical (21b), Davidsonian (21c), neo-Davidsonian (21d)

- (21) a. *Stab*  
 b.  $\lambda y \lambda x. \text{STAB}(x,y)$   
 c.  $\lambda y \lambda x \lambda e. \text{STAB}(e,x,y)$   
 d.  $\lambda y \lambda x \lambda e. \text{STAB}(e) \wedge \text{AGENT}(e) = x \wedge \text{THEME}(e) = y$

*quickly*, *with a stethoscope* as modifiers of the verb. Structurally functions from verb meaning to verb meaning (endocentric: output type equals input type), but with meanings that decompose to a one-place predicate of events, conjoined to the verb predicate.

- (22) a. Quickly:  $\lambda V \lambda y \lambda x \lambda e. V(e,x,y) \wedge \text{QUICK}(e)$   
 b. With a stethoscope:  $\lambda V \lambda y \lambda x \lambda e. V(e,x,y) \wedge \text{WITH}(e,s)$
- (23) a. WITH A STETHOSCOPE(QUICKLY(EXAMINE))  
 b.  $\lambda y \lambda x \lambda e. \text{EXAMINE}(e,x,y) \wedge \text{QUICK}(e) \wedge \text{WITH}(e,s)$

We get Permutation and Drop. Good.

But what about the *differences* between adjectives and adverbs? Look at them in terms of "diamond entailments": 25a entails 25b, 25b entails 25c, but 25b does not entail 25a.

- (25) a.  $A(B(\text{STAB}))(b,c)$   
 b.  $A(\text{STAB})(b,c)$  and  $B(\text{STAB})(b,c)$   
 c.  $\text{STAB}(b,c)$

What was the situation with adjectives? All of the downward diamond entailments, PLUS the upward one from b to a.

But look what happens to the adjective entailments if instead of a referential subject (John is a blond, blue-eyed American) we have an existentially quantified subject: *Someone is a blond, blue-eyed American*. Then the pattern is just like that of the adverbs above: downward diamond yes, but not upward from b to a. (p.10)

So the difference is captured by positing that the event variable is existentially quantified at the level of the sentence, and (25b) can have two independent existential quantifications, so may be about two separate events.

This existential quantification also explains the lack of adverbial "swapping across verbs" ((29), p.11), and the lack of monotonicity for adverbs (14), formalized in (30), p. 11.

Package deal:

1. Verbs have an implicit argument
2. Modifiers apply to this argument as co-predicates to the verb
3. The argument is an event argument
4. It gets existentially closed.

Some theories may not be Davidsonian at first look but may be equivalent to Davidsonian theories. See discussion of (Cresswell 1985), pp 13-14. Object language vs metalanguage. The event argument may be indirect, but Landman is convinced it has to be there somewhere for things to work right. (I oversimplify.)

Variable polyadicity: many verbs have more than one possible combination of arguments; that's real. (McConnell-Ginet 1982) develops that perspective into a genuinely different theory of adverbs. See Landman Ch. 3.

## 2. Mass-Count and Process-Event. Incremental Theme. Aspect.

### 2.1. The Mass-Count distinction.

Mass nouns (uncountable): *water, grass, air, music, hope, love*<sub>1</sub>.

Count nouns: *table, tree, song, fact, problem*.

1. Grammaticized in some languages (English, Czech, Russian), not in others (Chinese, Thai).
2. All languages have some way(s) to express "massy" quantification vs. "counting" quantification.
3. Where there is no grammaticized lexical distinction, all basic lexical items may be viewed as mass-like, i.e. undifferentiated with respect to individuation; countability can be added by use of classifiers, etc.
  - (a) one fact, many facts, \*much fact
  - (b) \*one information, \*many informations, much information
  - (c) one trouble, many troubles, much trouble
  - (d) Classifier languages: \*one N, \*many N, one CI N, many CI N
  - (e) cf. one piece of information, one grain of wheat, etc.

4. Link's semantics (below) provides a good basis for showing that mass is the semantically unmarked member of the mass/count opposition, and also for showing similarities among mass and plural.

5. Mass-count is primarily a classification of predicates of things/stuff, a perspective we take on describing things. There are differences in the nature of things in the external world, but linguistic evidence does not support the idea of a partition of the entity domain (McCawley examples: *shoes/socks/footwear, hats/headgear, chairs/furniture*, etc.)

There is no need for a mass/count distinction among entities themselves, then. And there is also no evident need for a mass/count distinction among full NPs, which are normally interpreted either as denoting entities, or as generalized quantifiers, i.e. sets of properties, the sorts of properties that might be denoted by verb phrases, for instance, among which there is also no mass/count distinction.

The mass/count distinction is of importance in the internal building up of NPs, and applies principally to common nouns and CNPs. (Quine argued that notionally it can also apply to adjectives: e.g. *blue* is mass, and *spherical* is count. But that seems never to be grammaticalized.)

Determiners are not themselves mass/count but they may differentially select for mass/count, (e.g. *many* vs. *much*) so the main points in the grammar where mass/count matters are in places where determiners and nouns combine.

6. Meaning shifts. While the existence of the mass-count distinction in languages like English, Czech, and Russian is indisputable, the classification of particular nouns as one or the other is subject to shifts, with or without explicit derivational morphology.

(a) beer, two beers; pivo, dvě piva, dvě pivečka ("portions")

(b) wine, a good wine ("kinds")

(c) Lewis's "Universal Grinder": now there is chair all over the floor.

### 2.2. Link's atomic/non-atomic lattices for mass/count/plural.

"Domain of entities not just a non-empty set but endowed with an algebraic structure" (Link 1983, Link 1998)

The denotation of each count noun (including both singular and plural forms) is taken to have the structure of an atomic join semilattice, where the entities denoted by the singular form are the atoms and the "plural entities" denoted by the plural form are the non-atomic elements. The denotation of a mass noun, on the other hand, is taken to have the form of a non-atomic (not-necessarily-atomic) join semilattice.

Figure 1

Figure 2

(blackboard)

3. Lattice structure helps show what mass and plurals share, how mass and count differ, and how mass::count::process::event.

4. Unified interpretation for those determiners (and other expressions) that are insensitive to atomicity, i.e. which have same interpretation for mass and count domains: *the, all, some, no*.

a. *the horses*  
*the water*       $\sup(|P|)$  (supremum of the given semilattice)  
*the horse*

b. *most horses/ most water/\* most horse*: *most* requires *measure*; most natural measure on plurals is cardinality measure, but atomicity not intrinsic *per se*.

c. *three, every* : interpretation requires atomic lattice.

5. Mass lattice more general (unmarked) than count; languages without mass/count distinction describable as if all *mass*.

### 2.3. Processes and Events and Verbal Aspect

1. Three kinds of connections between mass/count and process/event

(i) Nominalizations (Mourelatos 1978): process verbs nominalize to mass nouns (production, singing), event verbs to count nouns (explosion, arrival). (Further lexical shifts can apply, of course.)

(ii) Direct structural analogies (Bach 1986): process verb is to event verb as mass noun is to count noun. More below.

(iii) Interactions and mutual constraints: *eat soup* is a process, *eat an apple* is an event. More below: this needs the notion of *incremental theme*.

2. As with nouns and entity domain, probably better not to posit an essential distinction within the domain of situations or "eventualities" (Bach), but to see the distinction as one among process **predicates** and event **predicates**, choices in description of aspects of reality. Examples:

(1) (Comrie 1976) Я стоял там час  
Я постоял там час  
Я простоял там час

(2) Three ways of looking at orbiting.

- (a) The moon is in orbit around the earth. (stative)
- (b) The moon has orbited the earth for millenia. (process)
- (c) The moon has orbited the earth 10 times in the last 9 months. (event)

3. Grammatically more complex in many languages than mass/count distinction, because many languages have a grammaticized aspectual system, and it may be distributed over various parts of the grammar. In the noun domains, the "operators" are mainly determiners, grammatical structure fairly clear; in the verb domains, the operators may be auxiliary verbs, modal verbs, adverbs of quantification, affixes (derivational or inflectional), etc. Distinctions to worry about (with sometimes conflicting uses of terminology) include process/event/state (semantic, ontological), telic/atelic (event types; linguistic or ontological?), perfective/imperfective (aspectual); which are properties of (predicates of) things in the domain, which are properties of verbs, which of VPs or verbal complexes, or "inflectional phrases" or sentences?

### 3. Extending Link's semantics to Eventualities.

#### 3.1. Parallels with Mass/Count. (Bach 1986)

The denotation of each event predicate is taken to have the structure of an atomic join semilattice, where the "minimal" events denoted by the predicates are the atoms and the "non-minimal" events denoted by the predicates are the non-atomic elements. The denotation of a state or process predicate, on the other hand, is taken to have the form of a non-atomic (not-necessarily-atomic) join semilattice.

1. *much:many :: for 3 hours: 3 times*

2. shifts via "Universal Grinder" (idea from David Lewis, reported in (Pelletier 1971), via conventional packaging, and shifting to "kinds".

(a) every concrete count noun can have a mass counterpart via the Universal Grinder.

(b) every concrete "instantaneous" event can have a process counterpart via the Universal Slow-Motion Camera. (falling, noticing, arriving, crossing the finish line, exploding).

(But note (thanks to Elena Paducheva): The "slow-motion camera" shift is not universally available as a productive meaning shift in every language: some Russian verbs allow only an iterative reading for derived imperfectives.)

3. The "progressive paradox" and comparable "partitive problem"

(a) John was writing a symphony when he died.

(b) This is part of a symphony.

#### 3.2. The Incremental Theme

(Dowty 1989, 1991, Filip 1992, 1993, 1996, 1999, Krifka 1986, 1987, 1989a, 1989b, 1992). Here I am summarizing briefly from Filip (1999); she gives a nice summary of Krifka's and Dowty's work: the two of them jointly are responsible for the idea.

The phenomena to be explained can be seen in the examples in section II below: with some verbs, the "quantization" status of one of its NP arguments has an effect on whether the resulting VP is quantized (event-denoting, telic) or cumulative (process-denoting, atelic).

The Krifka-Dowty idea:

(1) **cumulativity vs quantization** is a notion that can be modelled in terms of atomic vs. non-atomic lattice structures in both the entity domain and the eventuality domain. (See also Bach 1986, Link 1987). (This is also reviewed in Partee 1997, 1999).

Cumulative: soup, apples (bare mass noun, bare plural count noun)

Quantized: the soup, an apple, the apple, two apples

Cumulative: run, sit, stir, watch, eat soup, eat apples, build houses (states, processes)

Quantized: die, break, build a house, eat the soup, eat an apple

**Definition** (Krifka 1986, repeated as (23) in Filip 1999, p. 94)

(23) A predicate P is **cumulative** iff

$\forall x \forall y [P(x) \wedge P(y) \rightarrow P(x \oplus y)]$  (provided P is a predicate that applies to at least two distinct entities; otherwise cumulativity is undefined for P).

In words: P is cumulative iff whenever it applies to x and to y, it applies to the mereological sum of x and y.

A predicate P is **quantized** iff  
 $\forall x \forall y [P(x) \wedge P(y) \rightarrow \neg y < x]$

In words: whenever P applies to x and y, y cannot be a proper part of x.

### Examples

**Cumulative:** If x is soup and y is soup, then x plus y is soup; if e1 can be characterized by 'run' and e2 can be characterized by 'run', then the mereological sum of e1 and e2 can be characterized by 'run'. It's harder to say this nicely in the metalanguage in the case of verbs – one often resorts to nominalization, saying "if e1 constitutes (some) running and e2 constitutes running, then e1 plus e2 constitute (some) running". But in the case of verbs, it's more customary to use the "in 2 hours"/ "for 2 hours" test.

"an apple": if x is an apple and y is an apple, then it is **not** in general the case that x plus y is an apple. (It happens only when x and y happen to be the same apple.)

"break": If e1 is a breaking event and e2 is a breaking event, then e1 plus e2 is not in general a breaking event.

**Quantized:** If x is an apple, then no proper part of x is an apple. (That's equivalent to: If x is an apple and y is an apple, then y is not a proper part of x.) If x is an event of building a house, then no proper part of x is an event of building a house.

Conversely, if x is "apples", then there may be proper parts of x that are "apples". And if e is "running", then there may be proper parts of e that are "running".

(2) The **homomorphism** idea behind **incremental theme**: A part of the meaning of certain episodic predicates, those that have incremental themes, is the entailment that there exists a homomorphism between the lattice structure (part-whole structure) associated with the Incremental Theme argument and the lattice structure associated with the event argument.

I.e., if there is such an entailment with respect to a certain argument, that argument is an Incremental Theme, or has the property "Incremental Theme".

On this account, the object of *eat* is an Incremental Theme because parts of the thing eaten correspond to parts of the eating event. The object of *throw* is not an Incremental Theme, because parts of the thing thrown do not correspond to parts of the throwing event.

Note: in the case of verbs of motion, the thing that moves (which Dowty calls "Holistic Theme") is not an incremental theme; but the Path generally plays a role corresponding to incremental theme. Sometimes the term Incremental Path Theme is used, because syntactically, paths are generally expressed differently from ordinary Incremental Themes, and are often left implicit or only partially specified (e.g. one end point may be specified by a PP such as *to Chicago*.)

(3) The homomorphism provides a semantic explanation of the basic correlation between quantization of the Incremental Theme and aspect of the resulting verb phrase:

#### The generalization:

When the Incremental Theme is cumulative, the corresponding verb phrase is atelic; when the Incremental Theme is quantized, the verb phrase is telic.

### 3.3. Mass-Count and Process-Event Interactions.

(R. Macaulay, Verkuyl (Verkuyl 1972), Vendler (Vendler 1967), Dowty (Dowty 1979, Dowty 1982), Hinrichs (Hinrichs 1986), Krifka (Krifka 1987, Krifka 1989, Krifka 1992, Krifka 1998), Link (Link 1983, Link 1987, Link 1998), Filip (Filip 1992, Filip 1993, Filip 1996, Filip 1999))

1. English: quantificational properties of the "Incremental Theme" constrain aspectual interpretation of unmarked verbs.

	for 30 min.	in 30 min.	"up"
(a) John ate soup	✓	*	*
(b) John ate the soup	(*)	✓	✓
(c) John ate apples	✓	*	*
(d) John ate 2 apples	(*)	✓	✓

2. Czech: aspectually marked verbs constrain the interpretation of unmarked bare mass and plural nouns in Incremental Theme role. (Filip 1992) (similar facts in Russian.)

- (a) Pil kávu. He drank/was drinking (some) coffee.
- (b) Vypil kávu. He drank up (all) the coffee.
- (c) Pletla svetry. She knitted/was knitting (some) pullovers.
- (d) Upletla svetry. She knitted-PF (all) the pullovers.

3. No such effect with non-Incremental Theme arguments.

- (a) Agnes watched birds/the birds [for 30 min./ \*in 30 min.]
- (b) Děti viděly chřestýše. The children saw (some/the) rattlesnakes.
- (c) Děti uviděly chřestýše. The children saw-PF (some/the) rattlesnakes.

### 3.4. Stage-level and individual-level predicates.

(1) Carlson (1977, 1980): the interpretation of bare plurals. See also Diesing 1992.

- (a) Opera tickets are available. (Stage-level: existential interp.)
- (b) Opera tickets are expensive. (Indiv-level: generic interp.)

(2) Interpretation: "Stage-level" predicates express properties of spatio-temporal manifestations of individuals, typically "temporary" properties, "episodic". "Individual-level" predicates express properties of individuals, including "kinds". Bare plurals denote kinds; predicating a stage-level property of a kind gets interpreted as saying that the kind has instantiations manifesting the given property.

Other structures sensitive to stage-level/individual-level predicates (see Kratzer (Kratzer 1995) and Diesing (Diesing 1992)):

- (3) Adjectival complements of perception verbs (Siegel 1976a, Siegel 1976b) (a)  
Mary saw Bill naked. (Stage-level)  
(b) \*Mary saw Bill intelligent. (Individual-level)
- (4) Existential there-construction (Milsark 1974, Milsark 1977)  
(a) There were dogs available. (st-level)  
(b) \*There were dogs intelligent. (i-level)

### 3.5. The ontology of entities and events.

*Event* vs. *entity* as a matter of perspective; frequently interchangeable.

Via nominalization, virtually anything can be regarded as an entity or individual (Cresswell 1973), and we tend to nominalize when we want to talk about anything, including *events*, *times*, *actions*, etc.

Less typical combinations: NPs with stage-level modifiers (3), and sentences with i-level main predicates (4) (Partee 1991)

- (3) How can there be a cherry that has no stone? ... A cherry when it's blooming, it has no stone.
- (4) A quadratic equation usually has two different solutions.

### 3.6. Type-shifting, Sort-shifting, and Markedness.

1. Items that are formally unmarked with respect to a given distinction can shift relatively easily among interpretations; items that are formally marked may not be able to shift without a change in formal marking. Lexical items shift interpretation more easily than grammatical constructions. The semantics of a grammatical construction may "coerce" (force) a lexical shift.

(a) "Blond" can shift between individual-level and stage-level interpretation; "being blond" is i-level only, "with blond hair" is stage-level only. "Red" is stage-level when predicated of a nose or cheeks, individual-level when predicated of a dress.

(b) English "wash the dishes" is unmarked for perfectivity or telicity, can shift easily between process and event readings under the influence of adverbs, etc.

(i) He washed the dishes for 30 minutes (but only got half of them done/ but didn't get any of them very clean.)

(ii) He washed the dishes in 30 minutes. (Conventional "packaging" of activity, with conventional beginning and end.)

Slavic verbs, (almost) all marked for aspect, do not shift without supporting morphological change.

(c) English "be sick", "be empty", "be dark", can shift to inchoative readings easily:

(i) When it was dark, they all came in.

(ii) I met him after he was sick. (ambiguous)

-- byl nemocný / onemocněl

(d) Czech and Russian bare mass nouns and plural nouns can shift easily between "definite" and "indefinite" interpretations (or perhaps are not to be seen as ambiguous at all).

English bare nouns have much more restricted interpretations, since English does not generally leave definiteness unmarked.

2. Incremental Theme and the different directionality of flow of information in English and Czech. (Filip)

(a) Pavel přepsal dopisy (inkoustem).

Pavel rewrote (all) the letters in ink.

(b) Pavel přepsal všechny dopisy (inkoustem)

(c) Pavel přepsal dopisy (?\*vším inkoustem)

(d) Pavel vypsal (na dopisech) (všechn) inkoust.

Pavel used up (all) the ink (on (some/the) letters)

3. Dowty, Krifka: homomorphism from the lattice structure associated with the Incremental Theme to the lattice structure associated with the event.

Filip: use unification-based approach: "verbal predicate and an Incremental Theme NP each provide partial information about a single linguistic object, a complex verbal predicate. [...] Constraints imposed by the language require that information coming from these two sources be compatible. [...] Languages may differ with respect to the localization of the relevant information in the surface syntax and morphology. In Czech, it is the verbal predicate that specifies more information than the Incremental Theme NP. In English, on the other hand, it is typically the Incremental Theme. The apparent "flow" in one direction is due to this imbalance in the encoding of information in the surface structure."

In both language groups, an "unbounded" verbal predicate and an "unbounded" Incremental Theme together lead to an atelic, imperfective, process-type sentence. Adding marked perfectivity to the verb (Slavic) or bounded quantification of the Incremental Theme (e.g. with an article in English) leads to a telic, perfective, event-type sentence.

## REFERENCES

In addition to the ones listed below, see also:

- Louise McNally and Gemma Boleda, 2004, Relational adjectives as properties of kinds. In *Empirical Issues in Formal Syntax and Semantics 5*, O. Bonami & P. Cabredo Hofherr, eds. 2004. pp. 179–196. <http://www.cssp.cnrs.fr/eiss5/mcnally-boleda/mcnally-boleda-eiss5.pdf>
- Larson, Richard K. 1998. Events and modification in nominals. In Devon Strolovitch and Aaron Lawson, eds., *Proceedings from Semantics and Linguistic Theory (SALT) VIII*. CLC Publications, Ithaca, NY, 145-168.
- Wechsler, Stephen. To appear. Resultatives under the 'Event-Argument Homomorphism' model of telicity. In *The Syntax of Aspect*, eds. Nomi Erteschik-Shir and Tova Rapoport. Oxford: Oxford University Press. <http://uts.cc.utexas.edu/~wechsler/Wechsler-result-Israel.pdf>
- Bach, Emmon. 1986. The algebra of events. *Linguistics and Philosophy* 9:5-16. Reprinted in Paul Portner and Barbara H. Partee, eds., *Formal Semantics: The Essential Readings*, Oxford: Blackwell (324-333).
- Carlson, Greg. 1977. A unified analysis of the English bare plural. *Linguistics and Philosophy* 1:413-458. Reprinted in Portner and Partee, eds., 2002, 35-74.
- Carlson, Gregory N. 1980. *Reference to Kinds in English*. New York: Garland Publishing Co.
- Comrie, Bernard. 1976. *Aspect: An Introduction to the Study of Verbal Aspect and Related problems*. Cambridge: Cambridge University Press.
- Cresswell, M. J. 1973. *Logics and Languages*. London: Methuen.
- Cresswell, Max. 1985. *Adverbial Modification*. Dordrecht: Reidel.
- Davidson, Donald. 1967. The logical form of action sentences. In *The Logic of Decision and Action*, ed. Nicholas Rescher, 81-95. Pittsburgh: Pittsburgh University Press.
- Diesing, Molly. 1992. *Indefinites*. Cambridge, MA: MIT Press.
- Dowty, David. 1979. *Word meaning and Montague grammar. The semantics of verbs and times in Generative Semantics and in Montague's PTQ*: Synthese Language Library. Dordrecht: Reidel.

- Dowty, David. 1982. Tenses, Time Adverbs, and Compositional Semantic Theory. *Linguistics and Philosophy* 5:23-55.
- Filip, Hana. 1992. Aspect and interpretation of nominal arguments. In *CLS 28: Papers from the Twenty-Eighth Meeting of the Chicago Linguistic Society*, eds. C.P. Canakis, G.P. Chan and J.M. Denton, 139-158. Chicago: Chicago Linguistic Society.
- Filip, Hana. 1993. Aspect, Situation Types and Nominal Reference, University of California at Berkeley: Ph.D. dissertation.
- Filip, Hana. 1996. Integrating telicity, aspect and NP semantics: the role of thematic structure. In *Formal Approaches to Slavic Linguistics 3: The College Park Meeting 1994*, ed. Jindrich Toman, 61-96. Ann Arbor, Mich.: Slavic Publications.
- Filip, Hana. 1999. *Aspect, Eventuality Types and Nominal Reference*. New York: Garland.
- Higginbotham, James. 1983. The logic of perceptual reports: an extensional alternative to Situation Semantics. *Journal of Philosophy* 80:100-127.
- Hinrichs, Erhard. 1986. Temporal Anaphora and Discourses of English. *Linguistics and Philosophy* 9:63-82.
- Kamp, Hans. 1975. Two theories about adjectives. In *Formal Semantics of Natural Language*, ed. Edward L. Keenan, 123-155: Cambridge University Press.
- Kamp, Hans, and Partee, Barbara. 1995. Prototype theory and compositionality. *Cognition* 57:129-191.
- Kratzer, Angelika. 1995. Stage-level and individual-level predicates. In *The Generic Book*, eds. Gregory N. Carlson and Francis Jeffrey Pelletier, 125-175. Chicago: The University of Chicago Press [original publication in 1989: Stage-Level and Individual-Level Predicates. In *Papers on Quantification*, ed. Emmon; Kratzer Bach, Angelika; Partee, Barbara: Department of Linguistics, University of Massachusetts at Amherst].
- Krifka, Manfred. 1987. Nominal reference and temporal constitution: towards a semantics of quantity. In *Studies in Discourse Representation Theory and the Theory of Generalized Quantifiers (= GRASS Series No. 8)*, eds. Jeroen Groenendijk, Martin Stokhof and Frank Veltman, 153-173. Dordrecht: Foris.
- Krifka, Manfred. 1989. *Nominalreferenz und Zeitkonstitution. Zur Semantik von Massentermen, Pluraltermen und Aspektklassen: Studien zur Theoretischen Linguistik*. München: Wilhelm Fink Verlag.
- Krifka, Manfred. 1992. Thematic relations as links between nominal reference and temporal constitution. In *Lexical Matters*, eds. Ivan Sag and Anna Szabolcsi, 29-53. Stanford: CSLI.
- Krifka, Manfred. 1998. The origins of telicity. In *Events and grammar*, ed. Susan Rothstein, 197-235. Dordrecht: Kluwer.
- Landman, Fred. 2000. *Events and Plurality: The Jerusalem Lectures: Studies in Linguistics and Philosophy* v.76. Dordrecht: Kluwer.
- Link, Godehard. 1983. The logical analysis of plurals and mass terms: A lattice-theoretical approach. In *Meaning, use and the interpretation of language*, eds. R. Bäuerle, C. Schwarze and A. von Stechow, 303-323. Berlin, New York: Walter de Gruyter. Reprinted in Link, Godehard. 1998. *Algebraic Semantics in Language and Philosophy: CSLI lecture notes No. 74*. Stanford, Calif.: CSLI Publications. pp.11-34. Reprinted in Portner and Partee, eds., 2002, 127-146.
- Link, Godehard. 1987. Algebraic semantics of event structures. In *Proceedings of the Sixth Amsterdam Colloquium*, eds. Jeroen Groenendijk, Martin Stokhof and Frank Veltman, 243-262. Amsterdam: ITLI. Reprinted in Link 1998, pp. 251-268.
- Link, Godehard. 1998. *Algebraic Semantics in Language and Philosophy: CSLI lecture notes No. 74*. Stanford, Calif.: CSLI Publications.

- McConnell-Ginet, Sally. 1982. Adverbs and Logical Form. *Language* 58:144-184.
- Milsark, Gary. 1974. Existential sentences in English, MIT: Ph.D. dissertation.
- Milsark, Gary. 1977. Toward an explanation of certain peculiarities of the existential construction in English. *Linguistic Analysis* 3:1-29.
- Montague, Richard. 1973. The proper treatment of quantification in ordinary English. In *Approaches to Natural Language*, eds. K.J.J. Hintikka, J.M.E. Moravcsik and P. Suppes, 221-242. Dordrecht: Reidel. Reprinted in Montague 1974, 247-270; Reprinted in Portner and Partee, eds., 2002, 17-34.
- Mourelatos, Alexander. 1978. Events, Processes, and States. *Linguistics and Philosophy* 2:415-434.
- Parsons, Terence. 1990. *Events in the Semantics of English. A Study in Subatomic Semantics*. Cambridge MA: MIT Press.
- Partee, Barbara. 1991. Adverbial Quantification and Event Structures. *BLS* 17.
- Partee, Barbara H. 1997. Vid i interpretacija imennyx grupp ("Aspect and the interpretation of Noun Phrases"). In *Trudy Aspektologicheskogo Seminara Filologicheskogo Fakul'teta MGU im. Lomonosova, Vol. 3*, ed. Marina Chertkova, 121-140. Moscow: Moscow University Press.
- Partee, Barbara H. 1999. Nominal and temporal semantic structure: aspect and quantification. In *Prague Linguistics Circle Papers*, v.3, eds. E. Hajicová, T. Hoskovec, O. Les'ka, P. Sgall and Z. Skoumalová, 91-108. Amsterdam: John Benjamins Pub. Co.
- Pelletier, Francis Jeffrey. 1971. Some Problems of Non-Singular Reference: A Logic for Mass, Sortal, and Adverbial Terms, Philosophy, UCLA.
- Siegel, Muffy. 1976a. Capturing the Russian adjective. In *Montague Grammar*, ed. Barbara H. Partee, 293-309. New York: Academic Press.
- Siegel, Muffy E.A. 1976b. Capturing the Adjective, University of Massachusetts: Ph.D. dissertation.
- Thomason, Richmond, and Stalnaker, Robert. 1973. A semantic theory of adverbs. *Linguistic Inquiry* 4:195-220.
- Vendler, Zeno. 1967. Verbs and Times. In *Linguistics in Philosophy*, ed. Zeno Vendler, 97-121. Ithaca: Cornell University Press.
- Verkuyl, Henk J. 1972. *On the compositional nature of the aspects: Foundations of Language Suppl, Series 15*. Dordrecht: Reidel.