

The Syntax and Semantics of Inner Aspect

Class 2: Theories of aspectual composition, the semantics of direct objects in (a)telic expressions

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Introduction

- While Vendler (1957) proposes an event classification based on verbs, it becomes clear later on that event type is determined by the verb and other elements in the clause (e.g. the direct object and various adverbial elements).
- **Central data for today:**
 - (1) a. Judith ate a sandwich. (accomplishment)
 - b. Judith ate sandwiches. (activity)
 - c. Judith ate bread. (activity)
 - d. Judith ate the bread. (accomplishment)

(Verkuyl 1993: 5)

Introduction

- **Verkuyl's Generalization:** Telic interpretation can only emerge in the context of a direct argument with property α .

(Borer 2005: 73)

An important goal is to determine property α , i.e. come up with a proper characterization of direct objects that give rise to telicity.

Three influential examples that we discuss today:

- Verkuyl (1972, 1993) suggests that terminative aspect (i.e. boundedness/telicity) is ensured by the presence of NP arguments associated with the semantic feature [+SQA] (specified quantity),
- Krifka (1989, 1992, 1998) argues for quantization,
- Borer (2005) proposes the notion 'quantity' defined as non-homogeneity.

Verkuyl's aspectual algebra

- **Central idea:** Only a combination of a verb associated with the semantic feature [+ADD TO] (where [+ADD TO] stands for 'movement') with one or more of its NP arguments associated with the feature [+SQA] gives rise to a "compositionally formed (and hence semantic) terminative inner aspect" (Verkuyl 1993: 17).
- The property [+ADD TO] together with the property [+SQA] contributed by the NP arguments can be said to map onto an event.
- Events are conceived of as temporal entities that can be counted and quantified over.

Verkuyl's aspectual algebra

- Terminative aspect arises if the verb and the NP arguments carry a plus-feature. Otherwise, durative aspect obtains.

(2) a. Judith ate three sandwiches	$[+SQA] + [+ADD\ TO] + [+SQA] = [+T]$
b. Judith ate sandwiches	$[+SQA] + [+ADD\ TO] + [-SQA] = [-T]$
c. Judith ate no sandwich	$[+SQA] + [+ADD\ TO] + [-SQA] = [-T]$
d. Judith wanted nothing	$[+SQA] + [-ADD\ TO] + [-SQA] = [-T]$
e. Nobody ate a sandwich	$[-SQA] + [+ADD\ TO] + [+SQA] = [-T]$
f. Nobody ate sandwiches	$[-SQA] + [+ADD\ TO] + [-SQA] = [-T]$
g. Judith wanted a sandwich	$[+SQA] + [-ADD\ TO] + [+SQA] = [-T]$
h. No one wanted a sandwich	$[-SQA] + [-ADD\ TO] + [+SQA] = [-T]$

(Verkuyl 1993: 20)

Verkuyl's aspectual algebra

- Verkuyl adopts an asymmetric construal of terminative aspect in light of (3) and (4).

(3) [[Judith ate] three sandwiches] ([+SQA] + [+ADD TO]) + [+SQA]

(4) [Judith [ate three sandwiches]] [+SQA] + ([+ADD TO] + [+SQA])

- Terminative aspect is not formed on the basis of plus-features only. If it was, *Judith ate* would have to be interpreted as [+T], contrary to fact. So, (4) seems more plausible.
- In light of these data, we need to distinguish between terminative VP-aspect and terminative S-aspect.

Verkuyl's aspectual algebra

Here is the updated version of (2):

(5) a. ate three sandwiches

b. ate sandwiches

c. wanted a sandwich

d. wanted sandwiches

e. Judith ate three sandwiches

f. Judith ate sandwiches

g. Nobody ate a sandwich

h. No one wanted sandwiches

$$[+ADD\ TO] + [+SQA] = [+T]_{VP}$$

$$[+ADD\ TO] + [-SQA] = [-T]_{VP}$$

$$[-ADD\ TO] + [+SQA] = [-T]_{VP}$$

$$[-ADD\ TO] + [-SQA] = [-T]_{VP}$$

$$[+SQA] + [+T_{VP}] = [+T]$$

$$[+SQA] + [-T_{VP}] = [-T]$$

$$[-SQA] + [+T_{VP}] = [-T]$$

$$[-SQA] + [-T_{VP}] = [-T]$$

Verkuyl's aspectual algebra

- The feature algebra alone does not explain what properties NPs associated with [+SQA] share or what properties verbs with [+ADD TO] have.
- A highly influential analysis aiming to do this is Krifka's mereological theory, to be discussed next.

Krifka's mereological approach to aspectual composition: some predecessors

- Krifka (1986, 1989, 1992, 1998) models the semantics of verbal predicates like *eat apples/soup* and *eat the/an apple* as part structures, which are also used to model the semantics of mass nouns and plurals in previous work by Link (1983).
- Other predecessors to Krifka are Bennett & Partee (1972), Taylor (1977), and Dowty (1979), where the mereological notion of *a part* appears in the characterization of verbal predicates with respect to the time intervals associated with these predicates.

Krifka's mereological approach to aspectual composition: some predecessors

- The subinterval property: "Subinterval verb phrases have the property that if they are the main verb phrase of a sentence which is true at some interval of time I , then the sentence is true at every subinterval of I including every moment of time in I " (Bennett & Partee 1972: 17).

Some examples that have the subinterval property: *walk, run, push a cart*

Krifka's mereological approach to aspectual composition: some predecessors

- This is how Dowty (1979: 166) describes activities versus accomplishments/achievements based on Taylor (1977):

If α is an accomplishment/achievement verb, then if $\alpha(x)$ is true at I , then $\alpha(x)$ is false at all subintervals of I .

If α is an activity verb, then if $\alpha(x)$ is true at I , then $\alpha(x)$ is true for all subintervals of I which are larger than a moment.

Krifka's mereological approach to aspectual composition: some predecessors

- Bach (1981, 1986) also integrates insights from the previous works into his analysis of eventuality types, where a basic distinction is made between events and processes.
- On this view, events like *build a cabin* and *notice something* have the property of antisubdivisibility, which corresponds to Krifka's quantization property and lack additivity, corresponding to Krifka's cumulativity (to be discussed shortly). Processes like *run* and *push a cart* are characterized by additivity and the lack of antisubdivisibility.
- Bach (1981: 70): "Note that it is not correct to say that a process can always be subdivided into parts that are also processes of the same kind. The point is that sometimes processes can be so subdivided but events never can".

Krifka's mereological approach to aspectual composition: part structures

(6) Krifka (1998) describes part structures, associated with events, objects and times, as follows:

$P = \langle U_P, \oplus_P, \leq_P, <_P, \otimes_P \rangle$ is a *part structure* iff

a. U_P is a set of entities;

b. $\oplus_P$, the *sum operation*, is a function from $U_P \times U_P$ to U_P . The sum operation has the following properties:

(i) commutativity: $\forall x, y \in U_P [x \oplus_P y = y \oplus_P x]$

(ii) idempotency: $\forall x, y \in U_P [x \oplus_P x = x]$

(iii) associativity: $\forall x, y, z \in U_P [x \oplus_P [y \oplus_P z] = [x \oplus_P y] \oplus_P z]$

c. the following two-place relations apply:

(i) the part relation, defined as: $\forall x, y \in U_P [x \leq_P y \leftrightarrow x \oplus_P y = y]$

(ii) the proper part relation, defined as: $\forall x, y \in U_P [x <_P y \leftrightarrow x \leq_P y \wedge x \neq y]$

(iii) the overlap relation, defined as: $\forall x, y \in U_P [x \otimes_P y \leftrightarrow \exists z \in U_P [z \leq_P x \wedge z \leq_P y]]$

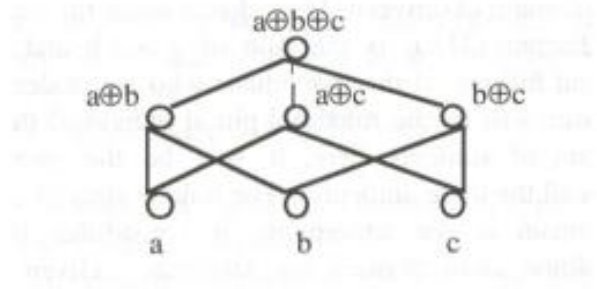
d. Remainder principle: $\forall x, y \in U_P [x <_P y \Rightarrow \exists! z [\neg [z \otimes_P x] \wedge x \oplus_P z = y]]$

(Krifka 1998: 199, (1))

Krifka's mereological approach to aspectual composition: part structures

- The part structure defined above is a complete join semi-lattice depicted by the following Hasse Diagram (see also Filip 1999: 46-50):

(7)



The lowest circles stand for individuals like John, Mary and objects like individual books.

For the entities a and b , there is a sum entity $a \oplus b$. So, with the sum operation, we can define sums of individuals.

The elements which join to form a sum are called the parts of the sum.

Krifka's mereological approach to aspectual composition: part structures

- An important motive for the part structure representation of events and that of objects is the following parallel between nominal and verbal predicates: Count:mass = telic:atelic.
- This is how Filip (2012: 736) discusses this parallel: "what *boy* and also *arrive* describe has no proper parts that are again describable by *boy* and *arrive*, respectively".
- By contrast, mass terms like *water* are similar to atelic predicates like *run*, which have proper parts that are again describable by *water* and *run*, respectively.

Krifka's mereological approach to aspectual composition: quantized vs. cumulative

- Krifka (1998: 200) captures this difference between count/telic and mass/atelic expressions by introducing the properties of quantization and cumulativity:

(8) Quantization: $\forall X \subseteq U_P [\text{QUA}_P(X) \leftrightarrow \forall x, y [X(x) \wedge X(y) \rightarrow \neg y <_P x]]$

Krifka's example: If x falls under *three apples*, then it cannot have a proper part y that also falls under *three apples*. See also *three liters of water*, *the apple* and *an apple*.

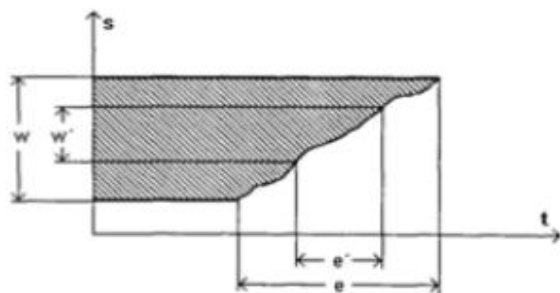
(9) Cumulativity: $\forall X \subseteq U_P [\text{CUM}_P(X) \leftrightarrow \exists x, y [X(x) \wedge X(y) \wedge \neg x=y]$
 $\wedge \forall x, y [X(x) \wedge X(y) \rightarrow X(x \oplus_P y)]]$

Krifka's example: If x and y fall under *apples*, then the sum of x and y falls under *apples* as well. See also *water*.

Krifka's mereological approach to aspectual composition: gradual change

- Another central assumption on this analysis is that the part structures of events and the part structures of objects are related to each other by homomorphic relations directly associated with some verbs.
- This is how Krifka (1992: 38) illustrates how the denotation of an event participant determines the structure of the denoted event:

(10)



Krifka's mereological approach to aspectual composition: the SINC

- Predicates like *eat* and *drink* encode the strict incremental relation (SINC), defined as follows in Krifka (1998: 213):

(11) θ is strictly incremental, $\text{SINC}(\theta)$, iff

$$(i) \text{MSO}(\theta) \wedge \text{UO}(\theta) \wedge \text{MSE}(\theta) \wedge \text{UE}(\theta)$$

$$(ii) \exists x, y \in U_P \exists e, e' \in U_E [y <_P x \wedge e' <_E e \wedge \theta(x, e) \wedge \theta(y, e')]$$

(12) θ shows mapping to subobjects, $\text{MSO}(\theta)$, iff

$$\forall x \in U_P \forall e, e' \in U_E [\theta(x, e) \wedge e' <_E e \rightarrow \exists y [y <_P x \wedge \theta(y, e')]]$$

Take *eat the apples*: For every proper part e' of e there is a proper part of the apples that was eaten at e' .

Krifka's mereological approach to aspectual composition: the SINC

(13) θ shows uniqueness of objects, $UO(\theta)$, iff

$$\forall x \in U_P \forall e, e' \in U_E [\theta(x, e) \wedge e' \leq_E e \rightarrow \exists! y [y \leq_P x \wedge \theta(y, e')]]$$

If e is an event of eating the apples, than it takes the whole e , not just part of it, to qualify for an eating of the apples.

(14) θ shows mapping to subevents, $MSE(\theta)$, iff

$$\forall x, y \in U_P \forall e \in U_E [\theta(x, e) \wedge y <_P x \rightarrow \exists e' [e' <_E e \wedge \theta(y, e')]]$$

If apples $a_1 \oplus a_2$ are eaten incrementally in an event e , then there is a proper part e' of e such that the apple a_1 was eaten at e' .

Krifka's mereological approach to aspectual composition: the SINC and the INC

(15) θ shows uniqueness of events, UE(θ), iff

$$\forall x, y \in U_P \forall e \in U_E [\theta(x, e) \wedge y \leq_P x \rightarrow \exists! e' [e' \leq_E e \wedge \theta(y, e')]]$$

If apples $a_1 \oplus a_2$ are eaten incrementally in event e , then there is a unique part e' of e at which apple a_1 is eaten.

- A looser incremental relation called the INC is encoded by verbs like *read*, associated with events that progress through subparts of the theme incrementally, but a subpart of the theme can be mapped to more than one subevent (*read a book* can describe situations where a chapter of the book is read more than once), so *read* is associated with a homomorphism that does not have the UE property.
- Krifka (1998) also provides an analysis of aspectual composition regarding motion predicates like *walk from the university to the capitol*.

Krifka's mereological approach to aspectual composition: the definition of telicity

- Krifka's (1998: 207) definition of telicity:

$$(16) \forall X \subseteq U_E [\text{TEL}_E(X) \leftrightarrow \forall e, e' \in U_E [X(e) \wedge X(e') \wedge e' \leq_E e \rightarrow \text{INI}_E(e', e) \wedge \text{FIN}_E(e', e)]]$$

A telic predicate is such that it does not describe any subevent e' that does not contain the initial and final parts of e .

Krifka's mereological approach to aspectual composition: the definition of telicity

- Beavers (2012: 34) notes that (16) makes incorrect predictions with respect to examples like (17).

(17) John walked to the capitol in/?for ten minutes.

Since the source of walking is not specified, various events with different initial points are in the denotation of (17), which is then predicted to be atelic.

This is a problem since the temporal adverbial test diagnoses telicity.

Krifka's mereological approach to aspectual composition: the definition of telicity

- In response to this problem, Beavers (2012: 35) drops the notion of initial subevents from his definition of telicity given in (18). See also Krifka (1992), where initial subevents do not appear in the definition of telicity.

$$(18) \forall X \subseteq U_E [\text{TEL}_E(X) \leftrightarrow \forall e, e' \in U_E [X(e) \wedge X(e') \wedge e' \leq_E e \rightarrow \text{FIN}_E(e', e)]]$$

This definition is compatible with (17) and the intuition that telicity is a property of predicates expressing events that have a natural end point.

- We will see that this idea is fundamentally challenged by Borer (2005), where co-finality is just a special case of telicity.

Some problems: the quantization puzzle

- Similarly to the predicate *walk to the capitol*, nominal expressions like *more than three apples*, *at least three apples* and *a sequence of numbers* are not characterized by quantized reference. And yet, the predicates in (19) are telic:

(19) a. John wrote a sequence of numbers in/?for one minute.

b. John ate at least three apples in/?for ten minutes.

- Zucchi and White (2001) propose that introduce a maximalization operator at the level of DPs to ensure that objects like *at least three apples* are interpreted with quantized reference. (Such object DPs are argued to determine sets of maximal participants, which is why they are quantized.)

Some problems: the quantization puzzle

- Rothstein (2004: 153), however, provides (20), along with other examples, where the object similar to the one in (19b), appears in an atelic predicate.

(20) John has owned more than half the houses on this street for the last five years, and he is adding to his property every few months.

As also discussed by Beavers (2012: 45), "if John has been buying up houses on this street incrementally, e could be an event of him owning 30 out of 40 houses and e' an event of him owning 29, both of which can be described by" (20).

Some problems: multiple incrementality

- That there is a single argument whose part structure is mapped to the part structure of the event is also challenged by the following examples from Beavers (2012: 25), adopted from Filip (1999: 100).

- (21) a. The earthquake shook a book off the shelf in/?for a few seconds.
- b. The earthquake shook books off the shelf for/??in a few seconds.
- c. The earthquake shook a book for/??in a few seconds.
- d. The earthquake shook books for/??in a few seconds.

Some problems: multiple incrementality

Another set of examples from Beavers (2012: 39-43) from the motion domain:

- (22) a. The liter of wine flowed onto the floor in/?for one minute.
b. The liter of wine flowed for/??in one minute.
c. Wine flowed onto the floor for/??in five minutes.
d. Wine flowed for/??in one minute.

Some problems: multiple incrementality

Beavers's generalization: The telicity of predicates is ensured if two incremental themes (two arguments determining aspectual composition) are available: a path with a specific goal point and a quantized figure DP (the DP whose referent undergoes some change).

- However, the notion of quantization is still a problem for examples like (19) and not every telic predicate is associated with a well-defined goal point (cf. the predicate *run around the corner* from class 1), as we will further discuss later.

Some more problems

- **Borer's (2005: 131-134) critique:**

(i) Telicity represented as a property calculated from the lexical semantics of the verb and that of the theme cannot be correct.

(23) a. We sang the baby asleep.

b. We ran our shoes threadbare.

Direct objects may give rise to telic structures when they are not arguments of the verb. This is a problem for a theory depending on the thematic relations between the verb and the object. See also MacDonald (2008) for a similar claim in class 4.

Some more problems

(ii) There are problems with the mapping of subparts of events to subparts of objects (and vice versa).

(24) John built a house.

Not every subevent of building a house can be mapped onto house parts.

(iii) The object cannot provide a single end point for measuring out the event.

(25) We filled the room with smoke.

This example is compatible with multiple culmination points. We can continue filling the room with smoke after a culmination point where the room can be considered to be filled with smoke.

Borer's notion of quantity

In response to the previous problems, Borer (2005: 74) introduces a novel notion to explicate telicity: She proposes that telic event descriptions are quantities, in the sense that they involve quantification over event divisions, while atelic event descriptions are homogeneous.

(26) a. P is *homogeneous* iff P is *cumulative* and *divisive*.

i. P is *divisive* iff $\forall x [P(x) \rightarrow \exists y (P(y) \wedge y < x)] \wedge \forall x, y [P(x) \wedge P(y) \wedge y < x \rightarrow P(x-y)]$

ii. P is *cumulative* iff $\forall x [P(x) \wedge P(y) \rightarrow P(x \cup y)]$

b. P is *quantity* iff P is not homogeneous.

Borer's notion of quantity

- Note that Borer's notion of divisiveness requires every interval of P to be P (contra previous assumptions like that in Kiparsky 1998).
- Previous problematic cases like *eat more than three apples* and *eat at least three apples* are not divisive, so they are predicted to be telic.
- *Run to the store* is also a quantity and is thus predicted to be telic. Recall that this predicate is not quantized. Quantity is a weaker notion than Krifka's notion of quantization.
- By introducing the notion 'quantity'. Borer dispenses with Krifka's mapping to (sub)events and mapping to (sub)objects. Therefore, it is no longer predicted that event culmination is necessarily linked to the direct object being "exhausted" in the denoted situation.

Borer's notion of quantity

- Telicity is thus no longer just co-finality. Telic predicates may also be associated with intermediate culmination points (cf. *fill the room with smoke*).
- Overall, what is necessary for telicity is some subpart of an event with the property P which is not itself P .
- A final question for today: What about predicates associated with quantity direct objects and both telic and atelic construals?

Borer's notion of quantity

Here are some examples from Borer (2005: 128, 140-141)

- (27) a. Kim pushed the button/the lever.
b. Kim pulled the rope/the lever.
c. We read the bible in Church today for two hours.
d. Pat climbed the mountain in two hours/for two hours.
e. For how long do you intend to eat this chicken?

The ambiguity illustrated by the examples above is a fundamental property that Borer relies on when arguing for the syntactic instantiation of telicity.

- Telicity is not a combination of lexical properties of verbs and nouns on this view, but is read off of grammatical event structures which Borer calls quantity structures, to be discussed in detail in class 3.

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References

- Bach, Emmon. 1981. On time, tense, and aspect: an essay in English metaphysics. In P. Cole (ed.), *Radical Pragmatics*, 63-81. New York: Academic Press.
- Bach, Emmon. 1986. The algebra of events. *Linguistics and Philosophy* 9: 5-16.
- Beavers, John. 2012. Lexical aspect and multiple incremental themes. In V. Demonte and L. McNally (eds.), *Telicity, Change, and State: A Cross-Categorical View of Event Structure*, 23-59. Oxford: Oxford University Press.
- Bennett, Michael and Barbara Partee. 1972. *Toward the Logic of Tense and Aspect in English*. System Development Corporation. California: Santa Monica.

References

- Borer, Hagit. 2005. *Structuring Sense: The Normal Course of Events*, vol. 2. Oxford: Oxford University Press.
- Dowty, David. 1979. *Word Meaning and Montague Grammar*. Dordrecht: Reidel.
- Filip, Hana. 1999. *Aspect, Eventuality Types and Nominal Reference*. New York: Garland.
- Filip, Hana. 2012. Lexical aspect. In R. I. Binnick (ed.), *The Oxford Handbook of Tense and Aspect*, 721-751. Oxford: Oxford University Press.

References

- Kiparsky, Paul. 1998. Partitive case and aspect. In W. Greuder and M. Butt (eds.), *The Projection of Arguments*, 265-307. Stanford, CA: Center for the Study of Language and Information.
- Krifka, Manfred. 1986. Nominalreferenz und Zeitkonstitution: zur Semantik von Massentermen, Pluraltermen und Aspektklassen. PhD thesis, Universität München.
- Krifka, Manfred. 1989. Nominal reference, temporal constitution and quantification in event semantics. In R. Bartsch, J. van Benthem, and P. van Emde Boas (eds.), *Semantics and Contextual Expression*, 75-115. Dordrecht: Foris.
- Krifka, Manfred. 1992. Thematic relations as links between nominal reference and temporal constitution. In I. A. Sag and A. Szabolcsi (eds.), *Lexical Matters*, 29-53. Stanford, CA: CSLI Publications.

References

- Krifka, Manfred. 1998. The origins of telicity. In S. Rothstein (ed.), *Events and Grammar*, 197-235. Dordrecht: Kluwer.
- Link, Godehard. 1983. The logical analysis of plurals and mass terms. In R. Bäuerle, Ch. Schwarze and A. von Stechow (eds.), *Meaning, Use, and Interpretation of Language*, 302-323. Berlin – New York: Walter de Gruyter.
- MacDonald, Jonathan E. 2008. *The Syntactic Nature of Inner Aspect: A Minimalist Perspective*. Amsterdam: John Benjamins.
- Rothstein, Susan. 2004. *Structuring Events: A Study in the Semantics of Lexical Aspect*. Oxford: Blackwell.

References

- Taylor, Barry. 1977. Tense and continuity. *Linguistics and Philosophy* 1: 199-220.
- Vendler, Zeno. 1957. Verbs and times. *Philosophical Review* 56: 143-160.
- Verkuyl, Henk J. 1972. *On the Compositional Nature of the Aspect*. Dordrecht: Reidel.
- Verkuyl, Henk J. 1993. *A Theory of Aspectuality: the Interaction between Temporal and Atemporal Structure*. Cambridge, UK: Cambridge University Press.
- Zucchi, Alessandro and Michael White. 2001. Twigs, sequences, and temporal constitution of predicates. *Linguistics and Philosophy* 24: 223-270.