

Specification of methods and the semantics of method-oriented adverbs: Method-oriented adverbs as instrumentals

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9-10 November 2018
Event Semantics Workshop 2018 (Heidelberg)



Introduction

Introduction

- ▶ Classification and analysis of classes of adverbs has been a staple in formal semantics and syntax (Jackendoff, 1972; Geuder, 2002; Schäfer, 2013, and many, many others).
- ▶ What these adverbs mean, and how syntactic position influences their interpretation.
- ▶ Many classes identified. Here's a few:

(1)	a.	arrogantly, idiotically	(subject-oriented)
	b.	quickly, clumsily	(manner)
	c.	linguistically, economically	(domain)
	d.	possibly, occasionally	(quantificational)
- ▶ Much still not understood about some (many?) classes of adverbs.

Method-oriented adverbs

- ▶ One such ill-understood class is method-oriented adverbials (MOAs), such as in (2).
- ▶ Method-oriented adverbials characterize a method or means by which the event comes about.
 - (2) a. Alma categorized the plants biologically. (Schäfer, 2013)
 - b. Noam evaluated the data linguistically. (ibid.)
 - c. The nations intervened militarily. (ibid.)
 - (3) Dieses Problem ist nur wirtschaftlich zu lösen (ibid.)
 this problem is only economically to solve
 'This problem can only be solved economically.'

Method-oriented adverbs

- ▶ Paraphrasable:
 - (4)
 - a. Alma used biological methods/principles to categorize the plants. (Schäfer, 2013)
 - b. Noam analyzed the data with the help of linguistic methods/tests.(ibid.)
 - c. The nations used their militaries to intervene.
 - (5) This problem can only be solved using economic means.
- ▶ Methods/means are mentioned explicitly.
- ▶ Differs from the paraphrases with the more well-known class of manner adverbs (e.g. *the way* paraphrases).

Goals for this talk

- ▶ Clarify the properties of method-oriented adverbs, especially with an eye towards distinguishing them from manner adverbs.
- ▶ Relate the semantics of these adverbs to adjectives like *maternal*, *presidential*, *nuclear*.
- ▶ Propose that method-oriented adverbs share semantic features with instrumentals.
- ▶ Sketch a formalization that ties this together.
- ▶ Work in progress! Many questions, and not as many answers.

Roadmap

- ▶ Properties of method-oriented adverbs, distinguishing them from manner adverbs
- ▶ Brief discussion of recent account of relational adjectives (Anderson & Löbner, 2018)
- ▶ Semantic proposal: method-oriented adverbs make use of components of meaning corresponding to instrumentals
- ▶ Some case studies, showing how the semantic composition would proceed
- ▶ Brief discussion of syntax

Properties of method-oriented adverbs

Manner adverbs: paraphrases

- ▶ *The way* paraphrases are a relatively good diagnostic for manner adverbs in English.
- ▶ Method-oriented adverbs are often marginal with *the way* paraphrases in English, although Schäfer (2013) notes that they are ok in German.
 - (6)
 - a. The way John fell was clumsy.
 - b. The way Noam evaluated the data was slow.
 - (7)
 - a. ??The way Noam evaluated the data was linguistic.
 - b. ??The way Alma categorizes the plants is biological
 - (8)

Noam hat die Daten auf linguistische Art und Weise ausgewertet.					
Noam has the data	on linguistic	manner	evaluated.		

Paraphrasability

- ▶ In German, they do not allow *wie-das-ist* paraphrases, which Schäfer (2013) takes to be a better diagnostic for manner adverbs.
- ▶ This sets them apart from manner adverbs, which do allow for *wie-das-ist* paraphrases.

(9) ??Wie Noam die Daten auswertet, das ist linguistisch. (Schäfer, 2013)
 how Noam the data evaluates, that is linguistic
 'The way Noam evaluates the data is linguistic.'

(10) ??Wie Alma die Pflanzen kategorisiert, das ist biologisch. (ibid.)
 how Alma the plants categorizes, that is biological
 'The way Alma categorizes the plants is biological.'

Paraphrasability

- ▶ Paraphrased with methods mentioned explicitly.
 - (11)
 - a. Alma used biological methods/principles to categorize the plants.
 - b. Noam analyzed the data with the help of linguistic methods/tests.
 - c. The nations used their militaries to intervene.
 - (12) This problem can only be solved using economic means.

- ▶ Differs from the paraphrases with the more well-known class of manner adverbs (e.g. *the way* paraphrases).

- ▶ Paraphrase is reminiscent of instrumentals (important point later).
 - (13)
 - a. Alma used a knife to cut the cake.
 - b. Noam opened the lock with a key.

Coordination

- ▶ Adverbs of the same type can often be coordinated.
- ▶ Possible with manner adverbs.
 - (14) a. He evaluated the data slowly and deliberately.
 - b. They categorized the plants quickly and carefully.
- ▶ Manner adverbs and method-oriented adverbs cannot be coordinated, however.
 - (15) a. *evaluate the data slowly and linguistically
 - b. *evaluate the data deliberately and linguistically
 - c. *categorize the plants thoroughly and biologically
- ▶ Suggests that manner adverbs and method-oriented adverbs form two distinct classes of adverb.

Non-gradability

- ▶ These adverbs are also non-gradable (on the relevant reading), unlike many manner modifiers.
 - (16)
 - a. *Noam evaluated the data very linguistically.
 - b. *The nations solved the problem more diplomatically than the citizens wanted.¹
 - (17)
 - a. Noam evaluated the data very quickly.
 - b. Local braggarts now crow that the Americans are following in our footsteps, albeit more clumsily. (Google)

¹Note: *Diplomatically* has a manner reading as well (*in a diplomatic way*).

Method-oriented adverbs are not manner adverbs!

- ▶ Number of diagnostics show that method-oriented adverbs behave differently from manner adverbs.
- ▶ **Conclusion:** method-oriented adverbs simply aren't manner adverbs.
- ▶ Need a different analysis in order to account for their behavior!

Some properties inherited from relational adjectives

- ▶ Relational adjectives (also called classificatory adjectives or nominal adjectives): Levi (1978); McNally & Boleda (2004); Anderson & Löbner (2018), among others
- ▶ Method-oriented adverb often constructed from relational adjectives.
- ▶ Non-gradability and inability to predicate are both typical properties of relational adjectives.

(18) a. *a very presidential visit
 b. ??Her love is maternal. (cf. maternal love)

- ▶ Relational adjectives also do not coordinate with property adjectives.

(19) a. *a black and presidential motorcade
 b. *expensive and nuclear power plant

- ▶ These properties can explain why method-oriented adverbs are also non-gradable and not good with *the way* paraphrases.

Distinguish method-oriented adverbs from other domain adverbs!

- ▶ **Note:** Other types of domain adverbs appear low in the clause.
- ▶ These do not relate to a method, but to some domain within which the event occurs.
 - (20) We treat the whole person — emotionally, physically, and spiritually.
(\neq treat using emotional/physical/spiritual methods)
- ▶ **Note:** Domain adverbs also appear high in the clause.
- ▶ Specify domain within which the proposition expressed by the sentence should be evaluated.
 - (21) Physically, he's sore. Emotionally, he's traumatized.
(\neq Using physical methods, he's sore.)
- ▶ Set these domain adverbs aside for this talk.

Standard neo-Davidsonian approach

- ▶ “Standard” neo-Davidsonian story about manner modifiers (*clumsily*, *quickly*) is that they are properties of events (e.g., Parsons (1990)).
- ▶ Interpreted intersectively.

$$(22) \quad \llbracket \textit{fix the car clumsily} \rrbracket = \lambda e \left[\begin{array}{l} \mathbf{fix}(e) \wedge \\ \text{THEME}(e) = \iota x.\mathbf{car}(x) \wedge \\ \mathbf{clumsy}(e) \end{array} \right]$$

$$(23) \quad \llbracket \textit{change the oil (in the car) quickly} \rrbracket = \lambda e \left[\begin{array}{l} \mathbf{change}(e) \wedge \\ \text{THEME}(e) = \iota x.\mathbf{oil}(x, \iota y.\mathbf{car}(y)) \wedge \\ \mathbf{quick}(e) \end{array} \right]$$

Standard neo-Davidsonian approach

- ▶ Method-oriented adverbs represented in this way would be indistinguishable from manner adverbs.

$$(24) \quad \llbracket \text{remove John's nose surgically} \rrbracket = \\ \lambda e. \text{remove}(e) \wedge \text{THEME}(e, \iota x. \text{nose}(x, \mathbf{j})) \wedge \text{surgical}(e)$$

- ▶ Not so clear what it means to be a *quick* or *clumsy* or even *surgical* event.
- ▶ Sometimes possible to use meaning postulates or other means to clarify the adverb-verb relationship.

$$(25) \quad \text{quick}(e) \leftrightarrow \mu(e)_{\text{speed}} > d_{\text{standard}}$$

- ▶ Not clear that the strategy is all that insightful if its generalized.

$$(26) \quad \text{clumsy}(e) \leftrightarrow \mu(e)_{\text{clumsy}} > d_{\text{standard}}$$

- ▶ Need a different strategy for MOAs.

Relational adjective semantics

Frame Semantics

- ▶ Assume Frame Semantics, a theory of meaning representation (Petersen, 2007; Löbner, 2014, 2017; Kallmeyer & Osswald, 2014).
- ▶ Frames represent lexical and compositional semantics, context, and world knowledge in the same representation.
- ▶ Structure:
 - ▶ Frames are recursive attribute-value structures.
 - ▶ Only functional attributes.
 - ▶ Assign to every possessor of the attribute a unique value for that attribute.
 - ▶ Values are typed in a type-feature hierarchy (Carpenter, 1992).
 - ▶ Values themselves can have attributes.
- ▶ Composition via unification (not type-driven function application).
- ▶ Unification only possible with compatible types (same type, or subtype).

Relational adjectives

- ▶ Characterize a subtype of the modified noun. Examples:

(27) nuclear power, dental instrument, medical school, presidential visit, mental stamina, thermal insulator

- ▶ Cannot always be used predicatively.

(28) a. ??The power this plant makes is nuclear.
 b. ??The visit to Canada was presidential.
 c. ??This insulator is thermal.

- ▶ Non-gradable.

- ▶ No binding.

(29) a presidential pardon of Richard Nixon/*himself

- ▶ Can relate to thematic argument of modified noun, especially with deverbal nouns.

(30) a. presidential visit (agent, theme)
 b. mayoral election (theme)

Co-nominality

- ▶ Many RAs are denominal (*presidential, mayoral, parental*).
- ▶ Of those that are not denominal, there is often a noun with a closely related sense (*thermal* and *heat*, *dental* and *tooth*, *maternal* and *mother*).
- ▶ In Anderson & Löbner (2018) we introduce the notion of **co-nominality** to cover this semantic relationship between RAs and certain nouns.
- ▶ Co-nominal adjectives are in a particular relationship with the semantics of a noun. Share the same semantics.

Co-nouns and co-adjectives

N → A	<i>president – presidential</i> <i>Canada – Canadian</i>	<i>parent – parental</i>
A → N	<i>electricity – electric</i> <i>semantics – semantic</i> <i>civilian – civil</i>	<i>municipality – municipal</i> <i>electronics – electronic</i>
A = N	<i>military – military</i> <i>public – public</i>	<i>official – official</i>
A, N	<i>pope – papal</i> <i>mother – maternal</i> <i>mind – mental</i>	<i>lungs – pulmonary</i> <i>king/queen/prince/princess – royal</i> <i>body – physical</i>

Table: Pairs of adjectives and co-nouns, and nouns and co-adjectives

Co-nominality

- ▶ **Our claim:** co-nouns have essentially the same semantics as their co-adjectives, except for two differences:
 - ▶ Co-adjectives are not able to refer, unlike their co-nouns
 - ▶ Components of the adjectival meaning corresponding to referential arguments (and other arguments) are not arguments with relational adjectives

 - ▶ Same semantics as the noun, but variables are unbound in relational adjective. Contextually determined, or determined through composition.
- (31) a. $\llbracket \textit{mother} \rrbracket = \lambda x \lambda y. \mathbf{mother}(x, y)$
 b. $\llbracket \textit{maternal} \rrbracket = \mathbf{mother}(x, y)$
- ▶ Explains difficulty in using adjective as a predicate.

Composition and relational adjectives

- ▶ Take modification using these adjectives to be marriages between frames, rather than examples of predication. Identification of values within the frame.
- ▶ Composition between an adjective and a nominal frame.
- ▶ Relation between adjective and noun can come from the modified noun or the adjective (*maternal love*, *presidential visit*)

- (32) a. love of a mother
 b. visit by a president

- ▶ Or also via a bridging frame that provides additional information on how to link adjective and noun. (*dental instrumental*, TREATMENT frame)

- (33) tool for treatment of teeth

Where do methods come from?

- ▶ How are method-oriented adverbs associated with methods?
- ▶ Methods can come from the frame associated with the adjective.
- ▶ Adjective frame directly supplies methods (e.g., the lexical semantics of the adjective).
- ▶ Or there is a secondary bridging frame provided by context.

Semantics of method-oriented adverbs

Instrumental paraphrases provide a clue

- ▶ How to link method-oriented adverb to verb? Paraphrases are a clue.

- ▶ Method-oriented adverbs are often paraphrasable with *use*, *using*, and *with* (Schäfer, 2013).
 - (34)
 - a. Alam categorized the plants biologically.
 - b. Noam analyzed the data linguistically.
 - c. The nations solved their disagreements diplomatically.
 - (35)
 - a. Alma used biological methods/principles to categorize the plants.
 - b. Noam analyzed the data with the help of linguistic methods/tests.
 - c. The nations solved their disagreements using diplomacy.

- ▶ *Use*, *using*, *with* often taken to be diagnostic of instrumentals (Lakoff, 1968).

Proposal

- ▶ **Proposal:** Method-oriented adverbs relate to the matrix event as some instrumentals do.
- ▶ Common meaning components between instrumentals and method-oriented adverbs.
- ▶ Components partially determined by verbal lexical semantics.
- ▶ What are the pieces of meaning in instrumentals?

Varieties of instrumentals

- ▶ Not all instrumentals have the same causal force (Koenig et al., 2008; Rissman & Rawlins, 2017, and references therein).
- ▶ Some instruments are causal intermediaries.
- ▶ Link in a causal chain between the agent of an event and the affected object.
- ▶ The cause of some subevent.
(36) John smashed the zombie's head with a club.
≈ John causes club to come into contact with the zombie, which causes it to be smashed.

Varieties of instrumentals

- ▶ Other instrumentals have a weaker relation to the event.
- ▶ Not a causal relationship. (Sometimes called facilitating instrumentals.)
 - (37) a. Lucy ate the cereal with a spoon.
≠ ... the spoon caused the cereal to be eaten
 - b. Martha changed the light bulb with a ladder.
≠ ... the ladder caused the bulb to be changed
- ▶ These instruments lead to the event being “better” or “easier” in some way.

Method-oriented adverbs are not causal intermediaries

- ▶ Method-oriented adverbs also don't seem to denote intermediate causers.
 - (38) a. The aliens communicated telepathically.
b. Noam evaluated the data linguistically.
 - (39) a. ??The aliens did something using telepathy, which caused them to communicate.
b. ??Noam did something using linguistic methods, which caused the data to be evaluated.

- ▶ Weaker relation to the event, more similar to instruments like *eat with a spoon*.

Weaker instrumentals

- ▶ Koenig et al. (2008) argue for a weaker notion involved with instruments that are not causal intermediaries.
- ▶ Introduce a relation **HELP** that models the idea that certain actions within an event do not cause other actions, but only facilitate them in some way.
- ▶ Verbs are schematized; **pred**₂ is a relation between an agent and an instrument, while **pred**₁ is a change in the patient.

$$(40) \quad \text{HELP}(s1, s3) \wedge \text{pred}_2(s1, \mathbf{A}, \mathbf{I}) \wedge \text{pred}_1(s3, \mathbf{P})$$

- ▶ Thus, a logical form like so: (Koenig et al. are not so explicit)

$$(41) \quad \llbracket \textit{eat cereal with a spoon} \rrbracket = \lambda x \lambda e \exists e' \left[\begin{array}{l} \text{HELP}(e', e) \wedge \\ \text{use}(e', x, \epsilon y. \text{spoon}(y)) \wedge \\ \text{eaten}(e, \epsilon z. \text{cereal}(z)) \end{array} \right]$$

- ▶ Instrumental relations are provided by the verb.

HELP

- ▶ HELP is defined for Koenig et al. (2008) as in (42).

(42) HELP definition

An eventuality e_1 helps the occurrence of token e_2 of the event category C iff (i) there is an ordering of tokens of C along a pragmatically defined scale (ease of performance, how good the resulting state is, fewer unwelcome 'side effects') and (ii) e_1 caused the token e_2 of C to be higher on that ordering than it would otherwise have been.

- ▶ Helping is a scalar notion.
- ▶ Instrument helps an event if the event is affected in some way.
- ▶ *With a spoon*, for instance, might raise the ease of performance of an *eat* event.

VPs encode a HELP relation

- ▶ VPs that method-oriented adverbs modify encode a HELP relation.
- ▶ These predicates are thus associated in their lexical semantics with underspecified events (e.g., **act**) that facilitate the completion of the event.

$$(43) \quad \llbracket \textit{evaluate} \rrbracket = \lambda e \exists e' \left[\begin{array}{l} \textit{evaluate}(e) \wedge \\ \textit{act}(e') \wedge \\ \textit{HELP}(e', e) \end{array} \right]$$

- ▶ **Note:** HELP is not a functional attribute!
- ▶ **Note:** Agent and Theme arguments suppressed.

evaluate the data linguistically

- ▶ *Linguistically* provides a clear case where the methods come from the adjective.

(44) Noam evaluated the data linguistically. (=used linguistic methods)

- ▶ Method-oriented adverb has the same semantics as the adjective *linguistic*.
- ▶ Adjectives for scientific fields encode scientific methods particular to that field (analysis of morphemes, finding minimal pairs, ...)

$$(45) \quad \llbracket \textit{linguistic} \rrbracket = \left[\begin{array}{l} \text{science}(x) \wedge \\ \text{language}(\text{OBJECT_OF_STUDY}(x)) \wedge \\ \text{linguistic_method}(\text{METHOD}(x)) \wedge \\ \text{linguist}(\text{AGENT}(\text{METHOD}(x))) \end{array} \right]$$

- ▶ The type **linguistic_method** will be true of events of analyzing morphemes, finding minimal pairs, constructing arguments based on linguistic data, and so on.

evaluate the data linguistically

- Unification of *linguistically* with *evaluate* identifies the helping act with a linguistic method.

$$(46) \quad \llbracket \textit{evaluate linguistically} \rrbracket = \lambda e \exists e' \left[\begin{array}{l} \mathbf{evaluate}(e) \wedge \\ \mathbf{act}(e') \wedge \\ \text{HELP}(e', e) \wedge \\ \mathbf{science}(x) \wedge \\ \mathbf{language}(\text{OBJECT_OF_STUDY}(x)) \wedge \\ \mathbf{linguist}(\text{AGENT}(\text{METHOD}(x))) \wedge \\ \underline{e' = \mathbf{linguistic_method}(\text{METHOD}(x))} \end{array} \right]$$

- Agent of the method can later be identified with the matrix agent.

solve diplomatically

- *Solve* is an example of another predicate that is underspecified in the methods used.

(47) The 20th century saw new experiments with international peace organizations designed to **solve disputes diplomatically** rather than through war.

$$(48) \quad \llbracket \textit{solve} \rrbracket = \lambda e \exists e' \left[\begin{array}{l} \text{solve}(e) \wedge \\ \text{act}(e') \wedge \\ \text{HELP}(e', e) \end{array} \right]$$

solve diplomatically

- ▶ *Diplomatic* frame inherits from *diplomat*.
- ▶ Specified for what nation the diplomat represents.
- ▶ Diplomats are also agents in events of diplomacy.

$$(49) \quad \llbracket \textit{diplomatic} \rrbracket = \left[\begin{array}{l} \mathbf{person}(x) \wedge \\ \mathbf{nation}(\text{REPRESENTS}(x)) \wedge \\ \mathbf{diplomacy}(e) \wedge \\ x = \text{AGENT}(e) \end{array} \right]$$

- ▶ Temporal modifiers such as *frequent*, *occasional* are sometimes taken as evidence for events in nominals (Grimshaw, 1990).

(50) an occasional diplomat

solve diplomatically

- ▶ Unification of the verbal frame and the adverbial frame.
- ▶ Diplomacy event is able to be identified with the helping event.
- ▶ Possible due to **diplomacy** being a subtype of **act** (by assumption).

$$(51) \quad \llbracket \textit{solve diplomatically} \rrbracket = \lambda e \exists e' \left[\begin{array}{l} \mathbf{solve}(e) \wedge \\ \mathbf{act}(e') \wedge \\ \text{HELP}(e', e) \wedge \\ \mathbf{person}(x) \wedge \\ n = \text{REPRESENTS}(x) \wedge \\ \mathbf{diplomacy}(e'') \wedge \\ x = \text{AGENT}(e'') \wedge \\ \underline{e' = e''} \end{array} \right]$$

- ▶ Further unifications possible; n (nation) can be identified with nation from subject position, for instance.

$$(52) \quad \text{Canada solved its disputes diplomatically.}$$

open manually

- ▶ *Open* differs from *solve* and *evaluate*.
- ▶ Much less abstract. Is it plausible that the lexical semantics for *open* encodes the possibility for a method event?
 - (53) Garage doors have a bypass that disconnects the garage door from the powered carriage and allows you to **open the garage door manually**.

open manually

- Availability of *by* adjuncts suggests that it does allow additional specification of an event interpreted as a method.

- (54) open the garage door
- ... by lifting it straight up
 - ... by pushing a button
 - ... by pulling on a cord

- *Open* thus encodes a HELP event in addition to its main event.

$$(55) \quad \llbracket \textit{open} \rrbracket = \lambda e \exists e' \left[\begin{array}{l} \mathbf{open}(e) \wedge \\ \mathbf{act}(e') \wedge \\ \text{HELP}(e', e) \end{array} \right]$$

open manually

- ▶ But what does *manually* contribute?
- ▶ I assume that its co-noun is *hand*. Thus, it has the semantics of *hand*.

$$(56) \quad \llbracket \textit{manually/hand} \rrbracket = \left[\begin{array}{l} \mathbf{hand}(x) \wedge \\ x = \text{HAND}(y) \end{array} \right]$$

- ▶ However, no reason to suppose that *hand* has an event in its frame.
- ▶ Particular way of embedding *hand* in an event frame must come from context.

Manually's method is contextually determined

- ▶ Many different methods of realization (from BNC). Also suggests contextually determined, and not determined (solely) by the adverbial frame.
- ▶ These methods are specifications of the *manually* frame.
 - (57)
 - a. sort and clean the seeds [...] manually, by sieving or blowing away the debris
 - b. silenced manually at any time by operating levers
 - c. This kind of map analysis used to be done manually [...] by overlaying transparent map sheets
 - d. it was to be driven manually by turning the big wheel
- ▶ Context and world knowledge determine specifics of how *manually* interacts with verbal semantics.
- ▶ Parallels to how context and world knowledge determine how relational adjectives and nouns should be composed.

Syntax of method-oriented adverbs

Low in the clause

- ▶ MOAs take a position low within the clause.
- ▶ Preference to be post-verbal in active sentences, suggesting VP-internal.
- ▶ VP constituency tests (*do so* test) point towards the adverb being within the VP.

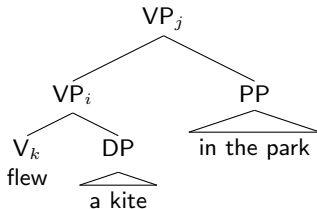
Low in the clause

- ▶ Locative PPs and manner adverbs (for instance) adjoin to the right of the VP, based on tests.

(58) The boy [[flew_k a kite]_i in the park]_j

- ... and the girl did so_{i/j}, too
- ... and the girl did so_i at the beach.
- *... and the girl did so_k a model plane.

(59)



(60) The girl [walked to the store]_i slowly, and the boy did so_i quickly.

Low in the clause

- ▶ Constituency test with a method-oriented adverb:

(61) Noam [[evaluated data]_i linguistically]_j

- ... and Darwin did so_j, too.
- ??... and Darwin did so_i biologically.

- ▶ Failure of test suggests that *evaluated data* is not a constituent (to the exclusion of the adverb)
- ▶ The VP is *evaluated data linguistically*, and the adverb is VP internal.

Confined to VP

- ▶ Haumann (2007) notes that method-oriented adverbs are confined to the VP layer, and cannot be fronted.

- (62)
- a. They removed brain tissue surgically.
 - b. They sent the message telepathically.
 - c. They opened the door manually.

- (63)
- a. *Surgically, they removed brain tissue.
 - b. *Telepathically, they sent the message.
 - c. *Manually, they opened the door.

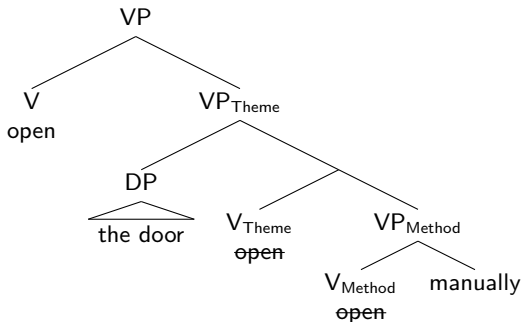
Method-oriented adverbs are low

- ▶ String linear position of method-oriented adverbs and constituency tests suggest they are within the VP.
- ▶ Constituency tests also suggest they are within VP.
- ▶ Position on the right appears to be a position that is below the internal argument (!).

Layers in the VP

- ▶ That VP is articulated in some fashion is not a new idea. Many proposals for aspectual layers and projections for particular subevents (see Ramchand (2008) and v_{init} , v_{proc} , and v_{res} , for instance)
- ▶ Few proposals (that I know of) that syntacticize instrumentals.
- ▶ Adverb as an argument of the verb in a VP shell arrangement would explain constituency observations

(64)



Conclusion

Discussion and open questions

- ▶ Syntax–semantics issues:
 - ▶ The general issue of how to link frame semantics and syntax.
 - ▶ How would a method-oriented adverb compose with a verbal head specifying method?
 - ▶ Why is the adverb necessarily low in the clause?
- ▶ Semantic composition issues:
 - ▶ What principles are at work to relate the agent of the matrix event to the agent of the method (e.g., principles of economy regarding variables)?
 - ▶ How are contextually specified methods determined (e.g., *manually*)?
- ▶ Instrumental relation: Is *HELP* sufficient for all method-oriented adverbs? Are some true causers? Are some neither (*categorize morphologically*)?
- ▶ How do method-oriented adverbs differ from other domain adverbs?

Conclusion

- ▶ A step towards explaining how method-oriented adverbs differ from other types of adverbs.
 - ▶ Method-oriented adverbs are not manner adverbs.
 - ▶ Method-oriented adverbs inherit the semantics of their base adjective.
 - ▶ Method-oriented adverbs share a semantics with that of instruments.
 - ▶ Method-oriented adverbs related to modified VP via a `HELP` relation.
- ▶ Method event can come from the lexical semantics of the adjective.
- ▶ Or, from a bridging relation that incorporates the meaning of the adjective.
- ▶ Unification allows for composition that involves aspects of the meaning of the adverb not projected in the argument structure.
- ▶ Lexical semantics plays an important role in understanding modification.

Thank you!

This research is supported by DFG CRC 991 “The Structure of Representations in Language, Cognition, and Science,” project C10.

I thank Antje Roßdeutscher, Hans Kamp, Tillmann Pross, Katja Gabrovskaja, Marcin Morzycki, and Ai Taniguchi for their comments and discussion.

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