

PS IN MOTION

ON THE SEMANTICS AND SYNTAX OF P ELEMENTS AND MOTION EVENTS

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1 Assumptions

Locative (stative) vs. directional (dynamic) prepositional phrases (PPs)

Semantics (Jackendoff, 1983; Zwarts and Winter, 2000; Zwarts, 2005, a.o.):

Locative PPs denote sets of places (locations)

Directional PPs denote sets of paths made up of places

Syntax (Koopman, 1997; van Riemsdijk and Huybregts, 2001; Svenonius, 2004, a.o.):

Locative PPs - Place structure

Directional PPs - Path structure that can embed Place structure

(1) [PathP [PlaceP [DP]]]

Locative, but not directional PPs can appear with stative verbs like *be*, *stay*, *remain*:

- (2) a. The box stayed in / on / under / behind the table.
b. *The box stayed to / into / onto / from / out of / through the table.

Diagnostics in the literature to test whether a P(P) is directional as opposed to locative???

Hypothesis 1: There are no lexically ambiguous Ps: Ps are either locative or directional

⇒ **Directional meanings with locative Ps must be structurally derived**

Hypothesis 2: Directional PPs are always complex

1.1 Locative Ps

Locative Ps relate the location of an event or entity (the figure or the reference object) to the location of the ground (the landmark) in a particular way - locative PPs denote sets of places (for formal accounts see Bierwisch, 1988; Wunderlich, 1991; Zwarts and Winter, 2000, a.o.)

1.2 Directional Ps

Zwarts (2005): Directional Ps map the ground to a set of sequences of vectors (places), **paths**, where each of these sequences determines a potential change in position of the figure

Goals and sources involve a two-stage structure, a positive phase overlapping with either end point of the path (see Fong's (1997) account in terms of phase quantification)

This positive phase is some final location such as AT, ON, IN x, the bounds of an incremental path (with INCREMENTAL PATH as defined in Rothstein 2004)

⇒ Final locations can be syntactically represented as PlacePs embedded under PathPs as in (1)

Routes: do not refer to transitions into a place but rather to paths that are related to a given place in another way

Zwarts (2005): Route PPs are associated with paths, where the figure potentially changes in location and some intermediate location is AT / IN / ON the ground

The path associated with route PPs does not necessarily have ending points and therefore is not necessarily bounded¹

1.3 Combining PPs with verbs

1.3.1 Account in terms of event structure (Higginbotham, 2000)

Events can be syntactically decomposed into sub-events, semantics is directly read off the syntax

Accomplishments are syntactically represented by ordered pairs of positions for events

Accomplishment interpretation may also stem from TELIC PAIRS ($\langle E, E' \rangle$) associated with Ps rather than with a verbal head:

- (3) I flew my spaceship to the morning star.
fly (I, my spaceship, e) & to (the morning star, (e, e'))

The main predicate *to* bears an ordered pair of event positions (process + state)

First event of *to* gets identified with the single event position of *fly*

1.3.2 Account in terms of event shape (Zwarts, 2006)

Zwarts (2006): event structure is not sufficient to account for certain phenomena in the area of motion events (e.g. cross-categoriality, opposition, fictive motion)

SHAPE-function maps events to their trajectory or contour, represented through a path²

- (4) $[[V PP]] = \{ e \in [[V]] : \text{SHAPE}(e) \in [[PP]] \}$

(3) + SHAPE function + particular definition of *to*-phrase: *to*-PP restricts the denotation of *fly* to flying events along a path whose upper bound is 'AT the morning star'

1.3.3 What happens with locative PPs?

- (5) *directional readings with locative PPs*
- a. She jumped in the lake.
 - b. He put the box on the table.

¹A directional PP is **bounded** (telic) iff it does not have cumulative reference, where the definition of cumulativeness involves the concatenation of paths (with **p** and **q** as variables for paths) (i) (Zwarts, 2005)

- (i) A set of paths **X** is **cumulative** iff
- (i) there are **p** and **q** \in **X** such that **p+q** exists and
 - (ii) for all **p, q** \in **X**, if **p+q** exists, then **p+q** \in **X**.

²Zwarts takes this function to be a more restricted version of Krifka's (1998) TRACE function, and as the major ingredient of functions that Jackendoff (1983, 1996) uses to relate PATH concepts to EVENT concepts, like for instance the GO function.

2 What makes an event telic?

- (6) *compatibility with for- and in-adverbials*
- Sharon ate an apple *for an hour / in an hour. TELIC
 - Sharon ate apples / soup for an hour / * in an hour. ATELIC
Sharon ate for an hour / *in an hour.
- (7) *entailment test / imperfective paradox*
- Sharon was eating an apple. $-/\rightarrow$ Sharon ate an apple. TELIC
 - Sharon was eating apples / soup. \rightarrow Sharon ate apples / soup. ATELIC
Sharon was eating. \rightarrow Sharon ate.

2.1 The relevance of the internal argument DP

2.1.1 Verkuyl (1972, 1993)

Iff a dynamic verb ([+ADDT0]) is combined with an internal argument DP with specified quantity ([+SQA]) the result is a telic VP (Plus-Principle)
feature percolation leads to [+T] VP

2.1.2 Krifka (1989, 1992)

homomorphism from objects to events with certain thematic relations (gradual patients)

intuitively: the extent of the event is measured by the extent of the object

the object is subject to the event in a **gradual / incremental** manner

quantised noun phrases lead to telic VP

strictly **cumulative** (non-quantised) noun phrases lead to atelic VP

temporal trace function τ from E (the domain of events) into the extension of T (the domain of times), which maps an event to its temporal trace (its 'run time')

2.1.3 problems

- (8) *not all +SQA objects with dynamic verbs give rise to telicity*
- Rick pushed the cart for an hour / * in an hour.
Rick was pushing the cart. \rightarrow Rick pushed the cart.
 - The council widened the road for two months. (*Hay et al., 1999*)
The council was widening the road. \rightarrow The council widened the road.

similar: *entertain the audience, hammer the metal*

not a problem for Krifka (1989, 1992), but also not accounted for under his theory

- (9) *telicity can arise despite lack of +SQA object*
- Jakub walked to the store *for an hour / in an hour.
 - Jakub was walking to the store. $-/\rightarrow$ Nino walked to the store.
- (10) *some VPs with +SQA object appear to be both telic and atelic*
- Roberta wiped the table for an hour / in an hour.
 - Roberta was wiping the table. \rightarrow Roberta wiped the table.

similar: *polish the vase*

a number of cumulative (non-quantised) DPs still lead to telic VPs (Zucchi and White, 2001; Rothstein, 2001, 2004; Arsenijević, 2006)

- the determiner is responsible for cumulative / non-quantised reference
 - only universals, singular DPs and numerals with an *exactly* reading are quantised
 - upwardly entailing DPs are cumulative: *some houses, at least three apples*
 - downwardly entailing DPs are non-quantised: *at most three apples, few books*
- cumulativity or non-quantisedness due to the nominal head
 - sequence, twig, quantity of N* (Zucchi and White, 2001)
 - hedge, wall, lawn* (Rothstein, 2001, 2004)

generalisation (Rothstein, 2004)

- the particular VPs are telic unless the incremental theme is a bare plural or a mass noun
- it is something about the verbal predicates themselves that serves as a precondition for telicity

2.2 Generalised homomorphism approaches

2.2.1 Krifka (1998)

homomorphism is not restricted to the direct object:

incremental relations between the event argument and one other (semantic) argument

PATHS to describe movement in various dimensions

- movement along paths
- paths that describe qualitative changes of properties (changes in a one-dimensional domain), e.g. *bake a lobster, heat the water*
- resultative adjectives specifying the goal of a movement event
- punctual movements are quantised: *Mary arrived in London*, transaction verbs like *give, buy*

simple movements

movement predicates have at least three arguments: object, path, event

WALK relates the parts of a path to the parts of an event

temporal adjacency of movement events is reflected in spatial adjacency of the paths, and vice versa

2.2.2 Hay et al. (1999)

difference variable as part of the lexical argument structure of particular verbs:

- verbs of creation and consumption
- verbs of motion: *He walked to the store.*
- verbs of change of state (degree of change in a gradable property determined by the verb): *The tailor lengthened the skirt.*

homomorphism from the difference argument to the event: the extent of the event is measured by the extent of the difference

difference variable can be bounded, either explicitly or contextually

2.2.3 Zwarts (2006)

event structure is not sufficient to account for certain phenomena (see below), the relevant property of events is their SHAPE

shape of an event: ‘the trajectory or contour that is associated to that event in space or in a scalar or conceptual domain’ (Zwarts, 2006, 2), represented by means of a path

A **path** is defined as a continuous function from a real interval $[0,1]$ (the indices of a path) to spatial points (given a particular model of points or regions); $p(0)$ is the starting point of the path, $p(1)$ is its end point, and for every index i between 0 and 1, $p(i)$ is an intermediate point
directional modifiers are not predicates of events but predicates of paths (following Piñón 1993)

the addition of a PP restricts the set of events denoted by the verb to exactly those events that have a shape that can be found in the set of paths denoted by the PP

$$(11) \quad \llbracket \text{swim across the lake} \rrbracket = \{ e \in \llbracket \text{swim} \rrbracket : \text{SHAPE}(e) \in \llbracket \text{across the lake} \rrbracket \}$$

the relevant property for (un)boundedness in any domain is cumulativity

(12) A predicate P is **unbounded** when it is cumulative, i.e. closed under sums.
A predicate is **bounded** when it is not closed under sums.

(13) The three dimensions of motion events
a. the path assigned by SHAPE
b. the time interval of the event, $\text{TIME}(e)$
c. the THEME of the event, the entity that moves

(14) Event e is a motion event, $\text{MOTION}(e)$, iff there is a monotone increasing homomorphism h from $\text{TIME}(e)$ to $[0,1]$ such that for every $t \in \text{TIME}(e)$, $\text{THEME}(e)$ is located at $\text{SHAPE}(e)(h(t))$.
(Zwarts, 2006, 16)

2.2.4 problems

(15) *with explicitly quantised degree variable, direct object can still play a role*
a. The tailor lengthened skirts 5 centimetres for three months. (Rothstein, 2004)
b. Shakuntala pushed carts to the store for two hours.

⇒ Rothstein (2004): two independent theories for the role of the direct object and the conditions for telicity (accomplishments)

(16) *what is the role of the complement of P?*
a. Shakuntala walked to stores for days.
b. (examples with mass nouns?)

(see Arsenijević 2006 for discussion)

2.3 Event structure

Moens and Steedman (1988); Pustejovsky (1991); Higginbotham (2000); Ramchand (2004, to appear), among others: Events can be decomposed into sub-events

common ground: ontology with **transition into a state / change of state**

(often thought of in terms of the BECOME-operator of Dowty 1979)

2.3.1 Pustejovsky (1991)

events can be of three different types, namely states (17), processes (18), and transitions (19).

(17) **State** (*S*): a single event, which is evaluated to no other event

Examples: *be sick, love, know*

$$\begin{array}{c} S \\ | \\ e \end{array}$$

(18) **Process** (*P*): a sequence of events identifying the same semantic expression

Examples: *run, push, drag*

$$\begin{array}{c} P \\ \wedge \\ e_1 \dots e_n \end{array}$$

(19) **Transition** (*T*): an event identifying a semantic expression, which is evaluated relative to its opposition (with *E* as a variable for any event type)

Examples: *give, open, build, destroy*

$$\begin{array}{c} T \\ \wedge \\ E_1 \quad \neg E_2 \end{array}$$

2.3.2 Ramchand (to appear)

events can be decomposed into maximally three subevents: a state (the initial state), a process (the dynamic part) and another state (the result state)

All dynamic verbs identify at least procP, the dynamic part of each event, but the causing subevent (initP) and the result state subevent (resP) are optional and not all verbs have the ability to identify these independently.

DPs in the specifier positions of initP, procP and resP have the interpretation of INITIATOR, UNDERGOER and RESULTEE

(20) **Event Composition Rule** Ramchand (to appear, 37)

$e = e_1 \rightarrow e_2$: *e* consists of two subevents, e_1, e_2 such that e_1 causally implicates e_2 .

(21) a. $\exists e_1, e_2 [\text{State}(e_1) \ \& \ \text{Process}(e_2) \ \& \ e_1 \rightarrow e_2] \rightarrow_{def} \text{Initiation}(e_1)$

b. $\exists e_1, e_2 [\text{State}(e_1) \ \& \ \text{Process}(e_2) \ \& \ e_2 \rightarrow e_1] \rightarrow_{def} \text{Result}(e_1)$

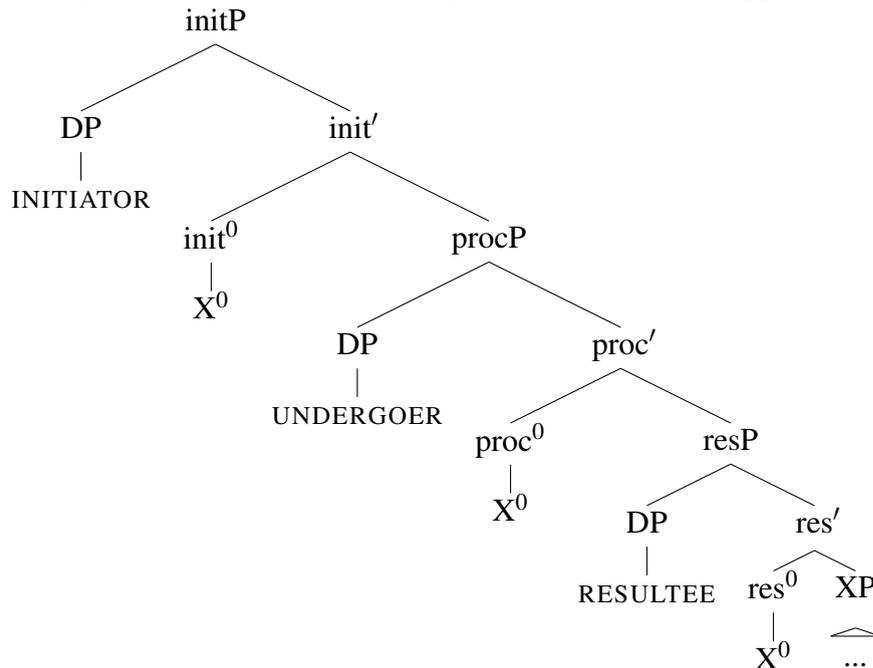
elements supplying a result state subevent:

– particular verbs can identify resP (e.g. *find, semelfactive jump*); they are lexically specified for the kinds of event structure they can license ([ν P, VP, resP] or [VP, resP])

- verbal particles in English (22-a)
- ‘resultatives’ (22-b)

- (22) a. Giorgos ate **up** the chocolate.
 b. Giorgos hammered the metal **flat**.

- (23) The syntax / semantics of the first phase (Ramchand, to appear)



problems

if verbs are lexically specified for telicity by the ability to license resP, there is a problem of optionality of resP

way out: telicity is something else (not necessarily resP) or resP is just one instance of telicity?

2.3.3 Hoekstra (1992, 1994, 1999)

small clause (SC) analysis for all change-of-state or position verbs, also where no overt secondary predicate is visible

the SC complement denotes the (path towards an) end-state of the (deep) object, i.e. the VP-internal argument DP

- (24) V [SC DP ... PRED]

constructions that have been analysed in terms of secondary predicates / small clauses

- verb-particle constructions (e.g. English) and prefixed verbs (e.g. Slavic)
- resultatives
- V-PP combinations

BUT: not all secondary predicates derive telic predicates

– depictives do not: *Evi ate the fish raw.*

– unbounded paths do not: *Evi walked towards the store / along the river.*

It is not the case that complex structure yields telic predicates

3 Arguments pro and contra event structure and event shape

3.1 event structure

3.1.1 structural (scope) instead of lexical ambiguity

adverbs like *quickly, rudely, clumsily, again, almost* can have more than one reading, depending on the verbal predicate they combine with

accounts in terms of event structure and scope ambiguity (e.g. Pustejovsky, 1991; von Stechow, 1996; Eckardt, 1998; Ernst, 1998)

- *again*

restitutive reading: repetition of the result state

repetitive reading: repetition of the whole event

(25) Clyde cleans his boots again ...

a. ... and Clyde has cleaned his boots before. *repetitive*

b. ... and his boots were clean before. *restitutive*

(examples from von Stechow 1996)

Pustejovsky (1991)

restitutive reading: only possible with complex events where *again* modifies the transition itself (hence, the result state)

repetitive reading: *again* modifies simple states or processes or the process part of a complex event

examples with motion events, put to use to argue against an aspectual asymmetry between goals and sources (Gehrke, in progress)

(26) a. Anna drove towards New York again. *repetitive*

Anna drove along the canal again. *repetitive*

b. Anna drove to New York again. *ambiguous*

Anna drove away again. *ambiguous*

c. Anna drove away from New York again. *ambiguous / repetitive*

arguments against scope ambiguity account of *again* (and against event structure account):
Jäger and Blutner (2000); Huitink (2003)

- *almost*

two readings with *almost* (Rapp and von Stechow, 1999):

- S(calar) interpretation: close to finishing

- C(ounterfactual) interpretation: close to starting

- (27) *examples from Winter (2006)*
- a. Dan almost drew a circle. (C / S)
 - b. Dan almost pushed a cart. (C / *S)

Scalar interpretation is only available with telic predicates (Dowty, 1979)
naturally accounted for in terms of event structure

BUT:

- (28) *lack of ambiguity of almost with V-PP combinations that are telic (Winter, 2006)*
- a. Dan almost walked around the lake. (C / ?S)
Dan almost circled the lake. (C / S)
 - b. Dan almost went to the park. (C / ?S)
Dan rende bijna naar het meer. (C / ?S)
Dan rende bijna tot (aan) het meer. (C / S)

alternative account in the spirit of ‘event shapes’ (Winter, 2006)

S-reading only available if the underlying scale is closed (following Rotstein and Winter, 2004, for deadjectival verbs)

atelicity involves weak downward monotonicity

telic structures may be open and then disallow the S-interpretation

account of facts in (28):

- a *to*-path is an open scale (hence: S-reading of *almost* is unavailable)
- but there is no weak downward monotonicity (hence: the event is telic)

• **locative PPs**

ambiguity with locative PPs between a locative and a directional reading (Gehrke, 2007)

English *in, on* cannot be understood directionally in all contexts:

- OK: *kick*, non-iterative *jump, throw, put, fall*, among others, henceforth **put-verbs**
- NOT OK: *dance, crawl, walk, swim*, among others, henceforth **swim-verbs**

(see also Thomas, 2003; Tungseth, 2006; Nikitina, to appear)

- (29) Sharon jumped in the lake.
- a. *paraphrase of the locative reading:*
Sharon jumped while being in the lake (i.e. the jumping took place in the lake).
 - b. *paraphrase of the directional reading:*
Sharon jumped and (as a result) she ended up in the lake.
- (30) Anna kicked the ball on the table.
- a. *paraphrase of the locative reading:*
Anna kicked the ball while being on the table (i.e. the kicking took place on the table).
 - b. *paraphrase of the directional reading:*
Anna kicked the ball and (as a result) the ball ended up on the table.

- (31) Shakuntala swam in the lake.
 a. *paraphrase of the locative reading:*
 Shakuntala swam while being in the lake (i.e. the swimming took place in the lake).
 b. **directional reading*
- (32) John danced on the stage.
 a. *paraphrase of the locative reading:*
 John danced while being on the stage (i.e. the dancing took place on the stage).
 b. **directional reading*

Similar split within motion verbs in Dutch:

- (33) a. Rick sprong in het meer. (locative / directional)
 Rick jumped in the lake
 ‘Rick jumped in the lake.’
 b. Willemijn zwom in het meer. (locative / *directional)
 Willemijn swam in the lake
 ‘Willemijn swam in the lake.’
- (34) a. Gert Jan schopte de bal op de tafel. (locative / directional)
 Gert Jan kicked the ball on the table
 ‘Gert Jan kicked the ball on the table.’
 b. Brigit dansde op het podium. (locative / *directional)
 Brigit danced on the stage
 ‘Brigit danced on the stage.’

account in terms of event structure (Gehrke, 2007)

the particular PPs are unambiguously locative but have different attachment sites

put-verbs license complex event structure and locative PPs can modify the result state (the final location) of the event

swim-verbs only have a process subevent and locative PPs can only modify the event as a whole
 syntactic tests: locative PP is more deeply embedded under the directional reading than under the locative reading (see also Tungseth 2006)

• ***for*-adverbials**

for-adverbials: only compatible with telic predicates

but there are cases where *for*-adverbials appear with telic predicates: as modifiers of result states
BUT this is not possible with all telic predicates:

- (35) *examples discussed in Kratzer (2000)*
 a. *The pots were washed up for 20 hours.
 b. The tires were pumped up for 20 hours.

Kratzer (2000): distinction between resultant states and target states

3.1.2 typological variation

Verb-framed and satellite-framed languages

Talmy (1985, 1991, 2000): Which surface elements express the path of a Motion Event?

- **Satellite-framed languages**

Verbs conflate Motion and Manner but not Path; Path is expressed by satellites

Satellites: ‘immediate constituents of a verb root other than inflections, auxiliaries, or nominal arguments’ / sister to the verb

(Indo-European (except Romance), Chinese, Finno-Ugric, Ojibwa, Warlpiri)

(36) *Satellite-framed languages, e.g. English*

- The bottle floated into the cave.
- The bottle floated out of the cave.

- **Verb-framed languages**

Verbs conflate Motion and Path; Manner of motion verbs cannot combine with path expressions

Manner is expressed separately, e.g. by a subordinate clause, or not expressed at all

(Romance, Semitic, Polynesian, Nez Perce, Caddo, Japanese, Korean)

(37) *Verb-framed languages, e.g. Spanish*

- La botella entró a la cueva (flotando).
the bottle MOVED-in to the cave (floating)
The bottle floated into the cave.
- La botella salió de la cueva (flotando).
the bottle MOVED-out of the cave (floating)
The bottle floated out of the cave.
- *La botella flotó a la cueva.
the bottle floated to the cave

- **Refinement**

Manner of motion verbs in verb-framed languages cannot combine with bounded paths

unbounded paths are grammatical (Aske, 1989; Fong and Poulin, 1998; Stringer, 2002):

(38) *French, Stringer (2002)*

- La fille a dansé vers la chambre.
the girl has danced towards the room
‘The girl danced towards the room.’
- *La fille a dansé à la gare.
the girl has danced to the station

Correlation with (un)availability of secondary resultative predicates (Fong, 1997; Folli, 2002; Mateu, 2002; Folli and Ramchand, 2005; Zubizarreta and Oh, in press)

- (39) *Italian, Folli and Ramchand (2005)*
- a. Gianni broke the vase open.
 - b. *Gianni a rotto il vaso aperto.
Gianni has broken the vase open

⇒ Maybe we would like to have the same account for resultatives that we have for directional PPs (contra Rothstein 2004)

Higginbotham (2000)

TELIC PAIR FORMATION: the complex event structure comes about through the combination of elements that, in and by themselves, only contain or refer to a single (sub)event

- (40) a. They arrived at the airport.
b. arrive (x, e) ↔ (∃p) [at(x,p,e) & (∃e') (e' is a journey by x & (e,e') is a telic pair)]

arrive: predicate applying to (instantaneous) events of being at a place, which constitute the terminus or telos of events of journeying to that place

PPs like *at the airport*: do not express a path or a result of the arrival, but simply identify a place

Higginbotham's proposal for typological variation: semantic parameter

operation of telic pair formation is available in satellite-framed but not in verb-framed languages

V and P are unambiguous in both languages: V denotes process, P denotes location

- (41) a. *float under the bridge* (English)
directional reading: $\lambda y \lambda e \lambda e'$ (float(y,e) & under(y,x,e') & telic-pair(e,e'))
locative reading: $\lambda y \lambda e$ (float(y,e) & under(y,x,e))
- b. *galleggiare sotto il ponte* (Italian)
float under the bridge
locative reading: $\lambda y \lambda e$ (float(y,e) & under(y,x,e))

Unless there are additional constraints (which are not discussed in Higginbotham 2000), this operation should be freely available in all contexts in satellite-framed languages like English

BUT: (Gehrke, 2007)

– availability of directional readings with locative PPs is highly restricted, in a way that is unexpected if telic pair formation were freely available

– directional reading of (41)[a] is a route reading that does not necessarily involve telicity

– 'satellite-framed' Dutch behaves like 'verb-framed' Italian in displaying no ambiguity:

- (42) *Dutch under + swim-verbs: locative only*

Het vliegtuig vloog onder de brug.
the plane flew under the bridge

'The plane flew under the bridge.' (locative / *directional)

– with particular verbs, directional reading is also available in ‘verb-framed’ Italian:

(43) *Italian, Folli (to appear)*

La palla è rimbalzata sotto il tavolo.
the ball is bounced under the table

‘The ball bounced (to a point) under the table.’

Why have ‘telic pair formation’ at all?

Alternative account (Gehrke, 2007)

Two ‘event positions’ $\langle e_1, e_2 \rangle$ always have to be lexically supplied in both types of languages (with incremental path associated with the first and something like a result state associated with the the second)

This can be done either by:

- a complex directional PP (as in (3), Higginbotham’s (2000) accomplishment Ps), or
- a *put*-verb (Rothstein’s (2004) accomplishment verbs)

put-verb cases are different from (41)[a]: the verb itself is lexically specified for two event positions, where the PP merely modifies the second event (the result state)

(44) *jump in the lake*
 $\lambda y \lambda e \lambda e' (\text{jump}(y, e, e') \ \& \ \text{in}(y, \text{the lake}, e'))$

Under the locative reading of *jump in the lake*, the PP modifies the whole event (the macro-event) of iterated minimal jumping events:

(45) $\lambda y \lambda e (\text{jump}(y, e) \ \& \ \text{in}(y, \text{the lake}, e))$

(46) $[_{VP} [_{\text{PlaceP}} \textit{in the lake}] [_{VP} \textit{DP jump}]]$

Verbs like *jump* are systematically ambiguous between a semelfactive and an iterative reading (Rothstein, 2004)

3.1.3 modification of result states

monotonicity properties of result states (final location) can account for certain modification possibilities with otherwise telic predicates

Czech source prefixes can combine with measure expressions such as *metr* ‘a metre’ or the prefix *po-* with the meaning ‘a bit’, which are both ungrammatical on verbs with goal prefixes³ (Filip, 2003)

- (47) a. *Od-skočil^p metr od okna.* (= (24), Filip 2003:77)
FROM-jumped metre.ACC from window.GEN
‘He jumped a meter away from the window.’
- b. *??Při-skočil^p metr k oknu.*
TO-jumped metre.ACC to windowDAT
(intended meaning: ‘He jumped a meter to the window.’)

³If either the prefix or the measure phrase modifier is omitted, the particular cases are grammatical with either goal or source PP.

- (48) a. Po-vy-táhl^P káru z příkopu. (= (49)[b], Filip 2003:94)
 PO-OUT-dragged cart.ACC out ditch.GEN
 ‘He dragged the cart out of the ditch a bit.’
 b. *Po-do-táhl^P káru do příkopu.
 PO-(IN)TO-dragged cart.ACC (in)to ditch.GEN
 ‘He dragged the cart (in)to the ditch a bit.’
 (= (50)[b], Filip 2003:94)

• **Filip’s (2003) account**

(49) **The Telicity Constraint**

Telicity modifiers⁴ express functions that map atelic (homogeneous) predicates onto telic predicates: $\lambda P\lambda e [P(e) \wedge \text{HOM}(P)(e)] \rightarrow \lambda P\lambda e [P(e) \wedge \text{TEL}(P)(e)]$.
 (Filip, 2003, 63)

Events can be delimited only once (Tenny, 1994; Krifka, 1998, among others)

(50) **Goal-Source Telicity Asymmetry**

The spatial orientation of directional modifiers determines the telicity status of a derived predicate. Source-modifiers form atelic (homogeneous) predicates. Goal-modifiers form telic predicates.
 (Filip, 2003, 79)

BUT:

- the particular predicates pass diagnostics for telicity (Gehrke, 2005, to appear)
 (– the particular prefixes pass diagnostics for VP-internal status, Gehrke to appear)

- (51) a. Vy-táhl^P káru z příkopu *(za) hodinu.
 OUT-dragged cart.ACC out ditch.GEN *(in) hour.ACC
 ‘He dragged the cart out of the ditch (in / *for) an hour.’
 b. Do-táhl^P káru do příkopu *(za) hodinu.
 (IN)TO-dragged cart.ACC (in)to ditch.GEN *(in) hour.ACC
 ‘He dragged the cart (in)to the ditch in / *for an hour.’
- (52) a. Vy-táhl^P káru z příkopu.
 → Už ne-vy-tahujeⁱ káru z příkopu.
 already not-out-drags cart out ditch
 ‘He dragged the cart out of the ditch.’ - ‘He no longer drags the cart out of the ditch.’
 b. Do-táhl^P káru do příkopu. → Už ne-do-tahujeⁱ káru do příkopu.
 already not-(in)to-drags cart (in)to ditch
 ‘He dragged the cart into the ditch.’ - ‘He no longer drags the cart into the ditch.’

⁴Filip provides the following examples for telicity modifiers: directional PPs with motion verbs (e.g. *to the store*), temporally delimiting adverbials (e.g. *for an hour*), resultatives (e.g. *to hammer the metal flat*).

alternative account (Gehrke, to appear)

Slavic (VP-internal) prefixes derive from locative Ps and can be treated as state morphemes denoting the result state of a complex telic event

- (53) a. *drag the cart into the ditch*
 $\lambda x \exists y \exists z \exists e_1 \exists e_2 [\text{cart}(y) \ \& \ \text{ditch}(z) \ \& \ \text{drag}(x, y, e_1) \ \& \ \text{inside}(y, z, e_2) \ \& \ e_1 \rightarrow e_2]$
(x causes the cart to be in(side) the ditch by dragging it)
- b. *drag the cart out of the ditch*
 $\lambda x \exists y \exists z \exists e_1 \exists e_2 [\text{cart}(y) \ \& \ \text{ditch}(z) \ \& \ \text{drag}(x, y, e_1) \ \& \ \text{outside}(y, z, e_2) \ \& \ e_1 \rightarrow e_2]$
(x causes the cart to be outside the ditch by dragging it)

measure phrases apply to the result state of the cart being inside or outside the ditch (modify a locative PP)

semantic restrictions on measure phrase modification of PPs (Zwarts and Winter, 2000)

Vector space semantics:

- a locative PP like *behind the house* is associated with the set of vectors that go from the house to points behind it
- the modified PP *5 metres behind the house* denotes the intersection of two sets of vectors, those that are five metres long and those that are behind the house

- (54) *not all locative PPs can be modified by measure phrases*
- a. two metres behind the car
two kilometres outside the village
- b. *two metres between the houses
*two metres in / inside the house

(55) Modification Condition

A set of located vectors $W \subseteq V \times V$ satisfies the Modification Condition iff W is $\text{VMON}\uparrow$, $\text{VMON}\downarrow$ and non-empty.

(given a particular definition of vector monotonicity)⁵

- (56) Universal: All simple locative Ps in natural language are downward monotone.

- (57) $\text{VMON}\uparrow$: in front of, behind; above, over, below, under; beside; outside
not $\text{VMON}\uparrow$: near, on, at; inside, in; between

possible account in terms of event shapes (inspired by Winter 2006):

Slavic prefixes ‘close the scale’ of an otherwise open scale associated with the particular directional PPs

provide not just an upper bound, the supremum of the interval associated with the scale, but guarantee that the supremum is a maximum

⁵The relevant notion of monotonicity is defined in (i) (with \mathbf{u} and \mathbf{v} as variables over located vectors).

- (i) **Vector monotonicity:** Let P be a prepositional function and $X \subseteq D_{pt}$.
- a. P is **upward vector-monotone** over x ($\text{VMON}\uparrow$) iff
 $\forall A \subseteq X \ \forall \mathbf{u}, \mathbf{v} \subseteq D_v [\mathbf{u} \leq \mathbf{v} \rightarrow (P(A)(\mathbf{u}) \rightarrow P(A)(\mathbf{v}))].$
- b. P is **downward vector-monotone** over x ($\text{VMON}\downarrow$) iff
 $\forall A \subseteq X \ \forall \mathbf{u}, \mathbf{v} \subseteq D_v [\mathbf{u} \leq \mathbf{v} \rightarrow (P(A)(\mathbf{v}) \rightarrow P(A)(\mathbf{u}))].$

3.2 event shape

(summary of arguments against event structure and pro event shape in Zwarts 2006)

3.2.1 Cross-categoriality

Motion verbs share spatial properties with prepositions and adverbs:

- (58) a. *enter* vs. *go into*
 b. *rise* vs. *go up*
 c. *circle* vs. *go around*
- (59) a. $\llbracket \text{into NP} \rrbracket = \{ \mathbf{p:p}(1) \text{ is inside } \llbracket \text{NP} \rrbracket \}$
 b. $\llbracket \text{around NP} \rrbracket = \{ \mathbf{p:p} \text{ encloses } \llbracket \text{NP} \rrbracket \}$
- (60) a. $\llbracket \text{enter NP} \rrbracket = \{ e:\text{SHAPE}(e)(1) \text{ is inside } \llbracket \text{NP} \rrbracket \}$
 b. $\llbracket \text{circle NP} \rrbracket = \{ e:\text{SHAPE}(e) \text{ encloses } \llbracket \text{NP} \rrbracket \}$

problematic for event structure account:

- (58)[a] not a problem: either the verb *enter* or the PP headed by *into* can license a complex event structure associated with a process and a transition into a result state
- (58)[b] potential problem: such cases do not necessarily involve a transition into a state (e.g. *the balloon rose for hours*) – not a problem

possible way out (Zwarts, 2006):

- an event structure does not have to be associated with pairs of subevents [as in e.g. Higginbotham 2000]
- event structure can also be associated with ‘sequences of states $e_1 \dots e_n$ over which a certain progression is specified’
- the final state e_n is a state of being closer to the reference object than the initial state e_1 [more or less the proposal of Rothstein 2004]

- (58)[c] remains problematic: there is ‘an overall shape of events of circling / going around that cannot be reduced to positions that are occupied at subevents’

3.2.2 Modification

- (61) a. Jill swam *across the lake*.
 b. The balloon rose *1800 metres*.
 c. Jack approached *too closely*.

directional PPs, measure phrases or adverbs of the type in (61-c) specify a property of the spatial trajectory of the event

- (62) a. $\llbracket \text{across the lake} \rrbracket = \{ \mathbf{p:p} \text{ is orthogonal to the length of the lake} \}$
 b. $\llbracket 1800 \text{ metres} \rrbracket = \{ \mathbf{p:p} \text{ has a length of 1800 metres} \}$

this cannot straightforwardly be reduced to an even structure property

3.2.3 Opposition

- (63) a. rise - fall, enter - leave
b. circle, cross, jump, pass, zigzag

possible event structure account (Zwarts, 2006):

define an operation \sim of reversal which reverses the order of the subevent

BUT: these kinds of spatial opposites are not restricted to verbs but can be found in other spatial domains as well:

- (64) front - back

rather: operation \sim reverses paths and shapes of paths

- (65) a. $\llbracket \text{up} \rrbracket = \{ \sim \mathbf{p:p} \in \llbracket \text{down} \rrbracket \}$ and $\llbracket \text{down} \rrbracket = \{ \sim \mathbf{p:p} \in \llbracket \text{up} \rrbracket \}$
b. $\llbracket \text{around} \rrbracket = \{ \sim \mathbf{p:p} \in \llbracket \text{around} \rrbracket \}$

- (66) a. $\{ \text{SHAPE}(e): e \in \llbracket \text{rise} \rrbracket \} = \{ \sim \text{SHAPE}(e): e \in \llbracket \text{fall} \rrbracket \}$ and vice versa
b. $\{ \text{SHAPE}(e): e \in \llbracket \text{circle} \rrbracket \} = \{ \sim \text{SHAPE}(e): e \in \llbracket \text{circle} \rrbracket \}$

3.2.4 Aspect

the kind of spatial trajectory described by a particular verb determines the event structure and aspectual class of a verb

motion verbs like *walk*, *swim*, *follow* correspond to a path of motion, but they do not impose any condition on the shape, length or direction of the path

other motion verbs like *enter*, *reach*, *leave*, *arrive* impose particular conditions on the starting points or endpoints of the paths:

- (67) a. $\llbracket \text{reach NP} \rrbracket = \{ e: \text{only SHAPE}(e)(1) \text{ is at } \llbracket \text{NP} \rrbracket \}$
b. $\llbracket \text{leave NP} \rrbracket = \{ e: \text{only SHAPE}(e)(0) \text{ is in } \llbracket \text{NP} \rrbracket \}$
c. $\llbracket \text{arrive PP} \rrbracket = \{ e: \text{only SHAPE}(e)(1) \text{ is } \llbracket \text{PP} \rrbracket \}$

3.2.5 Fictive motion

certain V-PP combinations are ambiguous between a (dynamic) motion sense (68-a) and a (static) extension sense (68-b)

- (68) a. The missile zigzagged to the village.
b. The road zigzagged to the village.

problem for event structure account:

Given that ordering of subevents is temporal, the extension sense cannot be accounted for because there is no temporal ordering, not even telicity, if this is a temporal concept as well.

event shape account:

the role of a path in the semantics of the predication can be other than temporal, taking into account other participants in the clause and its temporal reference

extension events: no motion of the theme along the path of the event, but distribution of the theme along the path

requires a decomposition of the theme into parts with respect to its major dimension: SLICES function gives an ordered set of parts ('slices') of the theme

(69) Event e is an extension event, $\text{EXTENSION}(e)$, iff there is a monotone increasing homomorphism h from $\text{SLICES}(\text{THEME}(e))$ to $[0,1]$ such that for every $x \in \text{SLICES}(\text{THEME}(e))$, x is located at $\text{SHAPE}(e)(h(x))$ at any $t \in \text{TIME}(e)$.

(Zwarts, 2006, 16)

homomorphism from 'matter' to path rather than from time to path (see Gawron, 2005, for elaboration)

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