PPs, paths, and resultatives
(*Secondary Predication in Formal Frameworks*, May 27, 2013, Utrecht)
Joost Zwarts
Utrecht University

0   Introduction

(1)   *Resultative PPs*
       a.   John hammered the metal <u>into a ball</u>.
       b.   The bullet whistled <u>out of the room</u>.
       c.   Matilda danced mazurkas <u>across the room</u>.

(2)   *Common assumption in much work on resultatives*
       The PP *predicates* an *end state* (*location*) of a participant in the sentence.
       a.   … [$_{SC}$ DP <u>PP</u>]   (Small clause, Hoekstra 1988)
       b.   [$_{Transition}$ Process <u>State</u>]   (Telic pair, Pustejovsky 1991, Higginbotham 2000)

(3)   *Point of this talk*
       Resultative PPs do not directly predicate a resulting state or location to a participant, but
       they are always *path* predicates of an *event*.
       (Related considerations in Rappaport & Levin 2001, Goldberg & Jackendoff 2004,
       Wechsler 2005, Beavers 2008, Ettlinger 2008, Matushansky et al. 2012)

(4)   *Structure of this talk*
       1   Types of PPs
       2   Resultative PPs are path PPs
       3   Path PPs as event path predicates
       4   Conclusions (Event structure, Goal bias, APs as paths)

1   Types of PPs

(5)   *Types of PPs* (Jackendoff 1983 and many others)
       a.   Locative or place PPs: e.g. at, in, on, under, over, behind, near, …
       b.   Directional or path PPs:
               (i)   Source: from, off, out of, away from
               (ii)   Goal: to, onto, into, towards
               (iii)   Route: via, through, across, along, over, around

(6)   *Two contexts that distinguish place PPs from path PPs*
       a.   The book was on/under/near the table.   (primary predicate)
       a'. * The book was to/off/via the table.
       b.   The book on/under/near the table got lost.   (adnominal modifier)
       b'. * The book to/off/via the table got lost.

(7)   *Some path PPs can be used predicatively* ('end-point focus')
       a.   My boyfriend is out of town.
       b.   The shop is around the corner.
       c.   The house is up the hill.

(8) *Only some nouns allow a path PP modifier*
  a. * the signpost/car to Utrecht
  b. the road/bus to Utrecht

(9) *Two orthogonal dimensions*

	Place	Path
Physical space	in the room	into/out of/through the room
Property space	in a depression	into/out of/through a depression

(10) *Property places versus property paths*
  a. The economy stayed in/?into a depression.
  b. The government inherited an economy in/?into a depression.

3 Resultative PPs are path PPs

(11) *Two parts of this generalization*
  a. Resultative PPs are not place PPs but path PPs.
  b. Resultative PPs are not only goal PPs, but also source and route PPs.

(12) *Two types of resultatives in Goldberg & Jackendoff (2004)*
  a. Path resultatives (GO Path, always PPs)
  b. Property resultatives (BECOME Property, APs or PPs)

(13) *Path resultatives – Goal* (G&J)
  a. Fred tracked the leak to its source.
  b. The witch vanished into the forest.
  c. Bill knocked the vase onto the floor.

(14) *Path resultatives – Source* (G&J)
  a. Bill drank from the hose.
  b. The critics laughed the play off the stage.
  c. Bill rolled out of the room.

(15) *Path resultatives – Route* (G&J)
  a. John danced mazurkas across the room.
  b. The toilet leaked through the floor into the kitchen below.
  c. The bullets whistled past the house.

(16) *PP property resultatives are paths* (Ettlinger 2005)
  a. The toast burned to/*at a crisp.
  b. The grammarian lectured us into/*in a stupor.

(17) *Property resultatives can also be sources and routes*
  a. Jaeger talked him out of a depression. (Source)
  b. You prayed him through a coma.   (Route)

(18) *Maybe no subject-oriented property resultatives* (Mathushansky et al. 2012)
  a. * He followed Lassie into a rage.
  b. * The wise men followed the star famous/out of their minds.

(19) *With certain motion verbs place PPs can refer to goal paths*
     (Thomas 2004, Folli & Ramchand 2005, Nikitina 2008, Gehrke 2008, Tham et al. 2012;
     path interpretation favoured when the verb implies "inherent displacement")
     a.   Sharon jumped in the lake.
     b.   Anna kicked the ball on the table.
     c.   Giorgos jumped behind the door.
     d.   Nino kicked the ball under the table.

4   Path PPs as event path predicates

(20) *Resultative PPs are not predicates of nominals*
     If resultative PPs are path PPs (section 3)
     and path PPs can not serve as predicates (section 2),
     then resultative PPs can not be (small clause) predicates.

(21) *Resultative PPs are not end states/locations*
     If resultative PPs are not only goal PPs, but also source and route PPs (section 3),
     then resultative PPs can not be characterized in terms of end states/locations.

(22) *Path PPs as event path predicates*
     a.   A path PP is a predicate of paths,
     b.   that applies to the 'trace' of an event in some space,
     c.   traversed by some participant in the event.

(23) *The notion of path*
     Gruber (1965), Jackendoff (1983), Verkuyl & Zwarts (1992), Piñon (1993), Krifka
     (1998), Talmy (2000), Eschenbach et al. (2000), Beavers (2002), Zwarts (2005), Gehrke
     (2008), Pantcheva (2012), and many, many others

(24) *The representation of paths*
     A path is a (continuous) function p from the (real) interval [0,1] to positions in some
     space.
     ($p(0)$ = starting point, $p(1)$ = end point, $p(i)$ = intermediate point for every i, $0 < i < 1$)

(25) *The denotation of path PPs* (very roughly)
     a.   into the forest (goal): $\lambda p.\textbf{in}(\textbf{the-forest})(p(1))$
     b.   off the stage (source): $\lambda p.\textbf{on}(\textbf{the-stage})(p(0))$
     c.   past the house (route): $\lambda p.\exists i.0{<}i{<}1 \wedge \textbf{near}(\textbf{the-house})(p(i))$

(26) *Also for paths in property spaces*
     a.   to death: $\lambda p.\textbf{at}(\textbf{death})(p(1))$
     b.   out of a coma $\lambda p.\textbf{in}(\textbf{a-coma})(p(0))$

(27) *Mapping from sets of places to sets of paths*
     a.   from $\lambda P.\lambda p.P(p(0))$
     a'.   from under the table $\lambda p.\textbf{under}(\textbf{the-table})(p(0))$
     b.   0 $\lambda P.\lambda p.P(p(1))$
     b'.   0 under the table $\lambda p.\textbf{under}(\textbf{the-table})(p(1))$
     (its operation subject to pragmatic constraints)

(28) *The trace function* (Krifka 1998)
The trace function PATH is a (partial) homomorphism that assigns to an event *e* the spatial or conceptual path PATH(*e*) that is traversed by THEME(*e*) across the running time TIME(*e*) of *e*.
   a. partial: not every event has a path
   b. homomorphism: (a)telicity of PP determines (a)telicity of VP
   c. spatial or conceptual: localism (Gruber 1965)
   d. traversal: corresponds to Jackendoff's GO function[1]
   e. THEME: a neo-davidsonian thematic role picking out the appropriate participant (whatever its characterization: patient, force-recipient, …)

(29) *The path PP as a event path predicate*
If **P** is the basic path denotation of a path PP,
then $\lambda e.\exists p.E(e) \land$ PATH$(e)=p \land$ **P**(p) is its event denotation (the set of events that have their trace in **P**).

(30) *Subject resultatives*
   a. John swam laps to exhaustion.
      $\exists e.\exists p.$**john-swim-laps**$(e) \land$ PATH$(e)=p \land$ **at**(**exhaustion**)$(p(1))$
   b. Robin danced out of the room.
      $\exists e.\exists p.$**robin-dance**$(e) \land$ PATH$(e)=p \land$ **in**(**the-room**)$(p(0))$
   c. The children played leapfrog across the park.
      $\exists e.\exists p.$**children-play-leapfrog**$(e) \land$ PATH$(e)=p \land$ **across**(**the-park**)(p)

(31) *Object resultatives*
   a. Clara rocked the baby to sleep.
      $\exists e.\exists p.$**clara-rock-the-baby**$(e) \land$ PATH$(e)=p \land$ **at**(**sleep**)$(p(1))$
   b. We all pulled the crate out of the water.
      $\exists e.\exists p.$**we-all-pull-the-crate**$(e) \land$ PATH$(e)=p \land$ **in**(**the-water**)$(p(0))$
   c. John waltzed Mary around and around the room.
      $\exists e.\exists p.$**john-waltz-mary**$(e) \land$ PATH$(e)=p \land$ **a-and-a**$(p,$**the-room**$)$

(32) *Summarizing: A resultative PP*
   a. … applies uniformly to an event,
   b. … adds a condition on the path of that event,
   c. … applies indirectly to a particular participant of that event.

5 Conclusions

(33) *Event structure*
Treating resultative PPs as event-modifying path PPs is not incompatible with a bi-eventive analysis (e.g. Rappaport Hovav & Levin 2001, Goldberg & Jackendoff 2004), as long as the second event is not a state.

---

[1] GO(THEME(*e*),PATH(*e*),TIME(*e*)) iff there is a continuous and monotone increasing bijection *f* from TIME(*e*) to [0,1] such that for every $t \in$ TIME(*e*), BE(THEME(*e*),PATH(*e*)(*f*(*t*)),*t*).

(34) *More event structure*
a.   Sam had coughed himself into a haemorrhage.
        $\exists e$.**cough**(e) $\wedge$ **agent**(e)=**sam** $\wedge$
            $\exists e'$.**R**(e,e') $\wedge$ THEME(e')=**sam** $\wedge$ **in**(**haemorrhage**)(PATH(e)(1))
b.   She talked seven warts off my hands.
        $\exists e$.**talk**(e) $\wedge$ **agent**(e)=**she** $\wedge$
            $\exists e'$.**R**(e,e') $\wedge$ THEME(e')=**7-warts** $\wedge$ **on**(**my-hands**)(PATH(e)(0))

(35) *The 'resultative' bias*
    Why have PPs been treated so often as 'results'?
a.   the BECOME operator inherited from generative semantics
b.   The *goal bias* (Lakusta & Landau 2005)
c.   The priority of APs in research

(36) *APs as paths?* (cf. Wechsler 2005, Beavers 2008, ….)
a.   flat: **to**(**flat**) = λp.**flat**(p(1)) $\wedge$ ¬**flat**(p(0))
b.   flatter (and flatter):   **up**(**flatter**) = λp.**flatter**(p(1),p(0))
    (Assuming that **flat** and **flatter** are defined over a scale of degrees.)

(37) a.   John hammered the metal flat.
            $\exists e$.**john-hammer-the-metal**(e) $\wedge$ **to**(**flat**)(PATH(e))
b.   John hammered the metal flatter and flatter.
            $\exists e$.**john-hammer-the-metal**(e) $\wedge$ **up**(**flatter**)(PATH(e))

(38) *Conclusion*
    From the *semantic* point of view, every 'resultative' PP must be analyzed as the
    predicate of the *path* of an *event*.

References
Beavers, John. (2002). Aspect and the distribution of prepositional resultative phrases in
    English". *LinGO Working Paper No. 2002-07*. Stanford, CA: CSLI, Stanford
    University.
Beavers, John (2008). Scalar complexity and the structure of events. In J. Dölling, T. Heyde-
    Zybatow, & M. Schäfer, eds., *Event Structures in Linguistic Form and Interpretation*.
    Berlin: Mouton de Gruyter, 245–265.
Eschenbach, Carola, Ladina Tschander, Christopher Habel and Lars Kulik (2000). Lexical
    specifications of paths. In C. Freksa, W. Brauer, C. Habel and K.F. Wender, eds.,
    *Spatial Cognition II: Integrating Abstract Theories, Empirical Studies, Formal
    Methods, and Practical Applications*. Berlin: Springer, 127-44.
Ettlinger, Marc. (2008). The syntactic behavior of the resultative: evidence for a
    constructional approach. In R.L. Edwards, P.J. Midtlyng, C.L. Sprague and K.G.
    Stensrud, eds., *CLS 41: The Panels. Proceedings from the Panels of the 41st Meeting of
    the Chicago Linguistic Society, vol. 2*. Chicago: Chicago Linguistic Society, 145-160.
Folli, Raffaella & Gillian Ramchand (2005). Prepositions and results in Italian and English:
    An analysis from event decomposition. In H.J. Verkuyl, H. de Swart & A. van Hout,
    eds., *Perspectives on aspect*. Dordrecht: Kluwer, 81–105.
Gehrke, Berit (2008). *Ps in Motion: On the Semantics and Syntax of P Elements and Motion
    Events*. Doctoral dissertation, Utrecht University.

Goldberg, Adele & Ray Jackendoff (2004). The English resultative as a family of Constructions. *Language* 80, 532-569.

Gruber, Jeffrey (1965). *Studies in Lexical Relations*. Doctoral dissertation, MIT, Distributed by the Indiana University Linguistics Club.

Higginbotham, James (2000). Accomplishments. *Proceedings of Glow in Asia II*, 72-82.

Hoekstra, Teun (1988). Small clause results. *Lingua* 74, 101-139.

Jackendoff, Ray S. (1983). *Semantics and Cognition*. Cambridge, MA: MIT Press.

Krifka, Manfred (1998). The origins of telicity. In Susan Rothstein ed., *Events and Grammar.* Dordrecht: Kluwer, 197-235.

Lakusta, Laura and Barbara Landau (2005). Starting at the end: the importance of goals in spatial language. *Cognition* 96, 1–33.

Matushansky, Ora, Annemarie van Dooren, and Lotte Hendriks (2012). A path to the result(ative). Paper presented at the Rencontres d'Automne de Linguistique Formelle, November 29-30, 2012.

Nikitina, Tatiana (2008). Pragmatic factors and variation in the expression of spatial goals: The case of *into* vs. *in*. In A. Asbury, J. Dotlacil, B. Gehrke & R. Nouwen, eds., *Syntax and semantics of spatial P*. Amsterdam: John Benjamins, 175–209.

Pantcheva, Marina (2011). *Decomposing Path: The Nanosytax of Directional Expressions*. Doctoral Dissertation, Univeristy of Tromsø.

Pustejovsky, James (1991). The syntax of event structure. *Cognition* 41, 47-81.

Rappaport Hovav, Malka & Beth Levin (2001). An event structure account of English resultatives. *Language* 77.4, 766-797.

Talmy, Leonard (2000). *Towards a Cognitive Semantics*. Cambridge, MA: MIT Press.

Tham, Shiao Wei, Beth Levin and John Beavers (2012). Directional interpretations with locative prepositions. Paper presented at *The Meaning of P*, Bochum, November 23-25, 2012.

Thomas, Emma (2004). On 'syntactic' versus 'semantic' telicity : Evidence from *in* and *on*. *Belgian Journal of Linguistics* 18, 145–166.

Verkuyl, Henk and Joost Zwarts (1992). Time and space in conceptual and logical semantics: the notion of Path. *Linguistics* 30, 483-511.

Wechsler, Stephen (2005). Resultatives under the 'event-argument homomorphism' model of telicity. In N. Erteschik-Shir, & T. Rapoport, eds., *The Syntax of Aspect*. Oxford: Oxford University Press, 255-273.

Zwarts, Joost (2005). Prepositional aspect and the algebra of paths. *Linguistics and Philosophy* 18.6, 739-779.