

Phrasal *before/after*

The Problem. The temporal connectives *before* and *after* can take complements of different types: times (1a), events (1b), clauses (1c) and what looks superficially like a DP (1d).

- (1) a. Mary arrived before/after 6pm.
 b. Mary left before/after dinner.
 c. Mary arrived before/after John left.
 d. Mary arrived before/after John.

Considering clausal complements of *before/after*, Beaver & Condoravdi (2003) propose a unified analysis of *before* and *after* as relations between times, cf. (2a) (where t corresponds to the complement time and t' is to be bound by the matrix tense). The complement clause of (1c) is analysed as “the earliest time at which John leaves” with a covert coercion operator EARLIEST as in (2b). Assuming a standard indefinite semantics for PAST, cf. (2c), (2b) is interpreted as (2d).

- (2) a. $\llbracket \text{before / after} \rrbracket = \lambda t. \lambda t'. \lambda P_{it}. P(t') \ \& \ t' < /> t$
 b. PAST $\lambda t_4 [t_4 \text{ after } [\text{EARLIEST WH}_3 \text{ PAST } \lambda t_4 t_4 \text{ AT } t_3 \lambda t_2 \text{ John leave}(t_2)]] \lambda t_1 \text{ Mary arrive}(t_1)$
 c. $\llbracket \text{PAST} \rrbracket^* = \lambda P_{it}. (\exists t < s^*) P(t)$
 d. $(\exists t < s^*) \text{ Mary arrives at } t \ \& \ t > \text{ the earliest } t' \text{ s.t. } t' < s^* \ \& \ \text{John leaves at } t'$

The semantics in (2a) also straightforwardly applies to cases where the complement of *before/after* denotes a time or an event (in the latter case employing a coercion operator τ returning the time of an event). But what about cases like (1d), where *before/after* superficially combines with a DP (phrasal *before/after*)? Should the complement of phrasal *before/after* be analysed as a clause, which has undergone some form of ellipsis (reduction analysis), or just as a DP (direct analysis)? While a similar issue arising for the complement of *than* in comparatives has been widely discussed (for a recent discussion see Bhatt & Takahashi, 2007), this question has not been addressed for phrasal *before/after*.

Empirical Evidence. Several kinds of evidence bear on the syntactic and semantic status of the complement of phrasal *before/after*, all favouring the direct analysis: (i) categorial restrictions: only DPs can serve as complement of phrasal *before/after*, never PPs or adverbials; (ii) only one DP can be embedded, not more; (iii) lexical distinction: several languages have different lexical items for clausal and phrasal *before/after* (e.g. German: *bevor/nachdem* vs. *vor/nach*); (iv) case: the complement DP (the remnant) is invariably assigned dative case, independently of the case of the phrase it corresponds to (the associate):

- (3) Mary arrived before him / *before he / before he did.

(v) scope of quantifiers: under the reduction analysis, the scope of quantifiers occurring under phrasal *before/after* is expected to be restricted to the subordinate clause, whereas under the direct analysis, quantificational remnants are predicted to interact freely with matrix elements. We find that quantifiers under phrasal *before/after* can indeed take wide scope with respect to matrix elements, while this is not possible for quantifiers occurring in *before/after* clauses:

- (4) a. Peter read a book after every article. $\forall > \exists$
 unspecific, different books are read after each article
 b. Peter read a book after he read every article. $\exists > \forall$
 specific, one book is read after the reading of all articles is completed

(vi) binding effects: under the direct analysis, the binding properties of the *before/after*- phrase

are expected to correspond to the binding properties of other PPs. Under the reduction analysis, the remnant is predicted to be c-commanded by everything that c-commands the associate. We observe that binding properties are determined by surface syntax, not by c-command relation between the associate and other matrix elements. (5a) isn't ungrammatical (also under the reading equivalent to (5b)), although the reduction analysis predicts a Principle C violation as in (5b), and (6a) violates Principle C (also again under the relevant reading), although the ellipsis and the full clause version are grammatical.

- (5) a. ?Mary saw Peter_i's sister before him_i.
 b. *Mary saw Peter_i's sister before he_i saw Peter_i's sister.
- (6) a. *Mary saw him_i before Peter_i's sister.
 b. Mary saw him_i before Peter_i's sister did.
 c. Mary saw him_i before Peter_i's sister saw him_i.

Analysis. We conclude that in cases of phrasal *before/after*, *before* and *after* are prepositions. The semantics of phrasal *before/after* has to mimic the semantics of clausal *before/after* in (2a) and can be stated in analogy to Heim's (1985) meaning rule for phrasal comparatives:

- (7) $[[\text{before}_p/\text{after}_p]] = \lambda x_e. \lambda t_i. \lambda R_{e(it)}. \lambda y_e. R(y)(t) \ \& \ t < /> \text{EARLIEST} (\lambda t'. R(x)(t'))$

The first argument of phrasal *before/after* is the individual denoted by the embedded DP, the second a time (to be bound by the matrix tense), the third a relation between individuals and times, and the fourth the individual denoted by the associate. With this, the sentences in (8a) (subject associate) and (9a) (object associate) are analysed in the following way:

- (8) a. George drank the whiskey before Ann.
 b. PAST λt_2 George [_{t₂} before_p Ann] [$\lambda x \lambda t_1$ [x drink(t₁) the whiskey]]
 c. ($\exists t < s^*$) George drinks the whiskey at t & t < the earliest t' s.t. Ann drinks the whiskey at t'
- (9) a. George drank the whiskey after the beer.
 b. PAST λt_2 the whiskey [_{t₂} after_p the beer] [$\lambda x \lambda t_1$ [George drink(t₁) x]]
 c. ($\exists t < s^*$) George drinks the whiskey at t & t > the earliest t' s.t. George drinks the beer at t'

An interesting question is how the LFs (8b) and (9b) are generated. We propose that this proceeds in the following way: First a temporal abstract of the VP is created (this might come about via PRO-movement, cf. Heim & Kratzer, 1998). Then the associate (*George* in (8), *the whiskey* in (9)) is QR-ed, creating a relation between individuals and times. To this derived predicate of type e(it), the *before/after*-phrase is adjoined in an instance of 'countercyclic' Merge (cf. Nissenbaum 1998), tucking in between the moved associate and the λ -abstract created by movement.

Summary We present empirical evidence that the complement of phrasal *before/after* is not underlying clausal and propose a matching analysis. Adopting this analysis has interesting consequences for the conception of the syntax/semantics-interface, as non-standard assumptions about the formation of LF have to be made.

References. BEAVER, D. & C. CONDORAVDI (2003): A Uniform Analysis of 'before' and 'after'. Proceedings of SALT XIII. BHATT, R. & S. TAKAHASHI. Direct Comparisons: Resurrecting the Direct Analysis of Phrasal Comparatives, Proceedings of SALT XVI. HEIM, I. (1985): Notes on comparatives and related matters, Ms., University of Texas at Austin. HEIM, I. & A. KRATZER (1998): Semantics in Generative Grammar, Blackwell. NISSENBAUM, J. (1998): Movement and derived Predicates: Evidence from Parasitic Gaps. In: U. Sauerland & O. Percus (eds.) The Interpretive Tract. MITWPL 25.