**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 denoting an individual (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. $[[\text{before} / \text{after}]] = \lambda t.\lambda t'.\lambda P_{it}. P(t') \land t' < t$  
   b. PAST $\lambda t_4 \left[ t_4 \text{after} [\text{EARLIEST WH}_3 \text{PAST} \lambda t_4 t_4 \text{AT} t_3 \lambda t_2 \text{John leave}(t_2)] \right] \lambda t_1 \text{Mary arrive}(t_1)$  
   c. $[[\text{PAST} P^* ]] = \lambda P_{it}.(\exists t < s^*)P(t)$  
   d. $(\exists t < s^*) \text{Mary arrives at} t \land t > \text{the earliest} t' \text{ s.t. } t' < s^* \land \text{John leaves at} t'$

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 $\tau$ returning the time of an event). But what about cases like (1d), where *before/after* superficially combines with a DP denoting an individual (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: in German, where case on DPs is overtly marked, the complement DP (the remnant) is invariably assigned dative case, independently of the case of the phrase it corresponds to (the associate), cf. (3a); (v) scope of quantifiers: the direct analysis predicts that quantifiers serving as complements of *before/after* obligatorily take wide scope. This prediction is borne out for genuine quantifiers (that cannot be interpreted as maximal individuals), e.g. German *jeder*, and contrast with quantifiers occurring in *before/after* clauses:

(3)  
   a. Peter las ein Buch nach jedem Artikel.  
       Peter read a.ACC book after every.DAT article  
       unspecific, different books are read after each article  
   b. Peter las ein Buch, nachdem er jeden Artikel gelesen hatte.  
       Peter read a.ACC book after he every.ACC article read had  
       specific, one book is read after the reading of all articles is completed

(vi) binding effects: binding properties of the remnant are determined by surface syntax. This is
compatible with the direct analysis, under which the binding properties of the before/after phrase are expected to correspond to the binding properties of other PPs, but not with the reduction analysis, under which the remnant is predicted to be c-commanded by everything that c-commands the associate.

(4) Grammatical, though reduction analysis predicts Principle C violation:
   a. Mary signed up Peter before him.
   b. *Mary signed up Peter before he signed up Peter.

(5) Principle C violation, though reduction analysis predicts it to be grammatical:
   a. *Mary saw him before Peter’s sister.
   b. Mary saw him before Peter’s sister saw him.

Analysis. We conclude that the complement of phrasal before/after is semantically of type e. 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:

(6) \[ [\text{before}_p/\text{after}_p] = \lambda x.\lambda t.\lambda R_{e(it)}.\lambda y. R(y)(t) & t < / > \text{EARLIEST} (\lambda t’.R(x)(t')) \]

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 (7) (subject associate) and (8) (object associate) are analysed in the following way:

(7) a. George drank the whiskey before Ann.
   b. PAST \[ t_2 \text{ before}_p \text{ Ann] [\lambda x.\lambda t_1.\lambda R_{e(it)}.\lambda y. R(y)(t) & t < / > \text{EARLIEST} (\lambda t’.R(x)(t'))] \]
   c. (\exists t < s*) George drinks the whiskey at t & t < the earliest t’ s.t. Ann drinks the whiskey at t’

(8) a. George drank the whiskey after the beer.
   b. PAST \[ t_2 \text{ after}_p \text{ the beer] [\lambda x.\lambda t_1.\lambda R_{e(it)}.\lambda y. R(y)(t) & t < / > \text{EARLIEST} (\lambda t’.R(x)(t'))] \]
   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 (7b) and (8b) 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 (7), the whiskey in (8)) 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 \[ \lambda - \text{abstract} \]

created by movement.

Summary We present empirical evidence that the complement of phrasal before/after is semantically an individual, 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.