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Stripping in temporal adverbial constructions

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Abstract. This paper argues that phrasal Temporal Adverbial Constructions (TACs; Kim left [before Bill]) are most amenable to a Stripping-like treatment. What I refer to as TAC-Stripping is low-adjunction of a TAC containing a truncated complement, viz. an extended *v*P. A single remnant is $\overline{\text{A}}$-moved to a focus position outside the elided *v*P (Pancheva 2009, Weir 2014). The remainder of the paper adapts Takahashi 2008 to account for the sensitivity of TAC-Stripping to familiar constraints against embedding the antecedent or ellipsis site, which are not observed with VP-Ellipsis.

Keywords. temporal adverbs; Bare Argument Ellipsis; VP-ellipsis

1. Introduction. Temporal Adverbial Constructions (TACs) introduced by the connectives *before* and *after* come in both full clausal (1a) and reduced phrasal (1b) forms.

(1) a. Ann left before/after Phil left.
b. Ann left before/after Phil.

Larson (1987) treats phrasal TACs as a species of Antecedent-Contained Deletion (ACD). The idea, illustrated in (2), is that covert movement of the TAC allows for resolution of an empty $\overline{\text{T}}$-constituent.

(2) a. [Kim left [before Phil $\langle_{\overline{\text{T}}}\ e\ \rangle$]]
b. [before Phil $\langle_{\overline{\text{T}}}$ left $\rangle]_1$ [Kim left t_1] (adapted from Larson 1987: 262, (47))

Among the problems of this analysis is a prediction that only Spec,TP will escape the ellipsis site. The ability to interpret *Tom* as a direct object in (3) is, therefore, unexpected.

(3) Kim met Sue before/after Tom_1 Δ.
a. $\Delta = x_1$ met Sue
b. Δ = Kim met x_1

Over the course of sections 2 and 3, I will present a modified analysis of phrasal TACs that still likens their external syntax to ACD configurations, but also treats them internally as a type of Stripping construction (e.g., Depiante 2000). The TAC is low-adjoined on the verbal spine and contains a truncated complement to the connective, roughly an extended *v*P. A single remnant is $\overline{\text{A}}$-moved to a focus position outside the elided *v*P. The basic idea is sketched below in (4).

(4) $[_{v\text{P}}\ [_{v\text{P}}$ Kim met Sue] $[_{after\text{P}}$ after $[_{\text{FocP}}\ \text{Tom}_1\ \langle_{v\text{P}}$ ~~Kim meet x_1~~ $\rangle]]]$

This is similar in spirit to what has been proposed by Pancheva (2009) for Slavic comparatives and by Weir (2014) for *Why*-Stripping. I will refer to this particular instance as *TAC-Stripping*.

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Evidence for movement and ellipsis in TACs as well as their truncated and low-adjoined status will be presented in section 2. We will also see that this basic analysis can help us understand the unavailability of genuine Stripping (i.e., IP-Ellipsis) in TACs; see (5).

(5) *Pam met Sue before not Tom.

In short, the relatively low adjunction on the verbal spine that is required of TACs forces truncation on penalty of generating an irreparable antecedent-containment configuration.

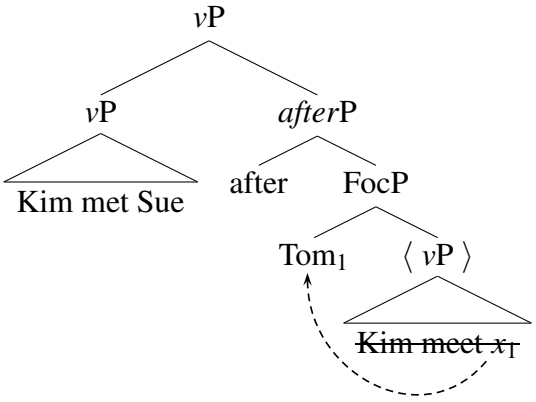
Section 3 begins by documenting the sensitivity of phrasal TACs to a familiar constraint on clause-reduction mechanisms, including Gapping (Hankamer 1979) and other Bare Argument Ellipses (Rooth 1992a, Lobeck 1995). We will state this constraint as (6).

(6) *No Asymmetric Embedding*
A clause-reduction site and its antecedent must be at the same level of embedding.

This constraint is intended to describe the observation that embedding the ellipsis site within the TAC or embedding the antecedent within the root clause is not tolerated. The remainder of section 3 provides an account for this observation that avoids postulating a coordination structure for TACs (cf. Lechner 2004 on comparatives). I will argue that the restricted distribution of phrasal TACs are additional cases of irreparable antecedent-containment or, adapting Takahashi 2008, re-binding effects that disrupt ellipsis-licensing. As we will see in section 4, a modification to Takahashi 2008 will be necessary to account for the equally familiar fact that VP-Ellipsis inside TACs is not subject to (6). Section 5 concludes and considers the future direction of this work.

2. TAC-Stripping. The basic syntactic analysis of phrasal TACs that I am proposing is sketched in the partial representation provided in (7).

(7) a. Kim met Sue after Tom.

b. 

Similar to genuine Stripping according to Depiante (2000), TAC-Stripping involves $\overline{\text{A}}$-movement of the remnant to a dedicated Focus phrase (FocP) outside of an elided constituent. Notably, the constituent being deleted is a *v*P within a truncated complement of a temporal connective. The reduced size of the elided constituent makes this analysis very similar to an analysis of Slavic comparatives according to Pancheva (2009) and to *Why*-Stripping according to Weir (2014).

On the basis of what will follow, the claim that the remnant is generated by movement out of the elided constituent is what separates this analysis from what is found in Larson 1987. The analysis here is also in opposition to proposals that would claim that a phrasal TAC does not have an elliptical derivation. This includes direct analyses, in which phrasal TACs consist of only the

temporal connective and a DP (e.g., Kennedy 1999 on comparatives) and proposals that would covertly move a constituent from the root clause into the TAC (e.g., Reinhart 1991).[1]

2.1. MOVEMENT AND ELLIPSIS. Rooth (1992b) demonstrates that the placement of focus in the root clause disambiguates phrasal TACs like (3), which has been reproduced in (8) and (9).

(8) $[_{\text{Root}}$ KIM met Sue $]$ after $[_{\text{Emb}}$ TOM$_1$ $\langle$ ~~x_1 met Sue~~ $\rangle]$
$[\![\text{Root}]\!]^f = [\![\text{Emb}]\!]^f = \{\ p\ :\ x \text{ met Sue} \mid x \in D_e\ \}$

(9) $[_{\text{Root}}$ Kim met SUE $]$ after $[_{\text{Emb}}$ TOM$_1$ $\langle$ ~~Kim met x_1~~ $\rangle]$
$[\![\text{Root}]\!]^f = [\![\text{Emb}]\!]^f = \{\ p\ :\ \text{Kim met } x \mid x \in D_e\ \}$

This is expected under Rooth's (1992b) theory of focus interpretation on the assumption that *Tom* has been extracted out of some elided material. Focus placement in the root clause will determine the set of well-formed alternatives that can be generated from the material in the TAC. When the root clause subject has a pitch accent there will be a presupposition that the the embedded clause is a member of the set of focus alternatives derived from the root clause, and vice versa. As shown in (8), this requires placing a pitch accent on *Tom* and interpreting it as the subject of the embedded clause. We can provide a similar explanation for when the root clause object has a pitch accent in (9).

Building on Lechner (2004) and Bhatt & Takahashi (2011) we can probe for the existence of elided linguistic material in phrasal TACs by investigating the binding properties of the remnant. To this end, observe that the pronominal direct object of a ditransitive predicate does not c-command the TAC. No disjoint-reference effect characteristic of Condition C arises in (10).

(10) I took him$_1$ to Sue [before Joe$_1$'s boss took him$_1$ to Sue].

Knowing this, it is interesting to discover that the subject/object ambiguity that we saw above is missing from the example in (11). Specifically, the remnant *Joe's boss* can receive a subject interpretation, but a disjoint-reference effect disrupts an indirect object interpretation.

(11) I took him$_1$ to Sue before
a. Joe$_1$'s boss$_2$ $\langle$ ~~x_2 take him$_1$ to Sue~~ $\rangle$
b. *Joe$_1$'s boss$_2$ $\langle$ ~~I take him$_1$ to x_2~~ $\rangle$

This observation that a disjoint-reference effect is a function of the interpreted grammatical role of the remnant is exactly what we would expect from an analysis employing extraction and ellipsis. A trace of *Joe's boss* is c-commanded by an elided instance of the coreferential pronoun only when interpreted as the indirect object in (11b). We also correctly predict that in (12) the ambiguity returns when we swap the pronoun and R-expression.

(12) I took Joe$_1$ to Sue before
a. his$_1$ boss$_2$ $\langle$ ~~x_2 take him$_1$ to Sue~~ $\rangle$
b. his$_1$ boss$_2$ $\langle$ ~~I take him$_1$ to x_2~~ $\rangle$

Finally, Merchant (2004) argues that fragment answers can be derived by movement out of an ellipsis site on the basis of their their sensitivity to a range of islands constraints. If the remnant in a phrasal TAC has undergone $\overline{\text{A}}$-movement, we should expect it to be sensitive to island

[1] It is possible, at this point, that both Gapping and Pseudogapping present salient alternative analyses to what is being called TAC-Stripping here. The inability to have either multiple remnants or an auxiliary in a TAC, which we will see in sections 2.3 and 4 respectively serve as evidence against these alternatives.

domains. The examples in (13) and (14) show respectively that the remnant is sensitive to the Complex-NP Constraint and the Left-Branch Condition.

(13) I met [$_{DP}$ someone who knows Dutch] before
  a. [$_{DP}$ someone who knows Russian]$_1$ ⟨ ~~I meet x_1~~ ⟩
  b. *Russian$_1$ ⟨ ~~I met [$_{DP}$ someone who knows x_1]~~ ⟩

(14) Bob read Kim's book after
  a. [$_{DP}$ Ann's book]$_1$ ⟨ ~~Bob read x_1~~ ⟩
  b. *Ann$_1$ ⟨ ~~Bob read [$_{DP}$ x_1's book~~] ⟩

The data presented in this subsection are expected if the remnant is $\overline{\text{A}}$-moved out of some elided syntactic material. As shown in (7), I am suggesting that this movement targets a focus-dedicated position in an extended projection of a truncated complement to the temporal connective. The next subsection motivates this internal architecture for phrasal TACs.[2,3]

2.2. TRUNCATION AND LOW-ADJUNCTION. The following examples, in which a main verb appears in its gerundive form, suggest that TACs can contain truncated complements. They appear to be approximately verbal small clauses in these examples.

(15) You should cook the dumplings [before eating them].

(16) The dumplings were eaten [after being cooked].

That the verb appears in its gerundive form in the absence of the progressive auxiliary *be* suggests an absence of the usual tense, modal, or aspectual structure.

Evidence that the complement in a phrasal TAC is a relatively small constituent that is adjoined relatively low to the verbal spine can be found in the interaction of negation and phrasal TACs. In order to appreciate this, let us first note that clausal TACs might adjoin to the verbal spine at various positions. This provides a way to understand the observation that *after*-phrases are ambiguous with respect to their relative scope with sentential negation, as shown in (17).

(17) Pam didn't leave after Beth left.
  a. *after*P $>$ $\neg$: 'After Beth left, it's not the case that Pam left.'
  b. $\neg$ $>$ *after*P : 'Pam left, but it's not the case that she did so after Beth left.'

[2] For full disclosure, there is a categorial restriction on the remnant of phrasal TACs that, at present, I do not entirely understand. Non-DP categories are not possible remnants of a phrasal TACs, unlike in genuine Stripping; see (i).

(i) a. I spoke to MARK but not (to) WILL.
  b. I spoke to MARK after (*to) WILL.

It may be possible to understand this as an effect of the resistance to pied-piping in embedded clauses (Cable & Harris 2011). The most natural pronunciation of (ia) has a pitch accent on *Will*. If we assert that the focus feature on *Will* does not project to the PP node, then the focus feature would effectively be pied-pipped by way of PP-movement. This simply may be dispreferred. Such an analysis would predict that placing the pitch accent on the preposition will make this example grammatical. To my ear, this at least provides an improvement.

(ii) ?I spoke TO Will before WITH Will.

[3] TAC-Stripping, as presented here, employs movement into the phrasal TAC's left periphery, contra Hooper & Thompson's (1973) claims about clausal TACs. We might reconcile these facts given a truncation account whereby clausal TACs lack a sufficiently articulated left periphery (Sawada & Larson 2004, Haegeman 2006).

The high-scope interpretation of the TAC in (17a) could be uttered in a context where, after Beth's departure, Pam decided not to leave and instead stayed. When the TAC is interpreted within the scope of negation in (17b), the sentence could be uttered in a context where Pam did in fact leave, but this actually occurred before Beth left.

It is interesting in light of this general ambiguity to find that a phrasal TAC, like in (18), only has the low-scope interpretation for the TAC.

(18) Pam didn't leave after Beth.
   a. **after*P $>$ $\neg$: 'After Beth left, it's not the case that Pam left.'
   b. $\neg$ $>$ *after*P : 'Pam left, but it's not the case that she did so after Beth left.'

This sentence is only true in a context where Pam in fact left, but did so before Beth left. The fact that the high-scope reading is not available suggests that phrasal TACs must be interpreted fairly low on the verbal spine. Specifically, phrasal TACs must be interpreted below sentential negation.

Now consider the sentence in (18) again with respect to the interpretation in (19). This is not a possible interpretation for that sentence.

(19) 'Pam left, but it's not the case that she did so after Beth didn't leave.'

There is no interpretation of (18) that would be true in a context where Pam left, but this in fact preceded an event in which Beth actually stayed. In other words, it is not possible to interpret negation inside the phrasal TAC.[4] Note that the absence of this interpretation does not reflect an absence of this interpretation generally. The unreduced clausal TAC below permits exactly this interpretation, though this is admittedly an odd way of expressing it.

(20) Pam didn't leave after Beth didn't leave.

The inability to interpret negation in the ellipsis site of the phrasal TAC in (18) is expected if the elided constituent is no larger than a *v*P plus a focus projection to catch the remnant.

2.3. INTERIM SUMMARY. The data above were presented in support of an analysis of phrasal TACs that I am referring to as TAC-Stripping. As sketched in (7), this involves low-adjunction of a TAC containing an extended-*v*P complement plus movement of a remnant out of the ellipsis site.[5]

Observe from the example in (21) that only a single remnant is possible within the TAC. I take this to suggest that the relevant reduction operation is correctly being considered distinct from the mechanism responsible for Gapping configurations, like in (22).

(21) *Kim will read the article after Sam the book.

(22) Kim will read the article and Sam the book.

This should not be entirely unexpected. One of the characteristic properties of Gapping is an inability to appear in subordinated environments (Jackendoff 1971, Hankamer 1979).

[4] A similar fact has been observed in Gapping configurations, which has been taken as evidence that such structures involve low coordination (e.g., Siegel 1987, Johnson 2009).

[5] Note that the claim being made in this paper is that at least some phrasal TACs involve ellipsis, not that they all must. There are examples such as (i) that would intuitively resist such an analysis.

(i) Kim left after the movie.

Such examples may be more amenable to an analysis of *after the movie* as a PP provided with an implicit time variable that can be quantified over by temporal connectives (e.g., Champollion 2011).

With that being said, one potential concern with this proposed analysis of phrasal TACs is the assertion that something that resembles Stripping is possible in subordinated environments. This is contrary to the usual generalization about where genuine Stripping (i.e., IP-Ellipsis) can be found according to Lobeck (1995). As shown in (23), Stripping, which may preserve a polarity item, is possible in coordinations, but not in TACs.

(23) Kate will read the article {but/*after} not Pat.

The analysis of phrasal TACs being proposed might provide a way to understand this contrast.

Assume first that the negation in (23) does not form a constituent with the remanent, but instead also has a source in the elided constituent. Assume further that its source position is outside the *v*P constituent that can appear in phrasal TACs. We can now assert that there will simply not be the appropriate amount of structure to host the base-position of *not* in a phrasal TAC. This is essentially the point that was made regarding the examples in (18)–(20).

What remains to be demonstrated is how a representation like (24) is blocked. If the complement of the temporal connective were not truncated, the structure to host negation in (23) would be available, just as in canonical Stripping.

(24) *[$_{\text{IP}}$ Kate [$_{v\text{P}}$ will read the article [$_{\textit{after}\text{P}}$ after not [$_{\text{FocP}}$ Pat$_1$ [$_{\text{IP}}$ ~~x_1 will read the article~~]]]]]

The ellipsis-based analysis of phrasal TACs being proposed will block this representation given the claim above that phrasal TACs are necessarily interpreted relatively low on the verbal spine—in some position lower than at least IP. The effect, similar to a suggestion by Thompson (2005), is that ellipsis of the IP node will be an unresolvable case of antecedent-containment. This in turn forms part of an explanation for why phrasal TACs must involve truncation of the complement. Ellipsis of IP or anything larger results in irreparable antecedent-containment. We will extend this idea in section 3.3 to further make sense of the distribution of phrasal TACs.

3. Eliminative effects of TAC-Stripping. As noted in the introduction, phrasal TACs have a restricted distribution that can be described by the constraint repeated in (25).

(25) *No Asymmetric Embedding*
A clause-reduction site and its antecedent must be at the same level of embedding.

To illustrate, the example in (26) shows us that it is not possible to modify an embedded predicate with a pharsal TAC that is resolved to the matrix clause. In (27), we see that the matrix predicate cannot be modified by a phrasal TAC that is resolved to an embedded clause.

(26) Kim heard [(that) Sue left after Joe].
a. = 'Kim heard that, after Joe had left, Sue left.'
b. ≠ 'Kim heard that, after Joe heard Sue left, Sue had left.'

(27) Kim heard [(that) Sue left] after Joe.
a. = 'After Joe heard that Sue left, Kim heard that Sue left.'
b. ≠ 'After Joe left, Kim heard that Sue left.'

Note that the clausal variants of these examples are grammatical with the missing interpretation:

(28) Kim heard [(that) Sue left after Joe heard that Sue left].

(29) Kim heard [(that) Sue left] after Joe left.

The fact to be derived, then, is that a phrasal TAC must be resolved to the *v*P it directly modifies.

3.1. POSSIBLE APPROACHES. This behavior is reminiscent of effects observed for both Gapping and genuine Stripping. It does not, however, follow from previous treatments of those phenomena.

Johnson (2009) argues that embedding constraints are properties one would expect from an analysis of Gapping as *v*P-coordination and Across-the-Board (ATB) VP-extraction. The option to prepose the clausal and phrasal TACs in (30), though, suggests that they are not coordinations.

(30) a. After he read the magazine, Tim read the book.
b. After the magazine, Tim read the book.
c. *And he read the magazine, Tim read the book.

Postal (1993) catalogs a significant amout of evidence that ATB-extraction is not possible in subordination structures and, moreover, that only nominal constituents can license parasitic gaps. These facts seem to preclude a VP-extraction analysis of any kind for generating the representation for phrasal TACs that is being proposed.

In a response to Johnson (2009), Toosarvandani (2016) proposes that a requirement for conjoined *v*Ps to have parallel focus structures is the source of Gapping's embedding constraints. This analysis, too, has the problem that requires treating TACs as coordination structures. The alternative to be proposed in section 3.2 treats TACs as subordinations and effectively simulates a parallel-focus constraint on *v*Ps with a focus-sensitive constraint on ellipsis (e.g., Rooth 1992a).

Wurmbrand (2017) argues that the inability to embedded a genuine Stripping site is an effect of projecting the CP layer of the embedded clause. This is based in part on corpus data, such as (31), which reveals that embedded Stripping is permissible in a coordination structure so long as the complementizer is omitted.

(31) When we asked who her favorite new country star is, she said (*that) you.
(adapted from Wurmbrand 2017: 344, (45))

An analysis that is sensitive to the architecture of a TAC's left periphery will not obviously help us make sense of embedding constraints on phrasal TACs. The temporal connectives *before* and *after* are not optional, suggesting that they are not a factor in the possibility of ellipsis. Furthermore, holding *before* and *after* responsible for the failure of ellipsis would miss the fact that TAC-Stripping is generally possible, as seen throughout section 2.

3.2. ELLIPSIS AND RE-BINDING. The alternative account I will present here builds on what is found in Takahashi 2008. That analysis capitalizes on the treatment of TACs proposed by Geis (1970). Geis observed that certain TACs, including those introduced by *before* and *after*, are ambiguous with respect to the events they order. The example in (32), for instance, might order my *seeing*-time after Kim's *saying*-time (32a) or after Kim's reported *leaving*-time (32b).

(32) I saw Kim [$_{\textit{after}}$P after $\lambda 1$ she said t_1 [that she would leave t_1]].
a. 'I saw Kim after the time of saying that she would leave.'
b. 'I saw Kim after the reported time of leaving.'

This ambiguity can be modeled by asserting the presence of a null-operator chain within the TAC. This operator is base-generated local to the predicate it modifies, moves to the edge of the TAC, and leaves behind a variable (t_n). This is sketched for each interpretation of (32).

Takahashi (2008) asserts that the base-position of this temporal operator is low enough on the verbal spine that it is contained in the elided constituent in instances of VP-Ellipsis like (33).

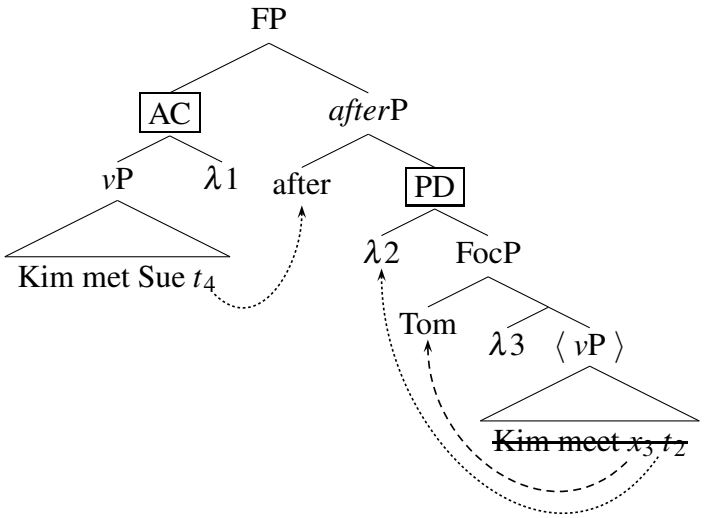
(33) Sue left [$_{\textit{after}}$P after λ1 Joe did ⟨ ~~leave t_1~~ ⟩].

Without saying more, it is not clear that VPE should be licensed in this example. The elided constituent appears to contain a bound variable that has no correlate in any available antecedent. Takahashi (2008) adopts a proposal made independently by Fox & Nissenbaum (2003), who argue that TACs undergo movement within their root clause. The effect is the introduction of a temporal variable in the root clause that creates a possible antecedent constituent for the ellipsis site.

(34) [$_{\textit{after}}$P after λ1 Joe did ⟨ ~~leave t_1~~ ⟩] λ2 Sue [left t_2]

Incorporating these pieces into our account of phrasal TACs gives the representation in (35). The TAC undergoes an instance of covert movement that targets some functional projection (FP) outside the root *v*P. In accordance with the data presented in section 2.2, this is still a relatively low position on the verbal spine.

(35)



We can understand how ellipsis is licensed in this construction by adopting an ellipsis-licensing condition along the lines of (36). This condition is a modified version of what can be found in Rooth 1992a and Takahashi & Fox 2005.

(36) Ellipsis of some XP is licensed only if:
- i.) there is a Parallelism Domain (PD) that contains XP,
- ii.) there is an Antecedent constituent (AC), and
- iii.) modulo ∃-closure, $[\![\text{ AC }]\!]^o \in [\![\text{ PD }]\!]^f$ for any variable assignment function g.

In prose, (36) says that a constituent (XP) may be elided on the condition that it is contained within some constituent (PD) whose focus alternative set, given any assignment function g, contains as a member the ordinary interpretation of some antecedent constituent (AC) in the discourse. The focus semantic value of a constituent is the set of propositions that are derived by replacing focus marked constituents—such as the remnant in a phrasal TAC—with their type-matching alternatives.

Applied to (35), the condition in (36) will require identifying an antecedent not for the elided ⟨ *v*P ⟩, but for a constituent that contains the binder indices for the re-bound variables in the

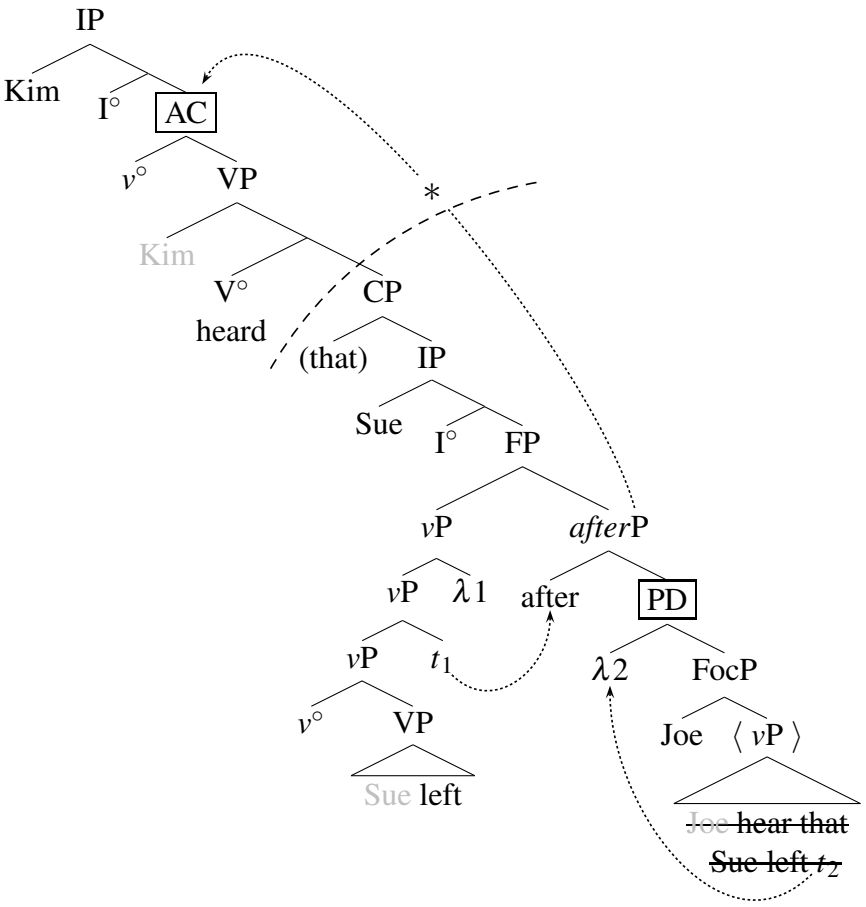
ellipsis site. Only this guarantees that we can find an antecedent that is a member of the computed alternative-set under any variable assignment function. (This will play a more significant role when we investigate VPE in section 4.) The constituent that contains the binder for the trace of the TAC provides an appropriate AC. We can see in (37) that ellipsis is correctly licensed.

(37) a. $[\![\text{AC}]\!]^o = \exists t$. Kim met Sue at t
b. $[\![\text{PD}]\!]^f = \{\ p : \exists t$. Kim met x at $t \mid x \in D_e\ \}$
c. $[\![\text{AC}]\!]^o \in [\![\text{PD}]\!]^f$ for any g, ellipsis is licensed.

3.3. EMBEDDING THE ELLIPSIS SITE. We are now prepared to account for the example in which a phrasal TAC modifies the embedded clause and is ungrammatically resolved to the matrix clause. This example is repeated in (38) along with its proposed representation.

(38) a. *Kim heard $[_{\text{CP}}$ that Sue had left after Joe $\langle_{v\text{P}}$ ~~heard that Sue had left~~ $\rangle]$

b.



Given an ellipsis-based analysis of phrasal TACs, the ungrammaticality of this example can be understood straightforwardly as another instance irreparable antecedent-containment. The general finite-clause-boundedness of QR means the phrasal TAC will be trapped in the embedded clause and unable to escape the attempted antecedent. As (39) shows, the calculation of ellipsis-licensing fails; the intended AC is not a focus alternative that can be derived from the PD.

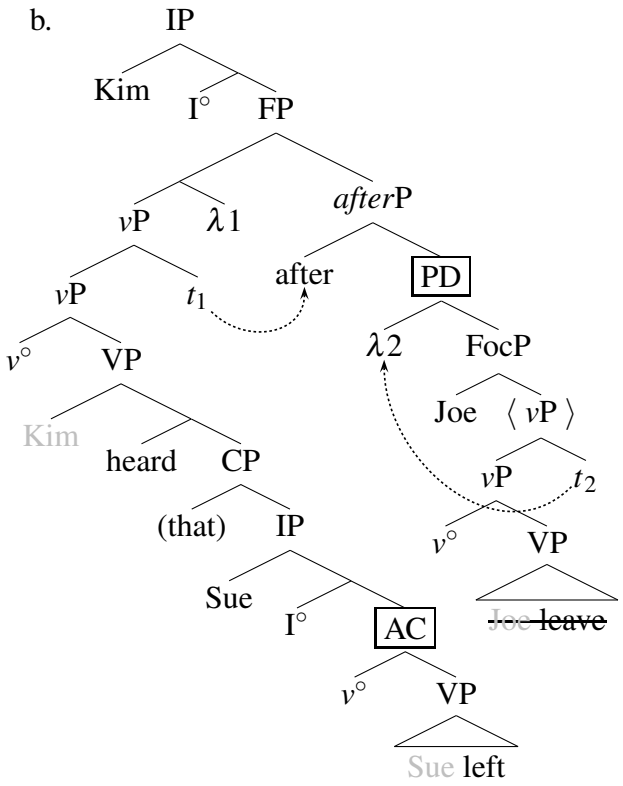
(39) a. $[\![\text{AC}]\!]^o =$ Kim heard that Sue left at some t after Joe heard that Sue left at t'
b. $[\![\text{PD}]\!]^f = \{\ p : \exists t$. x hear Sue leave at $t \mid x \in D_e\ \}$
c. $[\![\text{AC}]\!]^o \notin [\![\text{PD}]\!]^f$ for any g, ellipsis is not licensed.

The ungrammaticality of (38), therefore, is the result of an unlicensed instance of ellipsis.[6]

3.4. EMBEDDING THE ANTECEDENT SITE. In (40) is the proposed representation for the attempt to modify the matrix *v*P with a phrasal TAC and resolve the ellipsis site to an embedded *v*P.

(40) a. *Kim heard [$_{CP}$ that Sue had left] after Joe ⟨$_{vP}$ ~~leave~~ ⟩

b.



[6] Consider (i), in which a small clause complement to a light verb could be asserted to ungrammatically embed a TAC-Stripping site. This example is closer to the kind of examples normally discussed for Gapping and Stripping. Like the example to be discussed in (40), (i) cannot be ruled-out as a case of antecedent-containment.

(i) *Kim [$_{AC}$ left t_1] after [$_{PD}$ λ2 Sue made Joe ⟨$_{vP}$ ~~leave t_2~~ ⟩].
'After the time that Sue made Joe leave at, Kim left.'

The current analysis predicts ungrammaticality here due to a failure to license ellipsis. The PD that is required in this representation will contain the binder index for the temporal variable that is re-bound from the edge of the TAC. As shown in (ii), the attempted AC is not an alternative that can be derived from this PD.

(ii) a. $[\![\text{ AC }]\!]^o = \exists t$. Kim left at t
b. $[\![\text{ PD }]\!]^f = \{\ p : \exists t$. Sue made x leave at $t \mid x \in D_e\ \}$
c. $[\![\text{ AC }]\!]^o \notin [\![\text{ PD }]\!]^f$ for any g, ellipsis is not licensed.

It is not clear, however, that this re-binding actually arises. The absence of the Geis-ambiguity in (iii) suggests that temporal operator movement out of this small clause is not even possible.

(iii) Kim left [after $Op_{a/b}$ Sue made t_a [Joe leave t_b]].
a. 'Kim left after the time of Sue making Joe leave.'
b. *'Kim left after the time that Joe was made to leave at.'

This suggests that the source structure for (ii) is unavailable, independent of the ellipsis operation, as a result of some constraint on the relevant operator movement.

The ungrammaticality of this example cannot be attributed to antecedent-containment. What does the work here—similar to Takahashi 2008—is the temporal operator-variable relationship in the TAC. Note that there is no parallel temporal operator-variable relationship in the complement clause. Because of this non-parallelism, there is no AC that can be identified in (40) that would be an alternative derived from the PD for the elided constituent. This is shown in the calculation of ellipsis-licensing below:

(41) a. $[\![\text{ AC }]\!]^o =$ Sue left
b. $[\![\text{ PD }]\!]^f = \{\ p : \exists t.\ x \text{ leave at } t \mid x \in D_e\ \}$
c. $[\![\text{ AC }]\!]^o \notin [\![\text{ PD }]\!]^f$ for any g, ellipsis is not licensed.

As in the previous section, then, the ungrammaticality here is the result of unlicensed ellipsis.

4. The VP-Ellipsis puzzle. Up to this point, the analysis being presented is not significantly different from what is proposed for VP-Ellipsis (VPE) in TACs by Takahashi (2008). The relevant modification comes in response to the observation that VPE is possible where TAC-Stripping is not. Specifically, VPE in a matrix-modifying TAC is able to find an embedded antecedent, as demonstrated in (42).[7]

(42) Kim heard [(that) Sue left] after Joe had.
'After Joe had left, Kim heard that Sue left.'

This is unexpected for Takahashi (2008), who argues that VPE targets the trace of the temporal operator in the TAC. In the same way as was shown in the last subsection, the presence in the ellipsis site of the trace of the temporal operator would be expected to disrupt ellipsis-licensing.

The asymmetry can be made to follow, I argue, from the fact that VPE is ellipsis of a smaller constituent than what is elided in TAC-Stripping. The basic idea finds support in two other asymmetries between VPE and TAC-Stripping. VPE tolerates a mismatch between the voice of the antecedent and the ellipsis site. The same kind of mismatch is not tolerated in phrasal TACs, however. The contrast is illustrated in (43).

(43) a. ?The photos must be found before the police$_1$ do $\langle$ ~~x_1 find them~~ $\rangle$.
b. *The photos must be found before the police$_1$ $\langle$ ~~x_1 find them~~ $\rangle$.

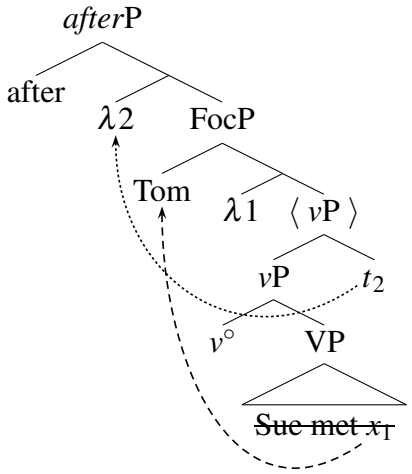
It is also telling that, when both the antecedent and ellipsis site are passive, as in (44), the passive auxiliary can escape VPE but cannot escape TAC-Stripping.

(44) a. The recycling should emptied before the trash$_1$ should (be) $\langle$ ~~emptied x_1~~ $\rangle$.
b. The recycling should be emptied before the trash$_1$ (*being) $\langle$ ~~emptied x_1~~ $\rangle$.

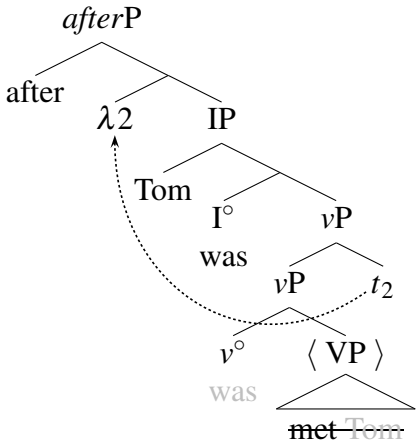
These facts can be understood by modeling VPE and TAC-Stripping as shown in (45) and (46) on the following page. TAC-Stripping is intended to be ellipsis of at least the argument structure of the predicate, the functional structure that introduces voice, and the trace of the temporal operator. Following Merchant (2013), VPE is ellipsis of the argument structure of the predicate to the exclusion of the functional structure that introduces voice.

[7] Embedding the VPE site creates an instance of irreparable antecedent-containment like we saw in section 3.3.

(45) *TAC-Stripping*



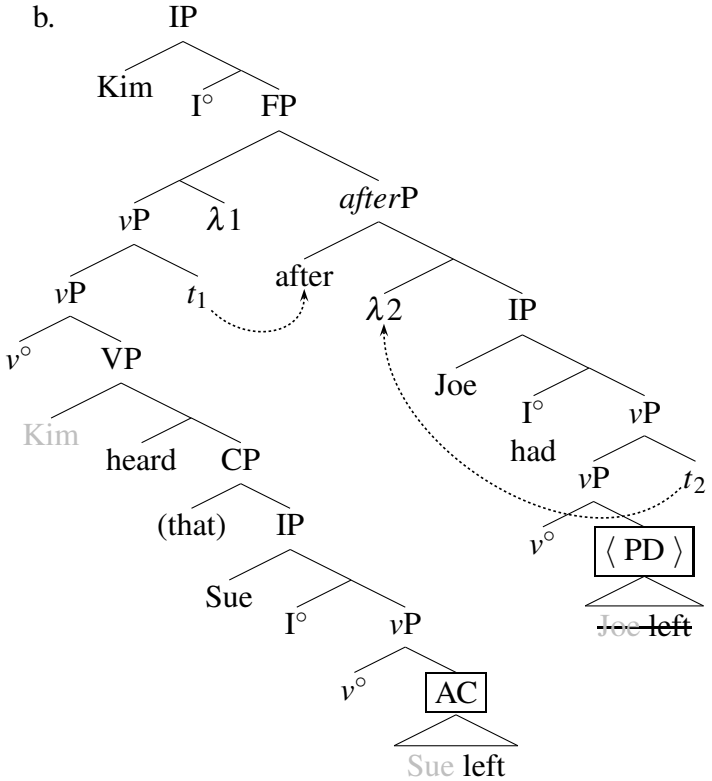
(46) *VP-Ellipsis*



Most crucial for the puzzle at hand is that VPE is ellipsis of a constituent that does not contain the trace of the temporal operator. Given our condition on ellipsis-licensing in (36), not including the trace of the temporal operator in the VPE site makes it possible to search for a smaller AC than is necessary for TAC-Stripping. This is because, in the case of VPE, there are no re-bound variables in the ellipsis site.[8] To see this, consider the proposed representation for (42), which is provided below in (47). This representation should be contrasted with (40).

(47) a. Kim heard [$_{CP}$ (that) Sue [$_{VP}$ left]] after Joe had ⟨$_{VP}$ ~~left~~ ⟩

b.



The calculation of ellipsis-licensing for this representation is shown in (48) on the following page.

[8] This means neither A-movement nor X°-movement induce re-binding (Messick & Thoms 2016, cf. Hartman 2011).

(48) a. $[\![\text{ AC }]\!]^o =$ Sue left
b. $[\![\text{ PD }]\!]^f = \{\ p : x \text{ left} \mid x \in D_e\ \}$
c. $[\![\text{ AC }]\!]^o \in [\![\text{ PD }]\!]^f$ for any g, ellipsis is licensed.

Because the deleted constituent does not have to find an AC with a trace of a temporal operator, the embedded VP now provides now provides a possible antecedent. The result is that ellipsis is licensed in this representation and the sentence is grammatical.[9]

5. Conclusion. This paper has argued that phrasal TACs can be derived by an ellipsis operation that targets the truncated complement in a low-adjoined *before*P or *after*P. It was argued that the elided constituent is larger than what is targeted in standard VP-Ellipsis, but smaller than the elided constituent in genuine Stripping (Pancheva 2009, Weir 2014). I referred to this constituent as *v*P. The single remnant in a phrasal TAC is generated by $\overline{\text{A}}$-movement to a focus position outside the elided *v*P.

We also adopted an articulated syntax-semantics mapping that involved covert movement of and within the TAC. These pieces together provided a way to account for the observation that phrasal TACs have a more constrained distribution than either their clausal counterparts or VPE. Put simply, trying to identify an antecedent that is a constituent other than the *v*P that the phrasal TAC directly modifies will necessarily fail. This was the result of creating an irreparable antecedent-containment configuration (section 3.3) or requesting an antecedent that lacks a binding relationship parallel to the temporal operator-variable relationship in the ellipsis site (section 3.4). The differing distribution of TAC-Stripping and VPE was argued to be an effect of VPE eliding a smaller constituent that does not include the TAC's temporal operator-variable relationship. This made it possible, specifically in the case of VPE, for a constituent that also lacked this relationship to serve as a licensing antecedent (section 4).

Among the remaining issues to be addressed is that the analysis of the embedding constraints on phrasal TACs does not entirely apply to Gapping and genuine Stripping. Recall that it has been observed that these constructions are also subject to embedding constraints. Although, neither of them is thought to generally contain the type of operator-variable chain that was exploited in section 3.4. Whether these phenomena can or should be unified remains to be demonstrated.

Another issue is how we should account for examples like (49), which were part of the empirical domain in Takahashi 2008.

(49) Agnes $[_{\text{VP}_1}$ arrived after John $[_{\text{VP}_2}$ ate t $]]$, but Bill didn't $\Delta_{1/*2}$.
(Hardt & Romero 2004: 384, (34))

For Takahashi (2008), the presence of a temporal operator trace in VP_2 rendered it unavailable as an antecedent for the elided VP, which lacks a temporal operator. However, I have argued that VPE is not sensitive to these types of operator variable relationships. We therefore lose the account of examples like (49) and must provide an alternative.

One possibility, following Hardt & Romero (2004) and many others, is to assert that there is a discourse-accessibility condition on finding an antecedent for ellipsis in addition to the licensing

[9] At this point, we should wonder why VPE is not possible in a phrasal TAC such as (40). Two possibilities come to mind: (i) the relevant head that licenses ellipsis of VP is not present as a result of truncation or (ii) the focus movement involved in TAC-Stripping induces a MAXELIDE-type effect that forces ellipsis of the larger *v*P (e.g., Merchant 2008). Choosing between these options must be left for future research.

condition in (36). One could assert, then, that VP_2 is a licensing antecedent but is inaccessible within the discourse of (49). Properly defining the appropriate discourse acceptability condition must be left for future research. The challenge will be making the embedded VP in (49) unavailable, while simultaneously making the embedded VP in (47) unavailable.

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