

Ellipsis and Syntactic Representation*

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This paper addresses a question that has been of interest to researchers on ellipsis since the very early days of work in generative grammar: do constituents targeted by various types of ellipsis operations have syntactic structure at some level (or levels) of representation, or can the various properties of ellipsis constructions be accounted for purely in terms of recovery of meanings, without positing syntactic representation at the ellipsis site? Focusing on the interaction of ellipsis and several different grammatical phenomena and constraints, including parasitic gaps, binding theory, and extraction islands, I will present evidence that ellipsis constructions are sensitive to configurational constraints on syntactic representations, but not to constraints that are based on morphophonological properties of lexical items, thus supporting a view of ellipsis as deletion of syntactic material.

1 The Representation of Nothing

Since at least Hankamer and Sag 1976, a central question in research on ellipsis has been what sorts of representations are involved in the resolution and licensing of unpronounced linguistic information? Two lines of thought have predominated, which differ in their assumptions about the role of syntax in ellipsis. The first approach, which has a long tradition in generative grammar, postulates that elided material has syntactic structure at some level of representation, but the grammar contains a means of blocking its pronunciation in the surface form. The second approach rejects the claim that unpronounced material has syntactic representation, hypothesizing instead that general mechanisms governing the recovery of meanings from context can be put to work to resolve ellipsis. The purpose of this paper is to provide arguments in favor of a version of the first approach, and to show that an analysis in which ellipsis involves only the recovery of meanings, without reference to syntax, fails to provide an empirically adequate account of the facts. Before making an argument in favor of this position, however, I will present an overview

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of the positive and negative aspects of several approaches that are representative of these different answers to the question of representation.

1.1 Syntactic Analyses of Ellipsis

The hypothesis that ellipsis involves syntactic representation can be implemented in two ways: deletion of syntactic material from the representation that is the input to the phonological component or recovery of syntactic structure at some level of logical representation. The former approach goes back to the very early days of generative grammar, and has been revitalized in recent work in the Principles and Parameters framework (see e.g. Hankamer 1979; Sag 1976; Tancredi 1992; Wilder 1995; Merchant 2001; Kennedy and Merchant 2000); the latter approach has also appeared in different forms over the past twenty-five years (see e.g. Wasow 1972; Williams 1977; Haik 1987; Kitagawa 1991; Fiengo and May 1994). The crucial assumption that both sorts of syntactic analyses share is that elided material has syntactic structure at some level of representation. A central result of such approaches, therefore, is that they can account for syntactic effects within the ellipsis site.

For example, the fact that island effects appear under ellipsis, as shown by the contrast between the (a) and (b) examples in (1) and (2), receives a straightforward explanation: if ellipsis involves deletion, then the (b) sentences are derived from the representations in (1c) and (2c) (where struck-through text indicates material deleted from the pronounced form), which involve extraction out of an island (indicated by a subscript *I*).

- (1) a. Sterling criticized every decision that Lou did.
 b. *Sterling criticized every decision that Doug was upset because Lou did.
 c. *Sterling criticized every decision [~~that~~_{*t*_i} that Doug was upset [_{*I*} because Lou did [~~criticized~~_{*t*_i}]]]
- (2) a. Dogs, I understand, but cats, I don't.
 b. *Dogs, I understand, but cats, I don't know a single person who does.
 c. *Cats_{*i*} I don't know [_{*I*} a single person who does [~~understand~~_{*t*_i}]]]

Note that in the absence of an \bar{A} -dependency into the ellipsis site, the relation between an elided VP and its antecedent is not sensitive to island constraints, as originally observed by Ross (1967).

The appearance of Binding Theory effects in the ellipsis site is another property that is expected in a syntactic analysis. For example, the fact that (3a) strongly disfavors a ‘strict’ interpretation, in which Sterling also blames Doug for the band’s collapse, follows from the fact that it is derived from (3b): the strict reading would violate Condition A, which requires a reflexive pronoun to find its antecedent locally. Likewise, the disjoint reference effect in (4a) is a direct consequence of Condition B of the Binding Theory, which rules out coreference between a pronoun and a co-argument.

- (3) a. Doug blamed himself for the band’s collapse, and Sterling did too.
 b. Doug blamed himself for the band’s collapse, and Sterling did [_{VP} ~~blame himself~~] too.
- (4) a. *Kim takes care of him_i because he_i won’t.
 b. Kim takes care of him_i because he_i won’t [_{VP} ~~take care of him_i~~]

Finally, a syntactic approach to ellipsis, augmented with sufficiently strict requirements on the type of identity relation that licenses deletion, provides the basis of an account of the unacceptability of examples involving syntactic non-identity.

- (5) a. ?? Only 43 percent of registered voters did.
 b. ?? A lot of this material can be presented in a fairly informal and accessible fashion, and often I do.

There appear to be a number of serious problems for a syntactic account of ellipsis, however, the most important of which is the fact that there are contexts in which syntactic effects within the ellipsis site seem to disappear. One such context involves comparatives constructed out of attributive adjective phrases, such as those in (6).

- (6) a. * The Cubs start a more talented infield than the Sox start an outfield.
 b. * Jones produced as successful a film as Smith produced a play.

Kennedy and Merchant (2000) demonstrate that the unacceptability of the examples in (6) is due to the Left Branch Constraint (LBC), which blocks movement of left branch attributive modifiers (see also Pinkham 1982). Assuming that comparatives are derived through an operation of \bar{A} -movement that targets the compared constituent in the *than*-clause (Ross 1967; Chomsky 1977), the syntactic structures assigned to the examples in (6) are those in (7), which, just like the questions in (8), violate the LBC.

- (7) a. *The Cubs start a more talented infield than [~~wh_i~~ the Sox start an t_i outfield]
 b. *Jones produced as successful a film as [~~wh_i~~ Smith produced a t_i play]
- (8) a. *How talented_{*i*} do the Sox start an t_i outfield?
 b. *How successful_{*i*} did Smith produce a t_i play?

The problem for a syntactic theory of ellipsis comes from examples like (9a) and (9b), which appear to indicate that island effects *disappear* under ellipsis, contrary to what we saw above in (1b) and (2b). If ellipsis involves deletion, then (9a) and (9b) should be derived from (10a) and (10b), respectively, which should be just as ill-formed as (7) and (8) above.

- (9) a. The Cubs start a more talented infield than the Sox (do).
 b. Jones produced as successful a film as Smith (did).
- (10) a. The Cubs start a more talented infield than [~~wh_i~~ the Sox (do)
~~_{[VP start [_{DP} a t_i infield]]}~~]
- b. Jones produced as successful a film as [~~wh_i~~ Smith (did)
~~_{[VP produced [_{DP} a t_i film]]}~~]

A second problem for syntactic analyses of ellipsis is that there are also contexts in which binding effects seem to disappear. (11a), for example, can clearly have a strict reading, despite the fact that it should be derived from (11b), which does not support such a reading.

- (11) a. Doug blamed himself for the band's collapse because everyone else did.
 b. Doug blamed himself for the band's collapse because everyone else did [~~VP blame himself~~]

Similarly, (12a) fails to show the disjoint reference effect that we would expect to see if it were derived from the representation in (12b), which does not permit coreference between the pronominal arguments in the second clause.

- (12) a. Most Americans expected him_{*i*} to be acquitted, and obviously he_{*i*} did too.
 b. Most Americans expected him_{*i*} to be acquitted, and obviously he_{*i*} did [~~VP expect him_{*i*} to be acquitted~~]

Finally, although it is the case that syntactic non-identity typically results in judgments of unacceptability, it is a fact about English that many such examples are attested. In particular, both of the examples presented above in (5) are naturally occurring sentences:

- (13) a. In yesterday’s elections, only 43 percent of registered voters did. (heard on National Public Radio by CK in November 1996)
- b. A lot of this material can be presented in a fairly informal and accessible fashion, and often I do. (Chomsky 1982, p. 41; cited in Dalrymple, Shieber, and Pereira 1991)

1.2 Semantic Analyses of Ellipsis

A second approach to ellipsis claims that elided constituents have no syntactic representation at all, but rather can be fully explained in terms of a more general theory of information retrieval (see e.g. Dalrymple et al. 1991; Hardt 1992, 1999; Jacobson 1992; Hendriks and de Hoop 2001). In the higher-order unification approach advocated by Dalrymple et al. (1991), for example, a structure like (14a) is assigned a semantic representation of the sort in (14b), where P is a free variable over properties that needs to be resolved. The problem of ellipsis is the problem of solving the value of P , which is done by abstracting over parallel elements in some previous clause to generate a property-denoting expression, as shown in (14c), and substituting this expression for P .

- (14) a. Sterling quit the band because Lou did.
- b. $quit(\textit{Sterling}, \textit{the band})$ BECAUSE $P(\textit{Lou})$
- c. $P = \lambda x. quit(x, \textit{the band})$
- d. $quit(\textit{Sterling}, \textit{the band})$ BECAUSE $\lambda x. quit(x, \textit{the band})(\textit{Lou})$

One obvious positive aspect of this type of approach is that it doesn’t run into the problems associated with purely syntactic accounts: because ellipsis does not involve syntactic representation, we should not expect to find syntactic effects inside the ellipsis site. However, this advantage is also its disadvantage: as noted above, there are a number of contexts in which we do find clear evidence of syntactic effects within the ellipsis site.

In order to account for facts like those discussed in section 1.1, we would need to significantly weaken assumptions about the nature of the syntax-semantics interface. For example, we could adopt Haïk’s (1987) position that the ellipsis site itself can serve as the “gap” for a syntactic operator, as illustrated in the following examples.

- (15) a. *Sterling criticized every decision [_{CP} ~~wh_i~~ that Doug was upset [_{AdvP} because Lou did t_i]]
- b. *Dogs, I understand. Cats_i I don't know [_{DP} a single person who does t_i]

Since this approach requires us to abandon the assumption that semantic type of a bound variable corresponds to syntactic category of a corresponding gap (the bound variable in the interpretation of the relative clause in (15a) has the type of an individual, but the syntactic category of the gap in the syntactic representation is VP), it should be adopted only if a less costly approach fails to materialize.

1.3 A “Mixed” Analysis

In recent work, Andy Kehler (1995; 2000) attempts to account for the apparently paradoxical sensitivity of ellipsis to syntactic constraints by developing a “mixed” syntactic/semantic analysis, in which whether an elided constituent has internal syntactic structure or not depends on the discourse context in which it appears. In particular, Kehler argues that the requirement for syntactic representation in ellipsis depends on the type of “coherence relation” an elided VP participates in (see Kehler 1995; Hobbs 1979). Coherence relations determine coherence between sentences in a discourse, which in turn affects acceptability. The two types of coherence relations that are relevant to ellipsis are CAUSE-EFFECT relations and RESEMBLANCE (parallelism and contrast) relations, the action of which is illustrated by the following coherent (acceptable) and incoherent (unacceptable) discourses.

- (16) CAUSE-EFFECT relations (coherent)
- a. Smith is a politician. He's bound to be dishonest.
- b. Smith is dishonest because he's a politician.
- c. Jones is a politician, but she's honest.
- (17) CAUSE-EFFECT relations (incoherent)
- a. ?? Smith is a politician. He's bound to wear long underwear.
- b. ?? Smith is dishonest because he wears long underwear.
- c. ?? Jones is a politician, but she has a nice daughter.
- (18) RESEMBLANCE relations (coherent)
- a. Smith likes to play golf. Jones enjoys surfing the net.

- b. Smith stepped up to the podium. His critics stepped into their offices.
- c. Jones seems unbeatable, while her opponent seems beaten.

(19) RESEMBLANCE relations (incoherent)

- a. ?? Smith likes to play golf. Jones ate lunch.
- b. ?? Smith stepped up to the podium. Jones bought a new Mercedes.
- c. ?? Jones seems unbeatable. The Senate is being painted.

Kehler suggests that an elided expression that is contained in a sentence that is part of a CAUSE-EFFECT relation does not require syntactic representation, but an elided expression that is part of a RESEMBLANCE relation must have syntactic representation. The reasoning underlying this proposal is that RESEMBLANCE relations are, to a large extent, at least, identified on the basis of syntactic structure, while CAUSE-EFFECT relations care only about propositional content (see Kehler 2000, pp. 540-543). The prediction of this analysis, then, is that syntactic effects should show up only in the context of RESEMBLANCE relations.

This seems to be exactly right for some of the cases that are problematic for a syntactic approach, such as examples involving syntactic non-identity (20)-(21) and the absence of Condition A effects (22)-(23) (but see also Hestvik 1995).

- (20) a. ?? This problem was looked into by Kim, and Lee did too. (RESEMBLANCE)
- b. ? This problem was looked into by Kim, even though Lee already had. (CAUSE-EFFECT)
- (21) a. ?? The letter from the Dean provoked a response from the Chair, and the Provost did too. (RESEMBLANCE)
- b. ? The Dean's actions provoked a response from the Chair, despite the fact that the Provost already had. (CAUSE-EFFECT)
- (22) a. Doug_i blamed himself_i for the band's collapse, and everyone else did too. (RESEMBLANCE; strict reading difficult)
- b. Doug blamed himself for the band's collapse, because everyone else did. (CAUSE-EFFECT; strict reading possible)
- (23) a. John wouldn't introduce himself to everyone, but Mary did. (RESEMBLANCE; no strict reading)
- b. Since John wouldn't introduce himself to everyone, Mary did. (CAUSE-EFFECT; strict reading possible)

However, Kehler's proposal also suffers from the same problems that afflict a purely semantic account of ellipsis: there are contexts in which an elided VP clearly occurs in a constituent that participates in a CAUSE-EFFECT relation, yet also appears to be sensitive to syntactic constraints. For example, both (24a) and (25a) manifest CAUSE-EFFECT relations, yet the elided VPs inside the relative clauses are sensitive to the Adjunct Island Constraint (islands enclosed in brackets). (24b) and (25b) demonstrate that ellipsis is possible in these examples as long as the elided VP is not in an island.

- (24) a. *Sterling criticized every decision that Doug was upset [because Lou did].
 b. Sterling criticized every decision that Lou did.
- (25) a. *Max refused to buy the shirt that I picked out even though it was less expensive than the one that the salesperson complimented him [after he did].
 b. Max refused to buy the shirt that I picked out even though it was less expensive than the one that he did.

Similarly, (26a) and (26b) show that Condition B effects arise in CAUSE-EFFECT environments.

- (26) a. *Kim takes care of him_i because he_i won't.
 b. *His closest allies supported him_i throughout this ordeal, even though he_i probably wouldn't have.

In addition to these empirical problems, there is a third, more general problem with a mixed approach such as Kehler's. If a purely semantic analysis is available in some examples, then it ought to be in principle available in all examples, even if a syntactic analysis is preferred. In other words, an approach that allows for the possibility of semantic recovery of VP meanings without concomitant syntactic representation of an elided VP predicts that examples like (27a) and (28a) should be no worse than (27b) and (28b), which violate coherence relations but do not violate any syntactic constraints.

- (27) a. ?? This problem was looked into by Kim, and Lee did too.
 b. This problem was looked into by Kim, and Lee looked into it too.
- (28) a. ?? The letter from the Dean provoked a response from the Chair, and the Provost did too. (RESEMBLANCE)

- b. The letter from the Dean provoked a response from the Chair, and the Provost responded to it, too.

This is not an accurate characterization of the facts, however. While (27b) and (28b) are less fluent than completely parallel structures, they are quite clearly more acceptable than (27a) and (28a).

2 Ellipsis and Syntactic Representation

The discussion in the previous section does not provide conclusive arguments for one answer to the representation question in ellipsis over another, but it lays out some of the empirical ground that must be covered by any account. At the same time, this discussion allows us to formulate very precisely a central prediction of analyses that posit syntactic representation in the ellipsis site. Taking the deletion analysis as the representative of such an approach (for simplicity; most of what I will say here holds of a copying analysis as well), we can formulate the predictions in (29).

(29) *Ellipsis and Syntactic Representation*

If ellipsis involves deletion of syntactic structure, then:

- a. Elided constituents should be sensitive to syntactic constraints in general.
- b. However, since ellipsis does not require pronunciation of the omitted structure, elided constituents should be insensitive to syntactic constraints that derive from morphophonological properties of lexical items.

In other words, the predictions of a syntactic analysis of ellipsis are more subtle than they appear at first. For the most part, we should see the same sort of syntactic behavior in overt and elided XPs; in particular, both elided and overt XPs should be subject to the same set of configurational constraints. However, the syntactic analysis does *not* predict that an ellipsis construction should have *exactly* the same syntactic properties as a corresponding overt form. Crucially, because ellipsis bypasses pronunciation, any constraints that make reference to the interface between the syntax and the phonological component should be vacuously satisfied, and therefore effectively “turned off”, in the case of ellipsis.

In the following two sections, I will show that at least one form of ellipsis — VP-deletion in English — behaves exactly as the predictions in (29) lead us to expect. For the purpose of this paper, I will assume a multistratal framework

in which the syntactic component generates a pair of representations, one that interfaces with the phonological component (PF), and one that interfaces with the semantic component (LF) (as in Chomsky 1995, etc.). I will show that VP-ellipsis constructions are sensitive to configurational constraints on (LF) representations, but not to morphophonological constraints governing the interpretation of PF representations, in line with the predictions in (29). I should note that I am adopting a multistratal framework for convenience. The predictions in (29) hold of any theory that includes both configurational and morphophonologically defined “interpretive” constraints on syntactic well-formedness: ellipsis constructions should be sensitive to the former but not the latter.

3 Ellipsis and Parasitic Gaps

3.1 “Non-parasitic” Gaps

As originally observed by Kim and Lyle (1996), apparent parasitic gap chains do not show island effects when the expected position of the parasitic gap is contained in a deleted VP (see also Lappin 1992).

(30) *Wh-islands*

- a. * Which article_{*i*} did you summarize *t_i* after Jim asked [who had read PG_{*i*}]?
 - b. Which article_{*i*} did you summarize *t_i* after Jim asked [who would be willing to]?

(31) *Adjuncts*

- a. * Which movie_{*i*} did you see *t_i* because Polly was so excited [after going to PG_{*i*}]?
 - b. Which movie_{*i*} did you see *t_i* because Polly was so excited [after she did]?

(32) *Complex NPs*

- a. * Mayor Daley_{*i*}, whom everyone met *t_i* except [the people who didn't know that there would be an opportunity to see PG_{*i*}], discussed Chicago politics.
 - b. Mayor Daley_{*i*}, whom everyone met *t_i* except [the people who didn't know that there would be an opportunity to], discussed Chicago politics.

(33) *Coordinate structures*

- a. * Which books_{*i*} did you read *t_i* after learning that Erik had bought PG_{*i*} and enjoyed them_{*i*}?
- b. Which books_{*i*} did you read *t_i* after learning that Erik had and enjoyed them_{*i*}?

Kennedy (1997) argues that these facts have a fairly straightforward and simple explanation: the putative parasitic gap chains in (30b)-(33b) do not show island effects because, contrary to what might be initially assumed, these sentences do not actually contain parasitic gaps. Instead, the “gap” in the deleted VP is actually a pronoun. In other words, the structural descriptions of (30b)-(33b) are as in (34a)-(34d), where the struck-through text corresponds to the deleted VP.

- (34) a. Which article_{*i*} did you summarize *t_i* after Jim asked who would be willing to [~~VP summarize it_i~~]
- b. Which movie_{*i*} did you see *t_i* because Polly was so excited after she did [~~VP saw it_i~~]?
- c. Mayor Daley_{*i*}, who everyone met *t_i* except the people who didn't know that there would be an opportunity to [~~VP meet him_i~~], discussed Chicago politics.
- d. Which books_{*i*} did you read *t_i* after learning that Erik did [~~VP read them_i~~] and enjoyed them_{*i*}?

The reason that VP-deletion is possible here, despite the apparent non-identity between deleted and antecedent VPs, is that these examples are just instances of what Fiengo and May (1994) call “vehicle change”: the observation that in many contexts, pronouns and other expressions (in particular, \bar{A} -traces) “count as” identical for the purpose of licensing deletion.¹

One of the arguments that Kennedy presents in favor of the claim that the elided VPs in (30b)-(33b) contain pronouns, not parasitic gaps, comes from crossover effects. As is well known, parasitic gaps show strong crossover effects (i.e., they are subject to Condition C; see Postal 1993; Cinque 1990). This is illustrated by the contrast in (35).

- (35) a. * Who_{*i*} were they investigating *t_i* before he_{*i*} knew they suspected PG_{*i*}?
- b. Who_{*i*} were they investigating *t_i* before you knew they suspected PG_{*i*}?

¹See Merchant 2001 for a semantic licensing condition on ellipsis, based on Schwarzschild's (1999) theory of focus and deaccenting, that derives vehicle change.

Sentences like (30b)-(33b), however, do not show strong crossover effects:

- (36) a. Who_i did Maureen vote for because he_i asked her to?
 b. Which students_i did Otis report without them_i knowing he had?
 c. Who_i did you call before she_i asked you to?

If the elided VPs in these examples contain pronouns, rather than parasitic gaps, then the facts in (36) follow: these sentences have structures that are completely parallel to examples like the ones in (37), which also do not show crossover effects.

- (37) a. Who_i did Maureen vote for t_i because he_i asked her to vote for him_i
 b. Which students_i did Otis report t_i without them_i knowing he had reported them_i
 c. Who_i did you call t_i before she_i asked you to call her_i

If, however, the elided VPs in these examples contained parasitic gaps, then they should be as ungrammatical as corresponding examples with overt parasitic gaps, such as those in (38).

- (38) a. Who_i did Maureen vote for t_i because *he_i/Charles asked her to support PG_i
 b. Which students_i did Otis report t_i without *them_i/you knowing he suspected PG_i
 c. Who_i did you call t_i before *she_i/Marcus asked you to visit PG_i

While the sentences under consideration do not show crossover (Condition C) effects, they *do* show Condition B effects:

- (39) a. * Who_i did Maureen recommend because he_i/Louis wouldn't?
 b. * Which students_i did Otis report even after telling them_i/you to?
 c. * Who_i did you try to serve before seeing that she_i/I already had?

Again, this follows if the “gaps” in the ellipsis sites are pronouns:

- (40) a. * Who_i did Maureen recommend t_i because he_i wouldn't recommend him_i
 b. * Which students_i did Otis report t_i even after telling them_i to report them_i

- c. * Who_i did you try to serve t_i before seeing that she_i already had served her_i

The conclusion to draw from these facts is that the gaps in the elided VPs in these examples are pronouns. It follows that (30b)-(33b) can be assigned the syntactic representations in (34a)-(34d), explaining the absence of island effects. More generally, if the principles of the Binding Theory (in particular, Condition B) apply to syntactic representations, as is standardly assumed, then it must be the case that elided VPs are syntactically represented.

Before moving on, we should first consider an alternative view of the Binding Theory, which views constraints on coreference as constraints on the morpho-syntactic expression of particular types of meanings, rather than as structure-based constraints on the possible interpretations. In such a model, the facts discussed here would not necessarily provide evidence for syntactic representation in ellipsis, as pointed out in Hardt 1999. An example of this type of approach to the Binding Theory is developed in Reinhart and Reuland 1993, in which Condition B is stated as in (41).

- (41) A reflexive predicate is reflexive-marked.

In essence, this constraint requires any predicate (at least) two of which's arguments are co-valued to be morphologically (or lexically) marked as reflexive. (41) thus correctly predicts that an example like (42a) is ungrammatical on the reading indicated by the coindexing even if there is no internal structure to the VP.

- (42) a. * Who_i did Otis nominate t_i because she_i couldn't?
 b. $wh\ x[Otis\ nominated\ x\ BECAUSE\ \neg\ \diamond\ [x\ nominate\ x]]$

The predicate is reflexive (in Reinhart and Reuland's sense), as indicated by the logical representation in (42b), but it is clearly not reflexive-marked. More precisely, if there is no structure to the elided VP, it could *never* be reflexive-marked.²

The problem with this analysis is that it is too strong. In particular, without some weakening, it rules out reflexive interpretations across the board: the second

²This is presumably exactly the right analysis of (i), in which the presence of the VP-anaphor *it* indicates an absence of internal structure.

- (i) * Who_i did Otis nominate t_i because she_i couldn't do it?

If this predicate is reflexive-marked, then the sentence is perfectly acceptable, as expected:

- (ii) Who_i did Otis nominate t_i because she_i couldn't do it herself_i?

conjunct in a simple example like (43a) should also violate (41), because the reflexive predicate in the second conjunct is not reflexive-marked. If the elided VP has internal structure, however, as indicated in (43b), then it is reflexive-marked, even if this is not apparent in the surface string.

(43) Otis served himself, and Alex did too.

(44) Otis served himself, and Alex did $\{\text{VP serve himself}\}$ too

3.2 “Missing” Parasitic Gaps

The analysis of the facts in the previous section builds on the idea that the deleted VP can be given the “non-parasitic” gap analysis in (45a). However, as pointed out by Shimada (1999) and Postal (2001), the alternative “missing” parasitic gap structure in (45b) is a *possible* analysis of the elided VP, but it is not chosen since it would result in an ill-formed structure.

- (45) a. $\{\text{VP} \dots \text{pro} \dots\}$ *the non-parasitic gap structure*
 b. $\{\text{VP} \dots \text{PG} \dots\}$ *the missing parasitic gap structure*

If we could find contexts in which (45b) had to be the actual analysis, and if such contexts behaved syntactically just like p-gap constructions (obeyed islands, showed strong crossover effects, etc.), then we would have even more evidence that elided VPs have syntactic structure. The only difference between (45a) and (45b) is a structural/syntactic one (semantically, both *pro* and PG are interpreted as bound variables), therefore if we can show that some instances of VP-deletion must have the former structure and some the latter, we will have provided evidence for syntactic representation in the ellipsis site. Postal (2001) makes essentially this point in the conclusion of his paper; here I am simply fleshing out the argument in more detail.

We begin with Engdahl’s (1985, p. 41, fn. 19) observation that VP-deletion improves some parasitic gaps outside the deletion site:

- (46) a. *Otis is a person who_i I admire t_i because close friends of PG_i became famous.
 b. Otis is a person who_i I admire t_i because close friends of PG_i seem to.
- (47) a. *Which film_i did you see t_i because a critic of PG_i was excited?
 b. Which film_i did you see t_i because a critic of PG_i advised you to?

According to Postal (2001), these contrasts provide evidence for a structural analysis of the deleted VP as in (45b). Postal observes that subject-internal parasitic gaps such as those in the preceding examples require the presence of a local \bar{A} -dependency; since no such dependency exists in the (a) sentences, the subject-internal gap is not licensed. The gap may be licensed by another parasitic gap chain, however:

- (48) a. Otis is a person who_i I admire t_i because close friends of PG_i seem to respect PG_i.
 b. Which film_i did you see t_i because a critic of PG_i had recommended PG_i?

The fact that (46b) and (47b) are grammatical, then, means that the deleted VPs must contain parasitic gaps. That is, they must have the structure in (45b), as illustrated in (49).

- (49) a. Otis is a person who_i I admire t_i because close friends of PG_i seem to ~~[_{VP} admire PG_i]~~
 b. Which film_i did you see t_i because a critic of PG_i advised you to ~~[_{VP} see PG_i]~~

Postal's observation holds of other "dependent" parasitic gaps as well. In the following examples, the dependent parasitic gap appears a clause that is adjoined to another adjunct clause. As shown by (50b), a parasitic gap in the second adjunct requires the presence of a parasitic gap (or some other \bar{A} -dependency) in the first adjunct — it cannot be directly licensed by the *wh*-chain in the main clause, as this would violate the Adjunct Island Constraint.

- (50) a. Who_i did you call t_i [before learning that I already had gotten in touch with PG_i [after seeing PG_i in the street]]?
 b. *Who_i did you call t_i [before learning that I already had gotten in touch with him_i [after seeing PG_i in the street]]?

The fact that an example like (51a) is well-formed, then, means that the elided VP in the first adjunct must have an analysis in which it contains a parasitic gap, as in (45b).

- (51) a. Who_i did you call t_i [before learning that I already had [after seeing PG_i in the street]]?

- b. Who_i did you call t_i before learning that I already had [~~VP-called PG_i~~] after seeing PG_i in the street?

Postal (2001) strengthens the conclusion that both (45a) and (45b) are possible structures for elided VPs by showing that examples involving dependent parasitic gaps, unlike the “non-parasitic” gap structures discussed in section 3.1, are sensitive to islands. This is illustrated by the following examples, which are parallel to the examples in (30)-(33) except that VP-deletion does not save the island violations.

(52) *Wh-islands*

- a. * Which band_i did you hire t_i only after people told you why you should book PG_i while insisting they adored PG_i?
- b. * Which band_i did you hire t_i only after people told you why you should while insisting they adored PG_i?

(53) *Adjuncts*

- a. * Which film_i did you refuse to see t_i because Roger was so revolted while he watched PG_i after renting PG_i?
- b. * Which film_i did you refuse to see t_i because Roger was so revolted when he did after renting PG_i?

(54) *Complex NPs*

- a. * Mayor Daley, whom_i everyone met t_i after grabbing the person who had arranged the opportunity to see PG_i while pointing at PG_i, discussed Chicago politics.
- b. * Mayor Daley, whom_i everyone met t_i after grabbing the person who had arranged the opportunity to while pointing at PG_i, discussed Chicago politics.

As Postal points out, the unacceptability of the (b) sentences is due to the fact that both of the possible syntactic representations of the elided VP — the one corresponding to (45a) and the one corresponding to (45b) — result in ill-formed structures: the missing parasitic gap analysis (45b) triggers an island violation in the first adjunct, and the non-parasitic gap analysis (45a) fails to license the dependent parasitic gap in the second adjunct. This is illustrated by the examples in (55), which show the two possible syntactic representations of (52)-(54).

- (55) a. * Which band_i did you hire *t_i* [only after people told you why you should ~~[_VP hire them_i/PG_i]~~ [while insisting they adored PG_i]]
- b. * Which film_i did you refuse to see *t_i* [because Roger was so revolted when he did ~~[_VP see it_i/PG_i]~~ [after renting PG_i]]
- c. * Mayor Daley, whom_i everyone met *t_i* [after grabbing the person who had arranged the opportunity to ~~[_VP meet him_i/PG_i]~~ [while pointing at PG_i]], discussed Chicago politics.

Finally, Postal shows that missing parasitic gaps also show strong crossover effects:

- (56) a. * Which candidate_i did the linguists support *t_i* because close friends of PG_i claimed he_i could also get the philosophers to back PG_i?
- b. * Which candidate_i did the linguists support *t_i* because close friends of PG_i claimed he_i could also get the philosophers to?
- c. Which candidate_i did the linguists support *t_i* because Maureen claimed he_i could also get the philosophers to?
- (57) a. * Who_i did you call after learning that he_i was expecting grey aliens to abduct PG_i after locating PG_i?
- b. * Who_i did you call after learning that he_i was expecting grey aliens to after locating PG_i?
- c. Who_i did you call after learning that he_i was expecting grey aliens to?

Only the missing parasitic gap analysis of the elided VP licenses the dependent gap, therefore the LFs of (56b) and (57b) must be as in (58), triggering a SCO effect.

- (58) a. * Which candidate_i did the linguists support *t_i* because close friends of PG_i claimed he_i could also get the philosophers to ~~[_VP support PG_i]~~
- b. * Who_i did you call after learning that he_i expected you to ~~[_VP call PG_i]~~ after locating PG_i

3.3 Summary

To summarize, the interaction of VP-deletion and parasitic gaps provides strong support for a syntactic analysis of ellipsis. First, the facts discussed here clearly demonstrate that the elided constituent is sensitive to (at least) Condition B effects,

strong crossover (Condition C effects), and various island constraints (including *wh*-islands, Complex NP Islands, Adjunct Islands and the Coordinate Structures Constraint).³ Assuming that these constraints are constraints on syntactic representations, it must be the case that elided VPs have syntactic structure. Second, the fact that an elided VP in these contexts can be shown to require a “non-parasitic” gap analysis in some contexts and a “missing” parasitic gap analysis in others — a distinction that is purely syntactic in nature — further strengthens the conclusion that ellipsis involves syntactic representation.

In the next section, I will examine a phenomenon that at first glance appears to challenge this conclusion, since it seems to indicate that elided constituents are insensitive to the Left Branch Constraint. As we will see, however, the facts actually substantiate the second part of the predictions of a syntactic analysis outlined in (29): ellipsis constructions are insensitive to syntactic constraints that derive from the morphophonological properties of lexical items.

4 Ellipsis and Left Branch Extractions

4.1 Attributive Comparative Deletion

As shown by the sentences in (59), comparative deletion constructions that target just an attributive adjective (henceforth “attributive CD” constructions) are ungrammatical (Pilch 1965; Pinkham 1982; Kennedy and Merchant 2000).

- (59) a. *The Cubs start a more talented infield than the Sox start an outfield.
 b. *Jones produced as successful a film as Smith produced a play.

This fact is unsurprising given Ross’ (1967) observation that comparative deletion is subject to the full range of syntactic island constraints. Assuming for concreteness that comparatives involve null or deleted *wh*-phrases which originate in the position of the gap (as in e.g. Chomsky 1977), the examples in (59) have the structures in (60a) and (60b). These are completely parallel to the questions in (61), which violate the Left Branch Constraint (LBC).

- (60) a. *The Cubs start a more talented infield than [~~*wh*_i~~ the Sox start [_{DP} an *t*_i outfield]]
 b. *Jones produced as successful a film as [~~*wh*_i~~ Smith produced [_{DP} a *t*_i play]]

³It should also be noted that many of the examples discussed above involve CAUSE-EFFECT coherence relations (e.g. the *because*-adjuncts), and are therefore contexts in which Kehler (1995, 2000) predicts syntactic effects to disappear.

- (61) a. *How talented_i do the Sox start [_{DP} an *t_i* outfield]?
 b. *How successful_i did Smith produce [_{DP} a *t_i* play]?

What *is* surprising is that ellipsis in the comparative clause seems to eliminate LBC violations (Pinkham 1982; Kennedy and Merchant 2000). This is illustrated by the examples in (62), which are just like the sentences in (59) except that a constituent containing the gap has been elided.

- (62) a. The Cubs start a more talented infield than the Sox (do).
 b. Jones produced as successful a film as Smith (did).

Given the main conclusion of the previous section — that elided constituents have syntactic representation and are subject to configurational constraints — the well-formedness of the examples in (62) is extremely puzzling. On this view, these sentences have the structures shown in (63), which should violate the LBC just as much as those in (60), assuming that the LBC is stated in terms of configurational relations (e.g., in terms of the ECP, as proposed in Corver 1990).

- (63) a. The Cubs start a more talented infield than [~~*wh_i*~~ the Sox (do)
 [_{VP} start [_{DP} an *t_i* infield]]]
 b. Jones produced as successful a film as [~~*wh_i*~~ Smith (did)
 [_{VP} produced [_{DP} a *t_i* film]]]

The solution to this puzzle developed and substantiated in Kennedy and Merchant 2000 (K&M) builds on an analysis of LBC effects in which extraction of attributive modifiers is ruled out not by a configurational constraint governing empty categories or operator/variable dependencies, but rather by a constraint on the morphophonological instantiation of syntactic feature combinations. If this version of the LBC is correct, then these constructions actually instantiate the prediction of the syntactic theory of ellipsis stated in (29b): since ellipsis does not require pronunciation of the omitted structure, elided constituents should be insensitive to syntactic constraints that derive from morphophonological properties of lexical items. K&M's arguments for a PF characterization of the LBC are summarized in the next section.⁴

⁴It should be noted that K&M focus specifically on the case of extraction of left-branch attributive modifiers, not e.g. extractions such as (i), which violate the head-movement constraint, assuming that *how* is the head of a Degree Phrase (DegP) with the AP headed by *strong* as its complement (see Abney 1987; Corver 1990; Grimshaw 1991; Kennedy 1999).

- (i) *How_i is Sammy *t_i* strong?

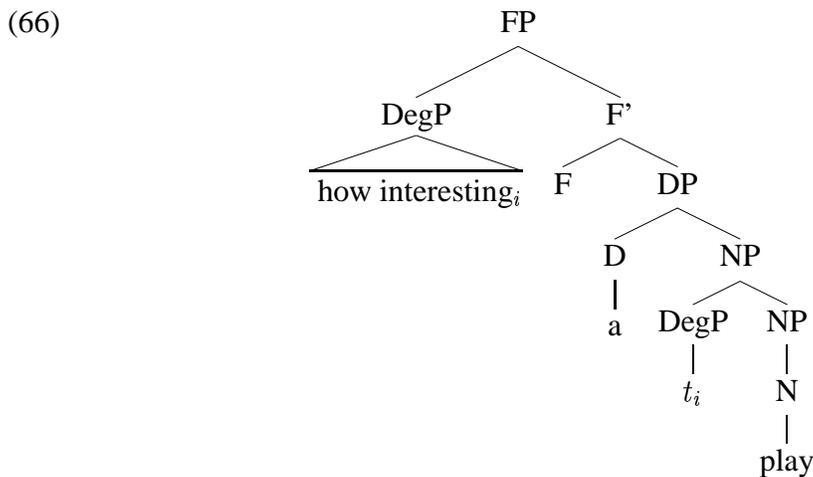
As originally observed by Grosu (1974) (see also Corver 1990), the various phenomena that Ross subsumed under the Left Branch Constraint are more properly explained in terms of distinct constraints.

4.2 A PF Analysis of the Left Branch Constraint

We begin with the syntax of attributive modifiers. Following Svenonius 1992, K&M assume that the base position of an attributive modifier (categorically a DegP) is as a right adjunct to NP. Inverted DegPs, such as those in (64)-(65), indicate that some attributive modifiers must move to the left of the determiner (Bolinger 1972; Bresnan 1973; Woisetschläger 1981; Baker 1989; Corver 1990; Hendrik 1990).

- (64) a. [How interesting a play] did Brio write?
 b. I ate [too big a piece].
 c. If I ever see [that disgusting a movie] again, I'll ask for my money back.
 d. Bob didn't write [as detailed a proposal] as Sheila did.
 e. He took [so big a piece] that he couldn't finish it.
- (65) a. * [A how interesting a play] did Brio write?
 b. * I ate [a too big piece].
 c. * If I ever see [a that disgusting movie] again, I'll ask for my money back.
 d. * Bob didn't write [an as detailed proposal] as Sheila did.
 e. * He took [a so big piece] that he couldn't finish it.

K&M propose that the position an inverted DegP — as well as an intermediate landing site for the *wh*-operator in comparatives — is the specifier of a functional phrase within the nominal projection but above DP: “FP” (cf. Bennis, Corver, and den Dikken 1998; see Corver 1990 for arguments that the landing site of inversion is not SpecDP). The basic structure is illustrated in (66).



K&M provide three pieces of independent evidence for this syntactic analysis. First, the head of FP can sometimes be morphologically realized as *of*, as in the following examples (cf. constructions like *a bear of a guy* discussed in Bennis et al. 1998).

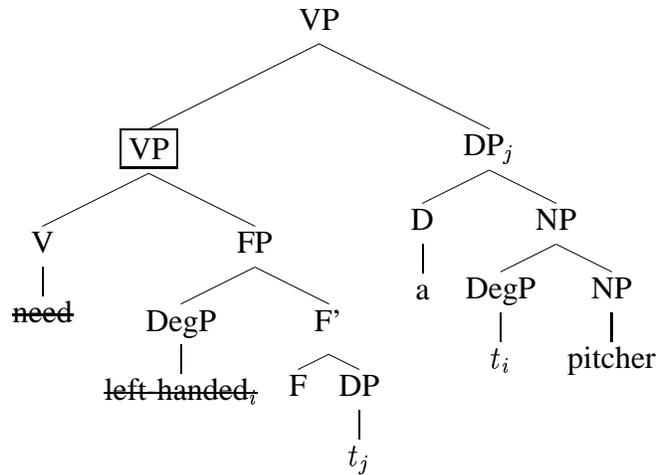
- (67) How long of a novel did Brio write?
- a. I ate [too big of a piece].
 - b. If I ever see [that disgusting of a movie] again, I'll ask for my money back.
 - c. Bob didn't write [as detailed of a proposal] as Sheila did.
 - d. He took [so big of a piece] that he couldn't finish it.

Second, an attributive modifier can be “caught” by pseudogapping. This is illustrated by (68a)-(70a), which are ambiguous between the (b) and the (c) interpretations.

- (68) a. I have written a successful play, but you have a novel.
 b. I have written a successful play, but you have written a novel.
 c. I have written a successful play, but you have written a successful novel.
- (69) a. The Cubs need a left-handed hitter more than they do a pitcher.
 b. The Cubs need a left-handed hitter more than they need a pitcher.
 c. The Cubs need a left-handed hitter more than they need a left-handed pitcher.
- (70) a. I buy expensive shoes because I don't suits.
 b. I buy expensive shoes because I don't buy suits.
 c. I buy expensive shoes because I don't buy expensive suits.

Given the assumption that pseudogapping involves movement of the “remnant” phrase out of VP, followed by VP-deletion (Kuno 1981; Jayaseelan 1990; Lasnik 1995; Johnson 1997; see Sag 1976; Levin 1986; Miller 1992 for qualifications), the possibility of the (c) interpretations follows directly from the structure in (66): these readings correspond to structures in which the attributive modifier raises to SpecFP, and DP moves out of (the deleted) VP. This is illustrated for (69a) in (71), where the deleted VP is enclosed in a box.

- (71) The Cubs need a left-handed hitter more than they do...



Crucially, only a syntactic analysis of the sort given in (66) (together with the assumption that pseudogapping involves VP-deletion plus extraction of the remnant XP) can account for the (c) readings in (68)-(70). An alternative explanation of the facts would be one that posited some kind of “attributive modifier ellipsis”, in which the structure assigned to e.g. (69a) would be (72).

- (72) The Cubs need a left-handed hitter more than they do [~~VP need t_j~~] [_{DP} a [_{NP} [~~DP left-handed~~] [_{NP} pitcher]]]_i

The problem with this sort of analysis is that it also predicts that the (b) sentences in (68)-(70) should have (c) readings, which is false. That is, such an analysis cannot capture the fact that ellipsis of the attributive modifier in these examples is “parasitic” on pseudogapping, whereas this follows directly from the structural analysis proposed in K&M.⁵ Only an analysis that assumes movement of DegP to SpecFP plus deletion (i.e., syntax on the PF side of the derivation) allows for the construction of a syntactic constituent of the type needed to get the (c) reading only when the verb (phrase) is also deleted.

The third argument presented by K&M for the FP-structure in (66) comes from particular uses of the verb *make*. This verb has an “evaluative” use that requires an attributive modifier, as shown in (73).

- (73) a. Peaches make delicious tarts.

⁵This discussion is stated in terms of a deletion analysis of ellipsis, but the same arguments hold of semantic analyses. A purely interpretive analysis such as the one developed in Dalrymple et al. 1991 runs into exactly the same problems of overgeneration outlined above, since it must posit an operation that recovers “missing” attributive modifier meanings. If such an operation is possible in the (a) sentences in (68)-(70), then it should also be possible in the (b) sentences, contrary to fact.

- b. #Peaches make tarts.

This restriction appears to be relaxed in pseudogapping contexts, however:

- (74) a. Peaches make delicious pies more often than they do tarts.
 b. #Peaches make delicious pies more often than they make tarts.

The acceptability of (74a) follows directly given the FP structure in (66) and the analysis of the pseudogapping sentences discussed above: (74a) can be assigned the structure in (75), which satisfies the requirement that the complement of *make* have an attributive modifier.⁶

- (75) Peaches make delicious pies more often than they do $[_{VP} \text{make} [_{FP} [_{DegP} \text{delicious}]_i F^0 t_j]]$
 $[_{DP} t_i \text{tarts}]_j$

Taken together, these facts provide strong support for the hypothesis that attributive modifiers can, and sometimes must (see (65) above), raise from their base position at the NP level to the specifier of a functional head within the nominal projection but above the determiner. Since this movement is clearly licensed, it must be the case that the locus of LBC violations is movement out of SpecFP, not movement from the base position of the attributive modifier. That is, the problem must be at the FP level, not the DP level.

This conclusion, together with the fact that ellipsis eliminates LBC effects in attributive comparative deletion, lead K&M to propose a formulation of the LBC in terms of the morphophonological expression of syntactic feature combinations. Specifically, K&M claim that extraction of left branch modifiers in English (and related languages) is regulated by the principle of Full Interpretation (Chomsky 1981, 1986, 1995), which requires that every element in a particular interface representation have an interpretation at that interface. In the case of the syntax-phonology interface, this means that all terminal nodes — structured bundles of syntactic features — must have a phonological value. Following Halle and Marantz 1993, K&M assume that a syntactic object “has a phonological value” if and only if it can be paired with a corresponding morphophonological matrix from the lexicon. This leaves open the possibility that the syntactic component can derive representations that are well formed in all respects except that they contain objects without morphophonological instantiations.

According to K&M, this is exactly what happens in LBC contexts. Like the inverted DegPs, an attributive *wh*-operator must move through SpecFP (cf. *how*

⁶I set aside here the question of what is responsible for this constraint. One possibility, given the well-formedness of sentences like *These peaches would make a hell of a pie* is that evaluative *make* subcategorizes for an FP.

tall a man vs. **a how tall man*), with the result that the head of FP is assigned a [+wh] feature by spec-head agreement. K&M's proposal is that left branch effects in English arise because the lexicon lacks a $F^0_{[+wh]}$ head. On this view, examples like those in (76)-(77) are ungrammatical not because of a constraint on movement *per se*, but because the syntactic representations are unpronounceable: they violate Full Interpretation at the PF interface, because $F^0_{[+wh]}$ has no morphophonological instantiation.

(76) * The Cubs start a more talented infield than [~~wh~~_{*t*_i} the Sox start [_{FP} *t*_i $F^0_{[+wh]}$ [_{DP} an *t*_i outfield]]]

(77) * How talented_{*i*} do the Sox start [_{FP} *t*_{*i*} $F^0_{[+wh]}$ [_{DP} an *t*_{*i*} outfield]]?

In order to generate a well-formed structure, the [+wh] feature on F^0 must be eliminated. This can happen in two ways. The first option is to pied-pipe the entire FP with the *wh*-operator, in which case the [+wh] feature on F^0 can be checked in the normal way. This is the strategy taken in questions such as (78), but it this option is unavailable in null operator constructions (see Grosu 1994).⁷

The second option is to delete a constituent containing the offending $F^0_{[+wh]}$ object. This is what happens in the well-formed examples of attributive comparative deletion, in which a constituent containing the gap is deleted. (78) illustrates the case where a VP has been deleted.

(78) The Cubs start a more talented infield than [~~wh~~_{*t*_i} the Sox (do) [_{VP} start [_{FP} *t*_{*i*} $F^0_{[+wh]}$ [_{DP} an *t*_{*i*} infield]]]]]

We now have an answer to our puzzle: if the LBC is a constraint on the morphophonological instantiation of syntactic representations, and if ellipsis involves deletion of syntactic representations (or, alternatively, an instruction to “bypass” morphophonological instantiation, *à la* Wasow 1972), then the fact that ellipsis of

⁷Caterina Donati points out that we also don't see this kind of pied-piping in comparatives in which the operator is overt, however (in Italian, Bulgarian, and Romanian), so this may not be a complete answer.

Movement of the entire FP to SpecCP may be exactly what is going on in examples of attributive CD in which only an argument is missing, such as (i), however.

(i) Jones produced as successful a film as [_{FP} wh_{*i*} $F^0_{[+wh]}$ [_{DP} a *t*_{*i*} film]]_{*j*} Smith produced *t*_{*j*}

This sort of analysis cannot be ruled out, if movement and deletion in SpecCP is part of the grammar of comparatives (see Kennedy to appear for arguments to this effect). Moreover, given that English does not allow deletion of argument DPs except in movement constructions (assuming a ‘copy and delete’ theory of movement), this may be the only plausible analysis for such comparatives.

a constituent containing the gap in attributive comparatives bypasses the LBC follows.

The formulation of the LBC presented here makes a number of predictions. First, if pseudogapping works as claimed above (see the discussion of (68)-(70)), then like other examples of ellipsis in which FP is included in the deleted VP, it should also license left branch extractions in attributive CD. As K&M point out, this is correct:

- (79) a. The Sox start a more talented infield than they do an outfield.
 b. Jones produced as successful a film as she did a play.
 c. Abby wrote a more interesting novel than she did a play.
 d. Erik drives a more expensive car than he does a motorcycle.

Second, if the LBC is a reflex of lexical inventory, reflecting whether or not a language has a morphophonological instantiation of a $F_{[+wh]}^0$ head, rather than a structural condition, then it should show a wide degree of cross-linguistic variation. This is true, as pointed out in Ross 1967 and Grosu 1974, 1994.

Finally, this analysis predicts the following pattern cross-linguistically (all other things being equal): if a language obeys the left branch constraint, then attributive CD should be acceptable only if deletion also applies; if, however, a language does not obey the left branch constraint, then attributive CD should be acceptable without deletion. This is also correct (see Kennedy and Merchant 2000).

4.3 Summary

The facts of attributive comparative deletion show that the elided constituent is insensitive to the Left Branch Constraint. At first glance, this fact appears to challenge the assumption that elided constituents are subject to syntactic constraints. However, if Kennedy and Merchant's (2000) characterization of the LBC in terms of the principle of Full Interpretation at the PF interface is correct, then these facts represent exactly the type of data we expect to see if ellipsis involves deletion of syntactic structure (where deletion can be formalized either as actual elimination of structure, or as elimination of morphophonological information only). Since deletion bypasses the need for PF interpretation of syntactic representations, Full Interpretation (and similar constraints) is satisfied vacuously by an elided XP.

5 Final Thoughts

The empirical data considered in this paper clearly show that elided constituents must have syntactic representation, but also that it is not the case that elided con-

stituents are predicted to be subject to exactly the same set of constraints and principles as their unelided counterparts. Specifically, elided constituents are predicted to be insensitive to just those constraints that make reference to morphophonological properties of syntactic objects, as specified in (80).

(80) *Ellipsis and Syntactic Representation*

If ellipsis involves deletion of syntactic structure, then:

- a. Elided constituents should be sensitive to syntactic constraints in general.
- b. However, since ellipsis does not require pronunciation of the omitted structure, elided constituents should be insensitive to syntactic constraints that derive from morphophonological properties of lexical items.

The next step in the research program, then, is to explore further the prediction in (80b). If ellipsis really does work this way, then we should be able to identify a set of (potentially otherwise unrelated) ellipsis constructions that have properties of structures that could not appear overtly. In other words, we should find in ellipsis constructions evidence for the presence of objects that do not appear in other (well-formed) constructions of the language (such as the the $F_{[+wh]}^0$ head in English). Initial support for this conclusion comes from Merchant's (2001) work on sluicing and Kennedy and Lidz's (2001) work on strict/sloppy readings of comparative stripping constructions, but there remains much to be done in exploring this prediction in detail.

The final question we are faced with is whether a syntactic analysis as I have laid it out here has anything to say about the problematic data discussed in section 1.1. Of particular interest are cases of active/passive mismatch and syntactic category mismatch, where native speaker intuitions often collide with observations about naturally occurring data. Answering this question will have to be the topic of another paper, but my guess is that Kehler's (2000) observations about the role of coherence relations in ellipsis, together with recent work on the role of parallelism and focus structure (in particular the work of Rooth 1992 and Fox 1999) may ultimately provide a basis for a pragmatic, rather than a syntactic or semantic, explanation of the facts. On this view, the coherence-based principles identified by Kehler would not govern the syntax of ellipsis *per se*, but rather would govern the felicity of particular uses of ellipsis, as in, for example, the theory of preposing and information structure defended in Ward 1988 and Ward and Birner 1998, whereby the latter crucially determines the felicity of the former, but not its syntactic well-formedness.

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