Deriving Syntactic Structure inside Ellipsis

Will Thompson
Northwestern University & Motorola Labs
wkt@motorola.com

Abstract

The proper linguistic representation of ellipsis has been a source of debate for years (Hankamer and Sag, 1976), with ellipsis theories broadly categorizable as being either *syntactic* or *semantic*, depending on whether or not an elided constituent is held to contain articulated syntactic structure. In this paper, I combine ideas from both syntactic and semantic theories in order to (1) account for the data that suggest there is syntactic structure within elided constituents, and (2) do so in a manner that preserves one of the prime advantages of existing semantic theories, namely straightforward declarative and procedural intepretations. This is accomplished by stating both semantic and syntactic identity conditions on ellipsis. The syntactic condition is formulated within a *desription theory* approach to grammar, as in the formalisms proposed in (Vijay-Shanker, 1992), (Rambow et al., 2001) and (Muskens, 2001).

1 Introduction

The proper linguistic representation of ellipsis has been a source of debate for years (Hankamer and Sag, 1976), with ellipsis theories broadly categorizable as being either *syntactic* or *semantic*, depending on whether or not an elided constituent is held to contain articulated syntactic structure. Recently the scales have tipped strongly in favor of syntactic approaches (see (Kennedy, 2003) for an overview). For example, the data in (1) ((Ross, 1969); see (Merchant, 2001) for extensive discussion) show that the wh-remnant of IP ellipsis ("sluicing") must bear the same case marking as its correlate in the antecedent, in those languages with overt case marking.

(1) (a) *Er will jemandem schmeicheln, aber*
He wants someone.dat flatter, but
sie wissen nicht wem.
they know not who.dat.
'He wants to flatter someone, but they don't know whom'

(b) *Er will jemanden loben, aber sie*
He wants someone.acc praise, but they
wissen nicht wen.
know not who.acc.
'He wants to praise someone, but they don't know who'

Other data strongly suggesting that elided constituents contain internal syntactic structure include filler-gap constructions, where the gap is contained in the elided constituent (2a). Such cases include island violations (2b).

(2) (a) John greeted every person who Bill did.
(b) * John greeted every person who Bill wondered why Sam did.

Facts such as these are difficult to account for in a purely semantic theory of ellipsis resolution, such as the one proposed in (Dalrymple et al., 1991). Given the strong evidence for the existence of syntactic structure within elided constitutents, the question arises of how to correctly infer the required syntactic structure, since this structure is not directly associated with overt phonological material.

In this paper, I will sketch an analysis of ellipsis employing the mechanisms of a description theory approach to grammar, such as in the D-Tree Grammar (DTG)(Vijay-Shanker, 1992) and D-Tree Substitution Grammar (DSG) (Rambow et al., 2001) formalisms. A description approach to grammar, in combination with a number of other assumptions, provides the right means for both declaratively characterizing the syntactic structure that exists within an elided constituent and for a pro-

cedural interpretation that transparently leads to an incremental processing model.

2 Background

2.1 Semantic approaches to ellipsis

Existing semantic approaches to ellipsis resolution, such as the ones in (Dalrymple et al., 1991) and (Egg and Erk, 2002) are attractive because they provide a good account of a variety of semantic phenomena (including interactions with scope ambigiuites and anaphora), and they have both a declarative and and a procedural interpretation. However, these analyses have paid scant attention to the syntactic data mentioned above, and have failed to provide an adequate account of the syntax-semantics interface for sentences containing elided constituents. For example, in (Egg and Erk, 2002), the auxiliary verb left behind by VP ellipsis is treated as a kind of pro-verb, which "discharges" the ellipsis potential of an antecedent clause. The question remains as to why constituents containing these "pro-verbs" show evidence of having further underlying syntactic structure, as shown in (2).

The most influential of the semantic approaches to ellpsis has been the higher-order unification approach proposed in (Dalrymple et al., 1991). Here, the semantic representation of a clause containing an ellipsis (the "target" clause) contains a higher-order variable (3a), and this variable receives a value by solving an ellipsis equation (3b) involving the antecedent (or "source") clause.

(3) From (Dalrymple et al., 1991):

(a) $S \wedge R(T_1, ..., T_n)$
(b) $R(S_1, ..., S_n) = S$

In (3a), the elided utterance is represented as containing a free variable R, which is applied to the semantic values of the target elements which are parallel to a sequence of elements contained in the source utterance. Solving the equation in (3b) using higher-order unification causes R to become bound to a lambda expression, which can then be applied to the semantic values of the target parallel elements to construct a semantic representation for the target utterance as a whole. A simple example of how this works is shown in (4).

(4) (a) George listened to Beethoven's Ninth, and Sam did too.
(b) $listen(george, b9th) \wedge R(sam)$
(c) R(g) = listen(george, b9th)
(d) $\{R \rightarrow \lambda x.listen(x, b9th)\}$
(e) listen(sam, b9th)

In (4a) the parallel elements are 'George' and 'Sam', the semantic representation of source and target are

shown in (4b), and the desired solution for the equation (4c) is given in (4d). Applying the lambda expression in (4d) to the semantic value of 'Sam' provides the (intuitively correct) meaning (4e) for the target containing the VP ellipsis.

While applying (3) to (4a) does derive the correct meaning, it provides no independent, compositionally determined representation of the semantics of the target clause containing the ellipsis, and no indication of the syntactic structure associated with the ellipsis clause. In (Gardent, 1999) and (Gardent, 2000) this defect is partially remedied. She demonstrates how replacing (3) with the equational setup in (5) both extends the empirical scope of the HOU account and provides a more principled account of the compositional semantics of elliptical sentences.

(5) From (Gardent, 1999):

(a) $S = C(X_1, ..., X_n)$
(b) $T = C(Y_1, ..., Y_n)$

In the approach of (Gardent, 1999), the semantics of the source and target sentences are derived from the normal compositional semantic construction process. An elided constituent is represented semantically with a free variable of the proper type, i.e. the type it would normally receive based on its syntactic category. This differentiates her analysis from the one in (Dalrymple et al., 1991). Futhermore, there are two equations (5a,b) rather than one (3b), which together introduce a free variable C representing the common background relation shared by the source and target clauses. Resolving these equations causes the free variable introduced by ellipsis to be resolved as a side effect. Thus, ellipsis resolution is driven by the general process of establishing a redundancy relation between two clauses in a discourse. How this works for sentence (4a) is shown in (6).

(6) (a) $listen(george, b9th) \wedge R(sam)$
(b) $C(george) = listen(george, b9th)$
(c) $C(sam) = R(sam)$
(d) $\{C \rightarrow \lambda x.listen(x, b9th), R \rightarrow \lambda x.listen(x, b9th)\}$

For this particular example, the approaches of (Dalrymple et al., 1991) and (Gardent, 1999) obtain the same result. However, as explained in (Gardent, 1999) and (Gardent, 2000) the equational setup in (5) not only provides a clearer picture of the syntax-semantics interface, it also opens the door to using the HOU analysis to explain other phenomena, such as focus, deaccenting, and strict/sloppy readings in both ellipsis and non-ellipsis contexts.

While (5) improves on (3), it still leaves open the question of how to syntactically represent elided constituents

which appear to contain internal syntactic structure, as shown in (1) and (2) above. In what follows I will adopt the equations in (5) as a semantic condition on ellipsis representations. However, I will augment it with a syntactic condition, which will be used to generate syntactic structure within elided constituents, and I will show how the syntactic and semantic conditions can be made to work together.

2.2 Syntactic approaches to ellipsis

Syntactic approaches to ellipsis start with the idea that elided constituents contain full syntactic structure at some level of a syntactic representation. They differ on which level of representation the syntactic structure is present. For example, in (Lobeck, 1995) and (Chung et al., 1995) an elided constituent is initially syntactically null, and receives syntactic structure by copying it from the antecedent clause at the level of LF. However, such "copying" approaches to ellipsis run into some of the same problems as semantic approaches to ellipsis, since special mechanisms need to be posited in order to account for the connectivity effects shown in (1) and (2). For example, (Chung et al., 1995) posit three separate special ellipsis operations ("recycling", "merger", and "sprouting") for this reason [1].

The other tack taken by syntactic approaches is to posit full syntactic structure at initial levels of syntactic representation, generated in the normal fashion (Ross, 1969) (Merchant, 2001). The difference between elided and non-elided constituents is that elided constituents have no overt PF material associated with them. Such "PF-deletion" approaches have the advantage that they straightforwardly account for the connectivity effects shown in (1) and (2).

The most successful and extended defence of the PF-deletion approach to ellipsis is given by (Merchant, 2001). In his analysis, PF-deletion is triggered by a syntactic feature on heads, labelled "E". When a head contains this feature, it instructs the PF component of syntax to ignore its complement, i.e., the complement receives no PF interpretation. Futhermore, the E-feature is associated with a semantic identification condition. This condition in essence states that the focus semantic values of the antecedent and ellipsis constituents must be semantically equivalent [2] (cf. (Rooth, 1992)). By stating this condition in terms of semantic entailment, (Merchant, 2001) avoids some of the problems associated with syntactic approaches that require syntactic isomorphism between source and target sentences (e.g., (Fiengo and May, 1994)), as illustrated in (7) and (8) (from (Merchant,

2001)).

(7) (a) Abby was reading, but I don't know what.

    (b) Ben called – guess when!

(8) (a) They arrested $Alex_i$, though he_i thought they wouldn't

    (b) They arrested
[the guy who lives over the garage]$_i$, though he_i thought they wouldn't.

    (c) *He_i thought they wouldn't arrest $Alex_i$.

    (d) *He_i thought they wouldn't arrest
[the guy who lives over the garage]$_i$.

Examples (7a) and (7b) show that a wh-trace can appear in an elided constituent even when no corresponding syntactic argument appears in the antecedent. The examples in (8) show that Condition-C violations do not occur in ellipsis clauses, counter to what would be expected were the elided constituent to be completely isomorphic to its antecedent.

Due to the success of this PF-deletion theory of ellipsis, and in particular its ability to account for both connectivity effects as well as the kind of syntactic "mismatches" shown in (7) and (8), I adopt much of its outline. One significant drawback, however, is that the theory (as stated) does not lead transparently to a processing model for ellipsis, unlike the semantic approaches outlined above. In particular, the formulation of the semantic identification condition given in (Merchant, 2001) leaves it unclear as to how a processor is to generate the requisite ellipsis-internal syntactic structure. The goal of the rest of this paper is to combine the demonstrated empirical advantages of the PF-deletion approach with the formal advantages of the HOU approach.

3 Analysis

Here is a brief outline of the phonological, syntactic, and semantic components of my analysis. First, (descriptions of) elementary trees are anchored by lexical items which consist of bundles of syntactic and semantic features, but not of phonological features. Phonological features are added independently by a set of "spell-out rules" (cf. (Halle and Marantz, 1993)(Ackema and Neeleman, 2003)), which map from bracketed sequences of syntactic feature bundles to sequences of bundles of phonological features. Second, loosely following (Merchant, 2001), certain syntactic categories (in English, NP, VP, and IP) may optionally bear an E-feature, which triggers spell-out rules that generate the empty string. Third, again following (Merchant, 2001), I will associate the E-feature with a semantic constraint on the content of the elided constituent. Unlike (Merchant, 2001), however, the semantic constraint is formulated in terms of the equations

---

[1]Some empirical problems with the (Chung et al., 1995) approach are detailed in (Merchant, 2001)

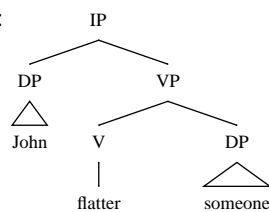[2]This is a simplification of the actual statement of this condition

in (5). Additionally, I associate a *syntactic* identity condition with the E-feature, which regulates the syntactic structures appearing within elided constituents. [3] Combining the semantic and the syntactic conditions has the advantage that they together provide a declarative characterization of the syntax and semantics of ellipsis. It is also straightforward to assign these conditions a procedural interpretation. In the rest of this paper, I further elaborate the three components of my analysis and conclude with some open problems that require further research.
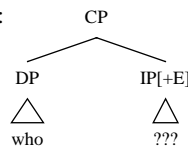
3.1 Syntax of Ellipsis

Here is a simple sluicing example:

(9)   (a) John flattered someone, but I don't know who.

    (b) source:

```
            IP
          /    \
        DP      VP
        /\      /  \
      John     V    DP
             flatter  /\
                    someone
```

    (c) target:

```
            CP
          /    \
        DP     IP[+E]
        /\      /\
      who      ???
```

Of particular interest here is the tree in (9c), representing a (partial) syntactic analysis of the target ellipsis clause. Note that the IP node in this tree bears the E-feature, which means that its PF content is absent. However, by hypothesis, the underlying syntactic structure is not. It is for this reason that the question marks appear under IP. The question here is how to generate the required syntactic structure, while avoiding some of the problems associated with approaches that require syntactic isomorphism with the source clause (Rooth, 1992) (Fiengo and May, 1994).

Imagine that (9c) is output by a parser, and represents a description of what the parser has seen so far. Assuming a lexicalized grammar (Joshi and Schabes, 1991), the DP slot into which the wh-phrase has been substituted must be part of an elementary tree anchored by some (missing) lexical item. I propose that we add this missing information to the tree description in (9c) through an application of the constraint in (10). [4]

(10)   Let $par(T)$ be the set of constituents in the target ellipsis clause that are parallel to a set of constituents $par(S)$ in the source clause. For each t $\in par(T)$ and matching s $\in par(S)$, $\alpha^-(root(t)) = \alpha^-(root(s))$

In (9c) assume that the DP dominating 'who' in the target is matched with the DP dominating 'someone' in the source. The negative lexical anchor of 'someone' is 'flatter'. Therefore, to satisfy constraint (10) in (9c), we must select an elementary tree from the lexicon that is anchored by 'flatter', and which is compatible with the existing description of the target ellipsis clause in (9c). The elementary tree in (11a) fits the bill. [5] We add the description representing this elementary tree to the desription of the target clause already generated by the parser, resulting in (11b), which contains syntactic structure derived within the ellipsis site.

(11)   (a)

```
              CP
            /    \
          DP      IP
                   :
                   IP
                 /    \
               DP      VP
                      /   \
                     V     DP
                     |     |
                  flatter  t
```

    (b)

```
              CP
            /    \
          DP    IP[+E]
          /\      :
         who      IP
                /    \
              DP      VP
                     /   \
                    V     DP
                    |     |
                 flatter  t
```

It is important to note that the syntax inside the ellipsis in (11) is incomplete, in the technical sense defined in (Rambow et al., 2001). That is, there are frontier nodes that are labelled with non-terminal symbols (i.e., substitution nodes). The constraint in (10) says nothing about these nodes. There are a couple of ways to approach this issue. First, one might posit another syntactic constraint which "fills in" these empty argument positions with pronouns of the appropriate sort. This would be play a role similar to that of the "Vehicle Change" analysis proposed in (Fiengo and May, 1994). Another way to approach this
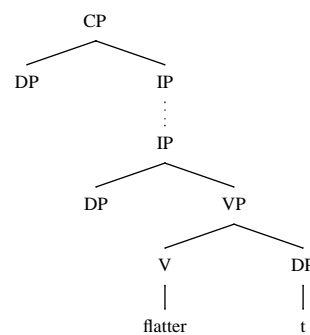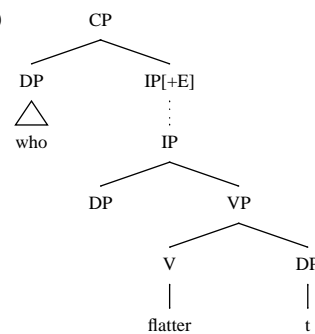
---

[3] This syntactic identity condition has the effect of constraining the possible meanings that can be associated with the elided constituent. These syntactic constraints therefore play a role similar to the one played by "syntactic presuppostions" in (Ginzburg, 1999).

[4] In (10), I borrow some terminology from (Muskens, 2001). The *negative lexical anchor* of the root node r of a tree τ_1 (denoted by $\alpha^-(root(\tau_1))$) is the lexical anchor of the substitution node n of tree τ_2 into which tree τ_1 is substitued.

[5] Here I am using the standard notation where solid lines indicate immediate dominance, and dotted lines indicate (possibly non-immediate) dominance.

issue is to allow the positions to remain unfilled. Normally, it is forbidden for a non-terminal to remain on the fringe of a derived tree at the end of a derivation. Linguistically, this can be viewed as a consequence of PF requirements and of the requirement of full interpretation of syntactic structure. However, in the case of ellipsis, PF requirements are fulfilled by mapping the elided structure to an empty string, and the structure containing the ellipsis receives full interpretation by solving the ellipsis equations (as described below). Hence the need to fill the argument slots with lexical material disappears.

The current approach can also handle examples of VP ellipsis. This includes VP ellipsis from which a wh-phrase has been extracted, as shown in (12).
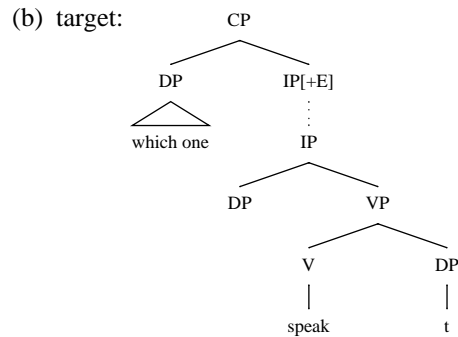
(12) (a) George claims to speak French, but I don't
          know which language Susan does.
      (b) source:

```
              IP
           /      \
         DP        VP
          |      /    \
       George   V      IP
                |    /    \
             claim  DP     I'
                    |    /    \
                  PRO   I      VP
                        |    /    \
                        to  V      DP
                            |       |
                         speak   French
```

      (c) target:

```
                       CP
                    /      \
                  DP        IP
                  |       /    \
         which language  DP     I'
                         |    /    \
                      Susan  I     VP[+E]
                             |       |
                           does     ???
```

      (d)
```
              IP
           /     \
         DP       I'
                /    \
               I      VP
                    /    \
                   V      IP
                   |
                 claim
```

(e)
```
                CP
             /      \
           DP        IP
                      :
                      IP
                   /     \
                 DP       VP
                        /    \
                       V      DP
                       |       |
                     speak     t
```

(f)
```
                          CP
                       /      \
                     DP        IP
                   /    \    /    \
          which lang    DP     I'
                        |    /     \
                     Susan  I      VP[+E]
                            |     /     \
                          does   V       IP
                                 |       :
                               claim     IP
                                      /     \
                                    DP       VP
                                           /    \
                                          V      DP
                                          |       |
                                        speak     t
```
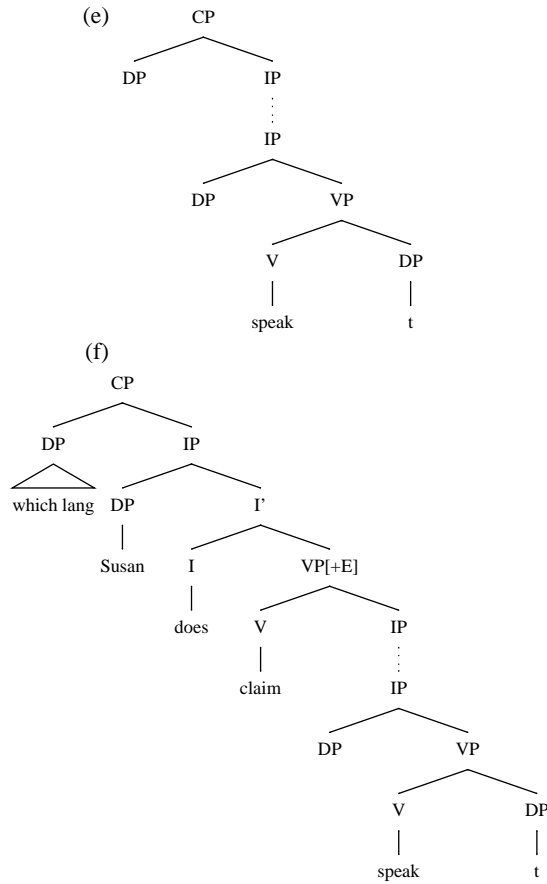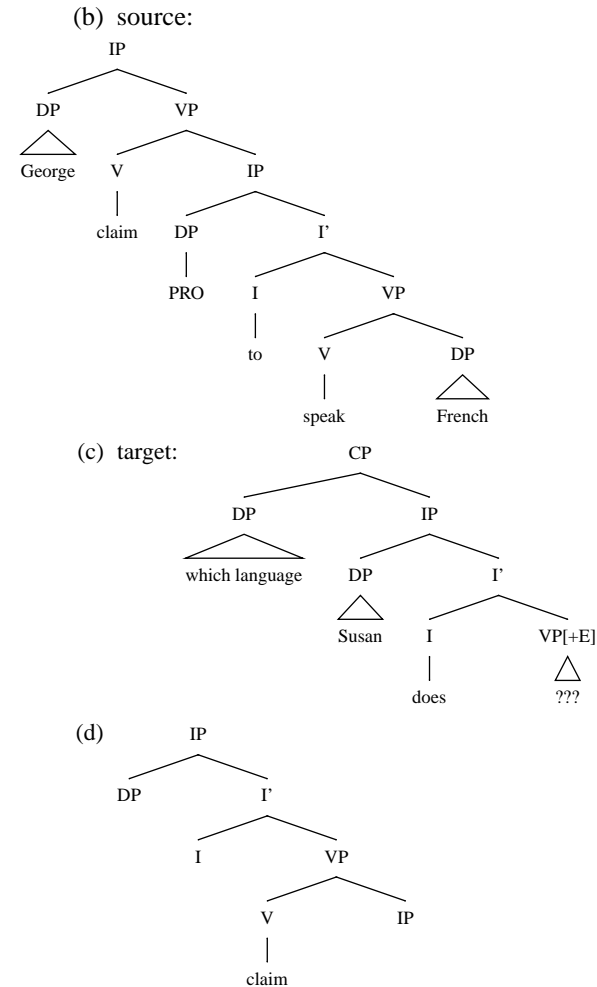
In (12), the target contains multiple ellipsis remnants ('which language' and 'Susan'), which match parallel elements in the source clause ('French' and 'George'). Employing condition (10) allows us to add the elementary tree descriptions in (12d) and (12e) to the desription shown in (12c). The resulting tree description is shown in (12f).

Another case of sluicing is shown in (13) (this time, only the syntactic structure of the target clause is shown, after applying (10)).

(13) (a) George claims to speak an exotic language,
          but I don't know which one.
      (b) target:

```
                    CP
                 /      \
               DP        IP[+E]
             /    \        :
      which one    IP
                /     \
              DP       VP
                     /    \
                    V      DP
                    |       |
                  speak     t
```

This example is notable because the matrix verb in the source clause is entirely unrepresented in the target, un-

208

like the previous two examples. The issue of how to assign this ellipsis the correct semantics despite this fact is addressed in the next section.

3.2 Semantics of Ellipsis

As noted above, I adopt (5) from (Gardent, 1999) as the semantic condition on ellipsis. More accurately, (5) is to be viewed as a general redundancy condition on two clauses entering into a discourse relation, and when applied to a clause containing an ellipsis, the ellipsis is resolved as a side effect. How this works for (9) is shown in (14).

(14) (a) $flatter(j, f(person)) = C(f(person))$
  (b) $flatter(x, g(person)) = C(g(person))$
  (c) $\{C \rightarrow \lambda y.flatter(j, y), x \rightarrow j\}$

The left hand sides of the equations in (14a) and (14b) contain (simplified) semantic representations of the source and target clauses, respectively. [6] Note that the fringe non-terminal DP in (11b) is represented in the (14b) as a free variable. This variable is resolved by solving the equations, as shown in (14c)

The resolution of (12) proceeds in a similar fashion, as shown in (15).

(15) (a) $claim(g, speak(g, fr)) = C(g, fr)$
  (b) $claim(s, speak(x, f(lang))) = $
      $C(s, f(lang))$
  (c) $\{C \rightarrow \lambda y \lambda z.claim(y, speak(y, z)), x \rightarrow s\}$

Once again, the fringe non-terminal DP in (12f) is translated as a free variable, which gets resolved by solving the equations in (15c).

More challenging is (13). Here we must say something more in order to derive the correct semantics, due to the fact that the matrix verb of the source is absent from the syntactic representation of the target. For this case, it is possible to take advantage of the fact that the two IPs in the target syntactic representation are related to each other by a dominance relation (as indicated by the dotted line), rather than an immediate dominance relation. For cases such as these, (Pinkal, 1996) proposes the constraint in (16).

(16) For each pair of nodes P_i and P_j for which the dominance relation is stated, we add the constraint $X_i = C(X_j)$. [where X_i is the semantic value of P_i, X_j is the semantic value of P_j, and C is a free higher-order variable]

Applying (16) to (13b) allows us to derive the semantic representation on the left hand side of the equation in (17b). Solving the equations then proceeds as normal in (17c)

[6]The parallel elements are represented as choice functions.

(17) (a) $claim(g, speak(g, f(lang))) = C(f(lang))$
  (b) $R(speak(x, h(lang))) = C(h(lang))$
  (c) $\{C \rightarrow \lambda y.claim(g, speak(g, y)), x \rightarrow$
      $g, R \rightarrow \lambda P.claim(x, P)\}$

Of course the analysis of (13b) goes through only if we do not conflate the two IPs in this representation, as would occur for example if we applied the "reading off" algorithm in (Rambow et al., 2001). There are both technical and conceptual issues here that remain to be taken care of.

3.3 Phonology of Ellipsis

Some mechanism is required in order to prevent the phonological realization of lexical items contained in elided constituents. If elided constituents contain syntactic structure, and syntactic structures are anchored to lexical items, then an elided constituent contains at least one lexical item, as for example in (11b). One possible means for ensuring that such lexical items remain unpronounced is to assume that they do not contain phonological material at the relevant level of representation. Instead, lexical items consist of sets of syntactic and semantic features only. It will then be necessary to formulate a theory for how these features are "spelled-out" (cf. (Halle and Marantz, 1993)(Ackema and Neeleman, 2003)). The theory might consist of a set of mapping rules from syntactic representations to phonological representations. These mapping rules could be made sensitive to the presence or absence of the hypothesized E-feature. A schematic formulation of an "ellipsis" spell-out rule is shown in (18). This mapping schema simply states that an XP bearing the E-feature is mapped to the empty string at PF.

(18) $[XP_{+E}] \mapsto \epsilon$ (where XPϵ\{NP,VP,IP\})

For now this remains merely a rough sketch of how an account of the phonology of ellipsis could be made to work. Clearly much more needs to be said to make this component of the analysis precise.

4 Conclusion

In this paper, I have sketched an analysis of ellipsis which combines ideas from PF deletion theories with ideas from semantic theories. This combination of ideas is enabled by adopting a description approach to grammar, as in the formalisms proposed in (Vijay-Shanker, 1992), (Rambow et al., 2001) and (Muskens, 2001). This has resulted in an approach that can handle some cases of ellipsis where there is evidence for syntactic structure within the elided constituent. The approach also lends itself to a straightforward procedural interpretation, making it possible to develop an explicit processing algorithm, once it has been made sufficiently explicit.

However, many technical and conceptual issues remain to be resolved, such as how it is possible to licence incomplete tree descriptions under ellipsis. Empirical issues remain as well. Here, I discuss only one example. The evidence for syntactic structure within ellipsis is more complicated than has been suggested above. It turns out that IP ellipsis can repair island violations (Ross, 1969)(Merchant, 2001), while VP ellipsis does not. This is shown in (19) and (20) (from (Merchant, to appear)).

(19)　(a)　They want to hire someone who speaks a Balkan language, but I don't remember which.

　　(b)　* I don't remember which (Balkan language) they want to hire someone who speaks.

　　(c)　Bob ate dinner and saw a movie that night, but he didn't say which.

　　(d)　* He didn't say which movie he ate dinner and saw that night.

(20)　(a)　* Abbey does want to hire someone who speaks Greek, but I don't remember what kind of language she doesn't.

　　(b)　* They got the president and 37 Democratic Senators to agree to revise the budget, but I can't remember how many Republican ones they didn't.

The challenge here is to generate sufficient syntactic structure for the VP ellipsis cases in (20) to account for the island violations, yet in a manner that doesn't generate island violations for the IP ellipsis cases in (19). Accounting for this puzzle provides a challenge for any unified theory of ellipsis constructions, including the present one. Doing so remains a goal for future research.

References

Peter Ackema and Ad Neeleman. 2003. Context-sensitive spell-out. *Natural Language and Linguistic Theory*, 21:681–735.

Sandra Chung, William Ladusaw, and James McCloskey. 1995. Sluicing and logical form. *Natural Language Semantics*, 3:239–282.

Mary Dalrymple, Stuart Shieber, and Fernando Pereira. 1991. Ellipsis and higher-order unification. *Linguistics and Philosophy*, 14:399–452.

Markus Egg and Katrin Erk. 2002. A compositional account of vp ellipsis. In Frank Van Eynde, Lars Hellan, and Dorothee Beermann, editors, *Proceedings of the 8th International Conference on Head-Driven Phrase Structure Grammar*, pages 162–179. CSLI Publications.

Robert Fiengo and Robert May. 1994. *Indices and Identity*. MIT Press.

Claire Gardent. 1999. Unifying parallels. In *Proceedings of the 27th Annual Meeting of the ACL*, pages 188–207.

Claire Gardent. 2000. Deaccenting and higher-order unification. *Journal of Logic Language and Information*, 9(3):313–338.

Jonathan Ginzburg. 1999. Semantically-based ellipsis resolution with syntactic presuppositions. In Harry Bunt and Reinhard Muskens, editors, *Computing Meaning*, volume 1, pages 255–279. Kluwer Academic Publishers.

Morris Halle and Alec Marantz. 1993. Distributed morphology and the pieces of inflection. In K. Hale and S.J. Keyser, editors, *The View from Building 20*, pages 111–176. MIT Press.

Jorge Hankamer and Ivan Sag. 1976. Deep and surface anaphors. *Linguistic Inquiry*, pages 391–428.

Aravind Joshi and Yves Schabes. 1991. Tree-adjoining grammars and lexicalized grammars. In *Definability and Recognizability of Sets of Trees*. Elsevier.

Chris Kennedy. 2003. Ellipsis and syntactic representation. In Kerstin Schwabe and Susanne Winkler, editors, *The Interfaces: Deriving and Interpreting Omitted Structures*, pages 29–53. John Benjamins.

Anne Lobeck. 1995. *Ellipsis: Functional heads, licensing, and identification*. Oxford University Press.

Jason Merchant. 2001. *The Syntax of Silence: Sluicing, Islands, and the Theory of Ellipsis*. Oxford University Press.

Jason Merchant. to appear. Variable island repair. In Kyle Johnson, editor, *Topics in Ellipsis*. Cambridge University Press.

Reinhard Muskens. 2001. Talking about trees and truth-conditions. *Journal of Logic, Language, and Information*, 10(4):417–455.

Manfred Pinkal. 1996. Radical underspecification. In *Proceedings of the 10th Amsterdam Colloquium*, pages 587–606.

Owen Rambow, K. Vijay-Shanker, and David Weir. 2001. D-tree substitution grammars. *Computational Linguistics*, 27(1):87–121.

Mats Rooth. 1992. Ellipsis redundancy and reduction redundancy. In Steve Berman and Arild Hestvik, editors, *Proceedings of the Stuttgarter Ellipsis Workshop*, number 29 in Arbeitspapiere des Sonderforschungsbereichs 340.

John Ross. 1969. Guess who? In R. Binnick, A. Davison, G. Green, and J. Morgan, editors, *Papers from the 5th Regional Meeting of the Chicago Linguistics Society*, pages 252–86.

K. Vijay-Shanker. 1992. Using descriptions of trees in a tree adjoining grammar. *Computational Linguistics*, 18(4):481–518.