

Structure of NP Shells: Evidence from Pied-Piping in English Relative Clauses

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1 Introduction

Beginning with Abney's (1987) dissertation, much research has demonstrated that the constituency of nominal and verbal projections are highly parallel. Meanwhile, work in the *Minimalist Program* has extended Larson's (1988) work on the double object construction to argue that almost all verb phrases have a complex internal structure comprised of a outer vP shell headed by "light verb" (often a causative morpheme or phonetically null) and an inner VP shell headed by the lexical verb. The light verb is associated with the AGENT theta role as well as accusative case. This gives a convenient account of Burzio's generalization that verbs assign accusative case just in case they also assign an external theta role. It seems sensible, then, to generalize this structure to noun phrases; many nouns have an associated agent (i.e., Bush's attack on France) and Baker's uniform thematic assignment hypothesis (UTAH) maintains that there is a unique correspondence between thematic roles and structural relations.

In this paper, I investigate a somewhat problematic paradigm in the pied-piping possibilities of English relative clauses and show that a solution presents itself when an analysis using NP shells is adopted. In the first section I briefly describe pied-piping and its status in minimalism. In the second section I present my paradigm and discuss why it is problematic. Finally, in the third section, I provide an analysis of the facts and then provide a discussion about the advantages of my proposal and some of its weaknesses. The analysis is done in the framework of the minimalist grammars of Stabler, which facilitates the exhaustive testing of strings; a string is easily classified as being in the language generated by the grammar or not (avoiding the possibility that a string could be generated by derivation missed by a human).

2 Pied-Piping

Horvath (to appear) describes pied-piping as “the phenomenon whereby some particular movement operation T designed to displace an element A ... displaces additional elements along with A.” As syntactic operations are assumed to apply to constituents, this means that rather than the targeted constituent A, a larger constituent B moves, which properly contains A.

(1) Wh-movement:

- a. [A Who] were you talking [B to _____]?
- b. [B To [A whom]] were you talking _____?

Pied-piping is commonly explained through specifier-head agreement. For example, a wh-word in the specifier induces a wh-feature on the head, and the head projects the feature up to the maximal projection. The wh-movement rule can then target either the wh-word or the maximal projection of which the wh-word is a specifier. If the maximal projection is itself in a specifier, then the process can repeat, and thus the possible targets for pied-piping are the members of the transitive closure of the “specifier of” relation, starting with the original feature-bearing unit.

(2) [DP [DP [DP_{+wh} Whose] guardian]’s employer] did you call yesterday?

In minimalism, heads are thought of as nothing more than bundles of features, some syntactic and some phonetic. Features are primitive elements and are the true targets of syntactic operations. Any overt movement (i.e., movement of a syntactic feature accompanied by movement of the associated phonetic features) is then an instance of pied-piping. Simultaneously, however, many syntacticians are reformulating their derivations to reduce or even eliminate covert movements, indicating that there is some ambivalence about the independence of features.

3 A Problematic Paradigm

- (3)
- a. ... a linguist [articles by whom] the editors always reject _____ ...
 - b. *... a linguist [by whom] the editors always reject articles _____ ...
 - c. ... a linguist [who(^{?m})] the editors always reject articles by _____ ...

- (4) a. ?The Colorado is a river [cabins by which] the Park Service has built _____.
 b. The Colorado is a river [by which] the Park Service has built cabins _____.
 c. The Colorado is a river [which] the Park Service has built cabins by _____.

The paradigm in (3) and (4) poses a difficult problem for any theory of pied-piping. The elements and their string relations are quite similar, but their behavior is quite different. Also, in traditional notions of constituency—which could be summarized by the phrase structure rule in (5)—the wh-element is not in a specifier-head relationship with its object.

- (5) $PP \rightarrow P DP$

4 A Solution in Constituency

4.1 The Spirit of the Proposal

- (6)
-
- The left diagram shows a flat NP structure where 'articles', 'by', and 'whom' are all direct children of the NP node. The right diagram shows a hierarchical structure where 'articles' is a child of NP, and 'by whom' is a child of a PP node, which is itself a child of NP.

Although (6) is out-dated, it captures the essence of what is going on; the different patterns of pied-piping are the results of different constituent structures. The more controversial claim implicit in (6) is that the “by” in “by whom” is not, in fact, the head of a prepositional phrase, but rather a part of the nominal phrase, I will make this claim explicitly in section 4.3 when I present the analysis.

4.2 The Framework of the Proposal

I present my solution in the framework of Stabler’s minimalist grammars. The minimalist grammars he describes are quite simple, and designed to be easily parsable by machines. They are also quite powerful, however, without being too powerful. They can generate anything in the mildly context-sensitive class of languages.

The grammars are given by a list of lexical items. The lexical entries are heads, each of which has a list of features. The features must be used in the order in which they are listed. There are

four kinds of features: selectional, categorial, licenser, and licensee. The first feature of a head is the category that it selects for its complement, then a (possibly null) sequence of selection and licenser features follow, merging or moving other elements into successively higher specifiers. Next comes the categorial feature, which represents a maximal projection, followed by an licensee features that would trigger movement of this projection to a licenser. At the time a head selects a complement, either head-movement or affix-hopping can occur, but a translation algorithm exists that can turn a head-movement based grammar into a head-movement-free grammar.

4.3 The Substance of the Proposal

4.3.1 NP shells

The problematic paradigm in section 3 is less problematic when the apparent similarities are derived from different structures. There are “by”s of two different categories: In “articles by Noam,” Noam is an agent (the articles were written by him) and “by” is the signal of Noam’s agency. The “by” in “cabins by the Colorado,” on the other hand, is the signal of the LOCATIVE property of “the Colorado.” Because the first instance of “by” is associated with the AGENT thematic role, it must also be associated with the outer nominal shell—the “nP” shell. The second instance of “by”, the LOCATIVE, is more like the traditional notion of a prepositional phrase and is merged somewhere lower.

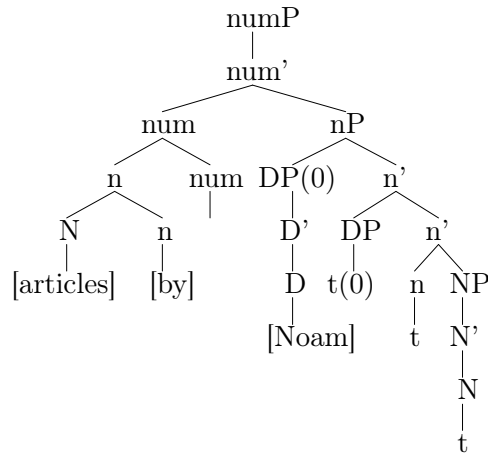
If causative morphemes—vP heads—allow a lexical verb to license an agent DP, I propose that ‘by’ is an nP head; it allows a lexical noun to license a DP agent. In English, the lexical verb undergoes “partial V-to-T movement,” that is, it moves to the “light verb”. In order to maintain the parallel, I propose that the lexical noun moves to the nP in partial N-to-D movement. In my proposal, these are head movements, but—as mentioned above—there is an equivalent grammar (in terms of the language it generates) without head movement.

The tree in (8) is an example of an NP with an agent licensed by ‘by.’ The first step of the derivation involving ‘by’ is the selection of its complement. This satisfies the categorial feature on the lexical noun and the first selectional feature (indicated by a prefixed equals sign) on the n-head. The greater-than sign indicates that this selection involves head movement of the Kaynian sort (i.e., left adjunction to the higher head). Next, the n-head selects a DP complement and checks its case

feature. At that point the *n* has made its maximal projection and its constituency is [_{nP} [_{DP} Noam] [_n [_N articles] [_n by]] [_{NP} *e*]]. The *n*-head then undergoes head movement again, yielding the correct word order. Notice that the head movement from *N* to *n* yields a structure in which it is impossible for the “preposition” and the agent to form a constituent to the exclusion of the noun, accounting for the movement facts in (3), repeated in (7).

- (7) a. ... a linguist [articles by whom] the editors always reject _____ ...
 b. *... a linguist [by whom] the editors always reject articles _____ ...
 c. ... a linguist [who(?m)] the editors always reject articles by _____ ...

(8) by :: =>N =D +case n

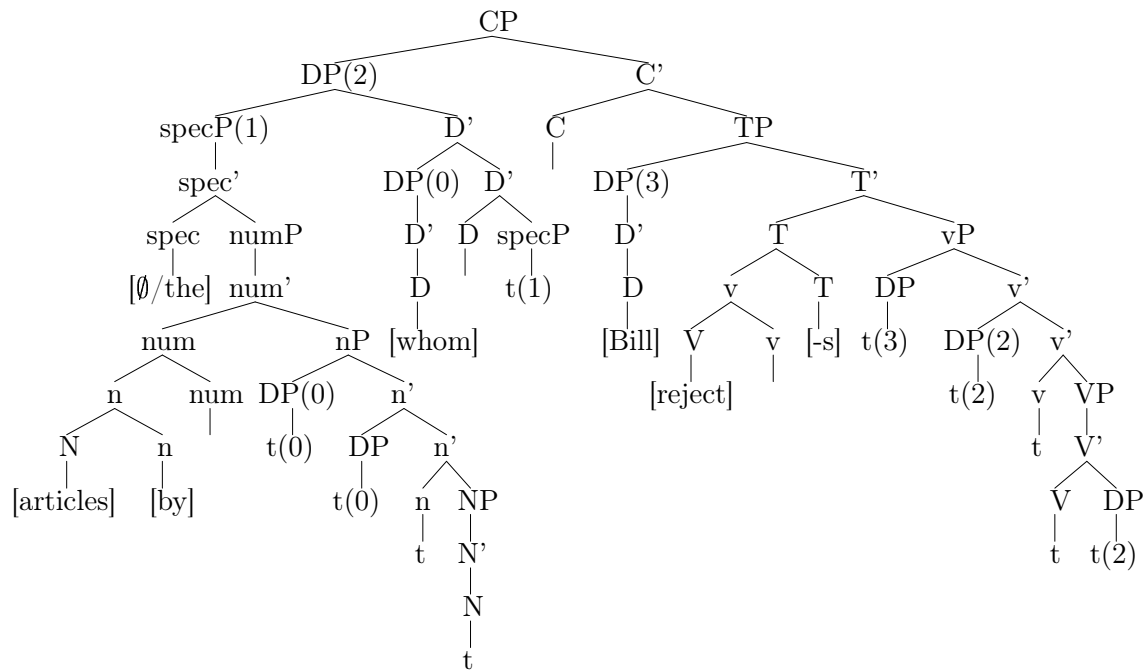


An NP with a locative PP is shown in (9). It has a much different constituency and is generated by a completely different lexical item. This ‘by’ is just a normal preposition like any other it selects a DP complement and projects a PP. I have a few items dominating it—*Agr_PP* and *locP*, demonstrating the head-movement-free way to get the right word order. The DP moves to the *Agr* projection to check case, and the remaining part of the PP moves to the specifier of a higher functional projection.

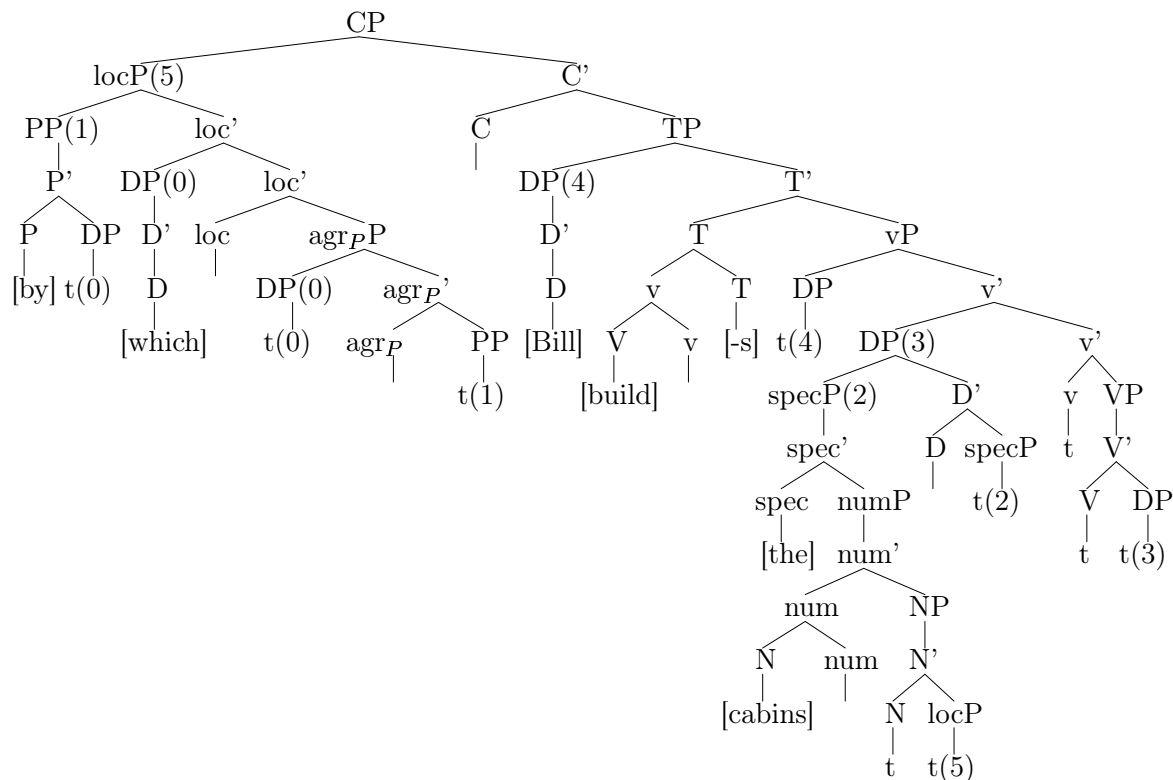
In (11), I show an example derivation of a relative clause with pied-piping. The pied-piped element is the DP, which selected first a “specificity phrase” and then licensed the wh-word, which was within the specificity phrase. The correct word order can then be obtained by moving the rest of the specificity phrase into a higher specifier of the D-head; what exactly drives this second movement is not exactly clear, but it could be called a kind of EPP effect. The D-head then has reached its maximal projection and demands to be licensed as a wh-word, eventually landing it in the specifier of C.

A similar example in (12) shows the same process with the LOCATIVE phrase. This time, pied-piping results in the preferred phrase “by which Bill builds cabins.” Notice that the head of DP(3) could have been a pied-piper as well, generating the degraded form “. . . cabins by which Bill builds”; Buell (p.c.) has suggested that this is degraded because in a sentence like “The Park Service built cabins by the river,” the prepositional phrase is more likely to be part of the verb phrase than the noun phrase.

(11) $\emptyset :: =\text{spec} +\text{wh} +\text{F D} -\text{wh}.$



(12) $\emptyset :: =agr_P +wh +func\ loc -wh$



5 Discussion

5.1 The Advantages of the Proposal

The primary advantage of my proposal is that it makes NP shells completely parallel to VP shells. Many other analyses of NP shells have hedged a bit on the connection between the AGENT role and the nP layer. It also gives the correct constituency to provide a valid account of the pattern in clefts (show in (13)), which match the patterns in relative clauses.

- (13) a. (i) It's articles by Noam Chomsky that the editors always reject.
 (ii) *It's by Noam Chomsky that the editors always reject articles.
 (iii) It's Noam Chomsky that the editors always reject articles by.
- b. (i) ?It's cabins by the river that the Park Service builds.
 (ii) It's by the river that the Park Service builds cabins.
 (iii) It's the river that the Park Service builds cabins by.

Marcus Smith (p.c.) has pointed out that this analysis is supported by cross-linguistic evidence from Zapotec languages. These languages normally have the word order preposition-object, but when the preposition is pied-piped by a *wh* object, the order is object-preposition, suggesting that the object has moved in an obvious way to the specifier of the preposition. This bodes well for an account that only allows for pied-piping from the specifier position, and gives some credibility to the movements of the pied-piped phrase to a higher specifier when the *wh*-word has appeared not to move.

This analysis is what we should expect given UTAH. If there is a uniform mapping from structural positions to thematic roles, why should that mapping be different in noun phrases and verb phrases? Further, it accounts straight-forwardly for ungrammaticality of agent-like *by*-phrases with unaccusative nouns, like (14). These nouns have no nP-shell, so they cannot have the ‘*by*’ n-head.

(14) *The arrival *by* John was beneficial to everyone.

My proposal avoids covert movement. Perhaps this is not important, but I believe that covert movement should be avoided when possible. Covert movements can tell us very little about syntactic structures. Additionally, my proposal can easily be generalized to other forms of pied-piping, as it provides a uniform mechanism for specifier head agreement in grammars like Stabler’s minimalist grammars, and does not rely on any particular property of the *wh* constructions.

5.2 Problems

There are, however, a few problems with my proposal. First of all, it allows for some pied-pipings which never occur, like those in (15). This could be solved by having *-’s* select a non-pied-pipable DP. Although that’s not particularly illuminating. I believe that there are some dialects of English which allow exactly this, so perhaps it is not tragic; also, this could be viewed as a (phonological) requirement of the *-’s* morpheme—that it cannot be preceded by an empty category.

(15) For example: *a man [whose mother] you killed _____’s lover. (with the reading that it was the lover, not the mother, who was killed).

Another inconvenience of this proposal is that it involves some very complicated structures. Most of these extra layers (e.g., “specificity phrase” and “locative phrase”) are there just to provide enough

space for the overt movement of a complement to a specifier can be hidden by further movements. Either we must redefine our notion of the major categories: i.e., “locP” which dominates LOCATIVE PPs, or we must accept that our traditional categories are not headed by what we traditionally think as being their heads (like putting ‘the’ as the head of a specificity projection instead of the head of the DP).

It makes difficult an explanation for the facts with coordination, as shown in (16). If the by-phrase is part of a constituent that properly contains a noun phrase, we would expect the conjunction of two nPs to contain two NPs, as in (17). There used to be something called “equi-NP-deletion” which would be the correct target for my analysis to generate (16). Also, VP-ellipses—the deletion of a VP in a coordinated structure that contains two or more identical VPs—is still used in much of today’s theories, so this can be described as an instance of NP ellipses. Because nP dominates NP, it is not affected by the deletion of NP, allowing for bare “by-phrases” like (16) under coordination. This is only a partial solution because Stabler’s grammars do not have a mechanism for this kind of ellipses.

(16) I read articles by Noam and by Baker.

(17) I read articles by Stabler and articles by Kobele.

6 Conclusions

The proposal in this paper is nothing if not controversial. It does, however, provide an account of problematic pied-piping facts that are otherwise unexplained. With further refinement, I believe that it is flexible enough to overcome most of its shortcomings. This flexibility, however, may be its greatest weakness. It gives no account of what constituents can be a target for pied-piping, it only tells us what pied-piping targets must be like. Perhaps a theory like Chomsky’s “*Derivation by Phase*” can give an account like “only phases can be targets for pied-piping.” In any case, the possibilities for pied-piping vary across languages, so pied-piping behaviors must be tied to some linguistic parameter, whether or not that parameter has effects outside of pied-piping or not.

7 References

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