PP as a Bounding Node

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In his valuable study of syntactic islands, Ross(1967)
first noted that rightward movement rules are "upward bounded"
in the sense that the elements which undergo the movement rule
cannot move more than one S-node up from their point of origin.
The effect of this constraint can be seen in the ungrammaticality
of (3), with (1) as the source:

(1) That that John was a fool was obvious surprised me.
(2) That it was obvious that John was a fool surprised
me.
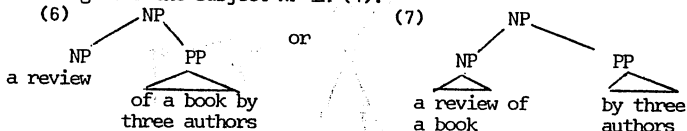*(3) That it was obvious surprised me that John was a fool.

In sentence (2), the S "that John was a fool" has
been moved to the end of the matrix sentential subject by the
rule of extraposition. The ungrammaticality of (3) results
from the application of the rule in such a fashion as to move the
clause more than one S-node up from its point of origin, in
violation of Ross's constraint.

In a refinement of Ross's constraint, Akmajian (1975)
notes that NPs also define bounding domains. Akmajians's
examples concern the rule of extraposition of PP, which relates (4)
and (5):

(4) A review of a book by three authors appeared.
(5) A review of a book appeared by three authors.

Sentence (4) is ambiguous, depending on which NP the
PP "by three authors" modifies. That is, there are two possible
bracketings for the subject NP in (4):

(6)   NP   (7)   NP
      /   \   or   /   \
    NP   PP   NP   PP
  a review   /\   /\   /\
            of a book by   a review of   by three
            three authors   a book   authors

However, as Akmajian notes, (5) is unambiguous,
corresponding only to the bracketing shown in (7), rather
than the one shown in (6), so that (5) can mean only that the
review was by three authors, rather than the book being by three
authors. As Akmajian observes, this extension of Ross's constraint
to NPs falls out of Chomsky's (1973) principle of subjacency, if
one postulates NPs as cyclic nodes. Chomsky's principle rules
out involvement of constant factors in a rule over non-adjacent
cycles.

Bresnan (1977b) attempts to provide an alternative to subjacency by postulating a constraint which she dubs the "complex phrase constraint". This constraint asserts that in the configuration (8):

(8)

$$
\begin{array}{c}
C \\
\diagup \diagdown \\
A \quad B
\end{array}
$$
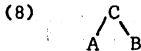
where C is a cyclic node and A is a lexical head, B cannot be analyzed with respect to any rule.

In the remainder of this paper, I will present evidence that prepositional phrases should be analyzed as cyclic nodes for the purposes of either subjacency or the complex phrase constraint. This analysis, then, is neutral between Chomsky's framework and Bresnan's. In section II, I present three arguments from English and one from French for analyzing PP as a bounding node. In section III, I argue that the identification of PP as a cyclic node forces a particular analysis of prepositional phrases which has strong independent motivation. Section IV presents an argument that bounding must be defined on rules of construal (Hale,1976) rather than purely syntactic rules.

II. ARGUMENTS FOR PP AS A BOUNDING NODE

The first argument for PP as a bounding node concerns the fact that extraposition from NP does not operate when the NP is dominated by a PP:

(9) In which magazine which was lying on the
    table did you see it?
*(10) In which magazine did you see it which was
    lying on the table?
(11) Which magazine did you see it in which was
    lying on the table?

The ungrammaticality of (10) would follow from sub-jacency, if PP and NP were both analyzed as cyclic nodes, since extraposition of the relative would have to move it over two cyclic nodes. It would also follow from the complex phrase constraint if PP were a cyclic node representing C in the schema in (8), P representing A as the lexical head, and B in this case being the entire complex noun phrase.

The second argument concerns the rule of subdeletion (Bresnan 1975; 1977a, b). This rule deletes, among other things, QPs which are left branch modifiers of $\bar{X}$ categories. Its effect can be seen in (12):

(12) John reads more of Shaw's plays than he ever
    reads ___ of Hardy's novels.

If, in Bresnan's framework, PP is analyzed as a cyclic node with P as a lexical head, my hypothesis predicts that sub-deletion cannot occur in the object of a preposition. In fact, this prediction is borne out:

*(13) John has worked in more villages than he's
      studied in ___ cities.
(14) John has studied in more cities than he's
      worked in.
The reason that (14) is good is that the entire NP,
which corresponds to the node labelled B in the configuration
in (8), is deleted by comparative deletion, not subdeletion. In
other words, B is not "looked into" but is deleted as a whole.
Again, I would emphasize that this analysis can be trivially
reformulated in Chomsky's framework, just so long as PP remains
a bounding node.
      Another argument concerns George Horn's (1974) NP
constraint. Horn's constraint, which is supposed to subsume the
Complex NP constraint, states that nothing can move out from
under the domination of an NP. Among the crucial data that
motivated this constraint is the following contrast:
(15) John destroyed a book about Nixon.
(16) John wrote a book about Nixon.
*(17) What did John destroy a book about?
(18) What did John write a book about?
      Horn demonstrates convincingly that the contrast
between (17) and (18) correlates with the fact that the sequence
"a book about Nixon" is a (NP) constituent in (15) but not in
(16). In other words, one cannot extract out of a PP dominated
by NP. Notice that this fact also falls out of the independently
motivated principle of bounding, with PP as a bounding node.
Therefore, the NP constraint is simply a derivative of bounding,
which is a more general explanation, and hence to be preferred.
      The fourth argument concerns some facts pointed out to
me by Richard Kayne (1975). As Kayne (1975) notes, French does not
observe Ross's (1967) left branch condition. Thus, (19), formed
from (20), is grammatical:
(19) Combien avez-vous vu d'hommes?
(20) Vous avez vu combien d'hommes?
      Bresnan (1976), following Grosu(1974), argues that the
left branch condition is not a unitary constraint, but rather falls
out from the way that rules are formulated. Thus, the rule of
wh-movement for French would have the following structural
description:
(21)   wh([_{NP}   _{NP}])
      This assumes that partitive phrases are NPs, a position
argued for for English in Baltin (1977). The NP parenthesized
in (21) would be a context predicate in the sense of Bresnan (1976).
Under her relativized A-over-A principle, one maximizes target
predicates, or constant factors actually operated on by a trans-
formation, only relative to context predicates, which simply
trigger the application of the rule in question. Thus, one can

wh-move a left branch QP in French because one maximizes it relative
to the partitive phrase which follows it within the noun phrase.
However, one cannot wh-move in this fashion when the QP is the
left branch of the object of a preposition:

*(22) Combien avez-vous danse avec de femmes?

The ungrammaticality of (22), again, follows from
postulating PP as a bounding node for French, again with
PP fulfilling the function of C in (8), the P fulfilling the
function of A, and the NP dominating the QP fulfilling the
function of B. Subjacency would handle these facts simply by
postulating PP and NP as cyclic nodes, so that any extraction out
of the object of a preposition would violate subjacency.

III. ON THE INTERNAL STRUCTURE OF PP

In Jackendoff (1973), the following base rule is
postulated:

(23) PP ⟶ P PP

This expansion for PPs, according to Jackendoff, is
instantiated by the following examples:

(24) Harpo rode the horse out of the barn.

(25) Sam disappeared down into the barn.

(26) A great howl of pain emerged from inside the
     rain barrel.

If the hypothesis about PP as a bounding node is correct,
then Jackendoff's structure for these examples predicts that wh-
movement out of the most deeply embedded objects will be impossible
by either subjacency or the complex phrase constraint. To see
this, consider the configuration (27):

(27)

$$PP_1$$

P $$PP_2$$

$$P_1$$ wh
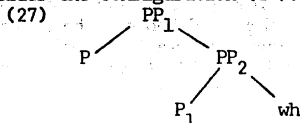
PP will be the relevant cyclic node, P its lexical head,
and PP the adjunct which fulfills the function of B in the 2
schema in (8). Therefore, given that B cannot be analyzed,
wh-movement should not be able to apply in this configuration.
The results, however, are mixed:

(28) What did Harpo ride the horse out of?

(29) What did Sam disappear down into?

*(30) What did a great howl of pain emerge from inside?

I think that (28) and (29) are perfectly good, an
apparent problem for the theory presented here. Nevertheless, I
think that there is good evidence, in fact, for saying that the
underlined PPs are not instances of the structure in (27).
Hendrick (1976) argues for the following base rules:

(31) (a) P" [$_{Spec}$ P"   ] P'

   (b) [Spec P']   right P'
                    straight

   Among Hendrick's diagnostics is the observation that
the intensifier right, which is a specifier of prepositions, cannot
always occur between the first and second preposition, a fact
which would be incompatible with base rule (27) but would fall right
out of the base rules in (31):
   (32) Harpo rode the horse right out of the barn.
   (33) Sam disappeared right down into the darkness.
   *(34) Harpo rode the horse out right of the barn.
   *(35) Sam disappeared down right into the darkness.
      Notice, however, that one gets different results
with (26):
   (36) A great howl of pain emerged from inside
the rain barrel.
      I would claim, then, that both structures exist, and
that the underlined PPs in (24) and (25) are instantiations of
(31), while the PP in (26) is an instantiation of (27). Another
diagnostic can be provided by the fact that where functions as
a Pro-PP, evidence for which is provided by Emonds (1972).
Therefore, if (27) were the correct base rule in all cases, if
we were to replace the sequence after the first preposition in
(24-26) by where, in all cases we would expect grammaticality.
Testing the prediction, we find:
   *(37) Where did Harpo ride the horse out?
   *(38) Where did Sam disappear down?
   (39) Where did a great howl of pain emerge from?
      These facts, if correct, support the postulation of
both structures, (27) and (31), in the grammar. The hypothesis
that PP is a bounding node predicts, however, that wh-movement
will only be possible out of the NP object in (31), and not in
(27). The results seem to support this. Another example of
(27) would be the PP in (40):
   (40) A rabbit appeared from under the rock.
   (41) A rabbit appeared from right under the rock.
   (42) Where did a rabbit appear from?
   *(43) What did a rabbit appear from under?
      Thus, the postulation of PP as a bounding node makes
predictions about the internal structure of prepositional phrases
which are borne out by independent tests.
IV. ON WHAT OBEYS BOUNDING
      In this section, I will suggest that rules of construal
(Hale 1976), rather than purely syntactic movements, are constrained
by bounding. As an example of a rule of construal, consider the
following:

(44) Mary is so hungry that she'd eat anything.
(45) John is too angry to do anything.
     It is obvious that there is a relationship between the degree word and its complement. This relationship is evidenced by the fact that these complements are selected by the choice of degree word, so that" so" selects finite complements, and "too" selects infinitivals, and also by the fact that these complements must co-occur with degree words:

    *(46)Mary is so hungry to eat anything.
    *(47) Mary is too angry that she would do anything.
    *(48) Mary is hungry that she would eat anything.
    *(49) John is angry to do anything.

     Given this dependence of the complement on the degree word, the natural assumption to make would be that they are co-generated under the same node an an extraposition rule would move the complement clause to the end of the sentence. However, Liberman (1974) and Andrews (1974) have shown that this assumption is incorrect, and that these complements of degree words (which include comparatives) must be base-generated in final position. Therefore, to capture the dependency facts noted above, one must posit a semantic rule of construal, which associates the complement with the degree word. Now, we can show that this rule of construal must obey bounding:

    *(50) People with so many problems were calling on
        John that he had to close his door.
    (51) So many people with problems were calling on
        John that he had to close his door.
    (52) People with so many problems that they couldn't
        function were calling John.
    *(53) People with so many problems were calling John
        that they couldn't function.

     Obviously, if the rule of construal is of the form in (54):

(54) [$_{DET}$] -X- [$_{S}$]

this notation telling one to associate the S and Det as a kind of "semantic constituent" at the level of logical form, PP as a bounding domain will block this rule from applying, since the Det in this case is properly within the domain of B in the schema of (8) for the purposes of Bresnan's complex phrase constraint, or in a non-adjacent cycle for the purposes of subjacency. Therefore, bounding must be defined on rules of construal.

V. <u>IMPLICATIONS</u>
     This paper, in its conception of bounding, has been quite willing to view this concept as being represented by either Bresnan's complex phrase constraint or Chomsky's subjecency condition. Within Chomsky's framework, however, there is a

necessary consequence which is not present in Bresnan's, as
pointed out to me by Amy Weinberg. If PP is considered to be a
bounding node for the purposes of subjacency, then S, as distinct
from S̄, cannot be. The reason is that if S were a bounding node,
Chomsky would predict, contrary to fact, that it would be impossible
to wh-move the object of a preposition and strand the preposition.
To see this, consider (55):

(55) Who did you buy this for?
which would have the structure
shown in (56) prior to wh-movement:

(56)
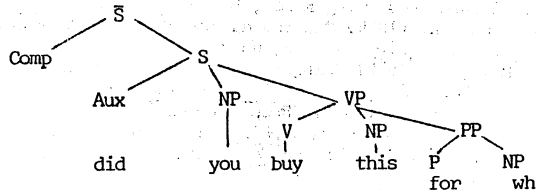
One must do wh-movement only after the Comp is able
to be analyzed by the rule. Given this, if both S and PP were
considered as bounding nodes for the purposes of subjacency, it
would be impossible for wh-movement to analyze the object of a
preposition, since the rule would be looking at non-adjacent cycles.
Bresnan's constraint, however, would be perfectly compatible with
identifying S as a bounding node, since she does not define bounding
by the counting of nodes, but rather by the notion of cyclic
nodes with lexical heads. Thus, if evidence is presented that
S is a bounding node, a testable prediction can be made to
compare the two conceptions of bounding.

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