On Pied-Piping:
Functional and GB Approaches

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Approaches. *Linguistics* 4, 45-55. The purpose of this paper is to study
the Pied-piping sentences of the preposition together with wh-expression
and to compare functional and GB approaches on the Pied-piping sentences.
To explain the Pied-Piping sentences, Ross proposes the Sentential Subject
and the Pied-Piping Condition and Chomsky suggests the Subjacency
Condition in the GB frameworks, and Kuno insists the Clause Non-final
Incomplete Constituent Constraint in the functional approach. I analysis
Ross's and Chomsky's explanations and present some problems on the
Pied-piping sentences. I try to solve their problems with Kuno's
Clause-Nonfinal Incomplete Constituent Constraint of the functional
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1. Introduction

In generative Grammar, the movement of a preposition with the
Wh-expression to the front of the clause is called "Pied-Piping."[1]
Pied-piping of the preposition can be moved together only with the
Wh-expression.

To explain Pied-piping sentences, Ross(1967) hypothesizes that
Pied-piping of a preposition is optional in nonsubject position and he

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[1]Postal(1971) defines the function and scope of Pied-piping sentences as
follows.

  (i) It is a functional property of some transformational rules that they operate
     on the proper analyses of phrase makers in such a way as to reorder not
     an NPa mentioned in some term T of the proper analysis but rather
     some NP in the phrase maker which dominates NPa
  (ii) Pied-Piping Scope
     Those rules which manifest this property are characterizable by the
     condition X and operate in the class of context Y.

suggests the Subject Conditions such as the Sentential Subject Constraint and the Pied-Piping Condition. In the framework of *Barriers*, Chomsky(1973, 1986) explains Pied-piping with the Subjacency Condition, movement cannot cross more than one barrier. Kuno(1973, 1992) insists the *barriers* framework cannot explain the extraction of an element from a subject. So he proposes the Clause-Nonfinal Incomplete Constituent Constraint in the functional approach framework to explain the acceptability or unacceptability of the Pied-piping sentences.

I survey Ross's, Chomsky's, and Kuno's approaches and point out some problems of Ross's and Chomsky's explanations. I show that Kuno's functional approach can solve these problems to explain the Pied-piping sentences.

2. Pied-Piping: functional and GB approaches

2. 1. Ross's approach by the Sentential Subject Constraint and
the Pied-Piping Condition

On the extraction of subject, Ross(1967: 133-134) suggests the Sentential Subject Constraint and the Pied Piping Condition.
Notice the following sentences:

(1) a. The reporters expected that the principal would fire some
teacher.
   b. That the principal would fire some teacher was expected by
the reporter.
   c. It was expected by reporters that the principal would fire
some teacher.

The sentences (1b, c) are the passives of (1a). Noun phrases in the *that*-clause of (1a) and (1c) can be relativized but noun phrase in *that*-clause of (1b) cannot be relativized as (2b) shows.

(2) a. The teacher who the reporters expected that the principal
would fire is a crusty old battleax.
   b. * the teacher who that the principal would fire was expected

by the reporters is a crusty battleax.

c. The teacher who it was expected by the reporters that the principal would fire is a crusty old battleax.

In order to explain the above (1) and (2) sentences, Ross proposes the Sentential Subject Constraint: No element dominated by an S may be moved out of that S if that node S is dominated by an NP which itself is immediately dominated by S.

In (1a), that *the principal would fire some teacher* is an [S]NP that immediately dominated by VP. In (1c), the extraposed clause is presumably not dominated by NP. So, it is possible to move *some teacher* out of these clauses, as found to be grammatical in (2a, c). On the other hand, in (2b), the same clause is an [S]NP that is immediately dominated by S. Thus it is not possible to move *some teacher* out of this clause, as found to be ungrammatical in (2b).

Observe the following sentence (3):

(3) Of which cars were the hood damaged by the explosion?

This sentence is grammatical. Ross concludes that this constraint could not be generalized to subject noun phrase.

Notice further that in (4):

(4) a. Which cars did the explosion damage the hood of ?

b. * Which cars were the hood of damaged by the explosion?

It can be seen that in converting (4a, b) to (3), *of which cars*, a subconstituent of the subject of (4a), has been moved to the front of the sentence, but (4b) has not been moved because it is ungrammatical.qs[2] So Ross suggests the following constraint.

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[2]According to Bresnam(1977: 165, by P. W. Culicover, T. Wason, and A. Akmajian edt.), The Wh-movement rule can move phrases superordinate to the Wh-pronoun, by so-called "obligatory Pied-Piping" convention. We see the following sentences.

(1) I asked [Q there was how large a percentage of men] -->
I asked how large a percentage of men there was.

(5) Pied-Piping Condition

Pied piping is obligatory in the environment [P——]NP where the prepositional phrase is dominated by an NP which is immediately dominated by S.

There is a difference in the sentence (2b) and the sentence (4b). The subject of the sentence (2b) is a sentence, while the subject of the sentence (4b) is only a phrase. Therefore the sentence (2b) is ruled out by a violation of the Sentential Subject Constraint and the subject of (4b) is ruled out by the Piped Piping Condition. But Kuno(1972, 1993) points out there are many difficulties with the Sentential Subject Constraint and the Pied Piping Condition as given above.

Observe the following sentences:

(6) a. Learning the spelling of some words is difficult.

b. * Which words is learning the spellings of difficult ?

c. ? Of which words is learning the spellings difficult?

Learning the spellings of some words in (6a) is a sentential subject. Therefore, the Sentential Subject Constraint should rule out (6c) completely ungrammatical. However, (6c) proves out acceptable. It seems clear to all that (6c) is considerably better than (6b). So Ross's Sentential Subject Constraint can't explain (6c).

2. 2. Chomsky's approach by the Subject Condition

Chomsky(1986) has defined the notion barrier. In the framework of *Barriers*, the Subject Condition is explained by the Subjacency Condition. The definition of barrier and Subjacency Condition is as follows.

(7) A is a barrier for iff (a) or (b)

(a) A is a maximal projection and A immediately dominates C,

The entire noun phrase including *a percentage of men* is "Pied-Piping" along with how large, into interrogative position.

C is a BC(blocking category) for B;

   (b) A is a BC for B, A is not IP.

(8) Blocking Category

   C is a BC for B iff C is not L-marked and C dominates B.

(9) L-marking

   A L-marks B iff A is a lexical category that theta-governs B.

(10) Subjacency Condition

   Movement cannot cross more than one barrier

Let's see the following sentences.

(11) a. *[CP Which car$_i$ [C' was [IP[NP the hood of e$_i$] damaged]]]?

    b. * The man who$_i$ [IP[NP pictures of e$_i$] are on the table.

In (11a, b) the embedded subject NP is not L-marked because its sister node is I', not a lexical category. Therefore, this NP is a BC and a barrier. Futhermore, IP inherits barrierhood from NP. Thus the extraction exhibited in (11a, b) crosses two barriers and the sentences violate the Subjacency Condition. The sentences (11a, b) are found to be ungrammatical.

Observe the following structures which are acceptable, as the same in (3) and (4a):

(12) a. [CP Which car$_i$ [C' did [IP you [VP e$_i$' [VP damage [NP
      the [N' hood [PP of e$_i^o$]]]]]]]]?

    b. [CP Of which car$_i$ [C' did [IP you [VP e$_i$'[VP damage [NP
      the [N' hood e$_i^o$]]]]]]]?

In (12a), PP is L-marked by the noun *hood* and NP is also L-marked by the verb *damage*. Therefore they are not barriers. The lower VP segment is a barrier for e$_i^o$ but it does not exclude e$_i^{l3}$ and therefore it

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[3]Exclusion(Chomsky, 1986: 9)

  (i) --- δ --- [$_\tau$ α [$_\tau$...β...]]

  (ii) α excludes β it no segment of α dominates β.

In (i) T does not exclude α, but α excludes T and δ excludes and is excluded

does not consider as a barrier for the purpose of subjacency. The movement from e_i^0 to e_i^1 does not violate the Subjacency Condition. The movement from e_i^1 to *which car* does not cross any barrier, because the higher VP is not a BC as one of the VP segments(i.e. the lower VP) does not dominate e_i^1, and because IP, a defective category, is not a barrier by itself. Thus (12a) does not violate the Subjacency Condition, and the sentence of acceptability results. The sentence (12b) is explained in the same manner, that is, in (12a, b), the initial trace is θ -governed, and the intermediate trace is antecedent-governed, thereby satisfying the ECP.[4]

As far as the above explanation is concerned, the *Barriers* framework seems to be able to account for the examples without requiring the Subject Condition. However it cannot account for the contrast between (13a) and (13b).

(13) a. * [CP Which car$_i$ [C' was [IP[NP the hood of e_i] damaged]]]?
     b. [CP Of which car$_i$ [C' was [IP[NP the hood e_i] damaged]]]?

In (13a), the embedded subject NP is a barrier, and its barrierhood is transmitted to IP. So the sentence (14b) is unacceptable. However, exactly the same situation holds with respect to (13b) as well; NP is a barrier since its sister node is I', and IP inherits barrierhood from NP. Therefore, two barriers are crossed, resulting in subjacency violation. The sentence is incorrectly predicted to be unacceptable.

The *barriers* framework predicts that extraction of an element from a subject is always impossible, but this is not necessarily the case.

Observe the following sentence (14) which is perfectly acceptable:

(14) This is something which$_i$ for you to try to understand e_i would be futile. (Kuno 1992: 43)

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by both α and Τ : δ is entirely disconnected from α, Τ.
[4]Empty Category Principle: ECP(Chomsky, 1986: 17)
Traces must be properly governed.
A properly governs B iff A theta-governs B or antecedent-governs B.

(i) A theta-governs B iff A governs B and A theta-marks B.
(ii) A antecedent-governs B iff A governs B and A is co-indexed with B.

In the *Barriers* framework, (14) has the following structure;

(15) This is something which; [IP[CP for you to try to understand
    e;] would be futile.

In (15), the embedded CP is a barrier because its sister node is I',
which is not a zero level category, and IP inherits barrierhood from CP.
Therefore two barriers are crossed and a subjacency violation should
result. So the sentence (14) is incorrectly predicted to be unacceptable.
This shows that the *Barriers* framework fails to offer a convincing
explanation for extraction from subject.

2. 3. Kuno's approach by Clause-Nonfinal Incomplete Constituent Constraint

Kuno(1972, 1992) attempts to show that the phenomena Ross observes
are not restricted to the subject position and proposes that the concept
of "Clause-final" or "Nonfinal" position plays a more important role than
the concept of "Subject" or "Non-Subject" position.

These phenomena can be accounted for if we replace the Sentential
Subject Constraint and the Pied Piping Condition with Kuno's
Clause-Nonfinal Incomplete Constituent Constraint.

(16) Clause-Nonfinal Incomplete Constituent Constraint:
    It is not possible to move any element of phrase/clause A in the
    clause-nonfinal position out of A if what is left over in A
    constitutes an incomplete phrase/clause. (1992: 43)

A phrase/clause is incomplete if an obligatory elements is missing in
the sense that it is not phonetically realized. Thus, [pp P e] pattern is
incomplete because the object of the preposition is missing. The [vp Vt
e] pattern is likewise incomplete because the object of a transitive verb
is missing.

The above constraint can automatically account for the contrast
between (17) and (18).

(17) a. Which car$_i$ did you damage the hood [of e$_i$]?
   b. [Of which car]$_i$ did damage the hood e$_i$?
(18) a. * Which car$_i$ was the hood [of e$_i$] damaged?
   b. [Of which car]$_i$ was the hood e$_i$ damaged?

In (17a) the prepositional phrase [pp *of* e$_i$] constitutes the smallest incomplete phrase. But this incomplete phrase appears in the Clause-final position. Hence, the sentence does not violate the Clause-Nonfinal Incomplete Constituent Constraint. In (17b) *the hood* has no obligatory element missing. Therefore, the constituent is not applicable, and the sentence is acceptable. In contrast, (18a) violates the Clause-Nonfinal Incomplete Constituent Constraint because the prepositional phrase [pp *of* e$_i$], an incomplete phrase appears in the Clause-Nonfinal position because the object of the preposition *of* is missing. So (18a) is unacceptable. (18b) is acceptable because it does not have an incomplete constituent. The incomplete phrase [*of* e$_i$] appears clearly at the clause-final position and therefore the Clause-Nonfinal Incomplete Constituent Constraint predicts that the sentence should be acceptable.

Similarly, observe the contrast in acceptability between (19a) and (19b):

(19) a. He is the person [of whom]$_i$ pictures e$_i$ are on the table.
   b. * He is the man who$_i$ pictures [of e$_i$] are on the table.
   (*Barriers*, 1986: 32)

(19a) does not violate the Clause-Nonfinal Incomplete Constituent Constraint because it does not have an incomplete phrase. In contrast, (19b) violates the constraint because [*of* e$_i$], an incomplete phrase, appears in clause-nonfinal position.

The Clause-Nonfinal Incomplete Constituent Constraint makes predictions that are different from the ones that Ross's Subject condition and the *Barriers* framework make with respect to sentences which contain incomplete phrase in nonsubject but clause-final position.

Observe the following sentences:

(20) a. * What$_i$ did you give a picture [of e$_i$] a finishing touch?

b. * Who$_i$ did you explain [to e$_i$] that money doesn't grow on trees?

The above sentences do not involve extraction from subject position, and therefore Ross's Subject Condition is inapplicable. In the *Barriers* framework, the PP dominating [of e$_i$] in (20a) is L-marked by the N *picture*, and therefore is not a barrier. The NP dominating [a *picture of* e$_i$] is also L-marked by the verb *give*, and it, is not a barrier, too. Since the sentence does not violate either Subjacency or the ECP, It is incorrectly predicted to be acceptable. In (20b), since PP is L-marked by the verb *explain*, there is no violation either of Subjacency or of the ECP. Therefore, the *Barriers* framework predicts, incorrectly, that the sentence should be acceptable. To solve the above the problems, Kuno(1992) suggests that the Clause-Nonfinal Incomplete Constituent Constraint can account for the unacceptability of these sentences, because they contain an incomplete phrase, i.e., [pp *to* e$_i$], in clause-nonfinal position.

Let's observe whether The Clause-Nonfinal Incomplete Constituent Constraint can account for the acceptability of (15) without any difficulty or not:

(15) This is something which$_i$ [IP[CP for you to try to understand e$_i$] would be futile.

In the above structure, [VP *understand* e$_i$] is an incomplete phrase because it has the object of the transitive verb *understand* missing. However, this incomplete phrase appears in the final position of the clause [*for you to try to understand* e$_i$]. Therefore, the structure does not violate the Clause-Nonfinal Incomplete Constituent Constraint. So the sentence (15) results in the acceptability.

Kuno suggests the proposed constraint cannot account for the unacceptability of sentences such as (21), which has often been attributed to Ross's Sentential Subject Constraint: No element dominated by an S may be moved out of that S if that node S is dominated by an NP which itself is immediately dominated by S.

Let's see the following sentences .

(21) a. * Who$_i$ did [that Mary kissed e$_i$] bother you?
b. * Who$_i$ was [that Mary went to the concert with e$_i$] expected by John?
(14) This is something which$_i$ for you to try to understand e$_i$ would be futile.

According to Ross's Sentential Subject Constraint, (21) are correctly predicted to be unacceptable, because extraction has taken place from a sentential subject. But according to Kuno(1994) explanation, the same constraint incorrectly predicts that the sentence (14) should be unacceptable. In the *Barriers* framework, the sentences (21a, b) are correctly predicted to be unacceptable, because the CP dominating the *that*-clause is not L-marked and therefore constitutes a barrier against extraction. Moreover, the IP above it inherits barrierhood, and the extraction shown in (21) crosses two barriers, violating Subjacency. However, this framework, too, incorrectly predicts that (14) should be unacceptable. In contrast, the situation is reversed for the Clause-Nonfinal Incomplete Constituent Constraint, because it correctly predicts that (14) should be acceptable.

3. Conclusion

In this paper, I have analyzed Ross's, Chomsky's, and Kuno's approaches to explain the Pied-piping sentences of preposition moved together with the wh-expression. In GB approach, Ross suggests the Sentential Subject Constraint and Chomsky proposes the Subjacency Condition. However Ross's and Chomsky's approaches have some problems. To solve these problems, I have admitted Kuno's functional approach. I have showed the Pied-piping sentences can be explained by Kuno's Clause-Nonfinal Incomplete Constituent Constraint.

References

Allen, L. C. 1980. *Topics in Diachronic English Syntax.* Garland Publishing, Inc.

Baldwin, M. 1982. "A Landing Site Theory of Movement Rules," *Linguistic Inquiry* 13, 1-38.

Chomsky, N. 1977. "On wh-movement," in Culicover et all, eds.

Chomsky, N. 1980. "On binding," *Linguistic Inquiry* 11(1),   .

Chomsky, N. 1981. *Lectures on Government and Binding.* Foris Publication.

Chomsky, N. 1986. *Barriers.* Cambridge, Mass.: The MIT Press.

Culicover, P. W., T. Wason and A. Akajiman, eds. 1976. *Formal Syntax.* Academic Press, Inc.

Kuno, S. 1973. "Constraints on Internal Clause and Sentential Subjects," *Linguistic Inquiry* 4, 363-385.

Kuno, S. 1987. *Functional Syntax: Anaphor, Discourse and Empathy.* Chicago: The University of Chicago Press.

Kuno, N and Ken-ichi Takami. 1992. *Functional Syntax and GB Theory.* Hanguk Munhwasa.

McCawley, J. D. 1998. *The Syntactic Phenomena of English,* Vol. 2. The Univ. of Chicago Press.

Lasink, H. and M. Saito. 1992. *Move-a: Conditions on Its Application and Output.* Cambridge, Mass: The MIT Press.

Haegeman, L. 1991. *Introduction to Government & Binding Theory.* Basil Blackwell.

Lizzi, L. 1990. *Relativized Minimality.* Cambridge, Mass.: The MIT Press.

Postal, Paul M. 1971. *Cross-Over Phenomena.* New York: Holt, Rinehart and Winston.

Radford, A. 1988. *Transformational Syntax: A First Course.* Cambridge: Cambridge Univ. Press.

Ross, J. 1967. *Constraints on Variables in Syntax.* Doctoral dissertation, MIT.

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