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Prepositional Phrase Extraposition

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1. The Existence of the Rule. In this paper it will be assumed that there exists in English a rule of Prepositional Phrase Extraposition, henceforth to be abbreviated as PPEX. The effect of PPEX is to move PP's which are dominated by the node NP rightward to the end of their clauses. PPEX operates on sentences such as (1-3)a to produce (1-3)b:

- (1)a. A book about the lexicalist hypothesis was sitting on the table.
- b. A book was sitting on the table about the lexicalist hypothesis.
- (2)a. A riot over Ky's appearance occurred in Ithaca last year.
- b. A riot occurred in Ithaca last year over Ky's appearance.
- (3)a. A lecture on musical syntax was delivered by Bernstein two years ago.
- b. A lecture was delivered by Bernstein two years ago on musical syntax.

The motivation for PPEX consists in the fact that the PP's found at the end of sentences like (1-3)b may only occur in that position if they can also occur to the immediate right of the subject of the sentence.¹ This point is illustrated by the following sentences, in which the subject has been changed so that it is unable to occur with the PP following it:

- (4)a.*A shovel about the lexicalist hypothesis was sitting on the table.
- b.*A shovel was sitting on the table about the lexicalist hypothesis.
- (5)a.*An event over Ky's appearance occurred in Ithaca last year.
- b.*An event occurred in Ithaca last year over Ky's appearance.

- (6)a.*A package on musical syntax was delivered by Bernstein two years ago.
 b.*A package was delivered by Bernstein two years ago on musical syntax.

If we have a rule of PPEX, the ungrammaticality of (4-6)b will be accounted for, because their source sentences, (4-6)a, are also ungrammatical.

It is possible, however, that there is no rule of PPEX, and that sentences such as (1-3)b are accounted for instead by an interpretive rule. Under this proposal, the PP's found at the end of sentences (1-3)b would be generated in this position by the base rules. The proposed interpretive rule would then examine the NP's of the sentence to find one which the PP could apply to. If no such NP is found, then the sentence is ungrammatical.

Presently, I have no evidence to decide between the two theories. For purposes of exposition only, I will refer to PPEX as a syntactic rather than an interpretive rule, assuming that any constraint found which blocks the application of PPEX may alternatively be regarded as a constraint preventing the interpretive rule from linking the clause-final PP to a head noun.

It has been suggested by Jorge Hankamer that there is no rule of PPEX, and that (1-3)b are instead generated by the application of Relative Clause Extrapolation (often called Extrapolation from NP), followed by the operation of Whiz-Deletion, as in the following example:

- (7)a. A book which was about primeval echinoderms was read by the class.
 b. A book was read by the class which was about primeval echinoderms.

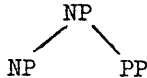
c. A book was read by the class about primeval echinoderms.

If this analysis is correct, then it must be the case that all PP's which may occur in extraposed position must also be able to occur in relative clauses of the form $\left\{ \begin{array}{l} \text{who} \\ \text{which} \end{array} \right\}$ be PP. But as the following examples show, this is not true:

- (8)a. A riot occurred last week over Hall's incompetence.
 b.?A riot which was over Hall's incompetence occurred last week.
- (9)a. A man was seen in the Square with six-inch fangs.
 b.*A man who was with six-inch fangs was seen in the Square.

These sentences show that there are at least some instances in which a separate rule of PPEX is required. They do not show, of course, that the derivation suggested by Hankamer may never occur.

2. The Subject of the Source Sentence. In English, there are an enormous number of expressions which have the structure



and thus may potentially be operated on by PPEX. Not all of these expressions, however, allow PPEX to work, as the following examples show:

- (10)a. A bottle of beer is sitting on the table.
 b.*A bottle is sitting on the table of beer.
- (11)a. An exit from this building is needed.
 b.*An exit is needed from this building.
- (12)a. An event of tremendous importance occurred last week.
 b.??An event occurred last week of tremendous importance.
- (13)a. Wines of Bordeaux were served at the party.

b.*Wines were served at the party of Bordeaux.

Some expressions which do allow PPEX to operate on them are attested in the examples below:

- (14)a. Proposals for qualifying exams were made last week.
b. Proposals were made last week for qualifying exams.
- (15)a. A man with six-inch fangs was seen in the Square.
b. A man was seen in the Square with six-inch fangs.
- (16)a. Atrocities against civilians were committed last week.
b. Atrocities were committed last week against civilians.
- (17)a. A picture of Edward Sapir hangs on the wall.
b. A picture hangs on the wall of Edward Sapir.

a book about the lexicalist hypothesis
(found in (1))
a riot over Ky's appearance
(found in (2))
a lecture on musical syntax
(found in (3))

I have not yet found a means of characterizing which NP-PP combinations do not allow PPEX to operate. It will be important later, however, to bear in mind that such expressions do exist, because the use of them might interfere when other phenomena involving PPEX are tested. For example, I will later claim that the predicate was read by the class always allows PPEX to operate across it, as it does in producing sentences such as (19):

- (19)a. A book about the early therapsids was read by the class.
b. A book was read by the class about the early therapsids.

A reader might object to this claim by citing the following example, in which PPEX may not operate even though the predicate is the same as in (19):

- (20)a. A book of stories was read by the class.
 b.??A book was read by the class of stories.

The problem with this objection is that the expression a book of stories may never be separated by PPEX, no matter what the predicate is:

- (21)a.*A book is sitting on the table of stories.
 b.*A book is circulating in the department of stories.
 c.*A book is coming into prominence of stories.
 d.*A book was reviewed by Auberon last week of stories.

A book about the early therapsids, on the other hand, may be separated by PPEX with many predicates in addition to was read by the class:

- (22)a. A book is sitting on the table about the early therapsids.
 b. A book is circulating in the department about the early therapsids.
 c. A book is coming into prominence about the early therapsids.
 d. A book was reviewed by Auberon last week about the early therapsids.

Furthermore, there are other NP-PP combinations which PPEX may separate when the predicate is was read by the class:

- (23)a. An article was read by the class on pre-Cambrian algae.
 b. Studies were read by the class in acoustic phonetics.
 c. A monograph was read by the class about the lesser uintatheres.

These facts all indicate that the reason why (20)b is ungrammatical is not that its predicate may not allow PPEX, but rather that PPEX cannot separate the NP and PP of its subject.

3. PPEX with Definite Subjects. In the great majority of cases, PPEX is unable to operate if the subject of the source sentence is definite. This is illustrated by the following sentences, which are the same as

(1-3) (to which PPEX can apply), except that their subjects have been made definite:

- (24)a. The book about the lexicalist hypothesis was sitting on the table.
 b.*The book was sitting on the table about the lexicalist hypothesis.
- (25)a. The riot over Ky's appearance occurred in Ithaca last year.
 b.*The riot occurred in Ithaca last year over Ky's appearance.
- (26)a. The lecture on musical syntax was delivered by Bernstein two years ago.
 b.*The lecture was delivered by Bernstein two years ago on musical syntax.

There are a few cases, however, in which PPEX is not blocked:

- (27)a. The key to the front door was found last week.
 b. The key was found last week to the front door.
- (28)a. The answer to your question has been found.
 b. The answer has been found to your question.
- (29)a. The formula for this sugar has been discovered.
 b. The formula has been discovered for this sugar.

The three sentences above are subject to dialect variation, with some speakers finding them deviant. I will discuss here only the dialect which finds them acceptable. The problem to be dealt with is why the definite subjects of sentences (27-29) behave in the same manner as indefinite subjects—that is, in allowing PPEX. The explanation which follows was suggested to me by Judith Aissen.

Consider first the conditions which must hold if the subject of any sentence is to be definite.

- (30) The book about the lexicalist hypothesis was sitting on the

table.

- (31) The riot over Ky's appearance occurred in Ithaca last year.
- (32) The lecture on musical syntax was delivered by Bernstein two years ago.

Sentences (30-32) are appropriate utterances only if the person listening to them knows in advance (either from prior discourse or from his own knowledge) what the referent of the book, the riot, or the lecture is. More generally, all definite noun phrases may be used only to refer to things whose existence the listener is already aware of.

When the head noun is indefinite, however, this is not the case.

- (33) Books about the lexicalist hypothesis were sitting on the table.
- (34) A riot over Ky's appearance occurred in Ithaca last year.
- (35) A lecture on musical syntax was delivered by Bernstein two years ago.

Sentences (33-35) are appropriate utterances even if the listener is not aware that the books or the riot or the lecture have existed.

Sentences (27-29), to which PPEX may apply despite their definite subjects, are repeated here for convenience:

- (27)a. The key to the front door was found last week.
- b. The key was found last week to the front door.
- (28)a. The answer to your question has been found.
- b. The answer has been found to your question.
- (29)a. The formula for this sugar has been discovered.
- b. The formula has been discovered for this sugar.

In these sentences, we find a strange phenomenon: they are appropriate even if the listener is unaware that the referents of the key, the answer, and the formula exist. Thus, despite their being syntactically definite,

the head nouns of (27-29) behave just as if they were indefinite.

This phenomenon provides us with an explanation for why the definite subjects of sentences (27-29) allow PPEX: PPEX is blocked whenever the listener already knows that the referent of the subject exists. Excluding the special cases under discussion, all definite NP's may be used only when the listener is familiar with their referents, and thus block the application of PPEX. All indefinite NP's do not require that the listener know that their referents exist; thus the constraint does not block the application of PPEX to them. The subject NP's of sentences (27-29) behave in the same way as indefinites: since they do not require that the listener know that their referents exist, PPEX may apply to them, too.²

4. The Predicates Allowing PPEX. There are many sentences to which PPEX is unable to apply, even when the NP-PP combination serving as the subject normally does permit PPEX. The following are examples of such sentences.

- (36)a. ?After the cops intervened, a riot over Ky's appearance broke up.
 b. *After the cops intervened, a riot broke up over Ky's appearance.
- (37)a. Studies in acoustic phonetics had a great influence in the 60's.
 b. *Studies had a great influence in the 60's in acoustic phonetics.
- (38)a. A book about social psychology is going out of style.
 b. ??A book is going out of style about social psychology.

An adequate theory of PPEX will have to predict which predicates will allow it to operate and which ones will block its application. I have no such theory, but offer here a set of facts which potentially could be used in the construction of one.

What I will show here is that the set of predicates allowing PPEX is, with a number of exceptions, the same as the set of predicates which allow the rule of There-Insertion (hereafter to be abbreviated as TI) to operate. In order to develop a predictive theory from this observation, two things must be done: the exceptions must be accounted for, and an explanation must be provided for why the two sets of predicates correspond. Some effort is made here to accomplish the first of these tasks; but the latter task remains to be accomplished.

In Milsark (1974), TI sentences are organized into the following groupings on the basis of the type of predicate they have:

NP be PASSIVE
 NP be PROGRESSIVE
 NP V X
 NP be ADJ
 NP be
 NP be LOCATIVE

Examples will be presented here in groups based on this classification.

4.1 Passive Predicates. There are many passive predicates which allow TI to apply. As the following examples show, these predicates also allow PPEX:

- (39)a. A proposal for a senior thesis was made last week.
 b. There was a proposal for a ~~senior~~ thesis made last week.
 c. A proposal was made last week for a senior thesis.
- (40)a. A key to the front door was found last week.
 b. There was a proposal for a ~~senior~~ thesis made last week.
 c. A proposal was made last week for a senior thesis.
- (41)a. Many atrocities against civilians were committed last year.
 b. There were many atrocities against civilians committed last year.

c. Many atrocities were committed last year against civilians.

- (42)a. A long lecture on the greater coelacanth was presented last week.
 b. There was a long lecture on the greater coelacanth presented last week.
 c. A long lecture was presented last week on the greater coelacanth.

A few passive predicates may be found which produce deviant results when they occur in TI sentences. These predicates also produce bad judgments with PPEX:

- (43)a. An article about the early thecodonts was intently read by the class last week.
 b.??There was an article about the early thecodonts intently read by the class last week.
 c.??An article was intently read by the class last week about the early thecodonts.

- (44)a. A model for speech recognition was discarded last week.
 b.??There was a model for speech recognition discarded last week.
 c.??A model was discarded last week for speech recognition.

- (45)a. A map of Luxemburg was ripped into shreds last week.
 b.??There was a map of Luxemburg ripped into shreds last week.
 c.??A map was ripped into shreds last week of Luxemburg.

4.2 Progressive Predicates. With most predicates in the progressive tense, TI is able to apply; in these cases, PPEX also may operate.

- (46)a. A man with six-inch fangs is running around the track.
 b. There is a man with six-inch fangs running around the track.
 c. A man is running around the track with six-inch fangs.

- (47)a. A riot over Ky's appearance is occurring outside.
 b. There is a riot over Ky's appearance occurring outside.
 c. A riot is occurring outside over Ky's appearance.

- (48)a. A monograph about discourse-conditioned rules is circulating in the department.
 b. There is a monograph about discourse-conditioned rules

- circulating in the department.
 c. A monograph is circulating in the department about discourse-conditioned rules.

As with passives, however, there are some progressive predicates which block TI. To an equal degree, these predicates block PPEX:

- (49)a. A book about the early trilobites is going out of style.
 b.??There is a book about the early trilobites going out of style.
 c.??A book is going out of style about the early trilobites.
- (50)a. Several proposals for qualifying exams were bothering me.
 b.??There were several proposals for qualifying exams bothering me.
 c.??Several proposals were bothering me for qualifying exams.
- (51)a. When I got there, a riot over Ky's appearance was slowly dispersing.
 b.*When I got there, there was a riot over Ky's appearance slowly dispersing.
 c.*When I got there, a riot was slowly dispersing over Ky's appearance.

4.3 Verbal Predicates. Milsark divides the predicates which allow TI but lack the word be into two groups, which he designates Inside Verbal and Outside Verbal. The groups differ in where the old subject of a TI sentence containing them must end up. With Inside Verbal predicates, the old subject immediately follows the verb; with Outside Verbals, it must occur at the end of the sentence.³ The following sentences illustrate this:

- (52)a. There began a riot out in the street.
 b.*There began out in the street a riot.
- (53)a. There came into the room an unhappy unicorn.
 b.*There came an unhappy unicorn into the room.

Inside Verbal TI sentences may occur only with a restricted set of verbs, among them being exist, begin, and ensue. These verbs also allow the application of PPEX:

- (54)a. A book about the Eohippus exists.
 b. There exists a book about the Eohippus.
 c. A book exists about the Eohippus.
- (55)a. A riot over Ky's appearance began.
 b. There began a riot over Ky's appearance.
 c. A riot began over Ky's appearance.
- (56)a. A lecture on the five-toed sloth ensued.
 b. There ensued a lecture on the five-toed sloth.
 c. A lecture ensued on the five-toed sloth.

Outside Verbal TI sentences may occur with a far wider range of predicates than Inside Verbals. Just which predicates allow Outside Verbal TI to apply is poorly understood; at present only rough semantic classifications may be made.

The first category of predicates allowing Outside Verbal TI describe the location of their old subjects, using verbs such as lie, sit and hang. These predicates allow PPEX to operate, too.

- (57)a. A book about pleistocene edentates lay on the floor.
 b. There lay on the floor a book about pleistocene edentates.
 c. A book lay on the floor about pleistocene edentates.
- (58)a. A portrait of Edward Sapir hangs on the wall.
 b. There hangs on the wall a portrait of Edward Sapir.
 c. A portrait hangs on the wall of Edward Sapir.
- (59)a. A man with six-inch fangs sat in the corner.
 b. There sat in the corner a man with six-inch fangs.
 c. A man sat in the corner with six-inch fangs.

Another class of predicates allowing Outside Verbal TI has the effect

of introducing the former subject onto the scene, either by describing its coming into view or its coming to the attention of the speaker. These predicates also allow PPEX to operate:

- (60)a. A train with 97 boxcars appeared over the horizon.
- b. There appeared over the horizon a train with 97 boxcars.
- c. A train appeared over the horizon with 97 boxcars.
- (61)a. A book about the Oligocene creodonts circulated in the department.
- b. There circulated in the department a book about the Oligocene creodonts.
- c. A book circulated in the department about the Oligocene creodonts.
- (62)a. A proposal for qualifying exams has come into prominence.
- b. There has come into prominence a proposal for qualifying exams.
- c. A proposal has come into prominence for qualifying exams.

In contrast to this last set of predicates are those predicates which describe the former subject's "going out of view" or "going out of existence." TI is unable to apply to these predicates, a fact first noted in Borkin et al. (197?). In addition, these predicates block PPEX:⁴

- (63)a. Two books about the theropod Gorgosaurus went out of print last year.
- b.??There went out of print last year two books about the theropod Gorgosaurus.
- c.??Two books went out of print last year about the theropod Gorgosaurus.
- (64)a. After the cops intervened, a riot over Ky's appearance simply broke up.
- b.*After the cops intervened, there simply broke up a riot over Ky's appearance.
- c.*After the cops intervened, a riot simply broke up over Ky's appearance.
- (65)a. A key to the front door fell into the sewer.
- b.??There fell into the sewer a key to the front door.
- c.??A key fell into the sewer to the front door.

Finally, there are the predicates which have direct objects: these completely block both TI and PPEX:

- (66)a. A book about the carnivorous pterodactyls bothered me yesterday.
 b.*There bothered me yesterday a book about the carnivorous pterodactyls.
 c.*A book bothered me yesterday about the carnivorous pterodactyls.

- (67)a. Studies in acoustic phonetics had a great influence in the 60's.
 b.*There had a great influence in the 60's studies in acoustic phonetics.
 c.*Studies had a great influence in the 60's in acoustic phonetics.

- (68)a. A man with six-inch fangs hit the volleyball.
 b.*There hit the volleyball a man with six-inch fangs.
 c.*A man hit the volleyball with six-inch fangs. (PPEX reading)

4.4 Adjective Predicates. According to Milsark (1974), the only adjective predicates which allow TI to apply are those denoting temporary states, as opposed to permanent properties. Thus the following sentences, which contain "property" adjectives, are completely out in their TI versions. The PPEX versions are correspondingly bad.⁵

- (69)a.?A book about the mesochippus was green.
 b.*There was a book about the mesochippus green.
 c.*A book was green about the mesochippus.

- (70)a.?A lecture on the evolution of monotremes was very long.
 b.*There was a lecture on the evolution of monotremes very long.
 c.*A lecture was very long on the evolution of monotremes.

Even adjectives denoting temporary states produce fairly deviant results when they occur alone in the predicate. This is true both for TI and PPEX:

- (71)a. ?Several books about the earlier Stegosauria were open.
 b. ??There were several books about the earlier Stegosauria open.
 c. ??Several books were open about the earlier Stegosauria.

- (72)a. A man with six-inch fangs was sick.
 b. ?There was a man with six-inch fangs sick.
 c. ?A man was sick with six-inch fangs.

But when a locative expression is added to the lone adjective, the result (for both TI and PPEX) becomes near-perfect:

- (73)a. A man with six-inch fangs was sick in the garden.
 b. There was a man with six-inch fangs sick in the garden.
 c. A man was sick in the garden with six-inch fangs.

- (74)a. Several books about the earlier Stegosauria were open on the table.
 b. There were several books about the earlier Stegosauria open on the table.
 c. Several books were open on the table about the earlier Stegosauria.

We see in these examples that TI is highly restricted in its application to adjective predicates, but that whenever it can apply, so can PPEX.

4.5 The Predicate be NP. Predicates which take the form be NP always block both TI and PPEX completely:

- (75)a. ?A man from Topeka was a Communist.
 b. *There was a man from Topeka a Communist.
 c. *A man was a Communist from Topeka. (PPEX reading)

- (76)a. A book about early Devonian vertebrates was a success.
 b. *There was a book about early Devonian vertebrates a success.
 c. *A book was a success about early Devonian vertebrates. (PPEX reading)

4.6 The Predicate be. The predicate be constitutes an exception to the pattern observed so far. It may appear in TI sentences, but not PPEX

sentences:

- (77)a. There is a book about that subject.
b. ??A book is about that subject.
- (78)a. There was a riot over Ky's appearance.
b. *A riot was over Ky's appearance.
- (79)a. There is an answer to your question.
b. *An answer is to your question.

The exception may be explained on the assumption that, with the predicate be, TI is obligatory. This assumption is externally motivated, since the source sentences of (77-79) are ungrammatical:

- (80) *A book about that subject is.
(81) *A riot over Ky's appearance was.
(82) *An answer to your question is.

The ungrammaticality of (77-79)b is explained if TI is obligatory with the predicate be, simply because PPEX never has a chance to apply.

4.7 Locative Predicates. For many speakers, locative predicates conform to the established pattern: the application of TI or of PPEX is equally possible:

- (83)a. A book about woolly mammoths is on the table.
b. There is a book about woolly mammoths on the table.
c. A book is on the table about woolly mammoths.
- (84)a. A portrait of Edward Sapir is on my wall.
b. There is a portrait of Edward Sapir on my wall.
c. A portrait is on my wall of Edward Sapir.

For some people, however, the c. versions of these sentences, in which PPEX has operated, are deviant even though the TI sentences are perfect. I can't explain why this is so, but will offer some speculation. Note

that sentences (83-84)c are markedly improved for the speakers in question when their subjects are quantified by the word several:

- (85) Several books are on the table about woolly mammoths.
 (86) Several portraits are on my wall of Edward Sapir.

This suggests that what is blocking PPEX in (83-84)c is not just the fact that their predicates are locative, but rather some interaction of their unquantified indefinite subjects with the locative predicates. If this is the case, then locative predicates also conform to the pattern observed in allowing both TI and PPEX to operate.

4.8 Conclusion. We have seen in this section that, with a few exceptions, the predicates which allow PPEX to apply are the same as the predicates which the operation of TI. For the exceptions, there either is evidence which provides an explanation for them, or at least some evidence indicating where an explanation might be found.

Given that the correspondence exists, there are several possible reasons for why this is so. It might be that the grammar simply marks predicates with an arbitrary feature which allows PPEX and TI to apply. The correspondence may also be only a perverse coincidence. If, however, some externally motivated reason may be found for why the sets of predicates are the same, then we will have a predictive theory describing the situations in which PPEX can apply.

NOTES

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1. There also exist sentences in which the NP which originally dominated the extraposed PP is not a subject:

(i) I read a book last week about the lexicalist hypothesis.

I have not yet investigated these sentences.

2. This explanation invites speculation as to why the expressions the key to the front door, the answer to your question, and the formula for this sugar differ from other definite NP's in not requiring that the listener be familiar with their referents. Perhaps this is due to facts about the real world: while it ordinarily is a property of front doors, questions, and sugars that they respectively have keys, answers, and formulas; it is only accidental if the lexicalist hypothesis should have a book written about it, that Ky's appearance should provoke a riot, and so on. The fact that the listener need not know in advance about the existence of the key, the answer, or the formula might therefore be due to the fact that the existence of those things has already been implied by the existence of the front door, your question, and this sugar.

3. The form of TI involving Outside Verbal predicates differs sharply in its properties from other instances of TI, and is thus probably a separate transformation. For example, it is demonstrated in Aissen (1975) that Outside Verbal TI, unlike ordinary TI, is a root transformation. In addition, Outside Verbal TI is exempt from a constraint which applies to ordinary TI, namely that the subject of the source sentence be indefinite. The following examples, found in Milsark (1974) illustrate this:

(i)a. At the meeting, there were introduced into the record all of Scrungeworth's ridiculous objections.

b.*At the meeting there were all of Scrungeworth's ridiculous objections introduced into the record.

4. This vaguely defined restriction against "going out of view" may extend beyond Outside Verbal TI. Note that some of the passive and progressive predicates cited above which block TI and PPEX also describe "going out of view" in some sense:

- was discarded last week
- was ripped into shreds last week
- is going out of style
- was slowly dispersing



5. For some speakers, however, the judgments of the source sentence versions of (69-70) are nearly as bad as the judgments for the TI and PPEX versions. This means that, for these speakers, the hypothesis that TI and PPEX produce results of equal grammaticality cannot be tested in these cases, since we don't know whether the ungrammaticality of (69-70)_{b,c} results from the badness of their sources or from the application of TI and PPEX.

REFERENCES

- Aissen, J. (1975) "Presentational There-Insertion: A Cyclic Root Transformation," in Proceedings of the Eleventh Regional Meeting of the Chicago Linguistics Society
- Borkin et al. (197?) "Where the Rules Fail," unpublished paper, University of Michigan
- Milsark, G. (1974) Existential Sentences in English, unpublished MIT doctoral dissertation