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1. Introduction

Chomsky (1981) offered a far-reaching revision of theories of Universal Grammar (UG), based on the fundamental notions of government and binding. Government was a structural relationship between two nodes, and binding was an indexical relationship that might hold between two phrasal categories. A central notion in this revision, embodied in the Empty Category Principle (ECP), was that empty categories must be "properly governed." The definition of proper government was essentially disjunctive and combined elements of the subtheories of government and binding.

\[(1) \alpha \text{ properly governs } \beta \iff \text{either (a) } \alpha \text{ governs } \beta \text{ and } \alpha \text{ is a lexical category (that is, an } X^0 \text{ in the X-bar system, but not Infl)} \]

\[\text{or (b) } \alpha \text{ is a phrasal category } X'' \text{ locally coindexed with } \beta.\]

This article will investigate the consequences of a separation such that well-formedness conditions applying at PF may be stated in terms of government and LF conditions dealing with binding relationships between phrasal categories and the like are stated in other terms. That is, a grammar provides a pairing between a PF and an LF phrase marker over an infinite range of structures, and there are two distinct kinds of well-formedness conditions, holding at different levels and stated in different terms, neither one reducible to the other. We shall argue specifically that Chomsky’s ECP, which conflates principles of government and binding, should be eliminated in favor of two separate types of locality requirements. The first demands that empty categories be
governed by lexical heads. The second says that an anaphor must be bound in some local domain. The first condition applies at PF and the second at LF. There is no disjunctive ECP, and the notion of antecedent government (1b) is replaced by an independently motivated notion of binding. Certain aspects of this approach have been foreshadowed in work by Jaeggli (1982), Koopman (1984), Saito (1984), and Stowell (1981), but our model of grammar and our analyses are significantly different, as will become clear.

The article is organized as follows. In section 2 we propose a PF condition that empty elements should be governed by a lexical head and argue that this is a necessary condition, not simply one of two options as in (1). In section 3 we show that the LF requirement that anaphors, whether empty or not, must be locally bound suffices to capture the desirable effects of (1b) and that it does not apply to the same representation as the requirement of government by a lexical head for phonologically empty items. In section 4 we illustrate how the PF and LF conditions combine to account for certain phenomena. Distinguishing PF and LF conditions in this way yields a model of UG that has good explanatory power and is much simpler than current models.

A certain technical device is crucial to the operation of the PF and LF conditions. We adopt a version of the Comp-indexing convention of Aoun, Hornstein, and Sportiche (1981), which permits a Comp containing an indexed item to take on that index (2). However, we drop their condition that percolation of an index i applies to a Comp that dominates only i-indexed elements; for us, percolation applies quite freely.

\[(2) \ Comp[X_\alpha Y] \rightarrow [X_\alpha Y]_i\]

If, for example, a Comp contains a wh-word, its index may percolate to Comp and then play a role in satisfying selectional restrictions. Thus, if the higher verb selects a +wh Comp, the Comp must (through percolation) bear the index of a wh-word that it contains. Since Comp indexing is relevant for selectional restrictions, it must take place at the level of representation where selectional restrictions apply: either S-Structure or LF. As is well known, in English and other languages that exhibit syntactic movement, selectional restrictions hold at S-Structure; in Chinese and other languages that do not exhibit syntactic Wh Movement, selectional restrictions hold at LF (for these correlations, see Aoun (1986, chap. 1), Lasnik and Saito (1984), and others). This means that in English Comp indexing must take place by S-Structure, and in languages without syntactic movement it must take place by LF. The convention (2) is now adopted by most authors, but what will be important for us is that an indexed Comp not only expresses the head of a complement clause for the purposes of selectional restrictions (thus being a kind of secondary head) but also may act both as a governor and as a binder, hence playing a role in the operation of the PF and LF conditions, as will become clear.\(^1\)

\(^1\) Comp indexing is really just a special case of the process by which the index of a head percolates to its maximal projection. However, given the analysis of Koopman (1982), the Comp-indexing convention may need to be construed as a marked option, which fails to be triggered in Italian and Vata.
2. Head Government

We propose that any empty element must be governed by a lexical head. This condition applies at PF; consequently, only those empty elements that are visible at PF are subject to the condition, and only those heads that are visible at PF may satisfy it. To be visible at PF, an element must be indexed at that level. Phonetic elements will have an index inherently, and empty categories may have an index through the application of grammatical processes like a syntactic movement rule or the Comp-indexing procedure (2). We shall first provide some evidence for this view.

2.1. Noun Phrases

It has long been noted that a phrase like John’s picture is at least two ways ambiguous: John may be understood either as the owner/painter of the picture or as the person portrayed. The latter case has often been analyzed as involving the movement of John from an “object” position to the right of the head noun picture; this would give the S-Structure representation in (3).

(3) [John’s picture ei]

Phrases like each of John’s pictures have the two readings noted for John’s picture, but the analogous phrase each picture of John’s has only the “subject” reading and lacks the “objective genitive” reading, as first noted by Chomsky (1970).

Dresher and Hornstein (1979) analyzed each picture of John’s as involving a kind of quantificational structure in which picture had either been deleted or undergone a local transformation rule. Under this view, the S-Structure representation would be as in (4a), where e has no index (assuming that rules moving or deleting nonphrasal categories

We assume that Infl is the head of S′, which would therefore be more appropriately labeled Infl′, but that an indexed Comp may act as a secondary head; in other words, Comp indexing is a means of creating a secondary head. As an alternative to treating Comp as a secondary head, one might adopt a structure like (i), where Infl′ is equivalent to S and Comp′ to S′ (Chomsky (1986b)).

(i)

\[
\begin{array}{c}
\text{Spec} \\
\text{Comp'} \\
\text{Comp} \\
\text{Spec} \\
\text{N''} \\
\text{Infl} \\
\text{V''}
\end{array}
\]

In that case Comp would subcategorize properties of the Infl that it governs, and that relationship would provide a vehicle for stating the agreement between Comp and Infl. The Spec of Comp would be a position for wh-elements, whereas the Spec of Infl would be the subject position. This would involve reformulating certain mechanisms.
do not leave the usual kind of indices). Rather than viewing this as the residue of a local transformation or deletion rule, we would now view the e as being a base-generated empty category coindexed with picture at LF (see Williams (1977) for discussion of such LF processes). Under any of these analyses, the S-Structure form of the nonoccurring objective reading of each picture of John’s would be (4b).²

(4) a. [each picture of \( \text{NP}[\text{John’s } e] \)]
   b. [each picture of \( \text{NP}[\text{John’s } e_{i}] \)]

The nonoccurrence of (4b) can now be attributed to our PF condition: the empty NP \( e_{i} \), being indexed through movement, is visible at PF and is therefore subject to the requirement of lexical head government. However, the governor \( e \) is not indexed at PF and therefore is not visible to fulfill a PF condition. This would also account for the lack of an objective reading in the picture which is John’s and this picture is John’s, which have the structures in (5), where no analysis that we have ever seen posits movement from the position of the nonindexed \( e \).

(5) a. the picture which is \( \text{NP}[\text{John’s } e_{i}] \)
   b. this picture is \( \text{NP}[\text{John’s } e_{i}] \)

We assume Aoun and Sportiche’s (1981) definition of government, augmented by the idea adopted by Belletti and Rizzi (1981) and by Aoun and Lightfoot (1984) that what is governed is a projection. Aoun and Sportiche stated that \( \alpha \) governed \( \beta \) if all maximal projections above \( \alpha \) also dominated \( \beta \), and vice versa. Aoun and Lightfoot took \( \beta \) to be a projection. Thus, if \( \alpha \) governs a phrasal category, it also governs its head. The definition we adopt is (6).

(6) \( \alpha (X^{0}) \) governs \( \beta \) iff all maximal projections dominating \( \alpha \) also dominate \( \beta \) and \( \alpha \) is dominated either by all maximal projections dominating \( \beta \) or by all maximal projections dominating the maximal projection of \( \beta \).

An analysis that attributes the missing objective genitives to a PF condition that indexed empty categories must be governed by a lexical category makes the assumption that nouns may act as proper governors; so in the straightforward case of (3) \( e_{i} \) is governed by picture. This approach seems to be quite productive. For example, several linguists have noted that English complementizers may be deleted if properly governed (see, for example, Stowell (1981)). Hence, the governed complementizers in (7) may be deleted, but not the ungoverned complementizers in (8).

(7) a. It was apparent (that) Kay left.
   b. The book (that) Kay wrote arrived.
   c. It was obvious (that) Kay left.

² Throughout we indicate empty positions by \( e \), regardless of whether they are syntactic gaps or empty at LF. What will be important is the level at which an \( e \) receives its index. The residues of syntactic movement—“traces”—have an index at S-Structure; other gaps receive indices at LF. Since (4b) is an S-Structure representation, \( e_{i} \) is a residue of syntactic movement and \( e \) receives an index later at LF.
Dutch *dat, French *que, German *daß, and Italian *che, on the other hand, are generally not deletable, which suggests that the existence of a complementizer deletion rule is data-driven—that is, "triggered" when a child hears alternations like those in (7). The operation of the rule is automatically subject to the UG requirement that residues of such deletion must be head-governed. Since complementizers must be present at S-Structure in order to satisfy LF processes (section 3), their deletion must take place (optionally) at PF, as we shall show in section 4.6. We take "deletion" to be dephoneticization rather than the removal of an element; hence, residues of "deletion" are still visible at PF and subject to PF requirements such as head government.

Taking nouns to be potential proper governors allows us to generalize this account to the deletability of complementizers in relative clauses, distinguishing restrictive and nonrestrictive clauses. Nonrestrictive relatives are characteristically separated by a slight pause from the noun they modify, unlike restrictive relatives. This has been taken as one reason to assign distinct structures to restrictive and nonrestrictive relatives, at least for modern English (this may not be universal; Cinque (1981) argues that certain nonrestrictive relatives in Italian have structures like (9b)). Like many others from Stockwell, Schachter, and Partee (1973) onward, we take (9a) as the usual structure for nonrestrictive relatives (where the relative clause is outside the noun phrase and is thus not

3 This approach attributes the absence of a that complementizer to an optional deletion rule that is subject to the restriction that the deletion site be lexically governed. Deletion of the for complementizer may also be subject to lexical government. The distribution of for is determined in large measure by the demands of Case theory: for appears where it is needed to assign Case. Otherwise it will be absent, at least in standard English, because of the For-To Filter. In (i) that cannot be deleted, because the Comp is not lexically governed. In (ii) for is required to assign Case to *John and so cannot be deleted. In (iii), however, PRO may not have Case and for does not appear. Note that the Comp in which for appears is no more lexically governed in (iii) than in (i), yet (iii) is acceptable.

(i) *(That) John left was annoying.
(ii) *(For) John to leave would be annoying.
(iii) *(For) PRO to leave would be annoying.

However, if one adopts the account of Chomsky (1981), whereby for is deleted at PF after assigning Case, then the ungrammaticality of Kay wanted very much *(for) Fay to come (where for could assign Case to Fay and then be deleted but where the deletion site is ungoverned) suggests that the distribution of for is not attributable entirely to the demands of Case theory; a further restriction is needed, and this might be that the deletion of for, like that of that, is subject to its being head-governed. Such a condition would also eliminate the need for Chomsky and Lasnik's (1977) NP-to-VP Filter.

Saito (1984) points to the Kobe dialect of Japanese, in which a complementizer may be deleted if properly governed. In (iv), but not in (v), te is properly governed by *yuuta and may be deleted. (Incidentally, this runs contrary to the analysis of Lasnik and Saito (1984), which must require that a trace in Comp is not lexically governed.)

(iv) John-ga [Koobe-ni iku (te)] yuuta.
    John to Kobe going (Comp) said
    'John said he was going to Kobe.'
(v) [Koobe-ni iku *(te)] John-ga yuuta.
governed by the head noun) and (9b) as the structure underlying restrictive relatives. This now entails on our account that the relative pronoun of a nonrestrictive (10a) cannot be deleted, because Kay does not govern who. On the other hand, the relative pronoun of a restrictive can be deleted in (10b), because guy governs the complementizer containing who; this is because the Comp-indexing convention renders an indexed Comp a secondary head of S'. The relative pronoun in restrictive relatives like (11) may not be deleted because it is not governed by the head noun: an extra maximal projection (the PP and NP indicated) separates the head from the wh-word.4

(9) a. [NP] S'
   b. [Det N[N' S']]  
(10) a. Fay saw Kay, who I admire.
   b. Fay saw a guy (who) I admire.
(11) a. the guy S'[PP[to whom] I wrote]
   b. the guy S'[NP[whose house] I bought]

Our proposal, then, is that empty noun phrases, like null complementizers, must be governed at PF by a lexical head and that nouns may act as proper governors. This accounts for the ungrammaticality of (4b) and (5), where the trace of John is not properly governed by an element visible at PF.5

2.2. Gapping

In addition to phenomena like (4b) and (5), gapping structures like (12) also provide evidence that empty noun phrases must be properly governed at LF and that unindexed elements do not act as proper governors. These structures suggest strongly that empty verbs, which are indicated by "GAP," may not properly govern and therefore that the traces do not meet our requirement. Because a "gapped" verb does not involve movement and is unrelated to Comp indexing, it is unindexed at PF and is coindexed with the antecedent overt verb only at LF. It therefore is not visible at PF as a governor for a following trace, and such a trace fails to meet the head government condition in (12b,c,d,f).6

4 Moreover, the complementizer cannot be deleted in complement clauses under nominal heads like the claim/belief/opinion that Fay is tall. Stowell (1981) gives arguments that such expressions have structures like (9a), where the complement clause is not governed by the head noun; if this is the correct structure, then this analysis predicts that the complementizer should not be deletable (see footnote 26 for an alternative account).

5 Saying that a noun may be a proper governor forces us to adopt a proposal made by Bouchard (1982) and Chomsky (1986a,b) to account for *Fay's appearance s[E, to like Kay]. They propose that nouns do not assign structural Case in these constructions. Rather, nouns assign inherent Case, which is spelled out in English as either the dummy preposition of or the possessive 's. Unlike structural Case assignment, inherent Case assignment strictly parallels θ-marking, and an item may assign inherent Case to a category only if it also assigns it a θ-role. Thus, the "subject" of appearance could not receive genitive Case from the head noun because it does not receive a θ-role from it.

6 Two observations are in order concerning (12). First, as noted by Hornstein and Lightfoot (1987), (12c) becomes grammatical if there is only one wh-word, which moves in the "across-the-board" mode of rule application: Who did Fay introduce to Ray and Jon to Ron? This means that the PF condition of head gov-
(12) a. Fay introduced Kay to Ray and Jon GAP Don to Ron.
b. *which man\textsubscript{1} did Fay introduce \textit{e}\textsubscript{1} to Ray and which woman\textsubscript{1} (did) Jon GAP \textit{e}\textsubscript{1} to Ron
c. *Fay wondered what\textsubscript{1} Kay gave \textit{e}\textsubscript{1} to Ray and what\textsubscript{1} Jon (did) GAP \textit{e}\textsubscript{1} to Ron
d. *Fay admired \textit{e}\textsubscript{1} greatly [her uncle from Paramus], but Jon (did) GAP \textit{e}\textsubscript{1} only moderately [his uncle from New York]
e. Fay gave her favorite racket to Ray and Jon GAP his favorite plant to Ron.
f. *Fay gave \textit{e}\textsubscript{1} to Ray [her favorite racket], and Jon (did) GAP \textit{e}\textsubscript{1} to Ron [his favorite plant]

An alternative explanation for these facts has been suggested to us: that there is a general prohibition against gapping into a clause that contains an overt Comp. This would explain not only (12) but also (13a). However, whatever explains (13a) is unlikely to carry over to (12), because structures like (13a) are improved by inserting an auxiliary verb (13b), as noted by Fodor (1985); see Berwick and Weinberg (1985) for discussion. This is not true of the ungrammatical structures of (12), which are equally bad with or without an auxiliary verb. Also, the grammaticality of (13c), discussed by Pesetsky (1982), and of (13d) suggests that further refinement would be needed.

(13) a. *I wonder whether Fay visited Kay and whether Ron GAP Jon.
b. I wonder whether Fay visited Kay and whether Ron did Jon.
c. I wonder where Fay bought the books and where the records.
d. I wonder which man saw Fay and which woman Kay.

Furthermore, our principle is needed independently for structures like those in (14). As noted, phonetically empty complementizers must be head-governed. A gapped verb does not suffice as a governor either for an empty complementizer (14b) or for a trace in
Comp (14c). Also, like (12), (14c) is not improved by the insertion of an auxiliary *did.* A prohibition against gapping across an overt Comp is not relevant here, but a lack of proper government is again crucial.

(14) a. Fay thought Kay hit Ray and Jon GAP that Don hit Ron.
   b. *Fay thought Kay hit Ray and Jon GAP [Ø Don hit Ron].
   c. *who<sub>i</sub> did Fay think Kay hit e<sub>i</sub> and who<sub>j</sub> (did) Jon GAP [[e<sub>j</sub> (that)] Don hit e<sub>j</sub>]

2.3. Complementizers

We noted in the context of (7)–(8) that English complementizers may be empty when properly governed. If *that* in (8) may not be empty because it is not properly governed, then we can say that nonbridge verbs like *quip, murmur, whisper* properly govern a direct object (*What, did Fay whisper e<sub>i</sub>?) but do not properly govern into the secondary head of a subordinate clause (that is, Comp) and hence do not allow a following *that* to be empty. So the marked (data-driven) property of bridge verbs is that they govern into a lower Comp (see Aoun (1985), Kayne (1981a,b), Stowell (1981)); hence, *believe* governs into Comp, with the result that *that* may be deleted (15b).

(15) a. Fay quipped *(that) Kay left.
   b. Fay believed *(that) Kay left.
   c. *who<sub>i</sub> did Fay quip [[e<sub>i</sub> that] Kay met e<sub>i</sub>]

Our analysis makes interesting predictions. The deletability of Comp should correlate with the possibility of moving a *wh*-word from the embedded clause. Therefore, (15c) must contain a trace of the *wh*-word in the lower Comp if movement conformed to the Subjacency Condition. If every empty NP must be properly governed at PF, we explain the nonoccurrence of (15c) on the basis of *quip* not governing the trace in the lower Comp.

The same correlation holds for extraposed constructions such as (8a): since the Comp of an extraposed construction is not properly governed, *that* will not be deletable; similarly, a trace will not be properly governed, thus violating our PF condition. Hence the nonoccurrence of (16a). Similarly, in an extraposed relative clause elements in Comp may not be deleted; compare (16b,c).<sup>7</sup>

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<sup>7</sup> Chomsky (1986b) suggests a more indirect linkage between the deletion of complementizers and movement out of clauses. He blocks movement by revising the Subjacency Condition and keying the definition of bounding nodes to ungoverned categories. Thus, if a clause is not governed, then its maximal projection counts as a bounding node (i). Consequently, adjunct clauses, which have no proper governor, also do not allow extraction (ii).

(i) *which woman<sub>i</sub> did Ray say yesterday [e<sub>i</sub> that Kay saw e<sub>i</sub>]
(ii) *which woman<sub>i</sub> did Ray visit New York after [e<sub>i</sub> he met e<sub>i</sub>]

If all ungoverned categories are bounding nodes intrinsically and other nodes may become bounding nodes "by inheritance," then adjuncts are absolute islands because they are ungoverned. Alternatively, under the model proposed here, we take S as a universal bounding node and this forces movement into Comp. Thus,
(16)  a. *who$_i$ was it apparent yesterday [[e$_i$ that] Kay saw e$_i$]  
    b. The woman (who) Fay likes has arrived.  
    c. The woman has arrived *(who) Fay likes.  

Further evidence for the claim that a trace in Comp must be head-governed in PF comes from sentences like (17a,b).

(17)  a. The crowd is too angry [PRO to organize a meeting].  
    b. What$_i$ is the crowd too angry [[e$_i$] PRO to organize e$_i$]?  

Chomsky (1986b) points out that (17a) is ambiguous: PRO may be interpreted as arbitrary or as referring to crowd. The slightly different theories of PRO in Bouchard (1982), Hornstein and Lightfoot (1987), Koster (1984), Manzini (1983), and Sportiche (1983) claim that a PRO may be governed and, when governed, is anaphoric; that is, it must have a local c-commanding antecedent. An ungoverned PRO has the nonobligatory control property in the sense of Williams (1980); that is, it need not be bound and may be "arbitrary" (having a pronominal sense; see Hornstein and Lightfoot (1987)). Under this view, (17a) reflects two structures: PRO may be governed by angry (through a process of S' Deletion; see footnote 28), in which case it is anaphoric to crowd; or it may be ungoverned, in which case it has the arbitrary reading. However, Chomsky also notes that (17b) is not similarly ambiguous; in our terminology the PRO has only the anaphoric interpretation. We explain this by saying that if PRO is governed by angry, then a trace in Comp would also necessarily be governed. On the other hand, if the PRO and the S' containing it are not governed (and PRO therefore has the arbitrary sense), then its Comp is also not governed and a trace in that Comp does not fulfill the PF condition of government by a lexical head; hence, extraction from such a clause is not possible.  

2.4. A Necessary Condition at PF

We have argued, then, that only phonetic elements or elements that are indexed at S-Structure can license a trace and that an empty NP or complementizer will be ill-formed
unless governed by an overt or indexed category. Notice now that government by a
lexical head is a necessary condition for well-formedness and not merely one of two
possibilities. In a number of the cases already discussed the empty NP is “antecedent-
governed” but nonetheless the structure is ill-formed. In other words, under the dis-
junctive definition of proper government (1), the structures of (4b) and (5) would be well-
formed because the trace of John is antecedent-governed by virtue of being coindexed
with a local c-commanding NP, thus satisfying part (b) of the definition. As a result,
(4b) and (5) would be well-formed, at least as far as the ECP is concerned. The same
holds for the ill-formed (12b,c,d,f), (14c), and the nonoccurring reading of (17b). This
suggests that antecedent government is not enough, that an empty NP must also be
governed by an overt or indexed head. This requirement holds at PF for reasons that
we shall discuss in section 4.6.

2.5. Visibility at PF

So far our examples have shown that empty categories that are both phonetically null
and unindexed do not license traces or deleted complementizers. Do empty categories
that are indexed at S-Structure—the residues of syntactic movement—act as proper
governors? Verb movement in Dutch and German shows that an indexed verb does
license empty NPs; Koopman (1984) draws a similar conclusion for the residue of verb
movement in the Kru languages. Dutch has structures like (18), where the trace of the
moved verb, which is indexed at S-Structure, licenses the empty NP (Dutch has un-
derlying object-verb order and verbs may be preposed, as indicated). 9

(18) wieₐ dooddeᵢ je [eᵢ, eⱼ]
who killed you
‘Who did you kill?’

9 Many interesting questions arise about empty verbs in languages that allow verb movement, and Koop-
man (1984) examines their properties in several languages. It is striking that gapped verbs in Dutch do not
behave like their English counterparts insofar as they appear to license empty NPs in PF; sentences cor-
responding to (i) and (ii) are well-formed, and we have indicated a possible representation for them at S-Structure.
Further analysis may of course suggest different structures for these sentences.

(i) welke boeken, kochtᵢ Jan eᵢ eⱼ en welke platenᵢ Joop eⱼ GAP
which books bought Jan and which records Joop
(ii) ik vroeg welke boekenᵢ Jan eᵢ kocht en welke platenᵢ Joop eⱼ GAP
I asked which books Jan bought and which records Joop

It might be the case that there is an intrinsic relationship between the occurrence of these sentences and
sentences like (18). That is, perhaps UG is structured in such a way that a child who finds that verbal traces
license gaps must generalize to gapped verbs. Alternatively, perhaps gapping in Dutch applies only to preposed
verbs, as suggested to us by Peter Coopmans; consequently, the S-Structure form of (i) and (ii) would have
an indexed empty V in the GAP position, licensing the trace of welke platen. This correctly predicts that (iii)
is much worse than (i) and (ii), where an overt complementizer dat prevents verb movement to Comp.

(iii) *welke boeken, zei Marie dat Jan eᵢ kocht en welke platenᵢ
which books says Marie that Jan bought and which records
zei Peter dat Joop eⱼ GAP
says Peter that Joop

Torrego (1984) argues for a verb movement rule in Spanish and claims that moved verbs do not act as
proper governors for the purposes of the ECP. However, her analysis raises problems (see Bouchard (1985),
Quintero (1982)) that we shall not discuss here.
The material discussed so far has involved empty elements that are indexed at PF as a result of syntactic movement, which demonstrate no effects of the important Comp-indexing convention. Let us turn, then, to the usual that-trace phenomena. This will illustrate the workings of both the Comp-indexing convention and the PF condition on empty elements.

We make the standard assumption that the grammars of English speakers contain some device blocking doubly filled Comps (but see section 4.4 for an alternative). We formulate this as (19), which prohibits Comp from containing any phonetic element other than the head.

(19) *[αι, β], where β is phonetic

*Who do you think that read the book? does not occur because its S-Structure form would be either (20a) or (20b), depending on which index has percolated to Comp.

(20) a. whoi do you think [[ei that j]i, ei read the book]
   b. whoi do you think [[ei thatj]i, ei read the book]
   c. whoi do you think [[ei ei]j, ei read the book]

(20a) has a phonetic element in Comp in addition to the head, which is not possible in English, and in (20b) the subject trace is not governed by a lexical head because the index on Comp does not match the index on the subject. In (20c), however, where that is not phonetic (i.e. has been deleted), the subject trace is governed by a lexical head, the coindexed Comp. This illustrates how a Comp that is indexed at PF licenses an empty subject with which it is coindexed and that it governs in the sense of (6). Notice also that the trace in Comp is governed by think in (20a–c); as noted, an indexed Comp acts as a secondary head of the clause, and the well-formedness of (20c) shows that if a Comp is governed, then all elements within it are also governed (that is, if the head of a projection is governed and has a two-part internal structure, both subparts are governed; this is fully consistent with the Aoun-Sportiche and Belletti-Rizzi definitions of government that we are assuming).

The material of section 2 strongly suggests the existence of a condition requiring empty NPs to be governed by a head that is indexed at PF. Our condition of head government obviously corresponds to part (a) of the definition of proper government, and we shall argue in section 4.6 that it must hold at PF.11 We shall now go further and

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10 Condition (19) does not exhaust what needs to be said about the distribution of items in Comp. Languages vary with regard to what they allow in a pre-S position. For example, Dutch allows a wh-word and either a complementizer or a verb in Comp, but not two wh-words. Polish, on the other hand, seems to allow more than one wh-word in Comp. This might suggest that Dutch is subject to some form of (19), contrary to some analyses, and that at PF the Dutch complementizer (and likewise the verb in main clauses) is not in Comp but in an Inf position, perhaps adjoined to S or contained inside Comp. Also, in section 4.4 we suggest that (19) applies only to indexed Comps.

11 Chomsky (1986a) suggests a “raising” analysis for John wants for himself to leave, whereby the anaphor himself raises and adjoins to wants in LF, yielding John wants + himself for ei to leave. Assuming that there is no LF reanalysis rule making a complex verb want himself for, the ei would not be lexically governed. This represents no problem if Chomsky assumes, as we do, that the requirement of lexical government holds at PF and not at LF.
claim that a version of generalized binding holds at LF. Generalized binding subsumes the effects of part (b) of the definition—antecedent government—as the next section will show. This constitutes a model of grammar along the lines of (21).

(21) \[ \text{D-Structure} \\
\left\{ \begin{array}{c}
\text{S-Structure} \\
\\text{PF} \\
\text{LF}
\end{array} \right. \\
\text{NP}[e] \text{ is head-governed} \quad \text{Generalized binding} \]

3. Generalized Binding

Generalized binding requires that anaphors be locally bound—that is, bound in their Domain, if they have one. It is "generalized" in the sense that the residues of movement to both argument (A) and nonargument (Â) positions are treated as potential anaphors, whereas Chomsky's (1981) binding theory took residues of Wh Movement to be R-expressions. Under generalized binding, then, anaphors include (although they are not limited to) all phonetically null NPs that are indexed at S-Structure, in other words, indexed by syntactic movement.

The binding theory that we adopt here is a modified version of the theory proposed by Aoun (1985; 1986).

(22) (where X = A or Â)
A. An X-anaphor must be X-bound in its Domain.
B. An X-pronoun must be X-free in its Domain.
C. R-expressions must be A-free.

So an A-anaphor (himself, each other) must be A-bound in its Domain (that is, coindexed with a c-commanding argument position), whereas an Â-anaphor, such as the residue of Wh Movement, must be Â-bound in its Domain. If an anaphor has no Domain, it is not subject to the binding theory. Â-anaphors are usually also R-expressions and hence must be A-free.

3.1. Domains

Since we are taking government relations as relevant only for PF conditions, we define Domain without reference to government (hence the change of terminology from the earlier "governing category"). A Domain for a given expression α is the first clause (S or S') or NP that contains an accessible SUBJECT for α. A SUBJECT may be Agr, [NP,S], or [NP,NP], as in Chomsky (1981, chap. 3), and we adopt the definition of accessibility in Aoun (1985).
(23) $\alpha$ is accessible to $\beta$ iff $\beta$ is in the c-command domain of $\alpha$ and assigning the index of $\alpha$ to $\beta$ would violate neither the $i$-within-$i$ Condition nor Principle C of the binding theory.

To illustrate, consider again the structures in (20). In each of these cases the subject trace is an $\bar{A}$-anaphor that must be $\bar{A}$-bound in its Domain. The Domain is the lower $S'$, where the Agr (contained in Infl, as in Chomsky (1981)) acts as an accessible SUBJECT. Furthermore, a coindexed Comp acts as a binder. Consequently, the binding theory is satisfied in all cases in (20) except the nonoccurring (20b).

For extraction from object, as in *who, do you think* [[*e, that* Fay saw e]], the traces of *who* are governed by *saw* and *think*, respectively, and therefore satisfy the PF requirement of government by a visible head. However, the object of *saw* has no Domain, because it has no accessible SUBJECT. If the anaphor were to be assigned the index of Agr, whether the local Agr or a higher Agr, then it would also be coindexed with the subject NP, because Agr is always coindexed with the subject NP that it governs. In that case the anaphor would be A-bound, since the subject is an argument position, and $\bar{A}$-anaphors that are subject to Principle C of the binding theory must be $\bar{A}$-bound in their Domain but not A-bound. Therefore, such an $\bar{A}$-anaphor has no Domain and does not fall under the binding theory. Therefore, this NP, which is an $\bar{A}$-anaphor and a variable, is subject not to the binding theory but only to the requirements of quantification theory; in other words, it must be linked to a c-commanding quantifier, a *wh*-word, but not necessarily with an indexed Comp.\textsuperscript{12} Therefore, for extraction from object position, the binding theory and Comp indexing are irrelevant.

An A-anaphor (like a reflexive) in object position, on the other hand, does have a Domain and therefore must be bound within that Domain. Its Domain is the minimal clause or NP that contains an accessible SUBJECT. Agr acts as an accessible SUBJECT because for an A-anaphor to have the index of Agr and thus of the subject NP entails no violation of the binding theory (since an A-anaphor needs to be A-bound, whereas an $\bar{A}$-anaphor needs to be A-free).

An $\bar{A}$-anaphor in subject position has Agr as an accessible SUBJECT, because assigning the index of Agr to the subject does not entail that it be A-bound, which would yield a violation of Principle C.

\textsuperscript{12} Since the indexed Comp rather than the *wh*-word within it acts as the binder, we do not need to claim that items in Comp are hierarchically structured. Two *wh*-operators in Comp can both be linked to variables at LF, but, if Comp were hierarchically structured, one would expect one of the *wh*-operators not to c-command anything outside the Comp, which would make double questions impossible.

This is a natural way of looking at things, given the Comp-indexing convention that we are using. The head of a phrase is not a maximal projection, so if an item percolates its index to Comp (becomes the head of Comp), then it is no longer a maximal projection \textit{within that configuration}. Consequently, it cannot be a binder for the purposes of the binding theory; indexed Comps, not the *wh*-items they contain, are binders. However, Comps are not operators, nor do they have semantic content, and so it is the *wh*-items within Comps that operator-bind variables.
3.2. Wh-in-Situ

Consider now wh-in-situ expressions like what in the S-Structure representations (24a–c).

(24) a. \([\text{who}_i, [e_i \text{ expected } \text{what}]\]

   b. \([\text{who}_i, [e_i \text{ expected S-[Comp [what to happen]]}]]\]

   c. \([\text{who}_i, [e_i \text{ expected S-[[that}_j, \text{what would happen}]}}\]

Since what has no corresponding empty NP at S-Structure, it is not subject to the PF condition of head government. Likewise, wh-in-situ elements do not affect the selectional restrictions holding for the matrix verb; as noted earlier, those restrictions hold at S-Structure for languages with syntactic movement. So expect requires a \([-\text{wh}]\) Comp, and this requirement is satisfied if the complement clause contains a wh-in-situ because there is no \([+\text{wh}]\) word in the lower Comp at S-Structure. Hence, who expected [to wear what] is well-formed, whereas *who expected [[what}_i, to wear e_j] has a \([+\text{wh}]\) word in Comp at S-Structure and thus violates the selectional restriction on expect. Conversely, who wondered [[what}_i, to wear e_j] is well-formed because wonder selects a \([+\text{wh}]\) Comp and that requirement is satisfied at S-Structure. On the other hand, *who wondered [to wear what] does not satisfy the selectional restriction because the Comp does not contain a \([+\text{wh}]\) word at S-Structure. Wh-in-situ elements are thus moved to Comp only in LF, following the analysis of Aoun, Hornstein, and Sportiche (1981) and Chomsky (1973).

What is relevant for the analysis of wh-in-situ structures is the generalized binding requirement at LF. Ignoring “echo questions,” we find that English allows wh-in-situ constructions only where there is a “pairing” of two or more wh-words. Thus, Fay expected what? has only an echo reading and must have contrastive stress, but (24a) is a kind of double question with a nonecho reading; the expected answer would be something along the lines of “Fay expected a tornado and Kay expected a hurricane.” The notion of pairing is captured by the two (or more) wh-words being attached to the same Comp at LF (see Aoun, Hornstein, and Sportiche (1981), Chomsky (1973), and Higginbotham and May (1980)). The S-Structure representation (24a), where the empty subject NP is governed by the indexed Comp, satisfies the PF requirement. When what is moved to Comp at LF (25a), the Ā-anaphor that is left behind, being an object, has no accessible SUBJECT and thus no Domain; therefore, it is not subject to the binding theory and does not require a binder (a coindexed Comp). Since it is linked to a quantifier, however, it satisfies the demands of quantification theory. Since who and what are in the same Comp, the pairing interpretation is available and the structure is well-formed.

(25) a. \([\text{who}_i, \text{what}_j, e_j \text{ expected } e_j]\)

   b. \([\text{who}_i, \text{what}_j, [e_i \text{ expected S-[Comp [e_j to happen]]}]]\]

   c. \([\text{who}_i, \text{what}_j, [e_i \text{ expected S-[[e_j] [e_j to happen]]}]]\)
Consider the S-Structure representation (24b) where the lower what must raise at LF to the higher Comp position in order to be paired with another wh-word. LF raising of wh-words might take place in one move as in (25b), as proposed by Aoun, Hornstein, and Sportiche (1981), or successive cyclically like syntactic Wh Movement as in (25c). The residue of this LF movement is an Â-anaphor that has no Domain. Since the lower clause is infinitival, it contains no Agr with which the anaphor may be coindexed; if the anaphor were coindexed with the higher Agr, it would automatically be A-bound by the subject NP and thus ill-formed. Therefore, it has no accessible SUBJECT and thus no Domain. It is, however, a variable and is linked to a quantifier, the LF-moved what. Consequently, a pairing interpretation is available for (24b). The same holds if LF raising takes place successive cyclically as in (25c). Moreover, if traces in Comp are anaphors that fall under the binding theory, then the anaphor in the lower Comp in (25c) will likewise have no Domain, because if it were coindexed with the higher Agr, then the subject of to happen would also be coindexed with the higher Agr (thus, with the higher subject) and hence would be A-bound and ill-formed. If the trace in Comp has no Domain, it requires no binder and, again, a pairing interpretation is available.

In (24c), however, if what is paired with who by raising in LF directly to the higher Comp, the residue of movement does have a Domain, the lower S'. Since Comp indexing must take place by S-Structure in English and since only indexed Comps may act as binders for the purposes of the binding theory, the residue of the LF movement of the subject of would happen will not be bound in its Domain, regardless of whether LF movement is successive cyclic or not. Consequently, the data of (24) fall under our theory of generalized binding whether LF movement takes place successive cyclically or not. We shall show in section 3.4 that there are reasons to suppose that LF movement may in fact take place successive cyclically.

3.3. Adjuncts at LF: English

Having considered the syntactic and LF movement of wh-subjects and objects, let us now turn to the behavior of elements that are not subjects or objects: adjuncts like where, when, why, how. Our discussion will exploit an idea suggested by Aoun (1986, chap. 1), but our analysis will differ somewhat from the one he adopts. The important point here is that our binding theory divides variables into different types.

It is clear that adjuncts may move to Comp prior to S-Structure: I wonder [[why], Fay left e]. If the PF requirement of head government for empty elements applies only to empty NPs and complementizers, it is of no concern whether the trace of an adjunct

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13 It is worth noting that Lasnik and Saito's (1984) detailed treatment of proper government includes several devices that are motivated solely by their treatment of adjuncts and their efforts to subsume Superiority effects under their ECP: for example, deletion of that in LF. Infl acting as a proper governor in languages like Chinese, Infl acting as a proper governor at LF but not at S-Structure, and the existence of secondary heads at LF. See Hornstein and Lightfoot (1986).
is head-governed if it is not an NP. We may therefore say that the trace is dominated by S and is not governed by a lexical head. However, we might also adopt the position of Andrews (1982), who argued that what had previously been treated as “sentential” preposition phrases and adverbs are actually dominated by VP, as sisters to VP, whereas so-called VP adverbs are sisters to V’ or V. If adjuncts are generated inside the VP, then their traces are governed by V, hence satisfying the PF requirement of head government.\(^\text{14}\) Either way, an adjunct may move by S-Structure. In the next section we shall show that syntactic movement is both necessary and restricted, but here we shall focus on the LF properties of adjuncts.

Unlike \textit{where} and \textit{when}, \textit{why} and \textit{how} may not undergo long-distance LF movement, as noted by Huang (1982). Hence, in (26a) \textit{where} and \textit{when} may be paired with a \textit{wh}-word in a higher clause, yielding well-formed structures. This is not possible for \textit{why} and \textit{how} in (26b). In fact, local movement is also generally not possible for \textit{why} and \textit{how} (although some speakers can sometimes use such sentences under a special “analogical” reading to be discussed), with the result that \textit{why} and \textit{how} must move to Comp in the syntax, again unlike \textit{where} and \textit{when} (see (27)).

(26) a. I wonder who thinks Kay lives where.
   I wonder who thinks Kay left when.
   b. *I wonder who thinks Kay left why.
   *I wonder who thinks Kay left how.

(27) a. Who lives where?
   b. *Who left why/how?

Our analysis adapts the idea of Aoun (1986) that nonadjuncts (subjects and objects) are potentially referential and form the argument structure of a sentence, entering into the selectional restrictions on the verb and receiving a 0-role from the element on which they depend. Aoun notes that locational and temporal adjuncts are referential (as suggested by the existence of pronouns that can be used coreferentially: \textit{here}, \textit{there}, \textit{then}, \textit{now}), whereas manner and reason adverbs are less likely to be referential (and therefore have no pronouns analogous to \textit{there}, \textit{then}, and the like). Hence, in a sentence like \textit{Fay did it in the garden/at 2:30/because of the heat/with panache, in the garden} and at 2:30 are referential in a way that \textit{because of the heat} and \textit{with panache} tend not to be.

\textit{Where} and \textit{when}, being referential adjuncts, essentially have the distribution of

\(^{14}\) If the second conjunct of a gapping sentence like \textit{Why did Fay visit Kay and why Jon Ron?} has a PF representation of \textit{why, Jon [GAP Ron e]}, the acceptability of such sentences would suggest that the PF condition of head government does not extend to empty adjuncts. Compare (12b,c,d) and (14b,c), which are significantly worse. We shall continue to keep our options open on whether adjuncts are immediately dominated by VP, as argued by Andrews (1982). If they are, then we might limit the PF requirement of lexical government to empty NPs and Comps, as suggested in the text.

Our agnosticism also extends to postverbal subjects in Italian, which may or may not be lexically governed by the verb. If such subjects are lexically governed, then one would expect no CED effects for extraction from within them, which seems not to be the case. We shall pursue these issues in future work.
direct object \textit{wh}-NPs and may undergo long-distance movement. Items that are not referential, however, are not subject to Principle C of the binding theory. Since they are not referential, they may be coindexed with Agr and thus with the subject NP without violating Principle C. Therefore, they have an accessible SUBJECT in their local Agr and hence a Domain, the local S’, just like a subject NP. This entails that \textit{why} and \textit{how} must move to their local Comp in the syntax. Failure to move in the syntax entails that the variable will not be bound since there will be no coindexed Comp, given that Comp indexing takes place at S-Structure.

As a further illustration of the point, consider (28).

(28) a. Who remembers what we bought \textit{where}?  
b. *Who remembers what we bought \textit{why}? 

(28a) may be understood with a pairing between \textit{who-where}, and a reasonable answer might be ‘‘Fay remembers what we bought in NY and Kay remembers what we bought in DC’’; it may also be understood with a pairing between \textit{what-where}, with the possible answer ‘‘Fay remembers that we bought a sweater in NY and a ring in DC.’’ (28b), on the other hand, has no interpretation. \textit{What} must have moved to Comp in the syntax in order to satisfy the selectional restrictions on \textit{remember}, and its index must percolate to Comp. Therefore, if \textit{why} were to move to Comp at LF (as is required for the pairing interpretation), its “\textit{trace}” could not be bound in its Domain. We account for the difference between the (a) and (b) structures in (26)–(28) in terms of the potential referentiality of locational and temporal expressions versus reason and manner expressions. In fact, English has referential equivalents of \textit{why} and \textit{how}, namely, prepositional phrases like \textit{for what reason} and \textit{in what manner}. So (28b) becomes grammatical if \textit{why} is replaced by these prepositional phrases. If \textit{for what reason} is referential, then it is subject to Principle C of the binding theory and the residue of LF movement has no Domain and does not need to be bound by a coindexed Comp.

Huang (1982) noted the nonoccurrence of sentences like (27b), \textit{Who left why?}; equally ungrammatical is \textit{Kay wondered who left why}. Under our analysis, the S-Structure form of the latter sentence is (29a). \(e_i\) meets the PF requirement of head government, being governed by the indexed Comp at S-Structure. If \textit{why} moves to Comp at LF, the resulting structure will be (29b) and the adjunct \(e_j\) is not bound in its Domain.

(29) a. Kay wondered \([\text{[\textit{who}_i,j}, [e_i, \text{left why}]]\)  
b. Kay wondered \([\text{[\textit{why}_j, \text{who}_i,j}, [e_i, \text{left } e_j]]\)

15 Hence, \textit{what reason/manner} may be used as a subject or object (\textit{What reason was given?/What manner was adopted?}) and may be modified by an adjective (\textit{for what important reason, in what brutal manner}). It might be the case that some speakers may sometimes treat \textit{why} and \textit{how} referentially by analogy to \textit{for what reason} and \textit{in what manner}; such speakers would be inclined to accept all of (26)–(28). However, here we follow the usual judgments in the literature. To the best of our knowledge, ‘\textit{when}’ and ‘\textit{where}’ are not treated nonreferentially in any language and never have nonreferential counterparts.
3.4. Chinese

Our analysis of wh-in-situ expressions, and particularly the treatment of why and how, carries over nicely to languages like Chinese and Japanese that exhibit no syntactic movement to Comp (but see the discussion of (42)). For grammars that contain no syntactic movement, the PF requirement of head government is irrelevant. Our model predicts that anaphors will show no that-trace effects in such grammars; only generalized binding is relevant for the distribution of traces at LF. Let us see how this works out.

Unlike English, French, Italian, and so on, Chinese allows reflexives to occur as the subject of finite verbs (Huang (1982)).

(30) a. Zhangsan shuo [ziji hui lai].
Zhangsan say self will come
‘Zhangsan said that himself will come.’

b. Zhangsan shuo s[s[ziji you mei you qian] mei guanxi].
Zhangsan say self have not have money not matter
‘Zhangsan said that whether himself has money or not didn’t matter.’

Huang argues that whether a clause is finite or nonfinite in Chinese, its Infl does not contain Agr. Therefore, an element in subject position has no accessible SUBJECT in its own clause. There may, however, be an accessible SUBJECT in the next higher clause (30a) or the next but one (30b) (namely, the subject Zhangsan); that clause will be the Domain for ziji.

Huang also showed in detail that Wh Movement is restricted to LF in Chinese. Thus, one finds sentences like those in (31), which have the LF structures in (32). The verb wen 'ask' requires a [+wh] complement, whereas xiangxin 'believe' requires a [−wh] complement, and these requirements hold at LF. The selectical properties of the matrix verb ensure that shei 'who' moves only to the local Comp in (32a) but must be moved out of its clause in (32b).

(31) a. Zhangsan wen wo [shei mai-le shu].
Zhangsan ask I who buy-Asp book
‘Zhangsan asked me who bought books.’

b. Zhangsan xiangxin [shei mai-le shu].
Zhangsan believe who buy-Asp book
‘Who does Zhangsan believe bought books?’

(32) a. Zhangsan wen wo [[shei], [e, mai-le shu]]
b. [[shei], [Zhangsan xiangxin [e, mai-le shu]]]

If Infl does not contain Agr in Chinese, there is no accessible SUBJECT for e, in (32); hence, the lower clause is not a Domain. The higher subject cannot act as a SUBJECT for an Ā-anaphor because coindexing between an Ā-anaphor and a higher subject would make it Ā-bound, violating Principle C of the binding theory. Therefore, e, in (32b) has no Domain in which it must be bound by Comp, and instead it must be linked
to a quantifier. Consequently, there is no subject-object asymmetry for LF extraction in Chinese. Both sentences in (33) are well-formed, regardless of whether shei moves from a subject or from an object position. Notice also that the LF structure of (33a) would be ruled out if the requirement of head government were to apply to the residues of LF extraction, an important point to which we shall return.  

(33) a. Zhejian shi s{gen s[ shei lai]} zui you guanxi?  
   this matter  who come most have relation  
   ‘Who is it that this matter has most to do with his coming?’  
   b. Zhejian shi s{gen s[ ni xihuan shei]} zui you guanxi?  
   this matter with you like who most have relation  
   ‘Who is it that this matter has most to do with your liking him?’  

Under this analysis a sentence like (34) is ambiguous and may be construed as a direct question on either of the two wh-words, giving the LF structures of (35) (where, as in (33a), the residue of shei in (35b) is not head-governed).

(34) Ni xiang-zhidao [shei mai-le sheme]?
   you wonder who buy-Asp what
   a. ‘What is the x such that you wonder who bought x?’
   b. ‘Who is the x such that you wonder what x bought?’

(35) a. s{shemej s[ ni xiang-zhidao s[ shei s[e1 mai-le e2]]]}  
   what you wonder who buy-Asp
   b. s{shei s[ ni xiang-zhidao s[shemej s[e1 mai-le e2]]]}  
   who you wonder what buy-Asp

However, the examples in (36) are not ambiguous in the same way, nor are the corresponding sentences with zeme ‘how’. ‘Who’ and ‘what’ may have wide scope over the matrix clause, with ‘why’ having narrow scope over the embedded clause under ‘wonder’, but not vice versa.

(36) a. Ni xiang-zhidao [shei weisheme mai-le shu]?
   you wonder who why buy-Asp book  
   ‘Who is the x such that you wonder why x bought books?’

(36b) a. Ni xiang-zhidao [Lisi weisheme mai-le sheme]?
   you wonder Lisi why buy-Asp what  
   ‘What is the x such that you wonder why Lisi bought x?’

Shei in (36a) and sheme in (36b) have no Domain and therefore are not subject to the binding theory. Weisheme ‘why’, however, is not subject to Principle C of the binding

16 We can dispense with Huang’s assumption (followed by Lasnik and Saito) that Infl is a proper governor at LF in Chinese. As argued in the text, movement at LF does not require that the trace be properly governed. As Aoun (1986) notes, this assumption about Infl is rather odd: the Infl in Chinese is taken to be rather anemic since there is no apparent agreement element. Therefore, it is odd to claim that Infl should act as a proper governor in Chinese but not in languages where it is realized morphologically. See also our discussion of (42), which shows that making Infl a proper governor is empirically inadequate.
theory and therefore has an accessible SUBJECT in each case: the subject NP. Consequently, it has a Domain in both structures, namely, the embedded clause. It therefore must be bound in the embedded clause, and so the lower Comp must have the index of weisheme. The LF structure of (36a) is (37a), where there may or may not be a trace of shei ‘who’ in the lower Comp, depending on whether LF movement is successive cyclic (see discussion below). (37b) is not a well-formed LF structure. Recall that in Chinese index percolation takes place at LF and selectional restrictions must be satisfied there. (37b) is not a possible indexing configuration for the lower Comp because the index that has percolated is the index of the intermediate trace and, since intermediate traces are always [\(-wh\)] (as argued by Lasnik and Saito (1984)), the selectional restrictions of ‘wonder’ are not satisfied. (37c), where the index of ‘who’ has percolated to Comp, is not a well-formed LF structure because the trace of the adjunct is not bound in its Domain.

\[(37)\] a. who, you wonder [\( [(e_j \text{ why})_j \text{ e}_i \text{ buy book e}_j] \)]

b. why, you wonder [\( [(\text{who} \text{ e}_j) \text{ e}_i \text{ buy book e}_j] \)]

c. why, you wonder [\( [(\text{who} \text{ e}_j) \text{ e}_i \text{ buy book e}_j] \)]

Huang (1982) makes the relevant distinctions by claiming that ‘who’ and ‘what’ are characterized as NPs in Chinese, whereas ‘why’ and ‘how’ are not. He also points out that ‘who’ and ‘what’ are arguments of predicates, whereas ‘why’ and ‘how’ are adjuncts to predicates or predicates themselves. In this respect ‘where’ and ‘when’ in Chinese pattern like ‘who’ and ‘what’; (38) is ambiguous.

\[(38)\] Ni xiăng-zhidao [Lisi zai nali mai-le sheme]?

  you wonder Lisi at where buy-Asp what

  a. ‘What is the x such that you wonder where Lisi bought x?’
  b. ‘Where is the place x such that you wonder what Lisi bought at x?’

Although (36a) is not ambiguous in the same way as (34), there is in addition an interpretation in which both wh-words are paired in the embedded clause, but not one in which both are paired in the matrix clause. Alongside the LF structure (37a), then, (39a) is also available, but not (39b). (Similarly, (36b) and (38) have readings where both items have embedded scope.)

\[(39)\] a. you wonder [\( [(\text{who} \text{ why})_j \text{ e}_i \text{ buy books e}_j] \)]

b. *[\( [(\text{who} \text{ why})_j \text{ you wonder } [(e_j) \text{ e}_i \text{ buy books e}_j] \)]

c. you believe [\( [(\text{who bought the book why}] \)]

d. [\( [(\text{who} \text{ why})_j \text{ you believe } [(e_j) \text{ e}_i \text{ bought the book e}_j] \)]

In (39a) \( e_j \) is bound in its Domain by the indexed Comp; \( e_i \) has no Domain (since there is no Agr in Chinese) but is coindexed with a quantifier. If the index of ‘who’ had percolated, \( e_j \) would not be bound in its Domain. (39b) is well-formed from the viewpoint of binding, \( e_j \) being bound in its Domain. However, since nonphonetic items are [\(-wh\)], the selectional restrictions of ‘wonder’ are not met and so (39b) is not an available
interpretation. This in turn correctly permits (39c) in Chinese to have the interpretation in which both 'who' and 'why' have matrix scope: (39d).

Our earlier analysis of English will now carry over to Chinese in the following way. An LF structure along the lines of (40a), which is equivalent to (38b), may exist in Chinese as in English. The residue $e_i$ has no accessible SUBJECT and consequently no Domain in which it must be bound.

(40)  a. where $e_i$ do you wonder [what$_j$ [Lisi bought $e_j$ $e_i$]]
   b. why$_i$ do you wonder [what$_j$ [Lisi bought $e_j$ $e_i$]]
   c. why$_i$ do you wonder [[what$_j$ $e_j$] Lisi bought $e_j$ $e_i$]

On the other hand, $e_i$ in (40b) does have an accessible SUBJECT, the overt subject Lisi; coindexing $e_i$ with Lisi is harmless because nonreferential adjuncts are not subject to Principle C. Therefore $e_i$ has a Domain and must be bound within it. (40b) cannot be redeemed by moving 'why' successive cyclically, yielding the LF structure (40c). Here the lowest $e_i$ is bound in its Domain, as required, if the local Comp bears the index of 'why'; but then the resulting LF structure does not meet the selectional restrictions of 'wonder', because the head of the Comp is [−wh], being nonphonetic.

Long-distance LF movement of weisheme is possible where no pairing interpretation is needed. So the LF structure of (41a) is (41b). Here the intermediate "trace" in the lower Comp is needed as a binder for the adjunct, whose Domain is the lower clause. So far we have kept our options open, but this suggests that LF movement in fact can be free to apply successive cyclically (likewise (39d)). Since we follow Lasnik and Saito in taking intermediate traces, including intermediate "traces" of LF movement, as [−wh], the selectional restrictions for xiangxin are satisfied.

(41)  a. Zhangsan xiangxin [Lisi weisheme mai-le shu]?
       Zhangsan believe Lisi why buy-Asp book
       'Why does Zhangsan believe Lisi bought books?'
   b. why$_i$ Zhangsan believe [[e$_j$]$_i$ Lisi e$_j$ bought books]

So the LF extraction of adjuncts in Chinese operates as our model predicts, given that there is no Agr and that selectional restrictions hold at LF in this language. What we have called referential adjuncts may move freely, whereas nonreferential adjuncts must be locally bound in their Domain. Therefore, it seems to be right not to key the behavior of adjuncts to properties of Infl, nor to any PF requirement of head government or whatever. The PF conditions on empty elements are irrelevant in Chinese, but the same distinctions are manifested for adjuncts as in English, strongly suggesting that LF conditions are involved.

There is some striking evidence that our PF/LF division is correct and that the scope of Chinese interrogatives should not be related to lexical government or properties of Infl. It has generally been supposed that Chinese has no syntactic Wh Movement (Huang (1982)). However, Steve Harlow (personal communication) notes that there is a movement process for topicalized expressions and that this process exhibits a clear subject-
object asymmetry. Thus, alongside (42a) one sometimes finds topicalized expressions like (42b), but never comparable cases such as (42c) where the subject is topicalized.

(42) a. John $s$[dui Bill hen xihuan Mary] hen shangxin.
   John to Bill very like Mary very sorry
   ‘John is sorry that Bill likes Mary.’

b. ?Mary$i$, John [dui Bill hen xihuan ei] hen shangxin.
   ‘Mary, John is sorry that Bill likes.’

c. *Bill$i$, John [dui ei hen xihuan Mary] hen shangxin.
   ‘Bill, John is sorry likes Mary.’

(42b) is less than felicitous, and Li (1985) claims that this may be due to a Subjacency violation. However, (42c) is thoroughly unacceptable, as our model would predict. (42c) contains a trace that is not head-governed, thus violating our PF condition, which is usually not manifested in Chinese. Even if dui is to be analyzed as a preposition, prepositions do not act as proper governors (see section 4.3); furthermore, the ungrammaticality of (42c) provides another reason not to treat Infl as a proper governor in Chinese. Also, even if Bill were to move first to its local Comp, then to the higher Topic, the subject trace would fail to be head-governed since Comps remain unindexed in Chinese until LF. (42b), on the other hand, is less bad because the trace is lexically governed by the verb xihuan. This poses serious problems for efforts to reduce the effects of lexical government entirely to antecedent government, and it strongly motivates the independence of the PF condition. The reason is that Chinese shows no subject-object asymmetry at LF, as (33)–(36) show. But (42b,c) indicate that, once there is overt movement, Chinese (like English) displays the predicted asymmetry. Our theory demands that traces of overt movement be head-governed, but not the residues of LF movement. Hence, it predicts subject-object asymmetries in cases of overt movement that do not occur in cases of LF movement because Chinese lacks Agr.

3.5. French

So far we have considered two languages where movement of a single wh-word is either almost nonexistent, as in Chinese, or obligatory, as in English. In French, however, wh-words may move either in the syntax or at LF, as observed by Aoun, Hornstein, and Sportiche (1981). So (43a) exists alongside (43b).

(43) a. Tu as vu qui?
   ‘You saw whom?’

b. Qui as-tu vu?
   ‘Whom did you see?’

LF movement in French operates as we would now expect. For example, (44a) does not occur because French allows overt movement, with the result that Comp indexing takes place at S-Structure; consequently, if the lower subject moves at LF, the residue
of movement fails to be Ā-bound in its Domain, which is the lower S’ (in which Agr acts as an accessible SUBJECT). In contrast, (44b), where a wh-word moves from an object position at LF and thus has no Domain, is well-formed.

(44) a. *Jean se rappelle [que quoi m’intéresse]?
   ‘John remembers that what interests me?’
   b. Jean se rappelle [que j’aime quoi]?
   ‘John remembers that I like what?’

We shall discuss the behavior of adjuncts in French in section 4.1.

4. Interaction of PF and LF Conditions

Having shown some effects of the PF condition of head government for empty NPs and some effects of the LF binding theory, we turn now to cases where the conditions interact in crucial ways to account for complex data.

4.1. Syntax of Adjuncts

Recall our treatment of the that-trace effect.

(45) a. whoi did Fay say [[ei that] ] ei left
   b. whoi did Fay say [[ei that], e , left]
   c. whoi did Fay say [[ei that], e , left]
   d. whoi did Fay say [[ei , that] , e , left]
   e. whoi did Fay say [[ei , e ] , e left]

Of the structures (45a–e), only (45e) is well-formed given the conditions we have proposed. In (45a) the empty subject of the embedded clause is neither head-governed nor bound because the Comp has no index. In (45b) the PF requirement of head government is violated because the index on Comp does not match the index of the empty subject. In (45c) the subject satisfies the PF requirement and is bound in its Domain, but the structure has a phonetic nonhead in Comp, which is not possible in English (see (19)). (45d) is ill-formed because the lower Comp has two indices, which violates the prohibition against double-headed structures. (45e), however, is well-formed because that is deleted (de-phoneticized) in PF; the trace has percolated its index to the Comp and consequently the subject trace is both head-governed and bound in its Domain.

It is worth noting the mechanisms used to derive the that-trace effects. We have adopted the Comp-indexing rule of Aoun, Hornstein, and Sportiche (1981), interpreting the process as one of percolation: an element in Comp may freely percolate its index. However, Comp may only have one index because double-headed structures are generally prohibited. On this account, unlike the account of Lasnik and Saito (1984), the complementizer that may bear an index and percolate it to Comp. After all, if verbs may subcategorize complements with that and a finite verb, it is natural that that may bear an index.
Grammars may or may not allow more than one item in Comp at PF. Unlike Lasnik and Saito’s (1984) universal filter, this reflects a parameter of language variation. Similarly, grammars may vary in their ability to delete items in Comp. This predicts that the that-trace effects will covary with the ability to have two items in Comp. Thus, Dutch allows two items in Comp and also shows apparent that-trace violations, as pointed out by Koopman (1984) and others.

(46) Wie denk je dat hem gezien heeft?
who think you that him seen has
‘Who do you think has seen him?’

Denis Bouchard (personal communication) notes that Quebec French also lacks (19) (Je me demande à qui qu’elle parlait) but does not allow analogues to (46) because of the rule that changes the complementizer que to qui (*Qui que tu penses qui* que va venir?).

Our account makes some interesting predictions about the interaction of Comp Deletion and the movement of items like why. As noted earlier, why leaves behind a trace that is an Â-anaphor bound in its Domain. Unlike the traces of who, what, where, and when, the trace of why generally has an accessible SUBJECT; therefore, its Domain is the first S’ that contains it. This predicts that movement of why in a language allowing only one item in Comp will be sensitive to the presence of intervening complementizers. Thus, in (47a) why may be interpreted as asking either for the reason for the boat sinking or for the reason for Fay’s statement. In (47b), however, only the second reading is appropriate. In (47c) why can be interpreted relative to think, say, or sink. In (47d) it can be interpreted only relative to think, and in (47e) it can be interpreted only relative to think or said. In short, why cannot be interpreted as originating in or moving through a clause with an overt complementizer. In effect, why shows that-trace effects, as our model predicts.

(47) a. Why did Fay say the boat sank?
   b. Why did Fay say that the boat sank?
   c. Why does Ray think Fay said the boat sank?
   d. Why does Ray think that Fay said the boat sank?
   e. Why does Ray think Fay said that the boat sank?
a’. whyt Fay said [(c], the boat sank et]
b’. whyt Fay said [(c, that]t, the boat sank et]
d’. whyt Ray think [(c, that]t Fay said [(c, the boat sank et]}

The S-structures of (47a,b) are (47a’,b’). To satisfy the demands of the binding theory, the index of why and of the intermediate trace of why in (47b’) must percolate to Comp. This poses no problem in (47a’), but (47b’) violates (19). The same reasoning would apply in the case of (47d), where the trace in the lowest Comp must be bound in its Domain, which is the next S’ up. However, that Comp contains that and therefore has the index of that, and so the trace in the lowest Comp is not bound in its Domain (47d’).

Intermediate complementizers have no analogous effects on the movement of who,
what, and so forth. In a structure like (48) the rightmost trace is both head-governed at PF and bound in its Domain at LF.

(48) who, you think [[e, that], Fay said [[e, e] left]]

The trace in the lowest Comp is properly governed by the bridge verb said, but, having no accessible SUBJECT, it has no Domain and therefore does not need to be bound (if the trace in Comp were coindexed with the higher Agr, then it would be coindexed with the higher subject and the coindexed variable in subject position would end up A-bound, violating Principle C). Therefore, it is of no consequence that the next higher Comp has the index of another element, that. Consequently, Who do you think that Fay said left? is well-formed.

This explanation turns on the fact that English allows no phonetic nonhead in Comp at PF. This suggests that where wh-words move at LF, the presence or absence of intermediate complementizers should have no effect on the scope of why, because the limitation of items in Comp will be irrelevant.\(^{17}\) We showed in the last section how that works out for Chinese. It also holds true for Japanese: in (49), if naze moves first to the embedded Comp and then to the higher Comp at LF, percolating its index in each case, the residues will be bound in their respective Domains by the indexed Comp, regardless of the fact that the lower Comp also contains tte (filter (19) refers to phonetic material and therefore does not hold at LF).

(49) Bill-wa [John-ga naze kubi-ni natta tte] itta no?
    Bill John why was fired Comp said Q
    \textquoteleft Why did Bill say John was fired?\textquoteright

Dutch allows two elements in Comp, and \textquoteleft why\textquoteright{} may move syntactically from a clause with an overt complementizer (50a). Crucially, however, Dutch does not allow movement of \textquoteleft{}why\textquoteright{} and \textquoteleft{}how\textquoteright{} at LF, as our model predicts; see (50b) versus (50c). If

\(^{17}\) Our model predicts that extraction from within an adjunct should be permissible at LF. Recall that we derive the CED by using the fact that all traces must be properly governed by a lexical head at PF (footnote 7). Therefore, LF movement should not be subject to such a condition and the CED should not apply to LF movement. This prediction is borne out in Japanese and Chinese, where the only movement takes place at LF.

(i) [Dare-ni atte kara] uti-ni kaetta no?
    who-to meet after house-to went-back Q
    \textquoteleft Who did you go home after meeting?\textquoteright

(ii) [Ni zeme dui ta jiang nasye hua hou] ta cai likai ne.
    you how to him say these words after he then leave
    \textquoteleft After how you said those words to him then he left.\textquoteright

In the Japanese example (i) dare has been extracted at LF, and in the Chinese example (ii) zeme has been moved at LF. These examples are taken from Lasnik and Saito (1984) and Aoun (1986).

Similar facts seem to hold in English. Thus, (iv) seems to be a tolerable double question, whereas (iii) is thoroughly unacceptable. (iii) violates the CED (that is, proper government at PF) and hence is ungrammatical: the trace in the lower Comp is not properly governed. (iv), on the other hand, involves no movement before PF and hence no CED violation.

(iii) *what, did Fay go home after S[e, Kay ate e,]
(iv) Who went home after Kay ate what?
‘how’ were to move at LF, it could not be bound in its Domain, the lower clause, because the Comp already bears another index.\textsuperscript{18}

\begin{enumerate}
\item[(50) a.] \textit{Waarom dacht Jan dat Kees gekomen was?} \item[(50) b.] \textit{ik vraag me af [{\textit{[wie],} e, hoe de hond geslagen heeft}] I wonder who how the dog hit} \item[(50) c.] \textit{ik vraag me af [{\textit{[wie],} e, waar de hond geslagen heeft}] I wonder where the dog hit}
\end{enumerate}

The limitations on the syntactic movement of nonreferential adjuncts ‘why’ and ‘how’ do not apply to the referential adjuncts ‘where’ and ‘when’, which may move freely across intervening complementizers, as predicted. In a structure like (51a) the lowest $e_i$ has the lower clause as its Domain, the local Agr being the accessible SUBJECT. It therefore must be Â-bound in that Domain. It will be Â-bound only if Comp has the index $i$. If the Comp has the index $i$, then there can be no \textit{that} at PF, since English does not allow a phonetic element in Comp in addition to the head. Consequently, \textit{Why did she say there are men outside?} may have a lower-clause interpretation for \textit{why}, but \textit{Why did she say that there are men outside?} may not, and the difference turns on the fact that English is subject to filter (19).

\begin{enumerate}
\item[(51) a.] \textit{*why, did she say [{\textit{[e, that],} there are men outside e$_i$}]} \item[(51) b.] \textit{where, did she say [{\textit{[e, that],} there are men outside e$_i$}]}
\end{enumerate}

\textit{(51b)} avoids this problem because the trace of \textit{where}, being subject to Principle C, has no Domain and thus does not need to be bound in the lower clause. This entails that nonreferential adjuncts may not move at LF in English, but that they may undergo long-distance movement in the syntax if no complementizer is present at PF.

We take these judgments to represent the core case: that \textit{where} may generally be understood in a lower clause but \textit{why} may not if a complementizer is present. The facts are particularly clear where \textit{that} cannot be deleted. Hence, (52a) may be understood with \textit{where} in the lower clause—that is, as a question about Ray’s address—but there is no analogous reading for \textit{why} in (52b), if the complementizer \textit{that} is present.

\begin{enumerate}
\item[(52) a.] \textit{Where did Fay persuade Kay that Ray lived?} \item[(52) b.] \textit{Why did Fay persuade Kay that Ray left?}
\end{enumerate}

It is important to note that this differs from what is assumed in some of the literature. Aoun (1986), Huang (1982), and Lasnik and Saito (1984), for example, construct models that allow \textit{why}, like \textit{where}, to move to a higher clause; they cite examples like \textit{Why do}

\textsuperscript{18} Speakers agree that \textit{hoe} may not remain in situ in (50b), but some speakers accept the comparable sentence with \textit{waarom}. This suggests that \textit{waarom} may have an analogical referential reading, equivalent to ‘for what reason’, as discussed earlier. Perhaps this could be related to the fact that \textit{waarom} can be analyzed as two words, with \textit{waar} treated as an argument of the preposition \textit{om}; no such analysis is available for \textit{hoe}.
you think Peter left?, where why may indeed be understood in the lower clause. But there seems to be no such interpretation for (52b).

Minimal pairs of sentences like those in (26)–(28) and (52) show quite clearly that why and how behave differently from where and when and are sensitive to intervening complementizers. However, the facts themselves are worth discussing. Some speakers claim to get a lower-clause interpretation for why in (51a) even if a complementizer is present. However, we have found that when asked to repeat the sentence, those speakers omit that, as if it were not perceived. Where that cannot be omitted, as in (52b), speakers never claim a lower-clause reading for why. It is crucial to note that this holds for why and how; there is no difficulty interpreting who, what, where, or when in the lower clause: Who did Fay persuade Kay that Ray loved?, Where did Fay persuade Kay that Ray lived? Similarly, one can sometimes extract who, what, where, or when from within a wh-island (?What did Fay wonder whether Kay bought?), although this is quite impossible for why and how: *Why did Fay wonder whether Kay bought a cup? (which is ungrammatical with a lower-clause reading for why).

Compare also (53a) and (53b). In (53a) the purpose clause is best understood in the lower clause, in which case why can only be understood in the higher clause and the presence or absence of that makes no difference. In (53b), however, the purpose clause may only be understood in the upper clause, in which case it is most natural to interpret why in the lower clause and therefore that may not occur.

(53) a. Why did Fay say (that) Kay quit her job in order to cause trouble?
   b. Why did Fay, in order to cause trouble, say (*that) Kay quit her job?

The behavior of nonreferential adjuncts in French may cast some light on disagreements about the status of (51a). Like their English counterparts, the nonreferential French adjuncts pourquoi ‘why’ and comment ‘how’ generally do not move long distance if a complementizer is present. Consequently, (54a) does not exist with a nonreferential reading, nor does the corresponding LF structure, in which pourquoi moves to the top at LF (54b).

(54) a. *Il dit [que Marie est partie pourquoi]?
   b. *pourquoi, dit-il [(e, que e,)] [Marie est partie e,]

The sentences of (54) do exist, however, at least for some speakers, but with a referential reading in which pourquoi is understood as ‘for what reason’. Dominique Sportiche (personal communication) points out that comment in situ is understood as an instrumental and not as a manner adverb, and pourquoi in situ is interpreted as purposive and not as causal. Thus, Tu as ouvert la porte comment? ‘You opened the door how?’ may be answered naturally Avec une clef ‘With a key’ but not Avec violence ‘With violence’. Similarly, Tu es venu pourquoi? ‘You came why?’ may be answered Pour visiter Marie ‘To visit Marie’ but not Parce que j’étais malade ‘Because I was sick’. This suggests that pourquoi and comment have both referential and nonreferential senses for some
speakers. Given the two senses, (54) and the corresponding sentences with comment exist, but only with the referential senses and not with the causal or manner sense; consequently, the referential senses of these items have the same distribution as ‘where’ and ‘when’, which are invariably R-expressions.

This suggests that English speakers who accept (51a) may be able to use why referentially, in the sense of ‘for what reason’. But the acceptability of (51a) for such speakers does not seem to us to indicate grammaticality, unless they also accept (26)–(28) and the like; rather, an analogical process is involved. Notice that the referential reading of why is equivalent to ‘for what reason’ and not ‘for what cause’. Hence, there seems to be a difference between (55a) and (55b). Since the complementizer is present, why must have the referential reading with the lower-clause interpretation. The oddness of (55b) with the lower-clause interpretation of why directly reflects the oddness of asking For what reason is it raining?. This in turn reflects the fact that there are causes for rain but not reasons.

(55) a. Why did Fay say that Ray quit?
   b. Why did Fay say that it was raining?

In fact, we predict a three-way gradation. (55b) is clearly worse than (55a) with the lower-clause interpretation for the reason given. (55a) in turn is not as good as Why did Fay say Ray quit?, which requires no analogical reading of why as a referential expression. Similarly, Why did Fay say there was a man in the garden? can be understood with a lower-clause interpretation on why, inviting an answer like In order to rake the leaves. However, Why did Fay say that there was a man in the garden? (with the complementizer) is most naturally interpreted as a question about the reason for Fay’s statement.

Our account naturally predicts some anti-Superiority phenomena. Ignoring the possible ‘for what reason’ interpretation of why, (56a) is ill-formed because the residue of why fails to be bound, there being no coindexed Comp. Similarly, in (56c) the residue of why is not bound by a coindexed Comp at LF. The residues of who and what in (56b) do not need to be bound because they have no Domain. Likewise for what in (56d).

(56) a. *Who did Fay persuade to leave why?
   b. Who did Fay persuade to buy what?
   c. ??What did Fay buy why?
   d. Why did Fay buy what?

Building on the discussion in section 3, we have argued here that ‘why’ and ‘how’ behave differently from ‘where’ and ‘when’ across languages and that grammatical theory must therefore distinguish different types of adjuncts. We have claimed that ‘why’ and ‘how’ are generally not referential and hence not subject to Principle C of the binding theory, although they are sometimes used referentially by analogy to ‘where’, ‘when’, for what reason, and in what manner. This means that they have different LF properties and consequently manifest that-trace effects in grammars with condition (19). This ac-
count predicts quite different phenomena in English, Chinese, Dutch, French, and Japanese, and the predictions seem to be accurate.\textsuperscript{19}

4.2. Superiority

It should be clear that the proposed model entails that \textit{that}-trace violations occur only in cases of overt syntactic movement. No \textit{that}-trace effects are found in the context of LF movement in languages that permit syntactic movement. As noted by Aoun, Hornstein, and Sportiche (1981) and by Lasnik and Saito (1984), the presence or absence of \textit{that} has no effect on the acceptability of \textit{wh}-in-situ constructions. Thus, (57a) is equally acceptable whether \textit{that} is present or not, and (57b) is equally unacceptable. For such sentences, only the binding theory is relevant: Comp indexing takes place at S-Structure in English, and the subordinate \textit{wh}-items move only at LF and therefore cannot be bound by an indexed Comp.\textsuperscript{20}

(57) a. Fay remembers who said (that) Kay bought what?
   b. ?Fay remembers who said (that) who left?

Our model also entails that we cannot subsume Superiority violations under the requirement of proper government, since these violations involve LF movement and the results of LF movement are not subject to conditions of proper government. Since they cannot be treated in parallel, we are not surprised to find that they do not have the same level of unacceptability. Superiority violations may be virtually eliminated by making the \textit{wh}-elements heavier, as in (58), but this is not so for \textit{that}-trace violations: (59b) is no better than (59a).

(58) a. *Fay remembers what who bought?
   b. Fay remembers which books which students bought?
(59) a. *Fay remembers who Kay said that left?
   b. *Fay remembers which students Kay said that left?

This long-noted difference suggests that the two types of violations should not be treated in unitary fashion. For us, \textit{that}-trace violations reflect the PF condition of head government, whereas Superiority phenomena are due to something else. Some Superiority phenomena like (58a) reflect the demands of binding theory. At S-Structure the Comp of (58a) has the index of \textit{what}; consequently, when \textit{who} moves to Comp at LF, its residue cannot be bound in its Domain. In that case expressions like \textit{which students} in (58b) may not be subject to the binding theory; see Weinberg and Hornstein (1986) for an analysis. However, as noted by Hendrick and Rochemont (1982), there are cases of "pure" Superiority that are clearly unrelated to the demands of proper government

\textsuperscript{19} It also permits a simple account of the Polish data discussed by Lasnik and Saito (1984); see Hornstein and Lightfoot (1986).

\textsuperscript{20} This, of course, is not to say that languages without syntactic movement will not show subject-object asymmetries. Some such asymmetries follow from our formulation of the binding theory, although they will be manifested only in languages with Agr, unlike Chinese.
or binding.\(^{21}\) (60a) is significantly better than (60b), although the trace of what in (60b) is properly governed, just like the trace of who in (60a). This strongly suggests that a condition other than proper government and binding is needed for such Superiority cases.

(60) a. Who did you tell to read what?
   b. *What did you tell who to read?

Similarly, Dutch lacks filter (19) and exhibits apparent that-trace violations, but it does not violate the Superiority Condition.

(61) a. Ik vraag me af wie wat zag.
   I wonder who what saw
   ‘I wonder who saw what.’
   b. *Ik vraag me af wat wie zag.
   I wonder what who saw
   ‘I wonder what who saw.’

If that-trace effects and Superiority violations are due to different processes, as in this model, the divergent levels of unacceptability and the absence of Superiority violations in Dutch are to be expected.

4.3. Preposition Stranding

A further property of our model concerns prepositions. We follow Kayne (1981b) in taking prepositions not to be proper governors, unlike the other lexical categories: noun, verb, and adjective. Embedding this claim in the model we have proposed makes some nice predictions.

It is well known that many prepositions, being closed-class items, have special phonological properties, behaving in some ways like syntactic dependents and clitics (Chomsky and Halle (1968), Kean (1981), among others). If they do not have the phonological properties of a syntactic category and if proper government is a PF condition, it is not surprising that they cannot act as proper governors at PF. Further, if prepositions are not proper governors, then prepositions cannot be stranded by syntactic movement because the trace following the preposition will not be properly governed. Only if the language has a particular device to make the trace governed (like the reanalysis rule of Hornstein and Weinberg (1981)) can a preposition be stranded. Our model automatically solves a problem with earlier accounts: although in most languages prepositions cannot be stranded syntactically, they can be stranded by LF movement quite uniformly. Thus, in (62) the item to the right of the preposition moves to Comp at LF, where it is paired with the item that is moved there in the syntax. Such movement does not involve pied-piping, as shown by Aoun (1985) and Huang (1982), but takes place even in a language

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\(^{21}\) This is noted in turn by Lasnik and Saito in a footnote. It is unclear how the facts described by Hendrick and Rochemont could be integrated into their theory. For some discussion of these cases, see Hornstein and Weinberg (forthcoming).
that never allows preposition stranding by syntactic movement (62b); moreover, it happens after so-called sentential prepositions in English, which cannot be reanalyzed onto the verb (62c).\footnote{Kayne (1983) argues that pied-piping does occur with LF processes. Weinberg and Hornstein (1986), however, present some new evidence against pied-piping at LF.}

(62) a. Who spoke to who?
   b. Qui a parlé avec qui?
   c. Who slept during which concert?

Under our model, only overt gaps must be governed by a lexical head, and this requirement holds at PF. Since head government is irrelevant for LF movement, preposition stranding at LF should occur freely, as seems to be the case. This conclusion follows without any assumptions about pied-piping at LF; all we need is the claim that prepositions are not proper governors and the requirement that proper government holds of empty categories at PF.

4.4. Subject-Auxiliary Inversion

We have adopted the view that Comp indexing takes place where needed to satisfy selectional restrictions: at S-Structure in languages with syntactic movement to Comp and at LF in languages that lack such movement. This enables us to distinguish the structures of (63).

(63) a. \([[\text{who}_i \text{ did}] \text{ e}_i \text{ leave}] \quad \text{or} \quad [[\text{who}_i], [\text{did} [\text{e}_i \text{ leave}]])
   b. \([[\text{who}_i \text{ did}] \text{ Fay see } \text{ e}_i] \quad \text{or} \quad [[\text{who}_i], [\text{did} [\text{Fay see } \text{ e}_i]])
   c. \([[\text{who}_i], \text{ e}_i \text{ left}]

In (63a) the auxiliary did has moved to some pre-S position, perhaps adjoined to S or in Comp; in neither case does the Comp properly govern the empty subject.

If did is adjoined to S, the Comp is not adjacent to the trace and so the empty subject fails to meet the PF condition of head government (we argue in the Appendix for an adjacency restriction on proper government). If the correct structure in (63a) has both who and did in Comp, then filter (19) must be refined to allow an auxiliary verb in Comp although it is not the head. Since Comp indexing in main clauses is not relevant for selectional restrictions, it is plausible to suggest that it need not take place here until LF, even in languages that otherwise percolate indices at S-Structure. In that case the Comp in (63) need not have an index until LF and filter (19) would apply only to indexed Comps at PF (an index being a condition for visibility at PF, as argued earlier). In (63a), then, the presence of an index on Comp would lead to a violation of (19) and the absence of an index would lead to the subject trace not being governed at PF. Consequently, whichever structure is adopted for (63a), the trace will not satisfy our PF requirement without leading to a violation of (19).

Compare the well-formed (63b), where the empty object is head-governed by the
verb. Here the Comp need not be indexed at PF, thus avoiding the effects of (19). In (63c) the subject trace is head-governed at PF; in this case, unlike (63a), there is no violation either of the adjacency restriction or of (19).23

Structures comparable to (63a) are well-formed in Dutch and other languages. If the verb moves to Comp, as we have assumed elsewhere in this article, then (19) does not operate in these languages: \([\text{wie}_i \text{ heeft}_j \text{, e}_j \text{ hem gezien}_j \] ‘Who has seen him?’ . If the preposed verb is adjoined to S, then the adjacency restriction on head government is relaxed. In either case a simple sentence like \(\text{Wie heeft hem gezien?} \) will act as an appropriate trigger.

We have argued that adjuncts like why and how, like anaphors in subject position, have a Domain and thus are subject to the binding theory. Unlike English subject traces, however, they tolerate subject-auxiliary inversion. Given an S-Structure form such as \([\text{why}_i (\text{did})] \) \(\text{Fay leave e}_i \), the \(e_i \) is governed by the verb leave at PF (but see footnote 14) and bound at LF by the Comp, which has its index at LF when the binding theory applies. Adjacency to the Comp is not relevant. If did is in Comp and if the index of why does not percolate to Comp before LF, the index will not be present at PF and hence there will be no violation of (19). (Compare also the work of Koopman (1983), who identified the ‘poverty of stimulus’ problem in (63a).)

4.5. Long-Distance NP Movement

Sentences like (64) have figured prominently in recent discussions.

(64) *Johni seems s[that it is certain s[e_i to like ice cream]]

On our account, (64) violates the binding theory: \(e_i \) is an A-anaphor and has a SUBJECT, hence a Domain, which is the S’ indicated. The SUBJECT is the Agr of the S’ clause; if \(e_i \) were to be coindexed with that Agr, it would also be coindexed with it and thus with the S that dominates it (the potential indexing is given in (65)). This indexing would

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23 Who has left? has the S-Structure form \([\text{[who]}_i \text{, e}_i \text{ has left}], \) where has does not move to Comp. Who did leave? does not have an analogous structure, because the nonemphatic do occurs only when Infl is separated from its verb.

Why is it impossible to say *Fay bought what why?, where both what and why move to Comp at LF, with why percolating its index to Comp? The reason is that wh-raising at LF takes place only to a Comp that is already \([+ \text{wh}], \) as proposed by Chomsky (1973) and by Aoun, Hornstein, and Sportiche (1981). In English a Comp is \([+ \text{wh}] \) when headed by a wh-item and thus indexed. In French, however, Comp may be intrinsically \([+ \text{wh}], \) containing an ‘abstract trigger’ that permits a wh-word to move to Comp at LF even though there may not be another wh-word already there: \(\text{Jean est parti pourquoi?} \) ‘Jean left why?’ is thus well-formed. See note 12 of Aoun, Hornstein, and Sportiche (1981) for details of this parameterization.

We have been assuming that in languages with overt Wh Movement, selectional restrictions are checked at S-Structure in addition to LF. If selectional restrictions were checked at PF rather than S-Structure, then extraction of why across a that Comp would be grammatical. Whether speakers check selectional restrictions at PF or S-Structure might be another way to account for the divergent judgments concerning examples such as (47b). Thus, if the grammaticality facts are as Lasnik and Saito claim, then a minor modification of our model would suffice to accommodate these data. However, it is less clear how they would account for the case in which extraction of why across a that Comp is ungrammatical.
not violate the $i$-within-$i$ Condition because that condition is relevant only for lexical anaphors, as argued by Sportiche (1983) and Aoun and Hornstein (1985).

\[(65) \ldots S[\text{that it} \ Agr_i \text{is certain} \ S[e_i \text{to like ice cream}]\]

The trace in (64) is lexically governed by certain, providing further evidence that lexical government is not a sufficient condition for well-formedness and thus that the disjunctive definition of proper government (1) is not correct.  

For the same reason (66) is ill-formed: if what were to be moved at LF to the uppermost Comp, its residue would have a SUBJECT, Agr, as long as the $i$-within-$i$ Condition does not apply to traces. In that case the structure is ill-formed because the residue of what would not be bound in its Domain, $S'$.

\[(66) \text{*who believes} \ S[\text{that [for what to happen] Agr would annoy me}]\]

4.6. Head Government as a PF Condition

In section 4 we have illustrated how the PF and LF conditions combine to account for some complex arrays of phenomena. We have shown the need for two distinct conditions applying to different representations. The binding theory clearly applies at LF, after the application of LF processes such as wh-raising to Comp. The condition of head government for phonetically empty elements clearly does not apply at LF because it applies to phonetically empty elements that are visible at PF, not, for example, to PRO with an “arbitrary” interpretation and not to the residues of movement at LF (as the lack of LF subject-object asymmetries in Chinese shows).  

We have assumed but not argued that this condition applies at PF and not at S-Structure. This is a natural assumption since the condition is defined in terms of phonological items, and we shall mention three factors here that force the condition to apply at PF if some common assumptions are made.

First, Saito (1984) offers an argument based on the Kobe dialect of Japanese that carries over perfectly to English. Right Node Raising (RNR) is a stylistic process leading

\[\text{Chomsky (1981, 306) treated (64) as a Subjacency violation, but see Chomsky (1986b) for counter-arguments.}\]

That (64) seems worse than a “mere” binding theory violation may be due to an additional violation of the $\theta$-Criterion. The men, were believed $e_i \text{were happy}$ is worse than The men, believed each other, were happy. It is reasonable to assume that $\theta$-roles are assigned only to well-formed chains (see Halk (1985) for a proposal along these lines); in that case, although both sentences violate the binding theory, the first also violates the $\theta$-Criterion in that the men has no $\theta$-role. Similarly, as noted by Edwin Williams (personal communication), Fay, was believed pictures of $e_i \text{were on sale}$ is worse than Who, did Fay believe pictures of $e_i \text{were on sale}$?; this difference would also be explained by saying that Fay has no $\theta$-role because $e_i \text{violates binding requirements.}\]

\[\text{Lasnik and Saito (1984) show that lexical government is not a sufficient condition for LF, discussing \text{*Who said he left why?} (pp. 246–247); in our framework, when why moves to the higher Comp at LF, its residue fails to be bound in its Domain, the lower $S'$, and similarly for an intermediate residue in the lower Comp. Our discussion of (64) points in the same direction. Furthermore, the Chinese examples (33a), (34b), (35b) suggest that lexical government cannot be a necessary condition for well-formedness at LF: in the LF structure (35b) the subject of the lower clause is not lexically governed, but the structure is well-formed. The same is true for (33a).}\]
to structures like (67), where that cannot be deleted. It is usually assumed that the complement clause is raised to a position where it is no longer governed by the verb.

(67) Fay believes and Kay asserted publicly [that the dean lied].

This shows that the condition of head government, which governs the deletability of complementizers (section 2.3), applies to the output of RNR; before RNR applies, that would be governed and hence deletable. It is sometimes claimed that RNR, being a stylistic rule, applies after S-Structure, and this must be correct because the rule does not affect binding relations: in (68) him must be interpreted as disjoint from James and John. This follows if the binding theory (requiring pronouns to be free in their Domain) applies to the structure preceding application of RNR, where him is c-commanded by James and John.

(68) James wants and John expects [him to win].

Second, an item in Comp may be deleted if it is governed by a lexical head. Thus, why may be deleted in (69a), where it is governed by reason, but not in (69b).

(69) a. the reason _[[why]],_ Fay left _e_ disturbed us all
   b. the reason he gave _[[why]],_ Fay left _e_ seemed specious

In both (69a,b), however, the _e_ must be bound in its Domain, the local S'. Consequently, why must be present at S-Structure in order for the binding theory to be satisfied at LF, being deleted in (69a) after S-Structure. Consequently, the condition on deletability must also apply after S-Structure, namely, at PF.

A third reason to take the condition of head government to apply at PF and not at S-Structure relates to the preposition stranding facts discussed in section 4.3. Since preposition stranding is generally possible at LF, the marked property that permits syntactic stranding in modern English is taken to apply at PF, following stylistic permutation rules that relate speak to Fay tomorrow and speak tomorrow to Fay. If, after these stylistic rules, the V governs the PP, then some process permits the V to govern the NP object of the preposition, permitting (70a) but not (70b,c).

(70) a. who_t will you speak to _e_t tomorrow
   b. *who_t will you speak tomorrow to _e_t
   c. *which concert_t did you sleep during _e_t

This would be achieved by a reanalysis process along the lines of Hornstein and Weinberg (1981) or a process that extended government across the PP node. Whatever that process is, it must apply at PF, after the level that feeds LF processes, and after stylistic rules that can affect government relations. Consequently, the condition that empty items must be head-governed cannot apply until after that marked PF process has taken place.
5. Conclusion

We have argued that the ECP should be split: lexical government is a requirement for empty elements that are visible at PF, and generalized binding holds for all anaphors at LF, whether empty or not. Since only syntactic gaps are subject to the requirement of head government, we can group that-trace phenomena, Comp Deletion, gapping, bridge conditions, quasipartitives, and the CED together, while distinguishing them from Superiority violations, wh-in-situ, and quantifier scope, all of which fall at least partially under generalized binding. This view enables us to explain a large range of data in a straightforward and principled way. Moreover, we have explored novel and hitherto undiscussed phenomena that the model has brought to our attention: the missing objective reading of each picture of John's, nonoccurring gapping structures, topics in Chinese, the distinctive syntactic and LF behavior of adjuncts like 'why' and 'how' (including some anti-Superiority phenomena), and so on. To conclude, we present a schematic summary of the model with both the universal and language-particular elements indicated.

(71)

D-Structure

S-Structure: Subjacency
  Comp indexing in grammars with syntactic movement

PF: Government by a lexical head for empty categories
  One item in Comp: English

LF: Generalized binding
  Comp indexing
  No double-headed structures

Our approach to the ECP has clearly benefited from earlier work, but it differs in important respects. If we pare down our approach to its essentials, its basic logic will be more visible, which will facilitate comparison with the other approaches that have been developed.

There are five basic parts to our account. First, generalized binding provides an articulated theory of variable types. These distinctions are crucial for explaining the subject-object asymmetries that occur at LF and the facts concerning the very different movement of adjuncts such as 'why' and 'how' (when compared to 'when' and 'where') in languages as diverse as Chinese and English.

Second, we distinguish two different notions of locality and insist that both are crucial to explaining the full range of linguistic data. The two notions are essentially binding on the one hand and head government on the other. We do not attempt to reduce either of these locality conditions to the other.

Third, we claim that these two notions of locality reside in different parts of the
grammar. In effect, we split the ECP, placing the part dealing with lexical government in PF and the part dealing with antecedent government in LF. Antecedent government is reinterpreted as binding, whereas lexical government comes close to the claim that overt gaps are subcategorized.26

The fourth part of the account involves defining the available positions in Comp, which may vary from language to language. This is important in explaining differences between that-trace effects in various languages. In interaction with generalized binding, it also allows us to explain certain differences in the extraction of adjuncts across overt complementizers in languages like English on the one hand and Chinese and Dutch on the other.

In addition to these conceptual underpinnings, there is one important technical device that allows the theory to run: Comp indexing, which we have interpreted as a form of percolation. It is Comp indexing that allows us to claim, following Stowell, that an indexed Comp can function as a lexical head—in other words, that it can subcategorize the subject position under the appropriate conditions.

These five features comprise the basic elements of the approach we have developed. Parts are found in earlier approaches. Thus, we share Stowell’s view that the relationship between a Comp and a subject trace is analogous to subcategorization. However, unlike Stowell (1981) and Jaegglí (1982), we do not try to reduce antecedent government to some form of lexical government. Aside from certain conceptual reasons for avoiding this, it is unclear how one could do this and still capture the range of phenomena discussed by Lasnik and Saito concerning Chinese and Japanese. As they show, traces left in Comp by movement at LF must be antecedent-governed. We have shown how antecedent government might be reduced to binding, but it is quite unclear how for such cases as these it could be reduced to a locality condition as restricted as lexical government.

Like Jaegglí (1982), we claim that the ECP should be split, with part going into PF and part going into LF. However, our PF condition of lexical government is equivalent to Jaegglí’s s-government. For Jaegglí, s-government applied not at PF but at LF and was linked with antecedent government to yield the notion of identification. Moreover, that-trace effects are ruled out by his LF identification condition and do not fall under his PF condition of c-government. So, although he splits the ECP, he carves up the data quite differently, and we have argued that the way they are carved up is crucial to the analysis and that that-trace effects must be attributed to PF properties.

Like Lasnik and Saito, we believe that traces in Comp are subject to well-formedness conditions at LF; unlike them, however, we subsume these conditions under indepen-

26 Rouveret and Vergnaud (1980) argued that subcategorization relations should be expressed through coindexation; hence, a verb is coindexed with an NP that it subcategorizes. In that case the formal relationship between an indexed Comp and an empty subject would be identical to that between a verb and a subcategorized NP; this formal relationship constitutes what is usually called subcategorization. In each case an element is coindexed with something that governs it. Thus, we might say that Comp indexing is a way to subcategorize an empty subject and, generally, that empty NPs occur only in subcategorized positions at PF. Hornstein and Lightfoot (1986) discuss some implications of this point.
dently motivated binding conditions as opposed to a revamped version of antecedent government. This, along with splitting the ECP, allows us to dispense with virtually all of the special machinery Lasnik and Saito introduce to deal with the data they discuss. Thus, we make no use of \( \gamma \)-marking, \( \gamma \)-indelibility, application of the ECP both at S-Structure and at LF, application of the ECP obligatorily as soon as it can apply, application of the ECP at different levels of arguments and adjuncts, and much more. See Hornstein and Lightfoot (1986) for detailed discussion.

Our approach differs in many other details from those discussed above, but its main outline should now be clear. We split the ECP, putting half in PF and half in LF. We treat antecedent government as generalized binding, which provides the appropriate typology of variable types. A necessary technical device is Comp indexing, and an essential parameter lies in the available positions in Comp that a language allows. It has not escaped our notice that our approach has implications for the analysis of many phenomena in many other languages.

Appendix

The grammatical model proposed here explains why the requirement of proper government by a lexical head holds for traces of moved categories but not for PRO (or presumably for "pro"). The reason is that PRO is not visible to the PF component, but a trace is visible. We showed in section 2 that indexed categories and indexed Comps may act as proper governors and likewise that empty phrases that are indexed must be properly governed. Consequently, items that are not indexed by S-Structure are not visible for the purposes of PF conditions. In that case it is not surprising that PRO, which receives its index at LF, does not need to be governed by a lexical head. Traces, on the other hand, all bear indices at S-Structure since they result from the application of Move \( \alpha \); it is part of the definition of Move \( \alpha \) that a moved element leaves behind an indexed empty category. Consequently, both wh-traces and NP-traces are visible at PF and are subject to the requirement of head government.

Although an index is required for an item to be visible to PF filters, there may be further requirements for items to be visible to PF rules. Thus, Aoun and Lightfoot (1984) argued that PRO is invisible to the rule adjoining to to want, yielding the contracted form wanna. This is as our model predicts. However, indexing is not sufficient for an item to be visible to the adjunction rule: adjunction may take place across a trace that is indexed at S-Structure but does not have Case (in other words, an NP-trace, as in (72)). This suggests that adjunction rules are sensitive to Case, whereas PF filters are sensitive only to indices and not to Case.

27 A PRO that becomes the subject of a passive verb is also not visible at PF. This entails that when it moves and leaves behind an index (a trace), the PRO does not itself bear an index at S-Structure. Thus, the defining property of the rule Move \( \alpha \) is that it leaves an indexed (not coindexed) trace; the fact that the trace is coindexed at LF is due to the binding theory. PRO is visible at LF because items that are Case-marked or in obligatory positions are visible there; see Hornstein and Lightfoot (1987).
(72) a. Fay was sposta leave. (was supposed [eI to leave])
   b. Who did you happenna see? (happen [eI to see e])
   c. Fay was certenna leave. (certain [eI to leave])

Pesetsky (1982) took a different approach to these contraction phenomena, which
was subsequently adopted by Lasnik and Saito (1984). For them, adjunction of to to (for
example) want takes place under strict adjacency, where no elements of any kind
intervene. Adjunction appears to take place across a PRO in (73a), but PRO, they argue,
is actually generated to the right of the lower VP. Hence, nothing would intervene
between want and to.

(73) a. I wanna leave. (want [to leave PRO])
   b. Who do you wanna visit? (want ([eI] [to visit eI PRO]))

In the case of (73b) Lasnik and Saito argue that a trace need not be left in the lower
Comp: movement only optionally leaves a trace. This analysis, however, crucially de-
pends on Subjacency being a condition on rule application rather than on S-Structure
representations. We argued earlier that this has some undesirable consequences. More-
over, saying that there may be no trace in Comp would lose our explanation for the
bridge facts (section 2) and the CED (footnote 7). If the bridge conditions are related to
the PF requirement of head government, then there must be a trace in Comp at PF. If
such traces are present at PF, then non-Case-marked traces may intervene between want
and to and therefore must not be visible to adjunction rules. Our analysis requires that
the S-Structure form of How do you wanna leave? contain a trace of how in the lower
Comp (see section 4.1); since Comps are not de-phoneticized before PF, we must say
that the trace, which is not Case-marked, clearly does not block adjunction. Assuming
that Case marking is necessary for rule visibility allows us to dispense with the lowering
analysis that Lasnik and Saito propose to explain such sentences (their (140)).

Under the approach taken by Pesetsky and by Lasnik and Saito, the contractability
of to in (72) would require that the trace subject of the lower clause also be to the right
of the VP, by analogy to their analysis of (73a). However, this does not seem plausible
because traces must be lexically governed and there is some sort of adjacency require-
ment for lexical government, as one might expect for a PF process. Therefore, an empty

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28 The process of Comp Deletion is distinct from S’ Deletion. We have shown that Comp Deletion or de-
phoneticization must take place at PF, S’ Deletion, on the other hand (if there is such a process; see Chomsky
(1981) for an alternative), must take place by S-Structure, feeding LF processes. Several authors have argued
in different ways for a structural distinction between anaphoric and pronominal or “arbitrary” PRO, among
In the context of (17) we adopted the view that PRO may be governed and in that case has an anaphoric
interpretation, as in Fay tried [PRO to leave]. In order for PRO to be governed in this case by try, the S’ must
have been deleted; moreover, that deletion must take place before LF, where the binding theory distinguishes
anaphors and pronouns. It must also take place before PF, in order to permit Fay, was expected [eI to win],
where the trace must be head-governed (by expected) at PF. Consequently, S’ Deletion must take place by
S-Structure, but this does not entail deleting or de-phoneticizing the Comp, which must remain until PF for
the reasons given in section 4.6.
complementizer may occur if it is head-governed, as we showed in section 2.3, but it must also be adjacent to its head governor, as pointed out by Saito (1984).

(74) a. It was believed (that) Kay was a fool.
   b. It was believed by everybody *(that) Kay was a fool.
   c. Fay believed sincerely *(that) Kay was a fool.

A further indication that some notion of adjacency is required for lexical government is the fact that a that complementizer at the front of the second of two relative clauses may not be deleted.

(75) The story (that) Fay wrote *(that) The Nation published was about the FBI.

If that is correct, it suggests that the traces in (72) are adjacent to their head governors and not to the right of the lower VP.

However, there is a version of Pesetsky’s account that can be combined with our analysis. Pesetsky argued that at the point where contraction rules apply there is no intervening material in Comp or PRO positions that would block application. If we assume that in the PF derivation from S-Structure to surface structure the representation is successively pruned of nonphonetic material, then we can agree with Pesetsky that at the point where contraction applies there is no PRO, wh-trace in Comp, or NP-trace, while still assuming that movement necessarily leaves an index. As is well known, the route from S-Structure to PF is not information-preserving. For example, whether a phrase is a VP or an NP is lost in the course of the derivation. It seems reasonable to expect that phonetically null items are also eliminated during this process. PRO, wh-traces in Comp, and NP-traces are phonetically empty and disappear. A wh-trace in an A-position is Case-marked, is not empty, and does not disappear. If contraction rules apply after these pruning conventions, then only a Case-marked trace would block contraction.

References


TWO TYPES OF LOCALITY


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