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1. Introduction

One of the goals of Chomsky's *Barriers* (Chomsky (1986)) is to provide a treatment of Subjacency and the Empty Category Principle (ECP) based on a uniform definition of *barrier*, thereby somewhat unifying these two principles of grammar. Subjacency is a constraint upon movement, which disallows movement across more than one barrier. Consider sentence (1):

(1) * Who$_i$ do [$_{IP}$ [$_{NP}$ pictures of t_i] amuse John]

Under the definitions of *blocking category* and barrier presented in Chomsky (1986), the NP headed by *pictures* together with the matrix IP are barriers separating *who* from its trace, t_i. As a result Subjacency is violated by sentence (1).

The ECP is a constraint upon empty categories which forces all traces of movement to be *properly governed*. A trace is properly governed if it is either θ-governed (see Section 2) or governed by a coindexed node that dominates it. One node governs another if the first c-commands the second and there are no barriers separating the two. Consider sentence (2):

(2) * How$_j$ did Bill [$_{VP}$ t'_j [$_{VP}$ wonder [$_{CP}$ who$_i$ [$_{IP}$ t_i fixed the car t_j]]]]

Note that the above interpretation links *how* with the most deeply embedded clause. Trace t_j must be properly governed to satisfy the ECP. To be properly governed it must either be θ-governed or antecedent-governed. It turns out that trace t_j is not θ-governed, since it is an adjunct. Thus, in order to satisfy the ECP, trace t_j must be governed by a coindexed antecedent. But trace t_j is not antecedent-governed, since the CP node between

t_j and its closest co-indexed dominating node, t'_j, is a barrier by the definitions given in Chomsky (1986). The above interpretation of sentence (2) therefore violates the ECP.

The definitions of Subjacency and the ECP that are used to rule out these sentences are both based on the definition of barrier, so Chomsky is thus far successful in his goal of collapsing the two principles.

Chomsky subsequently defines the Minimality Condition, an alternate way in which a node can achieve barrierhood. Intuitively, the Minimality Condition states that the closest lexical governor is a barrier with respect to more distant possible governors. Chomsky claims, however, that although the Minimality Condition applies to the ECP (proper government), it does not apply to Subjacency (boundedness):

> "We thus extend the concept of barrier defined earlier to include the following case [the Minimality Condition], for the theory of government but not the theory of movement." [Chomsky (1986), p. 42]

Chomsky makes this stipulation because of an unwanted interaction between the Minimality Condition and the stipulation that a tensed Infl phrase is a weak inherent barrier for Subjacency.[1] Nevertheless, Chomsky's stipulation is undesirable to the degree that it disrupts the unification of movement and government. In this paper we will argue that the unwanted effects are due to IP's weak inherent barrier status, rather than due to Minimality; the Minimality Condition should indeed apply to Subjacency as well as proper government.

Section 2 of this paper gives an overview of the relevant background material from *Barriers*. In Section 3 we observe two classes of English sentences – certain left branch extractions and deep right branch extractions – whose ungrammaticality cannot be explained in the current *Barriers* framework. Section 4 presents changes to the current definitions that allow the Minimality Condition to apply to the theory of movement, thereby explaining the ungrammaticality of the sentences presented in Section 3. Concluding remarks may be found in Section 5.

2. Background

This paper is based on the background definitions given in this section. All of the definitions are taken from *Barriers*; the reader is encouraged to consult *Barriers* for justification and further explanation of any definition.

2.1. Government and Barriers

The central concept of government is defined in terms of **m-command**, **exclusion** and **barrier**. The definition of m-command is the same as that for c-command, restricted to maximal projections (see Aoun and Sportiche (1983)). Exclusion is defined in (3):

(3) β excludes α if no segment of β dominates α.

In (4), for example, β excludes δ but does not exclude α or γ. δ excludes and is excluded by all of α, β and γ.

(4) ... δ ... $[_\beta\ \alpha\ [_\beta$ ... γ ...]]

Consider the definition of **government** given in (5) with respect to the sentences in (6):

[1] See Section 2.2 for the definition of "weak inherent barrier".

(5) α governs β iff α m-commands β and there is no γ, γ a barrier for β, such that γ excludes α.

(6) a. John believes [$_{IP}$ Mary to be a fashionable dresser]
b. * John says [$_{CP}$ [$_{IP}$ Joe to be intelligent]]

If it is assumed that abstract Case is assigned under government, then the embedded IP in (6a) cannot be a barrier, since Case is assigned from the verb *believes* across the IP to the noun *Mary*. Hence the definition of barrier does not make the embedded IP a barrier in (6a). The definition of barrier rules out (6b), however. CP is a barrier with respect to the NP *Joe*, so the verb *says* is unable to govern this noun phrase. As a result, no Case is assigned to the noun phrase *Joe* and the Case Filter is violated.

A barrier is defined in terms of a **blocking category**, which is defined in terms of **L-marking**:[2]

(7) A maximal projection γ is a blocking category (BC) for β iff γ is not L-marked and γ dominates β.

(8) Where α is a lexical category, α L-marks β iff β agrees with the head of γ that is θ-governed by α.

θ-government is defined in (9):

(9) α θ-governs β iff α is a zero-level category that θ-marks β, and α, β are sisters.

In (6a), the verb *believes* θ-governs the embedded IP since it assigns a thematic role to this IP and is also a sister to this IP. Since *believes* θ-governs the embedded IP, it also L-marks this IP. In addition, *believes* L-marks the subject of its complement IP, *Mary*, since there is agreement between the subject *Mary* and the IP.

Similarly, the verb *says* θ-governs and L-marks the embedded CP in (6b). There is no L-marking relation, however, between *says* and the subject of the embedded IP, *Joe*, since CP intervenes. Neither does the head of the embedded CP in (6b) L-mark its complement IP, since no thematic role is assigned here.

In (6a), the embedded IP is not a blocking category for its subject *Mary*, since it is L-marked by the verb *believes*. In (6b), however, IP is a blocking category with respect to its subject *Joe*, since this IP is not L-marked.

(10) γ is a barrier for β iff γ is a maximal projection and (a) or (b):
a. γ dominates δ, δ a blocking category for β;
b. γ is a blocking category for β, $\gamma \neq$ IP.

In (6a), IP is not a barrier with respect to its subject *Mary*, since there are no intervening blocking categories. By the definition of government, therefore, *believes* governs *Mary* and Case is assigned as desired.

The embedded IP in (6b) is not a barrier with respect to the noun *Joe*, because part (b) of definition (10) does not allow IP to be an initial barrier. Its immediately dominating CP, however, obtains barrierhood from IP's blocking category status. The verb *says*, therefore, does not govern the noun *Joe* since the barrier CP intervenes. No Case is assigned to *Joe* and the Case Filter is violated.

The Empty Category Principle (ECP) states that a nonpronominal empty category must be properly governed where proper government is defined in (11):

[2] The term *L-mark* is derived from "lexically mark".

(11) α properly governs β iff (a) or (b):
a. α θ-governs β (head-government);
b. α governs β and α, β are co-indexed (antecedent-government).

(12) a. $[_{CP}$ Who$_i$ did $[_{IP}$ Bill $[_{VP}$ see t_i^1]]]
b. $[_{CP}$ Who$_i$ do $[_{IP}$ you $[_{VP}$ t_i^3 $[_{VP}$ think $[_{CP}$ t_i^2 $[_{IP}$ t_i^1 left]]]]

In (12a) trace t_i^1 is properly governed since it is θ-governed by the verb *see*. Sentence (12a) therefore satisfies the Empty Category Principle. In (12b), trace t_i^1 is antecedent-governed by trace t_i^2, trace t_i^2 is antecedent-governed by trace t_i^3, and trace t_i^3 is antecedent-governed by *who*, so (12b) satisfies the ECP.

2.2. Subjacency

Subjacency, another principle of the theory of grammar from Chomsky (1986), is a constraint upon chain formation (movement):

(13) If $\{\alpha_i, \alpha_{i+1}\}$ is a link of a chain, then α_{i+1} is subjacent to α_i.

The definition of n-subjacency is given in (14):

(14) β is n-subjacent to α iff there are fewer than $n+1$ barriers for β that exclude α.

When the generic term *subjacent* is used (as in (14)), it means 1-subjacent.[3] Chomsky's initial definition of the Subjacency constraint states that a chain satisfies Subjacency if at most one barrier is crossed at each link during its formation.[4] Subsequently, Chomsky points out that evidence from Italian due to Rizzi (1982) forces the definition of Subjacency to refer to the number of barriers crossed during the formation of an entire chain rather than the number crossed in each link.[5] Consider (15):

(15) * What$_i$ do you $[_{VP}$ t_i^3 $[_{VP}$ wonder $[_{CP}$ who$_j$ $[_{IP}$ t_j $[_{VP}$ t_i^2 $[_{VP}$ knew $[_{CP}$ who$_k$ $[_{IP}$ t_k $[_{VP}$ t_i^1 $[_{VP}$ saw t_i]]]]]]]]]

This sentence is ungrammatical in Italian (as well as in English). Under a definition of Subjacency that counts barriers in chain links, this sentence would be marked grammatical in Italian, since only one barrier is crossed in each of two chain links. With a definition that counted barriers per chain, the sentence would be correctly marked ungrammatical, since two barriers are crossed in the formation of a chain.

It is assumed that traces of moved elements may adjoin to non-argument maximal projections so that Subjacency violations may be avoided in simple sentences such as (12a):[6]

(12a) $[_{CP}$ Who did $[_{IP}$ Bill $[_{VP}$ t_i^2 $[_{VP}$ see t_i^1]]]]

Trace t_i^1 is not subjacent to the *wh*-element *who* in the specifier of CP. VP is a barrier and IP inherits barrierhood, so two barriers intervene. Allowing adjunction to VP avoids this problem: since VP does not exclude trace t_i^2, t_i^1 is subjacent to t_i^2; IP is never an inherent barrier, so trace t_i^2 is subjacent to *who*.

Stipulation (16) is added to the definition of Subjacency for languages like English, but not Italian. This stipulation distinguishes barriers relevant to movement and barriers relevant to proper government.

[3] See *Barriers*, p. 30 for justification.
[4] This definition is taken from *Barriers*, p. 30.
[5] This definition of Subjacency is taken from *Barriers*, p. 38.
[6] See *Barriers* and May (1985) for justification and discussion.

(16) The most deeply embedded tensed IP in a clause is a weak inherent barrier with respect to Subjacency.

The specification that the IP must be tensed in (16) is given in order to distinguish between examples such as (17a) and (17b):

(17) a. [Which car]$_i$ did you tell John [$_{CP}$ how [$_{IP}$ to fix t_i]]
b. * [Which car]$_i$ did you tell John [$_{CP}$ how [$_{IP}$ Bill fixed t_i]]

Sentence (17a) is grammatical: the embedded IP is not a barrier since it is untensed. Sentence (17b), however, is ungrammatical: the embedded tensed IP counts as a barrier by (16).

In (12a), the chain link $\{t_2, t_1\}$ satisfies Subjacency since no barriers are crossed between the two traces. IP counts as a weak inherent barrier with respect to t_2, so that t_2 is 1-subjacent to *who*. Since only one barrier is crossed in the formation of this chain, the sentence is grammatical.

Stipulation (16) is made in order to account for the ungrammaticality of sentences such as (17b) and (18):

(18) * What$_i$ do you [$_{VP}$ t_i^2 [$_{VP}$ wonder [$_{CP}$ who$_j$ [$_{IP}$ t_j [$_{VP}$ t_i^1 [$_{VP}$ saw t_i]]]]]]

Note that (16) is parameterized so that it does not apply to languages like Italian, in which the translation of (18) is grammatical. The ECP is satisfied by (18), since *who* antecedent-governs t_j and *saw* head-governs t_i. The ungrammaticality of (18) must therefore be due to Subjacency. Without the stipulation that tensed IP is an inherent barrier, IP is still a blocking category in (18) since it is not L-marked. Hence CP becomes a barrier by inheritance, but it is the only barrier between t_i^2 and t_i^1. t_i^1 is therefore subjacent to t_i^2 and Subjacency is satisfied without the new stipulation. If IP is a barrier in (18), however, two barriers intervene between t_i^2 and t_i^1 and Subjacency is violated, as desired.

Consider once again (15), a far worse Subjacency violation than (18):

(15) * What$_i$ do you [$_{VP}$ t_i^3 [$_{VP}$ wonder [$_{CP}$ who$_j$ [$_{IP}$ t_j [$_{VP}$ t_i^2 [$_{VP}$ knew [$_{CP}$ who$_k$ [$_{IP}$ t_k [$_{VP}$ t_i^1 [$_{VP}$ saw t_i]]]]]]]]]

As in (18), movement from t_i^1 to t_i^2 crosses two barriers, IP and CP. Movement from t_i^2 to t_i^3 in (15) crosses one more barrier, another CP. It is examples like (15) that motivated Rizzi to claim that the more barriers crossed in the formation of a chain, the worse the derivation.

If Subjacency rules out sentences that cross more than one barrier during chain formation rather than chain-link formation, it is necessary to stipulate that only the most deeply embedded IP counts as an inherent barrier for Subjacency. Otherwise, sentences like (19) would be severe violations:

(19) Who do [$_{IP}$ you [$_{VP}$ t_i^5 [$_{VP}$ think [$_{CP}$ t_i^4 that [$_{IP}$ John said [$_{CP}$ t_i^3 that [$_{IP}$ Bill [$_{VP}$ t_i^2 [$_{VP}$ saw t_i^1]]]]]]]]]

Each IP in (19) is tensed, so if (16) were not restricted to the most embedded IP, then each would count as a barrier. Since (19) is fully grammatical, (16) is restricted to the most embedded IP.

2.3. The Minimality Condition

The Minimality Condition is defined in *Barriers* as follows:[7]

[7] The definition given here incorporates the definition given on p. 42 of *Barriers* with the conclusions of

(20) γ is a barrier for β if γ is an immediate projection of δ, a zero-level category that has sufficient agreement features and is distinct from β, $\delta \neq$ Infl.

Intuitively, the Minimality Condition means that α can't govern β if there is a closer governor to β than α. The Minimality Condition is used to account for an Empty Category Principle violation in (21):

(21) * How did John $[_{VP}\ t_3\ [_{VP}$ announce $[_{NP}$ a $[_{N'}$ plan $[_{CP}\ t_2$ to $[_{VP}\ t_1$ fix the car $t]]]]]]]$

Note that the above interpretation links *how* with the most deeply embedded clause. Trace t_2 is not head-governed, so it must be antecedent-governed to satisfy the ECP. However, N′ is a barrier with respect to t_2 by the Minimality Condition, so t_3, the closest possible antecedent for t_2, cannot govern t_2. As a result the ECP is violated.

The Minimality Condition also accounts for complementizer-trace effects such as those in (22):

(22) a. Who do you think $[_{CP}\ t_2\ [_{C'}\ e\ [_{IP}\ t_1$ left]]]
b. * Who do you think $[_{CP}\ t_4\ [_{C'}$ that $[_{IP}\ t_3$ left]]]

The head of CP is lexical in (22b) and, hence, by the Minimality Condition, C′ is a barrier with respect to government of trace t_3 by t_4. Since t_3 is not properly governed, an ECP violation results. In (22a), however, the head of CP lacks sufficient agreement features to trigger the Minimality Condition. C′ is therefore not a barrier with respect to t_1 in (22a). As a result, trace t_2 properly governs t_1 and the ECP is not violated, as desired.[8]

Infl is barred from invoking the Minimality Condition in definition (20) in order to account for the grammaticality of adjunct extractions. Consider, for example, sentence (23):

(23) $[_{CP}$ How$_i$ did $[_{IP}$ you $[_{I'}$ Infl $[_{VP}\ t'_i\ [_{VP}$ fix the car t_i]]]]]

In (23) trace t'_i must be antecedent governed by *how* if the ECP is not to be violated. To achieve this result I′ must not be a barrier. As a result, Infl is blocked from triggering the Minimality Condition with respect to t'_i in (23). Infl is a degenerate category: if it is to be a barrier, it must receive its barrierhood by inheritance from a different category.

In addition, assumption (24) is made in order to account for the grammaticality of

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the Minimality Condition chapter. In that chapter Chomsky argues for reference to *immediate* projection rather than simple projection in the definition. We include some of these arguments in this section; for a more complete discussion, see *Barriers*. Chomsky also argues that δ in (20) must have *sufficient* agreement features to invoke the Condition. Although the definition of *sufficient* is never made explicit, it is intended to account for complementizer-trace effects, among others (see *Barriers* for more discussion). Finally, Chomsky points out that Infl is a degenerate category with respect to the Minimality Condition. We have explicitly stated this exception in the definition.

[8] Chomsky postulates another possible derivation of complementizer-trace effects that produces the same ECP effects. He suggests that since the head of CP in (22a) has no features, there is no C' level. This analysis assumes a definition of *immediate projection* such that if a one bar level category is not present, then the head has no *immediate* projection. Because C' is not present in (22a), the head of CP therefore has no *immediate* projection and the Minimality Condition does not apply.

Some structure pruning algorithm is independently necessary to account for the lack of complementizer-trace effects with respect to adjuncts: see Lasnik and Saito (1984) and Chomsky (1986) for discussion on this topic. It is not clear, however, that the same pruning algorithm applies in both cases. If not, this new pruning algorithm adds an extra stipulation, that X' levels may be pruned if their heads have no features. This stipulation also contradicts assumption (24) (to come).

Since we do not see sufficient motivation for this new pruning algorithm, we will make the simpler assumption that immediate projection always refers to the next projection up having the same head, whether that happens to be X' or XP. Note that this analysis does not alter the empirical effects achieved with respect to proper government, *e.g.*, complementizer-trace effects.

sentences like (25).[9]

(24) One bar level projections (X′) are forced when there is a specifier; otherwise they are optional.

(25) $[_{CP}$ How$_i$ did you $[_{VP}\ t_i^2\ [_{VP}\ ([_{V'}]$ want $[_{CP}\ t_i^1$ to fix the car $t_i\ ]]]]]$

If the parenthesized V′ structure is present, the Minimality Condition will be invoked and V′ will count as a barrier for trace t_i^1. Trace t_i^2 will therefore not antecedent-govern t_i^1, and the ECP will be violated, an undesirable result. Chomsky avoids the problem in the following way:

> "...the Minimality Condition requires that we adopt the convention assumed earlier...: bar (prime) need not be present when not required. Note that the closer governor *want* does not prevent t_i^2 from governing t_i^1 if the parenthesized bracket labeled V′ is missing, because t_i^2 is not excluded by VP." [Chomsky (1986), p. 47]

In other words, when V′ is not present in (25), VP is the immediate projection of *want*. This VP does not count as a barrier, however, since it does not exclude t_i^2. As a result t_i^2 antecedent-governs t_i^1, and the ECP is not violated.

3. Some Empirical Difficulties with the Original *Barriers* System

It turns out that the definitions given in the original *Barriers* system have difficulty explaining the ungrammaticality of certain left branch extractions. Consider the sentences in (26):

(26) a. * $[_{CP}$ Which book$_i$ do you $[_{VP}\ t_i'\ [_{VP}$ believe $[_{IP}\ [_{NP}$ the first $[_{N'}$ chapter of $t_i\ ]]$ to be full of lies]]]]

b. * $[_{CP}$ Who$_i$ did you see $[_{VP}\ [_{NP}$ friends of $t_i\ ]]$ leave]]

c. * $[_{CP}$ Who$_i$ do you want $[_{IP}\ [_{NP}$ pictures of $t_i\ ]]$ to go on sale]]

The Empty Category Principle cannot be the cause of the ungrammaticality of any of the sentences in (26). Consider, for example, sentence (26a). The gap t_i is θ-governed and hence properly governed by the noun *chapter*. Furthermore, Subjacency cannot explain the ungrammaticality of the sentences in (26) under the current definitions. For example, in (26a), the verb *believe* subcategorizes for a bare IP, thus L-marking the specifier of this IP, the NP *pictures of* t_i. Thus this noun phrase cannot be a barrier. The IP dominating this NP is therefore not a barrier, and hence no barriers are crossed in the move from t_i to t_i'. As a result, Subjacency is not violated under the current theory.

Furthermore, the definitions given in the original *Barriers* system do not explain the ungrammaticality of deep right branch extractions. Consider the sentences in (27):

(27) a. * $[_{CP}$ Who$_i$ did you $[_{VP}\ t_i'\ [_{VP}$ give books $[_{PP}$ to $[_{NP}\ [_{N'}$ friends of $t_i\ ]]]]]$

b. * $[_{CP}$ What$_i$ did you read $[_{NP}$ books about $[_{NP}$ pictures of $t_i\ ]]]$

c. * $[_{CP}$ Who$_i$ did you put the paperweight $[_{PP}$ on $[_{NP}$ a picture of $t_i\ ]]]]$

d. * $[_{CP}$ Who$_i$ did Rick buy the ring $[_{PP}$ for $[_{NP}$ a friend of $t_i\ ]]]]$

e. * $[_{CP}$ Who$_i$ did you talk $[_{PP}$ about $[_{NP}$ friends of $t_i\ ]]]$

f. ? $[_{CP}$ Who$_i$ did you ask $[_{PP}$ for $[_{NP}$ pictures of $t_i\ ]]]$

As in the sentences in (26), the ungrammaticality of the sentences in (27) cannot be explained by the ECP. But neither is Subjacency violated under the definitions given in *Barriers*. Consider, for example, sentence (27a). The NP headed by *friends* is not a barrier, since it is θ-governed and hence L-marked by the preposition *to*. Nor is the PP headed by *to*

[9] This assumption is taken from *Barriers*, p. 4.

a barrier, and, as a result, no barriers are crossed in the movement from the object of *friends* to adjunction to VP, and Subjacency is not violated. This sentence is therefore incorrectly ruled grammatical under the original definitions of barrier and blocking category given in *Barriers*.

4. Applying the Minimality Condition to Subjacency

4.1. Definition Changes and Empirical Effects

We propose that the empirical problems that are noted in Section 3 can be alleviated by allowing the Minimality Condition to apply to the theory of movement.[10] Consider once again the sentences in (26) and (27), in particular sentences (26a) and (27a):

(26a) * $[_{CP}$ Which book$_i$ do you $[_{VP}\ t'_i\ [_{VP}$ believe $[_{IP}\ [_{NP}$ the first $[_{N'}$ chapter of t_i]] to be full of lies]]]]

(27a) * $[_{CP}$ Who$_i$ did you $[_{VP}\ t'_i\ [_{VP}$ give books $[_{PP}$ to $[_{NP}\ [_{N'}$ friends of t_i]]]]]

If we apply the Minimality Condition exactly as stated in (20) to the theory of movement, all of the above sentences still satisfy Subjacency. In sentence (26a), for example, the N′ immediately dominating the noun *chapter* would be a new barrier for Subjacency because of the Minimality Condition, but it would be the only one interrupting the movement from trace t_i to trace t'_i. In order for the Minimality Condition to have an effect on Subjacency theory in these examples, it is necessary to move the Minimality Condition into the definition of blocking category. By doing so, more than one node may become a barrier as a result of the Minimality Condition, since barrierhood may be obtained, in part, from the domination of a blocking category. Once this change has been made, it is necessary to further alter the definitions of blocking category and barrier to allow each to be nonmaximal projections, since barriers invoked by the Minimality Condition are not necessarily maximal projections (see, for example, complementizer-trace effects). Consider, then, the (initial) modified definitions of blocking category and barrier:

(28) γ is a blocking category (BC) for β iff γ dominates β and (a) or (b):
a. γ is a maximal projection that is not L-marked;
b. γ is an immediate projection of δ, a zero-level category that has sufficient agreement features and is distinct from β, $\delta \neq$ Infl.

(29) γ is a barrier for β iff (a) or (b):
a. γ is a maximal projection that dominates δ, where δ is a blocking category for β;
b. γ is a blocking category for β, $\gamma \neq$ IP.

Consider sentence (26a) with respect to the altered definitions of blocking category and barrier. The N′ immediately dominating the noun *chapter* is a blocking category with respect to trace t_i because of the Minimality Condition. This N′ is therefore a barrier with respect to trace t_i. The NP immediately dominating this N′ is another barrier for trace t_i due to the blocking category status of the N′. Furthermore the IP immediately dominating the NP achieves barrierhood status, again by virtue of N′ being a blocking category. Thus three barriers are crossed in the move from t_i to t'_i under these preliminary definition changes, and Subjacency is violated. However, consider sentence (30) with respect to the definitions in (28) and (29):

[10] See Kayne (1984) for an alternative explanation of the ungrammaticality of left branch extractions. Also see Johnson (1988) for an a third explanation, this one within the *Barriers* framework. See Clark (1985) for an alternative treatment of deep right branch extractions.

(30) Who$_i$ [$_{C'}$ did [$_{IP}$ you [$_{VP}$ t'_i [$_{VP}$ read [$_{NP}$ a [$_{N'}$ book about t_i]]]]]]

Under the proposed definitions, the N′ immediately dominating the noun *book* is a blocking category with respect to trace t_i because of the Minimality Condition. As a result of this blocking category status, both N′ and its immediately dominating NP are barriers with respect to t_i, and two barriers would be crossed in the move from t_i to t'_i. Furthermore, the matrix C′ node is a blocking category and barrier with respect to t'_i, also because of the Minimality Condition. Finally the matrix IP node is a weak inherent barrier for Subjacency and four barriers are crossed in the formation of the chain linking *who* to its trace t_i. Hence these definitions predict that sentence (30) should be a severe violation of Subjacency, which is clearly false, since the sentence is grammatical.

In order to partially correct the predictions made by the new definitions, we propose an additional stipulation: that barriers for Subjacency must be maximal projections.[11] Thus the new definition of barrier is given in (31):

(31) γ is a barrier for β iff (a) or (b):
a. γ is a maximal projection that dominates δ, δ a blocking category for β;
b. γ is a blocking category for β, $\gamma \neq$ IP, and (for Subjacency only) γ is a maximal projection.

As a result of this change, the N′ immediately dominating the noun *book* and the matrix C′ are no longer barriers with respect to chain-formation in (30). It is also possible to purge the matrix IP's weak inherent barrier status (see Section 4.2) so that only one barrier is crossed in the formation of the chain headed by *who*. As a result, Subjacency is once again satisfied by (30).

Up to this point we have been ignoring the prepositional phrase headed by the preposition *about* in sentence (30). The sentence is repeated below with the PP node included:

(30) Who$_i$ [$_{C'}$ did [$_{IP}$ you [$_{VP}$ t'_i [$_{VP}$ read [$_{NP}$ a [$_{N'}$ book [$_{PP}$ about t_i]]]]]]]

If the Minimality Condition can apply to the preposition *about*, then its immediately dominating node – either P′ if it is present or PP if there is no intermediate projection (see (24)) – is a blocking category with respect to trace t_i. The PP node would then be an additional barrier to the move from t_i to t'_i, and Subjacency would once again be violated. In order to see how to bar the PP from achieving barrierhood status in this case, recall that the category Infl is stipulated to be a degenerate category and is therefore barred from triggering the Minimality Condition and from being an inherent barrier. No property of Infl is given as a reason for this degeneracy: it is merely stipulated. If we can see what properties both subcategorized prepositions and the category Infl share, we may be able to give these properties as a criterion for degeneracy, thus allowing both categories to escape inherent barrierhood on the basis of this degeneracy. We propose that this property is that of neither independently assigning a thematic role to an argument, nor receiving and retaining a thematic role, as an argument does. The category Infl usually has this property: it does not usually receive a thematic role, and it does not assign one to an argument independently. A thematic role is often passed from a verb through Infl to its subject, but this thematic role originates in the verb, not in the Infl itself.

Subcategorized prepositions fall into this same class of degeneracy. The noun phrase objects of subcategorized prepositional phrases receive their thematic roles partially, if not

[11] This is an undesirable stipulation in that, much like Chomsky's original formulation of the Minimality Condition, it disrupts the unification of proper government and movement. However, we argue that it is superior to Chomsky's stipulation since more empirical effects are obtained. Moreover, it forces the removal of "weak inherent barrierhood", which is desirable on theoretical grounds (see Section 4.2).

wholly from their governing heads (see Rouveret and Vergnaud (1980); Kayne (1983); Baker (1988); and Larson (1988)). For example, in the noun phrase *a book about* t_i, trace t_i receives its thematic role from the noun *book*. The same is true of prepositional phrases that are subcategorized for by verbs:

(32) a. The doctor [$_{VP}$ gave [$_{NP}$ the steroids] [$_{PP}$ to [$_{NP}$ Ben]]]
b. Ben [$_{VP}$ talked [$_{PP}$ about [$_{NP}$ the steroids]] [$_{PP}$ to [$_{PP}$ the media]]]
c. Robin [$_{VP}$ hit [$_{NP}$ Mike] [$_{PP}$ with [$_{NP}$ a grapefruit]]]

In each of the example sentences in (32), the verb passes a thematic role to its complement prepositional phrase. The same thematic role is then passed on to the noun phrase object of the prepositional phrase. The preposition may further specify the thematic role to be assigned by the verb, but it may not alter the thematic role. For example, in (32a) the verb *gave* assigns the thematic role **goal** to the prepositional phrase *to Ben*. This thematic role is then passed from the preposition to the noun phrase *Ben*. Note that other prepositions that do not independently assign the thematic role **goal** cannot transmit this thematic role, and are thus ruled out:

(33) a. * The doctor [$_{VP}$ gave [$_{NP}$ the steroids] [$_{PP}$ of [$_{NP}$ Ben]]]
b. * The doctor [$_{VP}$ gave [$_{NP}$ the steroids] [$_{PP}$ by [$_{NP}$ Ben]]]

A preposition in a complement position neither receives and retains a thematic role (unlike, for example, a noun phrase) nor does it independently assign a thematic role (unlike a verb or non-complement preposition). Thus it is argued that complement prepositions are degenerate in the same way as is the category Infl. Degeneracy is defined in (34) and the definitions of barrier and blocking category are updated once more:

(34) A node is said to be *degenerate* if its head neither independently assigns a thematic role to an argument, nor receives and retains a thematic role.

(35) γ is a blocking category (BC) for β iff γ dominates β and (a) or (b):
a. γ is a maximal projection that is not L-marked;
b. γ is an immediate projection of δ, a zero-level category that has sufficient agreement features and is distinct from β, where δ is not degenerate.

(36) γ is a barrier for β iff (a) or (b):
a. γ is a maximal projection that dominates δ, δ a blocking category for β;
b. γ is a blocking category for β, where γ is not degenerate and (for Subjacency only) γ is a maximal projection.

So, for example, since the category Infl only passes on whatever thematic role is assigned by the verb that it immediately dominates, it will not invoke clause (b) of (36). Moreover, since clause (b) of the definition of barrier no longer bars a particular category from inherent barrierhood, other categories may also avoid inherent barrierhood. In particular, the preposition *about* in (30) relies on the noun *book* to assign a thematic role to its object trace. The definition of barrier given in (36) therefore bars the PP node headed by *about* from being an inherent barrier, and only one barrier (the NP headed by *book*) is crossed in the *wh*-chain formation.[12] Subjacency is therefore satisfied by (30) given the definition of barrier in (36).

Note that the updated definitions of blocking category and barrier do not alter the desired ECP effects. Consider, for example, the complementizer-trace effect in (22b):

(22b) * Who do you think [$_{CP}$ t_4 [$_{C'}$ that [$_{IP}$ t_3 left]]]

Since the complementizer phrase headed by *that* receives and retains a thematic role

[12] As of yet, we are still ignoring the weak inherent barrier, the matrix IP. See Section 4.2 to see how this barrier is avoided.

from the verb *think*, no projection of the complementizer *that* is a degenerate category. Hence the C′ node headed by *that* is not degenerate, and it still triggers the Minimality Condition. Trace t_4 cannot properly govern trace t_3 since C′ is an intervening barrier, and the ECP is violated.

Let us now check that the sentences in (26) and (27) violate Subjacency as required under the updated definitions. Consider first sentence (26a) with respect to the new definitions. The N′ immediately dominating the noun *chapter* remains a blocking category for trace t_i, but is no longer a barrier for it. The NP headed by *chapter* is still a barrier for t_i, as is its immediately dominating IP. Thus two barriers are crossed in the move from t_i to t'_i, and Subjacency is violated, as required.

Consider now sentence (27a) with respect to the new definitions. The N′ immediately dominating the noun *friends* is a blocking category for the chain link $\{ t'_i, t_i \}$ because of the Minimality Condition. Hence the NP node headed by *friends* is a barrier for this movement, as is the PP node headed by *to*. Resultantly, two barriers are crossed in the move from t_i to t'_i and Subjacency is violated.

Consider now (27f), the best of the deep right branch extractions:

(27f) ? [$_{CP}$ Who$_i$ did you ask [$_{PP}$ for [$_{NP}$ pictures of t_i]]]

Even (27f), which is the best that we have found of the deep right branch extractions, is not good; it is worse than a simple *wh*-question such as (12a) and also definitely worse than (37):

(12a) [$_{CP}$ Who did [$_{IP}$ Bill [$_{VP}$ t_i^2 [$_{VP}$ see t_i^1]]]]

(37) Who$_i$ did you see pictures of t_i ?

This is just as predicted by the theory proposed here: simple *wh*-questions like (12a) satisfy Subjacency and no barriers are crossed; (37) also satisfies Subjacency, but a barrier is crossed, so it is degraded; sentences like those in (27) are ungrammatical, since Subjacency is violated. The theory presented in *Barriers* does not make these predictions.

4.2. Weak Inherent Barrierhood

If the Minimality Condition is applied to the theory of movement, it is necessary to alter stipulation (16) in order to avoid Subjacency violations in sentences like (30):

(30) Who$_i$ did [$_{IP}$ you [$_{VP}$ t'_i [$_{VP}$ read [$_{NP}$ a [$_{N'}$ book about t_i]]]]]

The NP headed by *book* is a barrier with respect to movement of trace t_i to t'_i and the weak inherent barrier IP is crossed in the movement from t'_i to who_i. Since two barriers are crossed in the formation of the chain headed by *who*, Subjacency is violated as long as (16) is in effect. However, there are a number of conceptual problems with the stipulation in (16):

(16) The most deeply embedded tensed IP is a weak inherent barrier with respect to Subjacency.

First of all, the word "weak" is not well-defined. A "weak" barrier presumably causes less severe violations than normal barriers. This claim is made since crossing one weak barrier does not cause a degradation in grammaticality. The derivations of simple *wh*-questions such as (12a) cross one weak barrier, and are perfectly grammatical. Sentence (38) has three chains, all of which cross one weak barrier, and yet it is completely grammatical.

(38) The man [$_{CP}$ that [$_{IP}$ Mary liked t]] gave the ring [$_{CP}$ that [$_{IP}$ I saw t]] to the woman [$_{CP}$ that [$_{IP}$ you know t]]

As a result these barriers must be claimed to be deficient in some way. Simply calling them "weak", however, is not a solution: it is a renaming of the problem. Secondly, it is conceptually problematic to claim that only the deepest tensed IP is a barrier. Why only the deepest? What is it about the deepest IP that sets it apart from the others? Finally, a barrier is defined with respect to another category. Given this definition, it is odd to say that there exists such a thing as an "inherent" barrier; "barrier" is a relative term, not an absolute one.

Because of these difficulties, (16) amounts to a number of unjustified stipulations. It is necessary to either explain (16) or remove it from the grammar. We propose to do the latter. Before we can replace the weak inherent barrierhood status of IP with a simpler stipulation, we must reformulate the definition of barrier. To motivate the changes to be made, we first note that the notion *barrier* is a building block for the grammar system described above: it is used in the definitions of government and Subjacency. We reproduce the definitions of *barrier*, *government* and *n-subjacency* below:

(36) γ is a barrier for β iff (a) or (b):
a. γ is a maximal projection that dominates δ, δ a blocking category for β;
b. γ is a blocking category for β, where γ is not degenerate and (for Subjacency only) γ is a maximal projection.

(5) α governs β iff α m-commands β and there is no γ, γ a barrier for β, such that γ excludes α.

(14) β is n-subjacent to α iff there are fewer than $n+1$ barriers for β that exclude α.

A barrier is formally defined as a relationship between two nodes, γ and β. Note, however, that the fact that γ is a barrier for β in (39) does not stop α from being 0-subjacent to β:

(39) [$_{\gamma}$ α [$_{\gamma}$ β]]

In (39), α is 0-subjacent to β because, although γ is a barrier with respect to β, γ does not exclude α. A barrier is only relevant to the Subjacency (government) relation between α and β if it excludes α. As a result, the exclusion clauses of the Subjacency and government definitions could just as easily have been placed inside the definition of barrier. In fact, it makes more sense to do so, since then it is not necessary to repeat the exclusion clause for two other definitions. We propose that it be stated at the core, in the definition of barrier. The new definitions of barrier, government and Subjacency are given in (40) – (42):

(40) γ is a barrier for α, β iff γ excludes α and (a) or (b):
a. γ is a maximal projection that dominates δ, δ a blocking category for β;
b. γ is a blocking category for β, where γ is not degenerate and (for Subjacency only) γ is a maximal projection.

(41) α governs β iff α m-commands β and there is no γ, γ a barrier for α, β.

(42) α is n-subjacent to β iff there are at most n barriers for α, β.

Moving the exclusion clause into the definition of barrier does not change the empirical predictions of the definitions of government and n-subjacency. However, the change is warranted on theoretical grounds, since, under the new definitions, it is only necessary to state the exclusion clause once. Now we replace the stipulation that IP is a weak inherent barrier for Subjacency with (43):

(43) γ is a barrier with respect to α, β for Subjacency iff γ is a tensed IP that excludes α and dominates β, and the first maximal projection dominating γ is a barrier for α, β.

Intuitively (43) amounts to saying that if, through the definitions of barrier and blocking category, the first maximal projection dominating a tensed IP is a barrier, then propagate that barrierhood back down to the tensed IP. The stipulation in (43) obtains the same empirical effects as does (16), without the notion of "weak" barrier.

Note that stipulation (43) is not circular: the parent of IP relies on the *blocking category* status of IP, not its *barrier* status, to obtain barrierhood. As a result, if IP is a blocking category, and hence causes its parent to be a barrier with respect to some categories, stipulation (43) takes effect, and IP will also be a barrier. Also note that (43) does not allow transmission of barrierhood downward across a CP node (an S′ node), so the principle of Strict Cyclicity is not violated.

The final update of the definition of barrier is given in (44):

(44) γ is a barrier for α, β iff γ excludes α, dominates β, and (a), (b) or (c):
a. γ is a maximal projection that dominates δ, δ a blocking category for β;
b. γ is a blocking category for β, where γ is not degenerate and (for Subjacency only) γ is a maximal projection.
c. γ is a tensed IP and the first maximal projection dominating γ is a barrier for α, β.

Note that the precondition in (43) that states that γ must dominate β has been moved up to a precondition for the definition of barrier. This change has no empirical effect, but makes the definition simpler because it simplifies the third disjunct. Also note that it is no longer stipulated that the tensed IP barrier in clause (c) of (44) is only a barrier with respect to Subjacency: it may also be a barrier for government. Since the CP immediately dominating a tensed IP that satisfies clause (c) of (44) will also be a barrier for government, it makes no difference if there is another barrier for the same government relation. Hence (43) is permitted to apply to government as well as movement.

As a result of the replacement of weak inherent barrierhood with (43), the matrix IP in sentence (30) is no longer a barrier, since its immediately dominating maximal projection, CP, is not, and Subjacency is satisfied by this sentence. Consider now sentence (18), which was the motivation for stipulation (16) and the reformulated stipulation (43):

(18) * What$_i$ do you [$_{VP}$ t_i^2 [$_{VP}$ wonder [$_{CP}$ who$_j$ [$_{IP}$ t_j [$_{VP}$ t_i^1 [$_{VP}$ saw t_i]]]]]]

IP is a blocking category with respect to t_i^1, so CP becomes a barrier with respect to the chain link $\{t_i^2, t_i^1\}$. As a result IP becomes a barrier with respect to the chain link $\{t_i^2, t_i^1\}$ in this example, and Subjacency is violated by this link, as desired.

4.3. Further Empirical Effects

The analysis proposed here predicts that extraction out of a subcategorized prepositional phrase inside a verbal small clause should be grammatical, whereas extraction out of a category assigning an independent thematic role (*e.g.*, a noun phrase or verb phrase) inside a verbal small clause should be ungrammatical. This is exactly the case, as illustrated by the contrast between the sentences in (45) and (46).[13]

(45) a. Who$_i$ did you [$_{VP}$ t_i^2 [$_{VP}$ see [$_{VP}$ the man give the book [$_{PP}$ to t_i^1]]]]
b. Who$_i$ did you [$_{VP}$ t_i^2 [$_{VP}$ hear [$_{VP}$ the president talk [$_{PP}$ about t_i^1]]]]
c. Who$_i$ did you [$_{VP}$ t_i^2 [$_{VP}$ see [$_{VP}$ Rick buy the ring [$_{PP}$ for t_i^1]]]]

[13]For arguments that the complement of the perception verbs in these examples is a verbal small clause, see Clark (1988).

(46) a. * What$_i$ did you [$_{VP}$ t_i^2 [$_{VP}$ see [$_{VP}$ John read [$_{NP}$ books about t_i^1]]]]
b. * What$_i$ did the reporter [$_{VP}$ t_i^2 [$_{VP}$ see [$_{VP}$ Carl watch [$_{VP}$ Ben drink t_i^1]]]]

In (45a), the prepositional phrase immediately dominating the preposition *to* is a blocking category for trace t_i^1 because of the Minimality Condition. However, this PP does not invoke barrierhood condition (b), since the thematic role assigned by the preposition *to* is dependent on the thematic role assigned by its governing verb, *give*. As a result, the prepositional phrase headed by *to* is a blocking category but not a barrier. The VP headed by *give* obtains barrierhood status from the blocking category status of this PP, but this is the only barrier crossed in the move from t_i^1 to t_i^2. Subjacency is satisfied, and (45a) is ruled grammatical. Similar derivations apply for the other sentences in (45).

Neither of the sentences in (46) is grammatical, however. In (46a), for example, the NP headed by *books* is a barrier because the N′ that it immediately dominates is a blocking category by the Minimality Condition. The VP headed by *read* then inherits barrierhood, and Subjacency is violated by the move from t_i^1 to t_i^2.

A number of other empirical results are explained under the theory proposed in this paper. Consider the sentences in (47):

(47) a. [$_{NP}$ The decision t_i] upset me [$_{CP_i}$ that John was acquitted]
b. * [$_{NP}$ The proclamation of [$_{NP}$ the decision t_i]] upset me [$_{CP_i}$ that John was acquitted]

Sentence (47a) is correctly marked grammatical in the original *Barriers* system. The NP headed by *decision* is a barrier with respect to the move from t_i to CP$_i$ since this NP is not L-marked. This NP is the only barrier crossed in the derivation of (47a), so the sentence is ruled grammatical.

Under the system proposed here, exactly the same derivation takes place. Only one barrier is crossed, so (47a) is ruled grammatical as desired.

In (47b), CP$_i$ cannot be associated with trace t_i, as an argument of *decision*, although it can be associated with a trace that modifies *proclamation*. The ungrammaticality of the interpretation in (47b) cannot be due to the ECP: trace t_i is θ-governed by *decision* and hence properly governed. This ungrammaticality must therefore be due to Subjacency. Under the original definitions in *Barriers*, however, Subjacency is not violated. Since the noun *decision* is θ-governed by *proclamation*, the embedded NP is not a barrier. Only one barrier is crossed in the derivation of (47b), so it is incorrectly ruled grammatical.

Under the proposed changes, however, the embedded NP is a barrier for the extraposition movement from t_i because of the Minimality Condition. The subject NP inherits barrierhood and, as a result, at least two barriers are crossed by this movement, thus violating Subjacency. The interpretation of sentence (47b) that coindexes the extraposed CP with trace t_i is thus marked ungrammatical as desired.

5. Conclusions

We have proposed a system that differs conceptually from the original *Barriers* system in two ways. First, the stipulation that the most deeply embedded tensed IP is a weak inherent barrier, (16), was replaced by a simpler stipulation, (43). This change allows for the second major conceptual change in the system: that the Minimality Condition applies to movement as well as government. Although our proposal still necessitates a distinction between barriers for movement and barriers for government in that barriers for government may be maximal projections while barriers for movement may not, this disruption is less

severe than is found in the original system. Thus the two changes offered here simplify the *Barriers* system since the problems associated with (16) are removed and the unification of movement and government is more complete.

In addition, these changes allow a number of empirical facts to be explained by the new system that were not explained in the original *Barriers* system. Left branch extractions, deep right branch extractions and extraposition facts provide some of this evidence. Hence we argue that the changes proposed here are beneficial to the *Barriers* system, while offering support for the general framework.

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