Chomsky, N. (1981); Lectures on Government and Binding; Foris Publications; Dordrecht, North Holland

Chomsky, N. (1982); Some Concepts and Consequences of the Theory of Government and Binding; The MIT Press; Cambridge, MA

Clark, R. (in preparation); Positions and Asymmetries; PhD dissertation; UCLA

Hantson, A. (1984)' "Towards an Analysis of Retroactive Gerunds"; in de Geest & Putseys (eds.) Sentential Complementation; Foris Publications; Dordrecht

Horvath, J. (1981); Aspects of Hungarian Syntax and the Theory of Grammar; unpublished PhD dissertation; UCLA

Huang, C.-T.J. (1984); "On the Distribution and Reference of Empty Pronouns"; Linguistic Inquiry, 15, pp. 531-74

Kayne, R. (1983); "Connectedness"; Linguistic Inquiry; 14, pp. 223-49

Safir, K. (1984); "Worth"; ms. Rutgers

Sportiche, D. (1983); Structural Invariance and Symmetry in Syntax; unpublished PhD dissertation; MIT

Stowell, T. (1983); "Subjects Across Categories"; Linguistic Review; 2.3

Visser,F.T. (1973); An Historical Syntax of the English Language; Part Three, Second Half; Leyden; Brill

1985. In Proceedings of NELS 15, ed. Steve Berman, Jae Woong Choe, and Joyce McDonough. Amherst, MA: GLSA.

Parasitic Gaps, Co-ordinate Structures and the Subjacency Condition

Elizabeth A. Cowper

University of Toronto

1. The Phenomenon

1.1 Parasitic gaps

Chomsky(1982) points out that in parasitic gap constructions, the parasitic gap can be in a position which is otherwise inaccessible to movement. This is illustrated in (1).

(1) a. This is the type of book that no one who has read e would give t to his mother.
b. *This is the type of book that no one who has read e would leave his door unlocked at night.

An analysis where one of the gaps in (1a) - t - arises through movement, while the other - e - is base-generated, predicts these facts, if one assumes that subjacency is a condition on movement, rather than a condition on derived representations. However, as Chomsky points out, such an analysis fails to account for the relative

acceptability of (2), where neither gap is subjacent to its antecedent.

(2) George is a man who everyone who meets e knows someone who likes e.

Thus it seems that in parasitic gap constructions, neither gap needs to be subjacent to its antecedent.

1.2 Coordinate Structures

A similar set of facts may be observed in across-the-board extractions from coordinate structures. A sentence like (3), where subjacency is violated by an across-the-board extraction, is more acceptable than (4), where the same subjacency violation occurs in a single extraction.

(3) Which book did you accept the fact that they published e but reject the notion that the students should buy e?

(4) *Which students did you dismiss the proposal that the university should expel e?

In coordinate structures as well, it is possible that only one of the gaps will be non-subjacent to its antecedent. Such a sentence is also more acceptable than a case where there is only one gap and the same subjacency violation exists.

(5) a. Which students did they decide to [[expel e] and [give raises to everyone who taught e]]?
b. *Which buildings did they give raises to everyone who worked in e?

What these sentences have in common is that they involve $\overline{A}$-chains with two tails; that is for each lexical item heading such a chain, there is more than one coindexed e.c. in a theta position. I will call these configurations branching $\overline{A}$-chains, and go on to explore in more detail what types of subjacency violations are permitted in sentences containing such chains.

1.3 The nature of the subjacency violations

1.3.1 Where it occurs

Notice that the subjacency condition is not entirely impotent with respect to a branching $\overline{A}$-chain. The (a) sentences in (6) - (9), which contain branching $\overline{A}$-chains, are as unacceptable as the corresponding (b) sentences, where the chains do not branch.

(6) a. *This is the book which he met the woman who threw e out without reading e.
b. *This is the book which he met the woman who threw e out without looking at the cover.

(7) a. *This is the book which he read e while insisting that he had never met the woman who wrote e.
b. *This is the book which he smiled while insisting that he had never met the woman who wrote e.

(8) a. *This is the book which George told me he liked e and Fred said he wanted to vote for the woman who wrote e.
b. *This is the book which Fred said he wanted to vote for the woman who wrote e.

(9) a. *Which house did you go out with the agent who renovated e and sold e?
b. *Which house did you go out with the agent who sold e?

It turns out that the subjacency condition is relaxed at a very specific point in a structure containing a branching $\overline{A}$-chain. This is the structure occurring between the lowest point on the part of the chain which does not branch and the highest point on each of the branches of the chain. The subjacency condition continues to hold between adjacent points on each branch of the chain, and between adjacent points on the non-branching part of the chain. The examples in (6) -(9) contain subjacency violations elsewhere on the chain than at the branching point. In (6a), for example, the subjacency violation

is between which and who, on the non-branching part of the chain, while in (7a), the violation is between that and who, on one of the branches. (8a) and (9a) exhibit the corresponding situation in a coordinate structure.

1.3.2 How much

In addition, the subjacency condition has not entirely disappeared even with respect to the branching point of a branching $\overline{A}$-chain. The examples in (10) contain subjacency violations at the branching point, and they are much less acceptable than (1a) or (2).

(10) a. *George is a man who everyone who meets e has read a book about someone who likes e.

b. *Which students did you accept the fact that the University expelled e, but write a long article condemning the proposal that the government should prosecute e?

In fact, the subjacency condition is relaxed, in the case of branching $\overline{A}$-chains, in a very specific way, as follows: One additional bounding node is allowed to intervene at the branching point in a branching $\overline{A}$-chain. The sentences in (10) have three bounding nodes intervening at the branching point of the A-chain.

2. The basis for the analysis

The question that remains is why subjacency should be relaxed in exactly this way. I will claim that the answer is to be found in the way such constructions are processed, as follows: First, I will argue that the subjacency condition owes its existence to constraints on syntactic processing. Secondly, I will argue that sentences containing across-the-board extractions must be processed in a special way. Finally, I will conclude that the processing of across-the-board extractions results in a mental representation where the branching $\overline{A}$-chain contains one more point than it does in the syntactic S-structure. Thus speakers find acceptable those sentences where subjacency is violated by exactly one bounding node at the branching point of a branching $\overline{A}$-chain.

2.1 Subjacency as related to processing constraints

First, why is the subjacency condition related to syntactic processing? The first indication that this might be the case is found in the fact that speakers find sentences containing subjacency violations to be more incomprehensible than ungrammatical. Other types of ungrammatical sentences, involving for example violations of the binding theory, such as (11), are perfectly comprehensible.

(11) *John believes that Sue loves himself.

In addition, speakers can be trained to comprehend sentences containing extractions which violate the subjacency condition. To the extent that the sentences are comprehensible, they are deemed more acceptable.

Secondly, researchers in syntactic processing, including for example Marcus(1980) have argued that reasonable models of syntactic parsing 'enforce' the subjacency condition. In other words, syntactic parsing would have to be much more complicated in nature in order to allow for sentences which violated the subjacency condition. This is not to say that the subjacency condition has no status as part of UG. It has been argued (Rizzi1980) that the subjacency condition is parameterized, in that languages may choose which nodes count as bounding nodes for subjacency. Clearly, if the subjacency condition followed completely from the structure of memory, it would be extremely difficult to account for a parameterized condition. Thus I would argue that as long as the subjacency condition is parameterized, it must form part of UG. If, on the other hand, further research eliminates the need for a parameterized subjacency condition, then it would be possible to eliminate this condition from UG altogether, and simply have performance factors enforce it. Given the situation as it stands, however, we can only say that syntactic processing may have an effect on the perceived grammaticality or ungrammaticality of a sentence whose only offence is to violate subjacency.

2.2 Across-the-board constructions processed in a special way

What is it about across-the-board extractions that makes them different from single extractions with respect to syntactic processing? From a processing point of view, what is involved is

using a single plug (the wh-word, or in Marcus' terms, its trace) to fill two holes. In a single extraction construction, the parse of the extraction is complete as soon as the wh-word is linked to its theta position. In an across-the-board construction, on the other hand, the parse of the extraction cannot be assumed to be complete until the entire subtree in the c-command domain of the wh-word has been processed, and it is clear that there are no more holes to be filled. One might appeal to the notion of slash-category, proposed within the framework of Generalized Phrase Structure Grammar, to account for the fact that in coordinate structures with gaps, there must be a corresponding gap in each conjunct. A coordinate structure where one conjunct is a slash-category, i.e. contains a gap, while the other conjunct is not a slash-category, would simply not be a well-formed phrase structure. Such a proposal would correctly predict that the only possible extraction from a coordinate structure is across-the-board extraction, but it would fail to account for the relaxing of the subjacency condition in such situations. In addition, such a solution is not available for parasitic gap constructions, because parasitic gap constructions differ from coordinate structures in that the second, or parasitic, gap is not, in general, necessary. For example, the two sentences in (12) are equally grammatical.

(12) a. Here is the book that I reviewed e without reading e properly.
b. Here is the book that I reviewed e without reading my notes properly.

In (12a) there are two gaps, while in (12b) there is only one gap. The only time two gaps are required in a parasitic gap construction is when both gaps violate the subjacency condition in the way discussed above.
What is required, therefore, is an account which links the possibility of subjacency violations with the existence of a branching $\bar{A}$-chain. In what follows, I propose an account of how structures containing branching $\bar{A}$-chains are processed. I will show that the possibility of exactly this sort of subjacency violation follows automatically from the way such structures are processed.

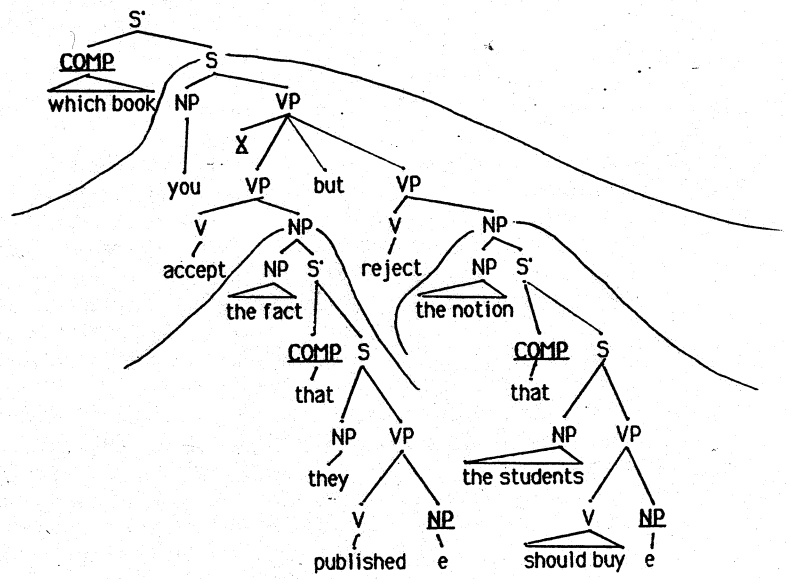
3. The Analysis

I would like to argue that any structure containing a branching

$\bar{A}$-chain must be processed in two steps. First, the subtree containing the multiple gaps is analysed. All gaps are identified and bound by an existential quantifier which has scope over the subtree. This quantifier is then reanalysed as the variable bound by the wh-operator heading the branching chain. In this way, the branching chain is provided with an intermediate point between the highest points on the branches of the chain, and the lowest point on the non-branching part of the chain. I will first illustrate how this works with respect to coordinate structures, and then go on to discuss parasitic gap constructions.

3.1. Coordinate Structures

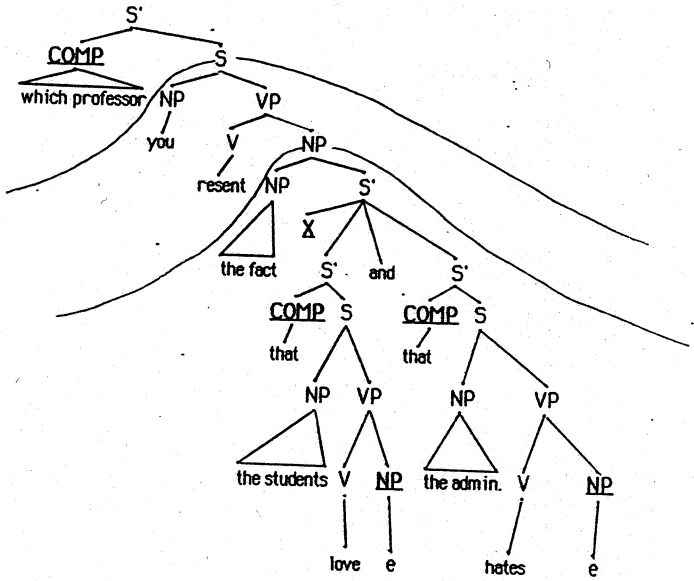
(13) (=3) Which book did you accept the fact that they published e but reject the notion that the students should buy e?



The conjoined verb phrase is the subtree containing the multiple gaps, and is thus analysed first. The existential quantifier

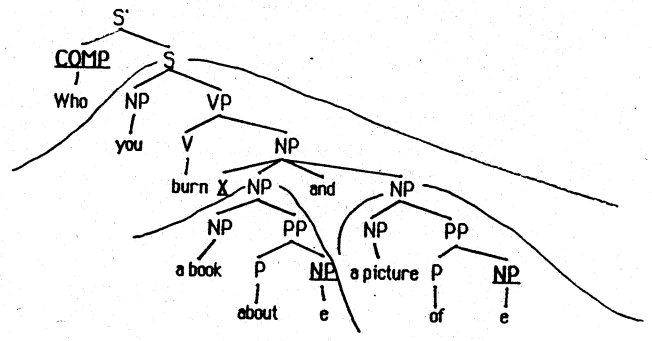
is supplied at the level of the conjoined verb phrase. Notice that this quantifier crucially intervenes between the two bounding nodes in the branching chain which constitute the subjacency violation. The next examples show that the quantifier must, in fact, intervene between these two bounding nodes.

(14) *Which professor do you resent the fact that the students love e and that the administration hates e?



In this case, the subtree dominating the multiple gaps is the embedded S', and the extra point on the chain is provided at the point marked. However, this quantifier does not intervene between the two bounding nodes constituting the subjacency violation, and thus the sentence is unacceptable.

(15) Who did you burn a book about e and a picture of e?

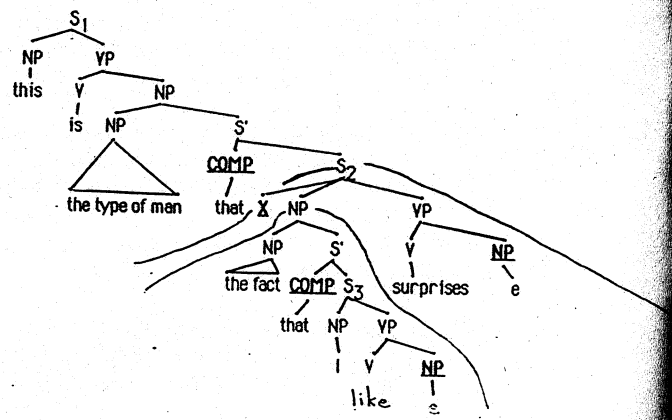


In this case, the subtree containing the multiple gaps is the object NP. The quantifier occurs at the point marked, which intervenes between the two bounding nodes. The subjacency violation is thus eliminated.

3.2 Parasitic gaps

The situation with parasitic gap constructions is similar to that involving coordinate structures, as shown in (16).

(16) This is the type of man that the fact that I like e surprises e.

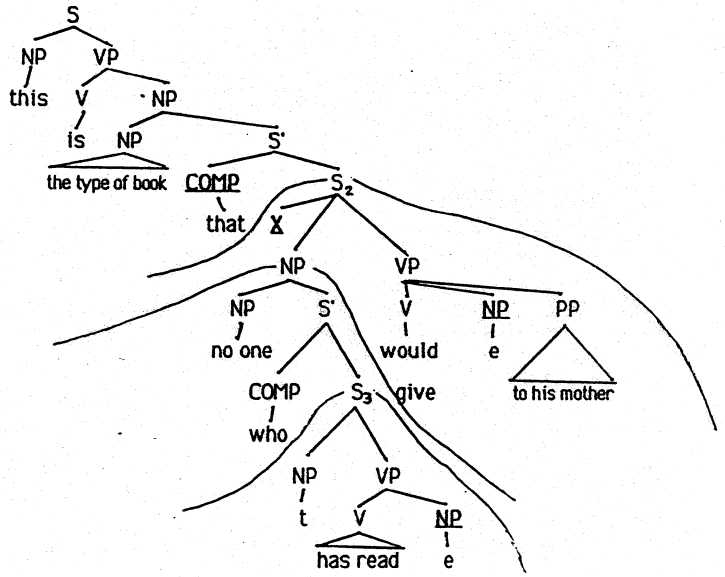


Here, the subtree containing the multiple gaps is S2. Thus, the existential quantifier is supplied at this level, providing an additional link on the chain between the COMP of S3 and the COMP of S2.

3.2.1 The special case of relative clauses

Sentences where the subjacency violation involves a relative clause structure are somewhat more complex, and require further discussion. First of all, it seems that subjacency violations involving not two, but three bounding nodes at the branching point of the chain are allowed. This is illustrated in (17).

(17)(=1a) This is the type of book that no one who has read e would give e to his mother.



The additional problem here is that COMP in S3 is not available as a point on the $\bar{A}$-chain, since it is filled with who. Thus, extraction must be in one step from the theta position within the relative clause

to the COMP in S2. This movement involves three bounding nodes, and seems to contradict the generalization about subjacency violations proposed above. However, all of the parasitic gap constructions of this type in the literature have something else in common: namely that the head NP of the relative clause constituting the subjacency violation is a quantified NP such as no one, everyone, or someone. Analogous sentences containing unquantified head NP's are significantly less acceptable, as shown in (18).

(18) a. *Here is the book that the student who bought e gave e to his mother.
b. *Fred is the teacher that the student who likes e knows the janitor who hates e.

Strangely enough, this difference does not seem to exist in sentences where parasitic gaps are not involved. The difference between (19a) and (19b) is not anything like as clear as the difference between, for example, (2) and (18b).

(19) a. *Here is the man that I met someone who likes e.
b. *Here is the man that I met the woman who likes e.

The account I propose above for structures containing branching $\bar{A}$-chains will, I believe, allow us to explain both the possibility of three bounding nodes in a branching $\bar{A}$-chain where there is a relative clause headed by a quantified NP, and the surprising difference between parasitic gap constructions and sentences like (19). If, in fact, branching $\bar{A}$-chains are processed in the way I propose, then the quantified head NP in a relative clause such as that in (2) will effectively disappear from the logical form of the structure, leaving only a quantifier binding the trace in the relative clause. This removes one of the bounding nodes intervening at the branching point in the $\bar{A}$-chain, and reduces the situation to that found in example (16) above. On the other hand, sentences like (19), which do not involve multiple gaps, are processed in the normal way. Thus the subjacency condition holds at S-structure, where both (19a) and (19b) contain relative clause structures. Both of these sentences therefore violate the subjacency condition.

4. Summary and Conclusions

I have argued that the subjacency violations found in parasitic gap constructions discussed by Chomsky(1982) do not follow from parasitic gaps being base-generated, in contrast to regular gaps which are derived by movement. I have shown that, given the right level of representation, the subjacency condition in fact holds of these sentences. The apparent violations are due to the fact that there is a difference between the S-structure assigned to these sentences by the grammar, and the mental representation of these structures. The mental representation contains an extra point on the branching $\bar{A}$-chain, which intervenes between the two offending bounding nodes, eliminating the subjacency violation. Exactly the same apparent subjacency violations can be found in other constructions involving branching $\bar{A}$-chains, namely coordinate structures.

The first conclusion that can be drawn from what I propose is that subjacency must clearly be a condition on representations, rather than a condition on the application of move α. I have argued that the subjacency condition is, in fact, not violated in sentences like (1a), (2), (3) and (5) at the level of mental representation, although it is violated at the level of S-structure and by the various applications of move α. Thus, one of the arguments for movement, as opposed to the base-generation of traces, has been shown not to hold.

A second conclusion that can be drawn is that syntactic processing does interact with the grammar in determining which sentences speakers find acceptable. A grammar which takes no account of processing cannot account for sentences such as (1a) and (2) in a straightforward way. This is not to say that the grammar must constantly refer to processing; rather that there are certain acceptability judgements, such as those involving branching $\bar{A}$-chains, which follow from the way sentences are processed.

References:

Chomsky, N. (1982) Some Concepts and Consequences of the Theory of Government and Binding. MIT Press.

Marcus, M. (1980) A Theory of Syntactic Recognition for Natural Language. MIT Press.

Rizzi, L. (1980) "Violations of the Wh-Island constraint and the subjacency condition" Journal of Italian Linguistics, vol. 5.

RULES AND CONSTRAINTS IN SENTENCE PROCESSING

Stephen Crain and Janet Dean Fodor

University of Connecticut

Some people have hoped that the study of sentence processing will help us choose between competing theories of grammars, where more narrowly linguistic evidence fails to distinguish them. Other people regard this hope as naive. Unfortunately, the pessimists appear to be closer to the truth. Even if a linguistic theory would stand still long enough to be tested experimentally, it very rarely generates any firm predictions about performance. Almost any kind of grammar can be reconciled with almost any experimental results on parsing times, error rates, and so forth, just by changing the way the grammar is implemented in the processing mechanism. It is even possible to implement one kind of grammar and then convert its output into a form characteristic of another kind of grammar; the latter could then be viewed as the competence grammar, while the former, which is actually doing all the work, would be thought of as merely a performance algorithm.

Nevertheless, most people who work on sentence processing have a fairly sturdy sense, even if it's only a matter of intuition at present, of the difference between a direct and an indirect implementation of a grammar. And it is most reasonable to start, surely, by considering the most direct applications of the kinds of grammars we have arrived at by linguistic argumentation. Only if these straightforward models fail do we need to look for more distant and intricate relationships between what people know about language and how they put that knowledge to practical use.

However, even if we accept this methodological rule of the game, it is still remarkably difficult to identify different implications for performance associated with different theories of grammar. For instance, what sort of experimental results would it take to really establish that people mentally derive passive sentences by transformation, rather than by looking them up in the