Adjuncts and the HPSG Binding Theory

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1 Introduction

Various syntactic theories in the GB tradition, starting with Chomsky (1981) and Reinhart (1976, 1981, 1983), provide an account of coindexation possibilities in terms of the phrase structural relation of c-command. The revised HPSG binding theory presented in chapter 6.8.3 of Pollard and Sag (1994) (henceforth P&S-94) rejects these configurational formulations and instead introduces a relation called o-command which is based on the relative obliqueness of arguments of the same head, as reflected in its ARG-ST list.[1] But this analysis faces a number of problems. For example, it fails to address the binding theoretic interaction between elements in the main clause and elements within adjuncts. In this talk, I present a revision of the HPSG binding theory that can account for these binding phenomena. Following Hukari and Levine (1995, 1996), I claim that a configurational relation similar to c-command is needed in order to capture the binding behavior of adjunct-internal elements. I therefore introduce a revised version of Hukari and Levine's relation of v(alence-based)-c-command and propose that Principle C must involve this configurational relation in addition to the obliqueness-based relation of o-command. New data will be provided that strongly support the proposed revision of the HPSG binding theory.

2 Problems with P&S-94's binding theory

P&S-94's nonconfigurational binding theory cannot account for the coindexation between main clause and adjunct-internal elements. Adjuncts are not selected by heads and do not stand in obliqueness relations to arguments, thus they do not appear on ARG-ST lists.[2] It follows that adjuncts are never (locally) o-commanded, and no element within an adjunct can ever be o-bound by an element outside of the adjunct. Consequently, P&S-94's theory cannot predict any Principle C effects involving nonpronominal NPs within adjuncts bound by arguments of the main clause.

But there is considerable evidence that adjuncts are transparent for binding purposes. First of all, a nonpronominal NP contained within a relative clause cannot be coreferential with an argument preceding the NP containing the relative clause, as illustrated in (1):

(1) (a) *She$_i$ admires the people who work with Lola$_i$. (Reinhart 1983: 102)
(b) *I sent her$_i$ many gifts that Mary$_i$ didn't like last year. (Culicover and Rochemont 1990: 29)

Since a relative clause functions as a modifier, a name within it is not o-commanded by a preceding argument of the matrix clause and P&S-94's binding theory does not predict a Principle C violation for these sentences.[3]

Other types of adjunct clauses also constitute a problem for the binding theory. As observed by Hukari and Levine (1995, 1996), nonpronominals within *without*-adjuncts are subject to Principle C:

(2) (a) *They$_i$ went into the city without anyone noticing the twins$_i$.
(b) *They$_i$ went into the city without the twins$_i$ being noticed.

However, there is an asymmetry between subject and object antecedents. While the nonpronominal NP *the twins* in the adjunct clause may not be taken as coreferential with the main clause subject (see (2)), it may be coreferential with the object in the main clause, as shown in (3):

[1] I employ here the feature ARG-ST as used in more recent work within the HPSG framework to replace the SUBCAT feature as used in P&S-94.

[2] As will become clear in the following discussion based on Hukari and Levine (1995), approaches in which adjuncts are added to the ARG-ST list, as for example van Noord and Bouma (1994) and Sag (2005), fail on empirical grounds since they cannot predict the complex cataphora asymmetries demonstrated below, for example the contrast between subject-based and object-based cataphora into *without*-adjuncts as shown in (2) and (3).

[3] Note that the original formulation of Pollard and Sag's binding theory (1992, 1994) can account for these data because o-command is defined in terms of a domination relation. Thus, the pronoun locally o-commands a phrase which dominates the nonpronominal NP within the relative clause so that the latter is o-commanded and hence o-bound by the coindexed pronoun in violation of Principle C. However, these definitions of the binding theory fail to predict binding relations in certain unbounded dependency constructions. In addition, Pollard and Sag (1994: 277) suggest to "minimally extend local o-command in such a way that unexpressed reflexive subjects of VP and predicative complements become subject to Principle A". That is why they revise the definitions and provide a totally nonconfigurational binding theory in chapter 6.8.3.

(3) (a) You can't say anything to them$_i$ without the twins$_i$ being offended.
(b) You can't say anything about them$_i$ without Terry criticizing the twins$_i$ mercilessly.

This contrast can also be found in sentences with other types of adjunct clauses:

(4) (a) *She$_i$ always gets angry if/when Kim$_i$ is criticized.
(b) *He$_i$ always stops before Freddy$_i$ says something stupid.
(c) *He$_i$ came into the room as quickly as John$_i$ could. ((4c) from Culicover and Rochemont 1990: 33)

(5) (a) Sara always stops him$_i$ before/when Freddy$_i$ acts stupid.
(b) We always console her$_i$ when Kim$_i$ is criticized.

The binding theory in P&S-94 does not predict these cataphora asymmetries. According to its definitions, all of the sentences in (2)-(5) should be equally grammatical.

Hukari and Levine (1995) argue that the *without*-clause has the status of a VP-adjunct by applying conventional tests for VP-adjuncthood (coordination, proform replacement, and displacement) that clearly suggest a structural difference between *without*-clauses and complements on the one hand, and between *without*-clauses and sentential adjuncts on the other.[4] These differences in the structural location are reflected by contrasts in coreference possibilities. Compare the sentences in (3) to those in (6).

(6) (a) *You can't tell them$_i$ that the twins$_i$ are being offensive.
(b) *You can't tell them$_i$ that people are irritated at the twins$_i$.

Assuming a configurational binding theory that is based on a c-command relation, Principle C prohibits the coreference in (6) since the nonpronominal is in an object clause which is clearly c-commanded by the coindexed pronoun *them*. The fact that the sentences in (3) are grammatical indicates a lack of a c-command relation in those examples and hence a structural difference between the complement clause on the one hand and the adjunct clause on the other.

Moreover, the difference in coreference possibilities between (7) and (8) is an indication of the structural difference between *without*-adjuncts and adjuncts that are clearly sentential:

(7) *They$_i$ could never do anything without the twins$_i$ feeling insecure about it.

(8) They$_i$ hadn't been on the road for half an hour when the twins$_i$ noticed that they had forgotten their money, passports and ID.

This contrast cannot be predicted by an obliqueness-based binding theory. Since neither sentential nor VP-adjuncts appear on ARG-ST lists, the nonpronominal NP *the twins* is not o-commanded and thus not o-bound by the subject pronoun in either case. The sentences should be equally grammatical.

Finally, the difference between the sentences in (2) and those in (3) also indicates a lack of a c-command relation between the complement of the matrix verb and the adjunct in (3).

In P&S-94's purely obliqueness-based approach, VP-adjuncts, but not sentential adjuncts, would have to be ordered between subjects and complements on the ARG-ST list in order to account for the cataphora asymmetries. But this position is unnatural; it does not reflect the unmarked linear order of elements (see Hukari and Levine (1995) and Pollard and Sag (1987)). I therefore suggest, following Hukari and Levine (1995), to supplement the definitions of the HPSG binding theory with a new command relation based on configuration (called vc-command) and reformulate Principle C so that it is based on both, o-command and vc-command. This approach is presented in the next section.[5]

3 A valence-based binding theory

Hukari and Levine (1995) propose the following command relationship in terms of configuration:

(9) **v(alence-based) c-command**:
Let α be an element on a valence list γ and α' the DTRS element whose SYNSEM value is structure-shared with α. Then if the constituent that would be formed by α' and one or more elements β has a null list as its value for γ, α vc-commands β and all its descendants.

[4] Culicover and Rochemont (1990) also provide evidence that such adverbial phrases must adjoin to VP.

[5] Bouma et al. (2001), citing works by Bolinger and Bresnan, in passing consider that Principle C effects are pragmatic in nature rather than syntactic. However, I am not aware of a pragmatic theory which covers all Principle C effects that has been integrated into HPSG. Moreover, Bouma et al. do not provide a careful syntactic analysis of the examples they discuss and thus have not demonstrated that no syntactic account of them is possible.

This relation is added to the definitions of P&S-94's binding theory, i.e., it exists in addition to o-command, and Principle C is replaced by the following formulation:

(10) **Principle C**: A nonpronominal must neither be bound under o-command nor under a vc-command relation.

In essence, a subject vc-commands the VP (and all its descendants), and a complement vc-commands all its sister constituents and their descendants. So, crucially, vc-command is a relation that exists between a subject and VP-adjuncts (including all descendants) but not between complements and VP-adjuncts. Moreover, it exists between a subject or complement and any adjuncts within more oblique complements. The revised Principle C prohibits the binding of nonpronominals under vc-command, thus causing the desired effect.

While I agree with the gist of Hukari and Levine's definition of vc-command, its formulation is conceptually strange, especially as concerns the modality in the formulation. I therefore propose the following refinement:

(11) **vc-command (revised)**:
Let α, β, γ be *synsem* objects, and β' and γ' signs such that β': [SYNSEM β] and γ': [SYNSEM γ]. Then α vc-commands β iff

(a) γ': [SS|LOC|CAT|VAL|SUBJ $\langle\alpha\rangle$] and γ' dominates β', or

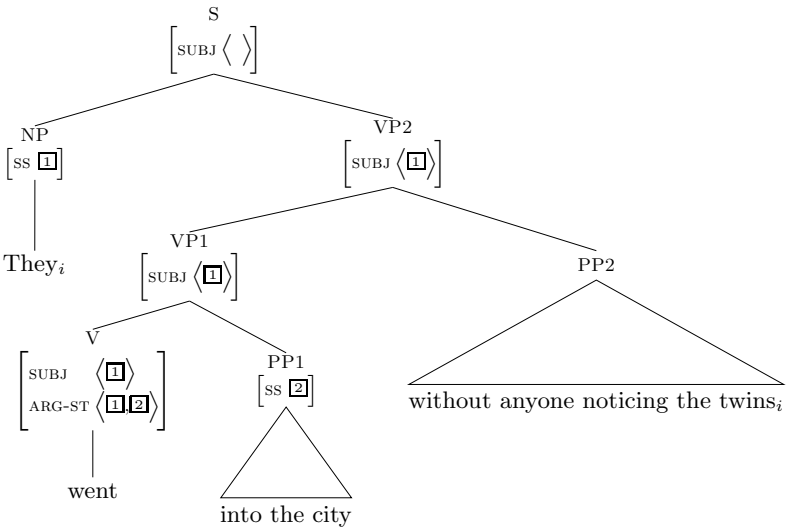
(b) α locally o-commands γ and γ' dominates β'.

Another benefit of this revised formulation is that it emphasizes the primacy of the subject. The subject is the least oblique and (in English) the sole obligatory argument of the verb and is in a superior structural position. This special status is reflected in its binding behavior. Subjects are strong binders: Some languages process anaphors that can only be bound by subjects.

The revised binding theory predicts all of the data provided above. The ungrammatical sentences are now correctly ruled out by Principle C. First of all, in the sentences in (1), the pronoun locally o-commands the NP containing the relative clause, which in turn dominates the nonpronominal NP so that the latter is vc-commanded by the coindexed pronoun. Next, consider again the sentences in (2). The structure of (2a), repeated as (12a), is given in (12b):

(12) (a) *They$_i$ went into the city without anyone noticing the twins$_i$.

(b)



Under the assumption that the *without*-adjunct is adjoined to VP, the subject NP *they* vc-commands the coindexed nonpronominal NP *the twins* (by (11a)). There is no Principle C effect in the sentences in (3) since the relevant nonpronominal is not vc-commanded by the coindexed object pronoun according to the definitions in (11). The relevant nonpronominal in (8) is not bound by the subject pronoun, either, under the assumption that the adjunct that contains the nonpronominal is a sentential adjunct.

4 Further consequences of the revised binding theory

The binding theory that incorporates both obliqueness and configuration into the formulation of Principle C has additional desirable consequences. First of all, as Hukari and Levine (1995) noticed, it can account for phenomena known as (anti)reconstruction effects, first observed in van Riemsdijk and Williams (1981) and taken up in Lebeaux (1988), in which adjuncts and complements within extracted arguments show different behavior with respect to Principle C:

(13) (a) *He$_i$ denied the claim that John$_i$ made.

(b) *He$_i$ denied the claim that John$_i$ likes Mary.

(c) Which claim that John$_i$ made did he$_i$ later deny t?

(d) *Whose claim that John$_i$ likes Mary did he$_i$ deny t?

With the new Principle C being based on both relations, o-command and vc-command, these effects can be straightforwardly explained. (13a) is ungrammatical because the name is vc-commanded by the coindexed pronoun (by (11a) or (11b)). (13b) is ruled out because the pronoun o-commands the NP *the claim that John likes Mary* on the ARG-ST list of *denied*. By repeated application of clauses (ii) and (iii) of P&S-94's definition of o-command, it also o-commands the coindexed name *John*. It is also the o-command relation that is responsible for the ungrammaticality of (13d). *he* locally o-commands the gap on the ARG-ST list of *deny*. Since the gap structure-shares its LOCAL value with the filler, its HEAD value is identical with the HEAD value of the head daughter (*claim*) of the filler. Thus, by repeated application of clauses (ii) and (iii) of o-command, *he* o-commands *claim*, the complement of *claim*, and finally the coindexed name *John*. In (13c), although the head of the filler, *claim*, is o-commanded by the pronoun *he* in the same way as in (13d), the o-command relation does not extend to the relative clause because relative clauses are not selected by the head that they modify. So *John* inside the relative clause is not o-bound by the matrix clause subject *he*. It is also not bound under a vc-command relation. In order for *John* to be vc-commanded by *he*, it would have to be dominated by a constituent that is locally o-commanded by *he* (cf. (11b)) or by a constituent on whose SUBJ list the pronoun appears (e.g., the VP with the head *deny*) (cf. (11a)). But there is no way in which such a domination relation can exist, independent of which analysis is assumed for unbounded dependency constructions.

Note the crucial difference between o-command and vc-command at this point. The relation of *vc-command*, being defined in terms of domination, breaks off at the gap site. It is not passed on from a gap to its filler. The *o-command* relationship, on the other hand, is passed on since it is defined in terms of the relation "projection of", or shared HEAD features.

Observations similar to the (anti)reconstruction effects can be found in extraposition constructions. Adjunct extraposition circumvents a Principle C violation, but complement extraposition does not, as the examples from Fox and Nissenbaum (1999: 139) demonstrate:

(14) (a) ??/*I gave him$_i$ a picture [from John's$_i$ collection] yesterday.

(b) I gave him$_i$ a picture yesterday [from John's$_i$ collection].

(15) (a) *I gave him$_i$ a picture [of John's$_i$ mother] yesterday.

(b) ??/*I gave him$_i$ a picture yesterday [of John's$_i$ mother].

It should be clear by now how the revised Principle C rules out the nonextraposed sentences. The coindexed non-pronominal is vc-commanded when it appears within an adjunct (as in (14a)) and o-commanded when it is inside a complement (as in (15a)). The extraposed variants are shown in the (b)-sentences. There are different approaches to extraposition in HPSG. Several movement-based analyses treat extraposition as a nonlocal dependency using the same kind of mechanism that accounts for extraction to the left (e.g., Keller (1994), Müller (1999)). For relative clause extraposition, an anaphoric approach assuming simple adjunction of the extraposed adjuncts is proposed by Kiss (2005). Crysmann (to appear) suggests a combination of the two approaches for complement clause and relative clause extraposition in German. No matter which analysis is applied, the binding theory proposed here interacts with any of them in the desired way. Since a complement, whether extraposed or not, is selected by a head, it appears on the ARG-ST list of its head, where the binding principles can be applied in the familiar way. Hence the name in (15b) is bound under o-command in violation of Principle C. Elements within adjuncts, however, are never o-commanded by arguments outside of the adjunct. As explained above, the nonextraposed version in (14a) is ruled out by Principle C under vc-command. The extraposed adjunct in (14b), however, escapes a vc-command relation and hence a Principle C violation under the assumption that constituents extraposed from within VP may adjoin to the VP.[6]

Note that the (anti)reconstruction effects (cf. (13)) are not found in VP topicalization, as shown in (16), an observation cited by Huang (1993) which goes back to Chomsky. On Huang's account, these contrasts follow from the VP-internal Subject Hypothesis.

(16) (a) * ... and leave office without anyone ever trusting Nixon$_i$ he$_i$ did.

(b) * ... and gather injunctions until Richardson$_i$ had every crook behind bars he$_i$ knew he$_i$ would.

[6]Note that when the coindexed pronoun is in the subject position, as in (i), adjunct extraposition does not bleed Principle C. This fact supports the suggestion by Culicover and Rochemont (1990), among others, that a constituent extraposed from an object must be adjoined to VP rather than S. Under this assumption, the phenomenon is correctly predicted by the binding theory proposed here.

(i) *She$_i$ invited many people to the party that Mary$_i$ didn't know.

But the same effects also fall out from the proposed revision of the binding theory, as noticed by Hukari and Levine (1995). The SUBJ specification of the fronted VP is structure-shared with the SUBJ specification of the VP gap, which in turn is structure-shared with the SYNSEM value of the subject of the extracted VP. Therefore, they share their indices. Since the SUBJ specification of the fronted VP vc-commands any constituent dominated by that VP (according to (11a)), no element within it may bear the same index, as required by Principle C.

Finally, another outcome of the revised Principle C is that it correctly predicts the ungrammaticality of sentences like in (17). The offending name is in a relative clause that is contained within a VP complement. It is bound by the pronoun complement of the matrix verb under vc-command (cf. (11b)), but not under o-command.

(17) *John seems to her$_i$ to have made a claim which Mary$_i$ resented.

5 Conclusion

In this talk, I have argued, following Hukari and Levine (1995, 1996), that structural configurations must be taken into account in order to capture the intricate binding theoretic interactions between adjunct-internal and main clause elements, which are not predicted by P&S-94's binding theory. To this end, Hukari and Levine introduced the configurational relation of vc-command and reformulated Principle C so that it prohibits coindexation under both relations, o-command and vc-command. Phenomena such as the (anti)reconstruction and VP topicalization effects fall out from this revision. I have developed Hukari and Levine's approach further and proposed a refinement of the definition of vc-command, which has two benefits: Firstly, it does not involve a modality, and secondly, it motivates the superior role of the subject in binding. Thirdly, I have proposed crucially different interactions of the relations of o-command and vc-command with fillers (including extraposed constituents). Finally, I have provided new data that strongly support the proposed revision of the HPSG binding theory.

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