21 Syntactic Reconstruction Effects

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0 Introduction

Reconstruction is the name given to a class of intricate puzzles in the theory of anaphora, which indicate a complex interaction between the representations created by movement operations, and the core principles determining possible or impossible referential relations between NPs. To give a simple example, *which pictures of himself does Bob like best?* is as grammatical as its declarative counterpart *Bob likes this picture of himself best*. The surface representation of the interrogative seems to defy the characteristic constraints on reflexive anaphora (see below), thus motivating further analysis. The exploration of these effects has turned out to be a useful tool relevant to the understanding of movement relations, scope, and Binding Theory, as well as the general architecture of the syntactic component of the grammatical system.

The term "reconstruction" itself emanates from an enduringly popular approach to this type of problem, in which the movement operation is undone, thus "reconstructing" the pre-movement representation, allowing the binding principles to apply as if the movement had not occurred. The term is nowadays used to refer both to this one type (among several) of formal analysis, and to the empirical data itself. This blurring of terminology is somewhat unfortunate, but commonplace enough that I will follow it here.

No single review chapter can do total justice to every data paradigm and theoretical approach to reconstruction. In my remarks here I hope to provide enough of an encounter with logical shape of the problem, the major formal analysis types, and the best-understood and most widely investigated of the data paradigms that the reader may be properly prepared to take on the more advanced and controversial recent literature.

1 Setting the Scene

1.1 Tree and dependencies

One of the longest-standing technical results in generative grammar is the conclusion that many of the core constraints on anaphoric dependence are subject to a purely geometric relation of *c-command*. The initial discovery was made in seminal work by Lasnik (1976) and Reinhart (1976), and has remained a bedrock principle of syntactic theory ever since. C-command is generally defined over hierarchical relations in phrase markers, although argument structure based variants are occasionally proposed (see e.g. Pollard and Sag 1992, Williams 1994b). I shall take it, for purposes of the current discussion, to have the definition in (1), the definition assumed in a broad range of recent and classical work, although no particular bias is intended toward alternative definitions:

(1) A *c-commands* B iff the first branching node dominating A also dominates B, and A does not itself dominate B. (Equivalently: A c-commands B iff B is, or is contained within, a sister of A.)

The class of constraints on anaphoric dependence which critically require c-command include those subsumed under the familiar principles A, B, and C of Chomsky's (1981, 1986a) Binding Theory, briefly summed up in (2)–(4). Principle A is concerned with the regulation of the relationship between anaphors and their antecedents (where within this subtheory *anaphor* is the class of NPs containing the overt reflexive and reciprocal proforms, and NP-trace), requiring that all anaphors have an antecedent drawn from among locally c-commanding NPs. Principle B imposes a requirement of disjointness of reference between a pronominal and all locally c-commanding NPs. Principle C requires disjointness of reference between any NP which is neither an anaphor nor a pure pronominal (Chomsky's class of *R-expressions*) and any other argument NP which c-commands it. The principles are stated in (2)–(4), and standard exemplifying data are given in (5)–(7):[1]

(2) **Principle A:** If α is [+Anaphoric], α must be A-bound in the minimal CFC containing it, its governor, and a potential antecedent.[2]

(3) **Principle B:** If α is [+Pronominal], α must be A-free in the minimal CFC containing it and its governor.

(4) **Principle C:** If α is an R-expression (= [–Anaphoric], [–Pronominal]), α must be A-free (within the domain of the operator binding it).

(5) a. $Earl_1$ knows $himself_1$.
b. *[$Earl_1$'s mother]$_2$ knows $himself_1$.
c. *$Earl_1$ said I_2 saw $himself_1$.
d. $Earl_1$ saw [$_{NP}$ several pictures of $himself_1$].
e. *$Earl_1$ saw [$_{NP}$ my_2 pictures of $himself_1$].

(6) a. *$Earl_1$ saw him_1.
b. [$Earl_1$'s mother]$_2$ saw him_1.
c. $Earl_1$ said I_2 saw him_1.
d. *$Earl_1$ saw [$_{NP}$ pictures of him_1].
e. $Earl_1$ saw [$_{NP}$ my_2 pictures of him_1].

(7) a. *He_1 saw $Earl_1$.
b. [the woman he_1 mentioned] said I know $Earl_1$.
c. *He_1 said I_2 saw $Earl_1$.
d. *He_1 saw [$_{NP}$ these pictures of $Earl_1$].
e. *He_1 saw [$_{NP}$ my_2 pictures of $Earl_1$].

The grammaticality contrasts between the (a) and (b) examples show the discriminating effect of c-command. Grammatical anaphora fails in (5b) because the anaphor's antecedent fails to c-command it; disjointness of reference is not forced in either (6b) or (7b), due to the lack of c-command, whereas it is enforced in (5a) and (6a), given the presence of c-command. One may think of c-command as a general, hierarchically defined, binary relation between two points in a phrase marker, rendering them "visible" to the filtering effects of the binding principles. The coindexed pairs in (5a), (6a), and (7a) are visible to the pertinent binding constraints, and the pairs in the (b) examples are not.

2 The Logical Problem of Reconstruction Introduced

The so-called "reconstruction effects" are simply a large class of apparent counter-examples to the c-command relation. The empirical data which fall into this class of problems are numerous, and I will here simply outline the basic logic of the problem with a relatively simple example, returning in later sections to more detailed and methodical consideration of more complex cases.

Consider what happens when the direct object NP in (5d) is moved leftward, either through topicalization or through *wh*-movement:

(8) [$_{NP}$ several pictures of $himself_1$]$_2$, $Earl_1$ saw e_2.

(9) [Which pictures of $himself_1$]$_2$ did $Earl_1$ see e_2?

Independent of the presence of anaphora, topicalization like that in (8) or (10) is subject to variation between speakers. Some speakers (including me) find

such topicalizations perfectly acceptable; others find the construction acceptable, but only in a richer context in which an explicit set of alternatives has been established in previous discourse; and some speakers find the construction unacceptable in any context:

(10) [Several pictures of Mary], Fred saw.

For speakers who accept (10), (8) is fully grammatical. And, to the best of my knowledge, all speakers of English find (9) perfect.

The problem presented by such dislocation as (8) and (9), with respect to the binding principles, should be immediately apparent: in neither case is the anaphor *himself* c-commanded by its understood antecedent *Earl*, at least not in the surface constituent structure borne by the examples. That is, at first glance, one should expect that the lack of c-command in (8) and (9) should render the examples ungrammatical, on a par with (5b). In the "visibility" metaphor of the previous section, the antecedent here is unexpectedly visible to the anaphor.

Turning to disjointness effects, we see essentially the same puzzle arise:

(11) [Pictures of $\text{him}_{2/?*1}$], Earl_1 saw.

(12) [Pictures of $\text{Earl}_{2/?*1}$], he_1 saw.

In (12), *he* does not c-command *Earl*, yet coreference is blocked exactly as in (7d). One might reasonably expect the failure of c-command here to render condition C irrelevant, as for (7b). But this expectation is wrong.

The example in (11), and its non-topicalized counterpart (6d), have the same status as well. Many speakers find (6d) perfect if the pronoun is completely destressed, and phonologically encliticized leftward ("pictures of'im"), and marginal (with coreference) otherwise, as originally noted by Fiengo and Higginbotham (1980). Other speakers find coreference permissible regardless of stress. For both groups, apparently topicalizing the pronoun out of the c-command domain of the antecedent has a null effect on grammaticality, indicating a null effect on the anaphoric options for the antecedent–pronoun pair. The most interesting dialect is the conservative one, since presumably the disjointness effect seen in (6d) is a (weak) condition B effect, and it is preserved under topicalization, even though c-command does not obtain.

Wh-movement has an identical effect, as in (13) and (14):

(13) Which pictures of him did Earl see?

(14) Which pictures of Earl did he see?

So, the initial boundary of the syntactic problem is this: how can we precisely account for the lack of effect on binding relations when such extractions take

place? Why should c-command be irrelevant just in case one of the elements participating in an anaphoric relation is contained within a leftward-extracted constituent? There is a descriptive facet to the problem, namely providing any precise definition of the binding principles which classifies (5d), (8), and (9) together, (6d) and (11) together, and (7d) and (12) together, and which draws a distinction between all these cases and (5b), (6b), and (7b). There is also a theoretical-conceptual facet to the problem, namely offering up a precise characterization of these data patterns which seems independently motivated, rather than simply cobbled together in a stipulative fashion to solve that exact problem. As one may imagine, there are more approaches to the reconstruction effect of the former type than the latter, and in my remark below I will try to evaluate approaches to reconstruction along both facets, including my own previous proposals on the matter.

3 Pre-LF Analyses of Reconstruction: Reconstruction Without Reconstructing

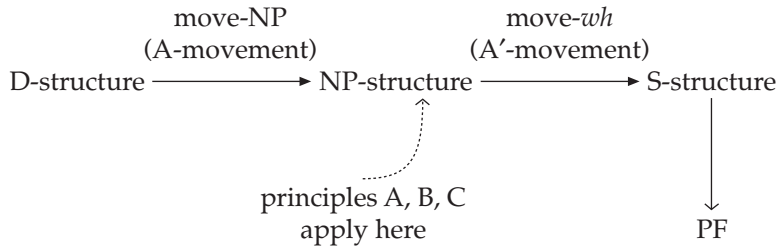
3.1 Pre-S-structure approaches

As a first stab, one might suppose that all the examples in (8)–(9) and (11)–(14) simply indicate that the binding principles apply to a syntactic representation prior to which overt leftward "movement" – Topicalization and *wh*-extraction, here – has not occurred. Within the derivational models of syntax typically known as the Revised Extended Standard Theory, Government Binding (GB) Theory, and Principles and Parameters (P&P) Theory, there are two technically distinct ways to achieve this result.

The first is to apply the filters of the Binding Theory to syntactic structures before any movement at all occurs, at least movement of the sort seen above (movement to non-argument positions). Two variants (at least) of this approach exist. On the first, binding principles would apply at the level D-structure, which, by definition (see Chomsky 1981, 1982) is the level of representation directly projected from the lexicon, and in which all arguments occupy theta-position. Such a view is not easily maintained in light of the fact that movement operations can feed binding principles, as shown below.

On the second variant, proposed by van Riemsdjik and Williams (1981) and extended in Williams (1986, 1994b), the overt component of the grammar (movement operations affecting pronounced word order) are divided into two sorts, A-movement and A'-movement, which are strictly ordered. A-movement derives NP-structure from D-structure, and A'-movement derives S-structure from NP-structure. The binding principles are claimed to apply at NP-structure, i.e., to the output of A-movement but prior to A'-movement:

(15) **NP-Structure Binding Theory**



Under either such approach, the seeming c-command problem presented by (8)–(9) and (11)–(14) is just an illusion. The examples would have the following form at the point where the binding principles apply:

(8′) Earl_1 saw $[_{\text{NP}}$ several pictures of $\text{himself}_1]_2$.

(9′) Earl_1 saw [which pictures of $\text{himself}_1]_2$.

(11′) Earl saw [pictures of him].

(12′) He saw [pictures of Earl].

(13′) Earl saw which pictures of him.

(14′) He saw which pictures of Earl.

The problem disappears. However, both variants of the "pre-(A′-)movement" theory of binding suffer from empirical inadequacy. The problem with D-structure application of the principles is quite straightforward (see van Riemsdjik and Williams 1981, Barss 1984, 1986, for discussion): A-movement alters binding relations systematically, for all three binding principles (and hence Binding Theory cannot apply solely to the D-structure level, contrary to what the model predicts). In (16a, b) is a pair of representations related by A-movement. As inspection shows, the anaphora is regulated by the post-movement representation, not the pre-movement representation:

(16) a. __ seems [to $\text{himself}_1/\text{him}_1$] [$\text{Bill}_1$ to be handsome].
b. Bill_1 seems [to $\text{himself}_1/*\text{him}_1$] [$e_1$ to be handsome].

It is this sort of evidence which is taken to motivate the NP-structure model and its approach to the problem. (16) shows that the binding principles apply after NP-movement, while (8)–(9) and (10)–(14) are consistent with van Riemsdjik and Williams's view that the principles apply before, and not after, A′-movement.

However, the NP-structure model is subject to the same sort of criticism as D-structure binding is. That is, it can be easily demonstrated that the *output* of

overt *wh*-movement, in some cases, forms the input to the filters of the binding theory.

Consider the contrast in (17) and (18):

(17) The men$_1$ believed that the women$_2$ had placed (these) [portraits of [themselves/each other]$_{2/*1}$]$_3$ in a scrapbook.

(18) a. [(these) portraits of [themselves/each other]$_{2/1}$]$_3$, the men$_1$ believed that the women$_2$ had placed e$_3$ in a scrapbook.
b. I wonder [which portraits of [themselves/each other]$_{2/1}$]$_3$ the men$_1$ believed that the women$_2$ had placed e$_3$ in a scrapbook.

(17) is unproblematic: the anaphor (*themselves* or *each other*) must be bound to the locally c-commanding NP *the women*, and cannot be bound to the distant c-commander *the men*. This follows from the locality portion of condition A.

However, (18) is ambiguous, with the anaphor possibly anteceded either by the NP which locally c-commanded it prior to extraction (*the women*), or by the intermediate NP (*the men*) which locally c-commanded it at an intermediate stage of the derivation (after the first token of A'-movement, prior to the second). The NP-structure model fails to capture the latter fact, since it strictly orders the binding principles and A'-movement, whereas factually the two seem to bear a more complex ordering relation (with either potentially occurring before the other).

So, to sum up the overview of this section: certain systematic binding paradigms indicate that the "surface" syntactic representation (the structure associated with a sentence which forms the input to the phonological system, on any theory of syntax) is not the syntactic level at which binding principles apply. Related binding paradigms indicate that it is insufficient to suppose that the binding principles apply solely prior to any extraction operations, or prior to operator movement (as in the NP-structure model). Placed together, these results indicate a most interesting, and quite complex, interplay of movement dependencies and binding relations: phrasal movement of both major types both bleeds and feeds binding relations. Even this preliminary overview indicates that the interaction of movement operations, and the c-command "metaconstraint" that determines which pairs of NPs can be inspected by the binding constraints, have implications for the overall organization of the grammatical levels of representation and the placement of specific principles within them.

In the next section I will overview a class of cases of extraction in which the generalizations observed above fail to hold. These are cases in which the material transposed to the left by movement operations is predicative in nature.

3.2 A further empirical puzzle: predicate movement and argument movement

In each of the examples of movement we have seen above (e.g. (8)–(14)), the moved material originates as an argument of a lexical predicate. As we have

seen with examples (18a, b) such A'-movement of an argument expression both (i) preserves the pre-movement anaphoric options and (ii) adds additional ones.

The latter effect (ii) does not obtain when the moved material is a predicative XP, as the examples below show:

(19) $John_1$ believes that $Martin_2$ is $[_{AP}$ very happy with $himself_{2/*1}]$.

(20) $[_{AP}$ How happy with $himself_{2/*1}]_3$ does $John_1$ believe that $Martin_2$ is e_3?

This empirical fact was first observed by Cinque (1982). Descriptively, an anaphor pied-piped in a moved predicate has exactly those anaphoric options which it has in the pre-movement representation. The implications for the overall theory of binding, and the formal analyses of reconstruction, were first investigated in detail in Barss (1986, 1987), and one analysis presented there was developed further by Huang (1993) and Takano (1995).

3.3 S-structure accounts

3.3.1 Predicate-internal subject traces

Barss (1986) presents two analyses of the critical contrast between moved arguments (which tolerate an ambiguity of antecedence) and moved predicates (which do not). On the first analysis, the strict parallelism between (19) and (20) is attributed to the presence of a theta-marked trace internal to the displaced constituent, following the (now standard) predicate internal theory of subjects developed by Manzini (1983b), Kuroda (1988), Koopman and Sportiche (1991), and McCloskey (1991). On any variant of this theory of subject theta-marking, (19) and (20) will have representations essentially of the form in (21) and (22):

(21) $John_1$ $[_{VP}$ e_1 believes that $Martin_2$ is $[_{AP}$ e_2 very happy with $himself_{2/*1}]]$.

(22) $[_{AP}$ e_2 how happy with $himself_{2/*1}]_3$ does $John_1$ $[_{VP}$ e_1 believe that $Martin_2$ is $e_3]$?

Because of the presence of the trace e_2, the preposed material in (22) is a complete binding domain: it is a CFC, and one which contains a potential antecedent for the lexical anaphor. As a result, binding must be strictly within AP, forcing, by transitivity of indexing, *himself* to be coindexed with *John*. The same effect extends – for the same reasons – to other predicative categories, including VP and predicative NP:

(23) $[e_4$ shave $himself_{4/*3}]$, $John_4$ hopes that $Martin_3$ will.

(24) $[_{NP}$ e_1 admirers of each $other_{1/*2}]$, the $Dukes_2$ hoped that the $Barons_1$ became.

Thus, if this account of Cinque's asymmetry is adopted, it provides striking confirmation for the predicate internal theory of subjects, as observed in Barss (1986) and by Huang (1993).

In spite of the appeal of this analysis, there is at least one outstanding problem with it: the failure to fully generalize to condition C effects. (For this reason, Barss 1986, 1987, develops an alternative to the trace-based account, discussed briefly in sections 3.3.2 and 3.3.3.) Consider the following, all of which are ungrammatical with coreference between the pronoun and *John* (and fine with disjoint reference):

(25) *Mary$_2$ [$_{VP}$ e$_2$ believes him$_1$ to be [$_{AP}$ e$_1$ very proud of John$_1$]].

(26) *He$_1$ [$_{VP}$ e$_1$ believes Mary$_2$ to be [$_{AP}$ e$_2$ very proud of John$_1$]].

(27) *[$_{AP}$ e$_1$ very proud of John$_1$] does Mary$_2$ [$_{VP}$ e$_2$ believe him$_1$ to be]?

(28) *[$_{AP}$ e$_2$ How proud of John$_1$] does he$_1$ [$_{VP}$ e$_1$ believe Mary$_2$ to be]?

(25) and (26) are standard condition C effects: the pronoun (and the trace it binds, under the internal subjects theory) c-commands the name, and they cannot be coindexed and satisfy the binding theory. (27) follows straightforwardly under the predicate internal trace account, since the pied-piped trace still c-commands the name. The pronoun and trace must be coindexed, and the trace and the name cannot be (by condition C), and by transitivity the pronoun and name must be contra-indexed.

But (28) is not properly accounted for, since the trace internal to the moved predicate is not coindexed with the pronoun or the name: it is the trace of the lower subject *Mary*. If the only thing responsible for the ungrammaticality of (27) is the c-command of the name by e$_1$, then we should expect (28) to be fine, contrary to fact. By the same token, we should hope that any account of reconstruction sufficiently general to rule out (28) would plausibly extend also to (27).

3.3.2 A second S-structure solution

As a substitute for the predicate internal trace based analysis, Barss (1986, 1987) develops in detail an approach which is first suggested by Cinque (1982) and Hornstein (1984). On this approach, c-command is replaced by a less conservative geometric relation between anaphor and antecedent, one which combines chain theory with the path system of Kayne (1981a), May (1985), and Pesetsky (1982).

The basic idea, informally, is that a potential antecedent for an anaphor must locally c-command either it or a trace of a phrase containing it. When a phrase is iteratively moved, as in (29), there will be several potential antecedents; one which locally c-commands the anaphor itself, and others which locally c-command one of the traces:

(29) a. Mark_5 knows $[_{NP}$ which picture of $\text{himself}_{1/2/3/5}]_4$ John_2 $[\text{I}'_b$ [thinks $[_{CP}$ e''_4 $[\text{Sam}_1$ $[\text{I}'_a$ said $[_{CP}$ e'_4 Dan [likes e_4]]]]]]].

b. chain = ([which pictures of himself]$_4$, e'''_4, e''_4, e'_4, e_4)

c. potential antecedents for *himself*:
Mark$_5$ (in virtue of local c-command of *himself*)
John$_2$ (in virtue of local c-command of e''_4)
Sam$_1$ (in virtue of local c-command of e'_4)
Dan$_3$ (in virtue of local c-command of e_4)

The portions of structure relevant to determination of this potential–antecedent relationship differ in each case, so that (within Barss's formalized system) each NP counts as being in distinct binding domains for the reflexive. Hence the multiple ambiguity of the example. Barss's system can be thought of as a purely "surface-level" metric for assessing possible binding relations, achieved through the abandonment of c-command in favor of a combination of c-command and chain structure. The idea is formalized within path theory, and the set of points connecting the anaphor and a potential antecedent is termed a *binding path.*

Barss captures the Cinque effect under an additional constraint on the path structure defining the potential–antecedent relation: the portions of structure connecting the anaphor and antecedent must represent whole thematic complexes (a re-encoding of Chomsky's CFC requirement on binding domains). In (30), *he* is contained within predicative AP, and the potential antecedents must be located via structure including the domain of theta-assignment of *Mary*. As a result, only *Mary* is close enough to the reflexive to count as a possible binder, blocking coindexation with the pronoun:

(30) $*[_{AP}$How proud of $\text{himself}_1]_3$ does $[_{IPb}$ he_1 $[_{I'b}$ $[_{VPb}$ believe $[_{CP}$ e_3 Mary_2 $[_{I'a}$ has $[_{VPa}$ become e_3]]]]]]?

Now let us return to the problematic example (28), repeated here:

(28) $*[_{AP}$How proud of $\text{John}_1]_3$ does $[_{IPb}$ he_1 $[_{I'b}$ $[_{VPb}$ believe $[_{IPa}$ Mary_2 $[_{I'a}$ to $[_{VPa}$ be e_3]]]]]]?

Recall that it was this type of example which appeared problematic for the idea that predicate internal traces underlie the Cinque effect. Within the path theoretic approach, condition C has this formulation (see Barss 1986, 1987 for original discussion, and Chierchia 1995 for extension to operator variable relations):

(31) **Condition C:** Given an R-expression R, R must connect to the root node via a binding path P such that R is not coindexed with any NP accessible to R through P.

Because *John* is contained within a predicate in (28), any well formed binding path for it must include the domain of theta-assignment of that predicate,

namely the lowest clause (of which *Mary* is the subject). Since *he* is accessible to *John* through this path, coreference is blocked.

3.4 Evaluating the second S-structure solution

The empirical coverage of this path theoretic S-structure approach is quite large. It directly captures the increased antecedence effects induced by cyclic movement; it subsumes Cinque's asymmetry with reconstructed anaphors; and it captures the condition C effects which proved problematic for Barss's (1986) original, predicate internal trace approach to Cinque's asymmetry. Nonetheless, the path theoretic approach achieves this empirical result at some non-trivial conceptual cost. In particular, the definition of "binding path" rests on a peculiar disjunction of hierarchical domination – a geometric relation central to the subtheory of constituent structure – and chain membership, a relation belonging to one particular approach to extraction dependencies. Why should these two relations travel together? Why not domination and, say, agreement? Or Case marking? The path theoretic account, in retrospect, is a fine example of the tradeoff seen so frequently in linguistic theory between data coverage power and conceptual elegance. What it possesses in the former, it partially lacks in the latter.

In this section, we have discussed the merits and weaknesses of several representational approaches to reconstruction. As we have seen, the D-structure approach, the NP-structure approach, and the S-structure approach all suffer from non-trivial drawbacks. In the next section, I will overview the one logically remaining representational approach, under which all binding principles apply at LF (and only at LF). I will draw particularly on recent work in the Minimalist framework by Chomsky (1995b) and Reinhart (1993, 1995).

4 LF-Based Approaches: Structural Reconstruction

Consider again the basic GB grammatical model, with its three dedicated levels of syntactic representation:

(32) DS $\rightarrow$ SS $\rightarrow$ LF

It is clear that D-structure cannot be the locus of application of the binding principles. It is equally clear that S-structure seems not to be the locus of application either, at least not if we continue to hold that c-command is a necessary ingredient in the binding principles. As we saw in section 3, there is conceptual cost associated with a precise formulation of the binding principles to hold just at S-structure. Having eliminated the alternatives, it is apparent that if the binding theory applies at any specific level of representation, that

level must be LF. LF is computed from S-structure by a variety of operations, including scope assignment of quantifiers, scope assignment of interrogatives, and ellipsis resolution. Within this model, all LF-deriving operations are totally "hidden" from the phonological components, and as a result the presence or absence of a particular extraction operation in the LF-component has to be inferred from interpretive aspects of the sentence.

I will here concentrate on the LF-reconstruction theory presented by Chomsky (1993, 1995), as it is the most precisely worked out, and certainly most influential, of all purely LF-based accounts of reconstruction effects. In the next subsection I will delineate the major theoretical principles related to this theory of reconstruction, and will follow that overview with some critical comments on both the syntactic and semantic aspects of this theory.

4.1 Movement as copying, reconstruction as selective deletion

Within the Minimalist model presented by Chomsky in recent work (see Chomsky 1995), the derivational character of the GB model has been retained, but the notion "level of representation" has been significantly constrained. In pre-Minimalist derivational syntax, the levels D-structure, S-structure, and LF have two distinct, though related, roles to play in the architecture of the model. On the one hand, they correspond to particular points in derivations: DS constitutes the beginning, and LF the terminus, of formal syntactic operations associated with a given sentence, while S-structure corresponds to the point in the derivation immediately preceding the "branch" between LF and PF. S-structure thus has a privileged role in being the last syntactic structure which provides input to both the phonetic and semantic components. So, given a particular derivation, one can pick out the D-structure, S-structure, and LF simply by observing the flow of the derivation.

On the other hand, the levels also served an important sorting function on the various principles, filters, and constraints of the syntax. A given constraint – the Case filter, principle A, the need for INFL to agree with a Specifier, etc. – could be placed at one or another level. Indeed, the level at which a particular principle applied was in principle parameterized (see e.g. Koopman and Sportiche 1991, Lasnik and Saito 1984, 1991, for case studies in parameters of this sort). Investigation of which principles applied at which levels in which languages was a major focus of comparative syntax.

This latter function of levels of representation is almost completely given up in the Minimalist framework. No longer is it a goal of the theory to identify which level(s) a particular principle or filter applies at (in a specific language). Rather, in the more conservative terms introduced by Chomsky (1993), all level-specific syntactic principles must apply solely at LF. D-structure exists not at all, and S-structure only in the derivative sense of there being a point where the derivation branches. No principle is permitted to "name" S-structure, and thus in the latter sense of level of representation, LF is all that remains.

With this conceptually driven meta-constraint in mind, let us turn to the fate of the binding principles in Minimalist syntax. The chief components of the LF-only analysis of reconstruction include the following major ideas:

(33) Movement is a copying operation. The immediate output representation of an instance of movement of a constituent X from point A to point B in a structure is a copy of X in position A, and another full copy in position B.

(34) LF, the final syntactic representation, is subject to two representational economy principles:
Copy Economy: Eliminate redundancy of copies, down to recoverability.
Operator Economy: Minimize the content of operator positions.

I will illustrate these three central aspects of the theory by first considering simple reconstruction of an anaphor under Movement (for reasons of clarity, subject auxiliary inversion is ignored in the following examples). (35) is constructed by the ongoing derivation. (36) is derived from (35) by overt copying. By general rule in English-type languages, the higher copy is pronounced, the lower copies phonetically deleted, deriving the overt form *which picture of himself will John see?*:

(35) [John will see [which picture of himself]]

(36) [which picture of himself] [John will see [which picture of himself]]

(36) thus corresponds to what would have been called the S-structure in the pre-Minimalist model. It forms the input to LF operations.

By Copy Economy, at least one token of *which*, *picture*, *of*, and *himself*, together with the constituent structure immediately dominating them, will have to be deleted prior to LF. Several options exist, including those below:

(37) [John will see [which picture of himself]]

(38) [which picture of himself] [John will see ϕ][3]

(39) [which]$_x$ John will see [ϕ_x picture of himself]

(37) is dubious, since it completely undoes the scope assignment achieved by the overt token of *wh*-movement, obliterating the relation between the *wh*-operator and its scope position (which is exactly identified with its overt landing site). (38) and (39) both satisfy Copy Economy, and in addition each retains a *+wh*-element in [Spec, CP], thus properly delimiting the scope of the interrogative.[4] The additional representational constraint Operator Economy chooses (39) over (38) as the preferred structure, since in (39) the A'-position (Spec, CP)

contains less material. (39) then seems a happy compromise between (37), which has maximal satisfaction of Operator Economy, but is likely to be semantically problematic, and (38). Almost as a side effect, the winning compromise structure (39) fully satisfies the Binding Theory, since it reconstructs the anaphor to a position c-commanded by *John*.

Similarly elegant results are achieved with condition C effects. Consider an overt derivation which constructs (40), and which subsequently derives (41) via copying:

(40) [he will see [which picture of John]]

(41) [which picture of John] [he will see [which picture of John]]

In the covert syntax, the pair of representational economy principles (34) will conspire to prefer (44) as the maximally economical (yet semantically intelligible)[5] LF representation. And, as a neat side effect, observe that the pronoun in this representation directly c-commands the name; condition C will, without any augmentation, properly block coreference between them:

(42) [he will see [which picture of John]]

(43) [which picture of John] [he will see ϕ]

(44) $[\text{which}]_x$ he will see $[\phi_x$ picture of John]

Under this copy and delete conception of movement, augmented with the Operator Economy principle, the basic retention of condition C effects under A'-movement is straightforwardly derived. As Chomsky (1995b: ch. 2) puts it, there is no need for any specific mechanism for Reconstruction – it all follows from independent mechanisms, at least for the rudimentary examples discussed to this point.

4.2 LF reconstruction and the moved predicate effects

In the discussion above, we observed the problems posed by example (28) for the most appealing S-structure approach to Reconstruction, the one which attributes reconstruction effects with moved predicates to the presence of a predicate internal trace. As we reviewed above, this hypothesis was criticized in Barss (1986) for its failure to straightforwardly predict the condition C effect in (28) (repeated here as (45)): since the predicate internal trace which c-commands *John* is not coindexed with the pronoun, nothing about this S-structure representation violates condition C:

(45) *$[_{AP}$ e_2 How proud of $John_1]_3$ does he_1 $[_{VP}$ e_1 believe $Mary_2$ to be $e_3]$?

In a reconsideration of these data, Takano (1995) presents an ingenious way to resurrect the essential insight of the predicate internal trace analysis in the context of Chomsky's LF-based theory of reconstruction. As Takano observes, the S-structure (45) violates Fiengo's (1977) Proper Binding Condition, stated as (46):

(46) **Proper Binding Condition:** Traces must be bound.

Following the general spirit of Minimalism, in which all specific constraints on syntactic representation apply (solely) at LF, Takano's analysis takes the PBC to be a filter on LF. On the copy theory of movement, (45) is actually (47) at the point of Spell-Out (i.e., at S-structure):

(47) $[_{AP}\ e_2$ How proud of $John_1]_3$ does he_1 $[_{VP}\ e_1$ believe $Mary_2$ to be $[_{AP}\ e_2$ how proud of $John_1]_3]$?

It is the higher copy of the trace e_2 which violates the PBC. Satisfying the PBC requires mapping (47) onto an LF like (48), by deleting the upper copy of the trace, and, presumably, the material surrounding it:

(48) How_4 does he_1 $[_{VP}\ e_1$ believe $Mary_2$ to be $[_{AP}\ e_2\ e_4$ proud of $John_1]_3]$?

The PBC is satisfied, in virtue of *Mary* c-commanding the preserved copy of e_2. However, as Takano argues, the lower copy of *John* is also retained (essentially parasitically on the general deletion of the upper material), and thus coindexing the pronoun and *John* violates condition C straightforwardly. Takano's analysis is similar to the original hypothesis presented in Barss (1986), that the Cinque effect – the fundamental preservation of all binding relations under predicate movement – is ultimately due to the presence of the trace. However, there is a crucial difference, as Takano's theory applies the binding principles univocally at LF. This resolves the problem Barss raised for this derivation of the Cinque effect, and remains wholly consistent with the Minimalist goal of reducing representational constraints to the LF level.

Having seen that the Cinque effect is derived without special appeal to any specific rules for Reconstruction, let us now return to the opposing data, namely the ambiguities of antecedence which arise when the anaphoric item is inside of an overtly moved argument. As discussed above, such preposing creates options for anaphora which are not present otherwise.

Within the copy theory of movement, the ambiguous example (18b) actually has something like (49) as its syntactic structure before Spell-Out, with a full copy of the *wh*-phrase in each landing site:[6]

(49) I wonder $[_{CPa}$ [which portraits of [themselves/each other]$_{2/1}]_3$ $[_{IP}$ the men_1 believed $[_{CPb}$ [which portraits of [themselves/each other]$_{2/1}]_3$ that $[_{IPb}$ the $women_2$ had placed [which portraits of [themselves/each other]$_{2/1}]_3$ in a scrapbook]]]].

Since the *wh*-operator is selected by *wonder*, enough residue of the *wh*-phrase must remain at LF in the [Spec, CP_a] position to satisfy this selectional requirement. Chomsky (1993) proposes that the determiner *which* is retained in that position, and satisfies selection; Chomsky (1995: ch. 4) proposes that it is simply the morphosemantic feature [+*wh*] which remains in [Spec, CP_a]. Whichever option is taken, it is clear that the remainder of the *wh*-phrase – the non-*wh* part *portraits of each other/themselves* – need not remain in Spec, CP_a. Thus, on Chomsky's assumptions, both (50) and (51) are licit LF representations:

(50) I wonder $[_{CPa}$ [which]$_3$ $[_{IP}$ the men$_1$ believed $[_{CPb}$ [e$_3$ portraits of [themselves/each other]$_1$]$_3$ that $[_{IPb}$ the women$_2$ had placed e$_3$ in a scrapbook]]]].

(51) I wonder $[_{CPa}$ [which]$_3$ $[_{IP}$ the men$_1$ believed $[_{CPb}$ that $[_{IPb}$ the women$_2$ had placed [e$_3$ portraits of [themselves/each other]$_2$]$_3$ in a scrapbook]]]].

Crucially unlike the case with moved predicate examples (e.g. (45)), there is no requirement that the constituent reconstruct to its deepest position, and so there is an ambiguity in which copy is retained. This underlies the anaphoric ambiguity. In (50), the anaphor is sufficiently close to *the men*$_1$ for that NP to grammatically antecede the anaphor. Similarly, in (51) *the women* is local to the anaphor.

Consequently, the copy theory of movement, plus the deletion theory of Economy, suffices to give a straightforward explanation of why there is a systematic anaphoric ambiguity induced by structurally displacing an anaphor as part of extracting an argument. (Very much unlike the case with the path theoretic approach reviewed in section 3, there is no complexity added to the system to take care of these effects.)

5 Reconstruction and A-Movement

The foregoing discussion has illustrated a wide range of reconstruction effects occurring under A'-movement, specifically *wh*-movement or focussing Topicalization, each of which is generally assumed to move a constituent to a non-argument position. What of A-movement? Does A-movement exhibit reconstruction effects?

We first note that the Cinque effect is essentially unobservable in A-movement. The reason for this is simply that predicates cannot undergo A-movement (which is, in the canonical case, movement of an argument NP to a Case marked position). This leaves us with the question of whether there are condition A, B, and C reconstruction effects with A-moved arguments, and the subsidiary question of whether the antecedence ambiguities of cyclic A'-movement occur as well under cyclic A-movement.

5.1 Basic anaphor reconstruction effects with A-movement

The fact that raising-to-subject constructions in general exhibit anaphor reconstruction effects is well established, and is investigated in detail by Barss (1984, 1986, 1996, 1999), Belletti and Rizzi (1988), Hoji (1985), Johnson (1985), and Williams (1994b), among many others.

In general, we will observe reconstruction effects under A-movement only in cases where there is an argument NP (the potential antecedent) which c-commands the deep position, but not the surface position, of the raised NP which contains the anaphor. Schematically this is as in (52), with α the potential antecedent argument NP and H the raising predicate:

(52) $[_{NP}$ . . . anaphor . . . $]_1$ [H . . . α . . . [. . . e_1 . . .] . . . α . . .]

Thus the raising predicate (which, by definition, does not theta-mark its subject position) must have two internal arguments: one the clause from which NP_1 is raised, the other α. In the discussion below I will overview the various subtypes of raising predicate which meet this requirement.

5.1.1 Raising

Consider the English cases in (53) and (54), each of which is standardly analyzed as a raising construction:

(53) [Old pictures of themselves$_1$]$_2$ usually strike the children$_1$ as [t_2 amusing].

(54) [Each other$_1$'s houses] appear/seem to the women$_1$ [t_2 to be overdecorated].

There is a significant grammaticality distinction between these raising constructions and the non-movement constructions in (55) and (56), suggesting that the acceptability of (53) and (54) is a reconstruction effect induced by the NP-trace:[7]

(55) *[Old pictures of themselves] convinced the children to pretend to be adults.

(56) *[Each other's houses] proved to the women that they had bad taste.

This is the analog of the simplest cases of anaphor reconstruction under A'-movement like (9): binding relations are calculated as if movement had not occurred. The formal interpretation under the copy theory of movement will be just as it was for *wh*-extraction. (53), for example, will have the pre-Spell-Out representation (57), and will be mapped onto the Binding Theory-satisfying LF (58) by deletion of the higher copy:[8, 9]

(57) [Old pictures of themselves$_1$]$_2$ usually strike the children$_1$ as [[old pictures of themselves$_1$]$_2$ amusing].

(58) usually strike the children$_1$ as [[old pictures of themselves$_1$]$_2$ amusing]

What about cyclic A-movement – does it produce ambiguities of the type seen in cyclic A'-movement, like (59)? Apparently yes, as the acceptability of (60) on the various indexings attests:[10]

(59) The women$_2$ asked [which pictures of themselves$_{2/3/4}$]$_1$ the men$_3$ had said that the children$_4$ had brought e$_1$ to the school fair.

(60) The women$_2$ consider [old pictures of themselves$_{2/3/4}$]$_1$ to have struck the men$_3$ as [appearing to the children [t$_1$ be amusing]].

5.1.2 Passive

The cyclic A-movement example (60) shows that subject-to-subject raising can participate in an iterated sequence of A-movement dependencies, each of which preserves and expands anaphoric possibilities. This suggests that A-movement, exactly on a par with A'-movement, participates in the reconstruction effect. Since Passive is usually taken to be fundamentally the same formal operation as raising (i.e., cyclic feature driven movement to non-theta-marked A-positions), we would expect much the same pattern to hold with iterated Passive as it does in (60). The examples are difficult to construct, since we would need, effectively, a series of passivized verbs which could occur in the configuration (61), where the verb takes a (non-moved) complement NP which acts as the potential antecedent for the anaphor moved inside the Passivized constituent:

(61) . . . [$_{NP}$ old pictures of themselves$_{i/j/k}$]$_1$ INFL V_{pass} NP_j [$_\alpha$ . . . t_1 . . .]

Unfortunately, this configuration violates Burzio's generalization (Burzio 1986), since V would have Accusative Case and fail to theta-mark its external subject. Consequently, the relevant examples are impossible to construct. However, there is one further subtype of A-movement which is relevant to the reconstruction issue, namely that seen in psych verb constructions on the analysis of Belletti and Rizzi (1988).

5.1.3 Psych verbs

On the influential analysis of Belletti and Rizzi (1988), one subclass of psychological predicates instantiates the schema in (52). Belletti and Rizzi argue that psych verbs of the *preoccupare/worry* class – those with experiencer subjects – are unaccusative,[11] with the surface subject raised from object position, and with the indirect object (the source argument) asymmetrically c-commanding the deep object, as in the schema (62):

(62) NP_1 INFL $[_{VP}\ [_{V'}\ V\ t_1]\ NP_2]$

Belletti and Rizzi use the derived subjects analysis to resolve a long-standing puzzle in this class of verbs: an anaphor inside the surface subject can be anteceded by the apparent object:

(63) a. Questi pettegolezzi su di sé$_1$ preoccupano Gianni$_1$ più di ogni altra cosa.
These gossips about himself worry John more than anything else.
b. *Questi pettegolezzi su di sé$_1$ descrivono Gianni$_1$ meglio di ogni biografia ufficiale.
These gossips about himself describe John better than any official biography. (Belletti and Rizzi 1988: (57a, b))

(64) a. These stories about himself worry John more than anything else.
b. *These stories about himself describe John better than any official biography.

The non-psych verbs in the (b) examples show the typical pattern (ungrammaticality due to failure of c-command), and the (a) examples illustrate the exceptional behavior with psych verbs. This exceptional behavior is actually expected under Belletti and Rizzi's analysis, given the general participation of A-movement in reconstruction effects.

Finally, we should expect that "psych movement" (the object-to-subject raising induced by the unaccusative psych verb), followed by subject-to-subject raising, should preserve binding relations, and this is in fact the case, as Belletti and Rizzi show in detail:

(65) [Images of themselves]$_1$ seem [t_1 to have [[frightened t_1] [the children]]]

(66) [Each other's accomplishments]$_1$ seem [t_1 to have been proven [t_1 to have deeply [[impressed t_1] [the cabinetmakers]]]].

Taking Chomsky's copy and delete theory of movement to apply to all types of movement, the parallelism of A-movement and A'-movement under anaphor reconstruction is precisely predicted. Prior to LF-component deletion, (66), for example, will have three copies of the moved NP:

(67) [Each other's accomplishments]$_1$ seem [[each other's accomplishments]$_1$ to have been proven [[each other's accomplishments]$_1$ to have deeply [[impressed [each other's accomplishments]$_1$] [the cabinetmakers]]]].

By Copy Economy, three of these copies must be deleted prior to LF. Binding by *the cabinetmakers* simply reflects the option of deleting the three higher copies, retaining the lowest:

(68) seem [to have been proven [to have deeply [[impressed [each other's accomplishments]$_1$] [the cabinetmakers]]]].

6 Condition C and Anti-Reconstruction Effects

In the discussion above, we focussed on anaphor reconstruction, and discussed condition C effects predominantly in the discussion of predicate extraction (section 3), noting the puzzle presented by the sharp contrast between (69) and (70):

(69) Which picture that John$_1$ took at the party did he$_1$ decide to display in his house?

(70) *How proud of John$_1$'s party did he decide he$_1$ should be?

We followed the initial suggestion of Cinque (1982) that this is fundamentally an asymmetry between arguments and predicates, and the analysis of Barss (1986) and Takano (1995) that the underlying cause of the more restrictive binding options in the latter case is to be attributed to a predicate internal trace of the raised subject.

There are three other major approaches to this contrast, each focussing on a more detailed examination of the apparent lack of condition C effects under *wh*-movement of arguments, as exemplified in (69). The first analysis is proposed by Friedin (1986), Lebeaux (1988), and Chomsky (1993), developing initial suggestions by van Riemsdjik and Williams (1981). The second is proposed by Heycock (1995). The third is proposed by Chierchia (1995). There is disagreement among these researchers on the nature and strength of the data, and I will present their analyses in chronological order, and note the judgments offered by the respective authors (giving my own at the end of the discussion).

To introduce useful terminology, the complete lack of condition C effects in (69) – that is, the lack of any enforced disjointness of reference between the name and pronoun, which might be expected if the extracted phrase is reconstructed – was termed "anti-reconstruction" by van Riemsdjik and Williams (1981). They note that there appears to be a contrast between (69) and (71) which they attribute to depth of embedding:

(71) ??Which picture of John$_1$ did he$_1$ like?

In explorations of how to formally implement this suggestion, Freidin (1986) and Lebeaux (1988) propose that the contrast has fundamentally to do with whether the R-expression is embedded inside an adjunct (e.g. the relative clause in (69) and (72)) or inside an argument of the head of the extracted phrase (73):

(72) Which report that John revised did he submit?

(73) *Which report that John was incompetent did he submit? (Freidin 1986: (76a, b); judgments cited are his as reported in text)

In the argument-contained case, Freidin and Lebeaux suggest, there is no anti-reconstruction effect. On their judgments, disjointness of reference is forced in (73), and coreference permitted in (72).

Freidin proposes that whatever mechanism is responsible for computation of reconstruction (e.g. lowering at LF) of a phrase must reconstruct the head's subcategorized arguments, and need not reconstruct adjuncts. Thus, the postreconstruction representation for (73), but not (72), will have the name c-commanded by the pronoun, hence the condition C asymmetry.

Freidin's proposal is implemented in detail by Lebeaux (1988) and Chomsky (1993). Lebeaux suggests that adjuncts – phrases which by definition need not be present at D-structure – are inserted into syntactic representations in the course of the derivation via generalized transformations. Thus, (72) has a derivation in which the relative clause is inserted after *wh*-movement has occurred:

(74) a. he submit which report
b. [which report]$_2$ did he submit t_2
c. [which [report [that John revised]]]$_2$ did he submit t_2?

Since there is no derivational stage at which the relative clause (and the name it contains) is c-commanded by the pronoun, and on the assumption that reconstruction only restores material to a position it occupied at some stage of the derivation, the relative clause will not reconstruct in (74). Hence there is no condition C effect. On the elaboration of this analysis by Chomsky (1993), "reconstruction" is simply retention of material in a trace position, and deletion of the higher copy. The pre-deletion representation of (74c) will be as in (75):

(75) [which [report [that John revised]]]$_2$ did he submit [which report]$_2$

The only copy of the relative clause is the one in [Spec, CP], hence after deletion there is no option other than to leave it in the operator position. Hence the anti-reconstruction effect with relative clauses.

Turning to the example in (73), the CP complement selected by *report* must be generated in the D-structure representation (in Lebeaux's analysis), or prior to any movement operations affecting the *wh*-phrase (on Chomsky's analysis).[12] Hence, the derivation proceeds as follows, assuming Chomsky's derivational system:

(76) a. he submit [which report that John was incompetent]
b. [which report that John was incompetent]$_2$ he submit [which report that John was incompetent]$_2$ (by movement)
c. [which]$_2$ he submit [report that John was incompetent]$_2$

(76c) is the LF representation. The lower copy of the CP complement is retained, the higher one deleted, by the principles in (34). Here, the pronoun c-commands the name. By Minimalist principles, condition C applies to this interface representation, precluding coreference. Hence the lack of anti-reconstruction effects with complements to heads of *wh*-phrases, and the adjunct–complement contrasts are formally derived from basic tenets of the grammatical system.

6.1 Empirical issues with anti-reconstruction

Though much of the literature on anti-reconstruction focusses on the contrastive judgments of the sort seen in (72) and (73), it is important to keep in mind that classifying (73) as a condition C effect carries a further implication, namely that it is exactly as ungrammatical, for all speakers, as (77):

(77) *He$_1$ submitted a report that John$_1$ was incompetent.

In a re-examination of the anti-reconstruction effect (and its import for the LF position of overtly moved constituents), Chierchia (1995) notes a substantial empirical problem: some speakers simply do not find cases of the form in (73) to be strongly ungrammatical. Chierchia argues that the original proposal by van Riemsdjik and Williams – that the effect is strongly correlated with depth of embedded of the name – is correct. That is, the true asymmetry is between deep-embedding cases like (72) and (73), both classified as grammatical, and cases like (78a):

(78) a. ??Which pictures of John does he like best?
b. Which pictures of himself does John like best?

Reinhart (1983) proposes that coreference between a pronoun and a name is unacceptable (pragmatically) if there is a variant of the same structure in which a reflexive is used. Chierchia observes that the shallow-embedding[13] examples like (78a) are precisely those in which Reinhart's principle favors use of a reflexive (as the acceptability of (78b) supports). (78a) is deviant because it takes a non-optimal pathway to coreference. Crucially, this is not a purely syntactic condition C effect.

In my own investigations of this effect (reported in Barss 1994, 1996, 1999) I have polled several dozen English speakers on their judgments, and found results compatible with Chierchia's remarks. A quite small group (two) of the speakers I consulted find the robust disjointness effects inside arguments cited by Friedin and Lebeaux. The majority found the examples very mildly deviant to perfect, and, critically, the same speakers found no difference of the argument-adjunct type discussed above. By contrast, all consulted speakers found the pied-piped names inside predicates to produce total condition C-level ungrammaticality. Thus the characteristic range of judgments I have found

cited by most speakers is as follows, with the judgments on (79) and (80) correlated:

(79) Which story that $Fred_1$ found in the newspaper did he_1 enjoy best?
name inside relative clause: very mildly deviant to fine

(80) Whose story that $Fred_1$ found a mistake in the newspaper did he_1 enjoy best?
name inside N-complement: very mildly deviant to fine

(81) How proud that $Fred_1$ owns a newspaper did Mary say he_1 was?
name inside moved predicate: ungrammatical

(82) Did Mary say he_1 was proud that $Fred_1$ owns a newspaper?
baseline condition C, name inside predicate: ungrammatical

(83) He_1 enjoyed the financial story that $Fred_1$ found in the newspaper best.
baseline condition C, name inside adjunct: ungrammatical

(84) He_1 enjoyed my story that $Fred_1$ found a mistake in the newspaper best.
baseline condition C, name inside N-complement: ungrammatical

What is controversial, it appears, is the status of examples like (80), and the theoretical principles that are justified by classifying them as (un)grammatical. I take the combined judgments cited by Lebeaux, Chomsky, Friedin, Chierchia, and Barss to indicate two things. First, there is inter-speaker variation of judgment on cases like (80), a fact that is by itself quite interesting and deserving of theoretical attention, as binding theoretic judgments tend to be quite stable across speakers (note, for example, the lack of variation on judgments on the other structures). Second, there is strong reason to suppose that, whatever is going on with cases like (80), it is not violation of condition C, since the same speakers who find (80) perfect (or only very mildly odd) find (84) completely ungrammatical. Chierchia's proposal, which is based on pragmatic preference strategies (which one can imagine varying in strength from speaker to speaker somewhat), seems like a promising line of attack.

7 Conclusion

This overview has shown that reconstruction is fundamentally a property of movement dependencies; and NP pied-piped inside a larger moved constituent C can, in the general case, be bound with respect to any position occupied by C at any point in the derivation. Complexities arise when the moved constituent is predicative, but this class of exceptions nonetheless follows from other basic principles of movement theory. We have seen, following Chierchia

1995, that certain cases of anti-reconstruction may require appeal to non-syntactic pragmatic preference strategies, but in the main the pattern of reconstruction effects follows what appears to be exactly what we would expect, given proper understanding of the representations derived by movement and deletion operations.

NOTES

1 The overt anaphora in (5)–(7) – where the c-commanded element is overt, and the regulated relation is between it and another NP c-commanding it – is the prototypical datum exemplifying these core constraints, and such overt anaphora will be central in the more complex examples discussed below. However, it is important to keep in mind that many versions of the Binding Theory adopt a view first formally advanced in Chomsky (1981, 1982) (and implicitly suggested in earlier work), namely that the partitioning of NPs into these subclasses extends as well to phonologically null NPs, or *empty categories*, which are taken in GB-style analyses to be present in a diverse set of environments. Within this symmetric framework, NP-trace (the EC left by movement to an argument position) is subject to condition A; PRO (the subject of control infinitivals and the like) is subject to principles A and B; and *wh*-trace is classified as an R-expression, and is thus subject to condition C. Because this typology of null categories is more controversial than the typology of overt categories, and because the technical issues which arise in this area are more complex, I leave them aside here. The reader is referred to Barss (1986: ch. 4, 1999), Lasnik and Saito (1991), Rizzi (1990: ch. 2), and Saito (1989), for discussion.

2 Related definitions:

   i. α is A-bound by β iff α and β are coindexed, β occupies an A position, and β c-commands α.
   ii. Σ is a Complete Functional Complex (CFC) iff Σ is a subphrase marker, and for any head H contained within Σ, all thematic relations of H are assigned within Σ.
   iii. K is the least CFC containing α iff K is a CFC containing α, and there is no CFC Π which contains α and is contained by K.

3 Chomsky (1993) is unclear on the actual form, if any, of the material occupying the object position after deletion. Presumably, the position itself remains, and is syntactically of category NP. This much is needed to carry over the lexical projection of the verb's argument structure to LF. From a semantic standpoint, the position must be interpreted as a variable (over individual objects) bound to the operator, a basic result carrying over from earlier work on LF (see e.g. Higginbotham 1980, 1983, Higginbotham and May 1981, May 1985). See n. 4 for further discussion.

4 This depends, of course, on exactly what semantic analysis is provided

for such "split" *wh*-expressions, in which the *wh*-determiner is divided off from the rest of the NP. Under the theory of *wh*-operators provided by Higginbotham and May (1981), May (1985), and Higginbotham (1994), *wh*-phrases are to be interpreted strictly as restricted quantifiers. Under this view, the reconstructed LFs in, for example, (39) and (44) are uninterpretable gibberish, since the operator's restriction (its first semantic argument) is embedded inside of the second argument. For the syntax of reconstruction in this form to succeed a more liberal semantic theory for interrogatives must be adopted. One such view is developed by Reinhart (1993, 1995), in which structures like (50) and (55) are to be interpreted by taking the *wh*-determiner as binding a variable over existential choice functions, and taking the embedded material as the argument of the function variable. See Barss (1994, 1999) for discussion, and demonstration of the difficulty in extending this semantic system to the full range of reconstruction data.

5 At least insofar as each lexical item in the interrogative operator is retained in the output LF, so that there is no "deletion without recoverability." It of course remains to be shown that there is a coherent method for interpreting LFs with the syntax seen in (50) as interrogatives. Such a method is set forth by Reinhart (1993, 1995, 1997), and is discussed with respect to reconstruction by Barss (1994, 1999).

6 Within the Barriers theory of extraction, there will be additional copies of the extracted phrase adjoined to each VP separating lowest copy from the highest copy, so the representation in its full form is (i):

i. I wonder $[_{CPa}$ [which portraits of [themselves/each other]$_{2/1}]_3$ $[_{IP}$ the men$_1$ $[_{VP\ CPa}$ [which portraits of [themselves/each other]$_{2/1}]_3$ $[_{VP}$ believed $[_{CPb}$ [which portraits of [themselves/each other]$_{2/1}]_3$ that $[_{IPb}$ the women$_2$ had $[_{VP\ CPa}$ [which portraits of [themselves/each other]$_{2/1}]_3$ $[_{VP}$ placed [which portraits of [themselves/each other]$_{2/1}]_3$ in a scrapbook]]]]]]].

For reasons of expositional clarity, I suppress these VP-adjoined copies in the text example, since nothing hinges on their presence for this example (the Spec, CP copy suffices for providing a copy of the anaphor local to the higher plural NP).

7 Speakers invariably find (53) fully grammatical. I am aware of some disagreement among speakers on cases like (54), some finding it perfect, others slightly degraded (perhaps due to the linear order of the anaphor and antecedent). Even this latter group of speakers invariably judge (54) as significantly better than (55) and (56).

8 A formal question arises as to what remains, if anything, of the higher copy after deletion. This question is straightforwardly answered under Chomsky's version of Brody's (1985) theory of Case checking. Since the driving force behind the movement in the first place was to satisfy the morphological need for the NP and TNS to check their NOM case features, and such checking is achieved prior to Spell-Out, nothing requires that the raised NP remains raised after Spell-Out.

9 There are semantic subtleties which arise here that are too complex to go into detail on here. See Barss (1994, 1999) for detailed discussion. The problem is that raising predicates tend to be scopal, and shift the

interpretation of NPs over which they have scope (as originally argued by May 1977, 1985). Thus although LF reconstruction of the lower copy of the raised NP is innocuous *morphologically* (see previous note), it is not innocuous *semantically*. To give a sketch of the problem, observe that (53) does not mean what (i) means, and that this interpretive difference is not easily attributed solely to the tense difference between the two:

i. It usually strikes the children that [old pictures of themselves are amusing]

(53) strongly prefers a semantic interpretation in which the indefinite NP containing the anaphor is associated with the quantificational adverb in the matrix clause, essentially as in (ii), while (i) prefers a separated interpretation, as in (iii):

ii. [for the usual x, x a picture of the children] it strikes the children that x is amusing
iii. [for the usual time t] it strikes the children at t [that for any x, x a picture of the children] x is amusing

The dominant interpretation for (53) is at odds with the LF-reconstruction of the raised NP into the lower clause. However, due to the complexity of the effect, I will simply refer the reader to the works cited above, particularly Barss (1999: ch. 2).

10 The judgments here are mine, and those of several speakers consulted. A reviewer notes a partial degradation of acceptability in (60) on the construal of the anaphor with the lowest NP *the children*. This is reminiscent of the effect first noted in Burzio (1986), and explored in detail by Takano (1998), of the effects of a PP-contained NP being able to antecede, with some decrease of acceptability (for some speakers, although I find them very close to perfect), an anaphor apparently c-commanded by the PP:

i. ?John gave some pictures of themselves$_1$ [to [the kids]$_1$] (Burzio 1986: (69b), 203)
ii. ?Some pictures of themselves$_1$ were given t [to [the kids]$_1$] (Burzio 1986: (69a), 203)

Note that the decline in acceptability of (60) noted by the reviewer is attributable to the "weak" c-command-blocking effect of the presence of the preposition, if we follow the reasoning of the text that the dependency of the anaphor on *the children* is a reconstruction effect under A-movement, a point substantiated by Burzio's example in (ii). Thus in spite of the variance in judgments, the major point discussed carries: cyclic A-movement shows reconstruction effects.

11 Specifically, the objects of these verbs consistently behave as a class with other deep objects: they cannot bind an anaphoric clitic, cannot be interpreted as *arb*, cannot be syntactically passivized, and the verb + NP cannot be embedded in the clausal causative construction.

12 In Chomsky's Minimalist derivational system, movement operations (copying) and addition of new lexical material (termed Merge) are interlaced, and apply together throughout the overt derivation. However, Chomsky (1993) imposes an Extension constraint on derivations, requiring that Merge and Move obey a cyclicity requirement which entails the result for complements described in the text. Adjuncts are exempted from

Extension, and thus Lebeaux's basic proposal is carried over into the revised derivational system.

13 Heycock (1995) reports contrastive judgments, on which examples like (78a) are judged substantially better than examples like (i):

i. How many stories about John is he likely to invent?

Heycock presents an interesting discussion of the semantic and pragmatic factors which might produce such differential judgments. My own judgment (and those of the speakers I have consulted) accords with that reported in Chierchia (1995), on which no significant difference is detected on (i) vs. (78a).