

## Generative Syntax

General Editor: David Lightfoot

Recent work in generative syntax has viewed the language faculty as a system of principles and parameters, which permit children to acquire productive grammars triggered by normal childhood experiences. The books in this series serve as an introduction to particular aspects or modules of this theory. They presuppose some minimal background in generative syntax, but will meet the tutorial needs of intermediate and advanced students. Written by leading figures in the field, the books will also contain sufficient fresh material to appeal at the highest level.

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Norbert Hornstein

# Logical Form

## From GB to Minimalism

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*Norbert Hornstein*



BLACKWELL  
Oxford UK & Cambridge USA

MLC	Minimal Link Condition
Neg/neg	negation
NP	noun phrase
NPI	negative polarity item
PA	Perceptual–Articulatory (system)
PERF	perfective
PF	Phonetic Form
PFI	Principle of Full Interpretation
pg	parasitic gap
PG	pseudo gapping
PIO	prepositional indirect object
PP	prepositional phrase
PRED	predication
PRO	pronominal anaphor
pro	null pronoun
Q-adjunction	quantifier adjunction
QNP	quantified noun phrase
QR	quantifier raising
rc	relative clause
REL	relative
REST	Revised Extended Standard Theory
SCO	strong cross over
SP	Scope Principle
Spec	specifier
SS	S-structure
SU	subject
Tns	tense
TP	tense phrase
UG	Universal Grammar
vbl	variable
VP	verb phrase
WCO	weak cross over
WH	WH-expression
WH-R	WH-raising
XP	maximal projection of type X

## 1

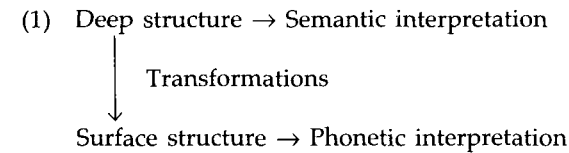
# An Introduction

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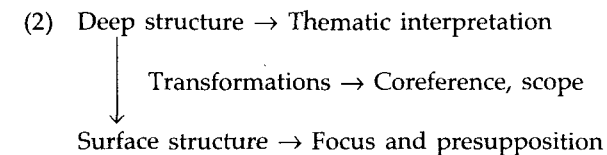
## 1 The Grammatical Locus of Semantic Interpretation

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Few points in the study of language are uncontested. One truism is that sentences are pairings of sounds with meanings. They are phonetically characterizable objects that carry a specific interpretation. Since the earliest days of generative grammar, a central concern of linguistic theory has been to elucidate how it is that a natural language sentence expresses its meaning. In earlier theories of grammar, the locus of interpretation is taken to be Deep Structure, as in (1) (see Chomsky 1965, and Katz and Postal 1964) and the transformational operations that produced Surface Structures were assumed to be meaning preserving in the sense that these operations did not contribute to the grammatical licensing of the interpretive information encoded in the Deep Structure phrase marker.



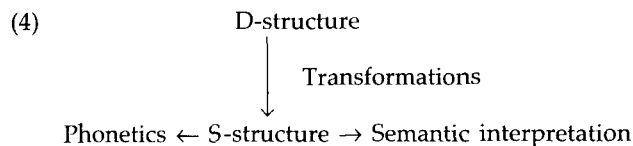
In the 1970s, the Extended Standard Theory (EST) proposed that grammatical levels other than Deep Structure syntactically determine sentence meaning. Jackendoff (1972), for example, argued that (2) specifies how the grammar contributes to meaning. On this conception, different grammatical levels determine different features of sentential interpretation. For example, a sentence's thematic properties are a function of its Deep Structure configuration while relative quantifier scope is related to the structural properties of the Surface Structure phrase marker.



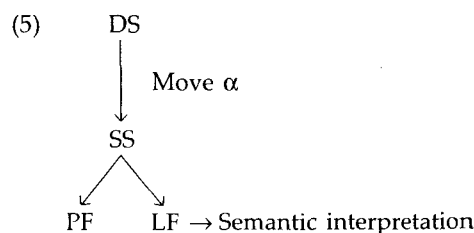
The development of trace theory in the mid 1970s made it possible to treat S-structure (SS) as the sole locus of semantic interpretation.<sup>1</sup> The Revised Extended Standard Theory (REST) postulates that grammatical operations do not reduce the basic grammatical information encoded in a phrase marker. For example, if a verb has an object at D-structure (DS) then it must have one throughout the course of the derivation. REST enforces this requirement by having a moved element leave behind a trace which preserves within the derived phrase marker the structural relations that obtained prior to movement. For example, whereas in EST WH-questions such as (3a) are formed from structures like (3b) yielding phrase markers like (3c), in REST the phrase marker resulting from WH-movement is the one provided in (3d) where  $t_i$  marks the position of the moved *what* while the indexing allows the content of this position to be recovered from the coindexed antecedent, i.e. the element that moved.

- (3a) What did Bill buy  
 (3b) [Bill [buy what]]  
 (3c) [What [Bill buy]]  
 (3d) [What<sub>i</sub> [Bill [buy t<sub>i</sub>]]]

Given the information-preserving quality of trace theory, semantic interpretation in REST can largely be driven by properties of the SS phrase marker. In effect, given traces, it seems possible to consolidate all the grammatical information relevant to semantic interpretation at SS. REST pictures the interaction of grammar and meaning as in (4).



Research in the late 1970s has tended to the conclusion that REST must itself be revised. In particular, it has been argued (and we review these arguments in chapters 2 and 3) that SS cannot adequately bear the interpretive load expected of it. The locus of the grammatical conditions within contemporary Government-Binding (GB) theory is the linguistic level called "LF" (meant to suggest "Logical Form"). (5) depicts how GB conceives the grammar's contribution to semantic interpretation.



GB organizes the grammar in a "T-model."<sup>2</sup> D-structure phrase markers are related to SS phrase markers by applications of transformations (Move  $\alpha$ ). As in REST, movement transformations leave behind traces coindexed with their antecedents. The derivation from DS to SS is "overt syntax." It is "overt" in the sense that movement operations result in phonetic gaps at the movement sites.

At SS, the derivation splits into a track leading to PF (meant to suggest "Phonetic Form") where phonological and phonetic information is ultimately encoded and a path leading to LF where interpretive-semantic information is represented. The path from SS to LF is the domain of "covert" syntax. The derivation is syntactic because LF is derived from SS via repeated applications of Move  $\alpha$ . However, the syntax is covert because these transformations do not have phonological consequences given the branching organization of the grammar in (5). In a sense, therefore, LF is more abstract than SS as the post SS applications of Move  $\alpha$  that are instrumental in deriving LF do not leave phonological tracks.

This book focuses on two different views of LF. The early chapters review the properties of LF within GB theories. The later chapters consider the structure of LF within the Minimalist program. Minimalism, though distinct in many ways from its GB precursor, shares one major commitment with its predecessor. Minimalism adopts a version of the T-model and so endorses the distinction between overt syntactic operations which have phonological effects and covert syntax which does not alter the phonological form of a sentence. Broadly speaking, Minimalism differs from GB theories in not according DS and SS any grammatical significance. In effect, Minimalism postulates only two levels, PF and LF. These two levels alone are legitimate loci of grammatical well-formedness conditions on representations. The effect of this restriction is quite dramatic. It effectively requires that all output conditions (e.g. the theta criterion, subjacency, the case filter, the Binding Theory (BT)) be stated at LF as opposed to being parsed among various levels as is standardly done in GB theories (e.g. subjacency at SS, the theta criterion at DS, the binding theory at SS and LF and case theory at SS). For present purposes, however, it is enough to appreciate that Minimalist theories, like GB predecessors, assume that LF and PF do not directly "converse" and that LF derives from earlier phrase markers via repeated applications of transformations similar to those operative in overt syntax. Chapter 4 details the theoretical commitments and technological devices that drive the Minimalist LF analyses in chapters 5-9.

## 2 Two Ways of Identifying LF

LF can be characterized in various ways. (6) gives a "content" designation of LF. It provides a specification of LF in terms of the kind of information that the level encodes.

- (6) LF is the level of linguistic representation at which all grammatical structure relevant to semantic interpretation is provided

In terms of (6), an *Aspects* style theory identifies LF with Deep Structure, REST equates LF with SS while EST denies that LF exists, viz. that there is a single level meeting the specification in (6).

Something like (6) is standardly assumed in GB (and Minimalist) characterizations of the LF phrase marker. Thus, both approaches assume that there is a level which encodes all the information grammatically relevant to semantic interpretation. However, this does not yet say very much. To have bite, it is necessary to specify how “semantic interpretation” should be understood. If semantic interpretation is rendered via a truth definition then what LF provides is the syntactic structure appropriate for the recursive application of the clauses of the truth definition. Other views of what semantic interpretation comes to may place different structural requirements on LF. However, in practice, what this content designation amounts to is clear enough. (6) comes down to the claim that various facts that we take to be characteristic of meaning such as relative quantifier scope, scope of negation, modality, opacity, pronoun binding, variable binding, focus and presupposition structure, adverbial modification, and so forth are all “done off” the LF phrase marker. In short, LF provides the requisite compositional structure for the execution of these interpretive procedures. Thus, whatever we naively mean by “meaning” meets its grammatical or structural requirements at LF and thereby has the specific interpretive properties it enjoys.

It is possible to identify LF in various other “contentful” ways. For example, in a GB-style account, LF is the level at which the Empty Category Principle (ECP) is checked. In particular, in a theory of the *Barriers* variety, LF is the unique level at which gamma marking is checked. In many GB accounts, LF is also a level to which the BT applies.

A Minimalist theory will strongly differ from standard GB accounts when these sorts of designations are considered. The reason is that LF is the unique level with phrase marker properties. Thus, it is the *only* level at which *any* structural condition can be checked. Thus, in a Minimalist theory, the Binding theory, case theory, and every other module of the grammar that is stated in terms of structural output conditions must all apply to the LF phrase marker. Minimalist theory can pick out LF quite trivially: it is the unique grammatical level with phrase structure properties. This clearly contrasts with a GB specification of LF given that SS and DS are significant levels in this sort of theory, in addition to LF.

In sum, if one thinks about what LF does, in both GB and Minimalist theories, it inputs to semantic interpretation procedures. In Minimalist theories it is also the locus of all output conditions while in a GB theory LF is one of three levels to which conditions have been assumed to apply. As should be obvious, this second “content” designation of LF is very theory dependent.

Another way to identify LF is “formally,” as in (7).

- (7) LF is the phrase marker derived from S-structure by applications of “Move  $\alpha$ ,” branches with respect to PF and is input to rules of interpretation

The specification in (7) locates LF within a GB-style grammar. It is more “formal” than (6) in that it identifies LF by specifying how the LF phrase marker

is derivationally related to other significant levels of linguistic representation. It goes beyond this by suggesting that the same rule that is involved in generating overt syntactic structures, Move  $\alpha$ , is responsible for generating LF phrase markers from S-structures.

As is evident, the formal determination of LF is sensitive to grammatical detail. The formulation in (7) is tied to the specific details of the T-model (Chomsky and Lasnik 1977). The characterization of LF in (7) specifically adverts to the grammatical levels PF and SS and to the fact that LF and PF branch. Consequently, detailed changes in the rest of grammatical theory could significantly affect the formal characterization offered in (7). An illustration of the potency of background grammatical assumptions on the overall form and detail of particular analyses is provided in the contrasting approaches to interpretive phenomena within GB and Minimalist theories outlined in detail in the chapters that follow. However, even brief consideration of the leading ideas behind the Minimalist program indicates that (7) could not be used to identify the LF level in this sort of theory. The reason is that there is no SS level nor does DS exist, though there is a PF level. Nonetheless, an analogue of (7) is available within the Minimalist scheme which functionally identifies LF; it is one of two grammatical levels. It branches with respect to PF, interfaces with the conceptual-intentional system and is derived from the phrase marker that obtains at SPELL OUT (the point at which the derivation splits) via repeated applications of the available singulary transformations.

### 3 Studying LF

What does research on LF consist in? One active empirical project has been to show that the two ways of identifying LF in (6) and (7) coincide. Research in the GB framework has been directed to show that they do, i.e. that those phenomena that we take to be characteristic of meaning are explicitly represented in a phrase marker whose structure is obtained from an SS phrase marker by the successive application of Move  $\alpha$ .

A further research aim arises when coupled with the view that meaning is exhausted by the specification of a sentence’s truth conditions. This further assumption requires that LF yields a logical syntax appropriate for recursively stating the truth conditions of a sentence. With this assumed, one can work backwards from the truth conditions of a given sentence first, to the syntax that a standard truth definition requires to yield these truth conditions, and then to operations on the SS phrase marker required to transform it into an LF phrase marker with the requisite logical syntax.

An example might help give the flavor of the enterprise. Consider the pair of sentences in (8):

- (8a) Everybody left  
(8b) John left

(8a) and (8b) are standardly treated as having distinct logical forms. *John* in (8b) is a name, a referring expression, in contrast with *everyone* in (8a) which is a quantifier. In the Frege/Russell tradition, this sentence expresses a singular proposition with a logical structure like that in (9).

(9) Left (John) [L(j)]

This representation is meant to display the fact that *John* is a logical simple and that *left* is a one place predicate with a single argument position, filled in this instance by *John*.

In contrast, (8a) is logically more complex. *Everyone* is not a referring expression and the sentence is not of simple subject/predicate form. A variable fills the argument position of the predicate and a quantifier is appended to the whole open sentence.

(10) (Every x: x a man) [left (x)]

The difference in logical syntax displayed in (9) and (10) reflects the purported semantic difference between names and quantified expressions. If LF is driven by the requirement of getting the truth conditions right, and we adopt the Frege/Russell distinction between names and quantified NPs, then the LF phrase markers of this pair of sentences should have structures analogous to these two logical forms. In other words, the LF phrase markers will reflect the fact that (8a) is semantically complex while (8b) is semantically simpler.

Given this, the question is how to get from the SS representation of these sentences to their respective LFs. In the case of (8b), there is hardly any problem as the SS and LF phrase markers are virtually identical, at least if we ignore orthographic conventions. (11) is an adequate LF representation of the logical form of (8b):

(11) [John [left]]

To obtain a semantically adequate LF for (8a) we apply the rule of Move  $\alpha$ , in the guise of quantifier raising (QR), and adjoin *everybody* to the front of the clause. QR, like other instances of Move  $\alpha$ , leaves behind a coindexed trace that is interpreted as a variable bound by the adjoined (restrictive) quantifier.<sup>3</sup> (12) is the phrase marker that results from these operations and it is a plausible representation of the logical form of (8):

(12) [Everybody; [t; left]]

This case illustrates how grammatical rules like Move  $\alpha$  can be exploited to yield structures that deliver up the right form for the recursive specification of truth conditions. The question is not whether this can be done but if it should be. In other words, what reason is there for thinking that we should avail ourselves of these sorts of abstract rules to yield these sorts of LF phrase markers? There is nothing incoherent in denying that LF exists in the sense of

a level of linguistic representation dedicated to representing the logical form of a sentence (vide Cooper 1983 for example). It is logically possible that there are not "any aspects of meaning that emerge in the course of normal maturation of the faculty for language" (Higginbotham 1985). This does not mean to say that sentences might not have the properties logicians claim for them. Rather these properties need not be *linguistic* properties, need not be represented in grammatical objects such as phrase markers nor derived via grammatical rules such as Move  $\alpha$ . A property can be significant, interesting, and cognitive without being linguistic.<sup>4</sup>

To this point, we have identified several generally assumed characteristics of LF. First, it is derived via Move  $\alpha$  from S-structure (in a GB theory). Second, it is "where all grammatically determined information that is relevant to interpretation" is consolidated (Higginbotham 1985: 549) and where certain output conditions apply. Third, it is the grammatical level that provides the correct logical syntax for the interpretive apparatus.

A fourth commonly held view is that LFs disambiguate sentences. In other words, if a sentence is *n*-ways ambiguous then it has *n* different LF phrase markers.<sup>5</sup>

There is a fifth additional assumption of note that is commonly held. At the level of LF, all grammars are alike. Thus, whatever surface differences disparate grammars may manifest, at the LF level, grammars are identical. This is a very powerful assumption and I would like to briefly consider the reasons adduced in its favor. The ones generally provided are of the standard poverty of stimulus variety. One version of this argument is concisely advanced in Higginbotham (1985: 550):

the most fundamental principles of semantics are so remote from the data available to the child (situations of utterance, the behavior of other speakers etc.) that it is quite plausible to suppose that these principles vary minimally or not at all from language to language, the differences that show up being attributable to local syntactic conditions.

If one understands the first phrase – "the most fundamental principles of semantics" – as including the principles that determine LF structure then we have a poverty of stimulus argument as applied to LF. The claim above is that LF is too remote from experience to allow parametric variation across grammars. In other words, there are no data accessible to the child in terms of which s/he could directly fix different LF parameter values. Consequently, LF phrase markers must be essentially identical across speakers and languages or can only differ in ways that are dependent on differences in overt syntactic structure that the child can use in the course of specifying its grammar.

This constitutes the argument for LFs being identical across grammars. As a *form* of argumentation, the poverty of stimulus argument cannot be faulted. However, it is not clear how powerful this particular application of the argument is. There is a good sense in which SS (in a GB-style theory), the locus of "local syntactic conditions," is more remote from "experience" than LF is, at least if by experience one intends non-linguistic information. The reason is

that LF is thought of as the grammatical level that interfaces with the other cognitive modules, just like PF and in contrast to SS.

To help us get a feel for the strength of the application of the poverty of stimulus argument when applied to LF, let us consider an analogy between LF and PF. PF ultimately interfaces with the modules involved with phonetic perception and muscle control systems that govern articulation. Grammarians believe that phonologies can differ across languages. If so, the reason must be that the child can fix phonological parameters by inspecting the incoming phonetic data. In other words, the relationship of PF to phonetic/motor events is transparent enough to allow a child to deduce the structure of phonological parameters from the patterns of perceptual/motor data that the child has access to.

Given the parallel between LF and PF the argument outlined by Higginbotham must amount to the claim that the relationship between the structure of LF and the information in its interface modules, say, for concreteness, a sentence's truth conditions, is more opaque than the relationship that obtains on the PF side of the grammar between phonetic data and phonological parameters. Consequently, inspecting truth conditions made manifest in a particular situation fails to be a good indicator of LF structure and so cannot be used to fix possible LF parameters. This kind of disanalogy between PF and LF is the assumption that drives the above argument. The question is why should we accept it.

Chomsky (personal communication) argues as follows:

The basic point seems to me simple. If a child hears English, they [*sic*] pick up the phonetics pretty quickly (in fact, it now turns out that many subtle distinctions are being made, in language specific ways, as early as six months). The perceptual apparatus just tunes in. But if you observe what people are doing with language, it is subject to so many interpretations that you get only vague cues about LF.

In simpler terms, we are perceptually built for sound but not perceptually built for meaning. I do not know whether this speculation is correct. Consider recent work by Fisher et al. (1994) for example. They observe that very young children upon hearing sentences of varying adicities will reliably turn to a screen projecting the situation described by these sentences. Thus, for example, given two screens, one portraying an event described by a transitive verb and the other depicting an event expressed by a ditransitive verb, the child will reliably gaze on the one that matches the sentence broadcast to him/her. If this is correct, it appears that argument structure (the adicity of the predicates) is perceptually available in the data the child exploits in fixing his/her grammar.

For the sake of argument, consider a further possibility. Say children are able to perceptually discern quite generally which truth conditions characterize a given situation. For example, say the possible relative quantifier scopes in "a shark attacked every diver" are discernable by children in the two different sets of circumstances corresponding to the alternate truth conditions that the sentence may have: in one situation a lone shark munches on every frogman

while in the other each frogman is served up to a different shark. If this occurs, then whether a given language licenses certain kinds of relative quantifier scope ambiguities can be culled directly from the linguistic context. If alternate quantifier scopes are reflected in different LF phrase markers, then LF parameters can be directly set by the primary data if this scenario obtains. I am not urging that this is indeed so, but it does not strike my pre-theoretical hunches as terribly far-fetched. What is clear is that this is an empirical judgement about an area that we know very little about. As such, it remains unclear just how powerful the poverty of stimulus argument outlined above really is. Suffice it to say that the discussions in the following chapters adhere to a principle of LF invariance in large part.

The rest of this book is divided as follows. The early chapters (2 and 3) review the canonical arguments for the existence of LF and its properties. LF in its standard version has the properties noted above. It is derived from SS via successive applications of the rule Move  $\alpha$ . Of particular importance in these derivations is the rule of QR and WH-raising. The former Chomsky-adjoins quantified NPs to IPs and the latter moves WH-elements to complementizer positions. The various boundary conditions noted above are taken to characterize LF so that all relevant grammatical information that determines sentence interpretation is represented at LF. The kinds of arguments surveyed below include analyses of quantifier scope interactions, pronoun-binding phenomena, antecedent-contained deletion structures, and superiority effects among others. These arguments for LF are set in a GB framework of assumptions.

Later chapters (4 through 9) set these GB assumptions aside to investigate the properties of LF against the background of a Minimalist theory. Minimalism places different desiderata on grammars and one aim is to see just what these imply for the structure of LF. In addition, Minimalist grammatical technology is somewhat different from that standardly assumed for LF within GB theory. In particular, it is unclear whether WH-raising or QR obtains at LF in a Minimalist theory, at least as these operations are standardly understood. There is also far more A-movement at LF in this revised model than there is in the standard GB system. What this empirically implies for LF structures and operations in general (and for the analyses surveyed in chapters 2 and 3 in particular) is the central concern of these chapters.

## 2

# Motivating LF

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There is a series of direct syntactic arguments that bear on the form and existence of LF in a GB-style theory. They are “syntactic” in that they exploit generalizations exemplified in SS phrase markers. Interestingly, these SS conditions can be generalized and given wider empirical reach by supposing that they apply to a phrase marker similar to (but more articulated than) SS rather than to SS itself. Furthermore, this grammatical object is formally very similar to the logicians’ logical form; a syntactic object sufficient for specifying the recursive interpretive structure of a sentence. This confluence of properties lurks behind the “LF” designation for this phrase marker.

In this chapter, I review some standard GB arguments supporting the conclusion that a grammatical level like LF exists. The form of these arguments is as follows. As noted in chapter 1, there is a semantic distinction between names and quantifiers, the latter being scopal elements. Suppose that scopal elements represent their scopes grammatically within LF phrase markers. Suppose as well that quantifiers assume their scope via the rule of Move  $\alpha$  at LF, i.e. QR adjoins quantified NPs to the clauses over which they have semantic scope. If this is correct, then we expect this movement to obey the assorted grammatical restrictions that typically characterize overt movement operations. For example, we expect the movement to be constrained by principles like subadjacency and the traces left by movement to be subject to the ECP (see below for the relevant definitions). Furthermore, the licit movements should result in phrase markers that reveal the semantic compositional structure of the sentence. This is what we expect if semantic information is grammatically encoded in phrase markers derived by standard grammatical processes. The data provided below support these expectations and thereby constitute evidence for the assumption that LF exists.

Before illustrating instances of this type of argument, it is worth observing that, if it can be provided, it is very powerful. What better reason can there be for postulating a new level of grammatical representation, a new kind of phrase marker (or for that matter any other kind of theoretical construct), than that it extends the domain of empirical coverage while exploiting independently motivated generalizations!

## 1 Interpreting LF

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A range of arguments for the existence of LF arise from considering the properties of WH-elements. WH-elements are semantically akin to operators. They take scope over the propositions relevant to the interpretation of the sentence. Consider a simple case.

- (1a) What did Bill buy
- (1b) What does Bill know that Frank bought
- (1c) John knows what Bill bought

We can think of the interpretation of a question as a function of the appropriate answers to it.<sup>1</sup> In (1a), for example, the answer consists of a sentence like (2) with appropriate purchases plugged into the X-position, e.g. shoes, a car, a telephone.

- (2) John bought X

(1b) has a different set of appropriate responses determined by the frame (3). The set of potential answers includes statements like “Bill knows that Frank bought a hot dog,” “Bill knows that Frank bought a lemon” etc. In contrast, the statement “Harry knows that Bill bought a hot dog” is not a potential answer as it exploits the wrong propositional frame.

- (3) Bill knows that Frank bought X

(1c) is not a question at all though it has a question as a subpart: the embedded clause. This embedded clause determines a set of “answers” arrived at by filling in the frame (4):

- (4) John knows: Frank bought X

Roughly speaking, (1c) is true just in case Bill knows if Frank bought a car, or a boat, or a stove or . . .

This very brief set of observations highlights the semantic function of the WH-operator. The moved WH has scope over the clause that it heads and this clause forms the propositional frame which helps determine the set of appropriate answers for a given question. The position from which the WH has moved further delimits the relevant propositional frame. The standard syntactic treatment of WH-questions moves the WH to sentence initial Comp(lementizer) position and leaves a trace behind. This trace functions as the variable X above, the slot that is filled to complete the set of answers. The boundary of the relevant propositional frame is determined by the position that the WH occupies; the trace functions to determine the position of the variable. The syntax of overt WH-movement in English, in effect, provides the kind of information needed to interpret a question.

Not all languages function like English. In various languages, including French and Chinese among others, WH-elements can remain *in situ* at SS.<sup>2</sup> Thus, at SS, these languages do not seem to render the propositional frame explicit. It is reasonable to suppose, however, that this information is somewhere provided, if not at SS then at some other level of representation. There is, in fact, considerable evidence that these WHs, despite their overt surface positions outside of the Comp slot, nonetheless act as if they were situated within it.

Consider the following type of data. (5) receives an interpretation as a simple (non-echo) question.<sup>3</sup> The Chinese sentence (6a) manifests the ambiguity made explicit in the English translations (6b) and (6c).

- (5) Jean a vu qui  
 J. has seen who  
 "Who did Jean see"
- (6a) Zhangsan zhidao [<sub>CP</sub> [<sub>IP</sub> Lisi mai-le sheme]]  
 Z. know Lisi bought-ASP what
- (6b) What did Zhangsan know that Lisi bought
- (6c) Zhangsan knows what Lisi bought

One way of accounting for the semantic parallelism between English questions, in which WH-expressions overtly move to the Comp at SS, and the French and Chinese cases, where there is no comparable SS movement, is to propose that at LF, the WH-elements *in situ* at SS in French and Chinese, move to the Comp position. Observe that if we adhere to the assumption that the interpretive (semantic) properties of grammars are uniformly represented cross-linguistically, then it is natural to assume that WH-*in-situ* elements abstractly move to Comp positions rendering languages structurally identical with regards to semantic interpretation. Note that French and Chinese thereby determine the relevant propositional frames at LF rather than SS. Assuming this, (5) has the LF phrase marker in (7) and (6a) has the ones in (8). Thus, at LF, the various French, Chinese and English sentences are formally identical and at this level, provide the relevant information for interpretation.

- (7) [Qui [Jean a vu t<sub>i</sub>]]  
 (8a) [<sub>CP</sub> Sheme<sub>i</sub> [<sub>IP</sub> Zhangsan zhidao [<sub>CP</sub> t<sub>i</sub> [<sub>IP</sub> Lisi mai-le t<sub>i</sub>]]]  
 (8b) Zhangsan zhidao [<sub>CP</sub> sheme<sub>i</sub> [<sub>IP</sub> Lisi mai-le t<sub>i</sub>]]

WH-*in-situ* constructions are not limited to French and Chinese. English multiple interrogatives involve them as well.

- (9) Who bought what

In this case, it is supposed that the WH-*in-situ* moves at LF to the Comp containing the overtly moved WH-element (Chomsky 1973). The WH-*in-situ*, then, joins the WH in Comp at LF. This permits an absorbed interpretation for the pair of WH-operators. Thus, the appropriate interpretation for questions like

(9) involves responses of buyer-buyee pairs; John a car, Bill a boat and Cathie a motorcycle.<sup>4</sup> The appropriate propositional frame is something like (10) in which the pair of variables X, Y must be filled in to yield an appropriate answer.

- (10) Which X, Y [X bought Y]

An LF phrase marker like (11) makes the relevant propositional frame explicit. The traces of movement once again function like variables and the complex WH-amalgam in Comp demarcates the appropriate proposition.

- (11) [[What<sub>i</sub> [who<sub>j</sub>] t<sub>j</sub> bought t<sub>i</sub>]

The examples above favor movement of WH-*in-situ* elements to pre-sentential positions on the assumption that the interpretive properties of operators have a syntactic reflex. In other words, the derivation of LF *phrase markers* to encode interpretive information is motivated on the assumption that in cases such as these, syntactic form follows interpretation. A pressing question then is whether there exist non-interpretive reasons for thinking that phrase markers such as these exist. What kind of evidence can be adduced aside from the interpretive concerns mooted above?

## 2 The Empty Category Principle at LF

The ECP is a condition that requires that traces be licensed to be licit. Thus, a trace in a given structure is acceptable if and only if it is properly governed (see definitions below). Thought of this way, the ECP is essentially a trace detector, a condition that makes noise when a trace fails to satisfy it. The aim of this section is to deploy this detector to hunt for possible covert traces, i.e. traces without phonological residues. The existence of such non-phonologically marked traces is implied by the existence of LF and so finding such would support the position that such a phrase marker exists. This section reviews evidence that such traces exist and trigger the ECP.

The ECP is a condition that distinguishes the movement behavior of (i) adjuncts and arguments and (ii) subjects and objects. (12) illustrates the first contrast, (13) the second.

- (12a) (?) Which car did John wonder how to fix  
 (12b) \*How did John wonder which car to fix  
 (13a) Which car did John say that Bill fixed  
 (13b) \*Which mechanic did John say that fixed the car

The ECP effects this contrast by requiring that traces formed by movement meet the locality conditions stated in (14) and (15).



- (14) ECP: All traces must be properly governed  
 (15) A trace is properly governed iff it is governed by a head  $X^0$  or locally bound by its antecedent<sup>5</sup>

Assume for the present that local binding is effected within the same clause. (14) and (15) encode the familiar head government and antecedent government options for proper government.<sup>6</sup> The details do not matter for the present.

The ECP distinguishes the sentences in (12) and (13) as follows. They have the structures in (16) and (17).

- (16a) [Which  $car_i$ , [John wonder [how<sub>j</sub> [PRO to [fix  $t_i$ ]  $t_j$ ]]]]  
 (16b) [How<sub>j</sub>, [John wonder [which  $car_i$ , [PRO to [fix  $t_i$ ]  $t_j$ ]]]]  
 (17a) [Which  $car_i$ , [John say [that [Bill fixed  $t_i$ ]]]  
 (17b) [Which mechanic, [John say [ $t_i$  that [ $t_i$  fixed the car]]]]

Consider the traces in (16a, b). The trace  $t_i$  is an argument of the verb *fix*. As such, it is sister to the verb and hence governed by it. The trace  $t_j$  is an adjunct outside the governing domain of the verb or any other lexical head. The former trace meets the ECP by being head governed by the verb. The trace of *how* can only conform to the ECP by being locally bound. In (16a),  $t_i$  is so bound by *how* from the local Comp position. However, in (16b), this fails to occur and  $t_i$  is neither head governed nor antecedent governed. An ECP violation results and the relative unacceptability of (16b) is accounted for.<sup>7</sup>

A similar account extends to (17a) and (17b) though the technical details differ. In the former,  $t_i$  is head-governed by *fix*. In contrast, the subject trace in (17b) has no head governor. The question is whether it is locally bound (i.e. antecedent governed) by the intermediate  $t_i$ . Assume that the Comp *that* blocks this.<sup>8</sup> The unacceptability of (17b) then follows from the ECP.

Consider now how the ECP interacts with non-syntactically overt WH-movement. Recall that in French it is possible to form a question without overtly moving the WH. Consider in this light the pair of sentences in (18).<sup>9</sup>

- (18a) Pierre a dit que Jean a vu qui  
*P. has said that J. has seen who*  
 "Who did Pierre say that Jean saw"  
 (18b) \*Pierre a dit que qui a vu Jean<sup>10</sup>  
*P. has said that who has seen J.*  
 "Who did Pierre say that saw Jean"

The pair display a subject/object asymmetry characteristic of the ECP. Indeed, we can extend the account above to these French cases on the assumption that the *qui in situ* moves to the matrix Comp at LF and that the result of this movement is subject to the ECP. The structure of (18b) at LF is (19). The trace in subject position fails to be properly governed.<sup>11</sup>

- (19) [Qui, [Pierre a dit [que  $t_i$  a vu Jean]]

Similar subject/object asymmetry effects are observable in English multiple interrogation constructions.<sup>12</sup>

- (20a) Who believes that Bill bought what  
 (20b) \*Who believes (that) what happened

If English multiple interrogatives involve moving the WH-*in-situ* to a Comp containing a WH, then the LF structure of (20b) is identical to (18b) above and results in an ECP violation (but see n. 7).

- (21) [[What<sub>i</sub> [who<sub>j</sub>]]  $t_j$  said [that  $t_i$  happened]]]

Further evidence for LF WH-movement obtains in Chinese. Consider (22).

- (22a) Ni xiang-zhidao Lisi zeme mai-le sheme  
*You wonder Lisi how buy-ASP what*  
 (22b) How do you wonder what Lisi bought  
 (22c) What is x that do you wonder how Lisi bought x

(22a) is unambiguous in Chinese. It can be interpreted as (22c) but cannot carry the interpretation (22b). Furthermore, the prohibition against (22b) is not due to the inability of extracting *zeme* long distance. (23) is well formed.

- (23) Ni renwei ta yinggai zeme lai  
*You think he should how come*  
 "How do you think that he should come"

A direct way to account for the unacceptability of (22a) with the interpretation (22b) is via the ECP. The structure of the unacceptable sentence is (24). The adjunct trace is neither head nor antecedent governed and hence the indicated structure is ill-formed, in violation of the ECP.

- (24) Zeme<sub>i</sub> [ni xiang-zhidao [sheme<sub>j</sub> [Lisi  $t_i$  mai-le  $t_j$ ]]]  
*How you wonder what Lisi bought*

Though we have used Chinese examples to make the case, the glosses indicate that parallel facts hold for English. In effect the pair of examples in (12) above follow the logic illustrated here. The key difference between the English and Chinese cases is that in the former the movement is overt while in the latter the WH-elements all move at LF. The fact that the interpretive properties of the English sentences (which involve overt syntactic movement) and the Chinese sentences (which appear not to) are identical follows from the assumption that the ECP applies to LF phrase markers of the kind postulated.

The ECP can also be brought to bear on another interesting set of data involving WH-movement, superiority effects.

- (25a) I wonder who bought what  
 (25b) \*I wonder what who bought

Assume once again that to receive an interpretation the WH-*in-situ* moves to the Comp containing a WH-operator and adjoins to it thereby permitting an

absorbed interpretation of the complex WH-operator. This yields (26) as the correct structure of (25).

- (26a) I wonder [[what<sub>i</sub> [who<sub>j</sub>]] t<sub>i</sub> bought t<sub>i</sub>]  
 (26b) I wonder [[who<sub>j</sub> [what<sub>i</sub>]] t<sub>i</sub> bought t<sub>i</sub>]

Consider the traces. In (26a, b) the object trace  $t_i$  is properly governed by the verb *bought*. In (26a) the subject trace  $t_i$  is antecedent governed by *who<sub>j</sub>*, or more precisely, by the complex WH of which *who<sub>j</sub>* is the head. This complex WH is in the same structural proximity to the trace in subject position as a simple WH would be, e.g. as in (27).

- (27) [What<sub>i</sub> [t<sub>i</sub> happened]]

This contrasts with (26b) where *who<sub>j</sub>* plausibly fails to locally bind the subject trace. The intervening head of the complex WH *what<sub>i</sub>* intervenes to upset the local binding relation much as *that* does in cases such as (13b) above. If we assume that this, or something like this, is correct, then superiority effects can be brought within the purview of the ECP.<sup>13</sup>

It is interesting to observe that we find similar superiority effects in languages in which WHs all move overtly to Comp in the syntax. Rudin (1988) observes that in Bulgarian and Romanian all WHs move to Comp by SS. These multiple questions exhibit superiority effects. (28) illustrates this using Romanian data.<sup>14</sup>

- (28a) Cine ce cumpara  
       Who what buys  
       "Who buys what"  
 (28b) \*Ce cine cumpara  
       What who buys  
       "What did who buy"

Once again, it is significant that we find overt analogues of the LF phrase markers proposed. If LF is a grammatical level, then its phrase marker properties should parallel those we find in other phrase markers. The fact that both overt movement of WHs in Romanian and covert movement of WH in English are amenable to a common analysis on the assumption that WHs-*in-situ* move at LF to Comp adds grammatical support to the hypothesis that LF exists.

Before reviewing further evidence, let us pause to consider the fine structure of the argument presented to this point. Semantically, a distinction exists between quantifiers and names.<sup>15</sup> The former have distinctive scopal properties which are reasonably represented grammatically by moving these expressions to positions that c-command their scopal domains. WH-operators are quantificational entities and so have scopal properties. In many languages, English being one, these scope properties are manifested overtly in the position that WH-elements occupy. It is reasonable to suppose that this movement manifests the logical structure of questions with the pre-sentential WH occupying its

scope position. What we have rehearsed evidence for is a more striking proposition; that the satisfaction of semantic ends (such as assuming one's proper scope position) is accomplished by syntactic means. The line of argument above indicates that quantifiers like WH-expressions are subject to the rule of Move  $\alpha$  and it is through a process of (grammatical) movement that WHs attain their scope positions. This movement, like overt forms of syntactic movement, leaves behind traces which are subject to conditions on trace licensing such as the ECP. This means that scope of WH is a property of phrase markers and hence that semantic content has syntactic consequences, in at least this one case. Importantly for our purposes, the phrase marker relevant to stating this confluence of semantic and syntactic fact is a phrase marker derived from SS by further application of syntactic operations. In short, LF.

Other quantified expressions conform to the ECP as well. Kayne (1981) considers some evidence from French that indicates that negative quantifiers display subject/object asymmetries with respect to abstract movement. Quantified NPs like *personne* take scope over the clause within which the negative marker *ne* appears. Typically, this is the same clause. (29a) has the LF (29b).

- (29a) Jean n'aime personne  
       J. neg likes no one  
       "Jean doesn't like anyone"  
 (29b) Personne<sub>i</sub> [[Jean n'aime t<sub>i</sub>]

Interestingly, there are cases in which it is possible in some dialects to get the neg marker and the quantifier whose scope it indicates in different clauses.

- (30a) Jean n'exige que Marie a vu personne  
       J. neg insist that M. has seen no one  
       "Jean didn't insist that Marie saw anyone"  
 (30b) \*Jean n'exige que personne est venue<sup>16</sup>  
       J. neg insist that no one is come  
       "Jean didn't insist that anyone came"

If *personne* moves to the clause that contains the neg marker *ne*, the LF representations of the two sentences is (31).

- (31a) Personne<sub>i</sub> [[Jean Neg exige [que [Marie a vu t<sub>i</sub>]]]  
 (31b) Personne<sub>i</sub> [[Jean Neg exige [que [t<sub>i</sub> est venue]]]

It is reasonable to account for the relative unacceptability of (30b) by treating (31b) as an ECP violation, on a par with (18b) above. In this instance, however, the trace is a result of a rule of quantifier raising (QR) rather than WH-raising. However, the logic is similar to the WH-case. Quantifiers are also scopal elements. On the familiar assumption that this scope is displayed at LF and effected via movement, then we expect QR to conform to the ECP and display the asymmetry noted above.<sup>17</sup>

The ECP plausibly accounts for a further set of quantificational relative scope facts as well.<sup>18</sup>

- (32a) At least one person expects every candidate to win  
 (32b) At least one person expects (that) every candidate will win

(32a) has a reading in which the universally quantified NP *every candidate* takes scope over the existential NP *at least one person*. Thus, it is compatible with the truth of (32a) that there be a different person expecting every candidate to get elected. This reading is unavailable for (32b). The relevant difference between this pair is that the embedded clause in (32b) is finite while the embedded clause in (32a) is infinitival. This difference is crucial. Given standard assumptions, subjects of non-finite clauses under verbs like *expect* are case marked by the higher predicate. As case marking is under government, this implies that *expects* governs the subject position of the embedded clause in (32a). This, in turn, implies that this position is head-governed by *expects*. Extraction from this position should then be perfectly acceptable. This contrasts with the subject of the embedded clause in (32b). Here case marking is via the finite inflection, which is not a proper governor. As such, extraction here should be prohibited. In effect, long QR from the embedded subject in (32a) meets the ECP while long QR in (32b) does not. The LF representations with wide scope for the universal NP are those in (33).

- (33a) [Every candidate<sub>i</sub> [at least one person<sub>j</sub> [t<sub>j</sub> expects [t<sub>i</sub> to win]]]]  
 (33b) [Every candidate<sub>i</sub> [at least one person<sub>j</sub> [t<sub>j</sub> expects [t<sub>i</sub> will win]]]]

(33b) has a non-properly governed trace *t<sub>j</sub>*. This accounts for the inability to give *every candidate* a wide scope reading in (32b).

Another important phenomenon displays an identical ECP effect. Consider sentences such as (34).

- (34) John likes everyone that I do

This is an example of antecedent-contained deletion (ACD).<sup>19</sup> The interpretation of (34) is provided in (35).

- (35) Everyone that I like John likes

An appropriate LF for this interpretation is provided in (36).

- (36) [Everyone<sub>i</sub> [that [I like t<sub>i</sub>]] [John likes t<sub>i</sub>]]

ACDs have the following difficulty. Assume, for concreteness, that the way that we interpret a null VP is by copying the VP it is dependent on (its antecedent) into the null position. Two observations are pertinent. First, to give (34) the interpretation (35) requires interpreting the deleted VP within the relative clause. Second, copying the antecedent of the null VP cannot

be effected if the quantified phrase remains *in situ*. The problem is that the null VP within the relative clause is interpretively dependent on the VP that contains it. With ACDs, this copying cannot eliminate the VP gap as copying the larger VP will result in copying the VP gap it contains. In short, copying cannot be executed without regress unless we move the whole quantified phrase out from under the VP that contains the null VP. The problem is graphically illustrated by considering the SS phrase marker of (35).

- (37) John [<sub>VP1</sub> likes [everyone that I do [<sub>VP2</sub> e]]]

It is not possible to copy VP1 into VP2 without copying the VP2 gap as well. But if we end up with a VP gap again then we still do not have a fully specified content for the clause. On the assumption that gaps must be discharged for interpretation to be well formed, the procedure outlined above is problematic, at least if stated at S-structure.<sup>20</sup>

Importantly, this simple procedure can proceed without a hitch if we assume that ACDs are interpreted at LF, the relevant structure being (38).

- (38) [[Everyone<sub>i</sub> that I do [<sub>VP2</sub> e] [John [<sub>VP1</sub> likes t<sub>i</sub>]]]

Here VP1 can be copied into VP2 without regress as VP1 no longer contains VP2. The effect of moving the relative clause to its scope position (note that the head *everyone* is a quantificational NP) is to remove it from under VP1 and this movement circumvents the regress problem that besets SS interpretation. In effect, ACDs provide another kind of interpretive evidence for the utility of LF. We gain syntactic corroboration for the view that ACD interpretation involves LF phrase markers by considering the following contrast.

- (39a) John expected everyone that I did to win  
 (39b) \*John expected everyone that I did would win

The relevant interpretation of interest is the one paraphrased as "John expected everyone that I expected to win to win." It is much more difficult to give (39b) this ACD reading than (39a).<sup>21</sup> This follows if movement is involved and this movement is subject to the ECP. The LFs required to feed the ACD interpretation are the ones in which the relative clause moves to a position above the matrix VP. The requisite LFs for the pair of sentences in (39) are provided in (40). In both phrase markers VP2 has been moved out from under VP1.

- (40a) [Everyone [that I did [<sub>VP2</sub> e]] [John [<sub>VP1</sub> expected [t to win]]]  
 (40b) [Everyone [that I did [<sub>VP2</sub> e]] [John [<sub>VP1</sub> expected [t would win]]]

The reason that (39b) cannot have the ACD interpretation is that (40b) violates the ECP, in contrast to (40a). In fact, (40b) has the same problem as (33b) above. The embedded trace in subject position fails to be properly governed. In both cases, the ECP prevents QR from moving the embedded subject to the

next higher clause. As this is required to get the indicated interpretations, these are not available for these sentences. In the case of (39b) this prevents VP2 from moving out from under VP1 and hence we face the regress problem when interpreting the VP2 gap in (39b). In sum, ACD constructions seem subject to ECP considerations; just as expected if LF movement is involved.

Consider one more interpretive phenomenon with apparent ECP effects.<sup>22</sup> Sentences like (41) are ambiguous, with either *what* or *everyone* taking wide scope. The two interpretations are highlighted by the answers in (42).

- (41) What did everyone bring  
 (42a) Everyone brought a bottle of wine  
 (42b) John brought a bottle of wine, Fred brought beer, Cheryl, chips and Sue guacamole

(42a) corresponds to a wide scope reading for *what* while (42b) gives the universal quantifier widest scope. Call the reading in (42b) the pair-list reading.

Various ways have been proposed for representing this pair of interpretations at LF. Chapter 3 considers various analyses of these constructions. For now, let us adopt the analysis in May (1985). May (1985) assumes that the rule of QR adjoins quantified NPs to any XP. Assume here that *everyone* adjoins to IP. The LF of (41) is then (43).

- (43) [<sub>CP</sub> What<sub>i</sub> [<sub>IP</sub> everyone<sub>i</sub> [<sub>IP</sub> t<sub>i</sub> bring t<sub>j</sub>]]]

Whence the ambiguity given a solitary LF? May (1985) suggests the following definition of c-command in terms of strong domination and the following scope rule.<sup>23</sup>

- (44) A c-commands B iff every node that strongly dominates A strongly dominates B  
 (45) A node N strongly dominates B iff every segment of N dominates B  
 (46) Scope rule: If A asymmetrically c-commands B then A has scope over B

The effect of the definitions (44) and (45) as regards (43) is that in this structure *what* and *everyone* mutually c-command each other. IP does not strongly dominate *everyone* as one of the segments of IP does not dominate the adjoined universal quantifier. The only node that strongly dominates *everyone* is CP and this strongly dominates *what* as well. Given the scope rule, the effect of mutual c-command between *what* and *everyone* is to permit either to take scope over the other. In effect, May (1985) drops the requirement that sentences be disambiguated at LF. The LF phrase marker is interpretively ambiguous with either quantifier capable of bearing wide scope.

In light of this consider a sentence like (47).

- (47) Who brought everything

This sentence is unambiguous. It does not support a pair-list reading. (42b) is an inappropriate answer to (47). The ECP explains why. Consider what

LF structure would be required for the pair-list reading. *Everything* must c-command *who*, which sits in Comp. The LF structure is (48).

- (48) [<sub>CP</sub> Who<sub>i</sub> [<sub>IP</sub> everything<sub>j</sub> [<sub>IP</sub> t<sub>i</sub> brought t<sub>j</sub>]]]

However, there is a problem with this configuration. In particular, it is plausible to suppose that *t<sub>i</sub>* is not properly governed given the intervening adjoined universal quantifier. If this is so, the unavailability of the pair-list reading in (47) follows. (48), the LF phrase marker required for the pair-list reading, violates the ECP.

One last issue remains. The LF of the acceptable interpretation of (47) is (49). *Everyone* is adjoined to VP. Within this configuration, *who* asymmetrically c-commands *everyone* (IP and CP strongly dominate *everyone* while only CP strongly dominates *who*) and thus is interpreted by (46) as necessarily taking scope over it.

- (49) [<sub>CP</sub> Who<sub>i</sub> [<sub>IP</sub> t<sub>i</sub> [<sub>VP</sub> everything<sub>j</sub> [<sub>VP</sub> brought t<sub>j</sub>]]]

The above canvassed material supports the conclusion that some semantic properties of sentences are mediated by LF phrase markers. WH-scope, quantifier scope, scope of negation, and VP ellipsis in ACD contexts all appear sensitive to whether the traces left by non-overt movement are properly governed. In short, the ECP appears to limit the effects of abstract LF operations in ways similar to the restrictions it imposes on overt SS movement. This follows if there is indeed a level of representation that mediates interpretation that is derived from SS via Move  $\alpha$ .

### 3 Cross Over Effects at LF

We have been thinking of the ECP as a trace detector. There is another: cross over effects. Consider the following sentences.

- (50a) \*Who<sub>i</sub> did he<sub>i</sub> give a book to t<sub>i</sub>  
 (50b) \*Who<sub>i</sub> did his<sub>i</sub> mother give a book to t<sub>i</sub>

These sentences in (50) exemplify strong and weak cross over. In (50a) the trace/variable *t<sub>i</sub>* is bound by the pronoun *he* within the domain of its operator/quantifier. This is a violation of principle C (as in (51)) and yields an illicit structure.

- (51) A variable must be free in the domain of its operator<sup>24</sup>

The variable *t<sub>i</sub>* in (50b) is coindexed with a pronoun on its left. This is illicit. A variety of principles have been proposed to rule such structures out. For

current purposes it is not crucial which is adopted so I rest with a traditional favorite, the Leftness Condition.<sup>25</sup>

(52) A variable cannot serve as the antecedent of a pronoun on its left

(52) bans structures with the indicated indexing in (50b) with indexation interpreted in terms of antecedence. In simple cases, if X (A-)binds Y then X is the antecedent of Y.

(50a, b) involve SS movement. They manifest strong cross over (SCO) and weak cross over (WCO) effects respectively. (53) indicates that similar effects can be detected in sentences without any form of overt syntactic movement.

(53a) \*Who said that he<sub>i</sub> gave a book to who<sub>i</sub>

(53b) \*Who said that his<sub>i</sub> mother gave a book to who<sub>i</sub>

The LF structures of these sentences are provided in (54), the WH-*in-situ* having moved to the matrix Comp position.

(54a) [[Who<sub>i</sub> [who<sub>i</sub>]] [t<sub>j</sub> said [that [he<sub>i</sub> gave a book to t<sub>j</sub>]]]]

(54b) [[Who<sub>i</sub> [who<sub>i</sub>]] [t<sub>j</sub> said [that [his<sub>i</sub> mother gave a book to t<sub>j</sub>]]]]

The relevant interpretations here have *he* in (54a) and *his* in (54b) interpreted as bound variables. What is crucial is that they cannot have the interpretations in (55).

(55a) For which pair of people x, y did x say that y gave a book to y (i.e. himself)

(55b) For which pair of people x, y did x say that y's mother gave y a book

These are perfectly coherent propositions but the sentences in (53) cannot express them. More importantly, as the structures in (54) clearly demonstrate, the same principles that rule out (50) above will filter out these structures as well. Thus, once again, assuming that multiple interrogative constructions involve moving the WH-*in-situ* to the WH in Comp allows us to generalize grammatical conditions attested at SS.

The argument carries over to non-interrogative quantifiers. (56a) cannot be interpreted as meaning "everyone gave himself a book" nor can (56b) mean "everyone's mother gave him a book."

(56a) \*He<sub>i</sub> gave everyone<sub>i</sub> a book

(56b) \*His<sub>i</sub> mother gave everyone<sub>i</sub> a book

At LF, after QR has applied, these have the structures in (57), the former induces an SCO violation and the latter displays a WCO configuration. Hence both phrase markers are ill-formed and the attendant interpretations are unavailable. Much as in the ECP cases discussed above, it appears that (51) and (52) do not discriminate between overt traces/variables or covert ones.

Neither variety may be bound or serve as an antecedent to pronouns on their left.

(57a) [Everyone<sub>i</sub> [he<sub>i</sub> gave t<sub>i</sub> a book]]

(57b) [Everyone<sub>i</sub> [his<sub>i</sub> mother gave t<sub>i</sub> a book]]

#### 4 Bound Pronouns

Movement has another significant effect. It alters the c-command domain of the moved expression. Prior to movement, the WH in object position only c-commands elements within the VP in (58a). After movement, it has the entire clause as its c-command domain.

(58a) John [<sub>VP</sub> bought what]

(58b) What [<sub>IP</sub> John bought t]

This can be significant given principles such as (59).

(59) If a pronoun P is c-commanded by an NP O then P can be interpreted as a variable bound by O

The movement of operators alters their c-command domains and thereby alters the pronouns that can be treated as bound variables. Consider an example.<sup>26</sup>

(60) \*The man [who disliked every boy<sub>i</sub>] hit him<sub>i</sub>

Here *every boy* does not c-command the pronoun at SS as it is embedded within the relative clause. If (59) applies at SS then *every boy's* failure to c-command *him* accounts for the lack of a bound pronoun reading in (60). For this example, the result is the same if (59) holds at LF. QR is typically clause bound (Chomsky 1977) and at LF, (60) has a structure something like (61).<sup>27</sup>

(61) The man who<sub>i</sub> [every boy<sub>j</sub> [t<sub>i</sub> disliked t<sub>j</sub>]] hit him<sub>i</sub>

In (61), *every boy* fails to c-command the pronoun and so the pronoun cannot be interpreted as bound. Though this instance of LF movement does not affect the pronoun-binding powers of the quantified NP, there are other cases in which it might. Consider some simple examples.

Parasitic gap constructions require that the real gap not c-command the parasitic gap. This is what differentiates the relatively acceptable (62a) from the unacceptable (62b).

(62a) Which book did Bill read t<sub>i</sub> after Frank reviewed t<sub>i</sub>

(62b) \*Which book t<sub>i</sub> was read by Bill after Frank reviewed t<sub>i</sub>

In the former, the real gap is in object position. If the *after* clause is adjoined to VP, then the real gap in object position fails to c-command the trace inside the adjunct. The contrast with (62b) is attributable to the fact that subjects c-command the whole clause thereby c-commanding the adjunct and the parasitic gap within it. This c-command configuration leads to a violation of principle C and the structure is ungrammatical.<sup>28</sup>

Assume that this is correct. We then are confronted with a puzzle in cases such as (63).

- (63a) John kissed every child<sub>i</sub> after Bill introduced him<sub>i</sub>,  
 (63b) Orson will drink no wine<sub>i</sub> before its<sub>i</sub> time

The pronouns here can be interpreted as bound variables, which should be impossible if (59) holds at SS. As we have just observed, the object NP does not c-command the adjunct at this level. This problem can be finessed, however, if we permit (59) to apply after QR. The relevant LF structures are (64) with the quantified object NP adjoined to IP via QR.<sup>29</sup> This LF movement suffices to place the pronoun within the c-command domain of the raised quantified NP. In short, for this case, LF movement serves to save the generalization proposed in (59).

- (64a) [Every child<sub>i</sub> [John [<sub>VP</sub> [<sub>VP</sub> kissed t<sub>i</sub>] after Bill introduced him<sub>i</sub>]]  
 (64b) [No wine<sub>i</sub> [Orson will [<sub>VP</sub> [<sub>VP</sub> drink t<sub>i</sub>] before its<sub>i</sub> time]]]

There is some independent evidence that the trace/variable does not c-command the adjunct. Consider the distribution of epithets. It is impossible to anaphorically anchor an epithet to an NP so long as this NP c-commands the epithet.<sup>30</sup> (65) illustrates this.

- (65) \*No boy<sub>i</sub> thinks that the boy<sub>i</sub> is smart

Now consider (66).

- (66) Orson will drink no wine<sub>i</sub> before the wine<sub>i</sub> is ready

It is perfectly acceptable. This follows on the assumption that the object position does not c-command the adjunct that contains the epithet, the same assumption as above. Thus, there are two kinds of data that point to the conclusion that an NP in object position at SS does not c-command a VP adjunct. The fact that pronominal binding is nonetheless possible from here supports the position that LF is the correct level for stating (59).

There are two other kinds of bound pronoun structures that support the conclusion that pronominal binding is licensed at a grammatical level different from SS. May (1977, 1985) observes that binding is possible in "inverse linking" configurations such as (67).

- (67) [<sub>NP</sub> Someone [<sub>PP</sub> from every city<sub>i</sub>]] loves it<sub>i</sub>

At SS, *every city* does not c-command the pronoun, as (67) indicates. By (59) the bound pronoun interpretation should be unavailable, contrary to fact. This c-command problem is solved once we assume LF movement of quantified NPs. The interpretation of (67) assigns the universally quantified NP wide scope. The LF structure is (68).

- (68) [<sub>IP</sub> Every city<sub>i</sub> [<sub>IP</sub> [someone from t<sub>i</sub>] [<sub>t<sub>i</sub></sub> loves it<sub>i</sub>]]]

Once again, there is independent evidence that *every city* does not c-command the pronoun at SS. Reinhart (1983) observes that sloppy identity constructions are subject to (59) as well. A sentence has a sloppy reading when the semantic value of the pronoun varies with that of the antecedent. The sloppy reading of (69a) is the one paraphrasable as (69b). (69c) is the strict reading.

- (69a) John loves his mother and Bill does too  
 (69b) John loves John's mother and Bill loves Bill's mother  
 (69c) John loves John's mother and Bill loves John's mother

That (59) applies can be seen from cases such as (70a) which only have strict readings, i.e. the readings in (70c). This is what we expect on the assumption that non-quantified NPs do not move at LF to their scope positions. Names, being scopeless, remain *in situ* even at LF and so a sloppy reading of the pronoun is not licensed.<sup>31</sup>

- (70a) People from Los Angeles love its beaches and someone from NYC does too  
 (70b) People from LA love LA's beaches and people from NYC love NYC's beaches  
 (70c) People from LA love LA's beaches and people from NYC love LA's beaches

Interestingly, the sloppy reading once again becomes available in cases like (71).

- (71) Someone from every western city loves its beaches and someone from every eastern city does too

At LF, Move  $\alpha$  derives an inverse-linked phrase marker with the pronoun c-commanded by the quantified NP. This licenses the sloppy reading.

One last point: if we replace the bound pronouns with bound epithets (or definite descriptions) the sentences remain acceptable with the same interpretations. That these anaphors are available corroborates that the SS expression does not c-command the epithet.

- (72a) People from LA love that city's beaches and people from NYC do too (strict reading only)  
 (72b) People from every western city love that city's beaches and people from every eastern city do too (sloppy reading possible)

A last instance of the same effect can be found in cases like (73).

- (73a) Everyone's<sub>i</sub> mother thinks he's<sub>i</sub> handsome  
 (73b) No one's<sub>i</sub> mother thinks he's<sub>i</sub> ugly

The genitive specifier is contained within the subject NP (or DP). Therefore, at SS, it fails to c-command the pronoun and hence by (59) should not be able to bind it. Nonetheless, the bound reading is available. This problem is once again solved if we assume that at LF quantifiers move and adjoin to IP. The relevant structure after movement is (74). At LF, the pronoun is c-commanded by the adjoined quantified NP and so (59) is respected.

- (74a) [<sub>IP</sub> Everyone's<sub>i</sub> [<sub>IP</sub> [<sub>NP</sub> t<sub>i</sub> mother] thinks he's<sub>i</sub> handsome]]  
 (74b) [<sub>IP</sub> No one's<sub>i</sub> [<sub>IP</sub> [<sub>NP</sub> t<sub>i</sub> mother] thinks he's<sub>i</sub> ugly]]

Corroboration for the claim that at S-structure the specifier fails to c-command the pronoun comes from further consideration of principle C effects. It is possible to get a bound epithet in these configurations – (75a) – and it is possible to get backwards pronominalization – (75b). This should not be possible if the SS specifier had the IP as its c-command domain as in both cases we would have a principle C effect.<sup>32</sup> Contrast (75) with (76).

- (75a) No kid's<sub>i</sub> mother thinks that kid<sub>i</sub> is ugly  
 (75b) His<sub>i</sub> mother gave the kid<sub>i</sub> a nickel  
 (76a) \*No kid<sub>i</sub> thinks that kid<sub>i</sub> is ugly  
 (76b) \*He<sub>i</sub> gave the kid<sub>i</sub> a nickel

Sloppy identity data add further confirmation to the claim that the SS specifier does not c-command the pronoun. In (77), the sloppy identity reading (77b) is unavailable, as expected. (77a) can be interpreted as (77c) but not (77b). The specifiers, not being quantificational, do not move to higher positions at LF. Hence *John* and *Frank* never c-command the pronouns and a bound variable interpretation remains unlicensed even at LF.

- (77a) John's mother loves him and Frank's father does too  
 (77b) John's mother loves John and Frank's father loves Frank  
 (77c) John's mother loves John and Frank's father loves John

Interestingly, we find sloppy readings in these configurations in cases where the specifier moves. There are two relevant cases. Reinhart (1991) has argued that bare argument ellipsis is fed by LF movement. In effect, what is elided is

an LF constituent. A sentence like (78a) has the LF structure (78b) and IP<sub>1</sub>, a constituent present only at LF, is copied into the elision site IP\*.

- (78a) John liked your poem yesterday and your book  
 (78b) [<sub>IP2</sub> Your poem<sub>i</sub> [<sub>IP1</sub> John liked t<sub>i</sub> yesterday] and [<sub>IP</sub> your book<sub>i</sub> [<sub>IP\*</sub> e]]]

Elision, in short, involves movement of even non-quantified NPs. With this in mind consider (79).

- (79) John's mother kissed him and Bill's too

In cases such as these the sloppy interpretation of the pronoun is available. (79) can carry the interpretation: "Bill's mother kissed Bill." This contrasts with the unavailability of this sloppy reading in (77a). The difference stems from the presence of elision in the latter case. Observe that the head noun has been elided, in addition to the rest of the IP. The LF structure is something like (80).

- (80) [<sub>IP1</sub> John's<sub>i</sub> [<sub>IP2</sub> [NP t<sub>i</sub> mother] kissed him<sub>i</sub>] and [<sub>IP</sub> Bill's [<sub>IP\*</sub> e]]]<sup>33</sup>

The availability of the sloppy identity reading is expected in this sort of case if elision involves adjunction of the remnant to IP. With this LF movement, the pronoun is c-commanded and is licensed as a bound pronoun. Consequently, the sloppy reading is expected to arise.

Confirmation of this comes from the reemergence of sloppy readings in cases without elision but with quantified determiners.

- (81a) Everyone's mother kissed him but no one's father did  
 (81b) Every congressman's aide will support him and every senator's secretary will too

These sentences permit sloppy readings. For example, (81a) has the paraphrase: For every *x*, *x*'s mother kissed *x* and for no *y*, did *y*'s father kiss *y*. This is once again expected given that QR raises the quantified determiner at LF to a position from which it can c-command the pronoun. This allows it to get a bound variable interpretation in conformity with (59).

Movement alters the c-command domain of an expression. In this section, I have surveyed arguments supporting the conclusion that the c-command domain of some NPs is larger than their SS position indicates that it should be. More interesting still, the NPs with these larger scope domains are quantificational. In this respect, they contrast with names, the scope of which are accurately reflected in their SS positions. This contrast is precisely what we expect if LF structurally reflects the semantic properties of different nominal expressions. Scopal NPs should move at LF and alter their c-command domains. Scopeless elements should not. The evidence suggests that the way things are is the way they should be.

## 5 Conclusion

This chapter has reviewed the standard arguments for LF. We have seen that there is considerable evidence that covert movement can alter SS c-command relations, can affect pronoun-binding conditions, can extend the reach of the WCO effect and the ECP. At the same time, we have surveyed evidence that suggests that LF phrase markers respect natural semantic distinctions such as that between names and quantifiers and also provide a grammatical basis for certain aspects of semantic interpretation, e.g. relative quantifier scope, VP anaphora in ACD structures. In sum, we have seen that there is considerable evidence that there is a grammatical level that is responsive to semantic distinctions. What is crucial is that there is a confluence of semantic and grammatical properties. The latter features implicate the presence of a phrase marker. The former makes it reasonable to call it "logical form."

## Appendix Subjacency

Some have argued for subjacency restrictions on LF movement. I review some of the arguments for this here. I take the evidence to be inconclusive. However, chapters 8 and 9 provide additional arguments to the effect that subjacency is a restriction that applies to LF phrase markers within a Minimalist theory.

Overt instances of Move  $\alpha$  are subject to subjacency.<sup>34</sup>

- (82) Movement cannot cross more than one bounding node, where IP and NP are bounding nodes

This condition restricts movement out of complex NPs and embedded WH-questions, among other islands. There are two ways of thinking of subjacency, as a condition on representations or derivations. The first view treats subjacency as a well-formedness condition on phrase markers that requires that links in a movement chain be locally relatable; e.g., that no two successive links be separated by more than a single bounding node. The second way of thinking of subjacency is as a condition on rule application. Here, the operative idea is that a movement operation cannot apply so as to move an expression across more than a single bounding node. In contrast with the representational view, this treats subjacency as a constraint on the operation of the rule itself rather than its output. In effect, subjacency is simply part of the *definition* of what it is to be a movement rule. Research since the early 1980s has oscillated back and forth, some results supporting the representational approach, others the derivational interpretation. For present purposes, it is the second version of subjacency that is of interest for it implies that LF instances of Move  $\alpha$  should display subjacency effects. In this section, we review some of the evidence

suggesting that this is the case. However, before beginning, it is worth considering the evidence against this position.

WH-*in-situ* constructions can appear inside islands.

- (83a) Who asked where Bill bought what  
 (83b) Who likes people who live where  
 (83c) Who said that pictures of what were sale  
 (83d) Who denied the claim that Bill bought what

The relevant interpretation of (83a) is the one in which *what* is paired with *who*. An appropriate answer would be: John asked where Bill bought his computer and Sheila asked where Bill bought his modem. With this interpretation we appear to have a violation of the WH-island condition. Overt instances of WH-movement result in unacceptability in analogous constructions. Compare (83) and (84).

- (84a) \*What did John ask where Bill bought  
 (84b) \*Where does John like people who live  
 (84c) \*What did John say that pictures of were on sale  
 (84d) \*What did John deny the claim that Bill bought

These data can be accommodated if we treat subjacency as a well-formedness condition on SS chains rather than a condition on movement itself.<sup>35</sup> However, there is some evidence that even LF movement is constrained by subjacency and that the cases in (83) are only in apparent violation of this principle.

Longobardi (1991) observes that some quantified expressions, e.g. negative quantifiers and *solo* NP ("only NP") constructions, can have scope wider than the clause that dominates them at SS but cannot scope out of islands. (85) exemplifies the first point and (86) the second.

- (85) Non credo che lui pensi che io desidero vedere nessuno  
*Neg believe-I that he thinks that I wish to-see no one*  
 "I do not believe that he thinks that I wish to see anyone"  
 (86a) \*Non approvarei la tua proposta di vedere nessuno  
*Neg approve-I the your proposal of to-see no one*  
 "I don't approve your proposal of seeing anyone"  
 (86b) \*Non ho incontrato chi potrebbe fare niente  
*Neg have meet who might to-do nothing*  
 "I did not meet (someone) who might do anything"

The examples in (86) are instances of the complex noun phrase constraint. As indicated, the negative expressions *nessuno* and *niente* cannot move to their scope marker *non* as this would involve moving out of an island.

These negative constructions also display CED (Constraint on Extraction Domains) effects. (87a) is an instance of the subject condition and (87b) the adjunct condition.



- (87a) \*Chiamare nessuno sara possibile  
*to-call no one will-be possible*  
 "To call no one will be possible"
- (87b) \*Non fa il suo dovere per aiutare nessuno  
*Neg does-he the his duty for to-help no one*  
 "He does not do his duty in order to help anyone"

Thus, it seems that negative scope is sensitive to island conditions and this suggests that subjacency is involved. However, these data need not imply that subjacency *per se* is what is involved. To establish this, it would be necessary to show that these examples are not simply instances of antecedent government violations, a condition more restrictive than subjacency.<sup>36</sup> Relevant cases are examples such as (88). These, however, are unacceptable. As such, these data cannot support the position that subjacency is what determines the licit distribution of *nessuno*.<sup>37</sup>

- (88) \*Non mi chiedo dove Gianni abbia visto nessuno  
*Neg self ask-I where G. has seen no one*  
 "I don't wonder where Gianni saw anyone"

A second kind of data in support of subjacency at LF has to do with answers to certain questions in the East Asian languages. In Chinese, for example, it is possible to form questions while leaving the WH *in situ*, as noted above. Furthermore, this WH can be lodged within an island. If the interpretation of WH *in situ* requires movement of this WH to Comp at LF, then a subjacency violation would result. The following data illustrate the problem.<sup>38</sup> These examples involve apparent extraction out of WH-islands, relative clauses and complex noun phrases.

- (89a) Ni xiang-zhidao [shei mai-le shenme]  
*You wonder who bought what*  
 "What do you wonder who bought"
- (89b) Ni zui xihuan [piping shei de shu]  
*You most like criticize who REL book*  
 "Who do you like books that criticize"
- (89c) Ni renwei [shei de hua zui piaoliang]  
*You think whose picture most pretty*  
 "Who do you think that pictures of are most pretty"

Indeed, even extraction out of multiple islands is apparently possible.

- (90) Ni zui tongqing [bei [shei xie de shu] piping de ren]  
*You most pity by who write REL book criticize REL person*  
 "Who is the x such that you sympathize most with the persons who are criticized by the books that x wrote"

However, several have argued that these violations of subjacency are only apparent and that what occurs in cases such as these are movement of the

container of the WH rather than the WH itself.<sup>39</sup> They observe that the answers to the questions in (91) cannot specify the value of the WH-word alone but requires one to repeat other material in the island. In particular, (91c) is an infelicitous answer and this reflects the fact that more than the WH is in operator position at LF, as would be expected if pied piping were required to allow subjacency to be adhered to.

- (91) Ni xihuan [shei xie de shu]  
*You like who write REL book*  
 "You like the book that who wrote"
- (92a) Zhangsan xie de (shu)  
 "The book that Z wrote"
- (92b) ??Zhangsan

Fiengo et al. (1988) observe several problems with this pied piping hypothesis. First, they observe that the "minimal" answer test does not work that well. Thus in (93) we should have pied piping to avoid violation of the sentential subject condition. However, (92b) is a felicitous answer to this question nonetheless.

- (93) [Shei kan zheben shu] zui heshi  
*Who read this book most appropriate*  
 "That who read this book is most appropriate"

They further point out that pied piping fails to adequately account for certain observed contrasts. Consider the sentences in (94).

- (94a) \*Who did you get angry because I spoke to t  
 (94b) Who got angry because I spoke to who  
 (94c) \*Who got angry why

The problem is as follows. If we assume that the acceptable (94b) contrasts with the unacceptable (94a) due to pied piping the whole adjunct to Spec CP at LF then we are left with no account as to why doing the same thing at LF in (94c) results in unacceptability.

Or consider another case discussed in Aoun (1985: 62ff). Consider the pair of sentences in (95).

- (95a) \*Who said that what was invisible  
 (95b) Who said that pictures of what were invisible

(95a) can be treated as a standard ECP effect. But, if pied piping is what allows the grammar to finesse subjacency effects at LF then (95b) should be structurally identical to (95a) at LF. To avoid violating the subject condition we must pied pipe the whole embedded subject to Spec CP. But this should then leave the resultant phrase marker structurally identical to (95a). The apparent discrepancy in relative unacceptability is then left unexplained.

Fiengo et al. cite several other problems for the pied piping proposal. Consider the most serious one. As they observe, there is at best a tenuous relationship between overt pied piping and what is proposed for LF movement. As they note, acceptable pied piping varies considerably across construction types (in English). Appositive relatives seems freest while embedded questions resist most forms of pied piping. The proposal that subjacency effects are cancelled by pied piping must therefore assume very different restrictions on overt pied piping and its covert cousin. However, it is at best unclear what theoretical advantage there is to trading uniformity of Move  $\alpha$  for non-uniformity on pied piping conditions.

In sum, there are empirical problems with the pied piping proposal and the particular data that support it are not overly compelling (the fragment answer test). It is, therefore, unclear whether much compelling evidence exists from this domain for LF movement.<sup>40</sup>

Reinhart (1991) examines another construction, “exception” ellipsis (EE) (96), which bears on whether subjacency holds at LF.

(96) No one kissed his mother except for Felix

The argument is in three parts. First, Reinhart argues that in EEs the *except* remnant must be associated with another NP to be licit. In particular, one cannot interpret (96) as in (97) as the latter makes no sense. Thus, at some level, the *except* phrase and *no one* form a constituent in (96).

(97) No one kissed his mother except Felix kissed his mother

Second, Reinhart argues that EEs are not DS units with the *except* clause moving by extraposition to its SS position. For example, (96) is not derived from (98) via extraposition.

(98) No one except for Felix kissed his mother

The argument for this conclusion traces the differences between overt extraposition and EEs.

(99a) \*The editor agreed to publish many reviews when we pressed him [about this book]

(99b) The editor did not agree to publish anything when we pressed him except one short review

(100a) \*Jokes about everyone were told [who went to school with me]

(100b) Jokes about everyone were told except for Felix

In (99), the PP is extraposed and the result is unacceptable. The EE analogue, in contrast, is fine. In (100a), extraposition is blocked, as it usually is from a strongly quantified NP, but the EE analogue is once again acceptable.

Reinhart proposes that in EEs the *except* clause and the NP it is semantically related to form a constituent at LF. For example, in (97), QR raises *no one* and

adjoins it to the remnant *except for Felix* forming a single LF operator. This sets the stage for the third leg of the argument. Reinhart argues that this instance of QR is subject to subjacency. Two facts are relevant. First, Reinhart argues that EEs can be unbounded – (101). Second, she provides evidence that islands block the construction – (102).

(101) Lucie admitted that she stole everything, when we pressed her, except the little red book

(102) \*The fact that everyone resigned got much publicity except the defence minister

The *when* adverbial phrase is taken to mark the end of the matrix clause in (101). If so the *except* remnant is not in the same clause as its correlate *everything*. This indicates that QR can move *everything* successive cyclically so that it can adjoin to the remnant. (102) indicates that this movement is bounded and cannot take place out of complex NPs.

In sum, given that the correlate and remnant in EEs must form a constituent for interpretive reasons and given that they are unable to do so at DS then they must do so at LF. Given that this association can be unbounded but is blocked by islands, subjacency is implicated.

There are problems with the analysis, however. First, it is not clear that all islands block EEs. Consider the following WH-island violation.<sup>41</sup> There is a clear discrepancy between the case of overt movement in (103a) and the LF version in (103b). To my ear, the contrast is very sharp. This is unexpected given Reinhart’s analysis.

(103a) \*What did you say how we might get t to Felix

(103b) Bill told us how we might get the diamonds to Felix, when I asked him, but not the money

Second, Brody (1993) makes two important points against the analysis. He suggests that examples like (101) are misleading. *Pace* Reinhart, he proposes that the *except* remnant is associated with the embedded clause and that a stylistic reordering process allows the *when* adjunct to be interpolated. To bolster this observation Brody notes that when material that is less easily interpolated is used to mark the matrix clause boundary, unacceptability results. In (104), *to our friends* is an indirect object argument which has been extraposed from immediately after *admitted* to sentence final position. The resulting EE is considerably less felicitous than those Reinhart cites.

(104) \*John admitted that Mary stole everything to our friends except the diamonds

Brody further correctly notes that the constructed LF quantifier cannot take scope over a matrix indefinite. In (105), *everything except the car* cannot take scope over *someone*. But this too is unexpected if as Reinhart proposes it hangs so far up. The analysis requires that at LF, *everything except the car* forms a

constituent hanging from the matrix IP. This should permit it to take scope over *someone*, contrary to fact.

(105) Someone will admit that we stole everything, if you insist, except the car

One further point. If EEs are formed by LF movement we would expect them to be subject to the ECP. However, EEs do not seem to display subject/object asymmetries.

(106a) John didn't admit that Bill saw anyone, when I pressed him, except for Frank

(106b) John didn't admit that anyone was missing, when I pressed him, except for Frank

Taken together, these observations weaken the claim that EEs are formed via an operation like Move  $\alpha$  subject to subjacency.

In this section, I have reviewed the standard arguments in favor of restricting LF movement by subjacency. The evidence, I believe, is inconclusive. The place of subjacency in a Minimalist theory is addressed in chapters 8 and 9.

### 3

## More on LF

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Chapter 2 reviewed the standard arguments in favor of postulating an LF level to grammatically encode the semantic properties of natural language sentences. This chapter presents more recent proposals.

The first part reviews Aoun and Li's theory of relative quantifier scope. To my knowledge, it is the only extant GB-style theory that systematically attempts to cover the intricacies of quantifier/quantifier scope interactions and WH/quantifier scope interactions in both English-type languages and East Asian languages like Chinese. The theory draws the right empirical distinctions by subtly exploiting the resources of an ECP-centered approach to the structure of LF. The aim is to review the details of this effort to better appreciate the scope and limits of GB-style, ECP-centered approaches of LF.

The second part of this chapter reviews recent work by Fiengo and May on ACD constructions. I review the rather impressive evidence that they marshal for the conclusion that VP elision sites manifest syntactic structure. In particular, the interpreted VP gaps are subject to various kinds of grammatical conditions.

### 1 Relative Quantifier Scope

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#### 1.1 Aoun and Li (1989)

Chapter 2 noted that QR can be used to represent the relative scope of quantified expressions. The ambiguous sentence (1a) has either of the representations (1b) or (1c), depending on whether QR applies first to the object or the subject.

(1a) Someone tried every dish

(1b) [[Every dish<sub>i</sub> someone, [t<sub>j</sub> tried t<sub>i</sub>]]]

(1c) [Someone, [every dish<sub>i</sub>, [t<sub>j</sub> tried t<sub>i</sub>]]]

Additional evidence in favor of this QR approach to representing quantifier scope ambiguities comes from observing that certain instances of QR display apparent ECP effects in ECM (Exceptional Case Marking) constructions.

- (2a) Someone expects every Republican to win reelection  
 (2b) Someone expects every Republican will win reelection

The examples in (2) contrast in that only the first allows the embedded universally quantified subject to have scope over the matrix indefinite. Chapter 2 shows that this follows if the ECP is assumed to limit the movement of the embedded quantified NP (QNP) in (2b). The trace left by QR-ing *every Republican* to the matrix clause so that it can enjoy semantic scope over *someone* violates the ECP in the LF structure underlying (2b) but not (2a).

Aoun and Li (1989) consider additional properties of relative quantifier scope. They concentrate on an important difference between English and Chinese as regards the ambiguity of sentences with multiple quantifiers. The facts are as follows. In English, QNPs in the same clause typically allow differential scope interpretations, as in (1). In Chinese, however, no similar ambiguity obtains. The Chinese sentence (3) only has a reading where the subject QNP takes scope over the object.<sup>1</sup>

- (3) Yaoshi liangge ren zhaodao meige xiansuo  
 If two men found every clue

Observe that the English gloss is ambiguous, unlike its Chinese translation.

This contrast between English and Chinese is discussed in Huang (1982). Huang here proposes that in Chinese, in contrast to English, LF scope is isomorphic to SS c-command relations. Thus, in (3), *liangge ren*, the subject, must take scope over *meige xiansuo*, the object. Aoun and Li's theory tries to account for why this might be so in the cases that Huang discusses.<sup>2</sup>

In addition, Aoun and Li expand the data set considerably. They note that the data as described by Huang for Chinese are not quite right. Nor, for that matter, is the typically accepted description of English. In particular, it appears that there are constructions that permit non-SS scope order in Chinese and there are constructions that require SS scope order in English. In Chinese, passive appears to permit scope ambiguities, while in English double object constructions the relative quantifier scope reflects SS order.

- (4a) Yaoshi liangge xiansuo bei meigeren zhaodao  
 If two clues by everyone found  
 (4b) John assigned someone every problem

The Chinese (4a) is ambiguous and there can be a different two clues for every person despite the fact that *liangge xiansuo* c-commands *meigeren zhaodao* at SS. In the English (4b) *someone* must take scope over *every problem*. Thus, there are contexts in which Chinese acts like English and vice versa. The question is why.

The Aoun and Li answer has two parts. They propose a condition on LF that forbids nested quantifiers, the Minimal Binding Requirement (MBR) – (5) – and a Scope Principle (SP) to accommodate possible ambiguity – (6).

- (5) MBR: Variables must be bound by the most local potential A'-binder  
 (6) SP: a quantifier A has scope over a quantifier B if A c-commands a member of the chain containing B

What do these two principles say? The MBR forbids phrase markers with multiple fronted quantifiers. Thus, LF cannot have structures such as (7).

- (7)  $Q_i Q_j [\dots]$

Note that it is irrelevant for the MBR whether the quantifier variable structures are nested or crossed. Multiply stacked QNPs are always barred as they violate the MBR.

The MBR makes it impossible to represent the readings in which object QNPs take scope over subject QNPs in the standard way. The LF in (1b), for example, violates the MBR. Aoun and Li use the SP to accommodate these readings. SP introduces the notion of chain scope. It is not QNPs that scopally interact but their chains. In particular, if any part of a chain A is c-commanded by any part of a chain B the quantified heads of the A'-chains are in a potential scope relationship. For example, in a structure like (8), either  $Q_i$  or  $Q_j$  can be interpreted as taking scope over the other. The chain consisting of  $Q_i$  and its traces c-commands some part of the chain headed by  $Q_j$  and its traces and vice versa. Thus either  $Q_i$  or  $Q_j$  can take scope over the other.

- (8)  $Q_i [\dots t_i \dots Q_j [\dots t_j \dots t_j \dots]]$

With these principles in play, LF phrase markers do not fully disambiguate relative quantifier scope (similar to May 1985). Rather, the grammar determines a family of permitted scope relations and extra grammatical factors specify a particular choice from within this group.<sup>3</sup> Let us consider some details.

The MBR accounts for the lack of ambiguity by forbidding quantifiers to stack. The trick is to explain why it is that ambiguity is ever possible given that relative scope cannot be represented in terms of the immediate c-command relations of QNPs after QR. What Aoun and Li (1989) suggest is that where quantificational ambiguity exists it is because there is a trace in the scope of an operator. For example, in (8) above,  $t_i$  is c-commanded by  $Q_j$ . Given the MBR, this trace  $t_i$  cannot be a variable as these must be locally A'-bound and  $Q_j$  is a more proximate potential binder than is  $Q_i$ .<sup>4</sup> So what must obtain in a structure like (8) is something like (9) where an NP trace (not a variable) is c-commanded by the lower  $Q_j$ .

- (9)  $Q_i [\text{vbl-}t_i [Q_j [\text{NP-}t_j \text{vbl-}t_j]]]$

In this configuration,  $Q_j$  can have scope over  $Q_i$  because it c-commands the NP-t. In addition, this structure does not violate the MBR because NP traces are not subject to this principle. Only variables are.

This is the mechanics. How can it be used to distinguish English from Chinese? Aoun and Li (1989) suggest that English has VP internal subjects but

that this is not so in Chinese. The reason they propose for this parametric difference is that Chinese has weak Infl. This prohibits raising the subject to Spec IP. A weak Infl prevents subject raising from VP internal position to Spec IP on the (*Barriers*) assumption that V-raising (at least by LF) is required to L-mark the VP and thereby deprive it of barrierhood status. Without V-raising the VP remains a barrier and blocks A-movement from Spec VP to Spec IP.<sup>5</sup> English has the LF structure (10a) while Chinese has the structure (10b). The absence of a VP internal NP trace, the residue of raising the subject from VP internal position to Spec IP, prohibits Chinese from having the interpretation where the object QNP has scope over the subject.

- (10a) [<sub>IP</sub> QNP<sub>i</sub> [<sub>IP</sub> vbl-t<sub>i</sub> [<sub>VP</sub> QNP<sub>j</sub> [<sub>VP</sub> NP-t<sub>i</sub> ... vbl-t<sub>i</sub>]]]]]  
 (10b) [<sub>IP</sub> QNP<sub>i</sub> [<sub>IP</sub> vbl-t<sub>i</sub> [<sub>VP</sub> QNP<sub>j</sub> [<sub>VP</sub> ... vbl-t<sub>i</sub>]]]]]

Aoun and Li claim that a structure similar to (10b) shows up in English double object constructions. They analyze these as VP small clauses. There is no NP-t in the VP small clause and hence the object cannot have scope over the indirect object. The SS of (11a) is (11b) and the LF is (11c). In the latter, no i-indexed NP-t is c-commanded by any member of the j-indexed chain. As such, the universal quantifier cannot be interpreted as taking scope over the existentially quantified indirect object.

- (11a) John gave someone every book  
 (11b) [John [<sub>VP1</sub> gave<sub>i</sub> [<sub>VP2</sub> someone [<sub>e</sub>, every book]]]]]  
 (11c) [John [<sub>VP1</sub> gave<sub>i</sub> [<sub>someone</sub><sub>i</sub> [<sub>VP2</sub> vbl-t<sub>i</sub> [<sub>every book</sub><sub>j</sub> [<sub>e</sub>, vbl-t<sub>i</sub>]]]]]]]

Consider now Chinese passive constructions. They permit quantifier scope ambiguities. This is to be expected on the Aoun and Li analysis because in passive phrase markers there is an NP-t in VP object position. The structure of (12a) at LF is (12b).

- (12a) Yaoshi liangge xiansuo bei meigeren zhaodao  
*If two clues by everyone found*  
 (12b) ... [liangge xiansuo<sub>i</sub> [<sub>vbl-t</sub><sub>i</sub> [<sub>meigeren</sub><sub>j</sub> [<sub>bei vbl-t</sub><sub>i</sub> [<sub>zhaodao NP-t</sub><sub>j</sub>]]]]]]]

Aoun and Li observe that this analysis to relative quantifier scope also handles the ambiguity of (13). The NP-t left by subject raising affords the embedded quantifier the opportunity to take scope over the matrix indefinite.

- (13a) Someone seems to have attended every rally  
 (13b) [Someone<sub>i</sub> [<sub>vbl-t</sub><sub>i</sub> seems [<sub>every rally</sub><sub>j</sub> [<sub>NP-t</sub><sub>i</sub> to have attended vbl-t<sub>j</sub>]]]]]

It is not clear, however, whether this is a good result. The reason is that Aoun (1982) provides evidence that lowering seems to be blocked in certain configurations. For example, in (14) the higher reflexive forces the existential matrix subject to take scope over the embedded universal.

- (14) Someone seems to himself to have attended every rally

These data suggest that an analysis in terms of lowering (see Aoun 1982, May 1985) is more empirically adequate. The lack of scope ambiguity in (14) follows from the Binding Theory (BT) if it holds at LF. One cannot lower because there will be an unbound anaphor left behind.

The SP cannot similarly accommodate the lack of ambiguity. The LF structure of (14) is (15). Observe that the embedded NP-t<sub>i</sub> is still c-commanded by *every rally*<sub>j</sub>. This should allow the universal QNP to take scope over the matrix subject.<sup>6</sup>

- (15) [Someone<sub>i</sub> [<sub>vbl-t</sub><sub>i</sub> seems to himself<sub>i</sub> [<sub>every rally</sub><sub>j</sub> [<sub>NP-t</sub><sub>i</sub> to have attended vbl-t<sub>j</sub>]]]]]

Curiously, Aoun and Li note the absence of analogous ambiguities in Chinese raising constructions. Quantified NPs in Chinese raising constructions reflect their SS c-command relations.

- (16) Yaoshi liangge ren keneng kandao meigeren  
*If two men likely see everyone*

Thus, in (16) *liangge ren* must take scope over *meigeren*; this, despite the fact that after raising (16) has the structure (17a). This phrase marker supports the LF (17b) which should allow the embedded universal to take scope over the matrix existential in accord with the SP.

- (17a) [liangge ren [<sub>keneng</sub> [<sub>t</sub><sub>i</sub> [<sub>kandao meigeren</sub>]]]]]  
 (17b) [liangge ren<sub>i</sub> [<sub>vbl-t</sub><sub>i</sub> keneng [<sub>meigeren</sub><sub>j</sub> [<sub>NP-t</sub><sub>i</sub> [<sub>kandao t</sub><sub>j</sub>]]]]]]]

This reading, however, is impossible in Chinese.

Aoun and Li argue that the absence of this scope reading is due to the fact that the lower NP trace is eliminated as the result of a restructuring rule that raises the embedded predicate (*kandao*) to form a single complex predicate (and thereby a single sentence) at LF. The reason for the obligatory restructuring is, once again, the absence of V to I raising in Chinese. Without it, raising the embedded subject to matrix subject position encounters barrierhood problems. Without V to I raising, the matrix VP fails to be L-marked and so is not porous. Thus, the VP dominating the subject is a barrier to A-movement. Without reanalysis to remove the offending NP-t, then, ECP problems ensue.

This solution raises another puzzle, however. If it is correct, why do barrierhood problems not hold in simple cases of passive as well? Should the barrier status of VP not block passivization or require the trace in object position to delete? Were this to obtain, it would require alteration of the above account of the quantificational ambiguity of Chinese passives. There are, no doubt, possible technical ways of differentiating the passive and raising cases. However, given that Aoun and Li pursue another more principled alternative in Aoun and Li (1993a: Chapters 2, 3), I will not suggest any.

Aoun and Li (1989) consider one more case. They observe that in contrast

to the double object cases, the prepositional indirect object (PIO) constructions allow for quantifier ambiguities. Contrast the examples in (18).

- (18a) John gave someone every book  
 (18b) John gave something to everyone

I provided the structure of (18a) in (11c) above. The LF structure Aoun and Li propose for (18b) is given in (19).

- (19) Something<sub>i</sub> [John [<sub>VP1</sub> gave<sub>j</sub> [<sub>SC</sub> vbl-t<sub>i</sub> [<sub>VP2</sub> everyone<sub>k</sub> [<sub>VP2</sub> e<sub>j</sub> NP-t<sub>i</sub>] to vbl-t<sub>k</sub>]]]]]

Observe that *everyone<sub>k</sub>* has NP-t<sub>i</sub> in its c-command domain. It is thus possible to interpret *everyone* as taking scope over *something*. Note further that Aoun and Li crucially assume (following Larson 1988) that the object in PIOs A-moves to the small clause subject position. Without this movement, there could be no scope ambiguity as the MBR prevents the A'-chains formed via QR from interleaving. The same assumptions account for the Chinese data. As in English, double object constructions (20a) do not display quantifier scope ambiguities and PIOs (20b) do.

- (20a) Wo song sange ren neiben shu  
 I gave three men every book  
 (20b) Wo song sanben shu gei meigeren  
 I gave three books to everyone

To sum up, Aoun and Li (1989) advance a theory to handle the different relative quantifier scope facts in English and Chinese. The analysis is driven by two new principles, the MBR and the SP. In addition, various language-specific differences between English and Chinese are observed which lead to the different observed patterning of data. In particular, English, in contrast to Chinese, has VP internal subjects raising to Spec IP. In Chinese, Spec IP NPs are base generated. As expected, where raising to Spec IP is not at issue (i.e., in double object constructions) the two languages pattern identically.

Aoun and Li make use of an important ancillary hypothesis, the *Barriers* theory of A-chains and L-marking. The difference between English and Chinese is tied to the appalling weakness of Infl in Chinese. It is so weak that even LF V-raising to Infl is prohibited. This prevents the VP from being L-marked. It consequently acts as a barrier preventing A-movement across it.

As noted, this set of assumptions has some empirical problems, mainly in dealing with raising constructions. One virtue of the Aoun and Li (1993a) theory is that it does not encounter similar difficulties.

## 1.2 Aoun and Li (1993a)

Aoun and Li (1993a) present a revised theory of these quantifier scope ambiguities. They here eliminate all reference to NP-t traces in determining

relative quantifier scope. The SP still determines scope via chains but only the non-NP-t links count. Thus, X takes scope over Y just in case some part of X's A'-chain c-commands some part of Y's A'-chain.<sup>7</sup> This reformulation of the SP helps to solve many of the problems noted above, in particular the noted discrepancy between Chinese and English raising constructions.

Aoun and Li make several key technical assumptions in revamping their account. A key one is that they adopt an adapted Generalized Binding Condition (21).<sup>8</sup>

- (21) An A'-binder B is a potential antecedent for a variable V iff indexing B and V does not violate any grammatical principle e.g. principle C, the theta criterion, etc.

With (21) in mind, consider the basic cases. Aoun and Li adopt the *Barriers* prohibition on adjunction to expressions in theta marked positions.<sup>9</sup> They observe that this permits adjunction to NPs in non-theta positions. Exploiting this possibility, Aoun and Li postulate a rule of bare Q(quantifier) adjunction in which the quantifier in a QNP is adjoined to the NP that contains it. If one assumes that in English, Spec IP is a non-theta position (as it is if there is raising from a VP internal subject position) then it should be possible to adjoin a quantifier to this NP. A quantifier so adjoined has narrower scope than a quantifier adjoined to IP. (22) displays the envisioned structure at LF. Q<sub>i</sub> has adjoined to the subject NP in this case while Q<sub>j</sub> has adjoined to IP.

- (22) [<sub>IP</sub> Q<sub>i</sub> [<sub>IP</sub> [<sub>NP</sub> Q<sub>j</sub> [<sub>NP</sub> NP t<sub>j</sub> ... ] ... t<sub>i</sub> ... ]]

This gets the correct c-command relationships among QNPs. For illustration consider the example in (23a).

- (23a) Some student attended every class  
 (23b) [<sub>IP</sub> Every<sub>i</sub> [<sub>IP</sub> [<sub>NP</sub> some<sub>j</sub> [<sub>NP</sub> t<sub>j</sub> student]] attended [<sub>NP</sub> t<sub>i</sub> class]]]  
 (23c) [<sub>IP</sub> Some<sub>j</sub> [<sub>IP</sub> [<sub>NP</sub> t<sub>j</sub> student] [<sub>VP</sub> every<sub>i</sub> [<sub>VP</sub> attended [<sub>NP</sub> t<sub>i</sub> class]]]]]

It has as a possible LF (23b). In (23b), *every* c-commands *some*. This is interpreted as giving *every* scope over *some*. In (23c), the opposite c-command relations hold and so the opposite scope relations obtain. In effect, Q-adjunction introduces an additional option to those made available by QR. It is possible to append a Q to its immediate QNP. The appended Q does not c-command outside the NP it is appended to. So, it fails to c-command the variable t<sub>i</sub> in (23b). This is crucial, for otherwise the structure is in jeopardy of violating the MBR. Note as well that the adjoined *some* immediately A'-binds the variable t<sub>j</sub>. Thus, adjoining *every* to IP does not induce an MBR violation either.

For Chinese, Aoun and Li continue to assume the absence of VP internal subjects.<sup>10</sup> In Chinese, therefore, Q-adjunction to the NP in Spec IP is not possible as the subject is a theta position. In effect, the analogue of (23b) is illicit in Chinese as the adjunction will lead to a theta criterion violation. However, the assumption that Spec IP is a theta position in Chinese active

sentences effectively prohibits scope ambiguities in these sentence types given that the only way to allow object QNPs to scope over subject QNPs is via a phrase marker like (22).

This route through the data obviates the need for invoking NP-t's to get the scope facts. This approach also implies that passive subjects in Chinese act like regular English subjects. In passives, the object is moved to Spec IP. This means that Spec IP is not a theta position in passives. As a result, Q-adjunction to the subject NP is permitted and the resulting scope ambiguities are possible.

Raising constructions are slightly more complex. Recall that in these constructions the raised quantified subject in Chinese must have scope over a lower QNP. The current approach can derive the difference between English and Chinese in a unified manner without invoking restructuring. To see this, assume that lowering can apply in either English or Chinese. The structure of a relevant raising construction prior to LF movement is (24).

(24)  $[_{IP} QNP_i \dots [_{IP} t_i \dots QNP_j]]$

If lowering applies in English, then adjunction to NP is allowed by the Q because the raising position  $t_i$  is not a theta position. Consequently, (25) is a licit LF structure in English after lowering and Q-adjunction.<sup>11</sup>

(25)  $[_{IP} t_i \dots [_{IP} Q_j [_{IP} [_{NP} Q_i [_{NP} t_i N']] \dots [_{NP} t_j N']]]]$

The structure (25) is banned in Chinese. The Q-adjunction to the NP in the embedded Spec IP position is prohibited as this is a theta position in Chinese. As a structure like (25) is necessary for getting scope ambiguities, its absence derives the Chinese scope facts in raising constructions without recourse to a restructuring process.

An additional benefit of this approach is that it allows Aoun and Li to account for the quantifier scope/binding correlation noted in (14). Lowering is prohibited from the matrix if this leaves an unbound anaphor. Thus, in cases such as (14), repeated here for convenience, the matrix subject must be interpreted as having scope over the embedded object.

(14) Someone seemed to himself to have attended every rally

In effect, the current proposal reduces the scope possibilities within raising constructions in both Chinese and English to whatever obtains within simple clauses. This is empirically the right result. In Chinese, there is no scope ambiguity in either while in English there is.

Aoun and Li introduce one further modification to their proposal. In addition to Q-adjunction (which they regard as obligatory) they postulate a rule of NP adjunction which moves a whole QNP to an A'-position.<sup>12</sup> This modification is prompted by the desire to accommodate the facts concerning antecedent-contained deletion (ACD) reviewed in chapter 2 above. If ACDs are licensed by moving the whole QNP out from under the VP then simply moving the Q from an object QNP will not suffice. As such, Aoun and Li

propose that whole QNPs can be moved prior to Q-adjunction. The problem is illustrated in (26). (26a) is the structure one gets without movement of the whole QNP. The problem that ACDs pose, as May (1985) observed, is that it is impossible to copy VP1 into the VP2 gap without regress. The only way to evade this problem is to move VP2 out from under VP1. QR, an operation that moves the entire QNP out, accomplishes this. Simple Q-adjunction does not. To accommodate these facts, Aoun and Li assume an analogue of QR which can adjoin an entire QNP to some A'-position prior to Q-adjunction. A structure like (26b) is thereby derivable.

(26a)  $[_{NP} [_{VP} Q_i [_{VP} V [_{NP} t_i [_{rc} \dots [_{VP} e] \dots ]]]]]]$

(26b)  $[_{NP} [_{VP} [_{NP} Q_j [_{NP_i} t_j N' [_{rc} \dots [_{VP} e]]] [_{VP} V t_i]]]]]$

In contrast to Q-adjunction, NP movement is optional. It must apply prior to Q-adjunction if the NP to which the Q adjoins is in a theta position. Thus, in Chinese, the structure of a transitive clause is the one in (27a). English can have the structure (27b). The latter is prohibited in Chinese given the thematic status of Spec IP in Chinese. The possibility of Q-adjunction in English to the QNP in Spec IP is what permits the scope ambiguity in English that is prohibited in Chinese. The thematic status of Spec IP in Chinese forces the subject to adjoin to IP before Q-adjunction can take place. This, in conjunction with the MBR, restricts the object QNP from adjoining to IP and taking scope over the subject.

(27a)  $[_{IP} [Q_i [t_i N']]_i [_{IP} t_i [_{VP} [Q_j [t_j N']]_j [_{VP} V t_i]]]]]$

(27b)  $[_{IP} [Q_j [t_j N']]_j [_{IP} [Q_i [t_i N']]_i [_{VP} t_i [_{VP} V t_i]]]]]$

Observe two final points. Q-adjunction leads to a representation in which the NP acts as a restrictor on the Q. This is similar in spirit to the May QR rule and the proposal in Heim (1982) that we syntactically distinguish a quantifier's restrictive scope and its nuclear scope. However, though this is Aoun and Li's stated intent, the structure in (27b) differs from (27a) in a crucial respect which somewhat undermines this proposal. (27a) has two exposed variables bound by the quantifiers  $Q_i$  and  $Q_j$ , the ones exposed via Q-adjunction within the restrictive N's and the ones due to QNP adjunction that sit in the case-marked theta positions Spec IP and [NP, VP] respectively. In (17b), this still holds true for  $Q_j$  but not for  $Q_i$ . The latter binds only one variable, the one exposed via Q-adjunction. It is crucial to this analysis that the trace in Spec VP not be a variable. The reason is that if it were, it would have to be A'-bound. This in turn would require that Spec IP be an A'-position or that the adjoined  $Q_i$  c-command the trace in Spec VP. However, if either of these options obtained, then the postverbal variable  $t_j$  would violate the MBR. Whatever bound the variable in Spec VP, be it the QNP in Spec IP or the adjoined Q, would be a closer A'-binder for  $t_j$  than QNP<sub>j</sub> which is adjoined to IP. Therefore, it is crucial to assume that the trace in Spec VP is an NP-t not subject to the MBR. But if it is, then an important structural asymmetry obtains between Chinese and English. The latter syntactically offers fewer variables than the former for the

purposes of representing the meaning of quantified sentences. This in turn suggests that the interpretation of quantification is rather different in the two types of languages. This is an unintended (and unwelcome) consequence of this version of the analysis.

Second, the semantic scope of the Q is not what it c-commands but what the NP it is adjoined to c-commands. This is important, for otherwise the relative c-command positions of the QNPs would not contribute to determining relative quantifier scope. It is also crucial to this analysis that the adjoined Q *not* c-command out of the NP it is adjoined to. In other words, it is a part of this analysis that c-command is not defined in terms of exclusion. If it were, (27b) would violate the MBR as  $Q_i$  would be a more proximate A'-binder to the variable trace in post-V position than would the QNP adjoined to IP. Curiously, then, though Q-adjunction is essential to the analysis, it does not directly contribute to the structural determination of quantifier scope. The relationship is more indirect. Q-adjunction forces QNP movement in particular circumstances and it is QNP c-command relations that determine relative quantifier scope.

Despite these caveats, the approach is very attractive in that the format eventually attained is semantically reasonable (at least most of the time). There is a rather obvious relationship between the semantics of these constructions and their logical form. Furthermore, we have eliminated use of NP-t's as part of the chain that determines scope. NP-t's are unnecessary for the representation of relative quantifier scope.

## 2 The Relative Scope of WHs and Quantifiers

### 2.1 The Problem

Aoun and Li (1993a) consider a further question: do variables play a role in relative scope or are they, like NP traces, irrelevant as well? This question relates to a comparative set of data bearing on certain subject/object asymmetries in LF that we introduced in chapter 2.

May (1985), we recall, observes the following contrast.

(28a) What did everyone say

(28b) Who said everything

In (28a) the subject can have scope over the WH whereas this is not possible in (28b). Why not? May's answer is that we are witnessing a typical ECP effect here similar to the ones evident in superiority cases such as (29).

(29) \*What did who say

The reasoning is as follows. May makes use of two principles. First, he assumes that the ECP holds at LF. Second, his analysis invokes a scope principle which

says that elements dominated by all the same maximal projections are freely ordered with respect to each other scopally. Given this, consider the relevant structures.

The LF of (28b) (if the pair-list reading is desired) requires the scope order in (30). With the universal quantifier adjoined to IP, it is not excluded by IP and so it c-commands the WH in CP. This allows it to take scope over the WH.

(30)  $[_{CP} \text{Who}_i [_{IP} \text{every}_j [_{IP} t_i \dots t_j]]]$

However, May proposes that this structure violates the ECP and so is ill-formed. The subject is assumed not to be locally A'-bound. The only grammatically legitimate LF is (31).

(31)  $\text{Who}_i [_{IP} t_i [_{VP} \text{every}_j \dots t_j \dots ]]$

Here *every* has adjoined to VP. However, in this structure, the universally quantified NP and the WH are not in the same scope domain as IP dominates the Q but not the WH.<sup>13</sup>

Contrast this with the structure of (28a).

(32)  $\text{What}_i [_{IP} \text{every}_j [_{IP} t_i \dots [_{VP} \dots t_i]]]$

Here *every* and *what* share the same projections and so can have either relative scope. Furthermore, the ECP is not relevant as the subject trace is locally A'-bound.

Aoun and Li (1993a) object to this account on two grounds. First, they observe that the ECP does not hold in Chinese, i.e. there are no subject/object asymmetries. Thus, in Chinese either a subject or an object can be extracted out of a WH-island equally well as Huang (1982) pointed out. (33a) has both the interpretation (33b) in which the WH-object has matrix scope or (33c) in which the subject does.

(33a) Ta xiang-zhidao shei mai sheme

He wondered who buy what

(33b) What did he wonder who bought

(33c) Who did he wonder what bought

Nonetheless, the contrast observed in May (1985) for English, holds in Chinese as well. (34a) can support a pair-list reading while (34b) cannot.

(34a) Meigeren dou maile sheme

Everyone all buy what

"What did everyone buy"

(34b) Shei maile meige dongxi

Who buy every thing

"Who bought everything"



They further point out that there are problems with May's scope principle. Once again, consider the data that Aoun and Li discuss concerning relative quantifier scope. How does May's scope principle account for the fact that Chinese active sentences with two Qs are unambiguous? The only way to track these facts is to forbid QR from raising QNPs to IP in these cases. The problem, of course, is why such raising is not forbidden in passives. Thus, the Chinese facts seem to indicate that the scope principle in May (1985) is empirically inadequate.

We have seen above how Aoun and Li accommodate these data. The MBR provides the relevant restrictions if the technicalities discussed above are adopted. However, there is a problem with this solution to the relative quantifier facts when extended to the WH/quantifier interactions. In particular, how does one represent the ambiguity in (28a)? The natural suggestion is (32). But is (32) not a violation of the MBR? Aoun and Li say it is not but seeing why not requires a digression into the theory of Generalized Binding.

## 2.2 Generalized Binding and Variable Types

Aoun (1985, 1986) proposes an analysis of ECP effects in terms of a theory that extends notions familiar from A-binding to the A'-domain. In particular, Generalized Binding proposes two kinds of variables. In the unmarked case, variables are "anaphoric." A(naphoric) - variables must be locally A'-bound within their domains. Typical A-variables are those left by the movement of WHs such as *how*, *why*, and the standard QNPs such as *everyone*, *someone*, *two books*, etc.

There is a second class of variables. These are typically left by WHs such as *who*, *what*, *where*, and *when*. They are different from simple anaphoric variables in that their domains are determined more indirectly. In particular, the licensing of these variables is accomplished by considering possible coindexations and seeing whether these conform to principle C. To get a feel for the system, consider the Generalized Binding approach to superiority effects.

(35a) Who bought what

(35b) \*What did who buy

(36a) [[What<sub>i</sub> [who<sub>j</sub>]<sub>i</sub>] [<sub>t<sub>i</sub></sub> Agr<sub>i</sub> bought <sub>t<sub>j</sub></sub>]]

(36b) [[Who<sub>i</sub> [what<sub>j</sub>]<sub>i</sub>] [<sub>t<sub>i</sub></sub> Agr<sub>i</sub> bought <sub>t<sub>j</sub></sub>]]

The central notion is that of A'-binding. The idea is that a variable must be A'-bound in its domain. The domain of a standard A-variable is the smallest one that contains a SUBJECT. SUBJECTs, following Chomsky (1981), include [NP, NP], [NP, IP], and Agr. In effect, SUBJECTs are the most prominent nominal expressions in NPs and clauses. Agr features are assimilated to other nominal expressions in just being bundles of phi-features.

In addition to A-variables, there are A/C-variables. The domain of an A/C-variable is the smallest NP or clause where it has an accessible SUBJECT. A

SUBJECT is accessible for an A/C-variable just in case indexing it and the A/C-variable does not violate principle C.

Assume that the variables in (36) are A/C-variables. Consider now their domains. In (36a), the domain of  $t_i$  is the matrix clause. It is indexed with the Agr node as it agrees with it. This indexing does not violate principle C or agreement would never be possible. This licit indexing leaves the matrix clause as the domain of this variable. Note that  $t_i$  is A'-bound within the matrix clause by *who<sub>i</sub>* in CP.

What of  $t_j$ ? It does not have  $t_i$  as an accessible SUBJECT as coindexing the two variables would violate principle C. Both are R-expressions and the subject c-commands the object. Indexation with the Agr, another (SUBJECT) is no better. The reason is that Agr is coindexed with  $t_v$ , a reflex of agreement, and so a principle C violation would ensue given the transitivity of coindexation. Hence, the object variable has no domain and so need not be A'-bound.<sup>14</sup> In fact, it is not A'-bound as *what<sub>j</sub>* does not c-command the variable. Nonetheless,  $t_j$  meets the requirements of Generalized Binding. It is A'-bound in its domain for the simple reason that  $t_j$  has no domain.

Consider now (36b). The binding domains of  $t_i$  and  $t_j$  are the same as in (36a). The difference is that  $t_j$  which need not be bound is, while  $t_i$  which must be is not. Therefore, the phrase marker is illicit and the corresponding superiority effect obtains in (35b).

To recap. Central to the theory of Generalized Binding is the postulation of at least two kinds of variable types whose domains are determined in different ways. For an A (naphoric) - variable V, D is the domain for V, iff D is the smallest constituent containing V and D has a SUBJECT. For an A/C-variable V', D is a domain for V' iff D is the smallest constituent containing V' and a SUBJECT accessible to V'. A SUBJECT is accessible to V' iff it meets (21), i.e. indexing V' and the SUBJECT do not violate principle C. With these details in mind, let us return to the problem of WH/quantifier scope interactions given the MBR.

## 2.3 MBR and WH/Q Structures

Consider (32) repeated here for convenience.

(32) What<sub>i</sub> [<sub>IP</sub> every<sub>j</sub> [<sub>IP</sub> <sub>t<sub>j</sub></sub> ... [<sub>VP</sub> ... <sub>t<sub>i</sub></sub>]]]

The problem at hand is why this structure does not violate the MBR. The reason Aoun and Li (1993a) offer is that *every* is not a potential binder for  $t_i$ , as indexing the two would violate principle C. In other words, Aoun and Li invoke the theory of variable types in determining potential A'-binders. Given that *what* leaves behind an A/C-variable, its potential A'-binders are only those that are accessible under licit reindexation. With this, the reason that the universal quantifier in (32) does not trigger the MBR is that it is not a potential antecedent. Coindexing *every* and  $t_i$  violates principle C given the coindexation of *every* and  $t_j$ . Observe, further, that with the structure in (32) *every* can

take scope over *what* because the two A'-chains interleave. In particular, *every*, c-commands  $t_j$ .

Observe that with these assumptions, we can account for the unacceptability of the other May (1985) cases as well. Consider (28b) again, repeated here as (37a). To have the pair-list reading it would have to have the LF structure in (37b) in which the universal quantifier is taking scope over *who* or (37c) where it takes scope over the variable in Spec IP. In either representation, the chain headed by the universal quantifier c-commands some part of the A'-chain headed by *who*.

- (37a) Who said everything  
 (37b) [Everything<sub>i</sub> [ $t_j$  Agr<sub>j</sub> said  $t_i$ ]]  
 (37c) [Who<sub>j</sub> [everything<sub>i</sub> [ $t_j$  Agr said  $t_i$ ]]]

Both (37b, c) must be ill-formed. (37b) is straightforward. It violates the MBR. The variable  $t_i$  is an A-variable. Consequently, its potential A'-binders are determined independently of principle C. As such, *who* is a potential A'-binder for  $t_i$  and as it is closer than *everything*, the structure violates the MBR and so is ill-formed.

(37c) should also be ill-formed to derive the relevant data. However, here things are a bit trickier. It must be the case that the structure violates the MBR. It does if *everything* is a potential antecedent for  $t_j$ . The problem is that  $t_j$  is an A/C-variable and coindexing it and *everything* does violate principle C if we assume, as we have until now, that indexing is transitive. The violation comes about from the fact that *everything* is coindexed with the variable  $t_j$ . Hence indexing *everything* and  $t_j$  will violate principle C. Thus, *everything* should not be a potential antecedent for the subject variable and the structure should be well formed.

There are other ways, however, to interpret the potential antecedent requirement to get the correct results in this case. Consider the following option. We do not relativize the notion of potential antecedent as Aoun and Li do. Instead, assume (38).

- (38) Any variable must be minimally bound in its domain

The point of (38) is that if a variable must be bound in a domain, then it must be minimally bound within it. What we have done is pack the MBR into the theory of Generalized Binding. Adopting (38), we can rule out (37c). The subject A/C-variable  $t_j$  has a domain as indexing it an Agr (a SUBJECT) does not violate principle C. But given that it has a domain, it must be minimally bound within it. This fails as *everything* intervenes between it and *who*. An MBR violation results and the structure is ill-formed, as desired.

A similar account extends to the A-variable in (37b). Here  $t_i$  is an A-variable. Its domain is the clause it is in. It is not minimally bound within this clause given the intervening *who*. In sum, given (38), all works out well for English.

Unfortunately, this account cannot extend to Chinese, where, as Aoun and Li observe, similar data hold. The reason is due to the absence of Agr in

Chinese, which in turn accounts for the absence of subject/object asymmetries in Chinese (as compared with English). The LF structures of the Chinese analogue of (37a) are (39a, b).

- (39a) [Everything<sub>i</sub> [who<sub>j</sub> [ $t_j$  said  $t_i$ ]]]  
 (39b) [Who<sub>j</sub> [everything<sub>i</sub> [ $t_j$  said  $t_i$ ]]]

We can rule out (39a) as we did for English as an MBR violation. The problem is (39b). We cannot invoke (38) as we did in English, since in Chinese there is no Agr and so no subject/object asymmetries as regards domains. In neither case do the variables have domains. Hence in neither should they require minimal binders.

Aoun and Li suggest a remedy for this problem. They propose that not even variables play a role in assigning relative scope. Only the A'-links of an A'-chain are involved in determining relative quantifier scope. On this assumption, (37c) and (39b) are irrelevant. *Everything* does not c-command any A'-member of the chain headed by *who*. As such, it cannot take scope over *who*. The relevant structures are (37b) and (39a) which we saw violate the MBR.<sup>15</sup>

Aoun and Li provide additional empirical motivation for the proposed restriction of chain scope to A'-expressions. They point to the lack of ambiguity in cases such as (40a) and its Chinese counterpart (40b). Similarly (40c) and its Chinese counterpart (40d) are ambiguous.

- (40a) What do you wonder whether everyone saw  
 (40b) Ni xiang-zhidao meigeren shi-bu-shi doun kandao sheme  
 (40c) What do you think everyone saw  
 (40d) Ni xiang meigeren doun kandao sheme

If this is correct then we do not wish to have variables included in the determination of relative scope as there is a WH-variable in the embedded object position in both (40a, b) and (40c, d). To distinguish these, Aoun and Li propose that in the latter cases there can be a trace of the movement of the WH-operator appended to VP ( $t_{#i}$  in (41b)). This trace is antecedently governed from Comp. Antecedent government of a similar VP-adjoined trace is not possible in the second case. In short, in the second derivation, the relevant intermediate variable ( $t^*_i$  in (41a)) would have to be deleted and so there would be no A'-element of the chain headed by *what* c-commanded by any A'-member of the chain headed by the universal quantifier at LF. The relevant structures are provided in (41).

- (41a) What<sub>i</sub> [you wonder [whether [everyone<sub>j</sub> [ $t_j$  [<sub>VP</sub>  $t^*_i$  [<sub>VP</sub> saw  $t_j$ ]]]]]]]  
 (41b) What<sub>i</sub> [you think [ $t_j$  [everyone<sub>j</sub> [ $t_j$  [<sub>VP</sub>  $t_{#i}$  [<sub>VP</sub> saw  $t_j$ ]]]]]]]

It is a further virtue of this theory that it can account for the wide scope that the *every* phrase can have over the WH in (42a) without moving the *every* phrase to matrix position, in contrast to the analysis in May (1985).

- (42a) What did John say that everyone saw t  
 (42b) [<sub>CP</sub> What<sub>i</sub> [<sub>IP</sub> John say [<sub>CP</sub> t<sub>i</sub> that [<sub>IP</sub> everyone<sub>i</sub> [<sub>IP</sub> t<sub>j</sub> [<sub>VP</sub> t\*<sub>j</sub> [<sub>VP</sub> saw t<sub>j</sub>]]]]]]]]]]]

The LF is provided in (42b). The trace  $t^*$ , adjoined to VP is an A'-link in the A'-chain headed by *what<sub>i</sub>*. It is c-commanded by the IP adjoined *everyone<sub>i</sub>* (which is also in an A'-position). *Everyone* can thereby have *what* in its scope.

This is superior to the May (1985) analysis, for the sort of long movement from the finite subject position invoked there is generally unacceptable. This is demonstrated in the non-ambiguity of (43). Here, the *some* phrase must take scope over the *every* phrase. The alternative reading is not possible, as it should be if long movement from embedded finite subjects were possible.

- (43) Someone believes that everyone left early

Aoun and Li note that their analysis of the data in (41) invokes a Lasnik and Saito (1984, 1992)/*Barriers* approach to the ECP. It assumes that the intermediate trace adjoined to VP must be gamma-marked to be licit. This is possible in (41b) but not (41a) as the trace  $t^*$  is not antecedent-governed. Aoun and Li suggest that this intermediate illicit trace could be eliminated via Generalized Binding as well. However, if so, Generalized Binding will require some further articulation. The reason is that the intermediate trace has no domain on this approach as coindexing it and any SUBJECT would result in a violation of principle C (see Aoun 1985 for details).

Note, further, that the pair-list interpretations are hard to get in structures that do not have the same antecedent government problems. Neither example in (44) supports a pair-list reading.

- (44a) What don't you think everyone saw  
 (44b) What do you wonder whether John thinks everyone saw

These examples share a similar problem. The trace adjoined to lowest VP can be licensed from the local Comp position. As such it should allow the embedded *everyone* to take scope over the matrix *what*. However, this is not possible.

- (45a) [<sub>What<sub>i</sub></sub> [<sub>you n't think</sub> [<sub>t<sub>i</sub></sub> [<sub>everyone<sub>j</sub></sub> [<sub>t<sub>j</sub></sub> [<sub>VP t\*<sub>j</sub></sub> [<sub>VP saw t<sub>j</sub></sub>]]]]]]]]]]]  
 (45b) [<sub>What<sub>i</sub></sub> [<sub>you wonder</sub> [<sub>whether</sub> [<sub>John thinks</sub> [<sub>t<sub>i</sub></sub> [<sub>everyone<sub>j</sub></sub> [<sub>t<sub>j</sub></sub> [<sub>VP t\*<sub>j</sub></sub> [<sub>VP saw t<sub>j</sub></sub>]]]]]]]]]]]]]

This is significant for it is not clear why the intermediate trace  $t^*$  in the lower VP could not remain there, being gamma marked by the trace in the local Comp. This latter trace in Comp might have to delete, but nothing in the Lasnik and Saito/*Barriers* system prevents this from gamma marking  $t^*$  before deleting at LF. It appears that neg elements cause problems and it is not clear that they can be finessed using the Lasnik and Saito/*Barriers* theory.

Consider how a Generalized Binding theory might account for these data. As noted above, we must more fully specify the algorithm for determining a variable/trace's domain. The technical problem can be briefly summarized

as follows. It is not clear that the story that Aoun and Li tell can rule out the intermediate VP adjoined trace on Generalized Binding grounds. Consider how Generalized Binding accounts for the ambiguity of (46) on the new format.

- (46) What did everyone say

Aoun and Li would have to say there is VP adjunction by the WH-element and that the A'-trace left there is what permits the subject to have scope over the WH in Comp.

- (47) [<sub>What<sub>i</sub></sub> [<sub>everyone<sub>j</sub></sub> [<sub>t<sub>j</sub></sub> [<sub>VP t<sub>i</sub></sub> [<sub>VP say t<sub>j</sub></sub>]]]]]]]

Now what is it that prevents the universal QNP in subject position from being the minimal binder for the object WH-trace? It is because indexing the quantifier and the variable  $t_i$  would violate principle C. The quantifier is indexed with the subject  $t_j$  which c-commands  $t_i$ . Thus if  $t_i$  assumes *everyone's "j"* index we arrive at a principle C violation. Observe that the adjoined VP trace had better not block principle C or this account fails here.

Now consider the long movement cases Aoun and Li discuss. Does the adjoined trace  $t^*$  need an A'-binder? The algorithm says it does if indexing it and a SUBJECT would not violate any grammatical principle. But indexing it with any of the SUBJECTs *you* or  $t_j$  or the two Agr markers would violate principle C, just as above. The variable  $t\#_i$  is coindexed with  $t^*_i$  so if the "i" indices are changed to "j", a principle C violation should ensue.

- (48) [<sub>What<sub>i</sub></sub> [<sub>you<sub>k</sub> Agr<sub>k</sub></sub> wonder [<sub>whether</sub> [<sub>everyone<sub>j</sub> Agr<sub>j</sub></sub> [<sub>t<sub>j</sub></sub> [<sub>VP t\*<sub>j</sub></sub> [<sub>VP saw t\#<sub>j</sub></sub>]]]]]]]]]]]

There is a way around this problem. Assume that reindexing the trace  $t^*$  does not lead to reindexation of the variable  $t\#_i$  in embedded object position. In effect, each trace would be evaluated with respect to Generalized Binding independently of the other expressions it is in a chain relation with. Instead of changing all the "i" indices to "j" we just change the index of the element whose domain is being evaluated. If we assume this, and we assume that adjoined traces are not subject to principle C for their domain evaluations (they are not in argument positions), we can technically circumvent the current problem. The trace  $t^*$  in (48) must be bound in the lower clause. Indexing it (and it alone) with *everyone* does not lead to a principle C violation. The relevant structure for evaluating the domain of  $t^*$  is (49).

- (49) [<sub>What<sub>i</sub></sub> [<sub>you<sub>k</sub> Agr<sub>k</sub></sub> wonder [<sub>whether</sub> [<sub>everyone<sub>j</sub> Agr<sub>j</sub></sub> [<sub>t<sub>j</sub></sub> [<sub>VP t\*<sub>j</sub></sub> [<sub>VP saw t\#<sub>j</sub></sub>]]]]]]]]]]]

This elaboration of the indexing convention for domain evaluation will also work to solve the problems (45) raised. The principles of Generalized Binding apply to LF phrase markers. Hence they apply after deletion. This prevents intermediate traces from licensing their bindees (i.e. gamma marking them) and

then deleting. This effectively forces the gamma marker of an intermediate trace to remain at LF and itself become licensed. In (45), this means that the intermediate trace in Comp must be bound. We assume that Neg blocks this in a manner analogous to a WH in Comp, then the unacceptability of these cases follows. The relevant structures are provided in (50). To license  $t^*$  we require that  $\#$  locally bind it. But then  $\#$  must in turn be locally licensed. It cannot be. Hence it must be deleted. However, if it deletes, then  $t^*$  must delete as well as it cannot be locally licensed.

- (50a) [What<sub>i</sub> [you n't think [t<sub>#i</sub> [everyone<sub>j</sub> [t<sub>j</sub> [<sub>VP</sub> t<sub>i</sub><sup>\*</sup> [<sub>VP</sub> saw t<sub>i</sub>]]]]]]]]]  
 (50b) [What<sub>i</sub> [you wonder [whether [John thinks [t<sub>#i</sub> [everyone<sub>j</sub> [t<sub>j</sub> [<sub>VP</sub> t<sub>i</sub><sup>\*</sup> [<sub>VP</sub> saw t<sub>i</sub>]]]]]]]]]]]

In sum, we can derive the correct relative scope configurations in these cases given a revised version of Generalized Binding. Crucial to the result is that the principles of Generalized Binding apply at LF, that the MBR restricts LF phrase markers and that only A'-elements are relevant for computing relative quantifier scope.<sup>16</sup>

Before moving on, it is worth observing that there is currently no other theory that attempts to cover such a rich and complex empirical domain. The fact that the theory required to cover these data is intricate is in and of itself no ground for rejecting it. Furthermore, it is important to observe that many of the complications stem from elaborations of an A'-movement/ECP approach to issues of scope and quantification. Within GB-style theories, there are not many ways of reining in A'-movement operations except in terms of the ECP. Thus, if one represents quantification in terms of A'-movement there is little theoretical choice beyond elaborating the conditions on antecedent government, be this through the traces it applies to (e.g. to adjunct traces in one way, argument traces another), the domains it is effective in (e.g. domains defined in terms of barriers or SUBJECTs) or the mechanics of its applicability (e.g. gamma marking, binding at SS and LF or just at LF).

I mention this because there is a general perception that Generalized Binding is too baroque to be plausible. It is not clear to me that Generalized Binding is any more involved than theories of the *Barriers* variety, which also have their share of rococo definitions to allow blocking categories and barriers to function adequately. This said, it is not hard to agree that all ECP-centered theories including those in Aoun (1985, 1986), Aoun et al. (1987), Aoun and Li (1993a), Chomsky (1986a), Cinque (1990), Lasnik and Saito (1984, 1992), and Rizzi (1990) are technically very complex and often lack intuitive appeal. The relevant question is whether there are any empirically viable alternatives that do not suffer from overdue complexity. If the diagnosis above is correct, viz. that the complexity stems from treating scope in terms of A'-operations and the consequent elaboration of the ECP, then only rethinking these aspects of the problem is likely to lead to more elegant theoretical approaches. Starting in chapter 4, I elaborate a possible alternative approach to these LF problems cast within a Minimalist framework that dispenses with the A'/ECP approach to issues of scope.

### 3 Antecedent-contained Deletion (ACD)

Chapter 2 outlined the May (1985) analysis of ACDs and the implications for LF. May (1985) observes that if VP deletion is actually a copying rule of some kind then it requires a rule of LF for the correct target for copying to be produced. Fiengo and May (1990) detail the properties of the copied expression and consider what this tells us about LF. Let us review their proposal.

As noted in May (1985), if the ACD construction is an instance of VP deletion, then it is responsible to a level more abstract than SS.<sup>17</sup> Fiengo and May provide evidence for another interesting result. They observe that the interpreted elided material in ACDs conforms to principles of the Binding Theory (BT). For example, we observe something very much like principle C. Consider the contrast in (51).

- (51a) \*Mary introduced John<sub>i</sub> to everyone that he<sub>i</sub> did  
 (51b) Mary introduced John<sub>i</sub> to everyone that his<sub>i</sub> mother did

Fiengo and May note two things about this pair of sentences. First, the contrast is unexpected if SS is taken as the relevant level for satisfying the BT. In neither example would any principle of BT be contravened if *John* were antecedent of *his/he*. Second, they show that the contrast is straightforwardly accounted for once the elided material is copied into the VP gap. The structure of the sentences at LF prior to copying is (52).<sup>18</sup>

- (52a) [[Everyone that he did [<sub>VP</sub> e]]<sub>i</sub> [Mary [<sub>VP1</sub> introduced John to t<sub>i</sub>]]]  
 (52b) [[Everyone that his mother did [<sub>VP</sub> e]]<sub>i</sub> [Mary [<sub>VP1</sub> introduced John to t<sub>i</sub>]]]

If VP1 is copied into VP\* in the two LFs, we end up with the following relevant structure.

- (53a) ... that he introduced John to ...  
 (53b) ... that his mother introduced John to ...

Now it is clear why the contrast obtains. Principle C of the BT prevents *he* in (53a) from being coindexed with *John* because *he* c-commands *John*. Nothing prevents this coindexing in (53b). Hence, if elided material in ACDs must respect BT we derive the correct results.

This is a very interesting result for it argues to three very strong conclusions. First, that VP ellipsis actually involves copying of syntactic structure. Second, that the BT must apply at LF, i.e. after ACDs are interpreted. Third, that the BT cannot apply at SS. It should be clear how the second conclusion is supported by these data. The third simply reiterates the point that if binding conditions are optionally satisfiable at SS then there should be no difference between the two sentences. Both would allow *John* to be coindexed with the pronoun, contrary to fact. The first conclusion follows on the assumption that

the BT applies to phrase markers. If this is so, then elision must copy syntactic configurations.<sup>19</sup>

Fiengo and May also argue that there are bleeding relations with respect to principle C in ACDs. However, here the issues are less clear. Consider the examples in (54) that Fiengo and May cite.

- (54a) Mary always buys him whatever John's other friends do  
 (54b) Mary gave him for his birthday the same thing that John's mother did

In (54a) we appear to have a principle C violation if the indirect object pronoun *c*-commands the direct object. Fiengo and May argue that this is just an apparent violation as at LF, after QR, the whole QNP is no longer *c*-commanded by the indirect object. The same argument applies to (54b). If QR moves the definite description out of the VP at LF, then no principle C violation should ensue. The proposed structures for the two sentences are given in (55).

- (55a) [[Whatever John's other friends do [e]<sub>i</sub>], [Mary always buys him t<sub>i</sub>]]  
 (55b) [[The same thing that John's mother did]<sub>i</sub>], [Mary gave him for his birthday t<sub>i</sub>]]

There are problems with this argument, however. First, if QR appends QNPs to IP, then we should be able to evade the principle C effects in (56) as well. However, the sentences are clearly unacceptable.

- (56) He<sub>i</sub> likes every picture that Bill<sub>i</sub> does

To get around this problem, they suggest that QR is adjunction to VP in the unmarked case. It is not clear, however, what constitutes the marked case. With unstressed *he* the indicated coreference is never available so far as I can judge. Or consider a more complex case. The sentences in (57) seem to be tolerably acceptable multiple interrogative constructions one of whose WHs is also an ACD.

- (57a) Which book did John give to which person that Bill did  
 (57b) To whom did John give how many books that Bill did

These sentences, though complex, seem acceptable. An answer to the first might be "John and Bill each gave *Moby Dick* to Sharon." An answer to the second would be "John and Bill each gave six books apiece to Sue, Mary, and Helen." However, if we substitute *he* for *John* in these examples, it cannot be interpreted as coreferential with *Bill*. This despite the fact that the WH-*in-situ* moves to Comp to join the other WH at LF. The structure of (58) should permit a violation of principle C. However, the coreference is impossible.

- (58) [[[Which person that Bill<sub>i</sub> did]<sub>i</sub>], [which book]<sub>k</sub>] [he<sub>i</sub> gave t<sub>k</sub> to t<sub>i</sub>]]

Second, it is not clear that QR should be able to evade principle C even in the cases cited in (54). If we change the phrase that is moved and forget about

the ACD aspect, we find principle C effects once again. In (59), it should be possible to move the indirect object phrase containing *Bill* outside the *c*-command domain of the *him*.

- (59a) \*Mary always buys him<sub>i</sub> every portrait of Bill<sub>i</sub>  
 (59b) \*Mary gave him<sub>i</sub> Bill's<sub>i</sub> book  
 (59c) \*Mary showed him<sub>i</sub> every plan to kill Bill<sub>i</sub>

Indeed, there are well-known cases in which overt SS movement fails to obviate principle C. This despite the fact that the WH-phrase is in a position in which Fiengo and May suggest the principle should be obviated.

- (60) \*Whose claim that Bill<sub>i</sub> shot Sam did he<sub>i</sub> deny

These remarks do not account for why the examples in (54) seem to violate principle C. However, they cast doubt on the claim that the attenuation of this effect has much to do with QR.

Fiengo and May point out that the elided VP also meets other binding conditions. Principle B also holds.

- (61) \*Mary introduced him<sub>i</sub> to everyone that he<sub>i</sub> did

This contrasts nicely with (62) where this effect is not evident.

- (62) Mary introduced him<sub>i</sub> to everyone his<sub>i</sub> mother did

The LF structure of the pair is provided in (63).

- (63a) [Everyone that he<sub>i</sub> did [<sub>VP</sub> e = introduced him<sub>i</sub> to t]] [Mary introduced him<sub>i</sub> to t]  
 (63b) [Everyone that his<sub>i</sub> mother did [<sub>VP</sub> e = introduced him<sub>i</sub> to t]] [Mary introduced him<sub>i</sub> to t]

The binding in (63a) between *he* and *him* violates principle B in that *him* is not free in its domain. In (63b), in contrast, *his* does not *c*-command *him* so there is no principle B violation.

Fiengo and May further observe specified subject effects in ACD contexts.

- (64a) Mary introduced him<sub>i</sub> to everyone John<sub>i</sub> wanted her to  
 (64b) \*Mary introduced him<sub>i</sub> to everyone that she wanted John<sub>i</sub> to

The LF representations of these sentences are given in (65). It is clear from these that indexing *John* and *him* in (65a) should be fine. The intervening subject *her* functions to license the binding. In (65b), in contrast, the binding violates principle B. *John* and *him* are in the same domain and so binding is illicit.<sup>20</sup>

- (65a) [Everyone that John<sub>i</sub> wanted her to [e = introduce him<sub>i</sub> to t]] Mary introduced him<sub>i</sub> to t]
- (65b) [Everyone that she wanted John<sub>i</sub> to [e = introduce him<sub>i</sub> to t]] Mary introduced him<sub>i</sub> to t]

Fiengo and May observe that things are not as neat as this and they require an additional assumption to make the BT work out right in some relevant cases. Consider the following case of VP ellipsis and its LF representation after ellipsis interpretation.

- (66a) Mary loves John<sub>i</sub> and he<sub>i</sub>/John thinks that Sally does too
- (66b) ... and he<sub>i</sub>/John thinks that Sally does [love John<sub>i</sub>] too

The LF structure in (66b) should lead to a principle B violation. However, the second conjunct in (66a) is quite acceptable under the indicated interpretation.

To accommodate such cases, Fiengo and May introduce a notion of *vehicle change*. If two elements A, B are semantically coextensive except for their pronominal features, then they can be substituted for each other. For example, a pronoun can go surrogate for a name if the two are coreferential. The effect of vehicle change is to eliminate principle C effects in ellipsis. More specifically, only violations of principle C that are also violations of principle B will lead to ungrammaticality. To see an example of vehicle change consider (66b) once again. With vehicle change we can substitute a pronoun for *John* in the elided constituent. The LF structure is then (67). Observe that this LF configuration, with the indicated binding, is perfectly licit.

- (67) ... and he<sub>i</sub>/John<sub>i</sub> thinks that Sally does [love him<sub>i</sub>] too

Consider now a case of ACD and vehicle change. The sentence (68a) without vehicle change is expected to be unacceptable as it violates principle C (68b). With vehicle change it is well formed (68c). Contrast this with (69a–c) in which the sentence is ungrammatical even after vehicle change. (69c) violates principle B with the indicated coindexing.

- (68a) Mary introduced John<sub>i</sub> to everyone he<sub>i</sub> wanted her to [e]
- (68b) Everyone he<sub>i</sub> wanted her to [introduce John<sub>i</sub> to t] ...
- (68c) Everyone he<sub>i</sub> wanted her to [introduce him<sub>i</sub> to t] ...
- (69a) Mary introduced John<sub>i</sub> to everyone she wanted him to [e]
- (69b) Everyone she wanted him<sub>i</sub> to [introduce John<sub>i</sub> to t]
- (69c) Everyone she wanted him<sub>i</sub> to [introduce him<sub>i</sub> to t]

Vehicle change also leads to the elimination of WCO effects in ACD ellipsis:

- (70a) Mary introduced every boy to someone his mother did
- (70b) [Every boy<sub>i</sub> [someone<sub>j</sub> [his<sub>i</sub> mother did [introduce t<sub>i</sub> to t<sub>j</sub>] [Mary introduced t<sub>i</sub> to t<sub>j</sub>]]]

In (70b), *t<sub>i</sub>* and *his<sub>i</sub>* are in a configuration in which WCO is typically violated. However, if the variable *t<sub>i</sub>* is subject to vehicle change and rewritten as a pronoun, WCO effects should disappear.

Fiengo and May (n. 9) observe, however, that there is more to WCO than this. In (70b), even under vehicle change, we have a WCO configuration. The structure after vehicle change is (71).

- (71) [Every boy<sub>i</sub> [someone<sub>j</sub> [his<sub>i</sub> mother did [introduce pronoun<sub>i</sub> to t<sub>j</sub>] [Mary introduced t<sup>\*</sup><sub>i</sub> to t<sub>j</sub>]]]

Here too the original pronoun *his* and *pronoun*, the output of vehicle change, are in a WCO configuration with *t<sup>\*</sup><sub>i</sub>*. Nonetheless, no effect is evident.

Fiengo and May also provide evidence of subjacency effects in ellipsis sites.<sup>21</sup> They observe the contrasts in (72). The relevant structure of (72a) is provided in (73).

- (72a) \*Dulles suspected everyone who Angleton wondered why Philby did
- (72b) Dulles suspected everyone that Angleton believed that Philby did
- (72c) ?Who did Angleton wonder whether Philby suspected
- (73) Everyone<sub>i</sub> [who<sub>i</sub> [Angleton wondered [why [Philby suspected t<sub>i</sub>]]]

(73) plausibly violates subjacency. The trace *t<sub>i</sub>* is related to *who<sub>i</sub>* across a WH-island. They further note that the enhanced status of (72c) is also expected given that *whether* induces weaker subjacency violations than *why*.

However, as Fiengo and May observe, given vehicle change, it is not clear that we should find a subjacency effect at all. If the trace *t<sub>i</sub>* is changed to a pronoun under vehicle change there should be no effect of subjacency. To prevent this, they suggest that in a language like English, without resumptive pronouns, traces cannot rewrite as pronouns or we would expect no bounding effects at all. They cite the following English example in support of the ban against resumptive pronouns in English.

- (74) \*Who did Angleton wonder why Philby suspected him

However, a more relevant contrast would have been the relative clause version of this, which is considerably better than the WH-question.

- (75) The man who Angleton wondered why Philby suspected him

The relative acceptability of (75) suggests that the problem with (72a) is not the lack of resumptive pronouns in English. Rather, it would seem to indicate that these pronouns cannot be bound, i.e. have quantificational antecedents. Thus, note that the following is also not very felicitous.<sup>22</sup>

- (76) ??Everyone who Angleton wondered why Philby suspected him<sup>23</sup>

The Fiengo and May analysis is rich in its implications concerning the properties of LF. They provide very interesting arguments that VP elision sites have

the structure of phrase markers. They also supply evidence that the BT must apply after VP interpretation has taken place. This seems to suggest that it must apply at LF and cannot apply at SS. Chomsky (1993) has recently argued for a similar conclusion. We start to address these issues in chapter 4.

## 4 Conclusion

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Chapters 2 and 3 present the following portrait of LF. LF is a level of derivation essentially concerned with representing relative quantifier scope and pronoun-binding properties of sentences. Quantifiers effect their scope properties by moving to A'-positions either overtly prior to SS or covertly at LF. The principal grammatical condition that constrains these operations is the ECP (in one of its myriad formulations). In effect, LF is essentially the province of A'-syntax. The operations that provide the relevant phrase markers target A'-positions as landing sites and the principal condition that reins in this movement is the "antecedent government" part of the ECP, a condition principally interested in A'-relations. This picture of LF is reconsidered in the following chapters. The aim will be to cover the same ground reviewed here but using notions derived from the Minimalist program.

# 4

## Some Minimalist Background

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### 1 Where We Are

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The last two chapters sketched an approach to LF based on GB assumptions first advanced in Chomsky (1981). Several key ideas are at the center of the proposals surveyed.

First, there is a distinction between A and A'-bound empty categories. The latter are identified as variables. Variables are A'-bound by operators and are generally case-marked. The two relevant kinds of A'-positions are Spec CP, in which WH-operators reside, and adjunct positions (i.e. adjunction to any XP), to which non-WH quantified expressions move. The syntactic c-command relations between operators at LF mirrors the relative semantic scope these expressions enjoy. So, for example, if operator A c-commands operator B at LF then A has scope over B semantically. The discussion above reviewed variations on this basic theme. We observed that alternate versions of c-command yielded different scope options. May (1985), for example, allows operators all adjoined to the same XP to freely have scope over one another by providing a definition of c-command in terms of exclusion. Similarly, by calculating c-command in terms of chains headed by operators rather than the individual operators themselves, Aoun and Li (1989, 1993a) permit an operator A c-commanded by an operator B to still enjoy scope over B if a part of A's chain c-commands a part of B's.

These variations are motivated by the extended empirical coverage that they underwrite. However, despite the important empirical differences we have observed, the set of theories canvassed start from the common intuition that grammars distinguish operators (quantified noun phrases (QNP)) in A'-positions) and variables (A'-bound traces in A-positions) and that the syntactic distribution of these elements at LF is what underlies the semantic scope properties that QNPs enjoy. These proposals further adhere to the view that the syntax of LF intimately reflects the semantic powers of quantifiers. Semantically, quantifiers take propositions as arguments. Syntactically, QNPs are adjoined to, and thereby govern, the sentences that express these propositions at LF just as predicates govern the arguments they take. In effect, LF consists of various movements that adjust phrase markers so that a recursive truth definition (or its surrogate) can efficiently compute a semantic interpretation. The GB legacy is that these LF movements are largely adjunctions