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Quantification and locality

Basilico, David Anthony, Ph.D.
The University of Arizona, 1993

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QUANTIFICATION AND LOCALITY

by

David Anthony Basilico

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A Dissertation Submitted to the Faculty of the
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1993
As members of the Final Examination Committee, we certify that we have read the dissertation prepared by David Anthony Basilico entitled Quantification and Locality and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copy of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Dissertation Director

Date
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DEDICATION

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This dissertation develops a transformational theory of scope which is based not on the position to which an entire quantificational noun phrase (QNP) can move and adjoin but on the position and to which a quantificational determiner can move and adjoin. Following Heim (1982), a tripartite representation for sentences containing QNPs is adopted in which quantificational determiners move out of their containing noun phrases and adjoin to the sentence node at the level of Logical Form (LF). By utilizing this type of representation, asymmetries between the movement possibilities of a phrase and scope possibilities of a phrase can be captured.

This dissertation argues that movement of an operator is free but constrained by the operator acquiring the selection index of the phrase which it binds. The selection index is percolated up the tree in a series of local relationships (government, specifier/head and X-Bar). This index percolation is dependent on the ability of a syntactic head to acquire an index.

The necessity of this index percolation approach is demonstrated in the first chapter, which investigates the phenomenon of unselective binding between an adverbial operator and indefinite in restrictive 'if/when' clauses. It
shows that this relationship is sensitive to some syntactic islands but not others. It demonstrates that the index percolation approach is the best way to capture the selective island sensitivities of this phenomenon.

Additional motivation for this account is given in chapter two, which deals with internally headed relative clauses (IHRCs). Several parallels between IHRCs and restrictive 'if/when' clauses are noted. It shows that the binding of the internal head by the determiner associated with the IHRC is similar to the binding of an indefinite by an adverbial operator.

The next two chapters treat the phenomenon of partial Wh-movement. These chapters further show the application of the index percolation account because they argue that the relationships noted above between an adverbial operator and indefinite and operator and internal head are analogous to the relationship between a partially moved WH-Phrase and the sentence initial scope marker.

In chapter six, the scope of quantified possessive phrases in English is examined. This is a case where movement of a phrase and scope of a phrase sharply differ. The approach where the determiner of the possessive is moved alone, with index percolation from the phrase in the specifier position to the moved determiner, is shown to best handle these cases.
1.0 Introduction

In transformational theories, the representation of sentences which contain quantifiers, such as (1), involves movement and adjunction of the quantified noun phrase (QNP) to a position in which it can bind its trace which is left behind after movement (see, for example, May (1977, 1985)). The scope of the QNP is then defined as the nodes that the QNP c-commands. A possible LF representation of (1) is (2):

(1) Suzie enjoyed every morsel.
(2) \[ [CP [IP1 [every morsel]j [IP2 Suzie [VP enjoyed t3]]]]\]

Here, the QNP is adjoined to IP and binds its trace in object position. Its scope is everything dominated by IP₂, since it c-commands IP₂, following the Reinhart (1976) definition of c-command.

In the above theory, the scope of the quantifier is given by what the entire noun phrase c-commands. A somewhat different approach to the syntax of quantifier scope is given by Heim (1982, chapter 2). In her theory, sentences containing quantified noun phrases have a tripartite structure at LF. QNPs move from their s-Structure position and adjoin
to $S (=IP)$, as above, but there is also an additional rule of **Quantifier Construal**. This rule moves the quantifier alone out of the QNP which has been adjoined to $S$ and attaches it to $S$. The resulting LF structure for sentence (1) would be (3):

$$(3) [CP [IP_1 [every], [IP_2 [morsel]]_4 [IP_3 Suzie enjoyed t_4]]]$$

The tripartite structure consists of an operator (every), the restriction on this operator (morsel) and the rest of the sentence, which Heim terms the nuclear scope (Suzie enjoyed $t_3$).

Quantifier scope under this approach is given only by what the operator itself c-commands. Thus, in the LF structure for sentence (1) given by (3), the scope of the quantifier 'every' is everything that is dominated by $IP_2$.

These two approaches potentially make different predictions as to what the scope of a particular quantifier could be. In a theory which considers scope to follow from the position of the entire QNP, the scope of a quantifier will be limited to those positions which the noun phrase can possibly move to and adjoin. In a theory which admits of Quantifier Construal, the scope of a quantifier will be limited to those positions which the quantifier can possibly move to and attach. If these possibilities differ, then
different predictions are made for quantifier scope.

As an example of the different predictions which are made, consider a structure in which a quantifier occurs within a syntactic island (see (4)). Suppose that XP is a barrier\(^1\). The QNP will be able to move and adjoin to any maximal projection within XP (4a) but not outside of XP (4b). This is because the barrier XP would prevent the moved phrase from properly governing its trace left behind within XP (4b). In a noun phrase scope theory, the scope of a QNP which is limited to movement within XP should be contained within XP and not extend beyond XP.

On the other hand, suppose that Quantifier Construal is not subject to the same kind of locality requirement that movement of an entire noun phrase is subject to. This would mean that movement of the quantifier to a position outside of XP would be possible, and consequently its scope would extend beyond XP. The movement of the phrase would be limited to sites within XP, but the movement of the determiner would not be (4c). The scope of the quantifier would extend beyond XP:

\[
\begin{align*}
(4)a & \ [yp \ [xp \ [zp \ [QNP]_3 \ [zp \ \ldots t_3 \ldots]]]] \\
\ & \ [yp \ [xp \ [zp \ [QNP]_3 \ [zp \ \ldots t_3 \ldots]]]] \\
\ & \ [yp \ [Q]_3 \ [yp \ [xp \ [zp \ [NP]_3 \ [zp \ \ldots t_3 \ldots]]]]
\end{align*}
\]

\(^1\) For recent approaches to barriers and the theory of government, see Lasnik and Saito (1984); Chomsky (1986); Rizzi (1990); Lasnik and Saito (1991).
In this dissertation, I will explore the syntactic restrictions on quantifier scope and show that the possibilities for movement of a phrase are different than the possibilities for the scope of a phrase. I will show that these differences can be explained if a tripartite representation is adopted over a representation which allows scope to be determined by the entire noun phrase.

The bulk of the dissertation will examine the syntax of 'Quantifier Construal' and will focus on the relationship between a quantifier and its restriction. It will demonstrate that although the relationship is a local one, its syntax is different from the relationship between a moved phrase and its trace. In this way, asymmetries between movement of phrases and the scope of phrases can be captured.

In order to flesh out these ideas in more detail, I first need to introduce Heim's theory. I give a very brief introduction of her work in the next section.

1.1 Heim's Theory

Heim's tripartite theory differs from the standard theory not only in the syntax that is employed but also in the semantics. One important difference is in the interpretation of indefinites. Heim considers indefinites not to have any quantificational force of their own, but that they simply
introduce variables which are bound by other operators\(^2\). Thus an NP such as 'a quadratic equation' would be interpreted as \textit{quadratic equation (x)} and not the Russelian type existential quantification \textit{Ex quadratic equation (x)}.

One of the reasons for adopting this interpretation of indefinites comes from sentences with indefinites and adverbs of quantification (Lewis, 1975). Consider the following sentence:

\begin{equation}
(5) \text{ A quadratic equation usually has two solutions.}
\end{equation}

This sentence has a paraphrase 'Most quadratic equations have two solutions.'; the indefinite has the quantificational force of the adverb 'usually'. The fact that indefinites acquire the quantificational force of other operators around them is motivation for considering these phrases not to have any quantificational force of their own.

In this particular example, the indefinite noun phrase 'a quadratic equation' functions as the restriction on the adverbial operator 'usually'. The adverb is said to 'unselectively' bind the indefinite because the adverb can bind any variable which is free within its scope. Here, the variable is provided by the indefinite. The LF representation

\(^2\) For a similar approach as to the nature of indefinites, see Kamp (1981).
for (5) is (6):

(6) \([cp \ [Ip \ [usually]_3 \ [Ip \ [a \ quadratic \ equation]_3 \ [Ip \ t_3 \ has \ two \ solutions]]]]\).

With adverbs of quantification, the adverbial operator and the indefinite restriction were never part of the same constituent. This differs from QNPs such as 'every man', in which the quantifier and it restriction do form a constituent. However, the LF representations will both be the same because of the operation of Quantifier Construal. As discussed above, Quantifier Construal will move the determiner 'every' out of the NP and attached to IP. In this way, sentences containing QNPs such as 'every man' and sentences with indefinites that are bound by other operators (such as adverbial operators) will both have a tripartite representation at LF.

Furthermore, indefinites which are within the nuclear scope of the sentence and are not bound by any other quantifiers become bound by an implicit existential quantifier. This operation is known as existential closure. For example, consider the following sentence with its associated logical representation:

(7)a Every man ate a prickly pear
   b \(Vx \ [man(x)] \ Ey \ [prickly \ pear(y)] \ [x \ ate \ y]\)
In this example, the QNP 'every man' is divided into an operator (Vx) and the restriction on the operator (man(x)). The rest of the sentence forms the nuclear scope. Since the indefinite 'a prickly pear' is in the nuclear scope and is not bound by any other quantifier, the variable that it introduces is bound by an implicit existential quantifier.

One aspect of Heim's LF structures that will become particularly important to the theory developed here is the selection index of a quantifier. The elements that a quantifier binds is given by the selection index of the quantifier. This selection index is the numerical subscript found with the quantifier. It will be the same as the numerical subscript found with the restriction and trace that it binds.

These subscripts are entered into the representation as follows. First, every non-pronominal NP is assigned an index, which is its referential index. When this non-pronominal NP is moved and adjoined to IP, it leaves behind a trace which has the same index as the NP. When a quantifier is moved out of the NP and attached to IP, it carries the index of the NP with it.

In the case of indefinites and adverbs of quantification, the referential index on the indefinite is copied onto the adverbial operator as that operator's selection index. Heim
allows this copy operation to occur as long as that operator is the lowest c-commanding operator in the representation for that particular indefinite.

I will follow Heim in representing the elements that a quantifiers binds by means of a selection index. I differ from her in the way the quantifier acquires that index. I will discuss the specifics of my proposals in the next section.

1.2 The Syntax of Quantifier Construal

In the next two sections, I will discuss in detail my proposals concerning the nature of the syntactic relationship between a quantifier and its restriction. I propose that there are two aspects of this relationship which will account for the properties seen with quantifiers. One aspect concerns the formal requirements of Quantifier Construal. The other aspect concerns the interpretive requirements for quantification. I will propose that it is the formal requirements of Quantifier Construal which will account for the 'long distance' behavior of scope, while it is the interpretive requirement which ensures that there is a certain 'local' requirement between a quantifier and its restriction.
1.2.1 The Formal Requirement

I will adopt the DP representation (Brame, 1982; Abney, 1987) for noun phrase structure. In this representation, the determiner functions as the head of the noun phrase. The representation for the QNP 'every man' would be:

\[(8) \cases{\text{DP} \ [\text{D}, \text{every} \ \text{NP} \text{man}]}\]

After Quantifier Construal, the determiner will be moved out of its head position and attached to IP. I will assume that this will leave behind an empty category in the head position of DP:

\[(9) \cases{\text{IP} \ \text{every} \ \cases{\text{IP} \ \text{DP} \ [\text{D}, \text{e} \ \text{NP} \text{man}]} \ [\text{IP} \ldots \ldots ]}\]

I will also assume that the formal requirements for the empty category that is left behind after movement of the quantificational head will be different than the formal requirements of the empty category that is left behind after movement of a noun phrase. I follow most practitioners in requiring that the empty category that is left after movement of an entire phrase must be properly governed. However, I propose that the empty category left after movement of a determiner is not required to be governed.

Since the formal requirements are different, it is conceivable within this approach for scope possibilities and
movement possibilities to differ. Recall the schematic phrase structures in (4). Movement of an entire phrase beyond an barrier will be blocked because the empty category left behind will not be governed. Movement of the determiner will not have to meet the government requirement and thus it will be free to move outside the barrier. Since the scope of the quantifier will be determined by the elements it c-commands, its scope will extend beyond XP.

As it stands now, the movement of the quantifier is entirely free; it would appear that scope is not subject to any sort of restriction at all. This is clearly not the case; it is well known that scope is not an unbounded phenomenon. Consider the following example:

(10) Some woman laughed because John read every book.

In this example, the QNP 'every book' cannot take scope over the subject QNP 'some woman'. If it did have this possibility, it would have as an interpretation that for every book, there is some woman who laughed because John read it. However, this sentence means only that there is some particular woman who laughed because John read every book. Nothing that I have discussed so far would limit the quantificational determiner 'every' from moving and adjoining to a position where it would c-command, and thus have in its
scope, the subject noun phrase.

I propose that Quantifier Construal is limited by an interpretive aspect that requires a link between the quantifier and its restriction. I will discuss this aspect in the next section.

1.2.2 The Interpretive Aspect

In Heim's theory, the elements that a quantifiers binds is determined by the selection index of that quantifier. We could say, then, that a quantifier that has no selection index binds nothing. A quantifier that binds nothing would be a case of vacuous quantification. Following Chomsky (1982) and Kratzer (1989), we could say that vacuous quantification is disallowed in natural language. This would mean that quantifiers without a selection index would be ruled out.

As discussed above, a quantifier acquires a selection index in two ways. One way is to take along the referential index of a QNP when the quantifier is moved out of the noun phrase by Quantifier Construal. The other way is for the referential index of a QNP to be copied onto the lowest c-commanding operator.
In this dissertation, I propose that an operator acquires a selection index only under copy\(^3\). This copy operation will be restricted in certain ways that I will discuss below. What this means is that a LF structure with a quantifier that fails to acquire an index under copy would be an instance of vacuous quantification and would be ruled out.

This aspect of Quantifier Construal will be what limits the scope taking possibilities of a particular determiner. I have discussed above that movement of the determiner is essentially unbounded; it does not leave behind an empty category that must be governed. However, given that a quantifier must acquire a selection index under copy, and that this copy operation is restricted, the movement of the quantificational determiner will be restricted to those positions where it can acquire a selection index under copy.

Selection index copying will have the following properties. First, I do not restrict the elements that can bear an index to just operators, restrictions or traces; potentially, any element can bear an index. However, the only indexing relationships that will matter semantically are those which appear on operators, restrictions and traces. The indices that appear on other elements will simply be formal

\(^3\) Heim (1982) also suggests that these two ways of acquiring an index may be collapsed into one.
objects that will allow for the operator to acquire an index under the copy operation.

Second, selection index copying will be subject to two requirements. One of the requirements is structural. The element which is to bear a selection index must exist is a certain structural configuration with an element that bears a selection index. The second requirement is lexical. It must be part of the lexical information of an item that it can bear a selection index. I will discuss each of these requirements in more depth in turn.

1.2.2.1 The Structural Requirement

The structural requirement has both a local and long distance aspect. I will discuss each of these aspects below:

1.2.2.1.1 The Local Aspect

An element can acquire a selection index under copy if it exists in three different types of local structural relationships. The first way is if it is in a government relationship with another element that has a selection index. The second way for an element to acquire a selection index is if it is in a specifier/head relationship with another element that has a selection index. The third way is for an element to be an X-Bar projection of another element that bears an
I will illustrate these three ways to transfer selection indices. If A is an element with a selection index, B can acquire a selection index under government in three ways. The first is if A and B are sisters. The second is if B has been adjoined to C, a sister of A. The third is if A and B are adjoined to the same projection. In each of these relationships, A will govern B. Here, I am adopting the Chomsky (1986) definition of government. I illustrate these three possibilities below.

(11)a \[
[\ldots [x \ [A]_1 \ [B]_1 \ldots ]]
\]

b \[
[\ldots [x \ [A]_1 \ [c \ [B]_1 \ [c \ldots ] \ldots ]]
\]

In (10)a, A and B are sisters. In (10)b, B has been adjoined to C, a sister of A. In (10)c, A and B have both been adjoined to the same maximal projection, X.

An element can acquire an index by SPEC/HEAD agreement also. If A is an element with a selection index, B can acquire a selection index if A is a head element and B occupies the specifier position of the A projection system. Conversely, if A occupies the specifier position of the projection system of which B is the head, B can acquire the selection index of A. These possibilities are shown in (12):

(12)a \[
[\_A \ [B]_1 \ [A, A, XP]]
\]

b \[
[\_B \ [A]_1 \ [B, B, XP]]
\]
Finally, if an element is an X-Bar projection of another element with a selection index, it will also bear the index. For example, if X is a head that bears a selection index, then the X' projection and the XP projection will also bear that index. This is very similar to the proposals for feature percolation of Gazdar et al. (1985):

\[(13) \ [\text{XP} \ [X', X]]\]

1.2.2.1.2 The Long Distance Aspect

In the above discussion, the possibilities for acquiring a selection index all involve a local relationship, either government, SPEC/HEAD agreement or X-Bar projection. However, this system will also allow for an element to acquire an index 'long distance' through a series of local relationships. Consider the following structure:

\[(14) a \ [\text{XP} \ [X', Y \ [\text{YP}, Y \ [ZP]]]]\]

In this structure, X and YP are sisters and Y and ZP are sisters; thus X governs YP and Y governs ZP. Suppose that ZP has a selection index. Since Y governs ZP, it will be able to bear the selection index:

\[(14) b \ [\text{XP} \ [X', Y \ [\text{YP}, Y \ [ZP]]]]\]

This selection can be percolated up from Y to YP because
both \( Y_P \) and \( Y' \) are projections of \( Y \):

\[
(14)c \ [x_P \ [x, \ X \ [y_P \ [y, \ Y \ [z_P \ ]]]]]
\]

Now, since \( X \) governs \( Y_P \), \( X \) can acquire the selection index from \( Y_P \). In this way, \( X \) has acquired a selection index from \( Z_P \) by a series of local relationships, government and head feature percolation:

\[
(14)d \ [x_P \ [x, \ X \ [y_P \ [y, \ Y \ [z_P \ ]]]]]
\]

The SPEC/HEAD agreement aspect of selection index copying and the government aspect of selection index copying can also be combined to produce a 'long distance' effect of selection index copying:

\[
(15)a \ [x_P \ [x, \ X \ [m_P \ [m, \ M \ [y_P \ [z_P \ ]]]]]]
\]

In this structure, \( Z_P \) bears a selection index and it also occupies the specifier position of \( Y_P \). By SPEC/HEAD agreement, \( Y \) is also able to bear this selection index:

\[
(15)b \ [x_P \ [x, \ X \ [m_P \ [m, \ M \ [y_P \ [z_P \ [y, \ Y \ ]]]]]]
\]

As discussed above, \( Y_P \) can now bear the selection index since it is a projection of \( Y \) and \( Y \) bears an index (15)c. Since \( M \) governs \( Y_P \) it can also bear the selection index (15)d. Another round of head feature percolation of the index to \( M_P \)
and government of MP by X will allow X to bear the index (15)e:

\[
(15) \begin{align*}
\text{c} & \quad [x_p \ [x, X \ [\text{MP} \ [M \ [A_p \ [z_p \ [y_p \ [x_p \ [x]]) \\
\text{d} & \quad [x_p \ [x, X \ [\text{MP} \ [M \ [A_p \ [z_p \ [y_p \ [x]]) \\
\text{e} & \quad [x_p \ [x, X \ [\text{NP} \ [M \ [A_p \ [z_p \ [y_p \ [x]]) \\
\end{align*}
\]

I will now show a particular example of how this system can be used to allow quantifier scope to extend beyond a barrier for movement. Consider the following structure before any movement has applied:

\[
(16) \begin{align*}
\text{a} & \quad [y_p \ [x_p \ [x, X \ [z_p \ [\text{QNP} \ [\ldots \ [y_p \ [y_p \ [y_p \ [x_p \ [x]]) \\
\end{align*}
\]

Suppose that XP is adjoined to YP and also that XP is a barrier. Also, suppose that a QNP is contained within XP. Since XP is a barrier, QNP will not be able to move outside of XP because the trace that is left behind will not be able to be governed (16b). However, the QNP will be able to move and adjoin to ZP because no barrier will be crossed. In addition, the quantificational determiner will be able to move beyond XP as this movement does not leave a trace that needs to be governed (16)c:

\[
(16) \begin{align*}
\text{b} & \quad *[y_p \ [y_p \ [\text{QNP} \ [\ldots \ [y_p \ [y_p \ [y_p \ [x_p \ [x]]) \\
\text{c} & \quad [y_p \ [y_p \ [Q] \ [x_p \ [x, X \ [z_p \ [\text{NP} \ [\ldots \ [y_p \ [y_p \ [y_p \ [x]]) \\
\end{align*}
\]

As it stands, this structure is illicit because the quantifier which is attached to YP does not contain an index.
However, the copy operation can apply to pass the index up to Q from NP₁. In (16)c, X governs NP₁ because NP₁ is adjoined to ZP, a sister to X. This will allow X to bear the selection index (16d). By head feature percolation, XP will also bear the selection index (16e). Since Q and XP are adjoined to the same projection, Q governs XP and Q will be able to bear the selection index (16f). The structure shown in (16)f is licit because the quantifier now has a selection index, and consequently the scope of a QNP contained within the barrier XP can extend beyond XP:

\[(16)d [\gamma_P [Q] [\gamma_P [X, X_1 [Z_P NP_1 [Z_P \ldots t_{i-1} \ldots]]]] [\gamma_P \ldots]]\]
\[(16)e [\gamma_P [Q] [\gamma_P [X, X_1 [Z_P NP_1 [Z_P \ldots t_{i-1} \ldots]]]] [\gamma_P \ldots]]\]
\[(16)f [\gamma_P [Q], [\gamma_P [X, X_1 [Z_P NP_1 [Z_P \ldots t_{i-1} \ldots]]]] [\gamma_P \ldots]]\]

1.2.2.2 The Lexical Requirement

The example in (16) shows how a quantifier can link up to its restriction 'long distance'. But I have also noted above that a quantifier cannot move anywhere; there are certain limitations to the scope of a phrase. I proposed that this limitation is imposed not by a condition on the movement of a determiner but is imposed on the way a quantifier can obtain its selection indices.

Notice that the cases of 'long distance' selection index copying are dependent on the indexing of a head and then percolation of the index from the head to the maximal
projection of the head. It is in this way that a phrase inside of a barrier can link up to a quantificational determiner outside of the barrier.

Suppose that a head $W$, although it is in the proper structural configuration to obtain a selection index, is lexically specified as not being able to bear a selection index. Since the head does not bear the index, the maximal projection of this head will also not bear this index. This index, then, will never be allowed to be passed beyond WP.

I propose that it is in this way that scope will be blocked from appearing outside of some maximal projections. The heads of these projections are not allowed to bear selection indices. To illustrate this, consider the following two structures, which contain two different phrases AP and BP. Both are barriers to movement, so the QNP cannot move outside of it. The head $A$ is allowed to bear an index, but the head $B$ is not allowed to bear an index:

$$(17)a \ [yp \ [Q] \ [yp \ [AP \ [A_1 \ [z_p \ NP_1 \ [z_p \ldots t_1 \ldots]]]]] \ [yp \ldots]]]$$

$$(18)a \ [yp \ [Q] \ [yp \ [BP \ [B_1 \ [z_p \ NP_1 \ [z_p \ldots t_1 \ldots]]]]] \ [yp \ldots]]]$$

In (17)a, $A$ governs $NP_1$ and because it can bear a selection index, the selection index of $NP$ can appear on it. In (18)a, although $B$ governs $NP_1$, it is head which is lexically specified as not being able to bear an index. In (17)a, the index can percolate up to AP and then appear on Q
as a result of government. This is not allowed in (18)a. Furthermore, Q is not in the proper structural relationship with anything that bears a selection index; it does not govern NP, nor is it in a SPEC/HEAD agreement relation with it. Q will not be able to bear an index. Consequently, because Q in (18)a does not bear an index, it does not bind anything and is an instance of vacuous quantification. This structure will be ruled out because vacuous quantification is disallowed:

\[(17)b \quad [\text{yp} [Q]_1 [\text{yp} [\text{AP}_1 [A_1, A_1 [ZP, \text{NP}_1 [ZP \cdots t_1 \cdots ]]]] [\text{yp} \cdots ]]]\]
\[(18)b \quad *[[\text{yp} [Q]] [\text{yp} [\text{sp} [\text{s' B} [ZP, \text{NP}_1 [ZP \cdots t_1 \cdots ]]]] [\text{yp} \cdots ]]]\]

The above illustrates the simplest case of how a head can either bear an index or not; it is simply a matter of lexical specification or not. However, I also argue that there is another way in which a head is allowed to bear an index. If there is a licensing element in the specifier position of the head, then this head can bear an index. Without this licensing element, the head will not be able to bear an index\(^4\). Consider again the same structure and condition as above, with a change that the head B can bear an index only if there is a licensing element in specifier of BP:

\[(19)a \quad [\text{yp} [Q] [\text{yp} [\text{sp} [\text{s' B} [ZP, \text{NP}_1 [ZP \cdots t_1 \cdots ]]]] [\text{yp} \cdots ]]]\]
\[(19)b \quad [\text{yp} [Q] [\text{yp} [\text{sp} [\text{XP}] [B, B [ZP, \text{NP}_1 [ZP \cdots t_1 \cdots ]]]] [\text{yp} \cdots ]]]\]

\(^4\) This case is very similar to Rizzi's (1991) proposal of how the head of CP can be filled by AGR and license a trace in specifier of IP position.
In this case, XP will be a licensing element. In (19)a, there is no licensing element in specifier position, while in (19)b there is a licensing element in specifier position. This means that in (19)a, the head B will not be able to bear the index of the moved NP. The index of the NP will never be able to reach the quantifier (19)c. However, in (19)b, because of the presence of the licensing element, the head can bear the index. This index can then percolate up to BP and ultimately to Q (because Q governs BP) (19)d. The structure in (19)c will be ruled out as an instance of vacuous quantification, but (19)d will be fine:

\[(19)c \ast [\text{yp} [Q] [\text{yp} [\text{zp} [B, B, \text{B}_1 [\text{zp} \text{NP}_1 [\text{zp} \ldots t, \ldots]]]] [\text{yp} \ldots]]]] \]
\[(19)d [\text{yp} [Q]_1 [\text{yp} [\text{zp} [\text{XP} [\text{B}_1 [\text{B}_1 [\text{zp} \text{NP}_1 [\text{zp} \ldots t, \ldots]]]] [\text{yp} \ldots]]]]] \]

1.3 A Comparison of the Two Systems

At this point, I would like to compare in depth the system of scope assignment which relies only on movement of the entire phrase and the system of scope assignment which relies on movement of a determiner.

Consider first a structure in which a QNP is contained in a phrase AP that is not a barrier to movement. Both systems will make the same prediction that the scope of the phrase can extend beyond AP because both systems will allow movement of the entire QNP out of AP.
In (20)a, the entire phrase has moved out of AP and c-commands AP. Its scope is thus not contained within AP. In (20)b the entire phrase has moved out of AP and furthermore the determiner has been extracted from the noun phrase. The Q operator c-commands AP and thus its scope is not contained within AP. Also, the Q element is in the proper structural configuration with the NP to allow it to bear the index of the NP. Thus, in both cases all constraints are satisfied.

The predictions of the two systems diverge when a QNP is contained within a phrase BP that is a barrier to movement, but only in the case where the head of that barrier can bear an index. If the head cannot bear an index, both systems predict that scope will not extend beyond BP. Consider again the following structure where BP is a barrier for movement.

\[
(21)\begin{align*}
\text{(21)a} & \quad \ast\{\gamma_p [\text{QNP}]_1, \{\gamma_p [\text{AP} [A, A [ZP \ldots t \ldots]]]\}\}
\text{(21)b} & \quad \ast\{\gamma_p [\text{Q}]_1, \{\gamma_p [\text{NP}]_1, \{\gamma_p [\text{AP} [A, A [ZP \ldots t \ldots]]]\}\}\}
\text{(21)c} & \quad [\gamma_p [\text{BP} [B, B [ZP [\text{QNP}]_1, [ZP \ldots t \ldots]]]]]\}
\text{(21)d} & \quad [\gamma_p [\text{BP} [B, B [ZP [\text{Q}]_1, [ZP [\text{NP}]_1, [ZP \ldots t \ldots]]]]]\}
\end{align*}
\]

The structure in (21)a is illicit because the entire phrase has been moved out of BP which is a barrier. The trace left behind will not be able to be governed.

In (21)b, the entire phrase has been moved and adjoined to ZP, which is allowed because no barrier is crossed. In
addition, Q has been moved out of BP, which is also allowed because this type of movement does not leave a trace which must be governed. However, Q fails to receive a selection index because it is not in the proper structural configuration with NP, nor has the feature been passed up from NP, to BP. This is because B is not allowed to bear an index. This structure will be illicit because Q, without an index, is an instance of vacuous quantification.

Finally, in (21)c and (21)d, movement of the QNP to ZP is allowed because no barrier is crossed. This is all that is required in a theory that treats scope as the c-command domain of the entire phrase (21)c. If the quantifier is extracted, then Q must bear the selection index. Q and NP, are in a proper structural configuration for Q to bear the index of NP,; they are both adjoined to the same projection so Q governs NP,. This structure will be ruled in.

In both systems, the only structure that has been ruled in is one where the scope of the QNP is within BP. The two structures that have been ruled out are instances where the scope of a QNP would extend beyond the barrier BP. Again, the same prediction is made for the scope of a QNP.

If the head of BP is allowed to bear an index, the the determiner scope theory would allow the scope of the QNP to extend beyond BP, while a phrasal scope theory would not allow
the scope to extend beyond BP:

\[
(22)a * \text{[} \text{yp} [\text{QNP}_1 \text{[} \text{yp} [\text{BP} [\text{B}_1 \text{B}_2 \text{..t}_1 ..]]]} [\text{yp} ..]]
\]

\[
b \text{[} \text{yp} [\text{Q}_1 \text{[} \text{yp} [\text{BP}_1 \text{B}_1 \text{NP}_1 [\text{zp} .. \text{t}_1 ..]]]} [\text{yp} ..]]
\]

In (22)a, the entire QNP has been moved out of BP, which is disallowed. This is the only option in a phrasal scope theory for having the scope of the QNP extend beyond BP. Thus, in this theory the scope of the QNP will always be within BP. In (22)a, the phrase has moved within BP, but the quantificational determiner has moved out of BP. This is allowed because this type of movement is not subject to the same constraints as movement of entire phrases. Also, since the head B can bear a selection index, the index of the NP can percolate up to BP and finally can appear on Q because Q governs BP. There is nothing wrong with this structure, and consequently, the scope of the QNP would extend beyond BP.

In summary, in many cases the two theories make the same predictions about the scope of a QNP. However, in the theory advocated here, some (but not all) islands for movement are 'leaky' for scope, while in a theory that relates scope to movement, all islands for movement are also islands for scope.

1.4 Connectedness

The formal system that I have developed for index percolation is very similar to the Connectedness Condition of
Kayne (1983). This condition attempts to explain locality effects with respect to movement. In this section, I would like to compare and contrast the two theories and show where they are similar and where they are different.

The Connectedness theory crucially relies on the formulation of 'g-projection', 'canonical configuration' and 'g-projection set' which I give below:

(23) \( Y \) is a g-projection of \( X \) iff
   a. \( Y \) is a projection of \( X \) or a g-projection of \( X \); or
   b. \( Y \) immediately dominates \( W \) and \( Z \), where \( Z \) is a g-projection of \( X \), and \( W \) and \( Z \) are in a canonical government configuration.

(24) \( W \) and \( Z \) are in a canonical government configuration iff \( V \) governs NP to its right in the language and \( W \) precedes \( Z \); or \( V \) governs NP to its left in the language and \( Z \) precedes \( W \).

(25) \( G_a \) is the g-projection set of a category \( \alpha \), where \( B \) governs \( \alpha \), iff
   a. all g-projections of \( B \) belong to \( G_a \)
   b. \( \alpha \) belongs to \( G_a \) and
   c. if \( \delta \) dominates \( \alpha \) and does not dominate \( B \), \( \delta \) belongs to \( G_a \).

With these definitions, the Connected Condition is defined with respect to g-projection sets as follows:

(26) Connectedness Condition

Let \( \alpha_1, ..., \alpha_n \) be a maximal set of empty categories in a tree \( T \) such that for some \( \beta \), all \( \alpha_i \) are bound by \( \beta \). Then \( \beta \) together with the g-projection sets of all \( \alpha_i \) must constitute a subtree of \( T \).
Let's see how this condition works. Consider the following two sentences:

(27)a  \[ [\text{CP} \text{Who}_1 [\text{VP} \text{John } [\text{IP} [\text{VP} \text{see t}_1]]]]] \]
(27)b  \*\[ [\text{CP} \text{Who}_1 [\text{VP} [\text{IP} [\text{CP} [\text{IP} [\text{VP} \text{explaining t}_1]]]] [\text{VP} \text{bother you}]]]]] \]

In (27)a and b, t_1 is an empty category with its antecedent who_1. According to the connectedness condition, 'who' and the g-projection sets of 't' must be a subtree of the sentence. The g-projection set of 't' in (27)a would be the g-projections of the governor of 't', in this case 'see'. Since VP is a projection of V, this is part of the g-projection set. Since I' dominates VP and I, and VP is a g-projection of V and VP is to the right (I and VP are in the canonical government configuration), I' is a g-projection of V, and consequently IP is also. By the same reasoning as for I', C' would be a g-projection of V and also CP. Here, 'who' is within CP. Therefore, the antecedent for the trace and the g-projection sets of 't' do constitute a subtree of the sentence, and this sentence meets the Connectedness Condition.

In (27)b, the g-projection set of the trace would be the g-projections of its governor 'explaining'. As above, the VP of the embedded CP would be part of this set, as well as the embedded IP and the embedded CP. However, the g-projection set would go no further, since the embedded CP is in subject
position. The IP which dominates the CP in subject position would not be part of this set because IP dominates I' and the embedded CP, which is a g-projection, but the canonical government configuration is not met—the embedded CP is to the left and for English the canonical government configuration is to the right.

The similarities between the theory of index percolation discussed here and the Connectedness theory lie in the notion of g-projection. Since I allow an index to percolate up from a node A through government, the nodes that would bear an index under government would be the same as the nodes which would constitute a g-projection set of the governor of A.

This is where the similarity ends. In the theory discussed here, an element is allowed to bear an index under SPEC/HEAD agreement. This is not allowed under connectedness. Furthermore, if AP and B are in a spec/head configuration, AP and B do not have to meet a canonical government configuration. Thus, a head B (and consequently the entire BP) could bear the index of AP if AP is to the left and the canonical government configuration is to the right as long a AP and B are in a spec/head configuration. This would not be allowed under connectedness.

In terms of which elements can bear an index, I have proposed that a head is either lexically specified to bear an
index or can bear an index if there is a licensing element in the specifier of the head. There is no analog to this conception within Connectedness\(^5\).

Lastly, the Connectedness Condition is used to explain locality effects with respect to movement of an entire phrase and its trace. The theory discussed here for index percolation is used precisely where movement of phrases is not allowed to occur. The theory argued for here attempts to capture the relationship between an operator and its restriction.

In summary, the Connectedness Condition and the theory of index percolation assumed here are both similar in that they allow for a long distance dependency under a government configuration. They differ in precisely what type of long distance dependency is being captured, and some of the formal mechanisms that allow for a long distance relationship.

### 1.5 Consequences of the System

In this section, I will discuss some of the major consequences that I see of the system that has been outlined above. I focus on three areas: types of long distance relationships; S-structure/LF asymmetries and variability.

\(^5\) In an earlier version of Connectedness, Kayne does make use of whether or not a head can bear an index. This is not carried over into later formulations. However, neither the earlier or later version has a notion of a specifier licensing a head to bear an index.
I turn to types of long distance relationships first.

1.5.1 Types of Long Distance Relationships

There are two types of long distance relationships that transformational linguists focus on: (pronoun) binding and movement. With respect to binding of pronouns by quantifiers, this is considered to be a long distance relationship that has no constraints other than the requirement that the pronoun be in the scope (and thus c-commanded) by the quantifier. The binding of pronouns by quantifiers is not sensitive to island constraints:

(28) Every man, laughed because his, dog tripped.

Here, the quantifier binds a pronoun inside of an adjunct island.

Movement creates another type of long distance relationship between an operator and a trace, but this type of relationship is sensitive to islands. Thus, movement can create a long distance dependency in some cases, but not others:

(29)a Which man, does John think that Mary saw t,?
   b *Which song, does John like Bill because he has t,?

In (29)a, movement out of the embedded clause is possible, but movement out of the adjunct clause is not possible.
The binding between an operator and an indefinite is also a long distance operation, but it is different from the other types discussed above. It is like the binding dependency and not like the dependency created by movement because it can occur across islands. For example, movement cannot occur out of 'if' clauses, although an operator can relate to an indefinite across this type of clause:

(30)a *Which man, does John think that if the boss promotes t, the company will be ruined.

b Every man, thinks that if the company promotes him, the company will be better off.

c Usually, if the company promotes a man, he will work harder.

Sentence (30)a shows that movement out of an 'if' clause is ungrammatical, while (30)b shows that binding of a pronoun is possible into this type of clause. Sentence (30)c has a paraphrase 'Most men that the company promotes will work harder', indicating that the indefinite inside the 'if' clause is bound by the adverbial operator outside the 'if' clause; the indefinite gets the quantificational force of the adverbial operator. Thus, the binding between an operator and an indefinite is not limited in the same way as movement.

While operator/indefinite binding is possible across some islands, it is not possible across every island. Consider the following:
(31) John is usually intelligent because he likes a book by Chomsky.

Here, the indefinite and its corresponding adverbial operator are separated by an adjunct 'because' island. There is no binding here; this sentence cannot be paraphrased as 'For most books by Chomsky, John is intelligent because he likes them'.

Because of these differences, it is not possible to reduce operator/indefinite binding to the same formal mechanism as pronoun binding, nor is it possible to reduce it to movement; this type of binding behaves differently from both of these phenomena. Thus, operator/indefinite binding is a different type of long distance operation.

1.5.2 S-Structure/LF Asymmetries

One major significance of utilizing a Heim type representation in which an operator and its restriction do not form a constituent is that with this type of representation, it is possible to account for so-called movement asymmetries between S-Structure and LF.

It has been observed (Huang, 1982 and many, many others) that scope assignment in the LF component is in some cases much greater than that of scope assignment at S-Structure. Since most transformation theories relate scope to the
position of the entire QNP, and scope assignment is accomplished by movement of this entire phrase, this has lead to the conclusion that movement is much freer at LF than at S-Structure (for various discussions as to the differences between S-Structure and LF movement, see Huang, 1982; Fiengo et al. 1990).

The Heim style representation given above in (6c) allows for movement possibilities between the two levels to be exactly the same. This is in keeping with the approach of Pesetsky (1987), Nishigauchi (1990) and Choe (1985). The difference between S-structure movement and scope assignment at LF is that S-structure movement involves movement of an entire phrase while scope assignment at LF is not necessarily related to movement of an entire phrase. Scope assignment is related to the position that the operator alone can move to and attach. Since the relationship between an operator and its restriction is subject to different conditions as those between an entire phrase and its trace created as a result of movement, it is possible to have scope assignment different at LF without having the possibilities for movement of entire

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6 Although some of these authors have also utilized a Heim style representation to account for S-Structure/LF asymmetries, they have not used the same constraints imposed on the representation that is advocated here, nor have they dealt with the range of languages and constructions that are treated in this dissertation.
phrases to be different.

1.5.3 Variability

As shown above, the relationship between an operator and its restriction can happen 'long distance' but this does not happen in every case; there are restrictions. I proposed that these restrictions are based on whether or not a head is able to bear a selection index.

Syntactic heads are the elements of the syntactic representation which come from the lexicon. The formal system that I have outlined links the variation in 'long distance' operator/restriction binding to whether or not a head can bear a selection index. Since heads are lexical elements, this means that the variation seen is not a consequence of the syntax but a consequence of lexical specification. This is a desirable result, as the lexicon is typically considered to be the place where idiosyncratic information is to be localized.

1.6 Short Summary of the Dissertation

In this introduction, I have outlined my proposal for the syntactic representation of scope and the syntactic relations between the elements that enter into quantification relations.
In what follows, I will try to show how this formal system can be applied to natural languages in a way that is better than other alternatives. I would like to present a short summary of the areas that will be explored.

In Chapter Two, I show in detail that operator/indefinite binding is sensitive to some constraints on movement, but not others. I show that restrictive 'if/when' clauses are islands for movement but not operator binding because the complementizer heads of these clauses are allowed to bear a selection index and thus a selection index can be passed 'long distance'. Other cases where operator/indefinite binding fails to occur across an island occur because such index percolation is impossible.

In Chapter Three, I examine the syntax and semantics of internally headed relative clauses. The syntax that I propose for internally headed relative clauses parallels the syntax I propose for restrictive 'if/when' clauses in that the same type of indexing relations are necessary for the operators associated with these clauses to bind the internal head. This is a welcome result, as I show that there are many syntactic and semantic properties that these clause types share.

In Part Chapters Four and Five, I investigate cases of 'partial' WH-movement in several languages (Arabic, Hindi, German and Slave). With partial WH-movement, a Wh-phrase
moves to an intermediate position between its base position and the matrix CP. Usually, a series of scope markers or pleonastic WH-elements appear between the WH-phrase and the matrix CP.

I propose a Heim-style representation for these cases and use index percolation to ensure that the partially moved WH-phrase is associated with a Q morpheme in the matrix CP. Again, this index percolation is crucially dependent on whether or not a head is allowed to bear an index. I show that the pleonastic elements are required because they allow the complementizer of a clause to bear an index. Furthermore, these are another example of where scope and movement diverge because partial movement with scope marking is often use when full WH-movement is impossible.

Lastly, in Chapter Six, I focus on the scope of possessive phrases in English noun phrases. These cases are interesting because they too show a divergence between movement and scope. I demonstrate how the formal system developed here can easily account for these cases and are to be preferred over other analysis which either change the definition of c-command or change the possibilities for movement at LF.
2.0 Introduction

In the previous chapter, I outlined my approach for treating the scope of a quantified noun phrase. This approach centers on the following three proposals. First, following Heim (1982), the scope of a quantified noun phrase is determined by the position of the operator alone, and not by the scope of the entire noun phrase. Second, the possibilities for scope are determined by the positions to which the operator can move. Third, an operator can move anywhere as long as it is in a position to acquire the selection index of its restriction. If an operator cannot acquire a selection index, this is considered to be an instance of vacuous quantification and is ruled out by a prohibition against vacuous quantification.

This approach thus places the constraints on scope not on movement possibilities but on the way in which an operator can acquire the selection index of its restriction. These constraints operate in two ways.

First, there is a structural requirement. An element can acquire a selection index only if it exists in certain local relationships with another element that bears a selection index. These local relationships are (1) government, (2) specifier/head and (3) X-Bar projection. It is possible to
have a 'long distance' effect by means of a series of local relationships. This series of local relationships would allow an index to pass from one element to another even though these two elements themselves are not in one of the local configurations described above.

Second, there is a lexical requirement. Index 'percolation' is dependent on whether or not a particular head can bear a selection index. If a head cannot bear the index, the index will not be percolated.

The purpose of this chapter is to motivate this system of constraints on the way an operator can acquire a selection index. In order to do this, I divide this part of the dissertation into two parts—this chapter and the next. In this chapter, I focus on 'unselective' binding between an adverbial operator and an indefinite in restrictive 'if/when' clauses. Since the relationship between an adverbial operator and a restrictive 'if/when' clause has been widely discussed it is a good place to begin. In the next chapter, I focus on operator binding in internally headed relative clauses. I demonstrate that the syntax and semantics of internally headed relative clauses are very similar to that of restrictive 'if/when' clauses. The system of index percolation that is proposed for restrictive 'if/when' clauses is also operative in internally headed relative clauses. This provides further
support for the types of indexing operations that I propose.

2.1 Unselective Binding and Restrictive 'If/When' Clauses

As I mentioned in the introduction, Lewis (1975) and Heim (1982) pay particular attention to sentences such as (1) below:

(1) A quadratic equation usually has two solutions.

This sentence has a paraphrase in which the indefinite noun phrase 'a quadratic equation' has the quantificational force of the adverb 'usually'; this sentence can be understood as 'most quadratic equations have two solutions'.

This type of phenomena led Heim (1982) to propose that indefinites are not inherently quantificational, but simply introduce variables which can be bound by other quantificational elements in the representation. For (1), the indefinite is bound by the adverb of quantification 'usually'. In Heim's system, it forms the restriction on the adverbial operator. Since the adverb appears to be binding any variables which are free within its scope, this type of phenomena is known as 'unselective' binding (this term was coined by Lewis (1975)).

Unselective binding can also occur between an adverbial operator and an indefinite in a restrictive 'if/when' clause:
(2) Usually, if/when a cat has blue eyes, it is intelligent.

This sentence has a paraphrase 'most cats that have blue eyes are intelligent'; this indicates that the indefinite has the quantificational force of 'usually' and is thus bound by the adverbial operator. Following the framework of Heim (1982), this sentence would have the following tripartite representation:

\[ [\text{IP usually}, [\text{IP if } [\text{IP a cat}, [\text{IP t, has blue eyes}]]], [\text{IP it, is intelligent}]] \]

In this representation, the adverb functions as the operator and is attached to the matrix IP. Following Kratzer (1978), Heim considers the 'if' clause to function as the restriction on this adverbial operator. The rest of the sentence (it is intelligent) forms the nuclear scope.

2.2 The Representation of Unselective Binding

In the above representation (3), the indefinite noun phrase 'a cat' is within the 'if' clause which functions as the restriction. It has been raised and adjoined to the IP node of the subordinate clause. This indefinite is bound by the adverb 'usually' which is outside of the 'if' clause. The question that is relevant at this point is how the adverb of quantification comes to bear the index of the indefinite.
As I see it, there are three possibilities. Two of these possibilities I consider to be direct relationships between the adverb and the indefinite, because there is no need for an intermediate element to bear the index and pass it from the indefinite to the adverb. The third possibility I will consider to be an indirect relationship. This is because such an intermediate element is needed in this analysis. It relies on the type of index percolation that I proposed in the introduction. I discuss these possibilities in the following sections.

2.2.1 The Direct Relationship

I stated above that there are two types of direct relationships. One I will call 'local' because it requires that there always be a local relationship between the adverb and the indefinite. The other I will call 'long distance' because it denies that there is any sort of local requirement for unselective binding.

2.2.1.1 The Local Relationship

This approach rejects that there is any sort of 'long distance' relationship between the indefinite and the adverb. The binding of an indefinite would always be the result of a local configuration, such as government or a specifier/head
relationship.

With respect to unselective binding in restrictive 'if/when' clauses, as it stands, the indefinite and the adverb are not in any sort of local relationship. The indefinite is within the clause and the adverb is outside the clause. However, it would be possible for the indefinite to raise out of the 'if' clause and adjoin to the matrix IP at LF. Once adjoined to the matrix IP, it would be governed by the adverb. Since this a local relationship, the adverb could bear the selection index:

(4) \[
[IP \text{ usually}_1 [IP \text [a cat]_1 [IP \text [CP if [IP t_1 \text { has blue eyes}]]] [IP it_1 \text { is intelligent}]]]
\]

2.2.1.2 The Long Distance Relationship

This second direct approach would deny that any sort of local relationship is needed for the adverb to bear a selection index. Since the adverb is outside of the clause, and the indefinite is inside of the clause which is an island for movement, the facts show that this type of binding does not obey any sort of locality. There would be no constraints on this type of binding as long as the adverb has the indefinite within its scope.

(5) \[
[IP \text{ usually}_1 [IP [CP if [IP [a cat]_1 [IP t_1 \text { has blue eyes}]]] [IP it_1 \text { is intelligent}]]]
\]
2.2.2 The Indirect Approach

The indirect approach relies on the type of index percolation that I discussed earlier. This index percolation requires that there be a local relationship between two elements for one element to bear the index of the other. Also, a series of local relationships can combine to produce a long distance effect.

Note that the adverb and the indefinite are not in one of the local configurations described above for the adverb to bear the index of the indefinite; the adverb does not govern the indefinite nor are they in a specifier/head relationship or a head projection relationship.

However, it is possible for a series of local relationships to transfer the index from the indefinite to the operator. The head of the restrictive clause CP is in a government configuration with the indefinite and it can bear the index. The index can then be projected from the head of CP to the CP projection itself. Finally, the adverb governs the CP of the restrictive 'if' clause. Since the CP now bears the index, the adverb can now also bear the index because they are in a government relationship:

(6) \([_I_p \text{ usually}_1, [_I_p \text{ [}_C_p \text{ if}_1 \text{ [}_I_p [\text{ a cat}_1 \text{ [}_I_p \text{ t}_1 \text{ has blue eyes}]]]_I_p \text{ it}_1 \text{ is intelligent]}]]\)
2.3 Discussion of the Alternatives

In what follows, I will discuss each alternative to the representation of unselective binding in restrictive 'if/when' clauses. I will show that the index percolation approach is superior to the others.

2.3.1 The Local Direct Approach

The first approach which relies exclusively on a local relationship is easily shown to be problematic. It relies on movement of the indefinite out of the restrictive 'if' clause to the matrix IP. It is well-known, however, that these clauses are islands for movement:

(7) *Which man, will if the company promotes t, Bill quit his job.

In this particular example, the WH-phrase has been extracted from within the 'if' clause, and the result is ungrammatical. Since restrictive 'if' clauses are islands for movement, it would be impossible for the indefinite to move out of this clause to be in a local relationship with the adverb.

2.3.2 Choosing Between the Other Alternatives

It is possible to choose between the long distance direct approach and the indirect approach because each makes a
specific prediction about the long distance behavior of unselective binding. Since the long distance direct approach does not posit any real restriction on binding, it predicts that an adverb can bind an indefinite within any syntactic environment as long as the indefinite is within its scope.

The indirect approach, on the other hand, does allow for restrictions to the long distance behavior of unselective binding. Recall that long distance percolation will occur only if a head can bear an index. If a head cannot bear an index, there will be no index percolation. This allows unselective binding between an adverb and an indefinite to be somewhat variable. In some syntactic environments, index percolation will be allowed; in other environments, it will not be allowed.

The remainder of this part of the chapter will demonstrate that there are restrictions to the long distance aspects of unselective binding.

2.3.3 Preliminaries for Developing the Argument

In developing my argument that unselective binding is subject to certain island effects, I rely on the following observations and analysis given by Kratzer (1989). She observes the following contrasts:

(8) *When Mary knows French, she knows it well.
(9) When Mary knows a foreign language, she knows it well.
When Mary speaks French, she speaks it well.

The difference between (8) and (9) is the presence of an indefinite (a foreign language) in the 'when' clause in (9); that between (9) and (10) is simply a change in the verb.

In order to explain these contrasts, Kratzer considers the antecedent 'when' clause to function as a restrictor on some operator (Kratzer, 1978, 1986). In the sentences above, the operator is not overt and is assumed to correspond to an adverb of quantification like 'always'. Kratzer gives the following tripartite logical representations for these sentences:

(8') Always [knows(Mary, French)] [knows well (Mary, French)]

(9') Always₁ [foreign language(x₁) & knows(Mary, x₁)]
knows well (Mary, x₁)

(10') Always₁ [speaks(e₁, Mary, French)] [speaks well (e₁, Mary, French)]

The analysis relies on two proposals. The first is that there is a principle of natural language which disallows 'vacuous quantification'. This principle states that a quantifier must bind a variable in both the restrictor and matrix (see also Chomsky, 1982):
(11) Prohibition against vacuous quantification

For every quantifier $Q$, there must be a variable $x$ such that $Q$ binds an occurrence of $x$ in both its restrictive clause and its nuclear scope.

The second is that some verbs contribute an 'event' variable to the logical representation, while other verbs do not. Those verbs that have event arguments correspond to those verbs which are called 'stage level' by Carlson (1977). Those verbs which do not have an event argument are Carlson's 'individual level' predicates.

In sentence (8), the fact that there are no indefinites in the 'when' clause and that the verb 'know' is an individual level predicate conspire to produce a violation of the principle against vacuous quantification. There are no variables in the restriction or the nuclear scope for the quantifier to bind. In sentence (9), however, there is a variable in the both the restriction and the matrix. The variable in the restrictor is provided by the indefinite 'a foreign language', assuming the Kamp-Heim analysis of indefinites. The variable in the matrix is provided by the pronoun. Lastly, in sentence (10), the verb 'speaks' is stage level and has an associated event variable. It is this variable which is available for the quantifier to bind. Both (9) and (10) satisfy the principle against vacuous
With this above argument concerning 'when' clauses, it is possible to test whether or not 'unselective binding' is an unbounded phenomena. If unselective binding is an unbounded phenomena, then embedding an indefinite within an island in the 'when' clause should not lead to ungrammaticality. This is because the indefinite will provide a variable, and the quantifier will be able to bind that variable, since we are assuming that the binding of the quantifier and the variable of the restriction is unbounded. The prohibition against vacuous quantification would not be violated.

On the other hand, if unselective binding is subject to locality effects, then embedding an indefinite inside an island in the 'when' clause will lead to ungrammaticality. This is because, although the indefinite or stage level predicate will provide a variable, the quantifier will not be able to bind it, this binding process being subject to locality effects. The prohibition against vacuous quantification would be violated in these instances.

At this point, a difference between 'if' and 'when' clauses should be pointed out:

(12) If the library has this book, it must be on the second floor.
(13) *When the library has this book, it must be on the second floor.
In these sentences, the epistemic modal 'must' serves as the operator that the 'if' and 'when' clauses restrict. According to Kratzer, the above contrast shows that 'if' clauses can serve as the restriction on an epistemic modal, while 'when' clauses cannot.

With this in mind, consider the following sentences:

(8) *When Mary knows French, she knows it well.
(14) If Mary knows French, she knows it well.

As was mentioned above, sentence (4) is ungrammatical because there is no variable in the restriction for the implicit adverb of quantification to bind. In this approach, however, the grammaticality of sentence (14) remains a mystery; the 'if' clause functions as a restriction on an operator, but there is no variable for the operator to bind.

Kratzer proposes that the difference between (8) and (14) is related to the difference between (12) and (13); 'if' clauses can serve as the restriction on an epistemic modal, but 'when' clauses cannot. In (14), the 'if' clause is functioning as the restriction on an implicit epistemic modal. Furthermore, Kratzer considers epistemic modals not to be quantifiers; they are not required to bind a variable. Thus, (14) does not violate the prohibition against vacuous quantification because the epistemic modal is not required to bind a variable. In (8), however, the 'when' clause cannot
serve as the restriction on an epistemic modal. It is functioning as the restriction on an implicit adverb of quantification which is a quantifier. Thus, it must bind a variable, but the 'when' clause in (8) does not provide that variable.

This digression is important because, in order to establish that unselective binding is subject to island effects, only restrictive 'when' clauses should be used as a test. This is because 'if' clauses can be used as a restriction on an epistemic modal, which does not need to bind a variable. Thus, it does not matter in these cases whether or not an indefinite is within an island; the modals do not need to bind any variables and there will not be any violation of the principle against vacuous quantification.

2.3.4 Island Effects and Unselective Binding

In what follows, I will present three examples of islands for WH-extraction and show that they are also islands for unselective binding. The islands that will be used as examples are adjunct islands, complex NP islands and coordination islands.

2.3.4.1 Adjunct Islands

Adjunct clauses are well known islands for WH-movement as
well as scope, as the following examples show:

(15) Adjunct Clauses and WH-Movement

(a) *Which country, does John know French because he travels to \( t_1 \) ?

(b) *Which author, does John admire Mary because she reads \( t_1 \) ?

The examples in (15) demonstrate that extraction from an adjunct clause leads to ungrammaticality.

Now consider an adjunct embedded within a restrictive 'when' clause. If the matrix does not contain any phrases that would provide a variable, an indefinite or stage level predicate within the adjunct clause does not lead to grammaticality:

(16)a *When John knows Arabic because he travels to a Middle Eastern country, it is located in the Gulf peninsula.

b *When John admires Mary because she likes a record album, it is by the Beatles.

c *When this textbook is too hard for Kevin because a problem is in it, it is a calculus problem.

For sentence (16a), if there was unselective binding of the indefinite noun phrase 'a Middle Eastern country' it would have the paraphrase 'every Middle Eastern country that John knows Arabic because he travels to it is located in the Gulf peninsula'. A possible representation for this sentence would be:
(17) Always, [knows(Arabic, John) because (Middle Eastern country (x₁) & John travels to x₁)] [x₁ is located in the Gulf peninsula]

Similarly, for sentence (16b), unselective binding of 'a record album' would be paraphrased 'every record album that John admires Mary because she likes it is by the Beatles'. Since these paraphrases do not exist for these sentences, in spite of the fact that there is a phrase which can provide a variable for the restriction, it is possible to conclude that binding of these variables is not possible because they are not in a syntactic position which would allow binding.

2.3.4.2 Complex NPs

As Ross (1967) has shown, movement out of a relative or complement clause within a noun phrase is impossible.

(18) Movement from Complex NP

(a) *Which man₁ did John see the friend who lives near t₁?

(b) *Who₁ do you believe the claim that Bill saw t₁?

Before turning to unselective binding within these clauses, it is necessary to turn to an additional complication with 'when' clauses and quantified noun phrases. As mentioned above, a sentence such as (8) (repeated below) is considered to be ungrammatical because there is no variable within the
restrictive 'when' clause which could be bound by the adverb of quantification:

(8) *When Mary knows French, she knows it well.

Now consider an analogous sentence with an individual level predicate (is intelligent, is tall, knows French) in the 'when' clause but, instead of a name, there is a quantified noun phrase:

(19) When every man in this room is intelligent, the conversation goes over my head.
(20) When most people in this room are tall, I look up alot.
(21) When every student in our department knows French, we offer Romance syntax courses.

Surprisingly, these sentences are grammatical. The logical representation for one of them (22), given standard assumptions, would be:

(22) always [Vx [man(x)& in this room(x) [x is intelligent]]]

Notice that there is no variable in the restriction for the operator 'always' to bind. The individual level predicate 'is intelligent' does not supply an event variable, and the variable over individuals provided by the common noun 'man' is bound by 'every'. Given the prohibition against vacuous quantification, this example is expected to be ungrammatical.
Since this example is grammatical, this means that there is either a problem with the prohibition against vacuous quantification, or there is a problem with the representation for the restrictive clause shown in (20) above.

A closer look into the semantics of this particular sentence reveals that there must be a hidden 'event' or 'time' variable that is being bound. Sentence (19) means that every time in which every man in this room is intelligent is a time in which the conversation goes over my head. The question now becomes what is the phrase that is supplying this time variable. If we want to keep the assumption that individual level predicates like 'is intelligent' do not supply an event variable, then the only other possible candidate would be the noun phrase predicate 'man in this room'. This would mean that noun phrases, as well as verb phrases, can have 'event' variables (see also Higginbotham (1985) who also assumes that noun phrases can have event variables and Enc (1982) for a discussion of the temporal aspects of noun phrases).

The revised logical representation for sentence (19) would now be:

(23) always, [\(Vx\) man\((x,e)\) & in this room \((x,e)\) [x is intelligent] [goes over my head \((e, the\) conversation)]]
What this says is that for every time in which every man at that time who is in this room at that time is intelligent, it is also a time in which the conversation goes over my head. This captures the meaning of the sentence, and is consistent with the prohibition against vacuous quantification.

Support for this particular analysis comes from noun phrases with indexical elements such as 'right now'. I assume that this element requires that the event variable be indexed to some contextually determined value, in the case of 'right now', this value would be this very moment. Once this variable takes on a contextually determined value, it is no longer free and cannot be bound by the adverb of quantification. This would predict that sentences such as (19)-(21), with 'right now' added to the noun phrase, would be ungrammatical, as there would not be any variable to bind in the restrictive clause of the quantifier; the prohibition against vacuous quantification would be violated. This is exactly what happens:

(24) *When every man in this room right now is intelligent, the conversation goes over my head.
(25) *When most people in this room right now are tall, I look up alot.
(26) *When every student in our department right now knows French, we offer Romance syntax courses.

Note also that contextual binding of the event variable does not require overt linguistic material in the noun phrase.
For example, in speaking about the men in this room right now, it would still be ungrammatical to say 'When every man in this room is intelligent, the conversation goes over my head'; the phrase 'right now' is not required to have the variable contextually bound.

As for the sentences with names (as (8) above), since names are rigid designators, they have no 'event' variable. Consequently, restrictive 'when' clauses that contain only names and individual level predicates will always lead to ungrammaticality.

The above digression was necessary because, in trying to show that unselective binding is not possible for an indefinite or stage level predicate within a noun complement clause or a noun relative clause, it is important to make sure that the adverb of quantification is not binding the 'event' variable associated with the noun phrase. Therefore, in order to test whether or not unselective binding occurs into these clauses, the event variable must be bound contextually.

With this in mind, consider the following sentences:

(27) *When every friend of mine who visits a foreign country is intelligent, it is located in Europe.
(28) *When most people in this room right now who like an opera are tall, it is an Italian opera.
(29) *When every member of our department who knows a foreign language is old, it is an Indo European language.

In sentences (27) and (29), the phrases 'friend of mine'
and 'member of our department' should be understood as my current friends and the members of our department at the present time. With these phrases read in this way, the event variable will be contextually bound and unavailable to be bound by the adverb of quantification. These sentences are all ungrammatical although there is an indefinite in the restrictive 'when' clause. Again, it appears that islands do have an effect on unselective binding.

2.3.4.3 Coordinate Noun Phrases

The last islands that will be considered are coordinate structure islands. As can be seen in the following sentences, a WH-word cannot move out of coordinate structure.

(30) Coordinate Structure and Movement

(a) *Which man, did John see Mary and t, ?

(b) *Which dog, did John buy a rabbit or t, ?

Similarly, an adverb of quantification cannot bind an indefinite which is part of a coordinate structure:

(31) *When John and a linguist, are tall, he, is from Arizona.

(32) *When Mary loves Hard Times and hates a Victorian novel, it, is usually by Thomas Hardy.

(33) *When Mary knows French and John knows a foreign language, he, knows it well.
If 'a linguist' in sentence (31) were bound by the implicit adverb of quantification 'always', it would have the paraphrase 'all linguists for whom John and them are intelligent are from Arizona'. However, this paraphrase is not possible, because the indefinite is within a coordinate structure.

2.3.5 A Comparison of Two Proposals

The previous discussion has shown that unselective binding obeys some island constraints: the Adjunct Island Condition, the Complex NP Constraint and the Coordinate Structure Constraint. However, I also discussed that one of the most well-known examples of unselective binding— that of adverbial operators binding indefinites within 'if/when' clauses—does occur across an island. This leads to the following question:

(34) Why does unselective binding occur across some islands (such as 'if/when' clauses) but not others (such as adjunct clauses)?

I have also put forward two possible approaches to the 'long distance' aspect of unselective binding. One approach, which I will call the indirect approach and is the one that is argued for in this dissertation, relies on index percolation through a series of local relationships. The other, which I call the long distance direct approach, has no
constraints other than simply requiring the indefinite to be in the scope of the adverb.

The best approach should provide a satisfactory answer to the question in (34). In what follows, I will see whether or not either of the approaches can answer this question. I show that only the percolation approach is consistent with the data.

2.3.6 The Long Distance Direct Approach Revisited

As I mentioned above, within the long distance direct approach the adverb can bear the selection index of the indefinite as long as it has the indefinite within its scope. The LF representation for a sentence such as (2), which I repeat below, would be as in (35):

(2) Usually, if/when a cat has blue eyes, it is intelligent.

(35) [IP usually, [IP [CP if [IP [a cat], [IP t, has blue eyes]]]] [IP it, is intelligent]]

In this representation, the adverb binds the indefinite directly.

As it stands, however, this approach cannot account for the locality effects which were demonstrated in the previous section. For example, I showed that if the indefinite is embedded within an adjunct clause within the 'when' clause,
the adverb cannot bind the indefinite. I repeat the relevant example below:

(16)a *When John knows Arabic because he travels to a Middle Eastern country, it is usually located in the Gulf peninsula.

This sentence would have the following LF representation under the binding approach:

(36) [IP usually, [IP [CP when [IP John knows Arabic [CP because [IP [a Middle Eastern country], [IP he travels to t,]]]]] [IP it, is located in the Gulf peninsula ]]]

Here, the 'when' clause is in bold and it functions as the restriction on the adverb of quantification 'usually'. The adjunct clause within this restrictive clause has been underlined. The indefinite which is inside this adjunct clause has been adjoined to the IP of the adjunct clause. The adverb has the indefinite within its scope and thus should be able to bind it.

Since the sentence is ungrammatical, the adverb should not be able to bind the indefinite. The binding approach fails to predict this. A possible alternative would be to impose a restriction on binding that would require that the adverb bind an indefinite within one island only. Since in the above example the indefinite is 'two' islands away from the adverb-it is within an adjunct (because) clause island which is
within a restrictive 'when' clause island—this sentence would be ruled out. However, even if the indefinite is embedded within only the adjunct (because) island unselective binding is not allowed:

(37) John usually knows Arabic because he travels to a Middle Eastern country.

If the adverb 'usually' were binding the indefinite, this sentence would have the paraphrase 'for most Middle Eastern countries, John knows Arabic because he travels to them'. Since this reading is unavailable, it shows that binding of the indefinite is not allowed.

This previous example demonstrates that it is not whether the indefinite is within an island, but what kind of island it is located in. The binding approach is not sensitive enough to capture distinctions among islands.

2.3.7 The Indirect Approach

Recall that the percolation approach requires that elements can bear an index only if they are in a certain local relationship (government, specifier/head or X-Bar projection). Furthermore, an index can be passed 'long distance' through a series of local relationships. This series of local relationships is dependent on whether or not a head can bear
an index. It is this fact which will provide an answer to question (34).

I argue that the selective nature of unselective binding within islands is dependent on whether or not the complementizer head of a clause can bear an index. I propose that only the complementizer head associated with 'if/when' clauses is able to bear an index. Consequently, this is the only clause that will allow a selection index to percolate to an element that will be in a local relationship with the adverb.

My analysis is as follows. The proposal that I outlined above would allow the following LF representation for unselective binding within restrictive 'if/when' clauses:

(38) [IP usually₁ [IP [CP₁ if/when [IP a cat₁, [IP t₁ has blue eyes]]] [IP it₁ is intelligent]]]

To recapitulate the analysis discussed earlier, the indefinite has been adjoined to the IP node of the restrictive clause. The head of the CP of the restrictive clause is in a government relationship with the indefinite adjoined to IP. Because they are in a government relationship, the head meets the structural requirements to bear the index. Furthermore, this head is lexically specified to bear an index. Thus, the selection index of the indefinite will be present on the head of this clause. This index will then percolate up to the CP
node because this CP node is the projection of a head which bears an index. Finally, the adverb will bear the index because it is in a government relationship with the CP of the restrictive clause which bears an index.

Now let's turn to a clause which does not allow index percolation. Recall example (16)a. It would have the following LF structure:

(39) [IP usually [IP [CP when [IP John knows Arabic [CP because [IP [a Middle Eastern country] [IP he travels to t ]]]][IP it is located in the Gulf peninsula ]]]]

The indefinite has been adjoined to the IP node of the adjunct clause. The head of the 'because' clause will be in a government relationship with the indefinite; it does meet the structural requirements for index percolation. However, as I proposed above, this head is not lexically specified as being able to bear an index. As a result, the index will never appear on the head and thus never be passed out of the clause. The index will never percolate high enough to a position where it could appear on the adverb.

The only way for the indefinite to pass its index to the CP of the restrictive clause would be for it to move out of the adjunct 'because' clause and adjoin to the IP of the restrictive clause. Then it would be in a government configuration with a head that can bear its index. However,
as I noted above, adjunct 'because' clauses are islands for movement. This is a case where both movement and index percolation is blocked.

Complex NP islands would be treated in a similar way. Consider again sentence (26):

(26) When every member of our department who knows a foreign language is old, it usually is an Indo-European language.

This would have the following LF structure:

(40) $\left[\text{IP usually } \left[\text{IP when } \left[\text{IP every } \left[\text{IP [DP member of our department [CP who, [IP [a foreign language]]] } \text{t, knows } t_2]]\right] \text{ it is old]]]\right] \text{ it is an Indo European language]]\right]$

As above, the reason that the adverb will not be able to bind the indefinite is because the head of the relative clause CP will not be able to bear a selection index. Consequently, as in the case of the adjunct 'because' islands, the index will never percolate up to an element which is in a local configuration with the adverb. Since the adverb will lack an index, the sentence will be ruled out.

Finally, consider the case of coordinate structure islands:

(34) *When Mary knows French and John knows a foreign language, he usually knows it well.
The LF structure would be as follows:

(41) \[ \text{IP \ usually \ [IP \ [CP \ when \ [IP \ [IP \ Mary \ knows \ French] \ and \ [IP \ [a \ foreign \ language]_1 \ [IP \ John \ knows \ t_1]]] \ [IP \ he \ knows \ it \ well]]] \]

In this structure, the indefinite 'a foreign language' has been adjoined to the IP node of the second conjunct. In this position, it fails to be governed by the head of the CP of the restrictive clause, because the conjoining node (the IP in bold) prevents the required government relationship. Furthermore, the indefinite is neither in a specifier/head relationship or X-Bar projection relationship with any element. Consequently, the adverb will not be in a local relationship with an element that bears a selection index, and it will be an instance of vacuous quantification.

To summarize, the index percolation approach can provide an answer to why unselective binding can occur within certain islands but not others. In the case of restrictive 'if/when' islands, index percolation is allowed because the head of these clauses can bear an index. In the case of adjunct and relative clauses, index percolation cannot occur because the head of these clauses cannot bear an index. Finally, in the case of coordinate structures, the required structural configuration will not be met for index percolation to occur.

2.4 The Problem of Scope
In the previous section, I showed that the complementizer head of restrictive 'if/when' clauses can bear a selection index which will allow the adverb outside of the clause to bind an indefinite within the clause. In this section, I show how adopting this percolation approach for unselective binding leads to a revision of the analysis of the problem of how these clauses are islands for scope.

Restrictive 'if/when' clauses are well known islands for movement. They are also well-known islands for scope. A quantified noun phrase within such a clause cannot take scope outside of this clause:

(42) *If/When a person knows [every foreign language],
he usually learned it, as a child.

The pronoun it in this sentence cannot be bound by every foreign language within the restrictive 'if/when' clause. Thus, every foreign language cannot have this pronoun in its scope.

This fact is easily captured under a theory which treats scope as the c-command domain of the entire noun phrase. The quantified noun phrase within the conditional must move out in order to have the pronoun within its scope. However, since the conditional is an island for movement, the QNP is not able to move outside of the clause. Since it cannot move outside the clause, the QNP will never have the pronoun in its scope.
Within the framework adopted here, this fact is much more difficult to capture. Since only the determiner need move out, and I argue that this movement can avoid island effects, nothing prevents the determiner from moving outside the restrictive 'if/when' clause. Furthermore, I also argue that the complementizer heads of these clauses are allowed to bear selection indices. This will allow a phrase within the clause to pass its selection index to the CP head and on up to CP.

A quantifier which governs CP can bear the index:

(43) \[
\text{[IP every}_2 \text{ [IP } \text{[CP}_2 \text{[C}_1 \text{ if}_2 \text{ [IP [op a foreign language]}
\text{[IP [op a man]}
\text{[IP t}_2 \text{ knows t}_1 \text{]}}} \text{]} \text{]} \text{] \text{] [IP he usually learned it, as a child]} \text{]}
\]

The position that I argue for would seem to allow conditional clauses to not be islands for scope.

The problem with (43) is that it is not the correct representation for this sentence. Recall that Heim adopts Kratzer's approach to conditionals in that they are considered to form restrictions on some operator. In this particular case, the operator is the adverb of quantification 'usually'. The adverb of quantification would bind the indefinite within the restrictive clause. The representation would then be:

(44) \[
\text{[IP every}_2 \text{ [IP usually}_1 \text{ [IP [CP}_1 \text{[C}_1 \text{ if}_1 \text{ [IP [op a foreign language]}
\text{[IP [op a man]}
\text{[IP t}_2 \text{ knows t}_1 \text{]}}} \text{]} \text{]} \text{] [IP he usually learned it, as a child]} \text{]}
\]
This still, however, does not solve the problem of limiting the scope of the universal quantifier. To remedy this, recall that in Heim's framework, there is another restriction on index copying that requires an index to be copied onto the lowest c-commanding operator. In the representation in (44), this means that both indices will appear on the adverb of quantification; the operator every will not be indexed because the adverb is the lowest c-commanding operator. Consequently, the every will be an instance of vacuous quantification, and this sentence will be ruled out.

As it stands, the above analysis requires a separate condition on index copying that does not follow from any of the constraints on index percolation that I discussed previously. However, Heim's condition to restrict index copying to the lowest c-commanding operator can be reduced to a constraint on government if the Rizzi (1990) formulation of Relativized Minimality is adopted. The essence of relativized minimality is that an element X cannot govern another element Y if there is a closer potential governor Z that intervenes between X and Y:

(45) Relativized Minimality: X α-governs Y only if there is no Z such that:
(i) Z is a typical potential α-governor for Y.
(ii) Z c-commands Y and does not c-command X.
With this conception of government, in the representation in (44), the operator *every* does not govern the restrictive clause CP. This is because there is another potential governor for the CP, the adverb of quantification, that intervenes between the operator *every* and the CP. This adverb of quantification c-commands the CP and does not c-command the operator *every*. Since the operator *every* does not govern the CP, the index present on the CP will not be transferred to the operator because the proper structural configuration will not obtain.

The same situation will occur if the operators were reversed. This time, however, it would be the adverbial operator that does not govern the restrictive clause CP, because the operator *every* would intervene.

The index percolation approach can easily accommodate the fact that the scope of quantifiers within restrictive 'if/when' clauses cannot extend beyond these clauses. Operators within the restrictive clause cannot move outside the clause because they would either fail to receive a selection index, or would block another operator from receiving an index. In both cases, the structure would be ruled out as an instance of vacuous quantification.
2.5 The Nature of the Complementizer

In the analysis that I have been considering, the one factor that allows index percolation in some cases and not others is whether or not the head of a CP can bear an index. For example, I have proposed that the head of a restrictive 'if/when' CP can bear an index, but the head of an adjunct 'before' clause cannot. The leads to the question of why these heads are allowed to bear an index, but others are not.

With the proposed system, it could just be a matter of the lexical restrictions on the head that allows it to bear an index or not. It is possible to say that the heads of restrictive 'if/when' CPs are lexically specified as being able to bear an index, while the heads of other clauses are not.

However, an interesting correlation exists between the clauses that are allowed to bear an index and the clauses that are not allowed to bear an index. The clauses that are allowed to bear an index are both associated with elements of the CP system that can function as [+wh] elements. For example, both 'if' and 'when' clauses can serve as complements of verbs that require indirect question complements, but 'because' clauses cannot:

(46) John wonders if/when/*because Mary is going out.
When 'if' and 'when' are used as restrictive clauses of an adverb of quantification, these elements do not contribute any information to the semantic representation, such as the fact that these clauses are 'question' complements, but nonetheless both clauses are associated with the elements that are [+wh].

I would like to argue that restrictive 'if/when' clauses are associated with a [+wh] element in their specifier of CP position that licenses the head of these clauses to bear an index. As I discussed in the introduction, a head can be licensed to bear an index if there is a special element in its specifier position. In the case of 'if' clauses, this element would be null, but in the case of a 'when' clause, this element is 'when' itself:

(47)a \([_{cp}0_{_{c'}1}if_{1}\ [_{ip}\ [a\ cat]_1\ [_{ip}\ t_1\ has\ blue\ eyes]\]

b \([_{cp}1\ when\ \ [_{c'}1\ 0_{1}\ [_{ip}\ [a\ cat]_1\ [_{ip}\ t_1\ has\ blue\ eyes]\]

This [+wh] element only functions as the element to license the head to bear an index, it does not contribute any semantic information. Since adjunct 'because' clauses are not associated with this element, their heads are not licensed to bear an index and thus index percolation cannot occur\(^1\).

---

\(^1\) It is interesting to note that the use of an element in the specifier of CP position to allow the head to bear an index is what I argue to be the function of 'pleonastic' WH-scope markers seen in Iraqi Arabic, German and Hindi. See chapters four and five for a discussion of this phenomena.
This opens another question about index percolation in relative clauses. I have also analyzed the heads of relative clauses to not bear an index, yet they have a WH element in their specifier position. The question that the above analysis leaves is what is the status of index percolation in relative clauses. I turn to this problem in the next section.

2.5.1 The Status of Index Percolation in Relative Clauses

As I discussed above, an adverb of quantification cannot bind an indefinite within a relative clause. I repeat the relevant example below:

(29) *When every member of our department who knows a foreign language is old, it is usually an Indo European language.

I analyzed this inability of the adverb to act as the binder of the indefinite as the result of the inability of the index of the indefinite to reach the adverb. The index was not able to percolate beyond the relative clause because the head of the relative clause CP was not able to bear an index.

However, in her analysis of unselective binding, Heim does allow an indefinite to be bound by the quantificational determiner associated with the noun phrase. Thus in a noun phrase such as:
(48) Every farmer who owns a donkey

the index of 'a donkey' can be bound by the determiner 'every'.

If this type of unselective binding of indefinites is possible, then the index of the indefinite must percolate far enough to be bound by the determiner. If this is the case, then the head of the relative clause CP must be able to bear the index. The associated LF structure in the framework argued for here would be:

(49) \[ \text{IP every}_{1,2} [\text{IP [DP e}_{1,2} [\text{NP farmer [NP [CP who}_{2} [\text{Cp}_{1}, 0_{1} [\text{IP [a donkey]_{1} [\text{IP t}_{2} owns t}_{1}]]]]]]_{2} ]] \]

This then would leave the question of why the head of the relative clause is allowed to bear an index. Recall that there is a [+wh] element in the specifier position of the CP. This element would allow the head to bear an index.

It might be argued that allowing the head of the relative clause to bear an index and the noun phrase determiner to bind the indefinite inside the relative clause would also mean that an adverb of quantification also can bind the indefinite; after all, the index of the indefinite can percolate out of the clause. This is not the case. Recall that for the adverb to bind the indefinite, it must govern an element that bears the index of the indefinite. Recall also that I adopt a
relativized minimality approach to government, which allows government between two elements as long as there is no intervening element between them. In the case above, the quantificational determiner will always intervene between an element that bears the index of the indefinite, and the adverb of quantification. Since there will be an intervening element, the adverb of quantification will never govern the element that bears the index, and consequently will never bind the indefinite.

However, there still remains a question of whether or not it is possible for even the quantificational determiner to bind the indefinite inside the relative clause. This is because the binding of the indefinite by the determiner in some cases leads to an incorrect semantics for the sentence; this is the noted 'proportion problem' (Heim, 1992; Kempson, 1984; Reinhart, 1987; Berman, 1991; Rooth 1990). Consider the following sentence:

(50) Most men who like a sports car worship it.

If the quantificational determiner 'most' binds the indefinite 'a sports car', and the pronoun 'it' is taken as anaphoric to the indefinite, the semantics for this sentence would be:

(51) Most_{x,y} [man(x) & sports car (y) & x likes y] x worships y
This would read as most pairs of men and sports cars in which the man likes the sports car, the man worships the sports car. In a situation in which one man likes ninety sports cars and worships all of them while nine men like one car each and do not worship their cars, the above semantics would allow the sentence to be true in this case. This is because most of the men/sports car pairs who are in the liking relation are also in the worshiping relation. The sentence, however, should be false in this situation.

Note that if the determiner is unable to bind the indefinite, this could be the result of either two conditions. It could be that determiners are different from adverbial quantifiers in that they can only bear one index\(^2\); this would prevent them from acquiring the index of the indefinite inside the relative clause even if its index could percolate to a position where it could be bound by the determiner.

Another condition could be as I had originally stated; the index of the indefinite cannot percolate beyond the relative clause. Again, the head of the relative clause CP would not be able to bear an index, despite the presence of the [+wh] element in its specifier position. This might not be as ad hoc as it sounds, because in the case of the [+wh] elements of relative clauses, these elements bear their own selection

\(^2\) This is similar to a proposal suggested in Chierchia (1992).
index. Since they occupy the specifier position of CP, it could be the case that they must agree in all features with their head position. This would be a case of strict specifier/head agreement. If the head of CP bears an index, it would also be required to appear on the element in specifier position. This element in specifier position would then bear more than one selection index, its own and the index of the indefinite. However, this would not be allowed as non-quantificational elements which enter into the semantic representation can only bear one selection index.

The status of quantificational determiners being able to bind indefinites inside relative clauses is unclear. Because of this, I will leave this question open at this point.

2.6 Previous Syntactic Approaches

Other authors have proposed syntactic restrictions on unselective binding. In this section, I review the proposals of Pesetsky (1987) and Nishigauchi (1990) and compare them to the approach in this dissertation.

2.6.1 Pesetsky (1987)

For Pesetsky, unselective binding is essentially an unbounded operation. This is based on the observation that an adverb of quantification can bind an indefinite inside an 'if' clause, although this clause is an island for movement,
noted above (sentences (2)). Since the adverb can bind an indefinite inside an island, Pesetsky concludes that unselective binding is free from island effects.

Pesetsky does not offer any other type of restriction on the phenomena. Thus, he allows unselective binding to be, in principle, unbounded. This is clear from his analysis of wh-in-situ. Certain wh-phrases (D(iscourse)-linked) are assigned scope not by movement but by being unselectively bound by a Q-element in COMP position. In a sentence such as (52) (Pesetsky's (30)), the phrase 'which woman' can be indexed with the Q-element in the matrix COMP (53); clearly this is a long-distance operation:

(52) Which man knows where which woman will live.
(53) [CP [Which man], [t, Q, [IP t, knows [CP where [IP [which woman]j will live]]]]]

Therefore, Pesetsky uses unselective binding to overcome island effects. His approach is the same as the long distance direct approach discussed above, and is inadequate in the same way.

2.6.2 Nishigauchi (1990)

Nishigauchi argues that there are two types of unselective binding, depending on the syntactic character of the operator which is to bind the restriction. If the operator is a maximal projection (it is an XP), such as an
adverb of quantification or a determiner in the specifier of the noun phrase, then binding can occur as long as the operator has its restriction in its scope. There is no locality constraint. An example of this type of binding phenomena is when an indefinite inside an 'if' clauses is bound by an adverb of quantification outside the clause.

On the other hand, if the binder occupies a head position (it is an X°), then the relationship of government must obtain. Nishigauchi gives as an example of this latter type of binding phenomena WH-Questions in Japanese. He proposes that non D-linked WH phrases in Japanese are like indefinites; they have no quantificational force of their own. These phrases get their quantificational force by being unselectively bound by a Q-element in COMP position (this is a head position). In order for this to occur, the WH-phrase must appear in SPEC position of CP. When they appear in SPEC of CP, they are governed by the Q element and unselective binding can occur.

Nishigauchi's proposal for a locality restriction on unselective binding parallels the locality restriction proposed here. The difference between the two theories is that while Nishigauchi argues that there are two different types of binding, one subject to locality and the other not, in the theory developed here, all types of unselective
binding, regardless of the nature of the antecedent, are subject to a locality requirement.
3.0 Introduction

I have shown in the previous chapter that index percolation is the best approach to explain the phenomena of 'unselective binding' in restrictive 'if/when' clauses. An adverb outside the clause comes to bear the selection index of an indefinite inside the clause by percolation of this index through the head of the clause.

In this chapter, I show that this same index percolation mechanism is also used in the syntax of internally headed relative clauses. I demonstrate that restrictive 'if/when' clauses and internally headed relative clauses share a number of syntactic and semantic properties. I argue that at the level of LF, these two types of constructions have similar syntactic representations.

3.1 Internally Headed Relative Clauses

In considering internally headed relative clause, it is useful to compare them to externally headed relative clauses. The following two examples and analysis are from Quechua (Cole, 1987). The first example is an externally headed relative clause, and the second an internally headed relative clause:
(1) Externally Headed Relative Clause
[\text{NP [\text{CP nuna ranti-shaq-n] bestya}]} \text{ alli}
\text{man buy-PERFECT-3 horse(NOM) good}
\text{bestya-m ka-rqo-n}
\text{horse-EVIDENTIAL be-PAST-3}

The horse that the man bought was a good horse.

(2) Internally Headed Relative Clause
[\text{CP nuna bestya-ta ranti-shaq-n]} \text{ alli}
\text{man horse-ACC buy-PERFECT-3 good}
\text{bestya-m ka-rqo-n}
\text{horse-EVIDENTIAL be-PAST-3}

The horse that the man bought was a good horse.

Both types of relative clauses receive a similar interpretation. The difference is that in the externally headed noun phrase, the noun 'bestya' is not a constituent of the clause 'nuna ranti-shaq-n', while in the internally headed relative clause, the noun is a constituent of the clause. The evidence for this comes from both word order and case. In Quechua, subordinate clauses are strictly verb final. Since the noun 'bestya' is to the right of verb in (1), it cannot be a constituent of the subordinate relative clause. In (2), the noun appears between the subject and the verb of the subordinate relative clause. In terms of linear order, it is a part of that clause.
There is also a difference in case marking between the nouns in the two constructions. For (1), the noun is marked with nominative case. This is the case marking that is consistent with the noun as subject of the matrix clause, and hence, not part of the matrix clause. For (2), the noun is marked with accusative case. This is the case marking that is consistent with the noun being the direct object of the subordinate clause and therefore, a constituent of the the subordinate clause.

Internally headed relative clauses are nominalized sentences (Langdon, 1977; Culy, 1990). They have a similar syntactic distribution to noun phrases and can appear with syntactic and morphological elements that are usually associated with noun phrases in these languages, such as case marking, determiners etc. The following examples from Lakhota and Diegueno illustrate these facts:

(3) Lakhota (De Reuse, pc)

(a) hokšila ki a+yə+phe
    boy ART +AGR(2NOM)+hit
    You hit the boy

(b) Wiyá wą lila tháka (čha) amáphe
    woman ART very 3S-big conj 1-3-hit
    A very big woman hit me.

(c) Wiyá wą amáphe ki oyuspa pi
    woman ART 1-3-hit ART 3-3-arrested PL
    They arrested the woman who hit me.
(4) Diegueño (Gorbet, 1976)

(a) i:pac(+pu+c) ciyaw
    man(+DEM+SUBJ) sing
The man sang

(b) i:pac 'wu:w
    man   I-saw
I saw the man

(c) i:pac 'wu:w+pu+c ciyaw
    man   I-saw+DEM+SUBJ sing
The man who I saw sang.

Sentences (3a) and (4a) show simple sentences with a noun phrase in object and subject position respectively. In (3a), the noun appears with the definite determiner ki, (in bold). In (4a), the noun appears with a demonstrative determiner -pu and subject case marking -(again in bold). The (b) examples are well-formed sentences in these languages that can appear as internally headed relative clauses with the appropriate nominal characteristics (the (c) sentences). In (3c), the sentence has the definite determiner ki and it appears as the direct object of the verb oyuspa. In (4c), the sentence has the subject case marker -(again in bold) and has the demonstrative determiner -pu. It functions as the subject of the verb ciyaw.

3.2 Similarities Between Restrictive Clauses and IHRCs

In this section, I explore in depth the similarity
between internally headed relative clauses and restrictive 'if/when' clauses. The discussion will focus on the following five topics: (1) semantic interpretation, (2) type of head noun phrase, (3) syntactic restrictions, (4) scrambling and (5) interchangeability.

3.2.1 Semantic Interpretation

Following Kratzer (1978), Heim (1982) considers that conditional clauses in English form the restriction on some operator. Thus, in a sentence such as (5) the conditional clause 'if a man is intelligent' will function as a restriction on the adverb of quantification 'usually'. The logical representation would be as (6), the restrictive clause in bold:

(5) Usually, if a man is intelligent, he is from Arizona.
(6) Usually_x [ man(x) & x is intelligent ] [ x is from Arizona]

The sentential part of the internally headed relative clause functions in exactly the same way; it forms the restriction on a quantifier¹. Consider the following

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¹ Culy (1990) considers internally headed relative clauses to function as the restriction on a quantifier. However, if an internally headed relative clauses is considered to consist of a determiner plus a sentence, then only the sentential part is the restriction. Srivastav (1991, 1992) argues that internally headed relative clauses are generalized quantifiers, and this takes into account that they have both a quantificational part (whether
internally headed relative clause from Lakhota (Williamson, 1987):

(7) hokšila yamni kuža pi iyuha
    boys three sick PL all
    all three boys who were sick

In this example, the sentence 'hoksila yamni kuza pi' appears with the determiner 'iyuha' and functions as the restriction on this quantifier. The logical representation is shown in (8):

(8) all, [three boys (x) & x is sick ]

The difference between the conditional clause in English and the internally headed relative clause in Lakhota is that in Lakhota, the sentence and quantificational operator that the sentence restricts form a constituent that can act as an argument to the verb (see (35), above). On the other hand, the conditional sentence in English does not form a constituent with the adverb of quantification that it restricts. It also cannot serve as an argument to a verb but it must appear as an adjunct to the matrix sentence.

3.2.2 Type of Head Noun Phrase

As was mentioned above, there is a noun phrase within implicit or explicit) and a restriction on that quantifier.
the sentential part of the internally headed relative clause that functions as the 'head' of the relative clause. However, it is not possible for any type of noun phrase to serve as the head of a relative clause. Consider the following sentences from Lakhota (Williamson, 1987). The relative clause is enclosed in brackets with the heads in bold:

(9) [Mary owiţa wa kaţe ki] he ophewathu
   Mary quilt a make the DEM I-buy
   I bought the quilt that Mary made.

(10)*[Wichaša iyuha t'a pi ki] Lakhota pi
   men all die PL the Lakhota PL
   All the men who died were Lakhota

In (9), the head of the relative clause is an indefinite noun phrase, while in (10) the head of the relative clause is a universally quantified noun phrase. Williamson explains that these relative clauses exhibit a 'definiteness' effect; the type of noun phrase that can function as the head of an internally headed relative clause are indefinite expressions that correspond to Milsark's (1974) class of cardinality expressions. This class includes noun phrases with the indefinite determiners wa 'a' and eya 'some', the determiners ota 'many' and conala 'few' and numbers. The types of noun phrases which cannot serves as heads are those noun phrases with the definite determiners ki 'the' and k'u 'the aformentioned', universal quantifiers iyuha 'every, all' and
other quantifiers such as *ota hca* 'most'.

This contrast can be explained if we adopt (1) the prohibition against vacuous quantification and (2) an extension of the Kamp-Heim analysis of indefinites to all types of noun phrases with weak determiners (Diesing (1990); see also Higginbotham (1987); Reinhart (1987) and the references therein); that is, all weak noun phrases can be interpreted as having no quantificational force but simply introducing variables. The determiner would function as a cardinality marker for the set\(^2\).

With these two proposals, the analysis for the above would be as follows. In sentence (9), the indefinite *owiza wa* 'a quilt' will introduce a variable which can be bound by the determiner. Since the sentential part of the internally headed relative clause functions as the restriction on the determiner, the indefinite noun phrase head, there will be a variable in the restrictive clause and the prohibition against vacuous quantification will be satisfied. In sentence (10), the universally quantified noun phrase *wicha̱sa iyuha* 'all the men' is to function as the head. However, the variable introduced by *wicha̱sa* is bound by the quantifier *iyuha* 'all'. In this case, there is no variable for the determiner to bind and this would violate the prohibition against vacuous quantification.

\(^2\) Culy (1990) makes a similar argument.
quantification.

Comparing these facts to English restrictive 'if/when' clauses, the contrast is the same. An adverb of quantification can bind an indefinite noun phrase within the conditional; the indefinite is understood as having the quantificational force of the adverb of quantificaiton. Universally quantified noun phrases do not have this property; they cannot be bound by an adverb of quantification because the variable introduced by the common noun is already bound by the universal quantifier of the noun phrase.

3.2.3 Syntactic Restrictions

Just as not any type of noun phrase is possible to serve as the head of the relative clause, it is also not possible for the head to appear in any syntactic position. The position of the head is sensitive to syntactic islands. The following examples are from Quechua and Navajo and show that the head of an internally headed relative clause cannot be inside of a another relative clause:

(11) Imbabura Quechua (Cole, 1987)

*[[Juan [warmi japi-shka sis-kuna] gushta-j]]
  Juan woman pick-NOMINAL flower-PL like-NOMINAL

juyaylla-mari
beautiful-VAL

*The woman who Juan likes the flowers that picked is beautiful.
(12) Navajo (Platero, 1974)

*[[Hastiin lééchąą́'í bishxash-ée] be'eldq̲́óòh
man dog 3:perf:3:bite-REL gun
néidiitá-(n)ée] nahał'ìn
3:perf:3:pick up-REL imp:3:bark

*The dog that the man who was bitten by picked up the gun is barking.

In sentence (11), the head warmi 'woman' is located within the externally headed relative clause warmi japi-shka sis-kuna 'the flowers that the woman picked'. This noun phrase plus relative clause is the object of the verb gusta 'like'. The entire sentence Juan warmi japi-shka sis-kuna gushta 'Juan likes the flowers that the woman picked' is nominalized and is an internally headed relative clause that functions as the subject of juyaylla-mari 'is beautiful'.

In sentence (12), the head lééchąą́'í 'dog' is located within the internally headed relative clause hastiin lééchąą́'í bishxash-ée 'the man who was bitten by the dog'. This internally headed relative clause is the subject of the verb néidiitá 'picked up'. The entire sentence hastiin lééchąą́'í bishxash-ée be'eldq̲́óòh néidiitá 'the man who was bitten by the dog picked up the gun' is itself nominalized and an internally headed relative clause that is the subject of the verb nahał'ìn 'bark'. 
In each of these cases, the head is located inside of a complex NP and the sentence is ungrammatical.

Also, in Navajo, the head cannot be part of a conjoined noun phrase. The head is again in bold:

(13) Navajo (Platero, 1974)

*[Leéchą́ą́'í dóó mósí áłhigá̃-(n)éé]
dog and cat recip:imp:3:fight-REL

nahał'ín
imp:3:bark

* The dog which and the cat were fighting were barking.

Here, the sentence *Leéchą́ą́'í dóó mósí áłhigá̃ 'the dog and cat were fighting' is relativized and functions as the subject of the verb nahał'ín 'bark'. The head of this clause is Leéchą́ą́'í 'dog'. However, it is part of a coordinate structure and the sentence is ungrammatical.

These facts about the head of an internally headed relative clause parallel those of an indefinite noun phrase in a restrictive 'if/when' clause; both cannot occur inside of a syntactic island.

3.2.4 Scrambling

As was mentioned above, a conditional which contains an individual level predicate will be ungrammatical unless it also contains an indefinite noun phrase which provides a
variable for the quantificational operator to bind. However, there is an additional complication with respect to indefinites in object position. Consider the following sentences, from Kratzer (1989) which all contain individual level predicates and indefinite objects:

(14) a *When this proof contains a mistake, Mary will point it out to us.
    b *When this proposal requires a formal approval, we will try to obtain it soon.
    c *When this lot is close to a swamp, construction must be kept 200 feet away from it.

(15) a When Sue likes a movie, she recommends it to everyone.
    b When Mary knows a foreign language, she knows it well.
    c When this assignment is too hard for a student, you may offer to help him.

The sentences in (14) are all ungrammatical and those in (15) are all grammatical, although in each case there is an indefinite which can provide a variable. This contrast is unexpected given our assumptions about 'when' clauses and the prohibition against vacuous quantification.

Kratzer observes that there is another property which distinguishes these two sets of verbs. This is the property of 'scrambling'. Scrambling is a phenomena found in some
natural languages in which the order of constituents is somewhat free; noun phrases may appear dislocated from their 'base' position and adjoined to a maximal projection. German is one language which allows noun phrases to scramble. Kratzer notes that in German, the object noun phrases of the verbs in (16) cannot scramble, while the object noun phrases of the verbs in (17) can scramble:

(16)
a *falls ein Bewels einen Fehler nicht enthält.
  if a proof a mistake not contains
b *falls ein Projekt eine Genehmigung nicht
  if a proposal an approval not
  erfordert.
  requires

c *falls ein Grundstück an einen Sumpf nicht grenzt.
  if a lot on a swamp not borders

(17)
a falls ein Kritiker einen Film nicht mag.
  if a critic a film not likes
b falls ein Dolmetscher eine Fremdsprache nicht
  if an interpreter a foreign language not
  beherrscht.
  knows

c falls ein Übungsblatt einem Schüler nicht
  if an assignment to a student not
  schwerfällt.
  hard is

The sentences in (16) contain the same verbs as those in (14), those in (17) contain the same verbs as in (15). In each sentence, the indefinite object precedes the negative
marker nicht. This is an indication that the object has been moved from its base position. Scrambling is possible for the indefinite objects in (17) but not in (16).

These facts about scrambling thus correlate with the possibility for an adverb of quantification to bind an indefinite in object position; an object must scramble if it is to be bound. In German, scrambling of the object happens overtly; it can take place at S-Structure. In English, scrambling of the object is covert and takes place at LF.

The distinction between those sentences in (14) and those in (15) is that in (14), the object cannot scramble at LF and therefore the implicit adverb of quantification has no variable to bind. This violates the prohibition against vacuous quantification. In (15) the object can scramble at LF and the indefinite can be bound; the prohibition against vacuous quantification is satisfied.

Turning to internally headed relative clauses, the following examples show that the internal 'head' can scramble overtly in some languages. The first two languages, Cocopa and Diegueno, are from the Yuman family and the second two, Tanaina and Koyukon are from the Athabaskan family. The head is in bold:
(18) Cocopa (Gorbet, 1976)

a  John xu:r ya:t xat pa:cu:t  
  John rock dog hit  
  John hit the dog with a rock.

b  ?John xu:r (ya:t) xat pa:cu:s+p+t'y u:n'iyil'cis  
  John rock dog hit+DEM+SUBJ black-EMPH  
  the dog John hit with the rock was black.

c  John xu:r xat pa:cu:s+p+t'y u:n'iyil'cis  
  John rock dog hit+DEM+SUBJ black-EMPH  
  The rock John hit the dog with was black.

d  John xat su:r pa:cu:s+p+t'y u:n'iyil'cis  
  John dog rock hit+DEM+SUBJ black-EMPH  
  the dog John hit with the rock was black.

(19) Diegueño (Gorbet, 1976)

a  i:pac 'wa: n'iy+k wyiw+pu+c n'imsap  
  man house that+ABL come+DEM+SUBJ white  
  the house that the man came from was white.

b  i:pac 'wa:+k wyiw  
  man house+ABL come  
  the man came from the house

(20) Tanaina (Thompson, 1980)

a  kil k'isen ghi'anen qenash  
  boy girl saw-REL is talking  
  The boy who saw the girl is talking.

b  kil k'isen yenazt'eden qut'ana eztel  
  boy girl kissed-REL man kicked  
  The woman whom the boy kissed kicked the man.

(21) Koyukon (Thompson, 1980)

a  soda soho kkaakin yagheghon deeyoookk  
  my sister me-for boots it-made-REL burnt  
  my sister me-for boots it-made-REL burnt

b  soda kkaakin soho yagheghon deeyoookk  
  my sister boots me-for it-made-REL burnt
c kkaakin soda soho yagheghon deeyookk
  boots my sister me-for it-made-REL burnt
  the boots which my older sister made for me
  burnt.

Sentence (18a) shows a basic sentence of Cocopa, with the direct object closest to the verb. This sentence can be nominalized to form an internally headed relative clause with the direct object (18b) or the indirect object (18c) as the head. In (18d), the direct object has been scrambled to a position between the subject and indirect object. In this sentence, only the scrambled, direct object can be the head of the relative clause. The examples in the next three languages show that head does not occupy its base position by the fact that a pronoun occupies this position. A comparison of (19a) and (19b) show that in Diegueno, the pronoun nyi occupies the base position of the head 'wa: 'house'. In example (20b) from Tanaina, the head k'isen appears dislocated from its base position because the third person prefix ye appears on the verb. This prefix does not appear when the direct object is in its base position (20a). Lastly, the examples from Koyukon demonstrate that the head of an internally headed relative clause can scramble from both word order and the pronominal prefix on the verb. As in Tanaina, the ye prefix on the verb appears only when the direct object is moved from its base position. Also, the head kkaakin
'boots' can appear at the front of the sentence (21c), between the subject and the indirect object (21b) or adjacent to the verb (21a).

3.2.5 Interchangeability

As a final note of the similarity between internally headed relative clauses and restrictive 'if/when' clause, it can be demonstrated that a restrictive 'if/when' clause can often be used in place of an internally headed relative clause. This occurs in Slave (Rice, 1989) when the relative clause is used to express a 'generic' statement:

(22) [yenene ?edø i] ?eno nezø hili yile
    woman 3-drink COMP mother 3-is good 3-is NEG
    A woman who drinks is not a good mother.

(23) [bele dawi i] ?aghata dene kahsho
    wolf 3-is hungry COMP sometimes person 3-bite
    A hungry wolf will sometimes bite people

Rice explains that "this type of relative clause is often expressed with a conjoined structure rather than a complement structure":

(24) [yenene ?edo ni'de] ?enø nezø hili yile
    woman 3-drink if mother 3-is good 3-is NEG
    yile
    If a woman drinks, she isn't a good mother.
If a wolf is hungry, it sometimes bites people.

3.3 The Analysis

In the previous section, I gave evidence which demonstrated a syntactic as well as semantic similarity between internally headed relative clauses and conditional clauses in English. In this section, I will give an analysis of the LF structure of internally headed relative clauses and show that they resemble the LF structure of conditional clauses. In this way, it can be shown that the same type of index percolation between a restriction and an operator is necessary in these types of clauses as well.

3.3.1 The LF Structure of Internally Headed Relative Clauses

As was mentioned above, internally headed relative clauses are sentences which have the morphosyntactic properties of noun phrases; they are nominalized sentences. The structure that I will adopt for the S-Structure and LF representation of these clauses will be a slightly modified and 'updated' version of the structure proposed in Williamson (1987). I will motivate this representation in the next section. However, for now, this is what I propose:
In these representations, I adopt the CP analysis for clause structure proposed in Chomsky (1986) and the DP analysis for the structure of noun phrases proposed by Brame (1982), Abney (1987) and others. Since internally headed relative clauses are nominalized sentences, determiner heads in these languages can be considered to take clauses as their
complement as well as NPs.

At LF, the head will move to specifier of CP position. Movement of the head at LF had been proposed by Cole (1987); Williamson (1987) and Barss et al. (1991). However, here I argue that this is not the ultimate LF representation for these clauses. Recall that Heim (1982) proposes a tripartite structure for sentences with quantifiers. In her theory, quantified noun phrases move to adjoin to the sentence (IP) node, but there is also a rule of Quantifier Construal which moves the determiner out of its base position and adjoins it also to the sentence (IP) node. The representation of the Lakhota relative clause *hoksila yamni kuža pi iyuhap* 'all three boys who were sick' would be:

(27) LF Structure for IHRC

```
  IP
 /   \
|     |
IP iyuhap
   \
   IP
    \
   DP ilk
    \
   IP
    D' ilk
     \
    IP
     \
   CP
     \
   [hoksila yamni] ilk
     \
   C'
     \
   IP
     \
   C
     \
  IP
    \
 tₐ kuza pi
```
In this representation, the determiner *iyuha* 'all' is moved out of its base position and adjoined to the matrix IP node. The indefinite noun phrase *hokšila yamni* 'three boys' has been moved to the specifier of CP position. The head of the internally headed relative clause serves the same function as the indefinite is a restrictive 'if/when' clause. It provides a variable for the operator to bind.

Here, the head must become bound by the quantifier *iyuha* 'all'; the quantifier must obtain the index of the indefinite. However, in its position adjoined to the IP node, the quantifier itself does not meet the locality requirement that I propose is necessary for unselective binding; it is too far away from the indefinite in the specifier of CP position of the relative clause.

I argue that the indefinite can receive the index of the quantifier by index percolation through the head of the DP. This head will be in a government relation with the CP of the internally headed relative clause. This CP can come to bear the index of the indefinite because the indefinite and the head of CP are in a specifier/head relationship. The indefinite head in the specifier position will license the head to bear an index. The head of CP can bear the index and then the index can percolate up to CP by X-Bar projection. The index will be transferred to the head of DP because CP and
the head of DP are in a government relationship. As a result of X-Bar projection again, the index will be present on the DP as well. Since the determiner governs the DP, it will also be able to bear the index. The indefinite thus is bound by the quantifier indirectly through the head of the DP.

The same arguments that motivated an indirect approach for binding in restrictive 'if/when' clauses can be used to support the indirect approach here. Recall that the head of an internally headed relative clause cannot occur within an island. If binding of the head were by means of a direct approach, there would be no way to explain why the head cannot occur inside of an island. The direct approach places no constraints on binding.

With an indirect approach, the binding of the internal head by the determiner depends on whether or not the index can percolate up to an element that is in a local configuration with determiner. I argued that this depends on whether or not an element can bear an index. When the internal head is located within an island, such as a relative clause, feature percolation does not occur because the complementizer head of these clauses cannot bear an index, just as in the case of unselective binding in restrictive 'if/when' clauses3.

---

3 See section 3.6 for cases where it appears that there are subjacency violations.
Notice that the type of indirect binding that I proposed for internally headed relative clause in fully parallel to the binding between an adverb of quantification and an indefinite within a conditional clause:

(28) LF Structure for Conditional Clause

In this representation, the indefinite has moved and adjoined to IP. The adverb of quantification 'always' is base generated in its position adjoined to the matrix IP; this is the same position that the determiner has at LF in the internally headed relative clause. The adverb of quantification and the CP of the conditional clause meet the locality requirement, therefore the adverb can bind the conditional clause CP and it can bear the index of the quantifier. The index can then percolate down to the head
position 'if'. As in the case of the internally headed relative clause, the head of the phrase and the indefinite also meet the locality requirement, and the indefinite becomes indirectly bound by the adverb of quantification through the head position.

In the above analysis, the syntax of quantifier binding in internally headed relative clauses is analogous to the syntax of quantifier binding in conditional clauses. The relationship between quantifier binding in internally headed relative clauses and in conditional clauses is similar to the relationship between WH-question formation in Chinese and English. In English, the WH-question word moves to the specifier of CP position in the syntax; the operator/variable relationship is determined at S-Structure. In languages like Chinese, the WH-question word is in situ at S-Structure but moves at LF to specifier of CP (Huang, 1982). The operator/variable relationship is determined at LF. Similarly, in the case of unselective binding in conditional clauses in English, the operator is associated with a head position at S-Structure but in a language like Lakhota with an internally headed relative clause, the operator is associated with its head position at LF.
3.4 A Reason for Head Movement

As I discussed above, I follow many authors in requiring that the head of an internally headed relative clause move at LF. However, many of these authors fail to give an adequate explanation for why the head must move at LF. In the system that I have adopted, the movement of the head at LF receives a natural explanation. Since unselective binding is subject to a locality restriction, the head must move to be close enough to the determiner to be bound by it.

More specifically, in this system of index percolation, a head is allowed to bear an index in two ways. One is if it is lexically specified to do so and the other is if there is an element in its specifier position that licenses it to bear an index.

If we assume that a head of CP can only bear an index if there is an element in its specifier position which licenses it to bear an index, then in the structure that I have proposed for internally headed relative clauses, the index of the head would never reach the determiner if it were to stay in its base position. This is because there is a CP between the determiner and the base position of the head. Since the head of CP cannot bear an index on its own, the index of the head would not be able to percolate beyond the IP of the internally headed relative clause.
If the head were to move into the specifier of CP, there would be an element in the specifier position to license the head to bear an index. Since the head is now able to bear an index, it can come to bear the index of the internal head by SPEC/HEAD agreement. This index can then percolate up to CP by X-Bar projection, and ultimately appear on the determiner as I described above.

3.5 A Motivation for this LF Structure

In the previous section, I adopted a revised Williamson (1987) representation of internally headed relative clause. However, I know of two other structures, one in Cole (1987) and the other in Barss et. al. (1991), which have been proposed for this construction. In this section, I compare the three different structures and argue that the revised Williamson (1987) proposal is most consistent with the available data.

3.5.1 The Three Structures

As I mentioned before, the Williamson (1987) treats internally headed relative clauses as noun phrases which have a sentential complement. I have updated her representation to be consistent with the DP Hypothesis and the CP representation for clause structure. Furthermore, she argues
that the head moves to the right. However, I revise her representation and move the head to the left:

(29)

At LF, the 'internal' head is moved to the specifier position of the CP that is the complement of D.

The representation of Barss et. al (1990) is slightly different. They consider internally headed relative clauses to be simply CPs. They also adopt a movement analysis of the head at LF, but the landing site of that head is different. They propose that the internal head is moved at LF to the specifier of CP, but that this specifier is to the right, not the left as above:

(30)
Cole (1987) proposes a much more radical structure. At S-structure, there is a null head which is coindexed with the NP inside the relative clause. At LF, the NP internal to the clause which is coindexed with the null head is raised into the head position. In (31)a I show the S-structure representation, and (31)b the LF representation:

(31)a
\[ \\
S \quad NP \\
\quad NP_1 \\
\quad e_1 \\
\]

(31)b
\[ \\
S \quad NP_1 \\
\quad t_1 \\
\quad (lexical) \\
\]

Since Cole's analysis is the most radical of the three, positing a null head where the other two do not, I will discuss this proposal first.

3.5.2 The Null Head Hypothesis

Cole (1987) gives two arguments in support of a null pronominal head at S-structure. One argument is based on the distribution of internally head relative clauses cross-linguistically. The second is based on subadjacency. I will
address the distribution argument first.

The distribution argument is based on the observation that internally headed relative clauses only occur in OV languages with null anaphora. Cole claims that the structure in (3) combined with the following principle on anaphoric relations (based on Langacker (1969) and Ross (1969)) will predict this distribution:

(32) An anaphor cannot both precede and command its antecedent.

The argument is as follows. A language with OV structure has left branching structures. Consequently, its noun phrase structure will be left branching. This would mean that (33)a would be the structure of a noun phrase with a null head plus (internally headed) relative clause in a left branching, OV language, while (33)b would be the same structure of in a non OV right branching language:

(33)a
In (33)a, the null head commands but does not precede the lexical head within the relative clause, which is the antecedent of the null head. This does not violate the principle stated in (32), and this structure is allowed to occur. However, in (33)b, the null head does precede and command its lexical antecedent within the relative clause, and this violates (32). This type of structure would not be able to occur. Thus, the existence of a null head which is anaphoric to the lexical head (with the principle in (32)) would predict the distribution of internally headed relative clauses. The distribution would not be predicted in a structure without a null head anaphoric to the lexical head.

The problem with this analysis is that it fails to account for the pattern of disambiguation seen with internally headed relative clauses that contain more than one possible head. Consider the following internally headed relative clauses from the Yuman family:
Diegueño (Gorbet, 1976)

a xatkkok wi:m tuc+pu+c n'iL'y 
dog rock+COMIT I-hit+DEM+SUBJ black

The rock I hit the dog with is black

The dog I hit with the rock is black

Mesa Grande Dialect

b 'wil'y 'xat n'i+m 'tu:+pu+c n'iL'y cis 
rock dog that+COMIT I-hit+DEM+SUBJ black-indeed

The rock I hit the dog with was black

In (34)a, which shows the more usual word order, either noun phrase can be construed as the head. In (34)b, with the oblique object fronted (and a resumptive pronoun left behind in its original position), has only one interpretation with the fronted object as the head. Thus, in order to disambiguate the sentence, the head can move to the left.

The representation that I advocate can explain these facts easily. Recall that in all the representation discussed above, the head is considered to raise at LF. This would be an instance of covert movement. It is also known that sometimes, it is possible for movement that happens covertly can also happen overtly. I argue that fronting of the head is an instance of overt raising of the head to specifier of CP. Since the specifier of CP is to the left in SOV languages, overt raising of the head would appear as movement of the head to the front of the sentence. This is exactly the
situation shown above.

For Cole, it would be hard to explain this pattern of disambiguation. First, if the head is considered to still be internal to the clause, there is no explanation given with the structure he adopts for why movement to the left is disambiguating. If anything, if this were a case of overt movement, Cole would predict that the head should move to the right. Second, even if it is assumed that this is an example of an externally headed relative clause, then this would be the case of a language with internally headed relative clauses and externally headed relative clauses which are left headed. This would pose a problem because Cole only allows internally headed clauses to appear in languages that would also have only right headed externally headed clauses.

The second argument is based on subjacency. The argument is developed based on data from Quechua. Quechua has both internally headed and externally headed relative clauses (see above). Also, both types of relative clauses are islands for extraction:

(35)a *pi-ta-taq, qanyan wamra t, rika-nga-n-ta
   Who-ACC-WH yesterday child see-NOM-3-ACC
   kuya-nki
   love-2

Who do you love the child that saw yesterday?
Cole suggests that these facts could be accounted for by the subjacency condition if S' and NP are considered to be bounding nodes.

However, Cole also points out a problem for the usual bounding node approach. This problem is based on his analysis of complement clauses in Quechua. He argues that complement clauses have the structure \([NP \ [S']]\) rather than simply \([S']\). This is based on the following data. First, clauses are case marked in the same way nominal arguments are. Second, the agreement morphology in these clauses is the same as that found in nouns and different than that on verbs in main clauses:

(36)a Main clause

qam shamu-nki
you come-2
You come.

b Second person nominal

peqa-yki
head-your

your head
c Object Complement Clause

\[ \text{noqa [qam rikaa-ma-nqa-yki]-ta pensa-rqo-o} \]
\[ \text{I you see-1-NOMINAL-2-ACC think-PAST-1} \]

I think you saw me.

In (36)c, the complement clause is marked with the accusative suffix -\( \text{-ta} \). Also, the second person agreement marker is the same as that on nouns (36b) and not like that on verbs (36a).

Thus, if complement clauses are [NP [S']] and subadjacency disallows movement across more than two bounding nodes, movement out of a complement clause should be ungrammatical. This is because movement of a WH-phrase to the matrix CP will cross the NP node of the complement clause as well as the S node of the main clause. However, movement out of these clauses is well-formed:

(37) \[ \text{pi-ta-taq qam rikaa-nqa-yki-ta pensa-rqo-nki?} \]
\[ \text{Who-ACC-WH you see-NOMINAL-2-ACC think-past-2} \]

Who do you think you saw?

Cole argues that the grammaticality of an example such as (37), with extraction from a complement clause and the ungrammaticality of (35)b with extraction from a headed relative clause, can be explained if the NP node of the complement sentence is not considered to be a bounding node,
while the NP node of a headed relative clause is considered a bounding node. He argues that Chomsky's (1973) definition of subjacency will allow this difference. This definition is dependent on the notion of L- containment:

(38)a Category A L-contains category B if and only if A properly contains B and for all C = A, if A contains C and C contains B, then A = \ldots C\ldots where \ldots contains a lexical item.

b B is subjacent to A if and only if A is superior to B and there is at most one cyclic category C such that C L-contains the Minimal Maximal Category of B and C does not contain A.

In essence, the notion of subjacency that is dependent on L- containment states that a particular node can count for subjacency only if it branches lexically; a node that does not branch but is a bounding node will not count.

This definition of subjacency will account for the pattern of extraction from complement clauses and lexically headed clauses. Since the NP of complement clauses does not branch lexically, it will not count for subjacency. However, since the NP node of a headed relative clause does branch lexically (it branches to NP and S, and NP contains lexical items), it will count as a bounding node.

This subjacency argument is applied to internally headed relative clauses because Cole also assumes that they are sentences that are dominated by an NP node. However, if there
was no null head, the structure of an internally headed relative clause and the structure of a complement clause would be the same; they would both have the structure [NP [S']] . This would predict that extraction would be allowed out of an internally headed relative clause; the NP that dominated the clause would not count for subjacency. However, if there was a null head, the NP of the internally headed relative clause would branch lexically just as an externally headed relative clause, the only difference being that the lexical part of the internally headed relative clause would be phonologically null. Since the NP under this analysis branches lexically, it would count as a bounding node and this would rule out extraction from the internally headed relative clause.

However, upon closer examination, it is still possible to have internally headed relative clauses as islands without resorting to a null head. This is because there is another bounding node present in the structure of internally headed relative clauses which could count for subjacency. This node would be the S (IP) of the clause.

Consider first complement clauses. Let's assume the structure that Cole adopts for these clauses; that is, these clauses are [NP[S']] . Movement out of this clause must be successive cyclic. What this means is that in [S'] of the complement clause, there would be an intermediate trace of
movement out of this clause:

\[(39)\]

Here, there is never any movement across two bounding nodes as long as the NP node of the complement clause does not count for subjacency purposes, as Cole suggests.

Now, if movement from the complement clause to the matrix S' was not able to proceed successive cyclically, and there was no intermediate trace in S' of the lower clause, then this movement would violate subjacency. This is because two bounding nodes would be crossed: the S of the complement clause and the S of the main clause. Note also that this does not depend on whether or not the NP of the complement clause is considered a bounding node for subjacency.

Thus, if internally headed relative clauses have a similar structure as complement clauses (they are [NP [S']]), then it would still be possible to account for the difference
in extraction from these clauses without resorting to a null head. If successive cyclic movement was not possible with internally headed relative clause, while the same kind of movement was possible with complement clauses, then the subjacency condition would be violated with internally headed relative clauses but not complement clauses. This violation would not depend on whether or not the NP node of the clause branched or not.

I argue that successive cyclic movement is not possible from internally headed relative clauses. Recall again that in the structure I adopt, there is obligatory raising of the head to $S'$ (the specifier of CP) at LF. However, if a phrase has been extracted from the clause, there will be a trace in $S'$ (the specifier of CP). This trace will block the movement of the head into $S'$ (the specifier of CP); this is an instance of the doubly filled COMP filter. If the phrase which has been extracted does not move through the $S'$ (specifier of CP) of the internally headed relative clause, the head of the relative clause can move into this position but there will be a subjacency violation. The phrase which has been extracted from the internally headed relative clause would cross two bounding nodes: the $S$ of the internally headed relative clause and the $S$ of the matrix clause.
In summary, the evidence from subjacency does not support a null head analysis for internally headed relative clauses. The data that shows that extraction from an internally headed relative clause is impossible is also consistent with a no (external) head analysis, as long as the internal head is considered to raise within its clause at LF.

3.5.3 The Position of the Head

The structure that I adopt is also different from the Williamson (1987) analysis and the Barss et al. (1991) analysis in the position of the head at LF. In these representations, the head is moved but is moved to the right. In the representation that I adopt, the head is moved to the left, into specifier of CP position.

Barss et al. (1991) also move the head to the specifier of CP position, but the linear order of the specifier position is to the right in their representation. They adopt this approach because they consider internally headed relative clauses and externally headed relative clauses to have the same structure at LF. The language that they base this claim on is Navajo. Navajo has both internally headed relative clauses and externally headed relative clauses. In the externally headed structure, the head is to the right:
The boy who is sleeping is snoring.

Sentence (40)a shows the internally headed relative clause, and (40)b the externally headed relative clause. In (40)b, the head is on the right.

Thus, Barss et al. (1990) consider externally headed relative clauses to be an instance of the overt realization of head raising, while internally headed relative clause would be an instance of the covert realization of head raising.

There are three problems with this approach. First, if externally headed relative clauses were an instance of overt raising of the head to the specifier of CP, then we would expect that another instance of overt raising to the specifier of CP position—that of WH-movement—to be in the same direction. Since overt raising moves the head to the right, WH movement should also move the WH-phrase to the right. However, this is not the case. WH-movement is to the left.

The following data is from Schauber (1979):

(41) ha'át'íísh ashkii yiyiíltsá
What Q boy 3.3.P.see

What did the boy see?
A second problem with this approach is that internally headed relative clauses and externally headed relative clauses have identical LF structures. Since LF is the interface between the syntax and semantic interpretation, this would predict that internally headed relative clauses and externally headed relative clauses would have the same semantic interpretation. There is evidence that this is not the case. In Quechua, which also has internally headed relative clauses and externally (right)-headed relative clauses like Navajo, there is a difference in the interpretive possibilities between these two types of relative clauses. This data and argument is from Srivastav (1992):

(42) nuna ishkay bestya-ta ranti-shqa-n alli
    man two horse-ACC buy-PERF-3 good
    bestya-m ka-rqo-n
    horse-VALIDATOR be-past-3

The two horses that the man bought were good.

This sentence contains an internally headed relative clause, with a numeral on the internal head. It can only mean that the total number of horses that the man bought were two; this sentence cannot be continued by "...and two were bad". However, if the head was external, this would be a possible continuation of the sentence. Thus, the two types of relative clauses have distinct semantics.
Finally, as described above, there are the cases where internally headed relative clauses alternate with disambiguated relative clauses in which the head is to the left. I repeat the relevant examples below:

(34) Diegueñó (Gorbet, 1976)

a xatkcok wi:m tuc+pu+c n'yil'y
dog rock+COMIT I-hit+DEM+SUBJ black

The rock I hit the dog with is black
The dog I hit with the rock is black
Mesa Grande Dialect

b 'wil'y 'xat n'i+m 'tu+:pu+c n'yil'y cis
rock dog that+COMIT I-hit+DEM+SUBJ black+indeed

The rock I hit the dog with was black

In the Barss et al. structure, it would be expected that disambiguation would place the head to the right. However, in this case the head appears on the left.

The question that is relevant at this point is what is the relationship between the internally headed relative clause and the relative clause in which the head is to the right and the relative clause in which the head is to the left.

I argue that it is the left headed headed relative clauses that are the instances of overt head raising. In these cases, the head occupies the specifier of CP position of the relative clause. The examples of right headed relative
clauses are cases where the head is truly external. I illustrate my proposals for the three clauses below:

\[(43)\begin{align*}
a & \rightarrow [\text{dp} [\text{cp} [\text{ip} \ldots [\text{head}] \ldots ]]] \\
b & \rightarrow [\text{dp} [\text{cp} [\text{head}]] [\text{ip} \ldots \text{t} \ldots ]]] \\
c & \rightarrow [\text{dp} [\text{cp}] [\text{head}]]
\end{align*}\]

In (43)a, b and c I show schematically an internally headed relative clause, left headed relative clause (in a language which has internally headed relative clause) and right headed relative clause.

I rely on two arguments to support this distinction. The first argument is from typology. One of typological universals concerning relative clause structure is that in an OV language, the head of a relative clause is typically to the right of the clause. If the cases where the head appears fronted and on the left were cases where the head is external to the relative clause, this would go against the typological tendency. On the other hand, if these cases were instances where the head is not external, but simply moved to specifier of CP position of the clause, then the generalization that heads are typically to the right of their clauses in OV languages can be maintained.

The second argument comes from case marking. The Yuman language Yavapai has both internally headed relative clauses and left headed relative clauses (Kendall, 1976). As
discussed above, the entire clause can be case marked according to its role in the matrix sentence. The internal head will be case marked for its role in the subordinate clause. Interestingly, when the head is moved to the left, it retains the case marking that is appropriate to its role in the subordinate clause. This will occur even when the entire internally headed relative clause is case marked for its role in the matrix, and this is different from the case marking on the head. This data is from Kendall (1976):

(44) [?ha-v-l vqot-e ?-i-m-c]  
water-dem-into drop-affix 1-say-affix-subj
mun-a qeyat-k?r
cold-tns much-cmp

The water that I fell into was very cold.

Here, I have put the internally headed relative clause in brackets. This clause is functioning as the subject of the predicate mun 'cold'. The clause as a whole appears with subject case marking -c. The head of the clause is ?ha 'water'. It appears at the front of the clause with the oblique case marker -l. Here, the head is marked for its role in the subordinate, not the matrix clause.

These facts are consistent with an analysis in which the head noun has been raised to the specifier of CP of the internally headed relative clause. The head noun is marked
with the case marker for its role in the internally headed relative clause, and it simply moves to the specifier of CP, carrying along its case marker. This data is not consistent with an analysis in which the head noun is external to the clause. If this were the case, we would expect the head noun to bear the case of its role in the matrix clause. However, this is not the case.

3.6 Stacking and Apparent Violations of Subjacency

In this section, I would like to present an analysis of internally headed relative clause stacking as well as apparent violations of subjacency in Lakhota.

As Williamson (1987) has explained, relative clause stacking is common in Lakhota and occurs when the internal head of a relative clause is itself a relative clause:

(45) [[[ogle eya] šapsapa cha] agli pi wachi ki] the shirts that are dirty that I want to take home

The internally headed relative clause ogle eya šapsapa cha 'shirts which are dirty' is itself acting as the head of another internally headed relative clause.

The definiteness of the entire relative clause is determined by the definiteness of the highest and rightmost determiner. In the above example, this is the determiner ki
'the'. In addition, the internally headed relative clause that is in intermediate position must also be indefinite. If it definite, the sentence is ungrammatical:

\[ (46)^* \text{[[[ogle eya] ŝapšapa ki] agli pi wachi ki]} \]
shirts some dirty the take-home PL I-want the

These facts have an nice explanation in the framework that is proposed here. I have considered internally headed relative clauses to be just like simple noun phrases; they are both DPs. An indefinite noun phrase can act as a head because it should be able to provide a variable which can be bound by the quantificational determiner associated with the relative clause. Since internally headed relative clauses are no different than simple noun phrases, they should also be able to be heads when they are indefinite. As indefinite heads, they provide a variable that can be bound by the determiner of the topmost relative clause. If the internally headed relative clause is not indefinite, it cannot act as a head for the same reason a simple noun phrase cannot; it will not be able to provide a variable that can be bound by the topmost determiner of the relative clause. This is what is shown in the above examples. I give an associated structure for each of the examples shown above. Example (45) would have the following representation at LF:
In this example, the phrase ogleeya 'some shirts' will move to the specifier position of the CP of the lowest internally headed clause. These will give 'shirts which are dirty'. This entire internally headed relative clause acts as a head and is then moved into the specifier of CP position of the topmost internally headed relative clause. This will give the 'shirts which are dirty which I want them to take home'. This entire head will be bound by the definite determiner ki to give 'the shirts which are dirty which I want
them to take home'.

The index associated with the indefinite ogle eva 'some shirts' will be able to percolate up to the determiner because there is no lexical or structural condition that is not met. The indefinite moves to the specifier of CP position of the lower clause. By SPEC/HEAD agreement, the index of the indefinite appears on the head of CP. It then percolates up to CP. Since the head of the intermediate DP governs the CP, this head will also be able to bear the index. The index will then percolate up to DP. By another round of SPEC/HEAD agreement, this index will appear on the head of the topmost CP. It will percolate again to CP. Since the head of the topmost DP governs the intermediate CP, it will be able to bear the index. The index will percolate up to DP which is governed by the determiner ki which has been extracted by Quantifier Construal. Thus, the index of the indefinite will come to bound by the determiner.

In example (46), the structure will be as follows. Note that I am treating internally headed relative clauses which are definite as quantificational phrases and thus they will adjoin to IP⁴:

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⁴ I differ here from Heim (1982) and consider definite noun phrases to be quantificational.
The lower internally headed relative clause ogle eya šapšapa ki 'the shirts which are dirty' has moved and adjoined to the intermediate IP position. Since it is definite, the determiner will move out of its head position by Quantifier Construal. This definite determiner will be able bind the index of the indefinite that has percolated up to the intermediate DP; it is in a position to govern the DP. Since
this determiner has bound the variable associated with the indefinite, there is no other unbound variable for the topmost determiner to bind. This will be an instance of vacuous quantification.

The framework that I have proposed can account for the phenomenon of relative clause stacking and the definiteness restrictions observed on stacking.

Another interesting aspect of Lakhota internally headed relative clauses is that they seem to be different from Navajo relative clauses in allowing a head to be within an internally headed relative clause. Sentence (49)a is a Lakhota example, and sentence (49)b is a Navajo example that was given above:

(49)a Wichota wowapi wą yawa pi cha ob wo?uglaka
many-people paper a read PL Ind with we-speak
pi ki he L.A. Times e
Pl the that L.A. Times be

The newspaper that we talk to many people who read it is the L.A. Times

b *[[Hastiin ɂééchaa'i bishxash-ée] be'eldqóh
man dog 3:perf:3:bite-REL gun
néidiitą-(n)ée] nahal'íin
3:perf:3:pick up-REL imp:3:bark

*The dog that the man who was bitten by picked up the gun is barking.

In the Lakhota example, (49a), the head wowapi 'paper' is located within the internally headed relative clause whose
head is *wichota* 'many people'. In the Navajo example, the head *żeéchaʼi* 'dog' is located within an internally headed relative clause whose head is *hastiin* 'man'.

Since I, along with others, have argued that the internal head must move at LF, the Lakhota example would seem to either argue against a movement analysis or show that the position of Huang (1982) and others that subjacency does not hold in the LF component is correct.

There is a problem with adopting either of these positions if we wish to provide a universal characterization of the syntax of internally headed relative clauses. First, it was shown that in Navajo internal heads cannot be located within another internally headed relative clause. This would mean that the syntax of Navajo IHRCs is different from Lakhota in that either Navajo has head movement while Lakhota does not, or that Navajo has subjacency at LF while Lakhota does not.

I will argue that it is possible to maintain a universal characterization of this construction if we adopt a pied-piping analysis for the Lakhota example that is similar to an analysis for Japanese WH-in-situ within relative clauses given by Nishigauchi (1990). First, let's decompose the example in (49) into its relevant parts.
(49) Wichota wowapi wə yawa pi cha ob woʔuglaka many-people paper a read PL Ind with we-speak
    pi ki he L.A. Times e
    Pl the that L.A. Times be

The newspaper that we talk to many people who read it is the L.A. Times

There is an internally headed relative clause Wichota wowapi wə yawa pi cha 'many people who read a paper'. The head of this relative clause is wichota 'many people'. This clause is acting as the object of ob 'with'. Furthermore, this internally headed relative clause is indefinite. The sentence Wichota wowapi wə yawa pi cha ob woʔuglaka pi would translate 'we talk to many people who read a paper'. This sentence is the complement of the determiner ki 'the' and this forms an internally headed relative clause with wowapi 'a paper' as its head: Wichota wowapi wə yawa pi cha ob woʔuglaka pi ki 'the paper that we talk to many people who read it'.

The embedded IHRC Wichota wowapi wə yawa pi cha 'many people who read a paper' would have the following structure:

(50) [dp [cp [wichota], t, wichota wowapi wa yawa pi] cha]

Here, the head of the lower relative clause wichota 'people' has moved to specifier of CP position. The head of the topmost relative clause is wowapi and is located within
this clause. It cannot move out because this would be a subjacency violation.

However, suppose that it, too, can move to the specifier position of the embedded CP:

(51) [op [cp [wichota], [wowapi wa]2 [c. [t1 t2 yawa pi] cha]

Now, this entire relative clause which both heads in its specifier of CP position can pied-pipe to the topmost specifier of CP position:
The index of the head wowapi would be bound by the topmost determiner ki. The index of the head, although it is located within the lower internally headed relative clause, is able to percolate up the tree to this determiner. This is because the lower internally headed relative clause is indefinite. There is no quantificational element between the topmost determiner and the head which would intervene in the percolation of the index.
I am claiming that apparent violations of subjacency are not violations because the internal head within the lower internally headed relative clause does not move out of this clause. The index of this head is able to percolate out of the clause.

Furthermore, I will also claim that this will only happen in the case where the lower clause is indefinite. Consider the following schematic structure if the lower internally headed relative clause is definite. Again, I will continue to assume that a definite internally headed relative clause is a QNP that undergoes QR and is adjoined to the IP node:
In this structure, $H_1$ is the head of the uppermost internally headed relative clause that has been moved to the specifier of CP position of the lower internally headed relative clause. $H_2$ is the head of the lower clause. The $t_2$ is the trace left behind after the lower internally headed relative clause has moved and adjoined to the lower IP. The index of both $H_1$ and $H_2$ is allowed to percolate to the DP of the lower internally headed relative clause in the manner that
I have described above. The index of $H_2$ can become bound by the lower definite determiner; this would be the case of a simple internally headed relative clause. However, the index of $H_1$ must percolate higher so that it can be bound by the topmost determiner. This can only happen if the head of the topmost CP can govern the DP that bears the index of $H_1$. Notice, however, that there is an intervening governing element between the head of the topmost CP and the DP which bears the index. This element is the definite determiner. By Relativized Minimality the head of the topmost CP does not govern the DP and consequently it cannot bear the index. Since the index does not percolate up, the topmost definite determiner does not bind anything and this is another instance of vacuous quantification.

The only other option that is available is if $H_1$ moves out of the lower internally headed relative clause to the topmost specifier of CP position. From this position its index would be able to percolate to the definite determiner. However, this movement derivation would be ruled out as a violation of subjacency.

This analysis would explain why Navajo does not allow a head to be within an internally headed relative clause. I repeat the relevant example from Navajo below:
(12)*[[Hastiin lééchág'i bishxash-ǝq] be'eldq̓q̓h
man dog 3:perf:3:bite-REL gun
néidiitá-(n)ǝq] nahaž'in
3:perf:3:pick up-REL imp:3:bark

*The dog that the man who was bitten by
picked up the gun is barking.

Note that in this case, both internally headed relative
clauses are interpreted as definite. This is different than
the situation in Lakhota, where the lower internally headed
relative clause is marked as an indefinite. Sentence (12)
would be ruled out as ungrammatical in the manner described
above.

A further example which shows the role of definiteness
is given by WH-questions in Lakhota. As Williamson (1984)
discusses, Lakhota has the option of leaving a WH-word
in-situ. It also has the option of leaving a Wh-word within
an internally headed relative clause:

(54) tuwa wowapi wǝ ǝowa cha lawa ha he
who book a write you-read DUR Question

Who, are you reading a book that t₁ wrote?

If we follow Huang (1982) and others that the WH-word
which is in situ must move to the matrix specifier of CP
position, then example (54) would appear to show that
subjacency does not apply at LF. However, an alternative
derivation exists in which the WH- phrase moves to the
specifier of CP position of the lower internally headed relative clause. The entire internally headed relative clause can then pied-pipe to the matrix specifier of CP. None of these movements violate subjacency.

Let us also follow Nishigauchi (1990) and Berman (1991) and consider WH-phrases to be like indefinites; they have no quantificational force of their own. For Nishigauchi, Wh-words get their quantificational force by being bound by question morphemes in the matrix CP. For Lakhota, this would mean that the WH-phrase would become bound by he. Since the IHRC is indefinite, the index of the WH word can percolate to the question morpheme in the matrix CP in the same way as described above for internal heads that are located within indefinite relative clause islands.

If the IHRC is definite, the sentence becomes ungrammatical:

(55)* tuwa wowapi wâ owa ki lawa ha he who book a write the you-read DUR Question

Who, are you reading the book that t, wrote?

Again, this would be because the index of the WH-word would not be able to percolate to the matrix CP and be bound by he, following the analysis described above. Since the IHRC is definite, it will QR to the matrix IP. The definite determiner would be extracted and adjoined to IP by Quantifier
Construal. The Wh-word would be in the specifier position of the CP of the IHRC. The index of the WH-word could only percolate up to the matrix CP if the head of the matrix CP were to govern the DP of the IHRC. However, this would not occur, because the definite determiner of the IHRC would always intervene between the head of CP and the DP of the internally headed relative clause. By Relativized Minimality, the intervening determiner would prevent government of the DP by the head of CP. Since the question morpheme does not have anything to bind, this would be an instance of vacuous quantification.

In closing this section, I would like to point out the similarities and differences between my analysis of the definiteness effect and the analysis of the definiteness effect given by Nishigauchi (1990). He observes a similar contrast with WH-in-situ in Japanese that are located within relative clause islands. If the NP that the WH-word is located in is indefinite, the question is fine. If the NP is 'specific', the question is ungrammatical:

(56)a Dare-ga kai-ta hon-ga omosiroi desu-ka? who-N wrote book-N interesting is-Q
Books that who wrote are interesting?

b *Dare-ga kai-ta sono hon-ga omosiroi desu-ka? who-N wrote that book-N interesting is-Q
The books that who wrote are interesting?
Nishigauchi argues that the WH-word moves to the specifier position of the relative clause. In this position, the [+wh] feature of the WHword gets percolated up to entire NP. This allows for pied-piping of entire NP to the specifier of CP of the matrix clause. Schematically, this would be represented as:

The [+wh] feature would percolate from WH₁ up through CP to NP₂. Nishigauchi also requires that the question morpheme in the head of the matrix CP position be able to govern the WH-element. If the Wh-word is still within the relative clause, this will not occur.

However, he also exploits a notion of 'percolation' (different from the one assumed here) to get the required
structural configuration. He adopts the notion of a 'percolation chain' of van Riemsdijk (1985). A percolation chain is the set of nodes that a given feature has percolated. Also, percolation must be from Spec. The Wh-word in the specifier position of the relative clause can percolate its [+wh] feature to CP node of the relative clause. Furthermore, he assumes that the relative clause CP is in specifier position of the NP. Since the relative clause CP is in a SPEC position, the feature can percolate up to NP. The NP now has the [+wh] feature and it can act as a WH element and move to matrix specifier of CP position.

The percolation chain associated with this structure would be {WH, CP, NP} The WH would be the head of the percolation chain and the NP would be its terminus. Nishiguachi proposes that if an element governs the terminus of the percolation chain, it governs the head of the chain. In the above structure, the question morpheme in head position will govern the NP that has been moved to specifier of CP. Since the question morpheme governs NP, the terminus of the chain, it would also govern WH, the head of the chain by the principle discussed above. In this way, the question morpheme comes to govern the WH-word within the relative clause.

In order to explain the specificity effects, he proposes that an NP with a demonstrative element is not [+wh] but a
referential element that cannot be moved by WH-movement. The entire NP gets marked as [+def]. If the [+wh] feature of the WH-word gets percolated to the entire NP, the NP will have both the [+wh] feature and the [+def] feature. He proposes that these two features are incompatible. If percolation occurs, the structure will be out due to feature incompatibility. If the [+wh] feature does not percolate, it is not present on the NP and the NP will not be able to pied pipe to the matrix specifier of CP. Movement of the entire NP to the matrix CP is necessary to get the correct government configuration between the Q morpheme and the Wh-word in the relative clause (or the relevant node of the percolation chain).

Nishigauchi's analysis is similar to the one proposed here in that both rely on pied-piping, a government requirement between the relevant elements and a notion of percolation. The differences are in the what gets percolated, how something gets percolated and the nature of the government requirement. In this dissertation, I am assuming that it is the referential index associated with an indefinite or Wh-phrase that gets percolated, while Nishigauchi assumes that it is a [+wh] feature. It would be impossible for Nishigauchi's analysis to be extended to the cases of internally headed relative clause, since in these cases the
head noun is indefinite and not [+wh]. Second, the notion of percolation chain allows a feature to percolate only if it is in a SPEC position. I allow percolation from complement positions that are governed as well as SPEC positions. Third, since I allow the index of the indefinite to percolate up to a quantificational determiner, an indirect structural relationship can obtain between the quantificational operator and the restriction which it binds. However, there is a direct structural relationship between the quantificational determiner and the element which bears the percolated index. In his conception of binding, Nishiguachi proposes that the quantificational operator must govern the restriction directly. In the cases where there is not a direct relationship, Nishigauchi must add an additional principle that states if the operator governs the head of a percolation chain, it also governs the tail of the chain.

Furthermore, I explain the definiteness effect as a result of a failure of index percolation because a particular structural configuration is not met. The definite determiner acts as an intervening element that blocks government of an element which bears an index by another element. Since indefinites are not quantificational, there is no intervening quantificational determiner to block the percolation of the index. Thus, my analysis of the definiteness effect with
regards to subjacency crucially relies on Heim's conception of indefinites as having no quantificational force; a conception that has been motivated independently of the subjacency effect.

On the other hand, Nishigauchi explains the definiteness effect as the result of a feature incompatibility; the [+wh] feature and the [+def] feature are incompatible. Since these two features are incompatible, only the [+def] feature will remain on the entire NP, since this feature is associated with the head noun. This analysis is not tied to the conception of indefinites as having no quantificational force; indefinites could simply be existential quantifiers that are not marked [+def]. It is also unclear as to why the features [+wh] and [+def] are incompatible; there is no independent motivation given for this incompatibility.

5.7 Summary of Chapters Two and Three

In this part, I proposed a locality requirement for unselective binding by showing that it was sensitive to island effects such as the complex NP constraint, the co-ordinate structure constraint and the adjunct constraint. However, it is well known that restrictive 'if/when' clauses are islands yet still allow unselective binding. By comparing restrictive 'if/when' clauses to internally headed relative clauses and
noting syntactic and semantic parallels between these two types of clauses, I showed that these islands are not counterexamples to the locality constraint because they allow for percolation of a quantifier's index into the clause through the head of the clause. This type of index percolation is also found between the determiner of an internally headed relative clause and the indefinite 'head' of the relative clause.
CHAPTER FOUR: LOCALITY AND UNSELECTIVE BINDING IN WH-QUESTIONS

4.0 Introduction

In the first part of this dissertation, I showed that the relationship between a quantifier and its restriction is subject to a locality constraint. This was motivated by showing that the binding of an indefinite by an adverb of quantification is sensitive to certain island effects. The same sort of phenomena is observed in internally headed relative clauses; the binding of the internal head by a quantifier associated with the clause is also subject to island constraints.

I also proposed that binding could occur indirectly through a system of index percolation. This allows a quantifier to bind its restriction even though they are not in a local relationship or even if the restriction is within certain islands. Index percolation is dependant upon whether or not a head can bear an index.

The purpose of this second part of the dissertation is to demonstrate that the proposed framework is also applicable to WH-quantifiers. To do this, I explore the phenomena known as partial WH-movement. Here, WH-words do not move all the way to the front of the clause but can remain in an intermediate position between their base position and the matrix clause. There is a scope marker in the matrix that establishes the
scope of the partially moved WH-phrase.

I argue that in these cases, index percolation is necessary for the WH-phrase which has been partially moved to be bound by a question operator in the CP position of the matrix clause. This index percolation is subject to certain locality effects. It is also dependent on whether or not a CP head can bear an index. Thus, the formal system which has been proposed on the basis of restrictive 'if/when' clauses and internally headed relative clauses has a natural extension to the phenomena of partial WH-movement.

This partial movement strategy is found in German (van Riemsdijk 1983; McDaniel, 1989), Hindi (Mahajan, 1990; Srivastaav 1990), Iraqi Arabic (Wahba, 1991) and, I will argue, Slave (Rice, 1990) (although Slave does not have a phonetically realized scope marker). I will demonstrate that the WH-phrase and the Q element in matrix CP position must meet the same locality requirement that an adverb of quantification and an indefinite must meet if the indefinite is to have the quantificational force of the adverb.

In this chapter, I explore in depth the partial movement strategy in Iraqi Arabic.
4.1 WH-Questions in Iraqi Arabic

Here, I consider in detail data from WH-questions in Iraqi Arabic (Wahba, 1990) that involves binding of a WH-phrase by an overt scope marker. Just as in the case of unselective binding, these cases are sensitive to some island effects, but not others. What I show is that in those cases where unselective binding occurs within an island, there is partial movement of the WH-phrase to a position where the locality condition is met.

2.11 Overview of WH-Questions in Iraqi Arabic

Iraqi Arabic has three possibilities for forming WH-questions. One possibility is for overt movement of the WH-phrase (23a). Another is keeping the WH-phrase in-situ (23b). The third possibility is for keeping the WH-phrase in-situ and putting a 'scope marker' (sh-) in COMP position (23c).

(1)a meno, Mona shaafat e, ?
Who Mona saw
Who did Mona see?

(1)b Mona shaafat meno ?
Mona saw who
Who did Mona see?

(1c) sh-raadat Mona Ali ygaabal meno?
SM wanted Mona Ali to-meet who
Who did Mona want Ali to meet?
Since I am mainly concerned with the relationship between the 'scope marker' and the WH-phrase in-situ, I will initially focus on these types of questions, discussing the two other kinds of questions as they relate to the scope marking strategy.

The scope marker must appear at the beginning of the sentence; it cannot occur in embedded clauses. The scope marker is actually the WH-word *sheno* 'what' which is contracted to *sh* when it appears before a verb.

The scope marker is obligatory for a WH-phrase in situ in one case. This is when the WH-phrase occurs within an embedded tensed clause. If the embedded clause is untensed, then the scope marker is optional:

(2) WH-in-situ and Tensed Clauses

a Mona tsawwarat Ali *ishtara sheno*?
Mona thought Ali bought what
What did Mona think Ali bought?

b *Mona tsawwarit Ali *raah weyn*?
Mona thought Ali went where
Where did Mona think Ali went?

(3) WH-in-situ and Untensed Clauses

a Mona hawlat *tishtiri sheno*?
Mona tried to-buy what
What did Mona try to buy?
b Mona raadat Ali yruuh weyn?
Mona wanted Ali to-go where

Where did Mona want Ali to go?

(4) WH-in-situ and Scope Marking

a sh-tsawwarit Mona Ali raah weyn?
SM-thought Mona Ali went where

Where did Mon think Ali went?

b sh-tsawwarit Mona Ali gabal meno?
SM-thought Mona Ali met who

Who did Mona think Ali met?

c sh-raadat Mona Ali ygaabal meno?
SM-wanted Mona Ali to meet whom

Who did Mona want Ali to meet?

The examples in (2) show that a WH-in-situ is
ungrammatical if it is within an embedded tensed clause, while
the examples in (3) show that a WH-in-situ within an embedded
untensed clause is grammatical. If a scope marker is added
to the beginning of the sentence, as in (4a) and (4b), a WH-in-situ
can appear within an embedded tensed clause. Sentence
(4c) shows that a scope marker can appear with a WH-in-situ
in an embedded untensed clause.

It is not the case that the scope marker can rescue all
cases where WH-in-situ leads to ungrammaticality. For
example, in Iraqi Arabic, a WH-phrase cannot occur within an
syntactic island:
Sentence (5) shows the WH-Island Constraint, sentence (6) the Complex Island Constraint and sentence (7) the Coordinate Structure constraint. These examples demonstrate that these constraints apply to WH-in-situ.

The addition of a scope marker in these cases does not lead to grammaticality. The following sentences show the same respective constraints as above, the only difference being the addition of a scope marker at the beginning of the sentence:

(8) *sh-Mona nasat li-meno, tinti sheno e_i?  
    SM-Mona forgot to-whom to give what

What did Mona forget to whom to give?

(9) *sh-'urfut Mona il-bint illi ishtarat sheno?  
    SM-knew the-girl who bought what

What did Mona know the girl who bought?

(10) *sh-ishtarat Mona li-ktaab wi-nasat sheno?  
    SM-bought Mona the-book and-forgot what

What did Mona buy the book and forgot?
A scope marker may rescue a WH-in-situ only in the case where the WH-phrase occurs in the first embedded tensed clause. If the Wh-phrase occurs more than one embedded tensed clause away from the matrix, the sentence is still ungrammatical, despite the appearance of a scope marker:

(11) **sh-tsawwarit Mona meno rada Ali ysa'ad meno?**
    SM-thought Mona who wanted Ali to-help who
    Who did Mona think wanted Ali to help who?

(12) ***sh-i'tigdit Mona meno tsawwar Ali sa'ad meno?**
    SM-believed Mona who thought Ali helped who
    Who did Mona believe thought Ali wanted to help who?

The data is a bit complicated by the fact that there are two WH-phrases; these sentences are to be interpreted as multiple questions. Each sentence consists of three clauses and there is a scope marker at the beginning of the sentence. Also, in each sentence one of the WH-phrases is within the most deeply embedded clause. In sentence (11), which is grammatical, the most deeply embedded clause is an infinitival. In sentence (12), which is ungrammatical, the most deeply embedded clause is tensed. What this data shows is that when the WH-phrase is separated from the scope marker by more than one tensed clause, the result is ungrammatical.

Another set of data which is relevant to this discussion are cases of 'partial' WH-movement. With partial WH-movement,
a WH-phrase can appear in any intermediate COMP between its base position and the matrix COMP:

(13)a Mona raadat tijbir Su'ad tisa'ad meno?  
Mona wanted to-force Su'ad to help who  
b Mona raadat tijbir Su'ad meno, tisa'ad e₁?  
c Mona raadat meno, tijbir Su'ad tisa'ad e₁?  
d meno, Mona raadat tijbir Su'ad tisa'ad e₁?  
Who did Mona want to force Suad to help?

Examples (13a) and (13d) show the familiar cases of WH-in-situ and WH-fronting. The interesting examples are (13b) and (13c). They show that the WH-phrase may be fronted to an intermediate position between the phrase's base position and the matrix COMP. Since the phrases appear clause initially with respect to each of the embedded clauses, it seems reasonable to assume that the phrases have moved to COMP of each of the embedded clauses.

As expected, there is an interaction with tense with respect to partial WH-movement. In the examples in (13), above, all of the embedded clauses are untensed. The following show the behavior of partial WH-movement with tensed embedded clauses:

(14)a *Mona tsawwarit sheno, Ali ishtara e₁?  
Mona thought what Ali bought  
What did Mona think Ali bought?
Where did Mona think Ali went?

Sentence (14) demonstrates that partial WH-movement is ungrammatical when the base position of the WH-phrase is within a tensed clause. If a scope marker is placed at the beginning of the sentence, as in (15), the sentence is grammatical with partial WH-movement and an embedded tensed clause.

Lastly, it should be pointed out that overt movement to the matrix COMP by a WH-phrase whose base position is within an embedded tensed clause is only possible for arguments; adjuncts cannot move 'long distance':

(15) *leesh, tsawwarit Mona Ali masha e,?
    why thought Mona Ali left

    Why did Mona think Ali left?

(16) sheno, tsawwarit Mona Ali ishtara e,?
    what thought Mona Ali bought

    What did Mona think Ali bought?

4.2 The Analysis

In this section, I give an analysis of the LF structure of WH-in-situ in Iraqi Arabic with particular attention to the scope marking strategy. I argue that the scope marker allows for a Q morpheme to unselectively bind the WH-phrase. Since
I have argued that unselective binding must obey a locality condition, this means that the position of the scope marker and the position of the WH-phrase at LF are important. I discuss each of these in turn.

4.2.1 The Position of the WH-Phrase

It seems reasonable to assume, as in Wahba (1990), that Iraqi Arabic has WH-movement both at S-Structure and at LF. Thus in (1a), where the WH-phrase appears at the front of the sentence, WH-Movement has applied in the mapping from D-Structure to S-Structure. In (1b), where the WH-phrase appears in its base position, WH-Movement will apply in the mapping from S-Structure to LF. At LF, therefore, the representations of these two sentences would be the same:

(17) \([cP \text{ meno}_1 [IP \text{ Mona shaafat e}_1 ]]\)

This representation for the LF structure of WH-in-situ is motivated by the fact that WH-in-situ is affected by conditions that relate to movement of the WH-phrase; WH-in-situ cannot occur within a syntactic island. If the WH-phrase must move to the matrix COMP from within an island, there would be a violation of subadjacency. This data, therefore argues, along with Nishigauchi (1990), Pesetsky (1987), Choe (1985) and others that subadjacency is a condition on LF
movement.

4.2.2 The Position of the WH-Phrase and The Scope Marking Strategy

With regards to WH-in-situ in embedded clauses, I showed above that these sentences are ungrammatical if the embedded clause is tensed but grammatical if the embedded clause is untensed. Wahba refers to this as the Tense Locality Restriction (TLR):

(18) Tense Locality Restriction (TLR):

A wh-phrase-in-situ may not cross more than one tensed clause in its path to Comp.

What this means is that long distance movement at LF of the WH-phrase to the matrix COMP is disallowed; a WH-in-situ in an embedded clause cannot appear in COMP at LF. Therefore, the following structure is impossible as the LF representation of a WH-in-situ in an embedded tensed clause:

(19) \[CP \ WH_1 \ [IP+\text{tense} \ldots [IP+\text{tense} \ldots t_1]]\]

In these cases a scope marker must be used, and this scope marker appears in the matrix COMP.

In my analysis of this construction, I will start from the assumption that the scope marker functions as the operator, and it must come to bind the WH-phrase which functions as the
restriction. This would be similar to the cases of unselective binding between an adverb of quantification and an indefinite. This type of approach would also be consistent with the proposals of Nishigauchi (1990) and Berman (1991) in considering WH-phrases to be like indefinites in not having any quantificational force of their own; they acquire their quantificational force by being bound by other elements in the representation.

There are two issues that are relevant at this point. The first is whether or not there is a locality restriction on scope marking that can be accounted for using the system of index percolation described above. The second issue is what is the position of the WH-phrase when a scope marker is used for WH-questions.

4.2.3 Three Possibilities for Binding

Recall that in my discussion of the constraints on unselective binding in Chapter One, I proposed three possibilities for relating the operator and the restriction in the case of adverbial quantification. One was for a local, direct relationship, the second a non-local direct relationship and the third was a non-local indirect relationship. I argued that it is the third possibility that can account for the restrictions on unselective binding.
These possibilities are also relevant in these cases of partial WH-movement. Since I am arguing that the scope marker must bind the WH-phrase, and that this is an instance of unselective binding, the restrictions on the scope marking strategy in should best be captured by adopting the non-local, indirect strategy.

I will discuss the three possibilities in turn, and show that only the indirect strategy works best.

With regards to the local, direct relationship, this would require that the scope marker and the WH-phrase be in a local relationship in order for the scope marker to bind the WH-phrase. Since the scope marker occupies the matrix CP, this would require that the WH-phrase move to the matrix CP. However, as discussed above, the WH-phrase cannot move to the matrix CP.

The second possibility is the non-local, direct relationship. This would allow the WH-phrase to stay in its base position and be coindexed with the scope marker in the matrix CP. The LF structure for a sentence such as (4b) would be as follows:

\[(20) [\text{CP} \text{sh}_1-[\text{IP} \text{tsawwarit Mona} [\text{CP} [\text{IP} \text{Ali gabal meno}_1]]]]\]

In this way, there would be no movement and no violation of the TLR.
This approach fails in that it predicts that the scope marker could be used to avoid any island effect. As was shown above, scope marking does not overcome the ungrammaticality of WH-in-situ with respect to the other island effects such as the Complex NP Constraint. Since scope marking for WH-in-situ is achieved only by co-indexation, an analysis which leaves the WH-phrase in its base position at LF would need some additional mechanism to explain why some island effects are voided through co-indexation while others are not. Note that this is the same type of problem encountered with the binding of indefinites by adverbs of quantification; they seem to obey some island effects but not others.

A refinement of the direct, non-local strategy is for the WH-phrase in-situ to undergo partial movement at LF and occupy not the matrix COMP position but the embedded COMP. The scope marker would then bind the WH-phrase directly:

(21) \[ CP_s h_1-[\text{IP}_t \text{tsawwarit Mona} [CP_m \text{meno}_1 [\text{IP}_t \text{Ali gabal e}_1]]] \]

Without movement to the matrix COMP, the TLR is not violated; in this representation, the WH-phrase moves across only one tensed clause. In fact, this LF representation would be the same as the S-Structure representation of 'partial' movement in an embedded tensed clause, as in (14b). Furthermore, since this approach relies on movement, it does
show promise in explaining some of the island effects.

One aspect that is lacking so far in this analysis is a reasons for why the WH-phrase must move to the embedded COMP. One likely explanation is that there is a locality effect that controls the binding between the WH-phrase and the scope marker. The locality principle that might be used in this case is subjacency (see McDaniel 1989). Just as the movement of a phrase is constrained by the number of bounding nodes which are crossed, so too might the relationship between the scope marker and the WH-phrase.

As shown by the usual island effects, the bounding nodes in Iraqi Arabic are IP and NP, with the requirement that not more than one bounding node may be crossed. Extending this to scope marking, the reason why the WH-phrase must move to the matrix COMP is that if it stays in its base position, there would be more than one bounding node between the WH-phrase and the scope marker. If it moves to the embedded COMP, there would only be one bounding node between the two elements:

(22) \[ [\text{sh}_1- [\text{IP} \text{ tsawwarit Mona} [\text{IP} \text{ Ali gabal meno}_1] ] ] ]

(23) \[ [\text{sh}_1- [\text{IP} \text{ tsawwarit Mona} [\text{IP} \text{ meno}_1 [\text{IP} \text{ Ali gabal e}_1] ] ] ]

In (22), with the WH-phrase in its base position, there are two IP nodes between the scope marker and thus this would
violate the subjacency requirement. In (23), with partial WH-movement, there is only one IP node between the scope marker and the WH-phrase and there is no subjacency violation.

Requiring that a scope marker be subjacent to the WH-phrase would also account for why certain island effects cannot be voided with a scope marker. For example, with the Complex NP Constraint, the WH-phrase within the relative clause would always be 'too far' from the scope marker because there would always be two bounding nodes between the scope marker and the WH-phrase. This would hold even if the WH-phrase could move to the COMP of the relative clause:

(24) \[
\text{(ep \text{sh-}[\text{ip} \text{'urfut Mona [\text{np} il-bint [\text{cp} illi [\text{ip} \text{ishtarat sheno}]]]}])}\]

(25) \[
\text{(ep \text{sh-}[\text{ip} \text{'urfut Mona [\text{np} il-bint [\text{cp} illi sheno, [\text{ip} \text{ishtarat t,]}]}]}])}\]

With the WH-phrase in its base position, as in (24), there are three bounding nodes (IP, IP and NP) between the scope marker and WH-phrase. If the WH-phrase moves to the COMP of the relative clause, as in (25), there are still two bounding nodes between the scope marker and WH-phrase. The only position available for the WH-phrase to meet the locality requirement on scope marking would be for it to move out of the subject NP altogether. However, in this case
although the subjacency requirement would be met for scope marking, subjacency would be violated in the case of movement.

Attractive as this proposal seems, there is one island effect which cannot be explained by the subjacency account. This is the WH-Island Effect. I repeat the relevant example below:

(8) *sh-Mona nasat li-meno₁, tinti sheno e₁?
    SM-Mona forgot to-whom to give what

    What did Mona forget to whom to give?

The problem is that at LF, the WH-in-situ *sheno would move to the embedded COMP, which already contains the fronted WH-phrase *li-meno:

(26) [cP sh₂-[₁p Mona nasat [cP li meno₁, sheno₂ [₁p tinti e₂ e₁]]

At LF, there is only one bounding node between the scope marker and the WH-phrase *sheno and there is no violation of subjacency.

Note that this above fact cannot be the result of a constraint that a scope marker cannot define the scope of a WH-phrase in a COMP that contains another WH-phrase. This is shown by examples such as (11), which I repeat below:
This sentence can be construed as a multiple question 'for which x and which y did Mona think x wanted Ali to help y'. In this case, the scope marker will define the scope of both WH-phrases. The LF representation for this sentence would be:

(28) \[ \text{cp sh, t-}\text{tsawwarit Mona} \text{[cp meno, meno] [ip e, rada [Ali ysa'ad e]}} \]

Here, both WH-phrases are in an embedded COMP and both can be bound by the scope marker. Hence, we cannot conclude that the ungrammaticality (8) is because there are two elements in COMP.

The third possibility is for an indirect, non-local strategy through the system of index percolation that I described above. In the non-local approach, the index of the WH-phrase can percolate up the tree to an element which is in a local relationship with the scope marker. The scope marker would then be able to bind the WH-phrase.

The representation that I adopt requires that there be partial movement of the WH-phrase to the embedded COMP, as above, but in addition the entire embedded CP moves and adjoins to the matrix IP. I give a tree representation for
Here, meno moves to the embedded CP, which itself has been adjoined to IP. Since meno is in the specifier position of the embedded CP, by SPEC/HEAD agreement the index of the WH-phrase can appear on the head of CP. This index can then percolate up by X-Bar projection to the maximal projection CP. The scope marker in the matrix CP governs the extraposed CP, and since this CP bears the index of the partially moved phrase, the index can then appear on the scope marker.
In my analysis, the embedded CP has been extraposed and adjoined to the matrix IP. In the next section, I try to motivate the movement of the embedded CP.

4.2.4 Extraposition

I argue that embedded tensed clauses are not present in their argument position at LF but are adjoined to IP. One welcome consequence of having the embedded clause move out of its argument position and adjoin to IP is that it can account for the pattern of extraction from the embedded tensed clause.

We have seen that overt movement of a WH-phrase from an embedded tensed clauses is allowed only if the WH-phrase is an argument; overt movement of an adjunct WH-phrase from an embedded tensed clause is not allowed. What this means is that there must be a barrier for movement between the position of the extracted phrase and the matrix CP. Given recent formulations of barriers for movement (Chomsky, 1986; Cinque, 1990), if the embedded tensed clause is extraposed, the embedded CP itself can be taken as the barrier responsible for disallowing movement of the WH-phrase.

For example, the Chomsky (1986) definition of a barrier is as follows:
(30) \( \alpha \) is a barrier for \( \beta \) iff (a) or (b):

(a) \( \alpha \) immediately dominates \( \delta, \delta \) a Blocking Category (BC) for \( \beta \);
(b) \( \alpha \) is a BC for \( \beta, \alpha \neq \text{IP} \).

A Blocking Category (BC) is defined as follows. Since the definition is dependent on L-marking and theta-government, these definitions are also given:

(31) \( \alpha \) is a BC for \( \beta \) iff \( \alpha \) is not L-marked and \( \alpha \) dominates \( \beta \).

(32) \( \alpha \) L-marks \( \beta \) iff \( \alpha \) is a lexical category that theta-governs \( \beta \).

(33) \( \alpha \) theta-governs \( \beta \) iff \( \alpha \) is a zero-level category that theta-marks \( \beta \), and \( \alpha, \beta \) are sisters.

With these definitions in mind, let's see how extraposition of the embedded tensed clause leads to the creation of a barrier. In its original position, the clause is a complement to the verb. In this position, the verb theta-marks and thus theta-governs the embedded CP. This also means that the embedded CP is L-marked. However, once the clause is extraposed and adjoined to IP, it is no longer theta-governed by the verb because it and the verb are no longer sisters. Since the embedded CP is no longer theta-governed by the verb, it is also no longer L-marked. Consequently, the CP will be a blocking category and thus a
barrier for government.

With the extraposed CP as a barrier, a trace of movement left within the extraposed CP will not be antecedent governed from outside the clause. This will help explain the pattern of extraction noticed above. Consider the overt extraction of an adjunct first. Successive cyclic movement of an adjunct WH-phrase to the matrix CP will create the following representation:

(34)

![Diagram](image)

Here, I follow Chomsky (1986) and require that government of a trace results only from antecedent government. A trace that is antecedent governed will be marked [+\(\gamma\)], a trace that is not antecedent governed will be marked [−\(\gamma\)]. A structure that contains a [−\(\gamma\)] marked trace will be ungrammatical.
I assume that the wh-phrase 'why' is a sentential modifier and thus is adjoined to IP at D-structure. It moves to the matrix CP by successive cyclic movement through the embedded specifier of CP position, leaving a trace adjoined to the embedded IP as well as in the embedded specifier of CP position. The trace adjoined to IP will be antecedent governed by the trace in specifier of CP and thus will be marked [+] . However, the only antecedent governor for the trace in the embedded specifier of CP is the WH-phrase in the matrix specifier of CP position, which is outside of the extraposed CP. Since the extraposed CP is a barrier, this WH-phrase cannot antecedent govern this trace. Consequently, this trace will be marked [-γ] and this sentence will be ungrammatical.

Now consider overt movement of an argument WH-phrase in object position (sentence 16), which is grammatical. As above, the movement will be successive cyclic, through the specifier of the embedded CP. The trace in object position will be antecedent governed by the trace in specifier of CP. However, just as above, this trace in specifier of CP will not be antecedent governed. We expect this sentence to be ungrammatical, yet it is grammatical.

The solution to this problem is found in the observations of Lasnik and Saito (1984), Rizzi (1991), Cinque (1991) and
Koopman and Sportiche (1992) that the connection between a moved WH-phrase and its trace is different depending on the type of WH-phrase that is moved. Broadly speaking, an argument WH-phrase can relate to its trace 'long distance', without there being an intermediate trace in the embedded COMP position. An adjunct WH-phrase cannot relate to its trace 'long distance'; the presence of an intermediate trace is required. While there are a number of different ways to formalize this generalization, I follow Lasnik and Saito (1984).

In their system, gamma-marking of traces follows the operation of 'Affect α'. What 'Affect α' means is that a particular phrase marker can be moved, inserted or deleted. Furthermore, gamma-marking for arguments can happen at either S-structure or at LF, while gamma-marking for adjuncts can only happen at LF.

In the case of overt movement of an object argument WH-phrase, affect-α will apply to move this phrase successively cyclically to the matrix specifier of CP. The trace left behind in object position can be gamma-marked at S-structure by the intermediate trace in the embedded specifier of CP. This intermediate trace will not be gamma-marked at S-structure (there is a barrier between it and its closest antecedent governor). However, in the mapping between S-
structure and LF there is another round of affect-α. This means that the intermediate trace can be deleted. Since this intermediate trace is no longer present, there is no longer any trace which will be marked [−γ] and this structure will not be ruled out.

In the case of overt movement of an adjunct, after applying affect-α in the mapping from D to S structure, there will be a trace adjoined to IP and an intermediate trace in specifier of CP. None of these traces will be gamma-marked at this point because this is movement of an adjunct and gamma-marking for adjuncts applies only in the LF component. In the mapping from S-structure to LF affect-α can apply again. There are two possibilities in this case. First, the intermediate trace can be deleted. However, this means that the trace adjoined to IP will fail to be γ-marked; its closest possible antecedent governor is the WH-phrase in matrix CP, outside of the embedded, extraposed CP which is a barrier. If the intermediate trace is not deleted, it can gamma-mark the trace adjoined to IP, but it itself will fail to be gamma-marked, as demonstrated above. Thus, there is no well formed structure for movement of an adjunct phrase.

For WH-in-situ, there is only affect-α in the mapping from S-structure to LF. What this means is that the intermediate trace resulting from successive cyclic movement
will always be present for both arguments and adjuncts. (Recall that I do not allow lexical proper government, so the intermediate trace is necessary even for arguments to gamma-mark the trace in argument position.) Consequently, this intermediate trace will always fail to be gamma-marked and WH-movement from an embedded tensed clause at LF will be ungrammatical.

In summary, the pattern of extraction from embedded tensed clauses seen with overt movement and WH-in-situ can be explained if the embedded tensed clause is extraposed and adjoined to IP. In this way, a barrier is created. The extraposition of the embedded clause is motivated by these extraction facts.

4.2.4.1 A Base Generation Approach

The above analysis of WH-movement in embedded tensed clauses crucially requires that there be conditions that apply at S-structure and that they be different than those that apply at LF.

Recently, however, Chomsky (1992) has proposed that conditions on syntactic representation only occur at certain interface levels. LF but crucially not S-structure is one of these interface levels. In effect, S-structure is eliminated as a separate and distinct level of syntactic representation.
If the Arabic data is to conform to this conception of the grammar, then the analysis would have to change to eliminate reference to S-structure in the derivation. I will argue that this is possible only if we adopt a base generated approach for Wh-phrases which appear in the matrix CP (Cinque, 1990).

To begin the analysis, consider Rizzi (1991) and Koopman and Sportiche (1992), who argue that cases of 'long' movement (movement that does not leave intermediate traces) is only possible for elements which have a referential theta role. For Rizzi, these referential theta roles are limited to agent, theme, patient, experiencer, goal, etc. WH-phrases that are moved to the matrix CP are connected to their trace via binding relation; there is no need for an intermediate trace to establish the connection. Phrases that do not receive this kind of theta role cannot participate in a binding relation with their trace, consequently, they cannot undergo long movement. They must be linked to their trace position via a chain of antecedent government relations that is provided by intermediate traces.

Applying this to the Arabic data, extraction of nominals from tensed clauses would be possible because they can undergo long movement; there would be no intermediate trace that needed to be antecedent governed to establish the
connection between the moved phrase and the trace. On the other hand, adverbials could not be extracted because they could not undergo long movement. Movement of an adverbial would create a series of intermediate traces that would need to be antecedent governed. However, since the embedded CP itself is a barrier to government, any movement out of this clause that leaves behind an intermediate trace would not be antecedent governed, and consequently the sentence would be ruled out.

The problematic part of this analysis is that it fails to account for the pattern seen with WH-in-situ in embedded tensed clauses. Recall that although overt extraction is possible for nominals (though not for adverbials), WH-in-situ is still impossible for both types of phrases. Since I am assuming that WH-phrases in situ move at LF to the matrix CP, and also that long movement is possible for nominals, it is expected that WH-in-situ for nominals would be acceptable. This analysis would require that long movement is possible covertly but not overtly, making covert movement somehow different than overt movement.

My proposal is that the difference lies not in the possibilities for movement but in the possibilities for base generation. Cinque (1990), following Rizzi, allows only certain phrases to participate in a long distance binding
relation but this does not necessarily arise from movement; it can be base generated. Applying this to the Arabic data, I propose that the case of an overt, fronted WH-phrase is a case of a base generated initial WH-phrase, relating to a base generated trace (or pro) in the embedded clause by a long-distance binding relation. Since adverbials cannot enter into a binding relation with their trace, they do not have the possibility of a base generated option. This will account for the pattern of 'overt' extraction.

For WH-in-situ, I continue to assume that these are cases of covert movement. However, I do not allow 'long movement' for any type of phrase. I propose that all cases of movement must be successive cyclic. This will account for the pattern of WH-in-situ in Arabic, because if both nominals as well as adverbials must move successive cyclic, then there will always be a trace left within the embedded CP that fails to be properly governed. Consequently, WH-in-situ in embedded tensed clauses will always be impossible.

Thus, I am proposing that here is only one type of movement operation, and it is always cyclic. Apparent cases of 'long' movement are not movement at all but are cases of base generation.
4.2.5 Extensions

The locality requirement between the scope marker in the matrix CP and the WH-phrase will also account for the 'distance' effects seen with scope marking. As described above, if there are two embedded tensed clauses, with the WH-phrase in the most deeply embedded clause, the scope marker cannot define the scope of this WH-phrase. This example is sentence (11), with an S-Structure representation given below it:

(11) *sh-i'tiqdit Mona meno tsawwar Ali sa'ad meno?
   SM-believed Mona who thought Ali helped who
   Who did Mona believe thought Ali wanted to help who?

   \[<\CP_1 \sh-<\IP_1 i'tiqdit Mona \CP_2 \meno_1, \CP_2 t_1 \tsawwar \CP_3 \]

   \[\IP_3 \Ali sa'ad meno > \]

In this particular example, at LF, the WH-phrase \textit{meno} which is the object of the tensed verb \textit{sa'ad} can only move to the most deeply embedded CP (CP3). If it were to move to the intermediate embedded CP (CP2), the TLR would be violated. As in the above simple example, the embedded CP clauses can move and adjoin to the next highest IP; CP3 will move and adjoin to IP2, and CP2 will move and adjoin to IP1. The resulting LF representation would be:
As can be seen in the above structure, meno₄ is not in a position to be governed by the scope marker in the matrix COMP. Although its index can percolate up to the embedded CP, this CP is still too far away from the scope marker to be governed by it. Consequently, since the scope marker does not govern an element which bears the index of meno₄, it will
never be able to bear the index of this phrase and the multiple question is ruled out.

4.2.6 The WH-Island Condition

As mentioned above, the scope marker strategy cannot mark the scope of a WH-phrase within a WH-island:

(8) *sh-Mona nasat li-meno, tinti sheno e,?
   SM-Mona forgot to-whom to give what
   What did Mona forget to whom to give?

This fact was given as evidence against a subjacency account to account for the restrictions on the scope marking strategy; the wh-phrase sheno could move to the embedded CP at LF and it would still be subjacent to the scope marker.

However, the government approach also faces difficulty. If the WH-in-situ moves at LF to the embedded CP, it will also be in a position in which the government relation holds between it and the scope marker in COMP. It would appear that the government approach to the locality of scope marking is no better than the subjacency account.

I argue that the problem in this case is that there are two different scope domains involving WH-quantifiers. WH-quantifiers can either have matrix scope, where they are interpreted as direct questions, or they can have scope only over the embedded clause, where they will be interpreted as
indirect questions (Baker, 1970). In this particular example, the verb 'forget' selects for an indirect question as its complement. The WH-quantifier associated with the indirect question has scope only over the embedded clause. The WH-phrase 'what' would be linked to a scope marker in the matrix COMP and be interpreted as a direct question. The scope here would extend over the entire sentence. Because this sentence is ungrammatical, it appears that the scope marker in the matrix cannot reach into the scope domain of an indirect question. The WH-phrase which appears within the scope domain of an indirect question cannot be bound by a scope marker in the matrix.

This generalization is similar to Heim's (1982) observations regarding unselective binding of indefinites and also Rizzi's (1990) theory of relativized minimality. As I discussed above, for Heim, an indefinite is bound by the lowest c-commanding operator. For Rizzi, a governor cannot govern inside the domain of another governor. Relating these two proposals to the problem here, the conclusion that is reached is that there must be another operator between the scope marker in the matrix COMP and the WH-phrase in the embedded COMP which governs and binds the elements in the embedded COMP.
I argue that the operator which blocks binding is the question operator associated with the indirect question. Following the position of Katz and Postal (1964) and further developed by Baker (1970) (see also Pesetsky (1987); Nishigauchi (1990) and Berman (1991)), I posit an abstract Q morpheme which functions as this question operator which marks the scope of WH--phrases.

The first question that arises from positing this abstract Q morpheme is what is its syntactic position. It is commonly assumed (see, for example Pesetsky, 1987 and Nishigauchi, 1990) that the Q morpheme is an element of COMP and more specifically that this Q element occupies the head position of CP. The WH-phrase that is associates with this Q element occupies the specifier of CP:

\[ (36) \]

However, if this is the representation, then there is a further question about the relation between the Q element and the WH-phrase. In this account, the Q element is an operator which binds the WH-phrase. I have been arguing that the relationship between an operator and the element that it
binds as a restriction is subject to a government requirement. This would mean that if the representation given in (35) is correct, a head is in a position to govern its specifier. Furthermore, if (35) is correct, then this would also mean that an appropriate head would be able to block government by a head outside of the maximal projection. This latter condition would be necessary because as we have seen above, a scope marker is not be able to bind a WH-phrase in the specifier of CP of an embedded question i.e. a WH-phrase which occupies the specifier position of CP whose head contains a Q element.

While this representation is certainly compatible with the claims made here (with the appropriate requirements on government as mentioned in the previous paragraph), I adopt a slightly different representation which is more compatible with the approach to government developed by Rizzi (1991). For Rizzi, a head can only govern 'within its immediate projection'; a head does not govern any elements within its specifier. The syntactic position that I adopt for the Q morpheme and its associated WH-phrase is given in (36):
Here, I assume, as above, that the Q element heads its own maximal projection. I differ from above in that I propose that the Q element takes CP as a complement. WH-phrases move to the specifier of CP and can be governed and thus bound by the Q element. Furthermore, I continue to assume that the scope marker is an element within the CP projection and not the SP projection. With this representation, it is easy to see why a scope marker cannot bind a WH-element within a WH-island. A verb which takes an indirect question as a complement would select an SP with a Q element as its head. I give a possible (almost) LF representation for (8)

(38) [SP Q₂ [CP₂ sh₂ [IP Mona nasat [SP Q₁ [CP li
neno₁ sheno₂ [IP titti e₂ e₁]]]]]

Here, I show both WH-phrases in the embedded specifier of CP. The government requirement between the scope marker and

(37)
sheno 'what' would require movement of the embedded clause out of its complement position and adjoined to IP. However, the government requirement will never be met because of the intervening SP maximal projection. In addition, if only the embedded CP moves and adjoins to the matrix IP then there will be a government relation between the scope marker and sheno in the specifier position, but there will no longer be any government between the embedded Q of the indirect question and li-meno.

Note also that I have made a change here with respect to what I have been assuming to be the ultimate binder of the index associated with the WH-phrase. Up until now, I had been assuming that it is the scope marker which is the ultimate binder of the WH-phrase. Now, I posit the Q morpheme as the ultimate binder. With this latter analysis, the question arises as to what is the function of the scope marker in the matrix CP.

In the system of index percolation that I am proposing, index percolation is crucially dependent on whether or not a head can bear an index. In this light, I argue that the function of the scope marker in the matrix CP is to allow the head of the matrix CP to bear an index. In this way, the index associated with the partially moved WH-phrase can percolate up to the CP projection, which is governed by the
Q element. Thus, the Q element will be able to bear the index of the partially moved Wh-phrase.

Within this interpretation, when there is no scope marker in the matrix CP, the head position will not be able to bear an index, and consequently the index will not percolate up to a position where it can be governed by the Q element. The Q element will not have an index, and the sentence will be out.

4.2.7 The Structure of the Scope Marker

As mentioned above, the scope marker is the WH-word sheno 'what' which appears as such when it precedes the subject and contracted to sh- when it precedes the verb. I have argued that this scope marker binds a variable introduced by a WH-phrase.

I have discussed the position of the WH-phrase. Here, I discuss the position of the scope marker.

The scope marker appears at the beginning of the sentence. It either occupies the specifier position of CP or the head position C:

\[(39) \quad \begin{array}{c}
CP \\
\text{sheno} \\
C' \\
C \\
o
\end{array} \quad \begin{array}{c}
CP \\
C' \\
C \\
sheno
\end{array}\]
It would seem most reasonable for it to occupy the specifier position; after all, it is homophonous with the WH-phrase 'what' and this phrase is a maximal projection that must appear in the specifier of CP at LF.

However, if the specifier position is correct, then the scope marker cannot bind any WH-phrase directly. In this position, it will never meet the locality requirement. This is because the presence of C' will make it impossible for the scope marker to govern any phrase below this position.

In order to keep the maximal projection analysis, it must be assumed that the empty head of the matrix CP can also bear the selection index of scope marker. The fact that there is a scope marker in its specifier will allow the head to bear the selection index. This head will then be able to govern elements adjoined to the matrix IP.

On the other hand, sheno could occupy the head position directly. We could make this analysis consistent with the fact that sheno is also a maximal projection by adopting a DP analysis for these WH-words. Under a DP analysis, sheno would be a functional D head that projects a DP. As a DP, and thus a maximal projection, it could appear in argument position and would move into the specifier position of CP. Since sheno is a functional head under this analysis, the only change that would need to be made to accommodate the
scope marking structure would be that sheno could also serve as a C head as well as a D head.

(40)     DP                      CP
         \                       \                  
          D'                     C'                  
          \                     \                  
           D                     C                  
           \                     \                
            sheno                sheno

In summary, either structure for the position of sheno will be consistent with the hypothesis that it acts as an unselective binder of WH-phrases and that unselective binding is subject to a locality constraint. At this point, I cannot choose between them.

4.3 Partial Wh-movement and Restrictive 'if/when' clauses

I have used the same formal mechanism to account for the scope of partially moved WH-phrases as to account for unselective binding in restrictive 'if/when' clauses. At this point, I would like to compare partial Wh-movement and adverbial binding in restrictive 'if/when' clauses. I will show that these two distinct phenomena have many similarities that receive a natural explanation in the theory developed here.

First, in some cases of partial WH-movement, the WH-phrase is within a syntactic island. The scope of the WH-
phrase is marked by an element outside of this island. I have argued that this scope marking is an instance of unselective binding between a Q operator in the matrix clause and the partially moved WH-phrase. This situation is parallel to indefinites within restrictive 'if/when' clauses and adverbial operators. The indefinite is within the 'if/when' clause, which is an island, while the adverbial operator is outside of this island. The adverb unselectively binds the indefinite within the island.

Second, the scope marking strategy cannot rescue all cases of WH-words within islands. Recall that the scope marking strategy cannot be used to avoid the WH-island condition, the Complex NP condition and the Coordinate Structure Constraint. It does rescue cases of WH-words within tensed clause islands. Since I am arguing that this strategy is a case of unselective binding, what this means is that unselective binding can occur within some islands but not others. With respect to indefinites and adverbial operators, I showed in chapter one that unselective binding can occur for indefinites within restrictive 'if/when' islands, but not in other islands such as Coordinate Structure islands, Complex NP islands and Adjunct Islands.

Third, I argued that unselective binding between adverbial operators and indefinites can occur within some
islands as a result of index percolation which is dependent on whether or not the head of CP can bear an index. In those cases where it is allowed to occur within an island, the head of CP is able to bear an index. The cases of partial WH-movement I argued to also be dependent on whether or not a head of CP can bear an index. The scope marker is present in the matrix CP which allows the head of CP to bear an index.

Since these two phenomena share a cluster of properties, it is natural to treat them in the same way.

4.4 Infinitivals and the Problem of Economy

As discussed above, the possibilities for questioning in embedded infinitival clauses are much greater than those for embedded tensed clauses. I repeat the relevant data below:

(3)a Mona hawlat tishtiri sheno?
Mona tried to-buy what

What did Mona try to buy?

(4)c sh-raadat Mona Ali ygaabal meno?
SM-wanted Mona Ali to meet whom

Who did Mona want Ali to meet?

(13)b Mona raadat tijbir Su'ad meno, tisa'ad e1?
Mona wanted to-force Su'ad who to help

It is possible to have WH-in-situ in an embedded untensed clause (3a) as well as WH-in-situ with a scope marker (4c).
In addition, it is possible to partially move the WH-phrase to an intermediate CP without a scope marker present (13b).

The sentence in (3)a indicates that the embedded infinitival is not a barrier to movement as a tensed clause is. Thus, it is possible to conclude that embedded infinitivals are not required to adjoin to IP as embedded tensed clauses are. Since there is no barrier between the matrix CP and the base position of the WH-word, it is possible to establish a chain of antecedent government links between the WH-phrase in the specifier of CP and the trace in the base position in the embedded infinitival.

While the embedded infinitival is not required to move, sentence (4)c indicates that it is possible to adjoin these clauses to IP. In these instances, the embedded CP will be a barrier to government. Consequently, there will be partial WH-movement of the WH-phrase in situ to the embedded specifier of CP and a scope marker will occupy the matrix CP to mark the scope of the partially moved WH-phrase.

The most interesting case is (13)b. Here, there is a partially moved WH-phrase to a CP in between the matrix CP and the base position of the WH-phrase with no scope marker present. The question that it relevant here is how this WH-phrase gets matrix scope. The most simple answer is that it moves to the matrix specifier of CP at LF; its LF
representation would then be no different than that of the same sentence with the WH-word left in-situ.

While this analysis is certainly tenable, it runs into problems with recent formulations concerning the economy of derivation and representation (see Epstein 1992; Chomsky, 1992). Basically, what Epstein's theory about the economy of representation attempts to capture is that once an operator has moved overtly, it does not get a second chance to move again, covertly. For example, consider the following sentence:

(41) Who wonders where we bought what?

This sentence can be answered in two ways. First, a possible answer is 'John wonders where we bought what'. In this case, only the question word 'who' gets answered. A second possible answer is 'John wonders where we bought the newspaper, Sue wonders where we bought the coffee maker etc.' In this case, both 'who' and 'what' are answered. Chomsky (1976) and others propose that because both 'who' and 'what' are answered, they both occupy the matrix specifier of CP at LF. The question word 'who' occupies the matrix specifier of CP at S-structure, but 'what' remains in situ at S-structure. It is moved, however, at LF:

(42) [cP who, what [IP t1 wonders [cP where [IP we bought t2 t3]]]
Notice that in this case, 'where' never gets answered, it must stay in the embedded CP. However, there is nothing which prevents 'where' from moving to the matrix specifier of CP at LF. Although it could be argued that once 'where' moves, the selectional requirements for 'wonder' are no longer met (it requires an indirect question), it would be possible for 'what' to move at LF and occupy the embedded specifier of CP. In this way, the selectional requirements for 'wonder' would be satisfied.

The economy approach solves this problem because it does not allow 'where' to move at LF; it has already moved at S-structure and can no longer move anymore. 'What' is allowed to move because it is still in-situ at S-structure; it has not undergone any movement so it is allowed to move at LF.

These descriptive generalizations are given a formal account by adding the following condition to the grammar (Chomsky, 1992; Epstein, 1992):

(43) Satisfy filters using the fewest applications of move $\alpha$.

In the above example, only one instance of move $\alpha$ is required to satisfy the requirements of wonder; this is the movement of where into the specifier of CP of the embedded clause. If 'where' is moved again and 'what' moved into this
position, then this would be two instances of move $\alpha$.

With this analysis in mind, consider again the case of Arabic partial movement. The WH-word has already moved at S-structure to an intermediate CP. These sentences are interpreted as direct questions so this phrase must get matrix scope. There is no scope marker present so it cannot remain in place and be indexed with a scope marker in the matrix CP. The only way for this phrase to get matrix scope is for it to move there.

This data, then, seems to be an argument against the economy approach. This is because there has been two applications of move $\alpha$ to get the Wh-phrase to the matrix, one application of overt movement and one application of covert movement. There is a shorter derivation in which the WH-word stays in situ and moves at LF to the matrix. This uses only one application of move $\alpha$. With the economy approach, this latter structure should be preferred and the partial movement should be out.

This conclusion is reached only if it is assumed that the WH-phrase must move to the matrix CP on its own. A movement derivation exists that might be consistent with economy if the entire clause that contains the WH-word is pied-piped to the matrix specifier of CP. With this LF representation, the Q morpheme would still be able to bind the WH-word in the
specifier of the embedded CP. I give a possible representation for (13)b:

(44) Mona raadat tijbir Su'ad meno₁ tisa'ad e₁?

The index of the WH-word could still percolate up to the Q morpheme even if it is pied piped with the entire clause.

However, this still violates the formal account of economy if we take into account the number of applications of move α for the entire structure. Even with the pied piping approach, there is two applications of move α, one for movement of the WH-word and one for movement of the infinitival clause. If the Wh-word stays in-situ, then there still would only be one application of move α to get the WH-
phrase to the matrix CP.

This can be remedied if we change the conception of economy to prefer the fewest applications of move $\alpha$ not for the entire structure, but only for the particular node that is being moved. This conception would then still disallow overt movement of a phrase and then covert movement of the same phrase if it is possible to have only covert movement of the phrase; the first derivation would have two applications of move $\alpha$ per node while the second would only have one per node. However, it would allow the pied-piping approach discussed above because the WH-word moved overtly would have one application of move $\alpha$ and the infinitival clause that has moved would also only have one application of move $\alpha$; in each case of movement there is one per node. If the WH-word stays in situ and moves at LF, this is also only one movement per node. Thus, the economy constraint could not chose between them.

This pied-piping analysis is very reminiscent of van Riemsdijk's (1985) analysis of pied-piping in non-restrictive relative clauses in German. Consider the following sentence:
(45) Jetzt hat er sich endlich den Wagen, [den zu kaufen] now has he to-himself finally the car which to buy
    er sich schon lange vorgenommen hatte, leisten
    he to-himself already long planned had afford
    konnen
    been-able

    Now he has finally been able to afford the car which he had planned to buy for a long time.

In this example, the material in bold in the non-restrictive relative clause. The material in brackets is an infinitival clause which contains a fronted WH-word.

van Riemsdijk argues that the infinitival clause which is in brackets is an S' (which would be a CP if this were updated) which has been moved by WH-movement to the COMP of its clause. Furthermore, the WH-word den has also been moved to the COMP of its own clause. The tree structure for this sentence would appear as follows:

(46) (46)
    NP
    |   NP
    den Wagen
    |
    CP
    |
    C' zu kaufen
    |
    C
    |
    IP
    |
    er sich schon lange vorgenommen hatte
This example parallels the Arabic example several ways. First, in both there is a WH-word which moves to the CP of an embedded clause. Second, the entire embedded CP which contains the moved WH-phrase itself moves to a CP. Third, this happens only in the case of an infinitival clause. The difference between Arabic and German is that in German the pied-piping is overt while in Arabic this would happen at LF.

Returning to the Arabic analysis, at this point, I have no data which chooses between whether the WH-word itself moves to the matrix CP or whether it pied-pipes the entire infinitival clause. I offer the latter analysis and comparison to German only to show that this data is entirely consistent with the economy approach.
CHAPTER FIVE: SCOPE MARKING IN OTHER LANGUAGES

5.0 Introduction

In the previous chapter, the scope marking strategy in Iraqi Arabic was discussed in depth. I showed that the index percolation strategy used for restrictive 'if/when' clauses and internally headed relative clauses is also operative in these types of questions.

The purpose of this chapter is to compare and contrast the scope marking strategy in Iraqi Arabic to the scope marking strategy in other languages, particularly Hindi, Slave and German. By comparing these languages, I hope to see if the theory of index percolation adopted here can account for the variation seen in this strategy. While many of the conclusions that I reach are speculative, I have included this chapter to show the range of variation that occurs with this particular strategy that any theory must account for.

5.1 WH-Questions in Hindi

The pattern of WH-movement in Hindi at LF is very similar to that of Iraqi Arabic, however the pattern of WH-movement at S-structure is quite different. In this section, I would like to account for this variation and also to present the scope marking strategy in Hindi. The data that I give is from Srivastav (1991) and Mahajan (1990). In addition, I will also
discuss an analysis for the restriction on LF movement discussed in Srivastav (1991) and compare it to the one given here.

5.1.1 WH-movement at LF and at S-structure

In Hindi, WH-in-situ is allowed if the WH-phrase is within a non-tensed clause, but not if the WH-phrase is in a tensed clause. This also correlates with a word order distinction between these clauses. Tensed clauses appear to the right of the verb, while untensed clauses appear to the left:

(1)a *tum jannte ho [ki usNE kyaa kivaa]  
you know that he what did  
What do you know that he did?

b tum [kyaa karnaal jaante ho  
you what do-NAA know  
What do you know to do?

In (1)a, I show WH-in-situ within a tensed clause, which is ungrammatical. In (1)b, I show the same case with a WH-word within an untensed clause, which is grammatical.

The analysis that I gave for Iraqi Arabic can naturally be extended to this data. While in IA, I argued that movement of the tensed clause takes place at LF, here the movement of

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1 This sentence does have an indirect question interpretation "You know what he did". However, in this interpretation the WH-word has not moved out of the embedded clause.
the tensed clause is overt. The movement of the tensed clause is shown by its position in the sentence; it appears to the right of the verb. Hindi has been argued to have SOV structure (Srivastav, 1991; Mahajan, 1990). Since the tensed clause in the example shown above is an object of the verb, it should appear to the left of the verb. Because it appears to the right of the verb, it is argued that the tensed clauses have moved to the right (Srivastav, 1991; Mahajan, 1990). Since the tensed clause has been extraposed, it becomes a barrier for movement and elements cannot move out of these clauses. Thus, if a WH-word in situ must move to the matrix CP at LF, it will be unable to do so because it will cross a barrier and consequently the sentence will be ungrammatical.

Untensed clauses appear to the left of the verb. This is the expected position if these clauses are complements to the verb. Since these clauses have not moved, they are not barriers to movement and consequently WH-movement out of these clauses is allowed. Thus, the major difference between IA and Hindi in this case is that the movement of the tensed clause is overt in Hindi, while covert in IA.

As for the pattern of overt WH-movement, the situation between these two languages is quite different. Hindi allows overt WH-movement for both arguments and adjuncts from tensed clauses, while IA allows only arguments to move overtly. I
give the Hindi data below:

(2)a kaun, tum socte ho ki t, aayegaa
who you think that will come
Who do you think will come?

b kEse raam-ne kahaa ki mohan-ne gaaRii Thiik kii
how Ram-erg said Mohan-erg car fixed
How did Ram say that Mohan fixed the car?

In (2)a I show movement of an argument, while in (2)b I show movement of an adjunct.

Both Srivastav (1991) and Mahajan (1990) give a derivational account for this restriction. They propose that in the mapping from D to S-structure, the WH-word can move before the tensed clause has been extraposed. Since the tensed clause has not moved, it is not a barrier and consequently a WH-word can move out of it. In the mapping from S-structure to LF, the tensed clause has already been moved. At this stage of the derivation, the tensed clause is a barrier and consequently no movement out of this clause is allowed.

This account cannot be extended to the pattern of overt extraction in Iraqi Arabic. If a derivialonal account is adopted, it would be expected that overt WH-movement should be allowed for both arguments and adjuncts, just as in Hindi. However, as has been shown, only arguments are allowed to move out of embedded tensed clauses in IA.

This difference between these two languages can be
explained if the pattern of overt WH-movement in Hindi is not considered an instance of actual WH-movement, but an instance of some other phenomenon. Note that Hindi also allows for 'scrambling' of noun phrases. In this case, noun phrases which are objects of embedded verbs can appear in the matrix clause. The following data is from Mahajan (1990):

(3)a mohan-ko, raam-ne socaa[cp] ki siitaa-ne t, Mohan(EDO) Ram(SUB) thought that Sita(ESUB)

dekhaa thaa]
see be-pst.

b raam-ne mohan-ko, socaa [cp] ki siitaa-ne t, Ram(SUB) Mohan(EDO) thought that Sita(ESUB)

dekhaa thaa]
see be-pst.

Mohan, Ram thought that Sita had seen.

In (3)a, the direct object of the embedded verb has been scrambled to appear t the beginning of the sentence, and in (3)b the direct object has been scrambled to appear between the matrix subject and verb.

It also appears that overt movement of WH-phrases is also an instance of scrambling (Srivastav, 1991). Consider again sentence (2)a.

(2)a kaun, tum socote ho ki t, aayegaa who you think that will come
In this sentence, the WH-phrase is a complement to the embedded verb, yet it appears in the matrix. This could be considered a case of WH movement of the phrase to the matrix CP. However, this sentence is actually ambiguous. It can be construed as a direct question, in which case the matrix verb is translated as 'think': 'Who do you think will come'. It can also be construed as an indirect question, in which the matrix verb is translated as 'wonder': 'You wonder who will come'. In this second interpretation, the WH-phrase which is in the matrix would be interpreted as the WH-phrase of the question complement of the embedded CP. In this second interpretation, it would appear as though the WH-phrase has been moved back into the specifier position of the embedded clause.

This latter fact is diagnostic for 'scrambling' of WH-phrases; this is also seen in Japanese and is argued to be an instance of scrambling in this language (Saito, 1989).

If Hindi overt WH-movement is an instance of scrambling, then there is no need for a derivational account to explain the differences between overt and covert WH-movement in this language. Covert WH-movement would be actual WH-movement, and subject to the restrictions that WH-movement is subject to. Overt WH-movement would be an instance of scrambling, and it would be subject to the conditions that scrambling is subject
to. If the conditions on scrambling are different from the restrictions on WH-movement, then the pattern of overt movement of WH-phrases would be different than covert movement of WH-phrases.

With respect to the difference between overt WH-movement in IA and Hindi, it can be argued that IA does not allow noun phrases to scramble out of embedded clauses. Since scrambling is not allowed in IA, overt WH-movement would be actual WH-movement (or a case of base generation). This overt WH-movement would be subject to the conditions on WH-movement. The overt WH-movement in Hindi would be subject to the conditions on scrambling. As above, if the conditions on scrambling are different than WH-movement, then overt movement of WH-phrases in IA would be different than overt movement of WH-phrases in Hindi.

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2 It has been argued that in Russian, scrambling is subject to different conditions than WH-movement. For example, WH-movement is not allowed across a WH-island, but scrambling is. This data is from Müller and Sternefeld (1991):

(i) Ty doktor₁ videl [CP kogda t₁ pod"ezzal]
you the-doctor saw when came

Did you see when the doctor came?

(ii) *Kto, ty videl [CP kogda t₁ pod"ezzal]
who you saw when came

Sentence (i) shows scrambling of the embedded direct object "doktor" across a WH-island, which is fine. Sentence (ii) shows WH-movement out of this same island, which is ungrammatical.
Thus, a derivational account is not needed if (1) overt movement of WH-phrases in Hindi is considered to be a case of scrambling and (2) scrambling is subject to different conditions than WH-movement, allowing it to move phrases out of islands that are not allowed to move by WH-movement.

5.1.2 The Scope Marking Strategy

In Iraqi Arabic, the scope marking strategy was used in cases where WH-in-situ was ruled out, as with WH-in-situ in embedded clauses. In Hindi, the situation is exactly the same. The question formation strategy that is preferred for WH-in-situ in embedded tensed clauses is the scope marking strategy:

(4) tum kyaa jaante ho ki usNE kyaa kiyaa
you what know that he ERG what did
What do you know he did?

Here, I have underlined and bolded the phrase that functions as the scope marker. Like IA, the scope marker is homophonous to the WH-word 'what'. Note that there is another difference between Iraqi Arabic and Hindi in the overt placement of the scope marker. In IA, the scope marker appears at the beginning of the sentence, and I argued that it is in the matrix CP. For Hindi, the scope marker appears before the verb, in the canonical object position.
I follow Srivastav and Mahajan and argue that the scope marker will move to the matrix CP position to mark the scope of the embedded WH-in-situ. The presence of the WH-scope marker in the matrix specifier of CP will license the head of the matrix CP to bear an index. The embedded WH-in-situ will partially move at LF to the embedded specifier of CP. It too will license the head of the embedded CP to bear an index. Since the WH-in-situ is in specifier position of the embedded CP and the head can bear an index, the head of the embedded CP can bear the index by spec/head agreement. This index will percolate up to the embedded CP by X-bar projection. Since the embedded CP is adjoined to the matrix IP, the head of the matrix CP will govern the the embedded CP. The head of the matrix CP can bear the index since it meets the structural requirements and it is licensed to bear the index by the dummy WH-element. Finally, the index can percolate up to the Q morpheme by X-Bar projection. The representation of WH-in-situ in embedded tensed clauses for Hindi will be exactly the same as that for IA.

5.1.3 A Second Look at WH-in-situ

As I showed above, both IA and Hindi do not allow WH-in-situ in embedded tensed clauses. I argued this to be the result of movement of the tensed clause out of its complement.
position to a position adjoined to the IP of the matrix clause. Since it is no longer a sister to a theta-marking lexical head, the embedded CP becomes a barrier for movement. Since it is a barrier to movement, WH-in-situ is not allowed because movement at LF would leave a trace that would not be governed.

In my account, it was crucial that both object arguments and adjuncts leave a trace within the embedded clause that was not able to be governed. This would account for why LF movement is ungrammatical for objects in these languages. However, it is standardly assumed that movement of an object arguments will leave a trace in argument position which can be lexically governed by the verb. Since this trace is lexically governed, all intermediate traces are unnecessary for government. These traces can be deleted, and movement of the object will be grammatical. With adjuncts, on the other hand, all the intermediate traces are necessary because the adjunct trace will not be left behind in a position in which it would be lexically governed. The intermediate traces are necessary for antecedent government. Consequently, adjunct movement will be ungrammatical.

Under the standard account, there should be an asymmetry between arguments and adjuncts in the case of movement out of an island; arguments should be able to move while adjuncts
should not. This is not supported by the data from Hindi and IA with respect to LF WH-movement out of embedded tensed clauses; both arguments and adjuncts are not allowed to move at LF. Thus, the analysis that I have given for IA and Hindi should be preferred.

A somewhat different analysis for this restriction is given in Srivastav (1991). In her account, she adopts the Fiengo et al. (1988) proposal concerning movement and subjacency effects. In their proposal, movement is allowed out of adjunct clauses (which are barriers for movement) because adjunction is allowed to phrases that are in a non-argument (A-bar) position. As a result of this adjunction, the adjunct is no longer a barrier to movement and thus subjacency is voided. However, Fiengo et al. also adopt the position of May (1985) that an adjunction structure prevents antecedent government for traces which are within the structure. In this theory, arguments will be able to move out of adjuncts because they their traces will be lexically governed. Since intermediate traces are unnecessary for proper government, they can be deleted. Adjuncts will not be allowed to move because here intermediate traces are necessary for proper government. In these cases, there will be an intermediate trace left behind which will not be antecedent governed:
This argument, however, still does not explain the facts about extraction from embedded finite clauses in Hindi. This argument predicts that there would be an argument/adjunct asymmetry and as we have seen both arguments and adjuncts are not allowed to be extracted. To solve this problem, Srivastav proposes that the embedded clause has been extraposed and is thus like an adjunct; the embedded CP is a barrier. She also assumes that there is a (possibly null) pleonastic pronominal in the usual preverbal object position that is coindexed with the extraposed embedded clause. Since theta role assignment is to the right in Hindi, the pleonastic will receive the theta role of the embedded clause. Srivastav also proposes that the pleonastic cannot bear the theta role and must transfer it to the embedded finite clause with which it is coindexed. She argues that this transfer of the theta role can happen only under proper government. The pleonastic must properly govern the head of the extraposed clause if the clause is to bear the theta role. In order to properly govern
the head of the extraposed CP, the pleonastic moves to INFL.

This analysis explains why it is impossible for the WH-in-situ to move out of the extraposed clause. Since this clause is a barrier, adjunction is necessary for movement to occur out of the clause. However, as argued by Fiengo et al., the adjunction structure will prevent proper government. In this case, the pleonastic in INFL will not be able to properly govern the head of the extraposed clause. As a result, the transfer of the theta role from the pleonastic to the clause will not occur and the sentence will be ungrammatical.

Although this analysis explains why wh-in-situ is impossible in embedded finite clauses in Hindi, it still faces problems. Not only will in rule out cases of WH-in-situ in embedded clauses, it should also rule out any sentence with an embedded finite clause. This is because Srivastav requires that there be proper government between the pleonastic in INFL and the head of the extraposed clause. However, she also assumes that the CP of the extraposed clause is a barrier. If this CP is a barrier, then it will always be impossible for the pleonastic to govern the head of CP. Since the head is dominated by CP and the pleonastic is outside of CP, the embedded CP will always be a barrier between the head and the pleonastic. Since barriers prevent government, the head of CP will always fail to be governed by the pleonastic in INFL,
regardless of whether or not there is an adjunction structure.

A second problem concerns the nature of the adjunction structure in the case of movement of an argument. In her analysis, if an argument or an adjunct is moved, it must adjoin to the embedded CP to void the barrierhood of the embedded CP. This allows movement out of the clause. However, in the case of arguments, this trace is not necessary for proper government. Since the original trace will be lexically governed, this intermediate trace adjoined to the embedded CP is not needed to properly govern the original trace. This intermediate trace itself will not be governed because it is still within the adjunction structure. In fact, if it is present in the representation, it will be an ungoverned trace and it should make the sentence ungrammatical.

In the Fiengo et al. analysis, intermediate traces which are not required by the projection principle and are not required for proper government are deleted. This is what allows movement for arguments out of islands. In the case of extraction from Hindi finite clauses, this would mean that the intermediate trace adjoined to the embedded CP would also be deleted. If this trace is deleted, and it must in the case of argument extraction to prevent the occurrence of an ungoverned trace, presumably there would also no longer be an
adjunction structure at the embedded CP. After deletion of the trace, there is nothing adjoined to the embedded CP. At this point, the embedded CP is no longer different from an embedded CP from which no movement has occurred. Since the latter type of CP is allowed, it now becomes unclear as to why movement of arguments is also not allowed\(^3\).

One of the reasons why Srivastav proposes this theta-role account for the impossibility of WH-in-situ in extraposed finite clauses is that WH-in-situ is allowed within adjunct clauses that are not complements. In these cases, there is the familiar argument/adjunct asymmetry:

\[(6)a \ \text{vo [kiosKO dekhne ke baad] ghar gayn}\]
\[\text{she who seeing after home went}\]
\[\text{Who, did she go home after seeing t,?}\]

\[b \ *\text{vo [kaise bartan saaf karne ke baad] thak}\]
\[\text{she how dishes cleaning after gets}\]
\[\text{hai jaatii tired}\]
\[\text{How, does she get tired after cleaning dishes t,?}\]

\(^3\) Note also that the Fiengo et al. analysis requires that subjacency be a condition on movement and not representation. After the intermediate trace is deleted in an adjunction structure, the adjunction representation should no longer appear. Thus, the ultimate representation would be as though there was movement from the island without adjunction to the island. To the extent that subjacency is considered a condition on representation, the Fiengo et al. analysis is problematic.
Sentence (6)a shows the argument case and (6)b shows the adjunct case.

Srivastav reasons that since these clauses are not theta marked, there is no need for any sort of theta role transfer as is required with the embedded complement clauses. Movement out of these clause, then, would be constrained only be the conditions proposed in Fiengo et. al.. These conditions would allow for movement of arguments and not adjuncts, and that is exactly what occurs.

Thus, Srivastav relates the difference between ordinary adjuncts such as those in (6) above, and extraposed finite clauses which behave like adjuncts to a difference in theta marking. Ordinary adjuncts are not theta marked while extraposed finite clauses are theta marked. Furthermore, extraposed finite clauses receive their theta role under proper government of their head by a pleonastic in INFL.

However, there are more differences between ordinary adjuncts and extraposed complement clauses than just theta-marking. First, in the examples that Srivastav gives, the ordinary adjuncts are untensed. The extraposed clauses are tensed. Secondly, the ordinary adjuncts are in preverbal position while the extraposed clauses are in post-verbal position. Thus, given all these differences, it is unclear whether the differences in the possibilities for WH-in-situ
in these two types of clauses is related to theta-marking, tense or directionality.

At this point, I would like to point out that the analysis I have proposed does not account for why WH-in-situ arguments are allowed in ordinary adjuncts. Since I do not allow lexical government and require that all intermediate traces be present for both arguments and adjuncts, there should be no difference with respect to arguments and adjuncts within ordinary adjuncts. In my analysis, both should be ruled out.

I would like to sketch a possible alternative for the analysis of WH-in-situ in ordinary adjuncts that would be consistent with my claims. While I realize that I do not have any Hindi data to motivate my analysis, I present my analysis to show that the theta-marking difference between ordinary adjuncts and extraposed complement clauses is not the only difference that can be used to account for the WH-in-situ facts.

In this analysis, I propose that WH-words do not move out of the adjunct clause. They will move to an intermediate position in the specifier of the adjunct PP:

\[
\text{(7)} \ [\text{pp} \ \text{kisK0}_1 [\text{p}, \text{t}_1 \ \text{dekhne ke baad} ]] \\
\text{who seeing after}
\]

This entire adjunct PP is then pied-piped to the matrix
CP. Since the WH-phrase does not move out of the adjunct clause, there is no violation of the proper government requirement on traces.

Two facts now need to be explained. First, a reason must be given for why adjuncts are not allowed to be in-situ in this case. The analysis above allows them to also move to an intermediate position. Second, a reason must be given for why the pied piping strategy is not an option with respect to extraposed complement clauses.

As for the first question, I will simply state that although the adjuncts can move to the intermediate specifier position, they will not allow for pied-piping of the adjunct clause. Since the entire adjunct clause cannot pied pipe, the WH-phrase will be too far from the Q morpheme for it to be bound by this morpheme.

While I do not have any data from Hindi which would motivate this contrast, I do have data from English which supports an argument/adjunct distinction with respect to pied piping.

Consider first that clausal pied-piping is allowed in non-restrictive relative clauses in English (Nanni and Stillings, 1978; Ishihara, 1986):

(8) those elegant parties, [to be invited to one of which] was certainly an honor, were usually held at Delmonicos.
Here, the entire infinitival *to be invited to one of which* has been pied-piped to the specifier of CP of the relative clause.

However, a contrast can be made with respect to argument and adjunct WH-phrases in allowing the infinitival to pied-pipe:

(9)a ?that elegant section of town, *to live in which* was certainly a mark of prestige,...

b *that elegant section of town, *to live where* was certainly a mark of prestige,...

In (9)a, there is an argument wh-word *which* which allows the entire clause *to live in which* to pied pipe. In (9)b the adjunct *where* does not allow the clause to pied-pipe⁴. Note that if there is no pied-piping, *where* can be used as the WH-word of a non-restrictive relative:

(10)a that elegant section of town, where John lived all his life,...

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⁴ Andy Barss has pointed out to me that there are some cases where adjuncts do allow pied-piping:

i Out from under where did Bill run?

This distinction might rest on whether or not it is a whole clause that needs to be pied-piped or just a phrase. Barss has also pointed out that a similar example with a a clausal constituent is completely ungrammatical:

iia *that little tiny clown car, to run out from under which is no mean feat,...

iib *that little tiny clown car, to run out from under where is no mean feat,...
This data thus provides support in English for the notion that adjuncts do not allow pied-piping.

In answer to the second question of why pied-piping is impossible in the extraposed complement clause, recall that this clause is tensed. Earlier, I had discussed that there is a tense/non-tense distinction with respect to pied-piping; untensed clauses allow pied-piping but tensed clauses do not. If this distinction can be shown to hold also in Hindi, then we have an explanation for why the pied-piping option is disallowed in extraposed clauses—they are tensed clauses and tensed clauses do not allow for pied-piping. In this way, I have drawn a distinction between WH-in-situ in ordinary adjuncts and extraposed complement clauses that is related to their tense properties and not their theta marking properties. This pied piping analysis is very reminiscent of a similar analysis for apparent island extractions in English proposed by Cinque (1991). In English, arguments but not

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5 An argument can also be made based on the difference in word order between tensed and non-tensed clauses. If there is a directionality condition on proper government, requiring that traces must be governed in the canonical direction, then pied piping of an entire tensed clause will leave a trace that must be governed to the right. However, if as Srivastav argues that Hindi is SOV, then the canonical direction for government would be to the left. Therefore, the trace left behind after pied-piping of a tensed clause would be ungoverned. This would not affect untensed clauses as they are located to the left.
adjuncts can be overtly extracted out of an island:

(11)a Who did you leave [without speaking to e]?  
   b*How did you leave [before fixing the car e]?  

Cinque proposes that these are not cases of actual movement but cases of base generation of an operator linked to an null pronominal in the adjunct. Since the null pronominal can only link to referential noun phrases, the contrast shown above is explained.  

However, this analysis predicts that the gap could be found in any type of island. It has also been noted that extraction of out of an adjunct within an adjunct is impossible:

(12) *Which book, did you leave Russia [without being arrested [after distributing e,]]

If the e in the above example is a base generated null pronominal, linked to a base generated WH-phrase, there is no explanation for this adjunct within adjunct condition.  

Cinque also argues that the constituent which contains the null pronominal must also move at LF. In (11)a above, the entire phrase without speaking to pro would be able to move because the adjunct phrase itself is not located within an island. In (12) since the entire phrase after distributing pro is located within an island, movement of this phrase out of the island would leave a trace that is ungoverned.
The facts in Hindi cannot be given the same type of analysis because in the Hindi adjunct case, the WH-words themselves are in the island. Consequently, there is no possibility for base generation of the WH-phrase in an A-bar position. However, the analysis that I have given for Hindi does incorporate a pied-piping account for these island violations.

Note also that in English there is an argument/adjunct asymmetry with respect to multiple WH-questions when the WH-word in-situ is located within an island:

(13)a Who left [after seeing who]?
   b *Who got tired [after washing the dishes how]?

This data parallels the Hindi facts. Again, it would be impossible to give a base generation analysis for these facts, since the WH-words are in-situ. The analysis that I have given above can be applied to these cases as well.

To the extent that these pied-piping properties can be shown to hold in Hindi, this explanation can be seen as support for the notion that movement out of adjuncts is barred in general, whether at S-structure or at LF. Apparent violations of this generalization can be argued to be cases of either base generation or pied piping.
5.1.4 A Quick Summary

Here, I would like to provide a quick summary of the facts concerning WH-movement in Hindi and IA and summary of my account for these facts.

First, both Hindi and IA do not allow WH-in-situ for both arguments and adjuncts in embedded tensed clauses. I have argued that these tensed clauses are in an adjunct position and are thus islands for movement. If the WH-phrases are to move out of these clauses at LF, they will leave behind a trace that will be ungoverned.

IA allows overt movement of arguments but not adjuncts from embedded tensed clauses, while Hindi appears to allow both types to overtly move. I have argued that in IA, the cases of overt movement are simply cases of base generation of a WH-phrase, the option of base generation being impossible for adjuncts. Adjuncts can only appear in the matrix if they move. However, since these clauses are islands, movement is impossible. In Hindi I have proposed that overt movement in not an instance of WH-movement but an instance of scrambling. Scrambling is subject to different conditions than WH-movement and this is why WH-words are allowed to move out of embedded tensed clauses.

Finally, in Hindi WH-in-situ is allowed for arguments but not adjuncts within ordinary adjunct clauses. I have argued
that in this case the WH-word does not move out but the entire adjunct clause is pied-piped. Arguments, but not adjuncts, allow the for pied-piping.

5.2 WH-Questions in Slave

In the previous chapter, I discussed WH-Questions in Iraqi Arabic and showed how in some cases of matrix WH-Questions the WH-phrase appears in an embedded CP and is bound by a scope marker in the matrix COMP.

In this section, I will apply this analysis to WH-Questions in Slave (Rice, 1990). However, Slave does not have any overt scope marker. What I show is that there are several parallels between WH-questions in Iraqi Arabic and Slave which demonstrate that the syntax of questions in these two languages should be similar. On the basis of these similarities, I argue that there is a scope marker in Slave which is syntactically, but not phonologically present.

5.2.1 Question Formation in Slave

Here I give an overview of question formation in Slave and present the similarities between question formation in Slave and Iraqi Arabic (IA).

Like IA, Slave has both overt movement of the question word to the front of the sentence as well as WH-in-situ:
(14)a ?ayį́ David yehtsi
   what David 3 make 4

   b David ?ayį́ ehtsi
   David what make

   What did David make?

(15)a ?amíi John yeghọ ?enietọ
   who John 3 of 3 loves

   b John ?amíi ghọ ?enietọ
   John who 3 of 3 loves

   Who does John love?

In these examples, the (a) cases show movement of the
question word while the (b) examples do WH-in-situ. It should
be pointed out that in cases of overt movement of the WH-
phrase with a third person subject, the pronoun ye appears
affixed to the verb.

In overt movement out of embedded clauses, there is
restriction that divides along the argument/adjunct
distinction, just as in IA. However, this restriction is not
related to the tense of the embedded clause but whether or not
the embedded clause is a complement to a direct or indirect
speech verb.

With a direct speech verb, the embedded clause is
interpreted from the point of view of the subject of the
matrix clause. With an indirect speech verb, the embedded
clause is interpreted from the point of view of the speaker.
Some examples are as follows:

(16) John ?erâke?ée wihsɁ gu’ kodîhshɁ
    John parka 1sg.made COMP 3 know area

    John knows that I made a parka.

(17) Rosie ?erâke?ée wihsɁ sedeyidɁ
    Rosie parka 1sg. made 3 told 1sg

    Rosie, told me she, made a parka.

In sentence (16) there is an indirect discourse verb and in sentence (17) there is a direct discourse verb. Notice that the embedded verb in both sentences is the same wihsɁ 'I made'. However, when this verb is embedded beneath an indirect speech verb, which is interpreted from the point of view of the speaker, the subject of the embedded verb and the speaker of the entire sentence are the same. When the verb is embedded beneath a direct discourse verb, which is interpreted from the point of view of the subject of the matrix verb, the subject of the embedded verb and the subject of the matrix verb are the same.

The following example shows the argument/adjunct split regarding overt movement from embedded clauses of indirect speech verbs:
(18)a \(\text{?ayíí netá} \text{ yéhk'é kenehdzá} \)
What 2sg.father 3 shot 4 3 tried
What did your father try to shoot?

b \(\text{yeri bedare ryeyehdí } \text{?ayílá} \)
what 3.sister 3 bought 4 3 caused 4
What did his older sister let him buy?

(19)a \(\text{*?ode netá nimbaa enáįh?á kenehdzáh} \)
where 2sg.father tent 3 pitch 3 tried
Where did your father try to pitch the tent?

b \(\text{*wodo se moóčike neté ?agíhtę} \)
when FOC 3.people.pl 3 lie 3pl. cause 4
When do his parents make him go to bed?

In (18), an argument is moved and the sentence is grammatical. In (19), an adjunct is moved and the sentence is ungrammatical.

If the matrix verb is a direct discourse verb, movement of both arguments and adjuncts is acceptable:

(20)a \(\text{?ayíí Freda segha qhtsi nédi} \)
what Freda 1sg.for 2sg. opt.make 3 told 2sg.
What did Freda tell you to make for her?

b \(\text{ayíí Margaret nayeuhndí enįdį} \)
what Margaret 3 opt.buy 4 3 wants
What does Margaret want me to buy?

(21)a \(\text{hodį nurse negháuhnda} \text{ néndí} \)
where nurse 1sg. opt.see 2sg 3 told 2sg.
Where did the nurse tell you she would see you?
When does the nurse want to see me again about Ted?

As in Arabic tensed clauses, this pattern of data implies that embedded clauses of indirect speech verbs are barriers to movement. The trace left behind after movement of an adjunct will fail to be governed by the WH-phrase in the matrix COMP. With arguments, there is no movement (as argued by Rice 1990); the WH-phrase is base generated in operator position. Recall that when an object argument moves there is a pronoun left behind. In this case, the WH-phrase can be base generated sentence initially and relate to the resumptive pronoun within the barrier. The relationship between an operator and a pronoun is not subject to locality restrictions. Note that IA shows the same type of argument/adjunct asymmetry with respect to overt movement, and that I have argued that in IA, overt movement of arguments out of embedded tensed clauses is not a case of movement but a case of base generation.

However, there is a difference between IA and Slave with respect to WH-in-situ. Recall that in IA, WH-in-situ in a embedded tensed clause is not allowed; the scope marking
strategy must be used. Since I am claiming a parallel between IA embedded tensed clauses and Slave embedded clauses of indirect discourse verbs, then we should expect WH-in-situ to also be ungrammatical in Slave when it occurs within an embedded clause of an indirect discourse verb. This is not the case. Wh-in-situ is allowed in these instances:

(22)a neta\?ay\?i whehk\?e kenehdza\?
2sg.father what 3 shot 3 tried

What did your father try to shoot?

b bedare yeri r\?y\?eh\?i \?ay\?l\?a
3.sister what 3 bought 3 caused 4

What did his older sister let him buy?

(23)a Raymond Jane jundeni ri yil\? kodihsho
Raymond Jane where FOC 3 is 3 knows

Where does Raymond know Jane to be?

b John seya jundeni rawoz\?e yudeli
John 1sg.son where 3 opt.hunt 3 wants 4

Where does John want my son to hunt?

The examples in (22) show that argument WH-in-situ is allowed in clauses embedded under indirect discourse verbs, while the examples in (23) show that adjunct WH-in-situ is also allowed.

5.2.2 Analysis

Since Slave has both overt movement and WH-in-situ, it
again seems reasonable to assume that WH-movement to the matrix COMP can happen covertly in the LF component as well as overtly. Again, this is similar to the situation in IA. However, from the above examples in (22) and (23) regarding movement out of embedded clauses, it could be possible to conclude that the parallelism between IA tensed clauses and Slave indirect discourse clauses is not so straightforward. The data in (22) and (23) could be used to argue that LF movement of WH-phrases is freer than overt movement of WH-phrases (contrary to the situation in IA); overt movement of adjuncts to the matrix is impossible but covert movement to the matrix COMP is possible.

This conclusion would seem to be in line with arguments from Huang (1982) and others regarding WH-in-situ in Chinese. Huang argues that movement at LF is freer than movement at S-structure because LF movement is not constrained by Subjacency while S-structure movement is. The ECP, however, is still operative at LF. The situation in Slave seems to be consistent with the observation that movement is freer at LF than at S-structure.

However, the data from WH-in-situ in Slave is different from that in Chinese. In Chinese, argument WH-in-situ is allowed within an island, but adjunct WH-in-situ is not. What this implies is that the possibilities for movement of
adjuncts is the same for overt as well as covert movement. For Huang (1982) and Lasnik and Saito (1984), this observation is explained by the ECP; arguments can move out of islands at LF because the traces they leave behind will always be lexically governed. Furthermore, subjacency does not apply at LF so there will be no subjacency violation. The traces of adjunct movement cannot be lexically governed; they can only be governed by antecedent government. Antecedent government cannot take place across and island. Consequently, adjunct movement from islands will leave behind ungoverned traces, in violation of the ECP.

In Slave, however, covert adjunct movement is actually freer than overt adjunct movement. Thus, there is a problem with WH-in-situ in Slave. It appears that adjuncts can freely move out of an island at LF, contrary to what is expected. If adjuncts must move to the matrix COMP at LF, then the conclusion that must be reached is that the ECP as well as subjacency is not operative at LF in Slave.

We are forced to the conclusion that the ECP does not apply at LF in Slave only if we assume that the adjunct must move to the matrix CP. An alternative conclusion from this data is that the adjunct does not move all the way to the matrix CP but only moves to the specifier of CP of the embedded clause. This would then be parallel to the case of
WH-in-situ in Iraqi Arabic tensed clauses; I have argued that they move at LF only to the embedded CP position. If the adjunct WH-phrase only has to move to the specifier of the embedded CP, it never leaves the island and consequently there is no ECP violation.

The leaves the problem of how to determine the scope of the WH-phrase in the embedded specifier of CP. In these cases, the sentences are direct questions; the WH-phrases must have matrix scope. However, I am arguing that the WH-phrases do not move to the matrix CP.

In the system argued for here, only the index of the WH-phrase needs to percolate up to the matrix CP and from there bound by the Q element. Consider again sentence (22)a, with its associated LF structure:
Here, I show that the WH-phrase has been partially moved to the embedded CP, and that the embedded CP has been extraposed, as discussed above. The index of the WH-phrase can appear on the embedded head of CP, by SPEC/HEAD agreement, and it can percolate up to CP by X-Bar projection. The null head of the matrix CP will govern the embedded CP, and thus it can bear the index. This index will again percolate up to the matrix CP where it is governed by the Q element and thus can appear on the Q element. This analysis is thus equivalent to the case of partially moved WH-phrases in IA.

Support for this partial movement strategy over a full
movement strategy comes from the fact that in Slave, partial movement to the embedded specifier of CP is allowed. I give the partial movement analogs for the WH-in-situ cases given in (23):

(24) a Raymond judenî ri Jane yiîî kodîhshô
Raymond where FOC Jane 3 is 3 knows

Where does Raymond know Jane to be?

b John judenî seya ráwozée yudeli
John where 1sg.son 3 opt.hunt 3 wants 4

Where does John want my son to hunt?

Thus, in Slave, partial movement of the WH-phrase can happen either overtly or in the LF component. In both cases, the scope of the WH-phrase will be marked by a null scope maker in the matrix CP. By adopting this partial movement strategy for WH-in-situ in Slave, it is possible to maintain that the ECP applies in the LF component in this language.

Thus, I have reduced the difference between IA and Slave to a difference in the ability of a head to bear an index. For IA, the index could appear on the matrix CP only if there was a special element in CP which would allow the head to bear the index. However, in Slave, I propose that there need be no special marker; the null head of CP is allowed to bear the index. Therefore, the scope of the partially moved WH-phrase can be determined by a 'scope marker' in the matrix CP, just
as in IA. The difference between IA and Slave would be that the scope marker in IA is phonetically present but the scope marker in Slave is not.

5.3 The Scope Marking Strategy in German

In this section, I will compare the scope marking strategy in Iraqi Arabic with the scope marking strategy in German. While there are several significant contrasts between overt WH-movement in German and IA, what I will focus on in this section are the differences between the two languages in the ability of CP heads to be used for the scope marking strategy with respect to multiple questions. First, I would like to present a brief summary of partial WH-movement in German.

5.3.1 Simple WH-Questions in German

In German, it is possible for a WH-word to occur sentence initially. However, there are certain restrictions with extraction from an embedded clause. The following data is from McDaniel (1989):

(25)* Wen, glaubt Hans dass Jakob t₁ anruft?
Whom does Hans think that Jakob is calling?

(26)a Wohin, glaubt Hans dass Jakob t₁ gegangen ist?
Where does Hans think that Jakob went?

b Mit wem, glaubt Hans dass Jakob t₁ spricht?
With whom does Hans think that Jakob is talking?

(27)a Wen, versucht Hans zu bestechen t₁?
Whom is Hans trying to bribe?
b Wen, will Hans dass Jakob besticht t₁?
Whom does Hans want that Jakob bribe?

In (25), the noun phrase wh-word *wen* has been extracted from a finite embedded clause, and this sentence is ungrammatical. If an adverbial or prepositional phrase is extracted from a finite embedded clause, as in (26a) and (26b) respectively, the sentence is grammatical. If the embedded clause is tense dependent, as in (27), then extraction of a noun phrase wh-word is possible.

Note that this pattern of extraction from a tensed clause is the complete opposite of the pattern found in IA. This pattern of extraction cannot be explained in terms of barriers for movement. If tense-independent embedded clauses were barrier for movement, we would still expect that the nominal WH-words could be extracted. This is because long movement is possible for these WH-words.

McDaniel (1989) proposes a case-theoretic reason for this restriction. She argues that the WH-words which can be extracted are either caseless or accompanied by a case assigner (in the case of prepositional phrases). The WH-words which cannot be extracted are those words which must inherit their case from their trace. McDaniel proposes that there is a Case inheritance restriction which is blocked over tense-independent clauses:
(28) Case Inheritance Restriction

In the configuration ...x...[z...y...], where z is a tense independent CP, x may not inherit structural Case from y.

Another difference between German and IA is that German does not allow simple WH-in-situ. However, like IA, German does allow partial WH-movement when there is a scope marker present in the matrix CP:

(29)a *Was* glaubst du *welchen Mantel* Jakob heute angezogen hat?
   SM do you think which coat Jakob put on today?

b *Was* glaubt Hans *wen* Jakob anruft?
   SM does Hans think whom Jakob is calling?

As expected, partial WH-movement is used to rescue violations of the Case Inheritance Restriction. This is shown above in (29)b. Since the nominal WH-word does not move beyond its own clause, there is no violation of the CIR.

Also as in Arabic, there is a distance limit to the use of the scope marker in German. If there is a tensed clause intervening between the scope marker and the WH-word which has been partially moved, the sentence is ungrammatical:

(30)a *Was* glaubst du mit *wen* Hans meint dass Jakob gesprochen hat?
   SM do you believe with whom Hans thinks that Jakob talked?
b *Was glaubst du dass Hans meint mit wem Jakob
gesprochen hat?
SM do you believe that Hans thinks with whom 
Jakob talked?

A sentence such as (30)b can be made grammatical if a
scope marker is placed in the CP of the intervening clause⁶:

(31) Was glaubst du was Hans meint mit wem Jakob
gesprochen hat?
SM do you believe SM Hans thinks with whom 
Jakob talked?

5.3.2 Multiple Questions

With this brief introduction to simple Wh-questions in
German and partial WH-movement, we can now turn to multiple
questions and compare them to multiple questions in Iraqi
Arabic. German allows WH-in-situ in the case of multiple
questions. As in English, it is possible for one WH-word to
move to the matrix CP while the other stays in-situ. It is
also possible for one WH-word to move to the matrix CP and the
other WH-word not to stay in situ but to undergo partial WH-
movement:

⁶This situation is quite different from that of Arabic, which
Wahba (1991) claims does not allow scope markers in embedded
clauses.
(32)a Wer glaubt dass Hans wen bestochen hat  
Who thinks that Hans whom bribed?  
b Wer glaubt wen Hans bestochen hat?  
Who thinks whom Hans bribed?  

Sentence (32)a shows a multiple question in which one Wh-word occupies the matrix specifier of CP and the other WH-word is in-situ. Sentence (32b) is the same as (32a) except that the Wh-word which was in-situ in (31)a has been partially moved to the embedded specifier of CP.

There is also a locality effect on the use of partial WH-movement in multiple questions:

(33)a *Wer glaubt dass ich meinte mit whem Jakob gesprochen hat?  
Who believes that I thought that Jakob with whom talked?  
b Wer glaubt mit whem ich meinte dass Jakob gesprochen hat?  
Who believes with whom I thought that Jakob talked?  

In (33)a, the partially moved WH-phrase is separated from the matrix CP by a two tensed clauses, while in (33)b it is only separated by one clause.

This pattern of locality is very similar to the pattern of locality seen with the scope marker (see 30a and 30b above). Yet in these examples, there is no scope marker
Furthermore, German appears to be different than Iraqi Arabic in that it allows a moved WH-phrase in addition to a scope marker to define the scope of a partially moved (or unmoved) WH-phrase. Consider the following sentences:

\[(34)\text{a} \quad \text{sh-} \text{tsawwarit Mona Ali gabal meno}\ ?
\text{SM thought Mona Ali met who}

Who did Mona think Ali met?

\text{b} \quad *\text{meno tsawwar Ali xaraj weyya meno}\ ?
\text{who thought Ali left with whom}

Who thought Ali left with whom?

This example shows that although a scope marker in the matrix CP is able to define the scope of a Wh-in-situ within an embedded tensed clause, a Wh-word in the matrix CP cannot do so. The question that is relevant at this point is what accounts for the difference between Iraqi Arabic and German with respect to multiple questions. Why is it the case that a moved WH-phrase can act as a 'scope marker' in German but not in IA?

Since the system that I am proposing allows variability in scope to be related to heads, I propose that the difference between German and IA is in the difference in the ability of the heads of CP to bear an index. In German, the head of the matrix CP can bear the index of the partially moved WH-phrase
when there is another WH-word in its specifier position, while in IA, this cannot happen. If the head of the matrix CP cannot bear an index, then the index of the partially moved WH-phrase will never be able to appear on the Q morpheme.

This suggestion raises a further question as to why the head is able to bear an index in German but not IA. I propose that this difference is because SPEC/HEAD agreement is strict in IA, but not in German. In IA, the element in specifier position must agree in all features with the head, while in German this need not be the case. This would mean that in IA, if the head of CP bears an index, it must also be present on the element in specifier position. This would not be required in German.

In the case of multiple questions in IA, if the head of the matrix CP were to bear the index of the partially moved WH-phrase in the embedded CP, then this index would also have to appear on the WH-word in the matrix specifier of CP. This WH-word would then bear two indices, its own and the index of the partially moved WH-phrase. However, it is usually assumed that an NP can only bear one index. In this case, this sentence would be ruled out because the WH-word would have more than one index.

For German, if the head of the matrix CP were to bear the index of the partially moved WH-phrase, then this index would
not be required to appear on the WH-word in specifier position. This WH-word would then only have one index, and the sentence would not be ruled out.

5.3.3 Economy and Partial WH-movement in German

In closing this section. I would like to point out some observations concerning German partial WH-movement and Economy. It was shown in (28) that a sentence containing a WH-word which has been overtly moved to an embedded CP and separated by more than two tensed clauses from the matrix CP occupied by an appropriate WH-word is ungrammatical. However, if this WH-word has been overtly moved to an embedded CP which is separated by only one clause from the matrix CP occupied by an appropriate Wh-word is grammatical.

(28)a **Was glaubst du mit wem** Hans meint dass Jakob gesprochen hat?  
SM do you believe with whom Hans thinks that Jakob talked?

b *Was glaubst du dass Hans meint mit wem Jakob gesprochen hat?  
SM do you believe that Hans thinks with whom Jakob talked?

The question that these facts bring up is why can't the WH-word which is too far from the matrix CP move at LF to a CP which is closer to the matrix. Why can't the WH-phrase in (28)b move one more clause higher at LF, so that its LF
representation is the same as (28)a?

The economy approach can explain this fact. Recall that the essence of the economy approach is that once a phrase has been moved, it is no longer allowed to move again. In the case of German partial WH-movement, since the WH-phrase has already been moved once, it is no longer allowed to move again at LF.

Note that also within the economy approach, if a phrase has not moved overtly it is possible for it to move covertly. Since German allows WH-in-situ in addition to partial Wh-movement in multiple questions, the prediction from economy is that (28)b would be grammatical if the WH-word had not moved at all. This is exactly what happens:

(35) **Wer** glaubt dass ich meinte dass Jakob **mit wem** gesprochen hat ?

Who believes that I thought that Jakob with whom talked?

Thus, economy makes the correct predictions in the case of German partial wh-movement.
CHAPTER SIX: POSSESSIVE PHRASES AND SCOPE

6.0 Introduction

In the previous chapters, I have shown how the possibilities for movement and scope are different with respect to conditional clauses, internally headed relative clause and WH-questions. Here, I would like to extend this analysis to possessive phrases in English. I show that this is another example of where scope possibilities are greater than movement possibilities and that the theory developed here can easily accommodate these cases. I compare my analysis of this construction to the analyses given in May (1985) and Fiengo et al. (1988).

6.1 The Nature of the Problem

There is a well known paradox with respect to English possessive phrases in that possessive phrases can bind pronouns as variables outside of their containing NP but cannot be overtly extracted from this domain:

(1)a [[Which man's], wife] did Jane tell t, that she loves his, cooking?
   b [[Every man's], wife] loves his, cooking.
(2) *Which man's did Jane tell t, wife that she loves his, cooking?

In (1), we see that the possessive quantified phrases 'which man's' and 'every man's' can bind the pronoun 'his' as
a variable. However, in (2) we see that the possessive phrase cannot be extracted from its containing noun phrase.

The paradox comes from the fact that scope is determined by the c-command domain of a quantified noun phrase. Since the examples in (1) show that a pronoun is within the scope of the quantified possessives, the possessives must c-command these pronouns. However, given current assumptions about phrase structure representations, the possessives phrases, which occupy the specifier position of their NPs, do not c-command these pronouns (under the standard Reinhart (1976) definition of c-command). Adopting the DP representation, the structure of the sentence would be as follows:

(3) \([\text{DP}_1, [\text{DP}_2 \text{ every man}] [\text{DP}, 's [\text{NP wife}]]] [\text{VP loves his cooking}]

In the above, the first branching node dominating the possessive is \(\text{DP}_1\). Thus, the c-command domain of the possessive is only what is dominated by \(\text{DP}_1\). Since the pronoun is not dominated by \(\text{DP}_1\), it is not c-commanded by the possessive. Since it is not c-commanded by the possessive, it is not within the scope of the possessive. Since it is not in the scope of the QNP, it should not be able to be construed as a bound variable. Yet the above shows that it can be construed as a bound variable. The fact that the possessives do not c-command these pronouns is further illustrated by the
binding possibilities of the possessive phrases. Possessive phrases do not license anaphors outside of their containing NP:

(4) *Every man's wife loves himself.

In (4) we see that an anaphor in object position cannot be licensed by the possessive phrase of a phrase in subject position. Since the anaphor is not licensed by the possessive, we can conclude that the possessive does not c-command and hence cannot bind the anaphor. Thus it is left without an antecedent and the sentence is ungrammatical.

A way around this paradox is to have the possessive phrase move out of its containing NP at LF and adjoin to IP. In this position, it would be able to c-command and thus have in its scope a pronoun in object position. The problem with this approach in that possessives cannot be extracted from their containing NP, as the example in (2) above shows.

6.2 The Various Analyses

The above facts show that possessive phrases are islands for movement but not for scope. This data forces a revision of what we define as the scope of a phrase and its relationship to movement. Here, I introduce three possibilities.
One revision is to adopt a different representation of the structure of QNPs at LF. This is the approach taken in this dissertation, and I will refer to it as the 'Tripartite Analysis' since it relies on Heim's formalism. Another revision is to adopt a slightly different version of the definition of c-command. This 'C-Command Analysis' is represented in the May (1985). The last revision that I will discuss I will refer to as the 'Movement Analysis'. In this type of analysis, a revision of the constraints which apply to movement are proposed. Here, I discuss the work of Fiengo et al. (1988).

In the following sections, I will discuss in depth each of these theories and show that the Tripartite Analysis is superior to the other two.

6.2.1 The Tripartite Analysis

As I mentioned in the introduction, the more standard approach to the treatment of quantifier scope is to define it in terms of the scope domain of the entire noun phrase of which the quantifier is a part. However, an alternative representation exists in which the quantificational determiner is extracted from the noun phrase. In this representation, the scope of the quantifier is determined only by its
Appling this theory to the problem of the scope of possessive phrases, the representation that would be needed would be for the quantificational determiner of the possessive phrase to adjoin to IP. In this position, its c-command domain would be everything dominated by IP and thus it would have pronouns in object position in its scope:

\[(5) [IP every, [IP [DP man] [0, s [NP wife ]]]2 [IP t, loves his, cooking]]]\]

The quantificational determiner is allowed to move out of the subject noun phrase because, as I have argued above, it is not constrained in the same way as movement of an entire phrase. However, I am also proposing that there is a constraint on the indexing relationship between a quantifier and its restriction in that the quantifier must govern an element which bears the selection index of the restriction.

In the representation in (5), the subject DP must be a barrier to the extraction of the possessive phrase, since it does not allow movement of the possessive outside of the subject. If this DP is a barrier, then it will not allow government of the restriction by the quantificational determiner which is outside of the DP. The restriction,

\[1 \text{ Barker (1992) has independently argued for this type of representation for possessive noun phrases.}\]
however, can adjoin to the subject DP. Once it is adjoined to the DP, DP is no longer a barrier to government. In this position, it can be governed by the quantifier adjoined to IP.

\[ (6) [_{IP} \text{everY}_1 [_{IP} [_{DP} \text{man}_1] [_{DP} t_1 [_{D} 's [_{NP} \text{wife}]]]_2 [_{IP} t_2 \text{loves his}_1 \text{cooking}]]] \]

Thus, the scope of the possessive phrase can extend beyond its containing phrase for two reasons. First, that movement of a determiner is much freer than movement of an entire phrase and second that the position of the possessive phrase allows its selection index to be passed up to a position where it will be governed by the determiner.

6.22 The C-Command Analysis

A different approach to the treatment of scope in noun phrases is given by May (1985). In this theory, quantifier scope is given by the c-command domain of the entire phrase, as in the standard approach, but the definition of c-command that is adopted is different than the usual Reinhart (1976) 'first branching node' definition. The definition that is adopted is the 'm-command' definition of Aoun and Sportiche (1983):

\[ (7) \alpha \text{ m-commands } \beta = \forall \text{ every maximal projection dominating } \alpha \text{ dominates } \beta \text{ and } \alpha \text{ does not dominate } \beta \]
Thus, a phrase will have an element in its scope if it m-commands that element.

Furthermore, an additional assumption is made concerning the structure of adjunction. Consider the following schematic of an adjunction structure, where the phrase $YP$ has been adjoined to $XP$:

(8)

```
        ZP
       /
      Z'    
     /
    Z  XP

     YP   XP
```

The question that is relevant is whether or not $XP$ dominates $YP$. If $XP$ does dominate $YP$, the scope domain of $YP$ will be everything dominated by $XP$. However, if $XP$ does not dominate $YP$, then the scope domain of $YP$ will be everything dominated by $ZP$. This is because $ZP$ is the first maximal projection which dominates $YP$, and scope is determined by what a certain phrase m-commands.

For May (1985), in an adjunction structure such as the one above, $XP$ does not dominate $YP$, and thus $YP$ has everything within $ZP$ in its scope. The occurrence of a projection is given by the set of all occurrences of that projection. To be dominated by a certain projection is to be dominated by all
the member nodes of that projection. Since YP is dominated by only on member of the XP projection, it is not dominated by YP.

Given this set of assumptions, we can turn to the problem of the scope of possessive phrases. As in the tripartite analysis, this c-command analysis does not allow the possessive phrase to move out of its containing noun phrase. However, it does allow for the possessive noun phrase to adjoin to its containing noun phrase:

(9) \[ CP \[ IP \[ NP [NP every man's], \[NP \[ t_1 \[ [NP\[ t_2 \[ loves his, cooking \]]]\]]]\]]\]

In this representation, the entire subject noun phrase 'every man's wife' is considered quantificational and has undergone QR and been adjoined to IP. In (9), the possessive has only been adjoined to NP but it has not been extracted from it. The scope of the possessive phrase would be everything dominated by CP, since this is the only maximal projection which dominates the possessive and thus is the m-command domain of the possessive. This is because the entire subject noun phrase has been adjoined to IP, and thus it is not dominated by IP. Furthermore, the possessive has been adjoined to the subject NP, and thus is not dominated by this NP. Since the scope of the possessive is everything dominated by CP, the possessive will have pronouns in object
position within its scope.

This approach does allow us to capture the fact that possessives can have scope outside of its containing NP without extracting the possessive from the NP. However, I will argue that, given current theoretical assumptions, the arguments put forth as motivation for this approach are no longer valid.

One of the main motivations for this type of approach is based on the interpretation of quantifier scope with VP deletion (Sag, 1976; Williams 1977). Consider the following sentence:

(10) Some student admires every professor, but John doesn't.

In this sentence, the object noun phrase 'every professor' cannot take scope over the subject 'some student', although the sentence 'Some student admires every professor' does allow the object to take scope over the subject.

Following Williams' approach, in a sentence such as (10) the object noun phrase can only adjoin to the VP node. This is because the VP must contain the 'every' phrase in order for reconstruction of the VP in the second conjunct to yield a well-formed representation. The following structures illustrate the problem:

(11)a [IP [every professor]₁ [IP [some student]₂ [IP e₂ [VP admire e₁ ]]]] but [IP John doesn't [VP admire e₁ ]]


In (11)a, the VP in the second conjunct contains an unbound variable, since the scope of the phrase every professor which has been adjoined to IP is limited to the first conjunct. This does not occur in (11)b, since the every phrase has been adjoined to VP and is thus reconstructed into the second conjunct. Here, it can bind the free variable.

In a structure in which the quantified phrase has been adjoined to VP, it is interpreted with narrower scope than an IP adjoined quantifier.

The VP deletion facts argue that VP adjunction is a possible site for QNPs. The problem is to determine what is the scope domain for a phrase adjoined to VP. May states that:

"it might be thought that ...their scope domain is VP...But it is hard to see just what semantic sense is to be made of a quantifier having 'predicate' level scope; in fact, where VP level quantification has been employed, it is always assumed to have absolute scope no different from S-level quantifiers" (pg. 55)

May concludes on semantic grounds that VP adjoined quantifiers must have scope over S (which is our terms is IP). Furthermore, he uses this observation to propose that the scope domain of a QNP must range over complete argument structures of a predicate:
(12) If an operator $O$ c-commands a predicate $P$, then it must c-command all the thematic arguments of $P$.

His system of basing the scope domain on the m-command definition of c-command and having adjoined elements not be dominated by the node they are adjoined to ensures that the above condition will be met.

It is possible for the condition stated in (12) to be maintained without having the c-command domain of a VP adjoined phrase be beyond the VP level if the VP internal subject hypothesis is adopted (Koopman and Sportiche, 1985, Fukui and Speas, 1986, Kuroda, 1988 and others). Here, the subject is not base generated external to the VP in specifier of IP position but it is base generated internal to the VP as a specifier of VP. However, the subject will raise to specifier of IP position in order to receive case. If the subject is internal to the VP, then a VP adjoined QNP will have scope over all thematic positions of the verb even under the Reinhart (1976) 'branching' node definition of c-command:

\[(13) \{_{_{IP}} \text{Some professor }_{_{VP}} \{_{_{VP}} \text{every professor}_{_{2}} \{_{_{VP}} \text{t}_{_{1}} \text{admire}_{_{2}} \text{t}_{_{2}} \}}\}\]

The QNP every professor will c-command the subject trace $t_{_{1}}$ in specifier of VP position, which is the position where the subject receives its theta-role. Under the branching node
definition, the VP adjoined QNP will not have specifier of IP position in its scope. However, the branching node definition of c-command will be consistent with (12) because it is specifier of VP which is the theta position, not specifier of IP.

The VP Internal Subject Hypothesis, therefore, removes any motivation for a VP adjoined quantifier to have scope beyond the VP, and, by extension, any motivation for having a QNP adjoined to a particular node to have scope beyond that node.

6.2.3 The Movement Analysis

A different approach can be given under the theory of Fiengo et al. (1988). Here, the problem of scope is considered to be a problem of movement possibilities at LF. In their theory, movement possibilities at LF are much freer than that at S-structure; this can be considered an extension of the ideas of Huang (1982). However, whereas Huang (1982) allowed movement to be much freer at LF because subjacency does not apply at LF, Fiengo et al. consider subjacency to apply at LF. Movement is much freer at LF because phrases are allowed to appear in A-bar positions at LF.

Consider the following contrast:

(14)a *Who, do you think that pictures of t₁ are on sale?
b ?? Who, do you think that many pictures of t₁, Mary believes are on sale?

In (14)a, the WH-phrase has been extracted from a phrase which is in subject position. This sentence is ungrammatical. However, in (14)b, the extraction has taken place from a subject which has been topicalized. This sentence is much better than (14)a.

Fiengo et al. relate this difference to the following condition on movement (from Chomsky, 1986):

(15) Adjunction is possible only to a maximal projection that is a nonargument.

A phrase that has been adjoined to IP, such as the noun phrase in (14)b, is no longer in argument position and thus it can be adjoined to.

Furthermore, following Chomsky (1986), a barrier can be crossed by first adjoining to it (I will not go into the details of why this is so). Thus, if a phrase is an adjunction site, it is not a barrier for movement.

In (14)a the subject noun phrase is in an argument position and it is also a barrier for movement. Since it is in an argument position, it is not a possible adjunction site. Movement of the WH-phrase from within the NP will cross a barrier, and the sentence will be ungrammatical.

In (14)b, the subject noun phrase has been topicalized;
it is no longer in an argument position. Thus, it is possible to adjoin to the topicalized phrase. Since it is an adjunction site, it is no longer a barrier and there are no barriers crossed in moving from a position within this phrase to the matrix CP.

Phrases which undergo QR at LF will no longer be in argument position, and consequently will be possible adjunction sites. Since they are possible adjunction sites, they will not be barriers for movement. Thus, since QR is limited to the LF component, movement will be freer at LF because phrases will no longer be in argument position.

Let's apply this theory to the problem of movement asymmetries with respect to possessive phrases. As mentioned above, overt movement of the possessive is disallowed. In this theory, this would be because the subject NP is a barrier which is in an argument position, and movement out of the subject would cross a barrier. No adjunction is possible because the subject is in an A-position. At LF, however, the subject will undergo QR and be adjoined to IP. Since it is in a non-argument position, the possessive phrase will be able to adjoin to it, voiding the barrierhood of this phrase. The possessive will be able to move out of the subject and adjoin to IP:

(16) $\left( \left[ IP \left[ every \ man's \right]_1 \ [ IP \ [ t_1 \ wife]_2 \ [ IP \ t_2 \ [ VP \ loves \ his, \ cooking]]] \right] \right)$
Since the possessive is adjoined to IP, it will c-command the object position and thus have in its scope pronouns in object position.

The problem with this analysis is that it is unclear if adjunction at LF will really overcome the barrierhood of the subject for possessive phrases. For example, if the subject is topicalized at S-structure, extraction is not possible for a possessive:

(17) *Whose, do you think that \{ t_2 pictures of Bill\},
Mary believes t_1 are on sale?

This is unexpected, since the subject is topicalized and is an adjunction site. Since this sentence is out, it is unlikely that QR of the subject at LF will allow the possessive to extract out, because the above sentence shows that it is not the A/A-bar distinction which allows movement of possessive.
REFERENCES


Berman, S. (1987) "Situation Based Semantics for Adverbs of Quantification" in J. Blevins and A. Vainikka (eds.) University of Massachusetts Occasional Papers 12, University of Massachusetts/Amherst.


----, (1976) "Conditions on Rules of Grammar Linguistic Analysis 2, 303-351


Ishihara, R. "Clausal Pied Piping: A Problem for GB" Natural Language and Linguistic Theory 2.4 397-418.


Kratzer, A. (1978) Semantik der Rede. Kontexttheorie-Modalwörter-Konditionalsätze Königstein Ts (Scriptor)


Williams, E. (1977) "Discourse and Logical Form" Linguistic Inquiry 8, 101-139.
