Binding as an Interface Condition:
An Investigation of Hindi Scrambling

by

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1. Abstract

This thesis provides an analysis of scrambling, following the Minimalist program of Chomsky 1992, examining Hindi as a case study and occasionally making comparisons with Japanese.

The first major claim is that there are two kinds of operations that yield scrambling. One type, called Outer scrambling, is an Operator-Variable construction and is the result of movement. The other type, called Inner scrambling, is the result of several conspiring factors that allow permutation without movement. These factors are triggered by (i) the strength feature of functional heads (ii) Economy principles that hold at phonological form and (iii) Full Interpretation, which causes the Agr structure to be deleted after its agreement relations have been established. These factors cause TnsP to collapse into an N-ary branching structure containing the arguments of the verb. It is assumed that linear order is not fixed until Spellout. Therefore, the N-ary branching structure is free to yield permutations without movement. Since there is no movement, and hence no trace of movement, Inner scrambling is not subject to reconstruction effects. Outer scrambling, since it is an Operator-Variable construction, is subject to reconstruction effects.

The second major claim is that the subject is special in that at least part of it must raise at LF to the Checking domain of C°. If the subject cannot be split, for example, when the subject is a monomorphemic pronoun, the entire subject must raise. The result is a novel solution to a problem for the Minimalist framework, namely, an account of how both Strong and Weak Crossover may be treated as interface conditions at Logical Form in scrambling constructions.

Furthermore, these structures are integral to an account which captures the subject-orientation of reflexive anaphors. The account also captures the lack of subject-orientation for reciprocal anaphors.

Thesis supervisor: Noam Chomsky
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2. Acknowledgment

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3. Table of Contents

4. Introduction

The technical side of this thesis is a discussion of how certain aspects of binding behavior under scrambling can be captured in the framework outlined in Chomsky 1992, "A Minimalist Program for Linguistic Theory", hereafter MPLT. We will look at Hindi as a case study, at times comparing constructions in Hindi with relevant counterparts in other languages. More broadly, we will situate this discussion in its broader implications for MPLT and the Principles and Parameters approach in general.

This document contains three major parts: (1) An introduction which includes some basic facts about scrambling and an outline of the general framework of the discussion which includes the terms "Inner" and "Outer" scrambling (2) an account of Inner scrambling driven by Clause Reduction, and (3) an Operator-Variable account of Outer Scrambling.

4.1. Scrambling

Throughout, we use the general term "scrambling" simply as a descriptive device to refer to a particular type of word order variation to be illustrated below. We will also use more specific descriptive vocabulary for discussing scrambling, in particular, the terms "Clause Level", "Clause External", "Leftward", and "Rightward" scrambling.

The technical terms "Inner" and "Outer" scrambling will be briefly introduced below and defended in the section on Inner scrambling.

Inner scrambling is a form of argument permutation that comes about as a result of a clause pruning operation motivated by Economy at the PF level and is not an instance of movement. The word order permutation is the result of the freedom of interpreting the linear order of N-ary[1] branching structures.[2] It is proposed that linear order[3] is not set in the lexicon but is determined by Spellout.[4] It is further

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[1]See Pesetsky 1992 for a proposal involving N-ary branching structures in conjunction with binary branching structures. See Kayne 1984 and Chomsky 1992 and sources cited there for arguments for binary branching structures.

It is crucial to note that the N-ary branching structures proposed in this thesis are not derived by movement and hence do not violate the condition on the cycle for movement to expand the target domain proposed in Chomsky 1992.

[2]See Farmer 1984 and Farmer 1985 for arguments for an N-ary structure in similar constructions in Japanese.

[3]See Noyer 1993 for morphological evidence that linear order is not set in the lexicon, but rather, is set during the course of the derivation.

suggested that linear order may play a role at LF, but as will be shown, this is not a necessary conclusion. Much more will be said about Inner scrambling below.

Outer scrambling is a familiar instance of Move-Alpha, forming an Operator-Variable construction, following Gurtu 1985 (p. 171).

4.1.1. Clause Level Scrambling

To establish a vocabulary for discussing the phenomena, let us for the moment simply consider word order facts, leaving syntactic diagnostics aside. The type of scrambling that does not cross a clause boundary, as shown by the permutations in (1), will be consistently referred to as "Clause Level" scrambling.

```
(1)  a.  raam-ne    kellaa      khaayaa
         Ram(SU)    banana(DO)  ate

         "Ram ate a banana"
```

---

[4]If linear order is determined exactly at the point at which the derivation branches to LF and to PF (ie, exactly at Spellout), it follows that the same configuration for linear order obtains at both levels. Also, if linear order is determined at some point before spellout, it still follows that the same configuration for linear order obtains at both levels. These options will be discussed below in the section that discusses Clause Reduction.

```
     b.  kellaa      raam-ne  khaayaa
         banana(DO)  Ram(SU)  ate
```

It is also possible for Clause Level scrambling to take place in an embedded clause, as shown in (2).

```
(2)  a.  siitaa   soctaa hE ki   [raam-ne  kellaa  khaayaa ]
         Sita(SU) thought that   [Ram(ESU) banana(EDO)  ate]

         "Sita thought that Ram ate a banana"

     b.  siitaa   soctaa hE ki   [kellaa      raam-ne  khaayaa]
         Sita(SU) thought that   [banana(EDO) Ram(ESU) ate    ]
```

In the default word order, the verb appears at the end of the clause. Therefore, from the point of view of the verb, the instances of scrambling shown in (1) and (2) are all "Leftward". For the purposes of this work, we will concentrate on this Leftward permutation of nominal elements, ignoring the further "Rightward" permutations shown in (3).

```
(3) a  Raam-ne  khaayaa  kellaa
       Raa(SU)  ate      a banana

       "Ram ate a banana"

    b  kellaa   khaayaa  Raam-ne
    c  khaayaa  Raam-ne  kellaa
    d  khaayaa  kellaa   Raam-ne
```

For ditransitive verbs there are six relevant orderings of nominal elements.[5]

---

[5]The SU-IO-DO ordering is the most natural word ordering, according to Gurtu 1985, et al. However, it has no special structural or grammatical status in the framework to be developed here.

```
(4) a  raam-ne    mohan-ko   ek kitaab   dii
       Ram(SU)    Mohan(IO)  a book(DO)  gave

       "Ram gave Mohan a book"

    b  raam-ne    ek kitaab  mohan-ko    dii
    c  mohan-ko   raam-ne    mohan-ko    dii
    d  mohan-ko   ek kitaab  raam-ne     dii
    e  ek kitaab  raam-ne    mohan-ko    dii
    f  ek kitaab  mohan-ko   raam-ne     dii
```

4.1.2. Clause External Scrambling

It is possible for elements to scramble out of an embedded clause to a higher clause, as shown in (5). Such examples will consistently be referred to as "Clause External" scrambling.

```
(5)    mohan-ko   raam-ne socaa   ki   [CP siitaa-ne ____t dekhaa thaa  ]
       Mohan(EDO) Ram(SU) thought that     Sita(ESU) ____t seen   be-PST
          |__________________________________________|
```

Clause Internal and Clause External scrambling differ significantly, as pointed out by Mahajan 1990. These differences will be discussed in detail below.

4.1.3. Movement Terminology

Throughout this work, we will avoid reference to "A-movement", "A-bar movement", and "reconstruction", and instead use descriptive terminology involving "inert" and "active" Chain Heads.[6] This move is inspired by the

[6]See Abe 1993 for an alternative theory of scrambling which also handles the construction without reference to the A/A-bar distinction.

Preference Principle of MPLT, which will be discussed shortly.

4.1.4. Copy Theory of Movement

Following MPLT, we assume the Copy Theory of movement. In particular, we assume that at each landing site, a full copy of the moved element is left.

Our present theoretical motivation is to defend the idea that all movement leaves copies, regardless of whether it is "A-movement" or "A-bar" movement. For example, consider the data in (6).

(6) The pictures of [each other]$_i$
seemed to [John and Mary]$_i$ to be on sale.

The well formedness of (6) follows if we assume that a copy[7] of the anaphor is left in the source position of the "A-movement", as shown in (7).[8]

(7) The pictures of [each other]$_i$
seemed to [John and Mary]$_i$
[the pictures of [each other]i] to be on sale.

---

[7]Having a copy for "A-movement" is a departure from the MPLT Copy theory of movement, which has copies only for "A-bar" movement explicitly.

[8]See Belletti and Rizzi 1988 for a discussion of similar anaphoric relations involving psychological predicates. See Pesetsky 1992 for additional discussion and arguments against their approach.

Evidence for the copy in (7) comes from the contrast of (8) with (6), which does not involve movement and is substantially degraded as compared with (6).[9]

(8) ?? The pictures of [each other]$_i$ hit [John and Mary]$_i$.

Nevertheless, since it is beyond the scope of this work to properly defend this idea, we will instead focus on neutral terminology, to be defined below.

4.1.5. Preference Principle

We will generalize on an important aspect of the Preference Principle to develop a vocabulary for talking about "reconstruction" effects within the Copy Theory of movement. Let us first review the Preference Principle of MPLT.

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[9]A further prediction is that the (a) cases should be worse than the (b) cases below. That is, (ia) should have a Condition C violation, and (iia) should have a Condition B violation, assuming that it is obligatory that the chains are Active at the tail. Although the judgements are not perfectly clear to me, the prediction does not appear to be borne out, and therefore these cases present a problem for the proposed theoretical move of positing copies for all types of movement.

(i) a. ? The pictures of John$_i$ seemed to him$_i$ to be on sale.
b. The pictures of John$_i$ fell on him$_i$.

(ii) a. ? The pictures of him$_i$ seemed to John$_i$ to be on sale.
b. ? The pictures of him$_i$ fell on John$_i$.

The Preference Principle is invoked in MPLT to account for a specific case the Freidin/Lebeaux[10] type of data. The general case is shown in (9).

(9) a. Which claim that $John_i$ made did he_i deny ____.
b. * Which claim that $John_i$ left did he_i deny ____.

The example in (9a) demonstrates "Anti-Reconstruction". The relevant distinction between (9a) and (9b) is that <u>the claim that John left</u> is a complement to <u>which claim</u> in (9b) whereas <u>the claim that John made</u> is not a complement in (9a). Thus the relative clause <u>the claim that John made</u>, not being a complement, does not "reconstruct". In our vocabulary, to be discussed in a moment, the (9a) case does not have <u>John</u> at the tail of the chain, regardless of whether the tail is Active or not, whereas (9b) has an Active instance of <u>John</u> at the tail of the chain. The tails are indicated with "____" in (9).

---

[10]See Chomsky 1992, Freidin 1986, and Lebeaux 1988 for discussion of this phenonemon.

The Freidin/Lebeaux/MPLT theory, in allowing generalized transformations to insert non-complements in the course of the derivation, allows an account for the distinction, since the tail of the chain therefore need not contain any instance of John, which triggers a Condition C violation at LF in (9b) but not in (9a)

In the following cases, Chomsky 1992 introduces the Preference principle to account for the unacceptability of the examples in (10) with the coreference indicated.

(10) a. * John wondered [which picture of Tom_i] [he_i liked ____]
b. * John wondered [which picture of him_i] [$Bill_i$ took ____]
c. * John wondered [what attitude about him_i] [$Bill_i$ had ____]

> To account for the judgements, it is only necessary to add a preference principle of reconstruction: Do it when you can, ie, try to minimize the restriction in the operator position. In [the cases of (10)], the preference principle yields reconstruction, hence a Binding Theory violation (Conditions (C) or (B)). Chomsky 1992, p. 58.

It is important to note that the Preference principle applies only to Operator-Variable formations in the specific case of minimizing the restrictor. In this work, we will consider generalizations of this type of principle which may govern the activity of portions of the chain at LF.

4.1.6. Inert and Active Elements at Head of Chain

Consider the Chain CH in (11), in which the Head of the chain is shown as H and the Tail is shown as T.

(11) CH = (H ... T)

Generalizing on the Preference Principle, let us assume that H may potentially be split by a process of fission that yields an "active" portion of H and an "inert" portion of H. In (12), the Active portion of H is labeled H+ and is unshaded. The Inert portion is labeled H- and is shaded.

(12) **CH** = ([H+ | H-] ... [T+ | T-])

Likewise, the Active portion of T is labeled T+ and is unshaded, and the Inert portion is labeled T- and is shaded.

Activity or Inertness is with respect to element E, which is either in H+ or H- depending upon the behavior of the fission. That is, Activity is only well-defined when it is defined with respect to an element E. For example, in (13), E is Active at the head of the chain CH.

(13) **CH** = ([H+ E | H-] ... [T+ | T- E])

Conversely, in (14), E is Inert at the head of the chain CH.

(14) **CH** = ([H+ | H- E] ... [T+ E | T-])

By virtual necessity, Activity is subject to the Activity Reciprocity Condition, stated in (15) below, which simply states what we have illustrated in (13) and (14), namely, that E can be Active at the head or the tail of the chain but not at both.

(15) **Activity Reciprocity Condition**

> If an element E is Active at the head of the chain, then E is Inert at the tail. Likewise, if an element E is Inert at the head of the chain, then E is Active at the tail.

We will consistently refer to Active or Inert with respect to the head of the chain, unless it is otherwise specified. Thus there are four logical possibilities regarding optionality: (i) optionally Active, (ii) obligatorily Active, (iii) optionally Inert, and (iv) obligatorily Inert. These reduce to three actual possibilities, since (i) and (iii) are equivalent. These are shown in (16).

(16) **Chain Head Fission: Active/Inert with respect to E:**

a. **Active at Chain Head**
(= Obligatorily Active)

	Head			Tail	
only:	([H+ E	H−]	...	T+	T− E)

b. **Inert at Chain Head**
(= Obligatorily Inert)

	Head			Tail	
only:	([H+	H− E]	...	T+ E	T−)

c. **Optionally Active at Chain Head**

	Head			Tail	
either:	([H+ E	H−]	...	T+	T− E)
or:	([H+	H− E]	...	T+ E	T−)

Thus the Preference Principle is a special case of Inertness at the head of the chain. It is motivated by theoretical conditions on the restrictor in an Operator-Variable construction.

It should be stressed that the terms in (16) are intended as a general purpose descriptive vocabulary at this point. The reason for developing this vocabulary is to avoid reference to a "reconstruction" operation that would imply that there is a special operation that is responsible for "moving" E from the head of the chain to the tail.

4.2. Theoretical Issues for Scrambling

Before discussing further details of the current proposal, let us briefly address some larger issues as well, thus situating this study in a broader field of inquiry. Scrambling presents a number of interesting theoretical problems. There are special issues for the MPLT framework, as well as general questions for the Principles and Parameters approach.

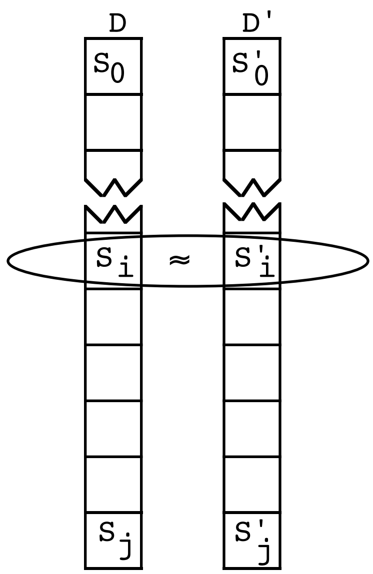
4.2.1. Optionality and Economy

Scrambling presents two special problems for the MPLT framework because of its optionality. We will touch briefly upon these problems now.

The first problem is a simple question regarding Economy. Within the Economy framework, assuming a global metric of Economy, one derivation is chosen over another in terms of a metric of the cost of the operations in those derivations. For two derivations that proceed from the same representation (in a way to be illustrated shortly) to be equally preferred, they must cost the same. Given the presence of Generalized Transformations and the absence of D-structure in the MPLT framework, the concept of "proceeding from the same representation" within a derivation is particularly difficult to define.

However, let us consider the following scenario for illustrative purposes. In (17), derivations D and D' run as shown. In D, structure S runs from stage S_0 to S_j, but the relevant stage for comparison is S_i. In D', structure S' runs from stage S'_0 to S'_j, but likewise the relevant stage for comparison is S'_i.[11] At stage S_i of D, S_i is equivalent to S'_i of D', as indicated in (17).

(17)



Now for stages S_j and S'_j to be equally preferred, the cost of derivation between S_i and S_j must be equivalent to the cost of derivation between S'_i and S'_j. Again, it assumed that a global metric of Economy is at work.

It is not inconceivable that structures with permuted elements cost the same — in fact, such a theory will be

[11]It could be the case that the derivations proceed in parallel from the initial stages of the derivations, in which case we would have the special case that the derivations begin from exactly the same structures. However, this special case is not assumed here.

presented below, although that theory achieves permutation without movement. But if the permutation were to take place by movement, the situation would be more difficult, though probably not insurmountable to formulate. In any event, the question of Economy of derivation must be properly addressed in accounting for free word order variation.

A deeper problem has to do with the Procrastination principle. Assuming for the moment that scrambling is the result of movement[12], if it is cheaper for operations to take place covertly at LF rather than overtly by spellout, then the obvious question is why scrambling ever happens overtly. The logic is roughly this: assuming uniform source structures for both scrambled and unscrambled sentences, we know that the cost of scrambling is equivalent to the cost of not scrambling. But then why not wait until LF to scramble because Procrastinating should make the derivation even cheaper? But if this were the case, we would have something cheaper than "free", a notion we will touch upon briefly in a moment.

Also, if we could scramble at LF, then there should be other reflexes, namely, it should create new binding

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[12]Given the semantic vacuity of scrambling (see Saito 1991), let us furthermore assume for the moment that no scrambling "morpheme" or "feature" is involved.

relations, it should remedy weak crossover violations, and so on. For example, (18) is unacceptable. Following Mahajan 1990, let us assume that (18) exhibits a weak crossover violation after the WH-element kisko raises at LF.

(18) * [uskii$_i$ bahin] kis-ko$_i$ pyaar kartii thii
his/her$_1$ sister(SU) who(DO) love do.IMP.FEM be.PST.FEM

"Who$_i$ did his/her$_i$ sister love?"

Assuming that the WH-element kisko raises at LF, the LF structure in (19) exhibits a Weak Crossover violation, assuming the Leftness condition on Weak Crossover.

(19) * kis-ko$_i$ [uskii$_i$ bahin] kis-ko$_i$ pyaar kartii thii
who(DO) his/her$_1$ sister(SU) who(DO) love do.IMP.FEM
| |
CH=(H.........................T)

"Who$_i$ did his/her$_i$ sister love?"

The example in (20), on the other hand, is an acceptable sentence. We may say that the weak crossover violation has been remedied by the permutation shown.

(20) kis-ko$_i$ [uskii$_i$ bahin] pyaar kartii thii
who(DO) his/her$_1$ sister(SU) love do.IMP.FEM be.PST.FEM

"Who$_i$ did his/her$_i$ sister love?"

Following Mahajan 1990, let us assume that LF movement of the WH-element kisko in (20) occurs from the surface position shown and therefore does not cross the pronoun uskii.

```
(21)   kis-ko_i [uskii_i bahin]          pyaar kartii      thii
       who(DO) [his/her_i sister](SU)   love  do.IMP.FEM  be.PST.FEM
            |
          Active
      <_____|
      LF Raising

          "Who_i did his/her_i sister love?"
```

That is to say, the Active portion of the chain[13], from which LF raising takes place, is the surface position shown in (21).

The point is that if scrambling were allowed at LF, (18) should be as acceptable as (20) which does not exhibit a weak crossover violation.[14]

The broader prediction would at least be that languages with scrambling do not have weak crossover (an incorrect prediction) or that weak crossover does not exist, depending

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[13]We will eventually argue that this chain is a unitary chain and does not arise by movement, at least for the cases which remedy WCO. Therefore, the only portion that may be Active in these cases is the portion shown in the surface position.

[14]The problem could be avoided by postulating an ordering relation at LF. If the Weak Crossover filter were checked <u>before</u> scrambling could take place, the example could still be ruled as unacceptable. However, such an interleaving of Filters and Movement violates the general spirit of Conditions at the Interface, which would imply that Movement takes place first, and Filters apply later, at the Interface.

upon exactly how scrambling is formulated (another incorrect prediction).

Furthermore, if scrambling before Spellout is cost free, the Procrastination principle would imply that scrambling after Spellout has a cost of even less than zero. But that would open the door for scrambling after Spellout to provide a global discount in cost to the derivation, perhaps licensing steps in the derivation elsewhere, assuming that a global metric of cost is at work. As we will show below, these issues will be avoided by forcing scrambling to happen before Spellout.

4.2.2. Scrambling and Parameters

Scrambling also presents a general problem for the Principles and Parameters framework. To put the problem simplistically, why does Hindi have scrambling but English does not? There are two options for an answer to this question. Either scrambling is derivable from other areas of the grammar or it is not.

That is, on the one hand, scrambling could be triggered by parameter settings elsewhere in the grammar. Let us refer to this option as the Dependent option. The theory of scrambling to be defended in this thesis is of the Dependent type.

On the other hand, it could require triggers in the primary linguistic data itself and not be derivable from other parameter settings. Let us refer to this option as the Independent option.

Furthermore, there are at least two ways of viewing parameters which we will touch upon here. These two views are separate from the question of whether scrambling is Independent or Dependent, but the the distinction between the two views bears on the analysis proposed in this thesis and is worth some consideration.

One view is that the set of parameters is a kind of switchbox with positions to be set and is an independent feature or module of the grammar.

One example of this idea is the formulation of the type of node that counts for subjacency. In particular, Rizzi 1982 proposes that different languages may have different bounding nodes. In English, NP and IP are bounding nodes, whereas in Italian, NP and CP are bounding nodes.

Another view is that the only way "parameters" are represented is by the presence of certain elements in the lexicon.

Thus for scrambling, to put the matter simplistically, we could say that languages that have scrambling have a scrambling "morpheme", or a scrambling "functional head" or "feature" that drives scrambling. The parameterization would simply be the presence or absence of the scrambling element in the lexicon.

In any case, using the term "parameter" somewhat loosely, let us discuss some implications of the general question of parameters for scrambling.

If scrambling is Independent, that is to say, if some independent piece of primary linguistic data is required to trigger scrambling, then some parameter or parameters must be responsible for allowing scrambling in one type of language but not in the other. If an independent parameter is involved, then the prediction is that a language could be just like English, but have scrambling. Likewise, a language could be just like Hindi, but fail to have scrambling.

On the other hand, if it is Dependent, then there is something about the rest of the grammar of English that happens to conspire not to allow it to have scrambling. Likewise, there is something about Hindi that happens to allow it to have scrambling. This kind of reduction would reduce the space of possible grammars by some number of parameters.

In any case, the problem bears on language learning. If scrambling is reducible to other parameters, then once those other parameters have been set, nothing new needs to be learned to know that the language has scrambling.

In this thesis, we will argue that scrambling is a Dependent feature of the grammar, in particular, that scrambling is dependent upon properties of functional heads, given other assumptions about Economy at PF and at LF to be made explicit below.

That is to say, the prediction is that a language could not be just like English, but have scrambling, and furthermore, Hindi must have scrambling, given the assumptions we have made.

4.3. Theoretical Architecture

Consider the architecture of the MPLT framework, as sketched in (22). Elements which are built into phrasal X-bar structures are drawn from the lexicon and added by generalized transformations. As the diagram illustrates, generalized transformations and lexical insertion occur only before Spellout.

Principles of Economy apply within the symbolic system in the framed portion of the diagram. That is, principles of Economy apply from the source representation to LF and to PF.[15]

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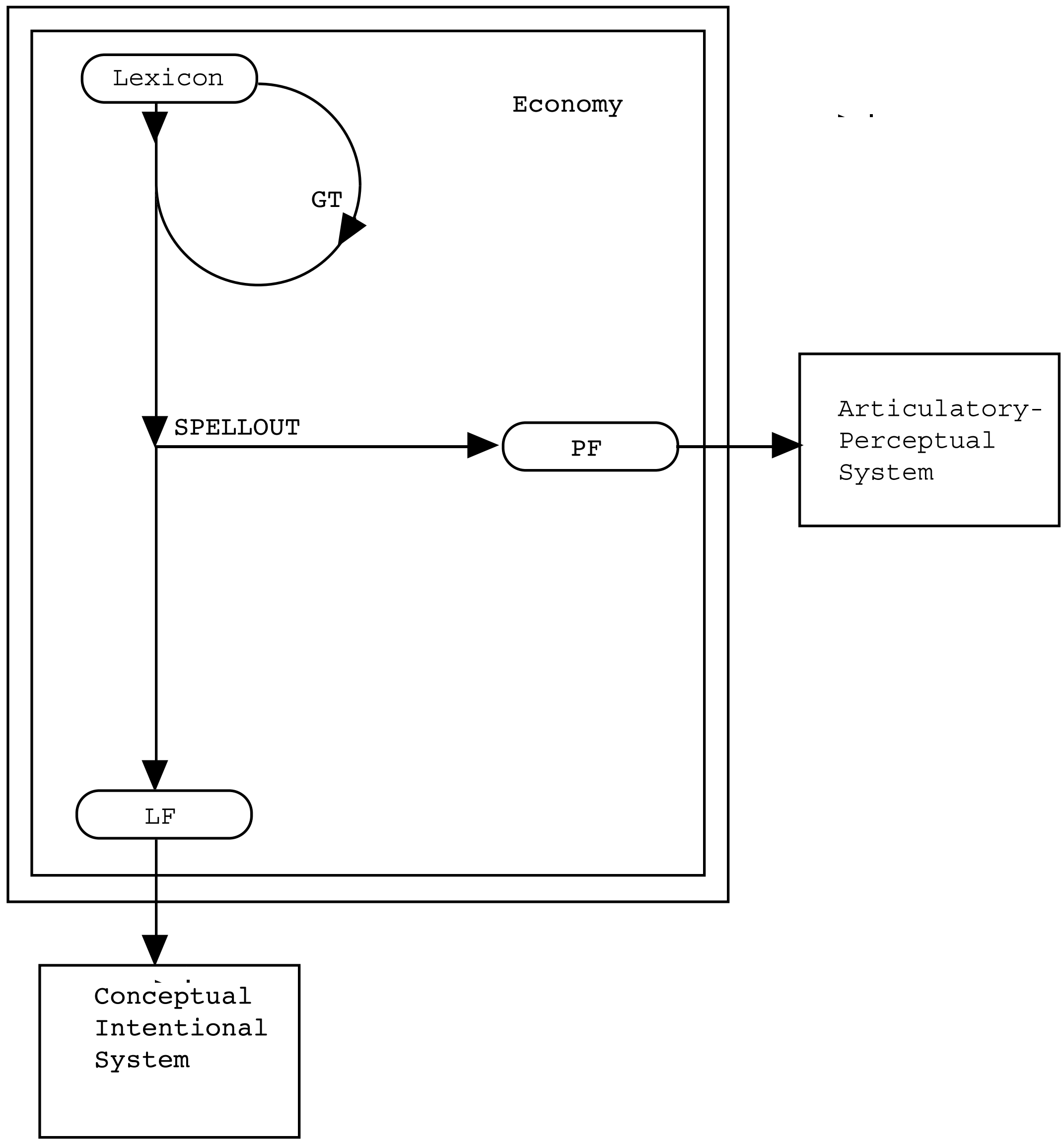
[15]No claim is made regarding whether any principles of Economy apply beyond the PF and LF interfaces, that is, whether they apply in the Articulatory-Perceptual and Conceptual-Intentional systems.

(22)



4.3.1. Binding Relations are evaluated at the LF interface

The following Binding Theory is a modification of the one proposed in MPLT. As in MPLT, all of these conditions are satisfied at the LF interface. However, we assume here that precedence[16] is part of the formulation of the conditions.

For the relevant local domain D, at LF:

(23) **Condition A:** Interpret an anaphor as coreferential with a preceding and c-commanding phrase in D. Assume that (reflexive) anaphors are clitics[17] at LF.

(24) **Condition B:** Interpret a pronominal as disjoint with a preceding and c-commanding phrase in D.

(25) **Condition C:** Interpret an R-expression as disjoint from every preceding and c-commanding phrase.

4.3.2. Weak Crossover at LF

Let us use the following as a working definition of the Weak Crossover filter, employing a version of the Leftness[18] Condition:

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[16]The question of precedence in binding relations is by no means new. Just to mention some important sources, the following references are suggested. See Lasnik 1976 for an early formulation of Condition C that involved precedence. See Reinhart 1976, where precedence is factored out in favor of pure c-command relations. See Barss and Lasnik 1986 for a discussion which suggests that linear order is relevant for binding relations. See Jackendoff 1990 and Larson 1990 for a debate on this matter.

[17]See Pica 1987 and Chomsky 1992 and sources cited there for a discussion of the anaphor clitic.

[18]See Chomsky 1976 for the source of the Leftness Condition as it relates to Weak Crossover.

(26) **Weak Crossover:** a copy of a WH element cannot be anaphorically related to a pronoun to its left at LF.

4.3.3. Strong Crossover at LF

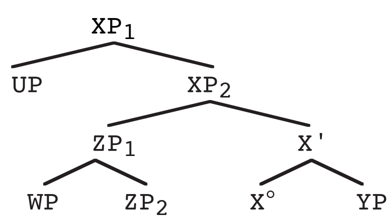
Let us also assume the standard[19] formulation of Strong Crossover, slightly adapted for our conception of the Copy theory of movement, as stated in (27).

(27) **Strong Crossover:** the copy of a WH element which has moved is subject to **Binding Condition C** at LF.

4.3.4. Domains

Using the following abstract tree from Chomsky 1992, let us define the domains that will be used in this work. The most important domain to be defined here is the Checking domain. Another important domain for our purposes is the Minimal domain.

(28)

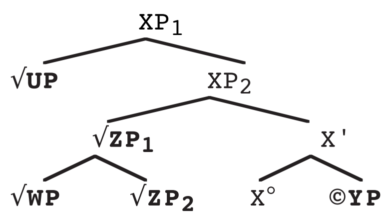


The elements in the Checking domain of H are marked with "√" in (29). Elements in the Complement domain are marked with ©. The Minimal Domain is the union of these two domains, that is the **boldfaced** elements of (29).

---

[19]See Chomsky 1981 for a version of the Strong Crossover condition in terms of the trace theory of movement.

(29)



So, working from the top downward, in terms of definitions, the definitions are as in (30). The following should be enough to establish the definitions we need here, but See Chomsky 1992, pp. 16-17 for a complete set of definitions

(30) **Checking Domain**

The Checking Domain is the minimal residue of the minimal Complement Domain.

Minimal Domain

For any set **S** of categories, the minimal set of **S** is the smallest subset **K** of of **S** such that for any member **m** of **S**, some other member of **K** reflexively dominates **m.**

Complement Domain

The Complement Domain is the subset of the domain reflexively dominated by the complement of the construction. In (29), the Complement Domain is **YP.**

4.4. Clause Internal versus Clause External Scrambling

Using such diagnostics as Weak Crossover and Anaphor Binding, Mahajan 1990 shows that Clause External scrambling is Active at the tail of the chain, whereas Clause Internal scrambling may be Active at either the head or the tail of the chain. A larger array of examples is given in Mahajan 1990, but the following cases will suffice to make this basic point.

For example, (31a) shows that the general pattern to be considered, involving backward pronominal binding, is relatively acceptable. A counterpart of (31a) exhibiting a Weak Crossover violation is shown in (31b). The structure in (31b) is remedied by the Clause Internal scrambling shown in (31c).

```
(31)  ?  [uskii_i bahin]      raam-ko_i  pyaar kartii      thii
a         his_1   sister(SU)  Ram(DO)    love  do.IMP.FEM  be.PST.FEM

          "His_i sister loved Ram_i."

   b  *  [uskii_i bahin]        kis-ko_i  pyaar kartii      thii
          his/her_1 sister(SU)  who(DO)   love  do.IMP.FEM  be.PST.FEM

          "Who_i did his/her_i sister love?"

   c  √   kis-ko_i  [uskii_i   bahin]      pyaar kartii      thii
          who(DO)   his/her_1 sister(SU)   love  do.IMP.FEM  be.PST.FEM

      √   "Who_i did his/her_i sister love?"
```

However, Clause External scrambling does not remedy Weak Crossover, as (32) shows. (32a) shows an acceptable sentence with overt Clause External scrambling of a WH-word. (32b) shows how Weak Crossover is not remedied by such Clause External scrambling.

```
(32)     kis-ko   raam-ne socaa   ki   [_CP siitaa-ne ___t dekhaa thaa  ]
a        who      Ram     thought that [    Sita      ___t seen   be.PST
         (EDO)    (SU)                      (SU)

         "Who, Ram thought (that) Sita had seen"


   b  *  kis-ko_i    [uskii_i bahin]-ne socaa   ki [_CP raam-ne _t dekhaa thaa  ]
         who_i       [his_i sister]   thought that [    Ram     _t seen  be.PST
         (EDO)    (SU)                             (SU)

         "Who, [his/her_i sister] thought (that) Ram had seen"
```

The conclusion is that Clause Internal scrambling may be Active at the head of the chain, whereas Clause External scrambling may not be Active at the head of the chain and must be Active at the tail. WH-raising, by assumption, takes place from the Active portion of the chain.

Mahajan 1990 presents the example shown in (33) to argue that Clause Internal scrambling may also be Active at the tail of the chain.

```
(33)     [ek duusree-ko]i  [raam Or siitaa]i   pasand kartee hEn
          each other (DO)   Ram and Sita(SU) like

         "Ram and Sita like each other"
```

The assumption is that the scrambled direct object is bound from its Active portion, as shown in (34).

```
(34)     [ek duusree-ko]i [raam Or siitaa]i [ek duusree-ko]i pasand kartee hEn
          each other (DO) Ram and Sita(SU)  each other       like
              |                                 |
            Inert                             Active

         "Ram and Sita like each other"
```

4.5. Fine-Tuning of Clause Internal scrambling

Let us explore a fine-tuning of Mahajan's observation, that Clause Level scrambling may be Active either at the head or at the tail of the chain. In particular, let us examine alternations between the direct and indirect objects in SU-DO-IO and SU-IO-DO orders. What we will see is that the surface orders of both the SU-DO-IO and SU-IO-DO orders correspond exactly to SU-DO-IO and SU-IO-DO orders at LF respectively. That is to say, the surface order and the LF order are the same in both cases.

For the purpose of the immediate discussion, let us assume that one order (either SU-DO-IO or SU-IO-DO) may be basic and the other order may be derived by movement. Ultimately, we will present an analysis in which the permutation does not arise by movement, but the results to be discussed here are of a general nature for which this aspect of the analysis is not important. If the order were derived by movement, we would say that the movement chain is Active at the head (and not the tail) in the derived order, in the case of DO~IO alternations.

To return to the main point: the order we see at the surface for both SU-DO-IO and SU-IO-DO orders is the same configuration that is evaluated at the interface level at LF. The result is that it is not possible to derive the orderings, assuming XP adjunction (as in Mahajan 1990), assuming that such adjunction structures may be Active at the tail of the chain. The point is not simply that XP adjunction is an alternative that is not chosen, the point is that XP adjunction is not allowed, assuming that XP adjunction would allow an Active tail.

To facilitate the following discussion, let us refer abstractly to two functional heads, "S°" and "F°". S° may be thought of as C° or COMP and F° may be thought of as Tns° or INFL, but these details are not important here.

For now all that is important is to say that scrambling to the Checking Domain of S° is Active at the tail[20] of the chain, and that scrambling to the Checking Domain of F° is Active at the head of the chain.

There are two basic scenarios that are consistent with Mahajan 1990's observation, namely, that Clause Internal scrambling may be Active at either the head or the tail, which are shown below.

In (35), elements which are Active at the head of a chain may be interleaved with elements which are Active at the tail of a chain. The result is that there is no privileged part of the clause that is restricted to host elements which are Active at the tail, and likewise there is no other part of the clause that is restricted to host elements which are Active at the head.

(35) $[_{SP}$ … $[_{FP}$ … $[_{SP}$ … $[_{FP}$

In (36), they may not be interleaved.

(36) $[_{SP}$ … $[_{FP}$ … $[_{FP}$ … $[_{FP}$ …

We will show below that (35) has incorrect predictions and that therefore (36) is to be assumed. Throughout the following discussion, "interleaving" refers to alternation

[20]Perhaps this Activity is a result of the Preference Principle.

within a clause. Moving to an FP in the local clause and then to an FP in a higher clause is not under discussion.[21]

Mahajan 1990 proposes that Clause Internal scrambling may be adjunction to XP, which he assumes may be Active at the tail of the chain (p. 46).

However, an argument against local XP adjunction for scrambling comes from the following data, shown in (37) and (38), which illustrate the effects of Binding Condition C. The result holds regardless of whether the base structure is SU-IO-DO or SU-DO-IO.

(37) a	?	ranii-ne	[raam$_i$ kii patnii]-ko	use$_i$	dii
		the queen (SU)	Ram$_i$'s wife (IO)	him$_i$(DO)	gave

"The queen gave him to Ram's wife"

b	??	ranii-ne	use$_i$	[raam$_i$ kii patnii]-ko	dii
		the queen (SU)	him$_i$(DO)	Ram$_i$'s wife (IO)	gave

(37a) is relatively acceptable: no binding condition -- in particular, Binding Condition B -- is violated at LF: Ram, contained in the indirect object and coreferent with the direct object use, does not c-command use . (37b) is relatively unacceptable. We assume that the reason for the unacceptability is a Condition C violation at LF.

---

[21]In fact, as will be shown, since Inner scrambling is not an instance of movement, it would not be possible for an element to undergo Inner scrambling to a higher clause.

If XP adjunction is allowed to be Active at the tail of the chain, we would expect (37b) to have the same structure as (37a) at LF: the pronoun <u>use</u> should be able to be Active in its position in (37a), yielding the same level of acceptability as (37a), contrary to fact. On the other hand, if <u>use</u> must be Active at the head of the chain, that is, at the surface position as shown in (37b), then we expect the Condition C violation at LF of (37b). Recall that we are assuming that binding conditions are evaluated at LF, and that the apparent surface Condition C violation in (37b) is irrelevant.[22]

Even if the base order were SU-DO-IO, (38) demonstrates the same fact. Local XP adjunction may not be Active at the tail of the chain.

(38) a	√	mE-ne	[raam$_i$ kii kitaab]	use$_j$	dii
		I (SU)	Ram$_i$'s book (DO)	him$_i$(IO)	gave

"I gave Ram's book to him"

b	*	mE-ne	use$_1$	[raam$_1$ kii kitaab]	dii
		I (SU)	him$_i$(IO)	Ram$_i$'s book(DO)	gave

If the base order were SU-DO-IO, and if local XP adjunction would allow the tail of the chain to be Active, (38b) should be able to escape a Condition C violation, contrary to fact.

---

[22]Although the two sentences under consideration differ in status, it is an open question why they do not differ more markedly.

For further evidence, consider the data in (39). If the permutation of IO and DO is an example of XP adjunction, then the tail of the chain should be Active. Let us for the moment assume Mahajan's formulation of Condition A, namely, that the anaphoric dependency is satisfied as a binding relationship in a local domain.

(39) a raam$_i$-ne   ser$_j$ [apne$_{\{i/j\}}$ baccoN-ko]   dikhaayaa
Ram$_i$(SU)   tiger$_j$(DO)   [SELF$_{\{i/j\}}$'s children(IO) show

b raam$_i$-ne   [apne$_{\{i/*j\}}$ baccoN$_j$-ko]   ser   ___$_t$ dikhaayaa
Ram$_i$(SU)   [<u>SELF</u>$_{\{i/*j\}}$'s children$_j$(IO) tiger(DO) ___$_t$ show

Assuming that the data in (39b) is an instance of XP adjunction, the tail of the chain should be Active. The result should be that <u>apne</u> should have the same binding possibilities as shown in (39a), contrary to fact. As throughout, we assume that the surface orderings are incidental and that binding conditions are satisfied at the LF interface.

Thus the data presented supports the non-interleaving schema in which the clause is partitioned into the SP part of the clause to the left in which the tail is Active and the FP part of the clause to the right in which the head is Active, as illustrated in (40).

(40) [$_{SP}$ … [$_{FP}$ … [$_{FP}$ … [$_{FP}$ …

An argument that Clause Level scrambling may be Active at the tail of the chain is as follows. Gurtu 1985, argues that Clause External scrambling is a type of Operator-Variable construction associated with focus, or some other semantic reflex. The result is that the chain is Active at the tail.

But if Clause External scrambling can be Active at the tail of the chain, then Clause Internal scrambling must also potentially have this property. The reason is very simple. Let us say that some property of the functional head we are calling S° is responsible for Clause External scrambling. Then unless for some reason, a matrix clause lacked S° just in case it also lacked an embedded clause, S° must potentially be available for Clause Internal scrambling as well as Clause External scrambling. Since such an interdependency is nearly inconceivable, we will assume that the S° node is always potentially present in a matrix clause.

Therefore we predict that Clause Level scrambling may be either Active at the head of the chain or at the tail, depending upon whether the scrambling is an instance of an Operator-Variable construction or whether it is an instance of Inner scrambling. It will be discussed in greater detail in the section on Inner scrambling, but the generalization is that since it is not an instance of movement, it is Active at the unitary head of the chain. Clause External scrambling is always an instance of an Operator-Variable construction and hence is always Active at the tail of the chain -- it is always an instance of Outer scrambling.

As mentioned earlier, in this thesis, a version of the non-interleaving view of scrambling will be proposed. Schematically, it is as shown in (41).

(41) a. Inner Scrambling

```
[… [SP [ … [FP   [  … [SP  … [FP     …  ]]    ]]] ]
                                |______|
```

b. Inner Scrambling

```
[… [SP [ … [FP   [  … [SP  … [FP     …  ]]    ]]] ]
                                    |__|
```

c. Outer Scrambling

```
[… [SP [ … [FP   [  … [SP  … [FP     …  ]]    ]]] ]
                       |_____________|
```

d. Outer Scrambling

```
[… [SP [ … [FP   [  … [SP  … [FP    …  ]]     ]]] ]
    |_________________________________|
```

Thus the essential division to be defended is that "Outer" scrambling is driven by an Operator-Variable construction. The locus of the Operator portion is S°. The landing site can either be to a Clause External position or to the beginning of a matrix clause, but in any case is movement to the checking domain of S°. Outer scrambling, being part of an Operator-Variable construction, is Active at the tail of the chain. Clause External scrambling is always an instance of Outer scrambling.

Inner scrambling, in contrast to Outer scrambling, is licensed by a combination of head-movement, clause-pruning, and Economy considerations to be presented below. Inner scrambling, in contrast to Outer scrambling, is Active at the head of a unitary chain.

5. Inner Scrambling by Clause Reduction

The task at hand is to derive Inner scrambling, and to derive the correspondence of the surface configurations to their LF configurations. The approach is to derive its behavior from independent aspects of the grammar. In particular, the N and V features of Agr° and Tns° nodes figure prominently in the analysis. This part of the proposal requires that one condition that must be met for Inner scrambling to take place is that the N feature of Agr° is strong, and that the V feature of Agr° is strong.

Furthermore, this proposal requires principles of Economy that allow scrambling just in case the arguments have moved to [Spec,Agr] positions by Spellout. We will argue that what allows Inner scrambling is that the Agr structure has already disappeared by Spellout. These principles of Economy at PF that drive Inner scrambling once it is allowed will be presented after the discussion of the strength of Agr° features.

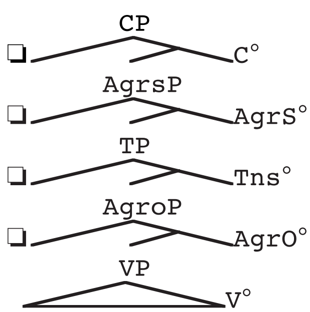
5.1. Strength of N and V features of Agr° and Tns°

The MPLT framework provides a partial typology of languages, based on the strength of N and V features of functional heads, and the strength of N and V features of Tns° and Agr°. The assumption is that the N and V features on these heads may be either strong or weak in a given language. We assume here that the N features of Agr° and Tns° are strong in Hindi.

5.2. Clause Reduction

Under a reasonable assumption about Full Interpretation, the Agr° node disappears after the agreement relation has been established as a Spec-Head relationship. Thus the question is what happens to the entire Agr structure[23] after the agreement relationship has been established, given the source structure in (42).[24] A further question that arises is what happens to the rest of the clausal structure after the disappearance of the Agr° nodes.

(42)



The following discussion will motivate a difference in behavior before versus after spellout regarding the

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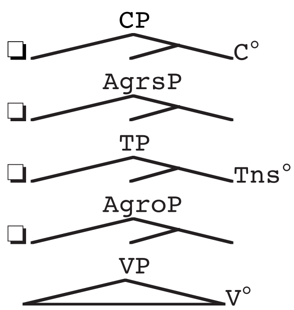
[23]Also see Pollock 1989 for arguments for the "exploded INFL" shown in the structure.

[24]To save space in the diagrams, boxes are used to stand for the specifier position. The symbol ❑
box around SU in SU means that the subject is in a specifier position.

structural changes associated with the disappearances of the Agr° node. The argument is that if movement to [SPEC,Agr] takes place after spellout, a skeletal phrasal structure remains, an example of which is shown in (43).

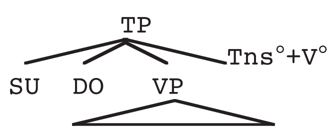
See Lasnik and Saito 1991 for evidence that a structure like (43) is correct at LF for English.

(43)



On the other hand, if movement to [SPEC,Agr] takes place before Spellout, we will argue that the resulting clause structure is roughly as shown in (44). In (44), the Agr structure is allowed to delete by Full Interpretation. Principles of Economy operative at PF trigger the subsequent collapse of the clause into (44). We will go through step-by-step the process that derives (44).

(44)



Let us call the pruning of (43) into (44) "Clause Reduction". As mentioned above, important questions are where, when, and why this operation takes place. Let us assume that a principle of economy of representation forces clauses to be as small as possible before spellout, but after spellout it is not relevant. The idea is that the clause reduction reduces the symbolic computation in the PF component. The details of this motivation involve the behavior of the metrical system at the phrasal level and will be given in the next section.

5.3. Computational Motivation for Clause Reduction

Halle and Vergnaud 1987, in capturing the behavior of phrasal stress, link the creation of metrical constituents to the presence of syntactic constituents. Thus:

> Whenever two words form a syntactic constituent (phrase or compound), we shall interpret the constituent boundaries as boundaries of metrical constituents …. The effect of this procedure will be to add a new line to the metrical grid. (p. 264)

However, in some instances, these additional metrical constituents require subsequent adjustment. The example discussed shows that automatically adding metrical constituents based on the presence of syntactic constituents can lead to incorrect predictions in terms of stress contours. A mechanism (The Stress Equalization Convention, p. 265) is proposed to compensate for the additional metrical structure. It adds additional metrical structure to yield the correct stress contours.

The example shown in Halle and Vergnaud (p. 265) is the following. In (45), it is shown how the Nuclear Stress Rule fails, by failing to assign more stress to Jesus than to preached, and by failing to assign more stress to preached than to people.

```
(45)      .        .                  .            *)
         (.        .                  .            *)
          .       (.                  .            *)
          *        *               (  *            *)
         [Jesus [preached [to [the [people [of [Judea]]]]]]]
```

When the Stress Equalization Convention is applied, the correct stress contour is produced, as is shown in (46).

```
(46)       .        .                  .            *)
         ({*}       .                  .            *)
          {*}     ({*}                 .            *)
           *        *               (  *            *)
         [Jesus [preached [to [the [people [of [Judea]]]]]]]
```

Thus, as the Stress Equalization Convention applies, the elements indicated as "{*}" are introduced into the metrical constituency in the example shown. For more discussion of the mechanism under consideration, see Halle and Vergnaud.[25]

Let us assume that this mechanism is correct as described. It is then only reasonable to assume that the addition of this compensatory metrical structure comes at a computational cost to the stress system.

When we turn to the nodes in functional projections, the automatic consequence is that stress contour would be assigned in the metrical component for these projections.

---

[25]Also, see Cinque 1993 for a criticism of the mechanism proposed, and see Truckenbrodt 1993 for a defense of it. Also, see Chomsky and Halle 1968 for a precursor to this mechanism.

Since we do not see such stress contours, we may assume that the Stress Equalization Convention is at work.

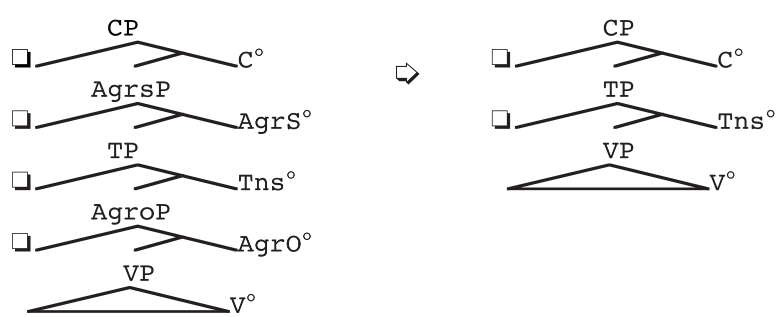
Let us continue to assume that one constituent is created for each node in the syntactic structure. Then, the fewer nodes there are, the less work that the Stress Equalization Convention must do. This aspect of the stress system will serve as a motivation for Pre-spellout Clause Reduction to be developed below.

An open question is the precise way in which the phrasal stress behaves under Inner and Outer scrambling as contrasted with unscrambled constructions.

5.4. Specifiers and Clause Reduction

Consider again the Clause Reduction from (47a) to (47b). Questions to be addressed include what happens to elements in the Spec positions of pruned maximal projections and what happens to the features associated with the functional heads.

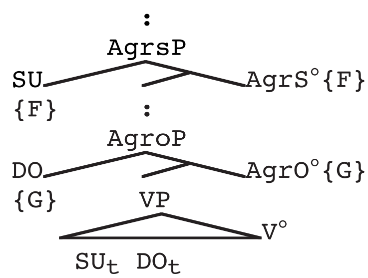
(47) a: b:



5.4.1. Spec Identification

Recall that Case is assigned by a head to a specifier in a Spec-Head relationship. In the general[26] spirit of Watanabe 1993, a feature F marks the Case relationship that was established under Spec-Head agreement. In (48), the Spec-Head relationships between AgrS° and the subject and AgrO° and the object are marked by "{F}" and "{G}" respectively. As a terminological convenience, let us refer to the residual effect of the Spec-Head agreement as "Identification".

(48)



Thus in (48), {F} Identifies the subject and {G} Identifies the object. It is critical that {F} and {G} persist in their Identification roles, even after the Agr° nodes delete. The persistence of Identification is crucial for the account of Weak and Strong Crossover as LF conditions -- more will be said about this aspect of Identification in subsection 5.4.1.

---

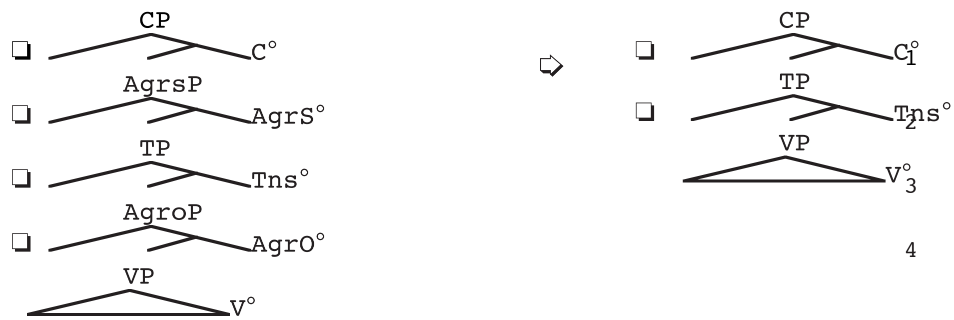
[26] I will not assume that Agr must further raise to delete {F}.

5.4.2. Chain Identification and Persistent Identification

Again, we must address the question of what happens to the Specifier positions ❑

consider the question of AgrS°.

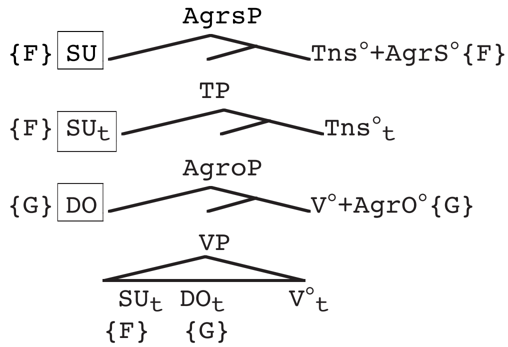
(49) a: b:



The simplest solution, namely, that the Specifier positions, as well as the AgrP and Agr' nodes, delete when their corresponding Agr° nodes delete, will be adequate, as long as we make two assumptions: (i) that Identification applies to chains and not simply to positions and (ii) the Identification relation persists in all Checking relations possible. Let us call (i) "Chain Identification" and (ii) "Persistent Identification". The details of the pruning operation will be given below.

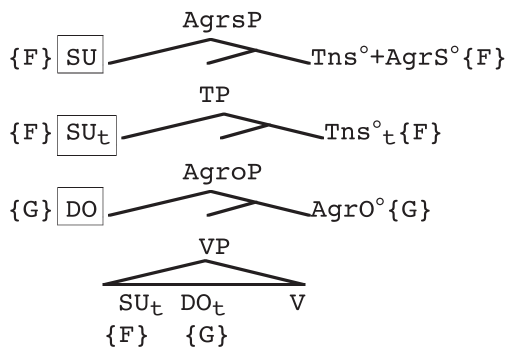
The effect of "Chain Identification" is illustrated in (50) below. Notice that the feature {F} appears in [Spec,AgrS°] and [Spec,Tns°] in (51). We assume that the subject has moved through [Spec,Tns°] on its way to [Spec,AgrS°], and that the entire chain is marked with {F}.

(50)



The effect of "Persistent Identification" is shown in (51), where the feature {F} appears on Tns°$_t$ in addition to AgrS°.

(51)



So now, when the Agr structure deletes, as shown in (52), the subject is still Identified by {F}, though now the relation is between {F} on Tns° and the copy of the subject in [Spec, Tns°].[27] The object is identified by {G} in AgrO°.

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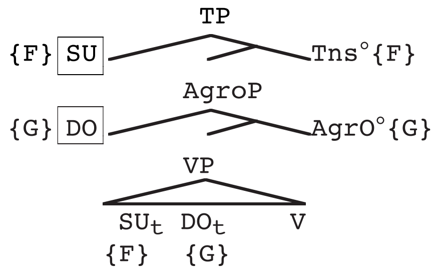
[27]Alternatively, we could assume that Tns°+AgrS jointly assign Case and consequently jointly have the {F} feature. The result will still be the same as shown in the example.

(52)

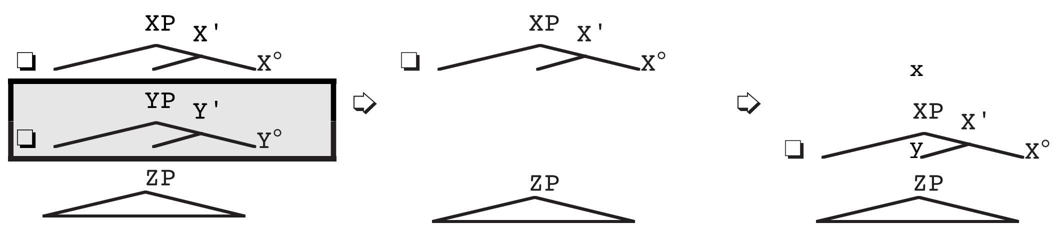


Thus the conceptual motivation for the apparent downward Spec shift is that the traces of the shifted elements already occupy the lower positions, given the assumed movement history shown in (51). Given the copy theory of movement, nothing special needs to be said about the disappearance of the top copy. We may assume that the chain that was formerly headed by the element in the [Spec,AgrS] position is now headed by the element in [Spec,Tns°], the result of an automatic cleanup process, a sort of pruning operation for chains.

5.4.3. Definition of Clause Reduction

Let us consider how we might characterize Clause Reduction formally. Exactly what happens to the boxed YP constituent in (53a) under clause reduction? Intuitively, it is as if we snipped it from the tree and the XP which dominated YP dropped down on ZP by force of gravity. This intuition, though visually appealing, glosses over important considerations that will be assumed below.

(53) a: b: b:



Let us explore a definition of Clause Reduction in terms of node deletion that makes as few assumptions about the tree as possible, namely, that the tree is defined in terms of the dominance relation and that deletion of a node means deleting all reference to it in the series of dominance relations that define the tree.

To make this notion concrete, let us assume that the hierarchical organization of the tree is represented by a matrix of statements encoding dominance, as shown in (54).[28]

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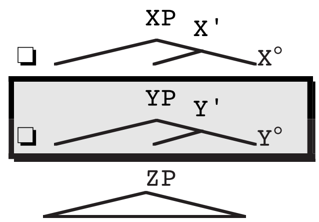
[28]The upper right hand triangle of the table is omited because it is redundant.

(54) Does **A** dominate **B** here ➪

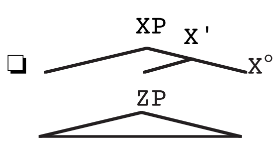


A➾ **B**➘	XP	X'	❑	X°	YP	Y'	❑	Y°	ZP
XP	no								
X'	yes	no							
❑	yes	no	no						
X°	yes	yes	no	no					
YP	yes	yes	no	no	no				
Y'	yes	yes	no	no	yes	no			
❑	yes	yes	no	no	yes	no	no		
Y°	yes	yes	no	no	yes	yes	no	no	
ZP	yes	yes	no	no	yes	yes	no	no	no

Assuming that deleting the intermediate YP structure entails deleting the Y°, Y', and YP and [SPEC,YP], that is, the boxed portion of the table in (54), we may simply assume that the columns and rows involving these nodes are deleted from the table of dominance relations. This yields the table and structure in (55):

(55) Does **A** dominate **B:**

A➾ **B**➘	XP	X'	❑	X°	ZP
XP	no				
X'	yes	no			
❑	yes	no	no		
X°	yes	yes	no	no	
ZP	yes	yes	no	no	no



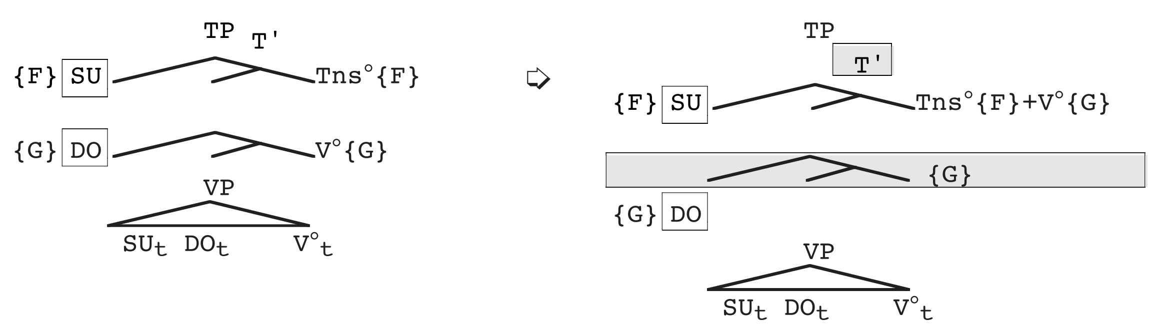
The above table automatically yields this graphic representation of the tree.

Below, we will consider the case in which all but the Specifier deletes, which under the definition of Clause Reduction given, will yield an N-ary structure in its counterpart to (55).

<u>5.4.4. Radical Clause Reduction</u>

As mentioned above, we are assuming that Tns° has strong V features and hence attracts the V° by Head movement. This consideration yields the more accurate version of the structure shown above, illustrated now in (56b).

(56) a. b.

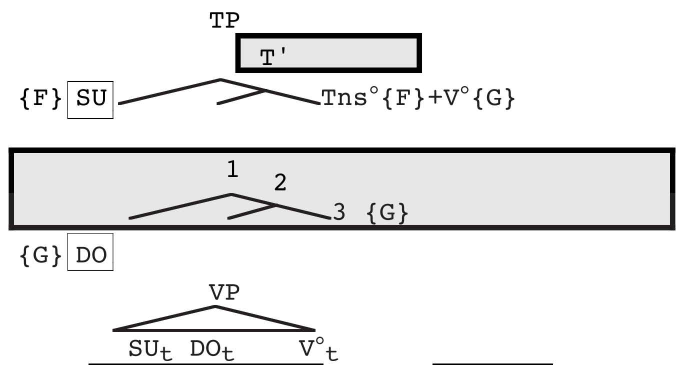


Let us assume two important augmentations about the form of Clause Reduction defined above, which we will call Radical Clause Reduction (i) that Persistent Identification of {G} of the direct object will allow the intermediate shaded portion of (56b) to be deleted at no cost to interpretability at LF, because the Case relation {G} is maintained after Radical Clause Reduction; and (ii) that single-bar level nodes are deleted when possible. In particular, let us assume that the shaded T' node in (57b) is deletable. Let us assume that the VP does not delete because it is required for the assignment of thematic relations.

Then by the defintion of Radical Clause Reduction, we are allowed to perform the following reduction of (56b), the beginning of which is shown in (57) and the end of which is shown in (58). The intermediate nodes of the shaded portion of the tree in (57b) are identified with "1", "2", and "3" in the tree and in the table below.

(57) Does **A** dominate **B** here ⇨

b.

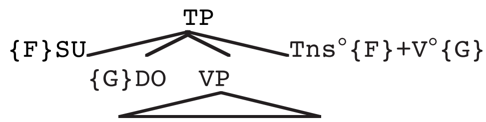


B ↘ / **A** ⇨	TP	T'	SU	$T^\circ+V^\circ$	1	2	DO	3	VP
TP	no								
T'	yes	no							
SU	yes	no	no						
$T^\circ+V^\circ$	yes	yes	no	no					
1	yes	yes	no	no	no				
2	yes	yes	no	no	yes	no			
DO	yes	yes	no	no	yes	no	no		
3	yes	yes	no	no	yes	yes	no	no	
VP	yes	yes	no	no	yes	yes	no	no	no

The resulting removal of the indicated dominance relations is shown below in (58). It is important to notice that the relation encoded in (and deleted from) the table is one of dominance and not simply one of <u>immediate</u> dominance.

(58) Does **A** dominate **B:**

A⇨ / **B**↘	TP	SU	$T^{\circ}+V^{\circ}$	DO	VP
T'	yes				
SU	yes	no			
$T^{\circ}+V^{\circ}$	yes	no	no		
DO	yes	no	no	no	
VP	yes	no	no	no	no



The above table automatically yields this graphic representation of the tree.

We assume that the resulting structure in (58) is allowed because it does not disturb the Identification relations {F} and {G} and is driven by Economy at PF.

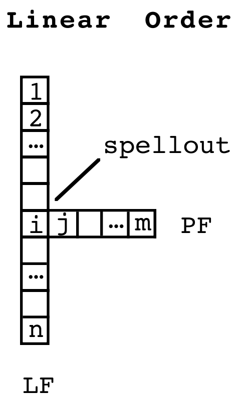
Thus we have illustrated the mechanism responsible for Inner scrambling.[29]

---

[29]The above example shows how Radical Clause Reduction yields permutations for transitives. Ditransitives behave in a similar way: it is assumed that the unnecessary structure that separates the indirect object from the other arguments disappears by Radical Clause Reduction, thus allowing free permutation of the subject, direct object, and indirect object.

The mechanism of Radical Clause Reduction just outlined has the consequence that linear order is necessarily represented in the interface conditions that apply at LF. To make these notions more precise, consider the diagram in (59).

(59)



The derivation splits at stage i and runs to both LF and PF. The derivation proceeds from stage 1 to stage n to arrive at an LF representation. The derivation to PF runs until stage i, at which point it runs from stage j to stage m, deriving a PF representation. If we assume that linear order is established at stage i, (instead of at j or after) and if we assume that Inner scrambling is free only until linear order is fixed, then it follows that Inner scrambling cannot happen after stage i, that is, after spellout. The consequence is that there is no Inner scrambling at LF.

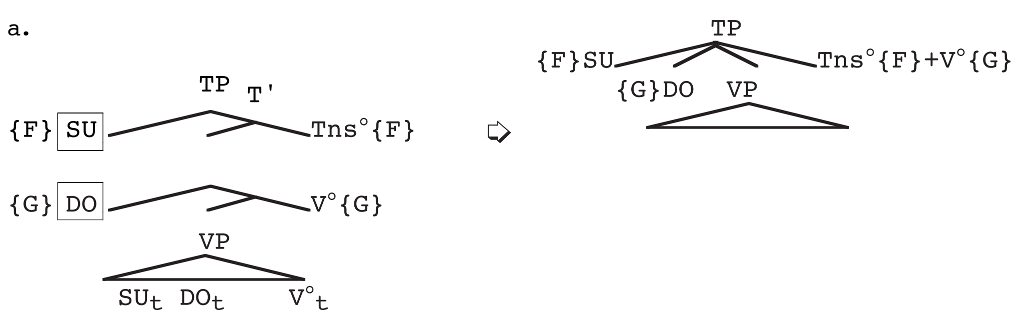
Hierarchical Clause Reduction

As mentioned above, the mechanism of Radical Clause Reduction just outlined has the consequence that linear order is necessarily represented in the interface conditions that apply at LF.

Let us briefly sketch another algorithm -- Hierarchical Clause Reduction -- which would accomplish basically the same thing, but still allow the traditional factoring out of linear precedence at LF. We will briefly explore this alternative algorithm.

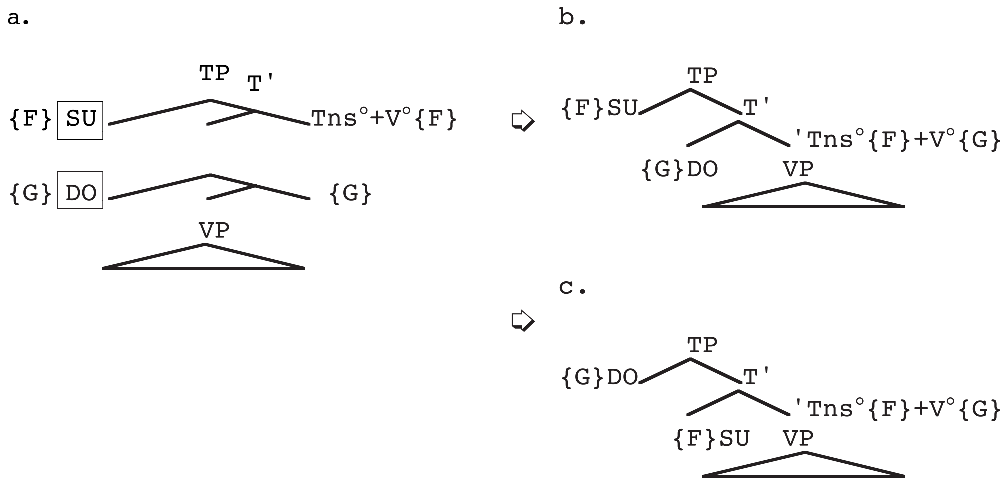
Let us assume that the Stress Equalization Convention seeks to minimize the number of maximal projections, and not simply the number of nodes in a phrase marker. Let us assume furthermore that rather than deleting columns and rows from tables that encode dominance relations, Hierarchical Clause Reduction is free to delete any node it can, as long as it does not interfere with interpretability. Recall the reduction that we saw above, repeated here as (60).

(60) a.



Hierarchcal Clause Reduction is free to transform (61a) either into (61b) or (61c), as will be discussed.

(61)



Given the assumption that Hierarchical Clause Reduction is free to change the hierarchical order of the direct object and the subject, for example, because it is licensed because the {F} and {G} relations are still satisfied within the Minimal Domain, we no longer need to make reference to linear order at LF.

Most importantly, both the total number of nodes in the tree and the number of maximal projections is reduced under Hierarchical Clause Reduction as well as under Radical Clause Reduction. The result of this reduction, of course, is that Inner scrambling is still motivated by Economy at PF, in the metrical component.

However, the cost is that Hierarchical Clause Reduction is a less motivated and more complicated algorithm than Radical Clause Reduction. We present the sketch here by way of noting that there may be alternatives to Radical Clause Reudction, and leave the matter open, preferring for now to maintain Radical Clause Reduction.

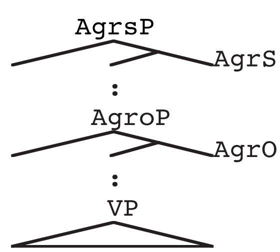
5.4.5. Question of Identifying IO

A question that naturally arises for ditransitive structures is whether the indirect object must be Identified in the same way as shown for the subject and direct object. We will show that it is not identified in this way, and in fact, we can show that no AgrIO° node exists, assuming LF interface conditions. We will conclude that Case for the indirect object is satisfied within an Agr structure associated with PP.

5.4.6. Arguments against AgrIO

Nevertheless, a reasonable consideration is that in addition to AgrO and AgrS, there is an AgrIO node responsible for the case-checking of indirect objects. Thus, there are two extensions to the structure of MPLT of (62), as shown in (63a) and (63b).[30]

(62)

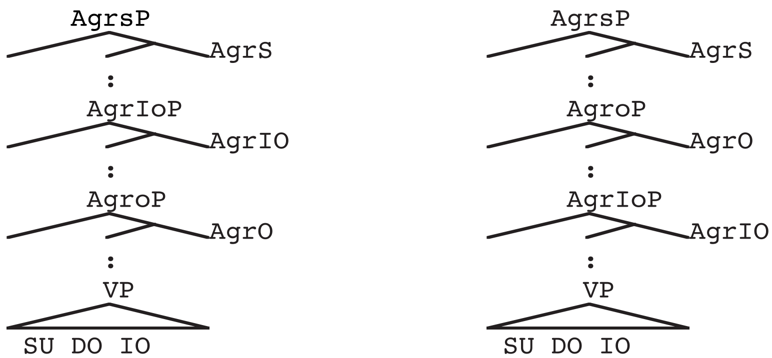


Given the assumption that binding relations are established at LF, we will show shortly, based on arguments

[30]Irrelevant structure that has been omitted is noted with ":".

from the lack of backward binding in ditranstivies, that neither structure is possible.[31]

(63) a: b:



Let us turn to data reported in Mahajan 1990. A close inspection of the paradigm in (64) and (65) shows that neither structure in (63) is correct, as will be demonstrated.

(64)	raam-ne	ser	apne	baccoN-ko	dikhaayaa
a	Ram(SU)	tiger(DO)	SELF's	children(IO)	show
	<i>	<j>	<i/j>		

b	raam-ne	mohan-ko	apnii	kitaab	lOTaaii
	Ram(SU)	Mohan(IO)	SELF's	book(DO)	returned
	<i>	<j>	<i/j>		

(65)	raam-ne	apne	baccoN-ko	ser	dikhaayaa
a	Ram(SU)	SELF's	children(IO)	tiger(DO)	show
	<i>	<i/*j>		<j>	

---

[31]It is also probably possible to dismiss these structures on theoretical grounds, given the mechanisms responsible for deriving movement of the subject to [Spec,AgrS] and the object to [Spec,AgrO] in MPLT which hinge on relativized minimality effects of the movement of these elements.

```
b  raam-ne   apnii kitaab        mohan-ko  lOTaaii
   Ram(SU)   SELF's book(DO)     Mohan(IO) returned
   <i>       <i/*j>              <j>
```

Let us assume for the moment the formulation of the Condition A presented in Mahajan 1990 (although we will reformulate it later) namely, that Condition A is satisfied by c-command within a local domain. Let us add to his analysis only the requirement that binding conditions are satisfied at LF, following the MPLT program, a requirement crucial to our present analysis.

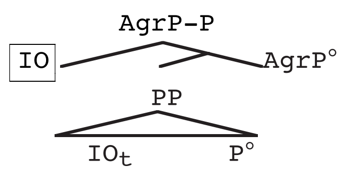
If the structure in (63a) were correct, in which [Spec,AgrIO] c-commands [Spec,AgrO], and the indirect object were as it appears in (65b), we would expect that the indirect object would bind into the direct object at LF. We would expect this because even though the indirect object fails to c-command the anaphor in the direct object at the surface, it does at LF and therefore binding should be possible, contrary to the reported fact.

On the other hand, if the structure in (63b) were correct, differing from (63a) in that [Spec,AgrO] c-commands [Spec,AgrIO], we would expect that the direct object would bind into the indirect object at LF by the same sort of reasoning we used for (63a).

Again, even if we do not know the relative dominance relation between AgrO-P and a hypothesized AgrIO-P, the array of facts in (64) and (65) show that AgrIO cannot exist.

We will therefore assume that the agreement relation for the indirect object takes place within a postpositional phrase, and has roughly the structure shown in (66). Presumably, the P° raises to the Agr° position for oblique case assignment.

(66)



As we will see below, assuming that the Case relationship is satisfied locally, along with the assumption that the Agr structure dominating disappears and therefore allows the indirect object to participate in the permutation of Inner scrambling, we will have solved the problems mentioned above.

5.5. Inner Scrambling – Transitives and Ditransitives

We will now address the question of Inner scrambling at LF. As discussed in the introductory section, if Inner scrambling were allowed to take place at LF, we would expect there to be no Weak Crossover, among other things, contrary to fact. It is therefore important to explain how Inner scrambling is unable to take place at LF, which we will now do.

5.5.1. No Inner Scrambling at LF

The lack of Inner scrambling at LF is a natural consequence of the analysis as presented. Since Economy at PF is driving Clause reduction, after spellout, there is no driving force for Clause reduction, therefore there is no further reason for Inner scrambling. Therefore it does not take place after Spellout.

5.6. Diagnostics Applied to Scrambling

A serious question that arises regarding Clause Level scrambling is why it remedies weak crossover but not strong crossover violations.

We will explore this question in this section, first presenting the relevant data. We will then propose an account of the Strong Crossover data, an analysis which involves excorporation of Tns° to C° and movement of the subject to the checking domain of C° forced by Persistent Identification.

We will then show how this analysis is also able to capture the Weak Crossover facts, given the assumption that only part[32] of the subject must move to the checking domain of C°, following the Identifying feature hosted on Tns°.

5.6.1. Weak Crossover Data

Recall the data presented above, which shows that Inner scrambling remedies Weak Crossover. (67a) shows that the base case involving backward pronominalization is relatively acceptable. A counterpart of (67a) exhibiting a Weak Crossover violation is shown in (67b), assuming that kisko raises at LF. The structure in (67b) is remedied by the Inner scrambling shown in (67c).

```
(67)  ?  [uskii_i bahin]      raam-ko_i  pyaar kartii      thii
a         his_1   sister(SU)  Ram(DO)    love  do.IMP.FEM  be.PST.FEM

          "His_i sister loved Ram_i."

    b  *  [uskii_i bahin]        kis-ko_i  pyaar kartii       thii
          his/her_1 sister(SU)  who(DO)    love  do.IMP.FEM  be.PST.FEM

          "Who_i did his/her_i sister love?"

    c  √  kis-ko_i  [uskii_i   bahin]      pyaar kartii      thii
          who(DO)   his/her_1 sister(SU)  love  do.IMP.FEM  be.PST.FEM

       √  "Who_i did his/her_i sister love?"
```

So movement involving the remedying of Weak Crossover is at least potentially Active at the head of the chain.

---

[32]See Lee 1993 for motivations for moving parts of clauses at LF. Part of the motivation for this move is to account for binding behavior as Interface Conditions at LF, following the MPLT program.

Surprisingly, instances of movement that we would therefore expect to remedy Strong Crossover and other Binding Condition violations appear to be obligatorily Active at the <u>tail</u> of the chain. Let us consider these in turn.

5.6.2. Strong Crossover Data[33]

Using (68) as a template, let us investigate the Strong Crossover properties of the Direct and Indirect object.[34]

```
(68)      jOn-ne    use          rakesh-ko       diyaa
          John(SU)  to him(IO)  [Rakesh](DO) gave

          "John gave Rakesh to him."
```

Assuming subsequent WH raising of <u>kiske</u>, the reason that (69) is unacceptable is that it exhibits a Strong Crossover violation.

(69)

* jOn-ne use$_i$ [kiske$_i$ shikshak-ko] diyaa
John(SU) to him$_i$(IO) [whose$_i$ teacher](DO) gave
"Whose teacher did John give to him?"

When the indirect and direct objects are permuted from the configuration in (69) to that in (70), the sentence becomes acceptable.

---

[33]The following section was strongly influenced by data presented in Frank, Lee, and Rambow 1992. Please see this work for further discussion and for more parallels in Japanese, Korean, and German.

[34]Given the paucity of simple ditransitive verbs in Hindi, we will use the somewhat pragmatically awkward verb for "give".

(70) jOn-ne [$kiske_i$ shikshak-ko] use_i diyaa
John(SU) [$whose_i$ teacher](DO) to him_i(IO) gave

These facts parallel the Japanese facts reported in Tada 1993, as shown in (71).

(71) a. * John -ga $soitu_i$-ni [$dare_i$-no sensei-o] shookaisita-no
John-NOM the guy-DAT who-GEN teacher-ACC introduced

"$Whose_i$ teacher did John introduce to him_i?

b. ? John -ga [$dare_i$-no sensei-o] $soitu_i$-ni shookaisita-no
John-NOM who-GEN teacher-ACC the guy-DAT introduced

But when the WH-phrase appears at the beginning, the structure remains unacceptable, as shown in (72) and (73).

(72)
* $usne_i$ [$kiske_i$ shikshak-ko] dekhaa
He_i(SU) [$whose_i$ teacher](ACC) saw
"Whose teacher did he see?"

(73)
* [$kiske_i$ shikshak-ko] $usne_i$ dekhaa
[$whose_i$ teacher](DO) he_i(SU) saw

These facts correspond exactly to the facts reported in Tada 1993 for Japanese, as shown in (74).

(74) a. * $soitu_i$-ga [$dare_i$-no sensei-o] nagutta-no?
the guy-NOM who-GEN teacher-ACC hit-Q

b. * [$dare_i$-no sensei-o] $soitu_i$-ga nagutta-no?
who-GEN teacher-ACC the guy-NOM hit-Q

In fact, Tada 1993 resorts to an S-structure condition on Strong Crossover, formulating it as in (75).

(75) A pronoun may not c-command a member of the A-bar chain containing the quantified NP coindexed with the pronoun at S-structure. Tada 1993: (p. 22)

However, the MPLT program does not have S-structure conditions. Therefore, we assume under our analysis, Tns°

excorporates to C°, bringing the subject to the checking domain of C° by Persistent Identification, thus preserving the condition as an Interface condition. We will examine this analysis in detail, but first let us compare other Binding Theory facts.

5.6.3. Binding Condition C

The Binding Condition violations below would appear to show that parallel structures are obligatorily Active at the head of the chain, as we can see in (76). The reason is given below.

(76) a raam$_i$-kii bahin-ne use$_i$ dekhaa
Ram$_i$'s sister(SU) him$_i$(DO) saw

b ?* use$_i$ raam$_i$-kii bahin-ne ___ dekhaa
him$_i$(DO) Ram$_i$'s sister(SU) ___ saw
Active Inert

As expected, (76a) is acceptable: no binding conditions are violated at LF: the subject has moved to [Spec,AgrS], which contains "Ram", coreferent with the direct object "use" which in turn has moved to [Spec,AgrO].

If use were allowed to be Active at the tail of the chain, we would expect (76b) to have the same structure as (76a) at LF: the pronoun use should be Active in its source position, yielding the same level of acceptability as (76a), contrary to fact. If the the chain were required to be Active at its head, then we expect a Condition C violation at LF. Recall that we are assuming that binding conditions are evaluated at LF, and that the apparent surface Condition C violation in (76b) is irrelevant.

A similar pattern obtains when we permute (76) slightly, putting the pronouns in subject position instead of object position.

(77) a * us-ne$_i$ [siitaa$_i$ kii pikchareN] xariidiiN
she$_i$(SU) Sita 's pictures bought
"She bought Sita's pictures"

b * [sitaa$_i$ kii pikchareN] us-ne$_i$ xariidiiN
[sita$_i$'s pictures](DO) she$_i$(SU) bought

As we can see in (77), the fronting of the direct object in (77b) is unable to save its counterpart in (77a). Given that the violations in Weak Crossover configurations were remedied by Clause Level scrambling, forced Activity -- and consequent failure to remedy Strong Crossover violations -- at the tail of the chain for (76) and (77) here is a mystery.

Let us now turn to an analysis of these facts, in which the proposed configuration in (76) and (77) is indeed Active at the head of the chain, but subsequent movement of the subject (or part of the subject) interferes with the expected remedying of binding violations.

5.6.4. Accounting for Strong Crossover

Let us examine the minimal assumptions about strong and weak crossover violations and see what array of mechanisms are readily available to capture the relevant behavior. Roughly speaking, the structure of weak crossover and strong crossover violations are as shown in (78) and (79). The brackets ("[") in the diagrams indicate embedding.

We assume in the (c) cases below that Quantifier Raising creates an Operator-Variable construction at LF, thus yielding the violations shown in the (a) schema.

(78) Weak Crossover Violation

a

* [… Op_i … [… […$PRONOUN_i$…] … [… Vbl_i …] …] …]

<--------------------------------<

b * Who_i does [his_i mother] love ___.

c * [His_i mother] loves $someone_i$.

The relevant distinction between the schema in (78a) and that in (79a) is that the pronoun is embedded in (78a) but not in (79a).

(79) Strong Crossover Violation

a

* [… Op_i … [… $PRONOUN_i$ … [… Vbl_i …] …] …]

<---------------------------------<

b * Who_i does he_i love ___.

c * He_i loves $someone_i$.

Roughly speaking, we are led to the conclusion that the abstract configuration that must obtain at some stage is that shown in (80), namely that the subject pronoun (or a trace of it) c-commands the object QP or WH phrase (or a trace of it). Following the minimalist program, this configuration must obtain at LF.

(80) subject > object

There are two ways in which (80) may obtain. Assuming a surface order of DO-SU, for (80) to obtain, either the object is lower at LF than it appears at the surface, or the subject is higher at LF than it appears at the surface. Or, more precisely, the object is Active at a position lower than it appears at the surface, or the subject is Active at a position higher than it appears at the surface.

Let us explore both of these options. First, we will consider the option in which the object is Active at a lower position. We will see that this option will not yield the correct results, and therefore conclude that the subject is Active at a higher position than it appears at the surface.

One way of capturing the first approach is as follows: if the tail of the Operator-Variable chain is Active, then the coreferent pronoun c-commands it, yielding the strong crossover violations shown in (73), repeated here as (81a), with the hypothesized LF movement of the WH-phrase shown in (81b).

(81) a. * usne$_i$ [kiske$_i$ shikshak-ko] dekhaa
He$_i$(SU) [whose$_i$ teacher](ACC) saw
"Whose teacher did he hit?"

b. * <u>[kiske$_i$ shikshak-ko]</u> usne$_i$ <u>[kiske$_i$ shikshak-ko]</u> dekhaa
Inert Active
|
Op............................Vbl

The abstract configuration of (81b) is shown in (82), illustrating the strong crossover violation.

(82) <-------------------

* Op$_i$ … PRONOUN$_i$ … Vbl$_i$
(DO) (SU) (DO)
Inert Active

The problem with (82) is that it fails to explain why weak crossover is remedied. For the solution sketched in (82) to capture the SCO violations presented above, the chain must be <u>obligatorily</u> Active at the tail. If it were not obligatory, the alternative process would have to yield (83) as an alternative LF representation.

(83) [sitaa$_i$ kii pikchareN] us-ne$_i$ xariidiiN
[sita$_i$'s pictures](DO) she$_i$(SU) bought

* <u>[kiske$_i$ shikshak-ko]</u> usne$_i$ <u>[kiske$_i$ shikshak-ko]</u> dekhaa
<u>Active</u> Inert
|
Op......Vbl

But (83) does not appear to violate any conditions -- notice that the pronoun <u>usne</u> does not c-command the Active portion of the chain and hence cannot trigger a Condition C violation. It should yield an acceptable structure, contrary to fact.

A possible approach would be to show that the derivation leading to (83) is not as economical as that leading to (81a). However, that approach would also have to explain how the converse is true in the case in which weak crossover is remedied by the fronting of a direct object. It therefore appears that this approach must be abandoned.

But as we noted in the outset of this section, there is another way to get the subject to c-command the direct object. In particular, if instead of forcing the tail of the direct object chain to be Active to get the subject to c-command the Active portion of the object, we may assume that the subject moves at LF to c-command the object.

That is, if we assume that the subject is moved to the Checking Domain of C° at LF, then the subject would c-command the other arguments. Recall that we are assuming that this movement is driven by excorporation of Tns° to C°, along with the effects of Persistent Identification. As we will see, this approach would allow a formulation of strong and weak crossover in terms of Interface Conditions.

Let us therefore investigate an alternative solution which places the subject higher at LF than it appears at the surface. It is a relatively straightforward solution which has three important features:

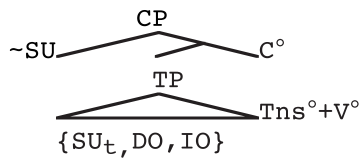
(i) The subject moves higher than the [SPEC,AgrS] and [Spec,TnsP] to the specifier of a higher functional head, possibly [Spec,CP].

(ii) In some cases, only part of the subject moves.

(iii) Strong and Weak Crossover violations are reducible to Interface Conditions at LF.

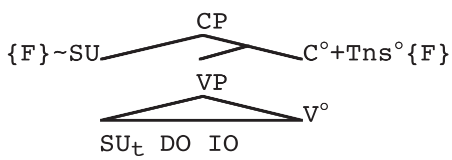
So, assuming that the subject moves higher than [Spec,AgrS], with justifications for it to be discussed below, the abstract representation for the clausal structure after such a movement is as in (84). The higher copy of the subject is marked with a "~" in (84), indicating that it might be the case that the entire copy of the subject is not present in [SPEC, CP]. This detail will be discussed below.

(84)



Let us assume that what drives the movement of the subject higher is that Tns° excorporates to C° and that the subject moves due to Persistent Identification.[35]

(85)



Let us consider in detail the difference between the behavior of Strong and Weak Crossover, in particular, let us see why Inner scrambling remedies Weak Crossover but does not remedy Strong Crossover.

Recall the failure of Inner scrambling to remedy Strong Crossover shown above in (72) and (73), repeated here in

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[35]See Stowell 1982 (p. 563), citing den Besten 1978, for a discussion of a requirement for the tense operator (in his terms) to appear in the COMP position.

See Roberts 1991 and Watanabe 1993 for discussions about the Excorporation operation.

(86). Recall also the ability of Inner scrambling to remedy Weak Crossover, shown above in (67), repeated here in (87).

(86) a. **Failure of Inner Scrambling to remedy SCO**

    * $usne_i$ [$kiske_i$ shikshak-ko] dekhaa
    He_i(SU) [$whose_i$ teacher](ACC) saw
    "Whose teacher did he see?"

b. * [$kiske_i$ shikshak-ko] $usne_i$ dekhaa
    [$whose_i$ teacher](DO) he_i(SU) saw

(87) **Ability of Inner Scrambling to remedy SCO**

a

* [$uskii_i$ bahin] kis-ko_i pyaar kartii thii
    his/her_1 sister(SU) who(DO) love do.IMP.FEM be.PST.FEM

    "Who_i did his/her_i sister love?"

b √ kis-ko_i [$uskii_i$ bahin] pyaar kartii thii
    who(DO) his/her_1 sister(SU) love do.IMP.FEM be.PST.FEM

√ "Who_i did his/her_i sister love?"

Recall one of our basic assumptions, namely, that Persistent Identification may be satisfied by moving only <u>part</u> of an element to the checking domain of a feature {F}. Let us refer to this splitting of copies as "fission", and assume the following in (88).

(88) a. Pronouns are not Fissionable.[36]
b. Complex maximal projections are Fissionable.

Let us make the further assumption that only the heads of maximal projections split off by Fission to raise by Persistent Identification. Let us assume that <u>uskii</u> is not

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[36]Perhaps pronouns are not fissionable because they are monomorphemic heads.

monomorphemic, but rather, that the genitive kii is the head and may split off by Fission. Let us assume that usne, on the other hand, is a head itself, and cannot be split by Fission.

Thus, the LF representation for the attempt to remedy Strong Crossover, repeated in (89), is shown in (90).

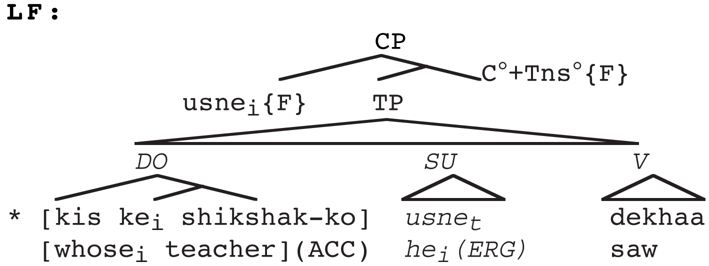
(89) * [kiske$_i$ shikshak-ko] usne$_i$ dekhaa
[whose$_i$ teacher](DO) he$_i$(SU) saw

"Whose teacher did he see?"

In (90), the pronoun usne raises to the Checking domain of C°+Tns° by Persistent Identification at LF. Notice that the pronoun is in a position to trigger a Strong Crossover violation at LF in (90).

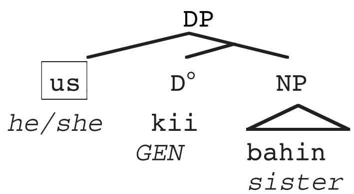
(90) **Failure of Inner Scrambling to remedy SCO**

LF:



In the case of Weak Crossover, on the other hand, since the subject is Fissionable, the head may raise to satisfy the requirement of Persistent Identification. The assumed structure[37] of the subject DP is as in (91).

(91)

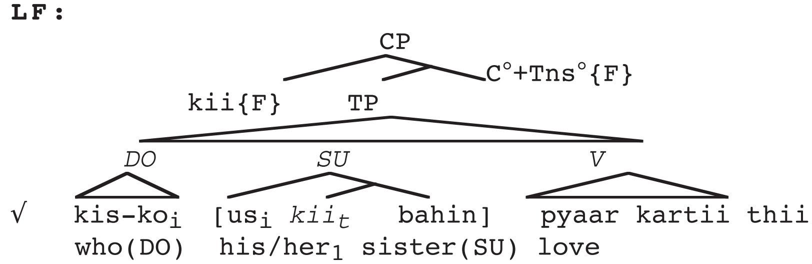


"his/her sister"

Thus in (92), the pronoun has been left embedded in the subject in a low enough position at LF as not to trigger a Weak Crossover violation. The D° head of the subject DP -- *kii* -- has raised to satisfy the requirements of Persistent Identification.

(92) **Ability of Inner Scrambling to remedy WCO**

LF:



"Who$_i$ did his/her$_i$ sister love?"

To summarize what we have seen: for Strong Crossover, since the subject is a unit unto itself -- ie, a monomorphemic pronoun -- there is no possibility of part of it being Active in a position low enough to avoid a Binding

[37]See Abney 1987 for motivation for the DP structure.

Condition violation. For Weak Crossover, since the pronoun is embedded, the part of the subject that <u>contains</u> the pronoun is able to be Active low enough, leaving enough of the subject in the Checking Domain of C° to satisfy Persistent Identification, and leaving the Active pronoun lower than the Checking Domain of Tns° thus avoiding a Weak Crossover violation.

Further evidence for the analysis just suggested is that shown in (93). There is no strong crossover or binding violation at the surface level.

(93) * [sitaa$_i$ -ke bhaii-ko] us-ne$_i$ ek kitaab dii
[to sita$_i$'s_1 brother](IO) she(SU) a book gave

However, the unacceptablility of (93) follows naturally if the subject moves to [Spec,CP], just as before, thus inducing a BT(C) violation at LF, as shown in (94)

(94) * us-ne$_i$ [sitaa$_i$ -ke bhaii-ko] ____t ek kitaab dii
she$_i$(SU) [to sita$_i$'s_1 brother](IO) she$_i$(SU) a book gave

The structures we have just motivated are also integral to capturing the difference between reflexives and reciprocals. In particular, the subject-orientation of reflexives will be accounted for in structures parallel to those we have just seen. These structures provide additional motivation for Persistent Identification.

5.7. Reflexive Binding

This section investigates the difference in the binding behavior of reflexives versus reciprocals in a dialect of

Hindi. We will show in this section how these anaphors behave under Inner scrambling. The general point is that subject orientation interferes with reflexive anaphor binding in constructions in which a referential direct object is scrambled in front of a subject containing an anaphor, as in (95):

(95) * raam$_i$-ko [apne$_i$ bacconN]-ne maaraa
Ram$_i$(DO) SELF$_i$'s children(SU) beat

"SELF's children beat Ram"

However, the parallel counterpart to (95) involving a reciprocal instead of a reflexive is much improved, as shown in (96):

(96) [raam aur siita]$_i$-ko [ek dusree$_i$-kii baccoN]-ne maaraa
Raam and Sita(DO) EACH OTHER's children(SU) beat.

The hypothesis is that reflexives are clitics which head-adjoin to TNS at LF, whereas reciprocals do not do this. Thus a locality condition at LF is responsible for the interference by the subject: the subject is closer to the reflexive anaphor than the object. In specific, the subject is in a Spec-Head relationship with TNS and the reflexive clitic whereas the object is not. As throughout, we assume that binding relations are satisfied at LF.

In this section, we will outline a solution to an asymmetry in the binding behavior of reflexives and reciprocals in Hindi. These two types of anaphor differ in their binding potential under scrambling. Furthermore, the reflexive is subject-oriented whereas the reciprocal is not. The core idea of the solution is that the reflexive is an LF-clitic, whereas the reciprocal is not. The reason that a scrambled direct object may bind a reciprocal in the subject but not a reflexive is that the latter would violate a locality condition on Condition A whereas the former would not. These ideas will be spelled out more precisely below.

One diagnostic to test whether the head or the tail of the chain is Active in scrambling is to test whether a scrambled element creates a new binding possiblity for an anaphor it has scrambled over. For example, Mahajan 1990 discusses the following examples: (97) is a simple case of a subject binding an anaphor inside of the direct object under canonical word order and (98) shows a parallel construction with scrambling.

(97) raam-ne [apne baccon-ko] maaraa
Ram.ERG self's children.ACC beat.PRF
"ram beat his children'

The claim in Mahajan 1990 is that (98), in which the direct object is scrambled to the left of the subject, is on a par with (97) in terms of acceptability.

(98) raam-ko [apne baccon-ne] maaraa
Ram.ACC self's children.ERG beat.PRF
"Ram's children beat him".

The theoretical claim, therefore, is that scrambling may be be Active at the head of the chain, assuming, as Mahajan 1990 does, that (98) is the result of movement.

However, in the dialect under consideration, the subject-orientation of the SELF anaphor interferes with anaphoric binding by scrambling. For these speakers, differing from Mahajan 1990 but consistent with Srivastav

1993, a locally scrambled direct object may not be coreferent with a SELF anaphor embedded in the subject as in (98). That is to say, local scrambling does not create a binding relation for reflexives and (98) is judged to be unacceptable.

Nonetheless, for speakers of both dialects, scrambling does create a binder for reciprocals, as shown in (99).

```
(99)   [jon aur meri]-ko [ek dusree] dekhaa
a      John and Mary.ACC, each other  saw

    b  [jon aur meri]-ko bill     [ek-dusree kii tasviren] degaa
       john and mary.acc bill.nom  each.other's  picture   give.fut
       "to john and mary, bill gave a picture of each other"
```

If the binding relations for reciprocals and reflexives were exactly the same, we would be forced to conclude that scrambling is Active at the head of the chain in the case of reflexives and may be Active at the tail of the chain in the case of reciprocals.

We will conclude, therefore, that reciprocals and reflexives are operative in slightly different binding configurations, and that there is no difference in chain Activity that depends upon the type of anaphor which has been scrambled. The difference in subject-orientation is an interfering factor in the structural geometry for establishing binding relations.

The core of the analysis is that for reflexive anaphors, Condition A is a SPEC-HEAD relationship because reflexive anaphors are LF-clitics, whereas the binding condition A for reciprocals is a c-command relationship because reciprocals are not LF clitics, at least not in the same structural geometry as reflexive anaphors.

So, assuming that the SELF anaphor is an LF-clitic, the simple, unscrambled structure at LF is as shown in (100). The exact position at which the clitic adjoins at LF is not important for the analysis but let us assume that it is TNS. As before, we assume that the subject moves through [SPEC,TNS] on its way to [SPEC,AgrS]. Furthermore, as before, we assume that Tns° excorporates to C° and that part of the subject must move to the Checking domain of C° as required by Persistent Identification. We assume that when Tns° excorporates, it takes the clitic with it.

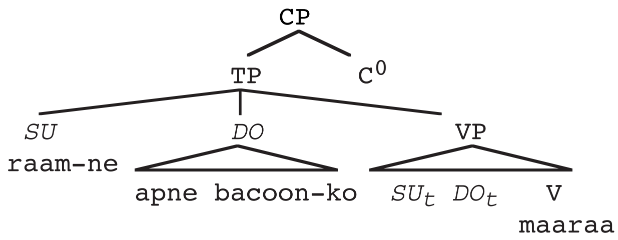
So, in (100), the subject antecedent is accessible. Let us assume that the anaphoric relation is realized as a spec-head relation.

(100) raam-ne$_i$ [apne$_i$ baccon-ko] maaraa

Ram$_i$.ERG SELF$_i$'s children.ACC beat.PRF
"Ram beat his children."

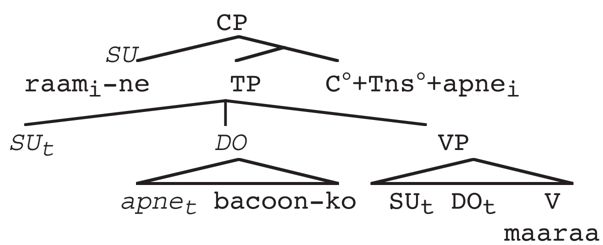
The surface representation that we see in (100) is as shown in (101). However, it is irrelevant that the configuration shown here would satisfy Condition A because it is not the configuration which is present at LF. The LF configuration is shown in (102) below.

(101)



In (102), the reflexive anaphor is shown adjoined to Tns°, which in turn has excorporated to C°. The subject, which has raised to the Checking domain of C° by Persistent Identification, is now in a local relationship with the reflexive anaphor <u>apne</u>. In fact, it is in the Spec-Head relationship required.

(102)



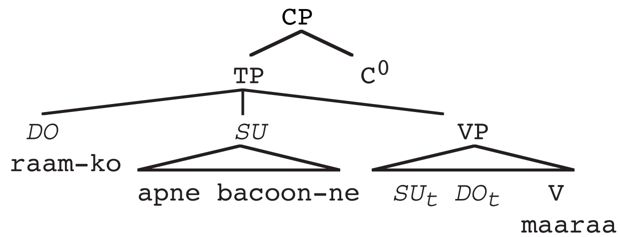
Let us now turn to the scrambled case in (103) and see how the subject-orientation of the SELF anaphor interferes with the binding relation. As is indicated, (103) is unacceptable.

(103) * raam$_i$-ko [apne$_i$ baccon-ne] maaraa

Ram.ACC self's children.ERG beat.PRF
"Ram, his children beat"

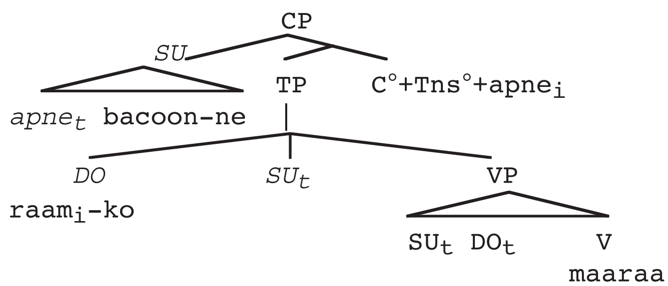
The surface form of (103) is shown in (104). The only relevant difference between (103) and (100) is that the direct object and the subject have been permuted, as allowed by Radical Clause Reduction.

(104)



However, the direct object is not accessible as an antecedent since it is not in a spec-head relationship with the reflexive anaphor clitic. The LF of (104) is shown in (105)

(105)



As in the SU-DO-V case of (102), the direct object is not in a Spec-Head relationship with the reflexive anaphor apne, and therefore cannot serve as an antecedent.[38]

This configuration does not arise in the case of the reciprocals, assuming that they are not anaphor clitics at LF.

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[38]An additional well-formedness condition must also be at work to completely rule out the sentence, that is, to rule out coreference between apne and baccon. In any case, since the the object is not in a SPEC-head relationship with the SELF anaphor apne at LF, it is not able to serve as an antecedent.

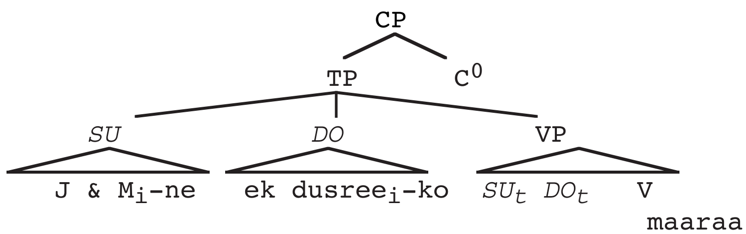
Let us first look at the unscrambled reciprocal, as shown in (106).

(106) [John aur Mary]$_i$-ne [ek dusree]$_i$-ko maaraa
[john and mary] [each other] hit

"John and Mary hit each other.

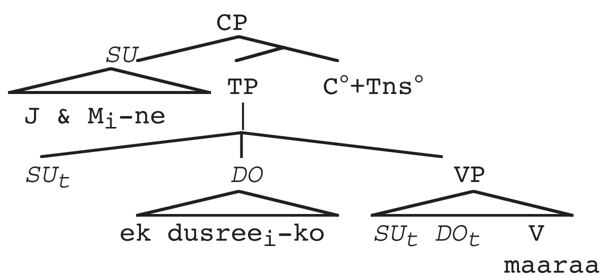
The surface form for (106) is shown in (107)

(107)



Here, the subject is in a c-command relationship[39] with the anaphor at LF, as shown in (108), and hence may serve as an antecedent.

(108)



And in the scrambled case, the antecedent is still accessible by assuming, as before, that the subject may fission into a sub-part to raise to the checking domain of C° by Persistent Identification. This will be shown in detail below. The sentence under consideration is shown in (109).

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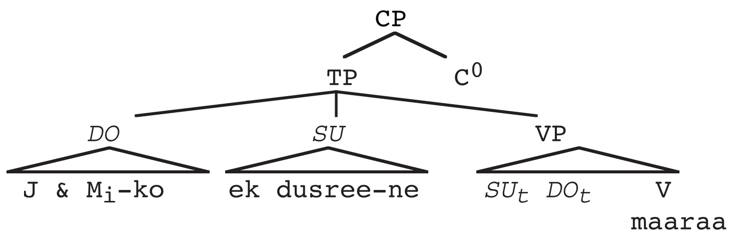
[39]In addition to being in a c-command relatinship, the atecedent is in a precedence relationship, which as noted before, may be part of the formulation of Condition A at LF.

(109) [jon aur meri]$_i$-ko [ek dusree]$_i$-ne maaraa
<i> <i>
John and Mary.ACC, each other.ERG hit
"Each other, John and Mary hit.

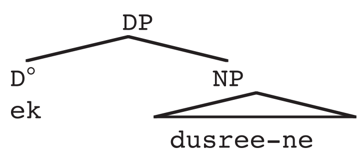
The surface form for (109) is shown in (110)

(110)



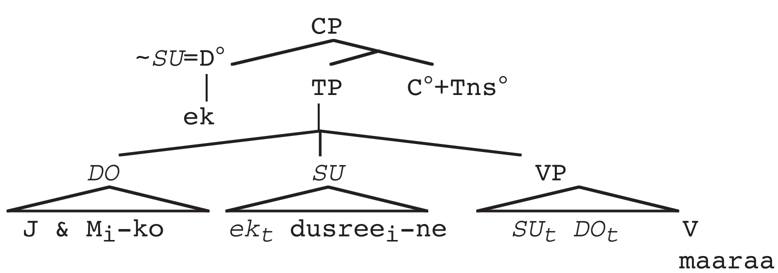
The analysis crucially relies on the fissionability of the subject as part of it raises by Persistent Identification to the checking domain of Tns°. Let us assume that the structure of the subject is as in (111), and that only the head of it (ek) must raise by Persistent Identification.[40]

(111)



We may further assume that dusree is the anaphoric portion of the reciprocal, and remains behind. Then the LF representation for (109) is as shown in (112)

(112)



[40]An idea to be explored more fully is whether it is only the head that raises by Persistent Identification in all cases. This condition is consistent with the facts presented here.

Since the reciprocal anaphor dusree remains in place in (112), john aur mary is able to serve as an antecedent, thus yielding the acceptable sentence of (109).

Thus we have shown that assuming only that reflexives are anaphor clitics at LF but that reciprocals are not, we may capture the effect of subject-orientation on the anaphoric binding relations.[41]

5.8. Subject Raising to the Checking Domain of C° at LF

Recall that we propose that the subject raises to the checking domain of C° at LF. This raising is important for our analysis of Strong and Weak Crossover, as well as the account for subject orientation of reflexive binding. The mechanisms proposed rely upon the following:

(113) a. Excorporation of Tns° -> C°.
b. Persistent Identification causes the subject to move to the checking domain of C° (where Tns° now is, along with the {F} feature).

A question that naturally arises is whether there are other means to accomplish the same effects without relying upon excorporation and Persistent Identification.

[41]Further work to be done would be to spell out precisely how the structures shown could be made fine-grained enough to represent the structure of reciprocals in Heim, Lasnik, and May 1991, in particular, to represent the distributor in the syntactic structures sketched here.

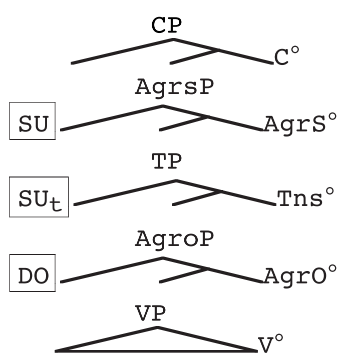
What about the following changes shown in (114)? The alternative (a) and (b) ideas correspond to (113) in a fairly simple way:

(114) a. C has a strong [n] feature.
b. Economy forces it to be the case that the subject move, rather than one of the other arguments.

The first modification, namely, that C has [n] features is only a slight extension to MPLT.[42]

The second modification might be fairly straightforward, given the clause structure in MPLT, shown here in (115).

(115)



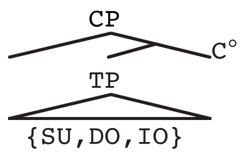
Notice that the subject, in [Spec,AgrS] is the closest NP to the checking domain of CP. Therefore, it would involve the shortest move, if "shortest" could mean "crossing the fewest nodes". It makes some intuitive sense, but it may not be entirely trivial to construct the argument. Let us assume for the moment that the argument can be made.

Another issue is that the subject is closer to the checking domain of CP only <u>before</u> clause reduction, in a

[42]See Zwart 1991 for arguments supporting this type of move.

clause structure such as (3). After clause reduction, in a structure such as (4), any of the arguments is a potential target for movement to [Spec,C] because of the free permutation involved in clause reduction, indicated with "{}"'s in (116).

(116) Clause after Clause Reduction:



The problem is that Clause Reduction must take place before Spellout. But the subject is only the closest element in TP before Clause Reduction. After Clause Reduction, the subject is no closer than any of the other NP arguments. And since the [n] feature is weak, movement of the subject to the Checking Domain of C must take place after Spellout.

Thus despite the attractiveness of the mechanisms sketched in (114), it still seems necessary to retain the mechanisms in (113).

6. Outer Scrambling by Operator-Variable Construction

6.1. Long Distance Scrambling of Anaphors

This section investigates anaphors which are scrambled Clause Externally. The general point is that Clause External scrambling is Active at positions other than the head and tail of the chain. That is, intermediate positions are relevant for assigning an antecedent.[43]

6.1.1. Outer Scrambling of Reflexives

An interesting pattern arises when we scramble a phrase containing an anaphor by Clause External scrambling. The pattern is that the further that the anaphor scrambles, the more possibile antecedents it acquires. Let us first consider the array of data, and then we will show how it is accounted for.

In (117a), a clause containing the possessive anaphor apnii is scrambled to the beginning of the most interior clause. It has only one possible antecedent, namely, the

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[43]These facts are akin to Barss's 1985 facts as in (i):

(i) Which picture of $himself_{\{i,j\}}$ did $Bill_i$ think $John_j$ liked.

Notice that himself may be coreferent with either Bill or John. The only relevant difference being that the movement is Clause External scrambling rather than WH-movement.

subject of that clause. In In (117b), the clause containing apnii is scrambled to the middle clause. It may now have either the subject of the middle clause or the subject of the most interior clause as an antecedent. In In (117c), the NP containing apnii is scrambled to the outer-most clause. In this case, any of the subjects may serve as an antecedent.

(117) a. $raam_i$-ne socaa
Ram thought

[ki $mujhe_j$ lag rahaa hE
that to.me strike keep is

[ki apnii $kitaab_{\{k\}}$ $siitaa_k$ $\_\_\__t$ mohan-ko degii]]
that self's book Sita to.Mohan gave

"Ram thought
that it seemed to me
that Sita gave SELF's book to Mohan."

b. $raam_i$-ne socaa

[ki apnii $kitaab_{\{j,k\}}$ $mujhe_j$ lag rahaa hE

[ki $siitaa_k$ $\_\_\__t$ mohan-ko degii]]

c. apnii $kitaab_{\{i,j,k\}}$ raam-ne_i socaa

[ki $mujhe_j$ lag rahaa hE

[ki $siitaa_k$ $\_\_\__t$ mohan-ko degii]]

The case of (117a) parallels the analysis in the previous section. The subject siitaa raises at LF to the checking domain of C° and may serve as an antecedent to apnii. See the previous section for the details of this analysis.

The cases of (117b) and (117c) are slightly more complex, but fall out of the Copy theory of movement in a fairly straightforward way. Recall our descriptive terminology of S° as the head which attracts elements undergoing Outer scrambling. Although it is not important what the exact status of S° is, let us continue to refer to S° in the following discussion. Let us assume in the following examples, although it will not be shown in all of the diagrams, that the scrambled element has moved to the checking domain of S°.

Thus the two possible LF forms for (117b), repeated as (118) are as shown in (119) and (120)

(118) raam$_i$-ne socaa
Ram thought

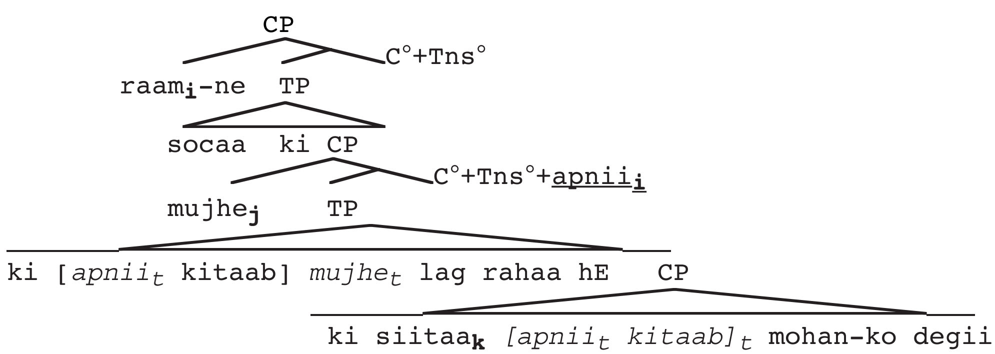
[ki <u>apnii kitaab</u>$_{\{j,k\}}$ mujhe$_j$ lag rahaa hE
that SELF's book to.me strike.keep.is

[ki siitaa$_k$ ___$_t$ mohan-ko degii]]
that Sita to.Mohan gave

"Ram thought
that SELF's book, it seemed to me
that Sita gave to Mohan."

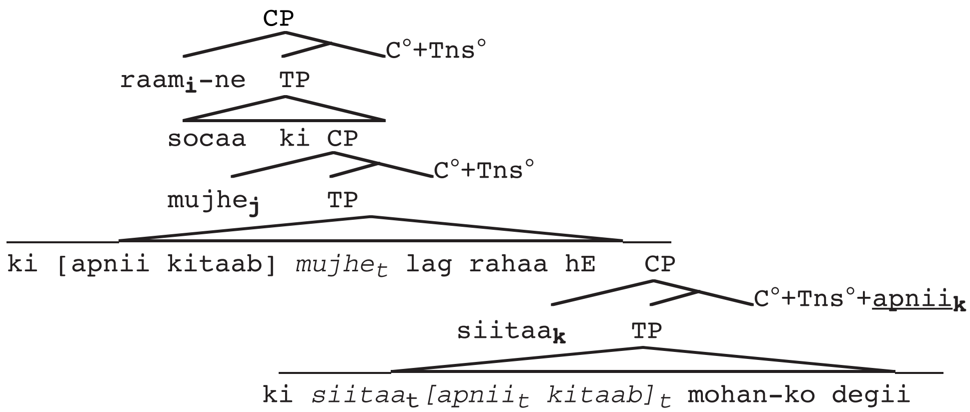
Let us first consider the case in which the reflexive anaphor <u>apnii</u> has its antecedent in the middle clause. In this case, <u>apnii</u> has head-adjoined to the intermediate Tns° clause. Since the subject of that clause has moved to the checking domain of C°+Tns° by Persistent Identification, it is able to serve as an antecedent.

(119)



In (120), on the other hand, <u>apnii</u> has head-adjoined to the lowest clause, as shown.

(120)



There are three LF configurations (117c), repeated as (121). The first two -- that in which the most interior subject is an antecedent that in wich the middle subject is an antecedent -- are parallel to those shown for the middle configuration shown in (119) and (120). The third case, that in which the outermost subject is an antecedent, is shown in (122)

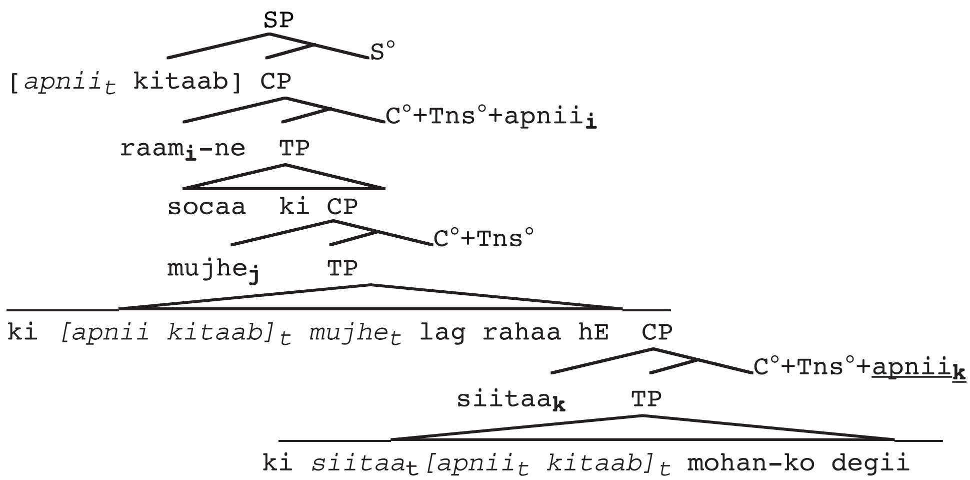
(121) <u>apnii kitaab</u>$_{\{i,j,k\}}$ raam-ne$_i$ socaa
SELF's book Raam thought

[ki mujhe$_j$ lag rahaa hE
that to.me seem keep

[ki siitaa$_k$ ___$_t$ mohan-ko degii]]
that Sita to.Mohan gave

We assume in (122) that the reflexive anaphor <u>apnii</u> has split off from the scrambled <u>[apnii kitaab]</u> and has head adjoined to Tns°, bringing it into a Spec-Head relationship with raam.[44]

(122)



6.1.2. Outer Scrambling of Reciprocals

In (123a), a clause containing the reciprocal anaphor ek dusree is scrambled to the beginning of the most interior clause. It has only one possible antecedent, namely, the subject of that clause. In In (123b), the clause containing ek dusree is scrambled to the middle clause. It may now have either the subject of the middle clause or the subject of the most interior clause as an antecedent. In In (117c), the clause containing ek dusree is scrambled to the outer-most

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44The exact nature of S° is not important here. It could equally well be the case that [apnii kitaab] adjoins to CP and that there is a feature in C° responsible for the scrambling. Nothing hinges on the difference here.

clause. In this case, any of the subjects may serve as an antecedent.

(123) a.
[raam aur siitaa]$_i$-ne soceN
Ram and Sita thought

[ki hameN$_j$ lagteN hEN
that to.us strike are

[ki ek dusre$_{\{k\}}$ kii tasvirEN
that each other's pictures

[jOn aur mEri]$_k$ ___2 mohan-ko degii]]
John and Mary to.Mohan gave

b. [raam aur siitaa]$_i$-ne soceN

[ki ek dusre$_{\{j,k\}}$ kii tasvirEN hameN$_j$ lagteN hEN

[ki [jOn aur mEri]$_k$ ___2 mohan-ko degii]]

c. ek dusre kii tasvirEN$_{\{i,j,k\}}$ [raam aur siitaa]$_i$-ne soceN

[ki hameN$_j$ lagteN hEN

[ki [jOn aur mEri]$_k$ ___t mohan-ko degii]]

The analysis of the reciprocals differs from that of the reflexives only in that the reciprocals do not head-adjoin to Tns°. But just as before, the subject of each clause raises to the checking domain of C°+Tns° by Persistent Identification.

The only additional assumption is that any of the copies of the reciprocal anaphor ek dusree may be Active in the scrambling chain and may receive a local antecedent at any stage of the movement.

6.2. Interaction between Inner and Outer Scrambling

Under the view of Inner versus Outer scrambling that we are advocating, the general picture of this sort of scrambling is shown in (124). Given the licensing mechanisms discussed, the linear orders given in (124) all correspond exactly to their LF orders. The "TP" in (124) stands for the N-ary branching maximal projection corresponding complex head "Tns+V".

(124) … [$_{TP}$] *LF order corresponds to surface order here.*

a.	SU	IO	DO
b.	SU	DO	IO
c.	DO	SU	IO
d.	IO	SU	DO
e.	DO	IO	SU
f.	IO	DO	SU

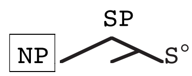
Outer scrambling, on the other hand, involves an Operator-Variable construction, as illustrated in (125). As before, let us assume that the Operator-variable construction has its head in [SPEC,SP], where "SP" is the maximal projection associated with the functional head S° which licenses scrambling. It is not crucial at this point whether the head S° is actually C° or whether it is some other functional head, for example Focus°. "SP" has no theoretical status other than to facilitate the following discussion.

(125) [$_{SP}$ Op$_i$ … [$_{SP}$ [$_{TP}$ … Vbl$_i$ …]]]
<-----------------|

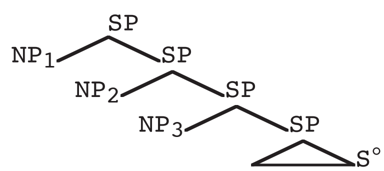
As we discussed earlier, unless there were something peculiar about matrix clauses, they too should allow such an Operator-variable construction, considerations of Clause External scrambling aside. Therefore, elements undergoing Outer scrambling may be Active at the tail of the chain and hence lower than they appear in relation to the surface order of the other arguments.

Let us consider briefly the abstract clausal structure licensing Outer scrambling. There are two possible ways this could be spelled out, as shown in (126).

(126) a. *Single Outer Scrambling Site*



b. *Multiple Outer Scrambling Sites*



All of the NP's shown in (126) are in the checking domain of their respective S°. In (126a), the NP is in the checking domain of S° because it is in a Spec-Head relationship. In (126b), $NP_1 \ldots NP_3$ are in the checking domain of S° by the adjunction portion of the definition.

Depending on whether (126a) is correct or whether (126b) is correct, we have two different possible combinations of properties. These will be shown immediately below. Let us first consider (126a).

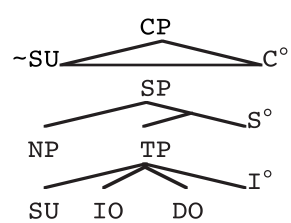
In the case of (126a), there is only one position for element scrambled in an Operator-variable construction. This movement creates an Operator-variable chain, with a copy in the top portion of the chain and a copy in the bottom portion of the chain.

Let us take this behavior into account, and merge it with the six possibilities of (124) which correspond to their surface orders. Recall the assumption that Tns° excoprorates to C° at LF. This forces the subject to raise to [SPEC,CP] to remain in a Spec-Head relationship with its identifying node Tns°.

Table (130) shows the full array of possible configurations, assuming that C° is higher than S°, and assuming that the tail of the chain may be Active for elements which have moved to [SPEC,SP].

Recall the basic clausal structure assumed in (127).

(127)



The structure in (127), along with the six logical permutations given in (128) yield 24 possible structures. It will be necessary to step through them to see the empirical consequences of the system.

(128)

a. SU - IO - DO
b. SU - IO - DO

c. DO - SU - IO
d. IO - SU - DO

e. DO - IO - SU
f. IO - DO - SU

Thus, any of the six orderings may appear in the TP structure shown in (127). Any one of the elements SU, DO, or

IO may move to the checking domain of S°, thus undergoing Outer scrambling within the local clause. Also, it may be the case that no argument undergoes Outer scrambling. Thus for each ordering in (128), there are four possible actions. We will eventually consider all of the possibilities, but for the moment let us consider the case in which the basic permutation of the three elements within the maximal projection TP is SU-IO-DO, as in row (a) in (128). This possibility is illustrated in (129).

Recall that in all cases we assume that at least part of the subject moves to the checking domain of C° because of Persistent Identification. The shaded cells in the table represent covert elements of the chains. The shaded column under "√CP" represents the part of the subject which has raised to the checking domain of Tns°. The other shaded cells shade the tails of chains since these are not visible in the PF component.

(129)	**LF Representation** (unshaded = overt)					Total Ordering:	Two Partial Orderings	One Partial Ordering
	√CP	**[SP**	**[TP**		**]**			
			SU	**IO**	**DO**			
a.	SU	-	SU	IO	DO	SU>IO>DO		
b.	SU	(SU_1	SU_2)	IO	DO	SU>IO>DO		
c.	SU	(IO_1	SU	IO_2)	DO		SU>DO IO>DO	
d.	SU	(DO_1	SU	IO	DO_2)			SU>IO

Thus in (129a), no element has undergone Outer scrambling. In the (b) case, the subject has undergone Outer scrambling.

In (c) and (d), the indirect object and direct object respectively have undergone Outer scrambling.

The resulting order at LF is shown in the last three columns of the table. In (129a) and (129b), a total ordering of the three elements obtains, namely: SU>IO>DO.

In the (c) case, two partial orderings obtain. All portions of the subject chain precede the direct object, as is indicated by SU>DO in the second column in (c). Likewise, all portions of the IO chain precede the DO chain, as is indicated by the IO>DO in the same column.

The weakest formation is that in which the direct object has undergone movement to the checking domain of S°. In this case, only one partial ordering obtains, namely, SU>IO since all portions of the subject chain precede all elements of the IO chain.

Thus at least two important questions arise from the table in (129). One has to do with the behavior of chain fission, as discussed in the section on Strong versus Weak crossover. If it is possible for portions of the chain to undergo fission, it remains to be seen exactly what principles are operative in governing the fission.

Another has to do with the nature of S°. Depending upon the semantic contribution of moving to the checking domain of S°, perhaps having something to do with focus of some sort, there should be predictable differences in the LF orderings.

These will be spelled out more fully below. We will first step through the logical possibilities in (130).

Afterward, we will examine the pairing between surface orderings and LF orderings in (131)

Again, the final three columns in table (130) show orderings in which all parts of a chain A precede all parts of a chain B. The first column shows cases in which a total ordering obtains. The others show cases in which two or one partial ordering obtains repsectively. The four rows of (130) are the same as the four rows in (129).

(130)	**LF Representation** (unshaded = overt)					Total Ordering:	Two Partial Orderings	One Partial Ordering
	√CP	**[SP**	**[TP**		**]**			
a.			**SU**	**IO**	**DO**			
0.	SU	–	SU	IO	DO	SU>IO>DO		
1.	SU	(SU_1	SU_2)	IO	DO	SU>IO>DO		
2.	SU	(IO_1	SU	IO_2)	DO		SU>DO IO>DO	
3.	SU	(DO_1	SU	IO	DO_2)			SU>IO
b.			**SU**	**DO**	**IO**			
0.	SU	–	SU	DO	IO	SU>DO>IO		
1.	SU	(SU_1	SU_2)	DO	IO	SU>DO>IO		
2.	SU	(DO_1	SU	DO_2)	IO		SU>IO DO>IO	
3.	SU	(IO_1	SU	DO	IO_2)			SU>DO
c.			**DO**	**SU**	**IO**			
0.	SU	–	DO	SU	IO	SU>IO DO>IO		
1.	SU	(DO_1	DO_2)	SU	IO		SU>IO DO>IO	
2.	SU	(SU_1	DO	SU_2)	IO		SU>IO DO>IO	
3.	SU	(IO_1	DO	SU	IO_2)			
d.			**IO**	**SU**	**DO**			
0.	SU	–	IO	SU	DO	SU>DO IO>DO		
1.	SU	(IO_1	IO_2)	SU	DO		SU>DO IO>DO	
2.	SU	(SU_1	IO	SU_2)	DO		SU>DO IO>DO	
3.	SU	(DO_1	IO	SU	DO_2)			
e.			**DO**	**IO**	**SU**			
0.	SU	–	DO	IO	SU	DO>IO		
1.	SU	(DO_1	DO_2)	IO	SU			DO>IO
2.	SU	(IO_1	DO	IO_2)	SU			
3.	SU	(SU_1	DO	IO	SU_2)			DO>IO
f.			**IO**	**DO**	**SU**			
0.	SU	–	IO	DO	SU	IO>DO		
1.	SU	(IO_1	IO_2)	DO	SU			IO>DO
2.	SU	(DO_1	IO	DO_2)	SU			
3.	SU	(SU_1	IO	DO	SU_2)			IO>DO

To arrive at the heart of this discussion, we want to see the relationship between the surface orderings of the scrambling operations under consideration, the corresponding ordering at LF for each, and the consequent predictions for each ordering.

Table (131) shows the relation between surface orderings SU-DO-IO and the corresponding possible LF orderings. In (131a), the surface order SU-DO-IO arises from Inner scrambling alone. Recall that Inner scrambling involves permutations of arguments within TP. Thus (131a) is simply one of the six possible surface permutations allowed by Inner scrambling.

The case of (131b) illustrates the possibility that the subject of SU-DO-IO could also undergo Outer scrambling. We will continue to use the notation of S° and SP as the locus of Outer scrambling, as shown in the table. (131c) shows the case in which the subject in DO-SU-IO undergoes Outer scrambling. Finally, (131d) shows the case in which the subject in DO-IO-SU undergoes Outer scrambling.

(131)	**Surface Order**	**LF Representation** (unshaded = overt)			
		[SP	**[TP**		**]**
a.	SU DO IO	–	SU	DO	IO
b.		(SU_1	SU_2)	DO	IO
c.		(SU_1	DO	SU_2)	IO
d.		(SU_1	DO	IO	SU_2)

Given that the question of chain Activity must be further studied in order to draw firm conclusions, we are limited in what we can predict at LF. That is to say, the behavior of chain Fission must be spelled out more precisely before we can make firm predictions at LF. The class of problem to be solved here is the following: what is the relationship between the head of the argument Chain in the Checking Domain of S° and its corresponding Tail? One instance of this class of problem is the exact nature of the Preference principle.

One aspect of the LF configuration that is left out of the table in (131) is that it does not show the partial movement of the subject to the checking domain of C°, as required by Persistent Identification with the {F} feature of Tns°. This addition is shown in (132).

(132)	**Surface Order**	**LF Representation** (unshaded = overt)				
		√CP	**[SP**	**[TP**		**]**
a.	SU DO IO	SU	-	SU	DO	IO
b.		SU	(SU_1	SU_2)	DO	IO
c.		SU	(SU_1	DO	SU_2)	IO
d.		SU	(SU_1	DO	IO	SU_2)

Thus there are two more empirical questions regarding the nature of the chains shown in (132): (i) what is the relationship between the head of the Subject Chain in the Checking Domain of C° and its corresponding Tail,[45] and (ii) what is the relationship between both of these? A possible answer to the latter question is that the two Chains are

[45]As mentioned before, perhaps only the X-bar head of a maximal projection raises by Persistent Identificatin.

fused, but this question requires further research. Since (i) involves an excorporated head, there exists the potential that it may behave differently.

Nonetheless, regardless of the nature of the Activity inside the chains, we may still make certain generalizations when <u>all</u> portions of the chain of one argument precedes all portions of the chain of another argument. The table in (133) shows these possibilities. For example, in (133a), all portions of the subject chain precede all portions of the direct object chain. Furthermore, all portions of the direct object chain in turn precede all portions of the indirect object chain. This yields the total ordering SU>DO>IO. A total ordering also obtains in (133b).

(133)	**Surface Order**	**LF Representation** (unshaded = overt)						**Complete Chain Orderings**		
		√CP	**[SP**	**[TP**		**]**				
a.	SU DO IO	SU	-	SU	DO	IO		SU>DO>IO		
b.		SU	(SU$_1$	SU$_2$)	DO	IO		SU>DO>IO		
c.		SU	(SU$_1$	DO	SU$_2$)	IO			SU>IO DO>IO	
d.		SU	(SU$_1$	DO	IO	SU$_2$)				DO>IO

In (133c), on the other hand, since there is the question of chain Activity occuring at either the head or the tail of the chain, we can be certain only that all portions of the subject chain precede all portions of the indirect object chain, and that all portions of the object chain precede all portions of the indirect object chain. Since the direct object chain precedes some the tail of the subject chain, we are unable to establish a total order.

In (133d), we are certain of even less: since both the direct object and the indirect object precede the tail of the subject chain, we can be certain only of the ordering of DO>IO.

The point is that knowledge of the behavior at LF of these cases depends upon understanding the nature of Activity within the chain, that is, it depends upon an answer to the traditional question of reconstruction. Given that this is still to some extent an open question, the cases that do not depend upon chain Activity are especially important. These are listed under the column "All Cases" in (134). Table (134) illustrates the complete set of pairings of surface forms with LF forms.

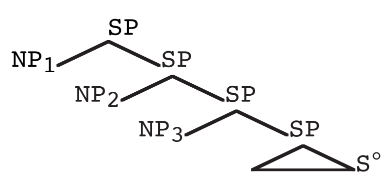
(134)	Surface Order	LF Representation (unshaded = overt)						Complete Chain Orderings			All Cases
		√CP	[SP	[TP		]					
a 0	SU DO IO	SU	–	SU	DO	IO		SU>DO>IO			DO>IO
1		SU	(SU$_1$	SU$_2$)	DO	IO		SU>DO>IO			
2		SU	(SU$_1$	DO	SU$_2$)	IO			SU>IO DO>IO		
3		SU	(SU$_1$	DO	IO	SU$_2$)				DO>IO	
b 0	SU IO DO	SU	–	SU	IO	DO		SU>IO>DO			IO>DO
1		SU	(SU$_1$	SU$_2$)	IO	DO		SU>IO>DO			
2		SU	(SU$_1$	IO	SU$_2$)	DO			SU>DO IO>DO		
3		SU	(SU$_1$	IO	DO	SU$_2$)				IO>DO	
c 0	DO SU IO	SU	–	DO	SU	IO			SU>IO DO>IO		SU>IO
1		SU	(DO$_1$	DO$_2$)	SU	IO			SU>IO DO>IO		
2		SU	(DO$_1$	SU	DO$_2$)	IO			SU>IO DO>IO		
3		SU	(DO$_1$	SU	IO	DO$_2$)				SU>IO	
d 0	IO SU DO	SU	–	IO	SU	DO			SU>DO IO>DO		SU>DO
1		SU	(IO$_1$	IO$_2$)	SU	DO			SU>DO IO>DO		
2		SU	(IO$_1$	SU	IO$_2$)	DO			SU>DO IO>DO		
3		SU	(IO$_1$	SU	DO	IO$_2$)				SU>DO	
e 0	DO IO SU	SU	–	DO	IO	SU				DO>IO	
1		SU	(DO$_1$	DO$_2$)	IO	SU				DO>IO	
2		SU	(DO$_1$	IO	DO$_2$)	SU					
3		SU	(DO$_1$	IO	SU	DO$_2$)					
f 0	IO DO SU	SU	–	IO	DO	SU				IO>DO	
1		SU	(IO$_1$	IO$_2$)	DO	SU				IO>DO	
2		SU	(IO$_1$	DO	IO$_2$)	SU					
3		SU	(IO$_1$	DO	SU	IO$_2$)					

7. Conclusion

To return to an earlier unanswered question, if multiple elements could be placed in the Operator-Variable construction, on a par with absorption of quantifier phrases we would expect the situation depicted in Table (136), in which all of the locally scrambled elements potentially be Active at the tail of the chain.

Recall the surface configuration that would obtain, shown above in (126), and repeated here in (135).

(135) *Multiple Outer Scrambling Sites*



Thus for each of the six orders derived by Inner scrambling, there are an additional sixteen orders derived by multiple Outer scrambling, yielding a total number of 96 configurations.

The entry for the six orders derived from the basic SU-IO-DO order are shown in (136). As before, the partial movement of the subject to the checking domain of C° is indicated in the table. The configuration is quite complex because either zero -- shown in (136a)-- one, shown in (136b)--, two shown in (136c) , or all three, shown in (136d), of the Inner elements is available for Outer scrambling.

(136) **LF Representation: multiple Outer Scrambling of SU-IO-DO ordering**

(unshaded = overt)

(Outer Scrambling) (Inner Scrambling)

	√CP	[SP	[SP	[SP	[TP		]
a.1					**SU**	**IO**	**DO**
b.1	SU			SU	**SU$_t$**	**IO**	**DO**
b.2	SU			IO	**SU**	**IO$_t$**	**DO**
b.3	SU			DO	**SU**	**IO**	**DO$_t$**
c.1	SU		SU	IO	**SU$_t$**	**IO$_t$**	**DO**
c.2	SU		SU	DO	**SU$_t$**	**IO**	**DO$_t$**
c.3	SU		IO	SU	**SU$_t$**	**IO$_t$**	**DO**
c.4	SU		IO	DO	**SU**	**IO$_t$**	**DO$_t$**
c.5	SU		DO	SU	**SU$_t$**	**IO**	**DO$_t$**
c.6	SU		DO	IO	**SU**	**IO$_t$**	**DO$_t$**
d.1	SU	SU	IO	DO	**SU$_t$**	**IO$_t$**	**DO$_t$**
d.2	SU	SU	DO	IO	**SU$_t$**	**IO$_t$**	**DO$_t$**
d.3	SU	IO	SU	DO	**SU$_t$**	**IO$_t$**	**DO$_t$**
d.4	SU	IO	DO	IO	**SU$_t$**	**IO$_t$**	**DO$_t$**
d.5	SU	DO	SU	IO	**SU$_t$**	**IO$_t$**	**DO$_t$**
d.6	SU	DO	IO	SU	**SU$_t$**	**IO$_t$**	**DO$_t$**

Recall that the point is that in all of the configurations in (c) - (d), some element or elements may be Active at the tail of the chain at LF. Perhaps the most extreme case is (d.6), repeated below as (137). In this case, if the elements are Active at the tail of the chain, they have the mirror image at LF of the surface structure.

(137)	√**CP**	**[SP**	**[SP**	**[SP**	**[TP**		**]**
	SU	DO	IO	SU	**SU_t**	**IO_t**	**DO_t**

Thus a topic for further research would be to examine the behavior of each of these configurations, if they are indeed possible. Presumably, each element which has moved to the checking domain of S° had some kind of topic reading, following Gurtu 1985 (p. 171). Given the large number of configurations under consideration, and given that each of these must be calibrated against the potential topic reading of each of the elements undergoing Outer scrambling, it is outside the scope of the present work to do more than raise this issue.

It is particularly important for the predictions to be discussed that a proper understanding of the phenomena requires an adequate characterization of the nature of the hypothesized Operator-Variable construction of Outer scrambling. This is particularly difficult, given arguments of the sort in Saito 1992, in which it is argued that such scrambling is semantically vacuous.

Some remaining predictions to be confirmed are as follows.

All types of forward binding obtain between SU and DO/IO in the following surface word orders, regardless of the exact position of SU in these orders: SU-IO-DO and SU-DO-IO.

No type of backward binding between DO and IO is predicted to obtain in the order SU-IO-DO.

No type of backward binding between IO and DO is predicted to obtain in the order SU-DO-IO.

No type of backward binding between SU and IO is predicted to obtain in the order DO-SU-IO.

No type of backward binding between SU and DO is predicted to obtain in the order IO-SU-DO.

Some further areas to be explored are as follows.

In the following discussion, "POTENTIALLY BIND", and "POTENTIAL BACKWARD BINDING" means by definition that this binding may obtain for some types of binding, though not necessarily all types. This issue is to be explored.

SU may POTENTIALLY BIND bind either DO or IO, regardless of surface word order.

POTENTIAL BACKWARD BINDING between DO and IO is predicted to obtain in the order IO-SU-DO

POTENTIAL BACKWARD BINDING between IO and DO is predicted to obtain in the order DO-SU-IO

POTENTIAL BACKWARD BINDING between any pair of {SU,DO,IO} is predicted to obtain in the orders DO-IO-SU and IO-DO-SU.

Other open questions are (i) the precise nature of the interaction between the syntactic structures and the metrical component, as briefly raised in the secion on PF economy and (ii) the precise nature of the semantic reflex of Outer scrambling, if indeed it has one.

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