Chain-formation and Crossover*

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1. Introduction: Chain-formation

The major empirical claim of this paper is that Strong Crossover is prohibited in A-movement, exactly as it is prohibited in A-bar movement. A closely related claim is that Relativized Minimality, as formulated by Rizzi (1990), does not apply to A-movement. The paper begins with a theory of chain-formation that provides a general explanation for phenomena with the formal character of Strong Crossover, including certain Relativized Minimality effects. Section (2), the core of the paper, provides detailed discussion of the primary evidence. Certain problems raised by the existence of a strong crossover constraint on A-movement, including problems associated with the VP-internal subject hypothesis and an AgrP theory of Case, are discussed in Section (3). Section (4) contains concluding remarks.

Rizzi (1986) argued that each link in a chain must be the local binder for the next lower link. Rizzi's "Chain Condition" thus has the effect that Strong Crossover is prohibited in A-movement, as well as A-bar movement. The following section provides strong empirical support for the descriptive accuracy of the Chain Condition. First, however, let us consider how the Chain Condition might be accomodated within a minimalist approach to syntactic theory, as argued for by Chomsky (1991 MIT lectures). One possibility would be to stipulate the Chain Condition as a condition of syntactic well-formedness at LF. This approach would be compatible with Chomsky's current "derivational" theory of chain-formation, in which chains are "syntactic objects" created by the rule Move-alpha, and in which chains might be viewed as having a "memory" for the history of their derivation. While this approach will remain as a possibility, in this section I will seek a more principled explanation for the existence of such a constraint. In so doing, I will abandon the derivational theory for a "representational" theory of chain-formation, along the lines of (Rizzi 1986).

Specifically, I will explore the idea that chains do not exist as grammatical objects until the point of semantic interpretation. Prior to this point, the history of the movement of a constituent is represented syntactically only by the traces that the moved constituent leaves behind. Syntactic operations, on this view, apply to particular "links" in a chain, without reference to the chain as a whole. Chains play a role only in the semantic interpretation of LF, when, for

example, operator-variable relations are interpreted, theta-roles are assigned, and the binding conditions are checked. At the point of interpretation, chains are constructed by "associating" with one another the links in a particular chain. The precise manner in which the links of a chain are formally associated with one another will not be important for the discussion that follows, but one might imagine that each link in a given chain is assigned a special label or index that is uniquely associated with that chain. The relevant requirement is that each link should be uniquely associated with the chain that contains it.

Contrary to (Rizzi 1986), I will go on to assume that the rule "Move-alpha" does not automatically co-index a trace with its antecedent. Rizzi (1986) used a single indexing system both to express co-reference for application of the Binding Conditions, and as a "bookkeeping" device to associate a trace with its antecedent. Following proposals of Rizzi (1990) and Chomsky (1991 MIT lectures), I will instead assume that the only indices playing a role in syntax are *interpretive* indices, and that these indices may be assigned to constituents in a syntactic representation only at the point of semantic interpretation.[1] Thus, no syntactic operation makes reference to the interpretive indexing, and the relation of the indexing to the grammaticality of a syntactic structure is indirect: A syntactic structure is grammatical only if it can be assigned an interpretive indexing on which it is semantically interpretable. At the point of interpretation, interpretive indices are assigned and chains are constructed using the information about Case-assignment, argument positions, and X-bar structure available in the LF representation.

I will adopt a version of Miyagawa's (1991) definition of A-chains and A-positions:

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[1]For the purposes of this paper, "interpretive" indices are identical to the "referential" indices of (Rizzi 1990). In the terms of (Rizzi 1990), an interpretive index is assigned only to a constituent bearing a "referential" theta role.

Contrary to (Rizzi 1990, Ch.3), I will adopt a program of research aimed at eliminating the notion of antecedent government. I will not attempt to address in this paper the possible need for traces to be properly head governed. The approach taken in this paper is, however, compatible with Rizzi's (1990, p.87) version of the ECP, which is exclusively a requirement of proper head government. Many of the phenomena previously treated through antecedent government will be shown to follow naturally from the notion of chain-formation as described here. Moreover, certain empirical problems for Rizzi's (1990) formulation of Relativized Minimality, to be presented in Section (2), do not arise on the present account.

1. An *A-chain* is a chain whose tail is in a theta-position and whose head is in a Case-position; a constituent is in an *A-position* if it is contained in an A-chain.

I will assume that predicate-argument relations and binding relations are established at the point of interpretation, and make reference only to A-positions.

I propose the following chain-formation algorithm.

2. At the point of interpretation:
   (i) Assign interpretive indices to arguments.
   (ii) Associate each trace with the nearest possible antecedent.

A *possible antecedent* in (2) is a c-commanding constituent that agrees with the trace in the following respects: identical interpretive index (if any); and identical X-bar level. Two constituents agree with respect to interpretive index if and only if one of the following is true: The constituents bear identical indices, or neither constituent bears an index. Assignment of indices is free, but a sentence will be grammatical only if the indexing yields a semantically interpretable structure. Thus, on the assumption that indices are interpretable only when they appear on arguments, the first clause of (2) can be simplified to, "Assign any constituent any index," because assignment of an uninterpretable index will rule out an LF representation as uninterpretable.[2]

Strong crossover constraints on both A- and A-bar movement follow directly from the above assumptions. For example, the strong crossover effect in (3) is predicted by the chain-formation algorithm.

3. **Whom$_i$ does he$_i$ t$_i$' like t$_i$?

The chain-formation algorithm in (2) yields the chains (he$_i$, t$_i$', t$_i$) and (whom$_i$). Contrary to (Rizzi 1986), *whom* is not included in the lower chain, and because the (trivial) chain containing *whom* does not include an argument position, it is uninterpretable. On the interpretation in which *he* is referentially disjoint from *whom*, however, *he* receives a distinct interpretive index (j), and the chain formation algorithm correctly generates the chains (whom$_i$, t$_i$) and (he$_j$, t$_j$').

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[2]I will assume that interpretive indices do *not* in general "percolate" from an NP node down to its N' and N^o daughters, because in general only the NP is interpretable as receiving a referential theta role.

There are two main differences between the Chain-formation Algorithm in (2) and that employed in (Rizzi 1986) to account for A-movement Strong Crossover. First, the Chain-formation Algorithm in (2) is driven by a need to associate every trace with an antecedent. As a result, chain-formation stops upon reaching a non-trace, and a coindexed element that is structurally higher is never added to the chain. Second, the violation resulting from a failure of the Chain-formation Algorithm is not (necessarily) due to the assignment of multiple theta roles to a single chain, but is more generally due to the presence of a constituent whose chain does not contain an argument position, as is true of *whom* in (3). These differences have empirical consequences in Modem Hebrew, as will be discussed in Section (2.5).

In addition to A and A-bar Strong Crossover, several classes of Relativized Minimality effects (having the formal character of Strong Crossover) follow from the Chain-formation Algorithm in (2). For example, head chains exhibit relativized minimality effects, as illustrated by the following example from Rizzi (1990).

(Rizzi 1990, ex. 24)
4a. They could have left.
4b. [V^0 Could] they [V^0 t] [V^0 have] left?
4c. **[V^0 Have] they [V^0 could] [V^0 t] left?

The ungrammaticality of (4c) follows from the chain-formation algorithm, because the V^0 *could* is the nearest possible antecedent for the [V^0 t], and *could* is incorrectly included in a head-chain with the [V^0 t]. The V^0 *have,* which is adjoined to C^0, is not included in the chain. *Have* fails to be associated in any way with the verbal-inflectional complex, and as a result is uninterpretable.[3] The requirement of Full Interpretation thus rules out (4c) exactly as it would the equivalent structure in which the V^0 *have* is base-generated as the head of CP.

Notice that the assignment of indices to the verbal heads *could, have,* and [V^0 t] might have

[3]Additionally, (4c) might be ruled out by an economy principle, as a form of superiority effect. The requirement that English matrix *wh*-questions be "V2" can be satisfied by any auxiliary (or modal or copula); the specific auxiliary used (i.e., the lexical item) is immaterial. Raising *could* to C^0 involves a shorter move than raising *have,* and thus depending on how the "V2" requirement is expressed grammatically, (4c) might be a superiority violation. Even so, superiority violations are generally far milder than the violation in (4c), as will be discussed in Section (4). Hence, a full explanation for the ungrammaticality of (4c) must involve violation of an additional principle, which I take to be the requirement of Full Interpretation following application of the Chain-formation Algorithm in (2).

permitted the [V^0 t] to be associated with the correct antecedent when the chain-formation algorithm was applied in (4c). Thus, the ungrammaticality of (4c) follows from the fact that interpretive indices are assigned only to semantic arguments (generally XPs), and not to V^0s.

Relativized Minimality effects are also found with multiple adjunct extraction, as in (5).

5a. **[$_{AP}$ When] does Mary wonder [$_{AP}$ how] John solved the problem [$_{AP}$ t] [$_{AP}$ t']?
5b. **[$_{AP}$ When] did Mary solve a problem [$_{AP}$ why] [$_{AP}$ t]?
(Ans.: M. solved a problem on Tuesday to complete her homework, and ...)

In (5a), *how* is the nearest possible non-trace antecedent for the traces of both adverbial adjuncts. As a result, the *wh*-adjunct *when* cannot be associated with a corresponding variable, and the sentence is uninterpretable. Because interpretive indices are assigned only to arguments, and not to adjuncts, there can be no contra-indexing of the adjuncts (and their traces) to disambiguate the overlapping chains in (5a). The result of applying the Chain-formation Algorithm to (5b) is uninterpretable for the same reason as in (5a), if we assume that at LF the *wh*-adjunct *why* raises (as an AP) to a scope position where it intervenes between *when* and *when'*s trace.

On the other hand, when an argument and an adjunct are both extracted by A-bar movement, as in (6), co-indexing of the argument and its trace prevents any relativized minimality effect.

6. [$_{NP}$ Which problem]$_i$ do you wonder [$_{AP}$ how] John solved [$_{NP}$ t]$_i$ [$_{AP}$ t]?

Sentences of the form in (6) have sometimes been treated as subjacency violations, but (6) in fact appears to be perfectly grammatical, or at most an extremely mild violation.

An example that is ruled out by Rizzi's (1990) formulation of Relativized Minimality, but that is not ruled out by the operation of the Chain-formation Algorithm, is given in (7).

7. **How does Mary wonder [which problem]$_i$ PRO to solve t_i t ?

Cresti (in preparation) argues for a reformulation of the Bounding Theory that would make (7) a strong violation for independent reasons. To summarize, Cresti argues that (contrary to traditional assumptions) subjacency violations are strong violations, and that what appears to be "long *wh*-movement" (as in 6) is really successive-cyclic movement. Cresti takes the view that (6) has the structure in (8a).

8a. $[_{NP}$ Which problem$]_i$ do you wonder $[_{CP_1}$ t_i $[_{CP_2}$ $[_{AP}$ how] John solved $[_{NP}$ t$]_i$ $[_{AP}$ t]]]?

SP(CP$_1$) is a position which, by assumption, is available only to operators or traces that range over individuals. PPs containing an appropriately interpreted operator as their object likewise may occupy or pass through this position, insofar as the P^0 reflects pied-piping and is in fact interpreted in a lower position. Higher-order operators and variables, however, cannot occupy SP(CP$_1$). In (7), the presence of *which problem* in SP(CP) blocks the only available landing site for *how*, and a (strong) subjacency violation results.[4]

Cresti' s proposal can be applied to account for many of the phenomena that would be handled with constraints on antecedent government in (Rizzi 1990), and that are not explained by the Chain-formation Algorithm in (2). One such phenomenon is the prohibition on super-raising. As will be argued on empirical grounds in Section (2), A-movement can skip a filled A-specifier, provided the NP in the intervening A-specifier is not co-indexed with the moved constituent. Thus, Rizzi's account of super-raising in terms of Relativized Minimality cannot be correct. Moreover, the Chain-formation Algorithm in (2) functions correctly on the examples in (9).

9a. **John$_i$ seems it appears t_i to be intelligent.
9b. ** John$_i$ seems there to have been kicked t_i.
9c. ** John$_i$ seems that $[_{IP}$ Bill$_i$ thinks t_i to be intelligent].

Chomsky's (1981) binding-theoretic account of super-raising, in which NP-traces are anaphors and must be bound within their governing category, seems doubtful because expletive subjects count for super-raising (as in 9a,b), but do not block the binding relation in (10).[5]

10. John thinks there are pictures of himself on the table.

A possibility provided by Cresti's proposal is that the strong violations in (9a-c) are due to violations of subjacency. For example, if SP(CP) is available only to XPs that are interpreted as

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[4] I am not certain how Cresti rules out the following derivation for (7):

i. How does Mary wonder $[_{CP}$ which problem$_i$ $[_{CP}$ t $[_{IP}$ to solve t_i t]]]?

One possibility would be to require some form of head-government to hold between *wonder* and a trace in SP(CP). Then the extra CP containing *which problem* might block head-government in (i).

[5] This observation is mentioned in Chomsky 1986b. The observation is valid, however, only if anaphors in picture NPs (as in 10) are subject to the same binding requirements as anaphors in the positions of the traces in (9a-c). For a contrary view, see Reinhart & Reuland 1989, 1991.

operators or variables, and an intermediate link in an A-chain cannot in general be interpreted as an operator or a variable, then (9a-c) would be ruled out by subjacency.

Cresti' s proposal might also provide a means of handling adjunct islands and subject islands through the Bounding Theory rather than through antecedent government (as in Rizzi 1990). Specifically, XPs that are not lexically selected might count as bounding nodes. The weaker violations that sometimes result from extraction out of an adjunct PP, for example, might then be due to a violation of much weaker constraints on V-P reanalysis, which would eliminate the relevant bounding node and prevent a strong violation.

In summary, the Chain-formation Algorithm appears promising as an explanation for the existence of a Strong Crossover constraint on A-movement and A-bar movement, as well as for certain Relativized Minimality effects that have the formal character of Strong Crossover. This section has outlined a program to eliminate the notion of antecedent government, in favor of the Chain-formation Algorithm and Cresti's proposed revisions to the Bounding Theory.

The following section (2) presents evidence supporting the existence of a strong crossover constraint on A-movement. In the process, Rizzi's (1990) account of super-raising in terms of Relativized Minimality is shown to be untenable. Evidence is drawn from Albanian passive-dative constructions, A-movement scrambling in Japanese and German, reflexive clitic constructions in French and Italian, and reflexive dative clitic constructions in Modern Hebrew. In particular, the interaction of the Chain Condition with a VP-internal subject position provides an account for previously unexplained properties of Romance reflexive clitic constructions.

Section (3) answers several questions raised by the existence of a strong crossover constraint on A-movement. Section (3.1) addresses the grammaticality of sentences such as (11a). On the assumption that the direct object *himself* must raise over a (co-indexed) VP-internal subject position when it moves into SP(AGRoP) to have its Case checked, a crossover violation is incorrectly predicted. Section (3.1) suggests several possible accounts for the grammaticality of (11a), including the possibility that anaphoric NPs become visible through

N-to-V incorporation (cf. Baker 1986, Marantz 1984). While incorporation is a highly restricted option in English, in (11a) incorporation may be forced by a requirement that reflexive predicates be syntactically identified as reflexive (adapting a proposal of Reinhart & Reuland 1991). Because the NP *himself* does not move over the VP-internal subject position in (11a), no crossover violation is expected.

11a. John kicked himself.
11b. Himself, John kicked.

Section (3.2) provides an account of apparent exceptions to Strong Crossover, as in the topicalization construction in (11b), and as with A-bar scrambling of anaphors in languages such as German. Section (4) contains concluding remarks, and briefly discusses arguments for the independence of Superiority effects and Weak Crossover (Bijection Principle) effects, from the Chain-formation Algorithm.

2. Rizzi's Chain Condition: A-movement Strong Crossover

Rizzi (1986), discussing reflexive indirect object clitics in Italian and French, argued that each link in an A-chain must be the most local binder for the next lower element (if any) in the chain.

12. (Rizzi, 1986, p. 66)
C = $(a_1 \ldots a_n)$ is a chain iff, for $1 \leq i < n$, a_i is the local binder for a_{i+1}.

Rizzi used (12) to account for the ungrammaticality of (13c), in which an intervening reflexive clitic pronoun would be the most local binder for the trace of the derived subject.

13a. Gianni$_i$ è stato affidato t_i [a Maria$_j$]/[a se stesso]$_i$.
'John has been entrusted to Mary/to himself.'

13b. Gianni$_i$ gli$_j$ è stato affidato t_i.
'John$_i$ has been entrusted to him$_j$'

13c. **Gianni$_i$ si$_i$ è stato affidato t_i.
'John$_i$ has been entrusted to himself$_i$.'

In section (2.4) the adoption of a VP-internal subject hypothesis will force a very different analysis of French and Italian reflexive clitics from that assumed by Rizzi. Nonetheless, I will continue to rule out one derivation for (13c) as a violation of Rizzi's chain condition.

The following subsections are concerned with demonstrating that Rizzi' s Chain Condition, which follows as a direct consequence from the chain-formation algorithm in (2), is empirically accurate as a constraint on A-movement. While Rizzi's condition in (12) is not explicit on this point, (2) predicts that Chain Condition violations will result *specifically* when A-movement crosses a c-commanding, coindexed *noun phrase.* This point will be especially important for the discussion of reflexive clitic constructions, in sections (2.4) and (2.5).

2.1 Evidence From Albanian Passive-Dative Constructions

As noted by Massey (1990), Albanian passive-dative constructions provide support for Rizzi's Chain Condition as a constraint on A-movement.[6] Albanian passive-dative constructions are relevant because it can be shown that the goal always occupies a position higher than the theme in an Albanian dative construction (and the goal can bind a reflexive theme), yet passivization necessarily causes the (accusative) theme to raise over the (dative) goal to become the surface subject. Precisely as predicted by the Chain-formation Algorithm in (2), A-movement of the theme over a goal that c-commands the trace of movement, is blocked if and only if the theme and the goal receive the same interpretive index. This result speaks against any account of Relativized Minimality that ignores the interpretive indexing of arguments.

(14a) is an example of an Albanian double object dative construction. The goal, *secilit djale* ('each boy'), occupies an A-position from which it c-commands the theme, *baben e tij* ('his father'); otherwise a weak crossover violation would result when the quantified expression *secilit djale* undergoes LF raising. (14b) illustrates that Albanian allows very free A-bar scrambling. In (14b) the linear order of the goal and the theme has been reversed by A-bar scrambling, but the interpretation of (14b) is the same as that for (14a). A-bar scrambling does not induce a weak crossover violation that would not exist otherwise.

[6] Albanian is a V2 language with relatively free word order resulting from very productive A-bar scrambling. The language has a rich system of morphological inflection and declension, and allows null subjects.

(Albanian examples are drawn from Massey 1990, 1991a.)

14a. Agimi ia tregoi secilit djale baben e tij.
Agim clcl show each boy father his
N 3sD3sA 3sPDAct D A
'Agim showed each boy_i his_i father.'

14b. Agimi ia tregoi baben e tij secilit djale.
Agim clcl show father his each boy
N 3sD3sA 3sPDAct A D
'Agim showed each boy_i his_i father.'

(l5a-c) show that the dative goal in an Albanian double object construction necessarily occupies an A-position from which it asymmetrically c-commands the accusative theme, as in (15). (l5a-c) should be well-formed if Albanian allowed the equivalent of the English *to*-dative shown in (16a). At least by the point at which the Bijection Principle applies, the theme in (16a) occupies an A-position from which it asymmetrically c-commands the goal. Albanian, however, allows only the equivalent of the English double object dative (16b), and a weak crossover violation arises in (15a-c).

l5a. *Agimi ia tregoi babait te tij secilin djale.
Agim clcl show father his each boy
N 3sD3sA 3sPDAct D A
'Agim showed his_i father each boy_i.'

15b. *Agimi ia tregoi secilin djale babait te tij
Agim clcl show each boy father his
N 3sD3sA 3sPDAct A D
'Agim showed his_i father each boy_i.'

l5c. *Secilin liber ia ktheu Agimi autorit te tij.
each book clcl return Agim author its
A 3sD3sA 3sPDAct N D
'Agim returned (to) its_i author each $book_i$

16a. Agim showed each boy_i to his_i father.

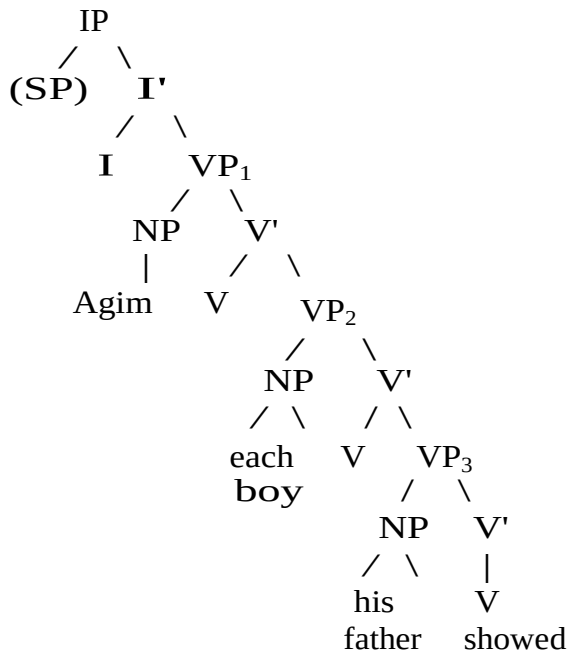
16b. *Agim showed his_i father each boy_i.

(l5a-c) also illustrate that A-bar scrambling in Albanian cannot prevent a weak crossover violation. Even when the quantified NP is A-bar scrambled to sentence-initial position, as in (15c), a weak crossover violation still occurs.

I will adopt a version of Marantz's (1990) analysis of double object constructions for both

Albanian and English, as illustrated in (16c) (corresponding to the Albanian (14a) as well as its English gloss).

16c.



As in (Marantz 1990), each argument of *show* is generated in the specifier of its own VP shell. Unlike Marantz, I will include the subject *(Agim)* under this generalization, and thus adopt a VP-internal subject hypothesis. Adapting a proposal of Larson's (1988), I assume that the V *showed* moves and substitutes for the empty head of VP_2, and then substitutes for the empty head of VP_3, both by S-structure (perhaps for reasons of Case-assignment, if we distinguish *Case-assignment* by the V, from *Case-realization* in the inflectional system; cf. Chomsky 1986a, Miyagawa 1991). IP in (16c) stands for the entire inflectional system, which I will assume below to have an articulated structure as in recent work of Chomsky's (e.g., 1991 MIT lectures). (16c) is consistent with the Albanian weak crossover facts in (14) and (15).

(17a,b) illustrate that in the Albanian passive-dative construction, the theme necessarily raises to an A-position from which it asymmetrically c-commands the goal. In (17a), no weak crossover violation arises when *secili djale* undergoes quantifier raising. In (17b), however, a weak crossover violation *necessarily* arises; there is no way for the goal to occupy an A-position

higher than the theme in an Albanian passive-dative construction.[7]

17a. Secili djale iu tregua babes te tij.
each boy cl show father his
N 3sD 3sPDNAct D
'Each boy$_i$ was shown (to) his$_i$ father.'

17b. *Baba i tij iu tregua secilit djale.
father his cl show each boy
N 3sD 3sPDNAct D
'His$_i$ father was shown (to) each boy$_i$.'

I will assume that the Albanian passive-dative construction is derived from the active double object dative construction, by inserting an N^0 affix which receives the external theta role and absorbs structural accusative Case.[8] Thus, derivation of the passive-dative construction requires A-movement of the theme over the goal. The goal should then asymmetrically c-command the trace of the theme, because as was shown in (14), the goal necessarily c-commands the theme in the active dative construction.

Rizzi's Chain Condition, as derived from the Chain-formation Algorithm (2), predicts that raising of the theme NP over the goal NP should be allowed when the theme and goal receive

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[7] Williams (1988) discusses an example (i) drawn from Hubbard (1985), in which the goal appears to bind the theme in a passive-dative construction.

i. Vetja iu tregua Drites prej artistit.
N show D by artist
'Drita was shown (to) herself by the artist.'

Massey (1990) has shown that for other constructions in Albanian, nominative case-marking may appear on NPs that are not the grammatical subject. Descriptively, Albanian nominative case-marking is associated with the structurally highest, overt NP that does not already bear a morphological case. Presumably, dative marking is obligatorily associated with the goal in (i), and the nominative-marked theme occupies an A-position lower than the goal. The theme then (optionally) A-bar scrambles into sentence-initial position. The matrix subject must be a null expletive, so that the sentence has the literal translation, "There was shown Drita herself by the artist."

Contrary to Hubbard's informant, however, Massey's informants categorically reject (i). Possibly, Hubbard's informant may have differed from Massey's informants in not requiring the passive morpheme to absorb a structural Case. Massey has been unable to locate any informant who accepts (i), and for her informants (17b) is also impossible.

[8] For the present discussion relatively little hinges on the precise analysis of passive, but in Section (2.4) there will emerge two (highly theory-internal) reasons for treating the recipient of the external theta role as an N^0 rather than an NP: Passive takes the 'be'-auxiliary, rather than the 'have'-auxiliary, in French and Italian; and (adopting a proposal made by A. Marantz, p.c.), the recipient of the external theta-role in the passive appears to be referentially deficient (receiving an "arbitrary" interpretation). Under proposals of Section (2.4), both of these properties suggest that the external theta-role of passive is assigned to an N rather than an NP.

distinct interpretive indices, but should yield an uninterpretable structure when the theme and the goal bear the same interpretive index. (18a,b) show that the predictions of the Chain Condition are borne out. (18a) illustrates that coindexation of the theme and the goal is permitted in the active double object dative construction, and it was shown in (17a) that the theme may undergo A-movement over the goal when the theme and goal receive distinct interpretive indices. Yet, in (18b), where the theme and the goal must receive identical interpretive indices, raising the theme NP over the goal NP yields an uninterpretable structure.

18a. Artisti ia tregoi Drites veten.
N show D A
'The artist$_j$ showed Drita$_i$ herself$_i$

18b. *Drita iu tregua vetes prej artistit.
N show D by artist
'Drita was shown (to) herself by the artist.'

Thus, Albanian passive-dative constructions provide strong support for Rizzi's Chain Condition, as derived from the Chain-formation Algorithm in (2).

2.2 Evidence From A-movement Scrambling in Japanese

In this section I will discuss A-movement scrambling in Japanese. I will show that Japanese permits A-movement scrambling of a direct object NP over a subject NP only if the subject and object receive distinct interpretive indices. A-movement of the object over the subject yields an uninterpretable structure when the subject and object share the same interpretive index.

Miyagawa (1991) reviews arguments from Tada (1990) and Saito (1990) for the existence of A-movement scrambling in Japanese. I will briefly summarize two arguments, one from reciprocal binding, and one from (absence of) weak crossover effects, to show that a direct object may undergo A-movement scrambling over a matrix subject in Japanese. First, the Japanese reciprocal anaphor *otagai* ('each other') is not subject oriented, but must be locally A-bound. Thus, (19a) in which *otagai* is bound by the subject of its clause, is grammatical. (19b), in which *otagai* is bound only from outside its local binding domain, is ungrammatical, however. Similarly, (19c), in which *otagai* is bound only from an A-bar position (sometimes called "major subject position"), is also ungrammatical. (19d), however, in which a scrambled direct object

binds *otagai,* is substantially improved over the Condition A violations in (19b) and (19c), and is either perfect (for those speakers who freely allow A-movement scrambling) or very slightly deviant (for those speakers who systematically assign a question mark to any structure derived through A-movement scrambling). The considerable improvement of (19d) over (19c) provides strong evidence that scrambling in Japanese may move a direct object into an *A-position* higher than the matrix subject.

19a. [John-to Hanako]$_i$-ga otagai$_i$-no hon-o yonda.
John-and Hanako-Nom each other-Gen book-Obj read
'John and Hanako read each other's book.'

19b.?*[John-to Hanako]$_i$-ga [$_{CP}$ Henry-ga otagai-no hon-o yonda to] itta.
John-and Hanako-Nom [Henry-Nom each other-Gen book-Obj read Comp] said
'John and Hanako said that Henry read each other's book.'

19c.?*[John-to Bob]$_i$-ga [$_{IP}$ sensei-ga otagai$_i$-no ie-o tazuneta].
John-and Bob-Nom teacher-Nom each other-Gen house-Obj visited
'John and Bob, the teacher visited each other's house.'

19d. ?[John-to Bob]$_i$-o [otagai$_i$-no kodomo]-ga mita.
[John and Bob]-ACC [each other's children]-NOM saw
'Each other$_i$'s children saw [John and Bob]$_i$.'

A second argument for A-movement scrambling in Japanese comes from the fact that scrambling may prevent a weak crossover violation. Presumbably because the Bijection Principle applies only to operator-variable constructions, traces of A-movement do not create weak crossover violations. The weak crossover violation in (20b) results because, after LF raising, the quantified element *daremo* ('everyone') is the local binder for both its own trace, and for the null pronominal glossed as 'him' in the embedded clause. A-movement of *daremo* to sentence initial position in (20c) prevents a weak crossover violation, because after LF raising, *daremo* is the local binder for its trace, and the trace is the local binder for the null pronominal ('him'). The trace of *daremo* in matrix object position is irrelevant precisely because it is locally A-bound, rather than A-bar bound.

20a. Daremo$_i$-ga [pro$_i$ hitome e$_j$ mita hito$_j$]-o suki-ni-natta.
everyone-Nom [pro once saw person-Obj] came-to-like
'Everyone$_i$ came to like the person$_j$ whom$_j$ he$_i$ saw once.'

20b. *[e$_i$ hitome pro$_j$ mita hito$_i$] -ga daremo$_j$-o suki-ni-natta.
[e$_i$ once saw person]-Nom everyone-Obj came-to-like
'The person$_i$ who saw him$_j$ once came to like everyone$_j$.'

20c. Daremo$_j$-o [e$_i$ hitome pro$_j$ mita hito$_i$]-ga t$_j$ suki-ni-natta.
everyone$_j$-Obj [e$_i$ once pro$_j$ saw person$_i$]-Nom t$_j$ came-to-like
'The person$_i$ who saw him$_j$ once came to like everyone$_j$.'

Because Japanese allows A-movement of an object over a subject, we may test the prediction of Rizzi's Chain Condition, namely that coindexing of the subject with the object will block A-movement scrambling. While (2la) is grammatical, (2lb), which differs in allowing the subject to bind the trace of the scrambled object, is ungrammatical. Derivation of (21b) by A-bar scrambling is also blocked, presumably because the subject would bind an A-bar bound trace, or R-expression, in violation of Condition C. The impossibility of deriving (21b) by either A or A-bar movement scrambling provides strong support for the Chain Condition as a general constraint on A-movement.

2la. [John-to Mary]$_i$-o otagai$_i$-no sensei-ga hihansita
[John and Mary]-ACC each other-GEN teacher-NOM criticized
'Each other$_i$'s teacher criticized [John and Mary]$_i$.'

21b. *[John-to Mary]$_i$-o otagai$_i$-ga t$_i$ hihansita.
[John and Mary]-ACC each other-NOM criticized
'Each other$_i$ criticized [John and Mary]$_i$.'

2.3 Evidence From A-movement Scrambling in German

Further support for the Chain Condition as a constraint on A-movement comes from German. Santorini (1990), discussing phenomena noted by Webelhuth (1984, 1989), argues that German permits A-movement scrambling of an object over a subject. In (22a) a weak crossover violation occurs when the quantified NP *jeden* ('everyone') raises at LF. In (22b), however, a weak crossover violation is avoided because the quantified NP first A-moves over the subject.

22a. *Vermutlich haben seine$_i$ Kinder jeden$_i$ lieb.
presumably have his children (Nom) everyone (Acc) dear
'Presumably, everyone is loved by his children.'

22b. Vermutlich haben jeden$_i$ seine$_i$ Kinder lieb.
presumably have everyone (Acc) his children (Nom) dear
'Presumably, everyone is loved by his children.'

As predicted by the Chain Condition, coindexation of the subject with the scrambled object prevents A-movement scrambling of the object to pre-subject position, as illustrated in (23).

23a. Vermutlich hat der Mann sich selbst geschlagen.
presumably has the man (Nom) himself (Ace) hit
'Presumably, the man hit himself.'

23b. **Vermutlich hat den Mann$_i$ sich selbst$_i$ t$_i$ geschlagen.
presumably has the man (Acc) himself (Nom) hit
'Presumably, the man hit himself.'

Another A-movement scrambling operation in German is object shift of a direct object over an indirect object. While the unmarked order for German, in which the indirect object precedes the direct object, does not permit the indirect object to bind the direct object reciprocal in (24a), A-movement of the direct object over the indirect object permits the direct object to bind an indirect object reciprocal as in (24b).

24a. *Ich habe [$_{PP?}$ den Leuten] einander vorgestellt.
'I have introduced the people (DAT) one another (ACC).'

24b. Ich habe die Leute$_i$ [$_{PP?}$ einander$_i$] t$_i$ vorgestellt.
'I have introduced the people (ACC) one another (DAT).'

I analyze (24a) as a double object construction in which the goal is projected to a position that is higher than the theme at both insertion and S-structure (cf. Marantz 1990). Goals in German are marked with inherent dative Case, which in German apparently projects its own maximal projection (perhaps PP) and blocks binding of the direct object by the indirect object. With scrambling in (24b), however, it becomes possible for the direct object to bind the indirect object. (24a,b) show that precisely where a binding relation (i.e., c-command) fails to hold, Rizzi's Chain Condition does not block the direct object from raising over a coindexed indirect object. Hence, this phenomenon provides indirect support for the Chain Condition, as derived from the Chain-formation Algorithm in (2).

2.4 Evidence From Reflexive Clitics in French and Italian

Following Marantz (1984), I shall assume that there are two types of analysis one might give to the French reflexive clitic construction in (25).

25. Marie s' est frappée.
    Mary 3SgReflCl be-3SgPrs hit-PerfPrt-FemSg
    'Mary hit herself.'

First, one might regard the reflexive clitic *se* as the direct object, and *Marie* as the (deep and surface) subject of (25) (the "clitic" analysis). Second, one might regard *Marie* as the underlying direct object, and take the external theta role of *est frappée* to be assigned to *se*, which on this analysis is more like a passive morpheme than a direct object clitic (the "non-clitic" analysis). Marantz reviews evidence from French (drawn from Grimshaw 1982) and Icelandic (drawn from Andrews 1982), and argues that in these languages reflexive clitic constructions *always* have a "non-clitic" analysis. For these languages, there is evidence that the surface subject in reflexive clitic constructions is always an underlying object.

Below I will summarize one type of evidence for the non-clitic analysis in French. I will then argue that the Chain-formation Algorithm in (2) *forces* a non-clitic derivation of reflexive clitic constructions in languages such as French, where clitic movement involves movement of an NP over the VP-internal subject position.[9] Finally, I will extend the non-clitic analysis to indirect object reflexive clitic constructions, and discuss the indirect object reflexives that originally motivated Rizzi's (1986) Chain Condition (12).

Grimshaw (1982) provides evidence supporting a non-clitic analysis for French reflexive clitic constructions. One form of evidence comes from causative constructions with *faire*, as in (26).

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[9] The clitic analysis for reflexive clitic constructions will be ruled out by (2) regardless of whether clitic movement involves A or A-bar movement over the VP-internal subject position.

26a. J'ai fait partir Jean.
I have made leave John
'I made John leave.'

26b. J'ai fait chanter Michel.
'I made Michael sing.'

26c. Marie a fait laver la vaisselle *(à) Jean.
Mary has made wash the dishes to John
'Mary made John wash the dishes.'

The descriptive generalization for *faire*-causatives in French appears to be that *faire* and the lower verb *together* can assign structural accusative Case to exactly one NP.[10] Thus, in (26a), *faire* and the unaccusative verb *partir* assign (a single) accusative Case to *Jean.* Likewise, in (26b), *faire* and the unergative verb *chanter* assign (a single) accusative Case to *Michel.* In (26c), moreover, *faire* and the transitive verb *laver* together assign accusative Case only once, to *la vaisselle,* even though both *faire* and *laver* are normally Case-assigning verbs. The subject of *laver la vaisselle* in (26c), *Jean,* receives inherent dative Case, as indicated by the obligatory dative marker *à.*

Direct object clitic pronouns in French require accusative Case, exactly as do their full NP counterparts. For example, cliticization of the object of an unaccusative verb in (27b) is not an acceptable alternative to raising-to-subject.

27a. Je_i suis tombé t_i.
'I fell.'

27b. *II m_i' est tombé t_i.
it-expletive lSgObjCI be-3SgPrs fall-PerfPrt
'It fell me.' (='I fell.')

Similarly, (28c) is unchanged when the direct object of *!aver* is cliticized:

28. Marie l'a fait laver *(à) Jean.
'Mary made John wash it.'

In (28), the direct object clitic must receive the one accusative Case assigned by *faire-laver,* and *Jean* is forced to bear inherent dative Case.

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[10] I suspect that the accusative Case assigned in *faire*-constmctions always comes from *faire,* and that for some reason the lower verb is prevented from assigning accusative Case even where it normally can do so.

The *faire-construction* provides a means of distinguishing the clitic derivation from the non-clitic derivation of reflexive constructions, because if the reflexive clitic is a true direct object clitic, then it should require accusative Case exactly as do other direct object clitics. As a result, if a transitive verb embedded under *faire* takes a reflexive direct object clitic, then the subject of the transitive verb should bear the dative marker *à*, as in (28). On the non-clitic analysis, however, in which the reflexive morpheme is not an object clitic, the reflexive morpheme should not require accusative Case, and no dative marker should occur on the surface subject of the embedded verb. (29b) illustrates that the predictions of the *non-clitic* analysis are borne out.[11]

29a. Marie l'a fait tuer au juge / *le juge.
'Mary made the judge kill him.'

29b. Marie a fait se tuer le juge / *au juge.
'Mary made the judge kill himself.'

Whereas in (29a) the presence of a direct object clitic forces *le juge* to bear inherent dative Case, in (29b) *le juge* (necessarily) receives structural accusative Case, despite the presence of a reflexive morpheme. Hence, evidence from *faire*-causatives supports the view that French reflexive-clitic constructions should always receive a non-clitic analysis.

The Chain-formation Algorithm in (2), in combination with the VP-internal subject hypothesis, provides an explanation for the impossibility of the clitic derivation for French reflexive constructions. First I will follow Rizzi (1990) in assuming that French clitics must move into the inflectional system as full NPs. For direct object clitics this will typically follow from a need for accusative Case-checking in SP(AGRoP). Moreover, in French the pressure for an object to enter into a morphological checking relation with an object agreement head appears to go beyond accusative Case-checking, as is evidenced by the past participle agreement triggered when an object overtly passes through the inflectional system. When the object of an unaccusative verb raises to subject, it triggers object agreement for person and number on a perfect participle, even though the object does not receive accusative Case.

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[11] (29) also serves to illustrate a difference between direct object clitic position (before *faire)* and reflexive position (before *tuer)* in *faire*-causatives. This difference may be due to the non-clitic derivation of (29b).

Provided that an object clitic is indeed forced to move into the inflectional system as a full NP, and assuming that subjects are generated VP-internally, the Chain-formation Algorithm will effectively block the clitic derivation for French reflexive constructions. For example, in (30a), the direct object clitic (NP) and the subject, *Jean*, are associated with the appropriate traces because of their distinct interpretive indices. In (30b), however, where the subject and the reflexive clitic (NP) bear the same interpretive index, the Chain-formation Algorithm fails to associate the subject and the object clitic with the appropriate traces. The trace t_i' is taken as the antecedent for t_i, *se* is taken as the antecedent for t_i', and *Jean*$_i$ is not associated with any argument position (causing the sentence to be uninterpretable).

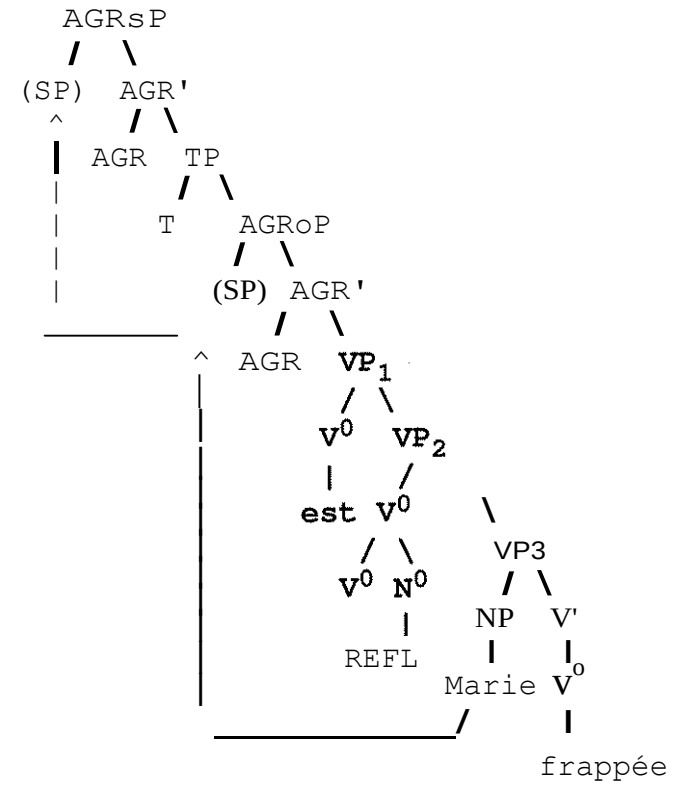
30a. Jean$_i$ l$_j$' a t_i frappé t_j .
'John$_i$ hit him$_j$.'

30b. *Jean$_i$ s$_i$' a/est t_i frappé t_i. [Clitic Derivation]
'John hit himself.'

In general, a clitic derivation for a French reflexive clitic construction will cause the Chain-formation Algorithm to fail in two ways: The trace left in the VP-internal subject position will incorrectly be taken as the antecedent for the object clitic's trace, and the object clitic's NP in SP(AGRoP) will incorrectly be taken as the antecedent for the trace in VP-internal subject position. The second error, if not the first, will always render the sentence uninterpretable, because the subject will be left unassociated with any semantic argument position, and thus will not belong to an A-chain as defined in (1). Hence, the Chain-formation Algorithm in (2) provides a general explanation for the impossibility of the clitic derivation for reflexive clitic constructions in French, or indeed in any language in which an object clitic must move *as an NP* over the VP-internal subject position.

I will adopt the following "non-clitic" analysis for the French reflexive construction in (25):

31.



In (31), the VP-internal subject position, $SP(VP_2)$, is left unexpanded, and the external theta-role of *frappée* is assigned instead to the reflexive N° affix, which is generated as an affix on the empty V^0 heading VP_2. The main verb *frappée* raises and substitutes for the empty V^0 by S-structure, and assigns its external theta role to the (syntactically independent) reflexive morpheme. The reflexive morpheme is spelled out morphologically as a reflexive clitic marked for the appropriate person and number. In (31), the reflexive morpheme blocks assignment of structural accusative Case to the direct object. The NP *Marie* is generated as the direct object of *frappée*, raises through SP(AGRoP) (where it licenses overt person-number agreement on the perfect participle), and then raises into SP(AGRsP) (where its person and number features and nominative Case are checked).

I will assume that the verbal/inflectional heads, from *frappée* to $AGRs^0$, eventually adjoin to one another to form a complex verb under an $AGRs^0$ node.[12] It would be necessary to add

[12] On the other hand, I will leave open the details of which heads adjoin to which other heads, and at what point in the derivation they do so. The assumptions in this paper are compatible with a number of possibilities.

some additional machinery to (2) to associate "nested heads" (where "nesting" is the product of successive head-movement operations) with the appropriate traces. Instead, I suggest that the interpretive component simply views the nested verbal heads as a "complex verb" which heads the chain of X^o traces below it.

Because the external theta-role in (31) is assigned to a nominal head (REFL) rather than an NP, the Chain-formation Algorithm correctly takes *Marie* as the head of a chain whose tail is in the direct object position ($SP(VP_3)$). On the analysis in (31), the selection of *être* rather than *avoir* as the perfect auxiliary in reflexive clitic constructions can be related to the empty (i.e., unexpanded) VP-internal subject position. I take perfect auxiliary selection to be a local agreement operation, in which selection of *être* is the default, and selection of *avoir* must be licensed by a lower adjacent (filled) specifier. In this way selection of *être* in reflexive clitic constructions is of a piece with the selection of *être* in passive and unaccusative constructions. On the assumption that the passive morpheme, like the reflexive morpheme, is a nominal head, both unaccusative and passive constructions have an unexpanded VP-internal subject position.

Furthermore, this account of auxiliary selection can be applied to Italian perfect auxiliary selection, to explain the contrast shown in (32) (discussed at length in Burzio 1986).

32a. Gianni si è essaminato.
32b. Gianni ha essaminato se stesso.
'John has examined himself.' (a & b)

Italian allows both a "clitic" form and .a "long" form of the reflexive pronoun. As in French, I take the clitic form *si* to be a reflexive verbal morpheme rather than a true clitic, but I take *se stesso* to be a full NP. In (32a), *Gianni* is generated as a direct object, and raises to subject position to get nominative Case. In (32b), however, *Gianni* is generated in the VP-internal subject position, and the full reflexive anaphor *se stesso* is generated (and remains) in direct object position. As will be discussed in section (3.1), *se stesso* becomes visible through incorporation rather than Case-checking, and therefore no strong crossover or Chain Condition violation will result from movement over the VP-internal subject position in (32b). Thus, the choice of *essere* in (32a) but *avere* in (32b) can be explained directly in terms of the presence of a VP-internal subject in (32b) but not (32a).

In addition to the reflexive reading, "Mary hit herself," (25) has an impersonal passive reading, "Mary got hit." I propose that the reflexive reading and the impersonal (arbitrary) reading are the only interpretations available to a semantic argument that is not an XP, and that this restricted set of interpretive possibilities is related to the impossibility of assigning an interpretive index to an X^0.[13]

To summarize, the Chain-formation Algorithm provides an explanation for the impossibility of the clitic derivation for (25). I have proposed a non-clitic derivation for (25), illustrated in (31). The key points of the non-clitic derivation are that the surface subject is an underlying object, and that what appears to be a reflexive clitic pronoun is instead a reflexive nominal head that receives the external theta role. This non-clitic analysis provides a straightforward account of perfect auxiliary selection in French and Italian, as a local agreement operation between the perfect auxiliary and the VP-internal subject position. The non-clitic analysis also provides a natural way of explaining the homophony, observed in many languages, between reflexive constructions and impersonal passive constructions.

Rizzi's evidence for his (1986) Chain Condition came not from direct object reflexives, but from indirect object reflexives. I will now extend the non-clitic analysis to indirect object reflexives, and discuss the divergent Case properties of the reflexive morpheme and the passive morpheme in French (and Italian). Finally, I will discuss Rizzi's original evidence in light of the non-clitic analysis.

The arguments for a non-clitic analysis of direct object reflexive clitic constructions can also be made for a non-clitic analysis of indirect object reflexive clitic constructions in French. (33a) contains a verb, *parler,* with an indirect object as its only internal argument. (33a) has a corresponding reflexive form with *se,* shown in (33b). When the sentence in (33b) is embedded under *faire* in a causative construction (33c), the logical subject of *parler, Marie,* receives

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[13] This proposal is compatible with the analysis of the passive morpheme as a verbal head, if we adopt a suggestion due to A.Marantz (p.c.): The passive morpheme always receives an impersonal (or "arbitrary") interpretation, but is compatible with a *by*-phrase which adds specific information. For example, "John was hit by Mary" has the interpretation, "For some x, x hit John, *and x = Mary."*

structural accusative Case rather than the inherent Case associated with the dative marker à.[14]

33a. Jean parle à Marie.
'John talks to Mary.'

33b. Marie se parle.
'Mary talks to herself.'

33c. ?Jean fait (*à) Marie se parler (*à Marie). 'John makes Mary talk to herself.'

33d. *Jean fait Marie lui parler.
*Jean lui fait parler Marie.

As for direct object *se,* indirect object *se* does not require a structural accusative Case; otherwise, *Marie* would appear in the dative rather than the accusative in (33c). True indirect object clitics are not permitted in the faire-construction, as illustrated in (33d).

Moreover, indirect object reflexives require *etre* as their perfect auxiliary, exactly as do their direct object counterparts.

33e. Marie s'est/*s'a parlé.
'Mary talked to herself.'

An additional argument, following (Grimshaw 1982), is based on presentational *il* constructions.

34a. * Il le detestaient plusieurs personnes.
'There hated him several people.'
34b. II se detestaient plusieurs personnes.
'There hated themselves several people.'
34c. (?)? Il lui parlaient plusieurs personnes.
'There talked to-him several people.'
34d. II se parlaient plusieurs personnes.
'There talked to-themselves several people.'

Presentational *il* constructions are possible only with verbs that do not assign accusative Case to an object, as illustrated for the direct object clitic in (34a). In (34b), however, with a reflexive affix, the construction is fully grammatical. With indirect object clitics, as in (34c), the construction is marginally acceptable, but in the corresponding form with a reflexive affix the construction is fully acceptable.

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[14] For reasons that are unclear to me, in the prefered word order for (33c) *Marie* comes before the verb.

The necessity of a non-clitic derivation for indirect object reflexive clitic constructions follows directly from the Chain-formation Algorithm. For example, in (33b), movement of an indirect object clitic (as an NP) over a (subsequently) coindexed VP-internal subject position would run afoul of the Chain-formation Algorithm, and the result would be uninterpretable.

35. $Marie_i$ se_i t_i' parle t_i. [Clitic Analysis]

In (35), the Chain-formation Algorithm will yield the chain (se_i, t_i', t_i), and the uninterpretable chain ($Marie_i$), which does not include an argument position.

A potential problem for the non-clitic analysis of indirect object reflexives comes from the fact that French indirect objects bear inherent dative Case, rather than structural accusative Case. In the non-clitic analysis illustrated in (36a), the surface subject *Marie* must be an underlying indirect object, and presumably must raise for Case reasons.

36a. $Marie_i$ REFL parle t_i. [Non-clitic Analysis]

Yet, indirect objects receive inherent Case in French, and it is well-known that indirect objects do not passivize in French.

36b. *Marie a été parlé(e).
'Mary has been spoken to.'

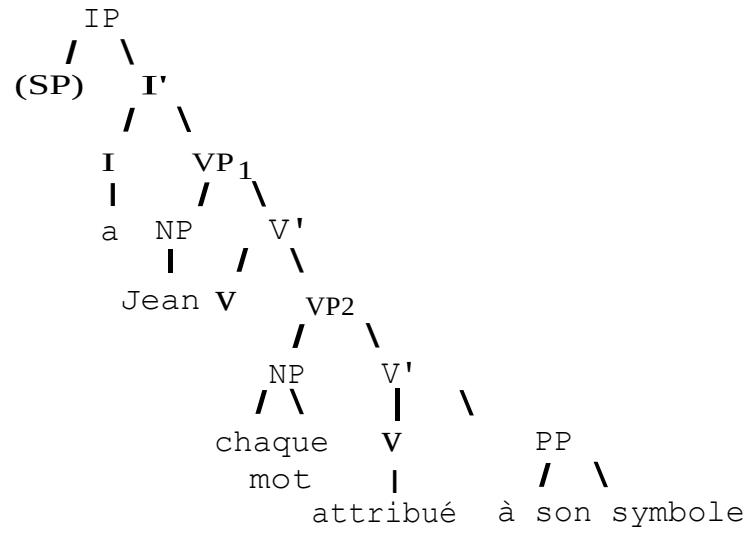
The question that then arises for the non-clitic analysis in (36a) is why the reflexive morpheme, unlike the passive morpheme, should absorb inherent Case and force *Marie* to raise to subject position.

The answer is that the reflexive morpheme in French does not need to *receive* (structural) Case, as does the French passive morpheme, but merely *blocks* the assignment of (structural or inherent) Case by a verb. Thus, in (36a) REFL blocks assignment of inherent Case to the indirect object *Marie,* and raising is forced.

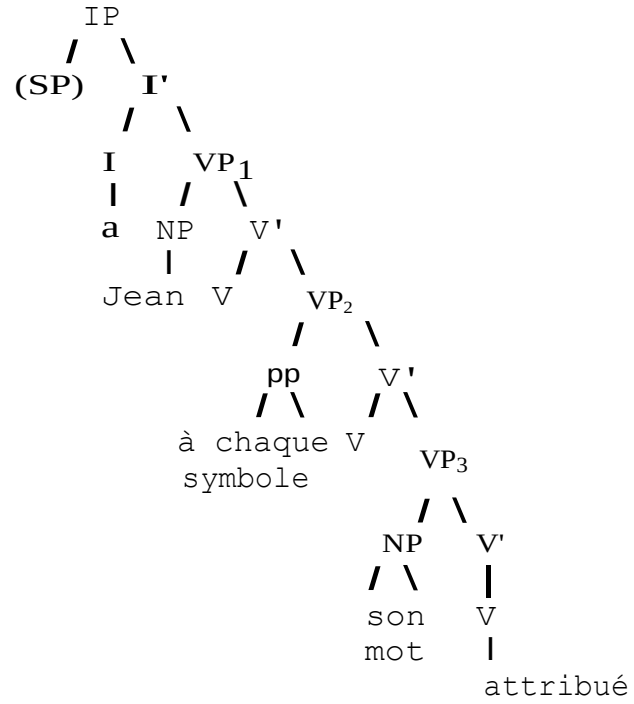
Adapting Marantz's (1990) analysis of English double object and prepositional datives, I assume the structures in (37e,f) for grammatical sentences (37a,b).

37a. Jean a attribué chaque mot à son symbole.
'John attributed each word to its symbol.'
37b. (?) Jean a attribué à chaqne symbole son mot.
'John attributed to each symbol its word.'
37c. ?* Jean a attribué son mot à chaque symbole.
'John attributed its word to each symbol.'
37d. * Jean a attribué à son symbole chaque mot.
'John attributed to its symbol each word.'

37e.



37f.



As indicated by the Weak Crossover facts in (37a-d), the indirect object, though always marked with *à*, may be generated either in a SP(VP) position higher than the direct object (as in

an English double object dative), or in a complement position lower than the direct object (as in an English to-dative). If REFL is necessarily generated in the highest VP shell, and blocks the assignment of Case only to the lower adjacent specifier, then REFL will block assignment of Case to the indirect object, but not the direct object, in sentences such as (38a) (corresponding to the structure in 37f).

38a. Jean$_i$ s'est confié t_i la tache difficile.
'John entrusted to himself the difficult task.'

On the other hand, in (38b), which corresponds to an English *to*-dative, REFL blocks assignment of Case to the direct object, rather than the indirect object.

38b. Jean$_i$ s'est confié t_i à Marie.
'John entrusted himself to Mary.'

Blocking of Case-assignment specifically to the lower-adjacent specifier suggests that accusative Case-assignment involves a local agreement operation between a V^0 and a lower-adjacent SP(VP), as well as an agreement operation between the object NP and AGRO (cf. Chomsky 1986a and Miyagawa 1991 on the distinction between Case-assignment and Case-realization; cf. Snyder 1991 on the proposal that structural accusative Case is assigned by V^0 into a lower-adjacent SP(VP).)].

Thus, roughly the same line of reasoning that supports a non-clitic analysis for direct object reflexives, will also favor a non-clitic analysis for indirect object reflexives. One consequence is that we must consider the non-clitic analysis, as well as the clitic analysis, for the indirect object reflexives that served as Rizzi's evidence for the Chain Condition. The crucial examples for Rizzi are given in (13), repeated as (39).

39a. Gianni$_i$ è stato affidato t_i [a Maria$_j$] / [a se stesso]$_i$.
'John has been entrusted to Mary / to himself.'

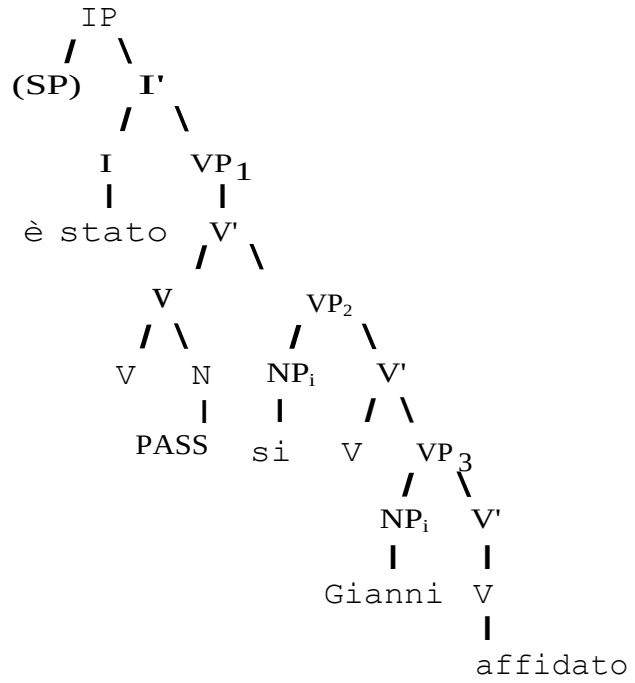
39b. Gianni$_i$ gli$_j$ è stato affidato t_i .
'John$_i$ has been entrusted to him$_j$.'

39c. **Gianni$_i$ si$_i$ è stato affidato t_i.
'John has been entrusted to himself.'

As in Rizzi (1986), the Chain Condition (or the Chain-formation Algorithm in (2)) will rule out the clitic derivation for (39c), in which *Gianni* raises over a (subsequently) coindexed NP *si*.

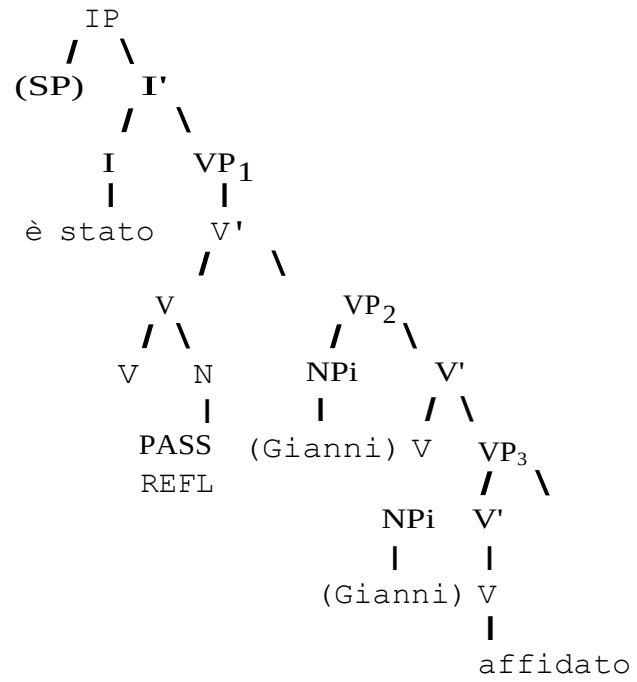
This is important because (39c) is *not* ruled out by interaction of (2) with the VP-internal subject hypothesis. On the assumption that the passive morpheme is a nominal head, no conflict will arise when *Gianni* or *si* raises over the (empty) VP-internal subject position. The ungrammatical structure corresponding to (39c) is illustrated in (39d).

39d.



In addition to ruling out the clitic derivation for (39c), we must now rule out a non-clitic derivation for (39c). This is readily accomplished. A non-clitic analysis for (39c) would require that the surface subject *Gianni* be the underlying indirect object, and that *si* receive the external theta role. In (39c), however, both *si* and the passive morpheme would need to receive the external theta role. Moreover, the surface subject *Gianni* would be left to bear both the direct object's and the indirect object's theta role. Hence, the non-clitic derivation, like the clitic derivation, is unavailable in (39c). The (impossible) structure corresponding to the non-clitic analysis of (39c) is illustrated in (39e).

39e.



For Rizzi' s original examples, both types of derivation are correctly ruled out. The clitic derivation is ruled out by the Chain Condition (i.e., by (2)), and the non-clitic derivation is ruled out by a conflict in the theta-role requirements of the passive and reflexive morphemes. The Chain-formation Algorithm in (2) provides an explanation both for the Chain Condition effect in (39c), and for the impossibility of the clitic derivation for either direct object reflexives (as in 30b) or indirect object reflexives (as in 35).

2.5 Evidence From Reflexive Dative Clitics in Hebrew

Modern Hebrew uses dative clitics in a variety of constructions, as discussed by Borer & Grodzinsky (1986). Reflexive dative clitics may be used to emphasize that the subject is affected by the activity of the verb. N. Chomsky (p.c., 1991) has pointed out that Hebrew reflexive dative clitic constructions exhibit the *effect* of Rizzi's Chain Condition, but are (arguably) incompatible with Rizzi's explanation for the constraint.

As Borer & Grodzinsky note, the reflexive dative clitic is incompatible with a derived subject. Thus, in (40a,b), the reflexive dative clitic may be bound by an ("underived") subject; but in the passive and unaccusative examples in (40c) and (40d), the reflexive dative clitic cannot appear.

40a. Rani ve-Dina$_{i+j}$ ’axlu lahem$_{i+j}$ tapuxim l@hana‘atam
Rani and-Dina ate to-them apples for-their-pleasure
'Rani and Dina ate apples for pleasure.'

40b. ha-yalda$_i$ yashva la$_i$.
the-girl sat to-her
'The girl sat leisurely.'

40c. *ha-’uga$_i$ ne’exla la$_i$.
the-cake was-eaten to-her
'The cake was eaten.'

40d. *ha-maftexot$_i$ naflu la-hem$_i$.
the-keys fell to-them
'The keys fell.'

The impossibility of raising an object over a reflexive dative clitic is suggestive of Rizzi's Chain Condition. Yet, Rizzi originally explained Chain Condition violations in terms of the Theta Criterion: If a chain contains more than one theta-position (as it would when an NP raises over a coindexed theta position; cf. (12)), then the structure violates the Theta Criterion. In (40a-d), however, it is not at all clear that the dative clitic would bear an independent theta role. The reflexive dative clitics in (40a,b) correspond roughly to the reflexive indirect object in (40e).

40e. John had (himself) a good time.

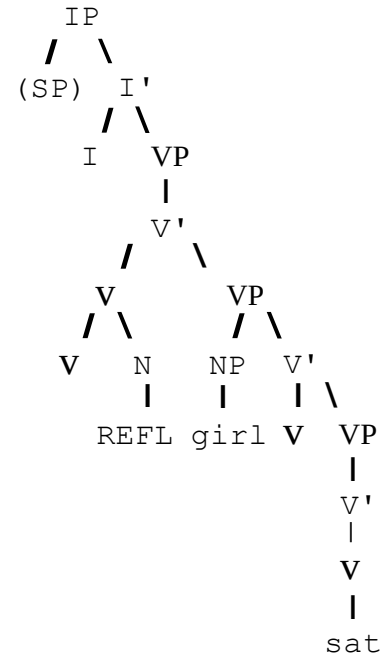
N.Chomsky (p.c.) suggests that *himself* in (40e) does not change the meaning of the sentence to the same extent that would be expected if it bore an additional theta role. For this reason, Chomsky suggests that both (40e) and (40a-b) should be given an analysis in which the dative clitic shares the subject's theta-role. Assuming for the sake of argument that Chomsky is correct, and that the reflexive dative clitic does not in fact bear an independent theta role (such as Benefactee), then a problem arises for Rizzi in explaining the ungrammaticality of (40c,d) because Chomsky's (1981) Theta Criterion is not violated.

In this paper I have tacitly assumed that the Theta Criterion is not a condition of syntactic well-formedness, but rather follows (insofar as it is correct) from the requirement of interpretability at the LP-semantics interface. In fact; the Chain-formation Algorithm in (2) will rule out (40c,d), as well as other Chain Condition violations, completely independently of the Theta Criterion. The reflexive dative clitic is assigned an interpretive index (if for no other

reason than) to satisfy Condition A when the Binding Conditions are checked. As a result, (2) will take the reflexive dative clitic as the antecedent of the derived subject's trace, and (unlike Rizzi's Chain-formation Algorithm) will leave the derived subject as a trivial chain that does not contain an argument position. Hence, (40c) and (40d) will be uninterpretable.

Given that the facts in (40a-d) so closely parallel the facts for French and Italian discussed in Section (2.4), I will take the Hebrew reflexive clitic constructions to have a non-clitic analysis essentially identical to that given for French and Italian. On this view, what appears to be a reflexive dative clitic (NP) in Hebrew is in fact the morphological realization of a reflexive (N^o) affix on the verb. As for French or Italian, the verb's external theta role is assigned to the reflexive affix, and the underlying indirect object (blocked from receiving Case in its VP-internal position) raises to SP(AGRsP). For example, I propose the analysis illustrated in (40e) for sentence (40b):

40e.



In (40e), both the indirect object theta role and the subject theta role are assigned in their own VP-shells. The V *sat* substitutes for the empty Vs heading the higher shells. REFL blocks assignment of Case to *girl*, which raises to SP(AGRsP).

(40c) and (40d) are ruled out straightforwardly by the unavailability of an external theta

role to assign to REFL. In (40c) the external theta role is already assigned to the passive morpheme, and in (40d) the unaccusative verb does not have an external theta role to assign.[15] Because the VP-internal subject position in (40c) and (40d) is unexpanded (assuming the passive morpheme is an N^o rather than an NP), the clitic derivation is not automatically ruled out by the presence of a (coindexed) VP-internal subject position. Here the clitic derivation would be ruled out by the (incorrect) operation of the Chain-formation Algorithm, because the derived subject would undergo A-movement over a (subsequently) coindexed reflexive clitic NP. The structure corresponding to a clitic analysis of (40c) is illustrated in (39d).

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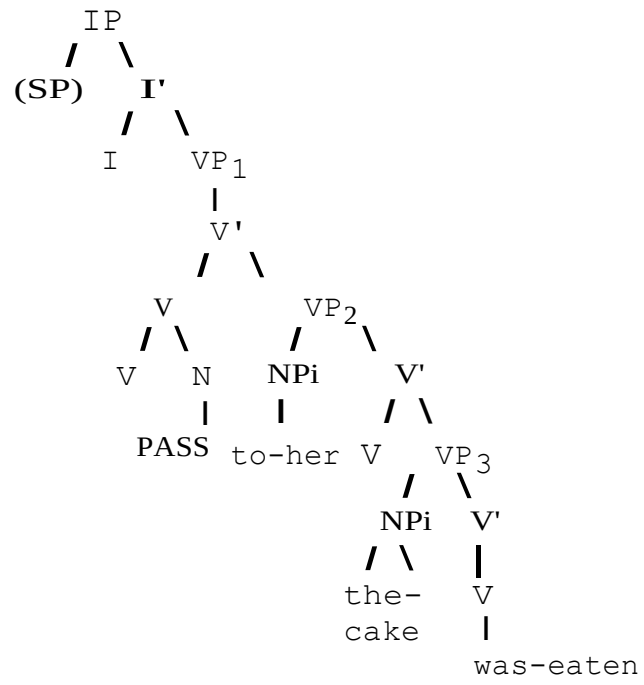
[15] A very different explanation for the ungrammaticality of (40c,d) had some initial appeal, but does not appear to be tenable. (40c,d) might have been ruled out by a requirement that the reflexive dative clitic have an agentive/volitional antecedent, much as the English adverb *deliberately* requires a volitional subject. Typically, passive and unaccusative verbs do not have agentive subjects, and this fact might explain the ungrammaticality of (40c,d). A critical test case for this hypothesis is the class of verbs denoting inherently directed motion (e.g., *fall*), which have been argued by Levin & Rappaport (1988) to be unaccusative even when they have an agentive subject. If the only problem with (40c,d) is that the reflexive clitics' antecedents are non-agentive, then there should be substantial improvement when the unaccusative verb in (40d) is replaced with a member of the *fall* class. This prediction is not borne out, as illustrated in (i).

i.a. *ha-maftexot$_i$ naflu la-hem$_i$.
the-keys fell to-them
'The keys fell.'

i.b. *nafla li hayalda.
fell to-her the-girl
'The girl fell down.'

My informant tells me that (i.b.) is bad even if the girl fell down on purpose.

39d.



3. Related Issues

In this section I attempt to provide principled answers to several questions raised by the existence of a strong crossover constraint on A-movement. Subsection (3.1) is concerned with the interaction of the Chain-formation Algorithm with the VP-internal subject hypothesis and an AgrP theory of Case. Subsection (3.2) is concerned with apparent exceptions to Strong Crossover, which arise with A-bar scrambling in a variety of languages and with topic cleft constructions in English.

3.1 Case Theory and Chain Formation

The purpose of this section is to reconcile the Chain-formation Algorithm in (2) with an AgrP theory of Case-checking. A conflict appears to arise between an AgrP theory of Case-checking and the Chain-formation Algorithm in (2), if the only way for an NP to become visible is for the NP to move into a SP(AgrP). For example, when the NP *himself* in (41) raises into SP(AGRoP), over a VP-internal subject position (t_j) bearing the same interpretive index, (2) would lead us to expect an uninterpretable result. Instead, (41) is fully grammatical.

41. John$_i$ t_i kicked himself$_i$.

There are a number of ways in which *himself* might plausibly become visible without raising into SP(AGRoP), however. One possibility would be that the heads of anaphors are (exceptionally) allowed to bear an interpretive index, perhaps because of the precise manner in which anaphors are interpreted (which I will leave open). In this case, the head of the anaphor might become visible by moving and adjoining to $AGRo^0$, where its features could be checked. This instance of head-movement would not violate the Head Movement Constraint (as derived from Chain-formation); the presence of an interpretive index on both the head of the anaphor and its N^0 trace would allow the Chain-formation Algorithm to correctly associate the N^0 and its trace despite the presence of intervening V^0s. Moreover, the NP *himself* would never have to raise into SP(AGRoP) over the coindexed VP-internal subject position, and no Strong Crossover violation would be predicted. (For theories requiring head-movement of anaphors for independent reasons, see for example Avrutin 1991, Reinhart & Reuland 1989).

Alternatively, *himself* in (41) might become visible through incorporation of its head into the verb. The possibility of visibility through incorporation has been suggested (in differing forms) by Baker (1986) and Marantz (1984). While N^0 incorporation appears to be a highly restricted option in English, incorporation might be forced in (41) by a requirement that syntactically reflexive predicates be syntactically identified as reflexive (cf. Reinhart & Reuland 1989). Again, on this proposal no Strong Crossover violation would be expected in (41), because the NP *himself* never raises to SP(AGRoP).

A further possibility is that an NP can become visible by being anaphorically bound to another visible NP. If we acknowledge a distinction between Case-assignment and Case-realization, then an anaphoric NP might have to be assigned Case (and would thus be restricted to occuring with Case-assigning verbs), but might become visible through anaphoric binding rather than through Case-checking in SP(AGRoP). On this proposal we might also obtain an alternative explanation for the super-raising facts discussed in Section (1): Assuming that *every* link in an A-chain (and not only the head of the chain) must be visible, then perhaps the NP-traces in an A-chain must become visible through anaphoric binding. This would permit an explanation for super-raising violations in terms of Condition A, provided the objections

mentioned in Section (1) can be countered with an appropriate version of the Binding Theory (e.g., Reinhart & Reuland 1991).

3.2 Apparent Exceptions to Strong Crossover

In one type of apparent counterexample to the A-bar Strong Crossover constraint, an anaphor A-bar moves over a coindexed NP. (43) is an example from German, a V2 language.

43. Sich selbst$_i$ hat der Mann$_i$ geschlagen t_i.
himself-Acc has the man-Nom hit
'The man hit himself.'

I suggest that (43) is grammatical because the A-bar scrambled anaphor is interpretable even if it is not associated with its trace through Chain-formation. At the LF-semantics interface, the trace of *sich selbst* in VP-internal direct object position is assigned the same interpretive index as the subject, and becomes visible through anaphoric binding with the subject. Chain-formation in this case yields a single chain receiving both the subject and the object theta roles, because the VP-internal subject position is the nearest potential antecedent for the trace in object position. Nothing in the present system rules out such a chain.[16] The Theta Criterion, insofar as it is needed, has been derived from the requirement of Full Interpretation, and there is no reason why the subject-object chain in (43) should be uninterpretable.

The NP *sich selbst* in SP(CP) is not interpreted through association with the lower chain, but instead is assigned an interpretation similar to that of the reflexive morpheme in French and Italian; that is, *sich selbst* is interpreted as signifying that its clause (CP) contains a reflexive predicate. The position of *sich selbst* in SP(CP) places contrastive stress on the fact that the predicate of the clause is reflexive, and implies that the activity of the predicate is *exclusively* reflexive. Thus, in this instance the anaphor is interpretable without having an associated argument position.

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[16] Chomsky, in his 1991 MIT lectures, presents an Economy explanation for the non-existence of verbs such as *HIT*, which would be the unaccusative equivalent of *hit* (i.e., "John HIT t" = "John hit himself'). A verb such as *HIT* would be impossible because its direct object would never have any "selfish" reason to pass through the VP-internal subject position and pick up the external theta role. The direct object would satisfy all its Case- and thematic requirements, for example, without receiving the external theta role. This argument would rule out verbs such as *HIT* while still permitting (43) on the proposed analysis.

A second type of apparent counterexample to the A-bar Strong Crossover constraint involves topicalization structures in English, as in (44a).

44a. Himself, John likes.
44b. Himself_i , Op_j John_k likes t_j .
44c. It is himself_i who_j John_k likes t_j .
44d. John thinks that himself/*him, Mary likes.

I will analyze (44a) as involving a logophor *himself,* which is in a predication relation with the CP predicate formed by raising a null operator to SP(CP) (as illustrated in (44b)). (44b) has a closely corresponding cleft construction, as in (44c). (44b) and (44c) have an interpretation to the effect of, "there is some person whom John likes, and HIMSELF is that person," where HIMSELF is interpreted logophorically. Notice that if (44a) could instead be derived by A-bar movement of *himself* with subsequent reconstruction, we would incorrectly predict (44d) to be grammatical with *him* as well as *himself.*

4. Conclusions

The central theoretical proposal of this paper has been that the mechanism of indexing is unavailable in syntax. The only operation that has the formal properties of indexing, and that plays a role in determining the well-formedness of a syntactic structure, is the assignment of indices to a (completed) LF representation, at the point of semantic interpretation. No syntactic operation, such as Move-alpha, makes reference to this interpretive indexing. Moreover, *chains* exist as grammatical objects only at the point of semantic interpretation, where they are constructed on the basis of the information about Case-assignment, argument positions, and X-bar structure available in the LF representation. Chains are relevant only to subsequent interpretive operations, as are involved in the checking of Binding Conditions, operator-variable structures, and predicate-argument relations. Chains, as grammatical objects, are irrelevant to the operations involved in deriving the LF representation or checking well-formedness conditions, such as morphological agreement, that are not directly related to semantic interpretation.

The extremely simple chain-formation algorithm proposed in (2) provides an explanation for the phenomena of A-movement and A-bar movement Strong Crossover, as well as certain Relativized Minimality effects that have the formal character of Strong Crossover. On the other

hand, a number of phenomena have been explicitly treated as independent of the Chain-formation Algorithm. For example, Section (1) suggests that certain phenomena handled by Relativized Minimality in (Rizzi 1990) might be better accounted for by the Bounding Theory, revised along the lines of (Cresti, in preparation). As demonstrated in Section (2), Rizzi's (1990) account of super-raising in terms of Relativized Minimality does not appear to be tenable. A treatment in terms of the Bounding Theory, however, is compatible with the proposed Chain-formation Algorithm and also accommodates the evidence in Section (2).

An argument can also be made for the independence of superiority effects, as in (45), from the operation of the Chain-formation Algorithm.

(Based on an example from Barss & Lasnik, 1986)
45a. Whom$_i$ did Mary tell t_i what$_j$?
45b. ??What$_j$ did Mary tell whom$_i$ t_j?

Contra-indexing of the links in (what$_j$, t_j) and (whom$_j$) should allow the Chain-formation Algorithm to operate correctly on (45b). Hence, some other principle must be responsible for the relative unacceptability of (45b). I suggest that (45b) is ruled out for Economy reasons: Movement of either *wh*-word to SP(CP) will satisfy the PF morphological requirements of the null complementizer Q, which heads matrix interrogative CPs in English (and will also satisfy a morphological requirement of the moved *wh*-word, I assume); a principle of economy of derivations ("shortest move") forces movement of the indirect object *wh*-word *whom,* rather than the direct object *wh*-word *what,* because the indirect object is structurally higher than the direct object in an English double object construction at the point when one of the *wh*-words must move into SP(CP) (Barss & Lasnik, 1986).[17]

Notice that the mildness of the violation in (45b) also distinguishes superiority effects from a failure of the Chain-formation Algorithm. When the Chain-formation Algorithm fails, as in (3)

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[17] Specifically, I assume that the notion "shortest move" can be formalized in terms of asymmetric (branching) c-command, so that the movement of *whom* to SP(CP) in (45a) is a shorter move than movement of *what* to SP(CP), precisely because *whom* asymmetrically c-commands *what* at the point where movement is required. Chomsky, in his 1991 MIT lectures, has suggested an alternative formalization of "shortest move" which treats as equivalent two arguments that are in the internal domain of the same V^0. This formalization, however, was motivated by a version of Relativized Minimality that fails to explain the A-movement phenomena in Section (2), and that has therefore not been adopted in this paper.

(a Strong Crossover violation), (4c) (a Head Movement Constraint violation), or (5a,b) (SCO-like violations with multiple *wh*-adjuncts), the sentence is completely uninterpretable, not only in the technical sense of violating the requirement of Full Interpretation, but also in the more familiar sense that an English-speaker, on hearing these examples, finds it extremely difficult to extract the intended meaning. The severity of these FI violations, as compared to the milder violations resulting from Weak Crossover, also supports the implicit assumption throughout this paper that Weak Crossover (i.e., Bijection Principle) violations should not be explained in the same fashion as Strong Crossover violations.

In summary, I have proposed that a variety of phenomena having the character of crossover violations, in a broad construal of the term, follow from the Chain-formation Algorithm in (2). I have provided empirical support for Rizzi's A-movement strong crossover constraint, or "Chain Condition," through an examination of passive-dative constructions in Albanian, A-movement scrambling in Japanese and German, reflexive clitic constructions in French and Italian, and reflexive dative clitics in Modern Hebrew. In particular, I have shown that the A-movement strong crossover constraint, in combination with the VP-internal subject hypothesis, provides an explanation for previously unexplained properties of French and Italian reflexive clitic constructions. Finally, I have discussed several related issues including the compatibility of the Chain-formation Algorithm in (2) with an AgrP theory of Case.

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