WEAK CROSSOVER, SPECIFICITY AND LF CHAINS*

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In this paper I argue that *Weak Crossover* effects show up only with non–specific *wh*–operators. In order to establish the relevance of specificity in Weak Crossover contexts systematically, a notional and an operational definitions of specificity are provided, drawing from the literature. In particular a range of constructions affected by specificity of the extracted DP are used as tests to support the claim. I propose a refined typology of Ā binders with respect to that proposed by Lasnik and Stowell (1991) in their paper on *Weakest Crossover*: quantificational operators need to be further split into specific and non–specific ones. On the basis of Rizzi's (2001a) proposal concerning the nature of specific vs. non–specific chains at LF and a condition of non–distinctness of grammatical features for chain links, I develop an analysis that accounts for the data.

1 INTRODUCTION

Weak Crossover (WCO) phenomenology is richer than usually understood. The first investigations of WCO (Wasow 1972; Cole 1974) illustrated that the effect is absent when the antecedent is *determinate*, but this notion remained at an intuitive level.[1]

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1 These proposals tried to reduce WCO to the *Backward Pronominalization* paradigm discussed by Langacker (1969), Ross (1967), and some others, and exemplified in (i).

(i) a. *He$_i$ will go if Jim$_i$ feels good.
b. If he$_i$ feels good, Jim$_i$ will go. (Ross 1967: ex. 5.151-b,5.151-d)

For a recent development of this kind of approach see Portolan 2005: ch. 6.

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In the study of WCO at LF, starting with Chomsky 1976, this empirical observation was shelved and the bipartition between quantificational and referential antecedents (Reinhart 1983) obscured the relevance of subtler differences.

In their paper on *Weakest Crossover*, Lasnik and Stowell (1991) reintroduced the issue of the kind of operator in WCO. They distinguished between *true quantificational operators* and non–quantificational Ā antecedents, which leave a *null epithet* in argumental position ((1-a) versus (1-b)).

(1) a. ?*Who$_i$ do his$_i$ students admire t$_i$? *Quantificational*
b. [This professor]$_i$, his$_i$ students admire e$_i$. *Non–quantificational*

What I systematically establish is that *wh*–antecedents, quantificational in the sense of Lasnik and Stowell, induce WCO effects only if they are non–specific (2). If we modify the base example (1-a) by using respectively an aggressively non D–linked (2-a) and a D–linked phrase (2-b) (Pesetsky 1987), we get sharply different grammaticality judgments: D–linked cases are (almost) acceptable whereas non–specific ones are completely out.[2] [3]

(2) Only non–specific *wh*-operators give rise to WCO effects
a. ?*[Who the hell]$_i$ do his$_i$ students admire t$_i$? *Non–specific*
b. (?)[Which famous professor]$_i$ do his$_i$ students admire t$_i$? *Specific*

In order to establish the claim in (2) systematically, both a conceptual and an operational definition of specificity are needed.

Pesetsky (1987) showed that D–linking has important consequences for LF syntax. This work marked the beginning of a new trend in the study of syntax: for a long period before, specificity was shelved as a mere discourse property, not part of the study of core syntax. Pesetsky 1987 broke with this tradition and paved the way for a series of studies that aimed at integrating this notion in the syntax, in order to account for a range of empirical phenomena. This research trend brought up a conceptual and operational definition of specificity, though its role in WCO has not yet been systematically addressed.

As far as the notional definition of specificity is concerned, I assume the formalization proposed in Enç 1991. Concerning the operational definition, a series of syntactic contexts whose grammaticality is sensitive to the specificity of the extracted DP have been advanced in the literature. I carefully combine these tests with the WCO configurations to establish the hypothesis. The resulting generalization is that only non–specific operators give rise to WCO effects. This is the starting point of the analysis to be developed. I propose to refine

2 In order to account for the subtler differences of grammaticality in WCO, we introduce a richer set of diacritics than traditionally assumed. The grammaticality scale of the diacritics is the following: (?) < ? < ?? < ?* < *.

3 Wasow (1972) originally noted differences in grammaticality judgments with different *wh*–elements:

(i) a. ?*Who$_i$ did the woman he$_i$ loved betray?
b. ?[Which picture]$_i$ did the man who purchased it$_i$ refuse to sell? (Wasow 1972: ch. 4, ex. 21-a,23-a)

We rarely find this observation in recent literature. An exception is Culicover and Jackendoff 1995 that propose the following contrast:

(ii) a. [Which famous senator]$_i$ do his$_i$ constituents despise?
b. ??Who$_i$ do his$_i$ constituents despise? (Culicover and Jackendoff 1995: ex. 39)

However, the authors do not discuss the paradigm in detail.

Lasnik and Stowell's typology of Ā operators: quantificational cases are split into specific and non–specific ones.

In order to explain the asymmetries with respect to reconstruction and weak island sensitivity between specific and non–specific *wh*–elements, Rizzi (2001a) proposes that these give rise to two different LF chains. In a nutshell in non–specific cases the restriction must reconstruct in argumental position at LF, whereas in specific cases it stays in the left periphery. A mechanism of φ features non–distinctness between operator and pronoun allows for a fruitful account of WCO and specificity effects. In fact, only specific *wh*–phrases remain complete in the Ā position and, being endowed with grammatical features, they can bind a pronoun directly from the Ā position; on the contrary, non–specific *wh*–phrases lack grammatical features in the Ā position at LF, due to reconstruction, hence cannot bind a pronoun from the Ā position. This refined analysis accounts for the data discussed here and opens a new perspective on WCO phenomena.

Apart from this introductory section, the paper is organized as follows. Section 2 is devoted to the discussion of Lasnik and Stowell's classic proposal reintroducing the relevance of the Ā operator in WCO. This, in fact, is the starting point of the proposal to be developed here. In §3 the semantic formalization of the notion of D–linking as proposed by Enç (1991) is introduced. Section 4 presents a series of syntactic contexts where it has been argued that the specificity of the extracted DP plays a crucial role in determining grammaticality. In particular, I will consider antireconstruction (Heycock 1995), weak island extraction (Cinque 1990), participial agreement in French (Obenauer 1994), clitic doubling in Romanian (Dobrovie-Sorin 1994), extraction from existential *there* constructions (Heim 1987), and scope reconstruction (Cinque 1990). The predictions of these tests are discussed in detail in §5, where I make some important methodological remarks on the use of such contexts as tests for my hypothesis. Bearing this in mind, in §6 I systematically apply the tests and show how the evidence support the hypothesis. Building on this empirical result, §7 is devoted to the development of the analysis. Rizzi's theory of LF chains is introduced, and, on the basis of this proposal, I consider WCO configurations and show how we can account for the empirical phenomenology at issue. In §8 I briefly suggest some possible extensions and refinements of the proposal left for future research: the theory is linked to some recent proposals on the syntax and semantics of pronominal features, and some open empirical issues are summarized. In the Conclusion (§9) the achieved results are briefly reviewed.

2 WEAKEST CROSSOVER

The starting point of Lasnik and Stowell's (1991) proposal is the *Generalized WCO Hypothesis*: WCO violations are expected in all instances of Ā movement, and not only in the paradigmatic cases involving binding by quantifiers and *wh*–operators. However, the authors establish that WCO effects show up only with a subset of Ā movements. As a matter of fact, they claim that the effect is systematically present in the types of constructions illustrated in (3).

(3) a. *The fact that he$_i$ owned a gun implicated everyone$_i$. *Quantification*
LF: everyone$_i$ [$_{IP}$ [$_{NP}$ the fact that he$_i$ owned a gun] [$_{VP}$ implicated t$_i$]]
b. *Who$_i$ does his$_i$ boss dislike t$_i$? *Wh–question*

c. *The man$_i$ [who$_i$ [his$_i$ mother loves t$_i$.]] *Restrictive relative*
d. ??His$_i$ mother shot JOHN$_i$. *Focus*
LF: John$_i$ [$_{IP}$ his$_i$ mother shot t$_i$]
(Adapted from Lasnik and Stowell 1991: ex. 12-a,12-b,13-a,13-b,82-b)

On the other hand, WCO effects are absent in Ā–movement cases exemplified in (4).

(4) a. John$_i$ [*Null Op.$_i$* [I believe his$_i$ mother loves t$_i$]]. *Topicalization*
b. This book$_i$ was too obscene [*Null Op.$_i$* [PRO to have [its$_i$ author] publicize t$_i$]]. *Object deletion*
c. Who did you gossip about t$_i$ [*Null Op.$_i$* [despite his$_i$ teacher's having vouched for t$_i$]]. *Parasitic gaps*
d. This book$_i$, which$_i$ its$_i$ author wrote t$_i$ last week, is a hit. *Appositive relative*
e. It was this book$_i$ [(*Wh$_i$*) that I got its$_i$ author to read t$_i$]. *Cleft*
(Lasnik and Stowell 1991: ex. 33-a,29-a,23-a,36-b,78-b)

The sentences in (4) are instances of *Weakest Crossover*, a term indicating the complete (or almost complete) absence of the expected violation.

To explain this pattern, Lasnik and Stowell (1991) propose that two kinds of Ā–operators are involved in the two paradigms. Cases which give rise to WCO effects (3) involve *true quantificational phrases*, which operate on sets with members ≥ 2, and leave a variable in trace position. The structures that do not give rise to WCO (4), in contrast, involve non–quantificational antecedents, which leave a *null epithet* in argumental position.

Postal (1993) provides further evidence for the idea that the presence of WCO is tied to the operator type, rather than the construction type.[4] While Lasnik and Stowell (1991) claim that topicalizations and clefts with quantificational phrases are impossible in English, Postal (1993) shows that these construction are actually possible if the moved DP is modified by an exceptive (for example *anyone else*), a relative (for example *anyone who was sick*), or an adjective phrase (for example *somebody taller and thinner than you*). Consider the following examples (5) with an exceptive phrase:

(5) a. Anyone$_i$ else/but Bob/other than her they would have fired t$_i$.
b. It was somebody$_i$ else/other than her that they would have fired t$_i$.
(Postal 1993: ex. 6)

The moved phrases in these constructions qualify as true quantifiers and do give rise to WCO effects, as illustrated in the examples (6).

(6) a. Jack$_i$, I told his$_i$ wife that I had called t$_i$.
b. *Everybody$_i$ else, I told his$_i$ wife that I had called t$_i$. (Postal 1993: ex. 9-a,9-c)

To sum up, Lasnik and Stowell 1991 reintroduced the relevance of the operator type with respect to WCO. Different kinds of operators (quantificational vs. non–quantificational) show different amounts of sensitivity to WCO. In the next sections I argue that the speci-

4 Postal 1993 is a critical analysis of Lasnik and Stowell's (1991) proposal. In the former article the author describes interesting data that complicate WCO phenomenology. Even though these data would definitely deserve further investigation, we will not discuss them here.

ficity of the quantificational operator is relevant for WCO phenomenology, by providing a notional (§3) and an operational definition (§4) of specificity.

3 A FORMALIZATION OF THE NOTION OF SPECIFICITY

Pesetsky (1987) analyzes the discourse properties of interrogative elements and distinguishes them on the basis of their discursive properties. When a *wh*–question asks for answers in which the entities that replace the *wh*–phrase are drawn from a set that is presumed to be salient both to speaker and hearer, the *wh*–phrase is D–linked. Pesetsky distinguishes interrogative elements on the basis of this property, as summarized below.

- *which N*: always D–linked
- *who*, *what*, *how many*, adjuncts: could be D–linked
- *who the hell*, *what the hell*: *aggressively non D–linked*

Enç (1991) provides a semantic formalization of the notion of D–linking.[5] Her proposal is based on Heim's (1982) *File Change Semantics*. This theory accounts for the difference between definite and indefinite DPs through the *familiarity condition* and the *novelty condition*.[6] The *familiarity condition* applies to definites and requires their discourse referents to have been previously introduced in the discourse representation, while the *novelty condition* applies to indefinites and requires them to introduce new referents in the discourse domain. Enç extends this account to include specificity. In her view, specific phrases are equivalent to partitives (e.g. *two of the books*), so they impose one more restriction on the structure of the discourse domain.

Every DP has a double indexing (i, j): i denotes the DP referent and j a set in which i is included (the index of *books* in the partitive indefinite *two of the books*).

(7) Every $[_{DP}\ \alpha]_{<i,j>}$ is interpreted as $\alpha(x_i)$ and
  a. $x_i \subseteq x_j$ if $DP_{<i,j>}$ is plural
  b. $x_i \subseteq x_j$ if $DP_{<i,j>}$ is singular (Enç 1991: 7)

Indices have a definiteness feature: the presence of this feature on the first index marks the DP as definite, while its presence on the second index is associated to its specificity. If index j is definite the DP must be familiar and, as (7) requires that the referent of the DP be a subset of x_j, it must have a specific interpretation, i.e. its referent has to be included in a familiar referent. In contrast, if the index j is indefinite, the DP must be new, so x_j is introduced as a new referent in discourse representation.

Both specific and definite phrases require their discourse referents to be familiar, while non–specific indefinites have to be new. In the case of familiar entities, the nature of the link with discourse referents comes in two types: for definites there should always be identity, while for specifics there is only an inclusion relation, corresponding respectively to *strong* and *weak antecedents* in Enç's system.

5 Enç (1991: fn. 8) explicitly says that D–linking is exactly the same phenomenon as what she characterizes as specificity.

6 Enç 1991 and Heim 1982 use NP instead of DP, but in the text I employ updated terminology.

According to (7) all definites (nouns, pronouns, definite descriptions and demonstratives DP) are specific because identity of referents implies inclusion, so if the first index is definite, the second one is definite, too. Indefinites can be specific or non–specific. Summarizing we obtain the three cases below:

- Definites: i[+definite] j[+definite]
- Specific Indefinites: i[−definite] j[+definite]
- Non–specific Indefinites: i[−definite] j[−definite]

4 INTRODUCING THE SPECIFICITY TESTS

The literature provides a series of operational tests of specificity, namely a series of contexts where it has been argued that the specificity of the extracted DP plays a role in determining the grammaticality of the constructions. The goal of this section is to present these contexts and to show how the idea of specificity the various authors have in mind can be assimilated to the notion formalized in the previous section, following Enç 1991.[7]

4.1 *A. Antireconstruction*

The term *antireconstruction* is introduced by van Riemsdijk and Williams (1981) to refer to the absence of principle C effects that we would expect if the extracted phrase were to be reconstructed in argument position.

Heycock (1995) analyzes the reconstruction possibilities of an extracted phrase in terms of its referentiality. Concerning this notion she quotes works by Comorovski (1989), Kroch (1989), Rizzi (1990) and Cinque (1990) in which it is argued that referentiality is relevant for weak island extraction possibilities. The referential/non–referential contrast can thus be reduced to a specific/non–specific one, in terms of the definition we provided above.

(8) a. [Which stories about Diana$_i$]$_j$ did she$_i$ most object to t$_j$? *Specific*
b. *[How many stories about Diana$_i$]$_j$ is she$_i$ likely to invent t$_i$? *Non–specific*
(Heycock 1995: ex. 33)

(9) a. [Which lies aimed at exonerating Clifford$_i$]$_j$ did he$_i$ expect t$_j$ to be effective? *Specific*
b. *[How many lies aimed at exonerating Clifford$_i$]$_j$ is he$_i$ planning to come up with t$_j$? *Non–specific* (Heycock 1995: ex. 34)

In the non–referential cases, e.g. the object of creation verbs, as in (8-b) and (9-b), there is no presupposed set of entities specified by the complement of the *wh*–operator. This corresponds to a non–presuppositional interpretation, and in Enç's (1991) terms to a non–specific interpretation. In fact, the restriction of the operator is not a set of entities previously introduced in the discourse and familiar to the speaker and the hearer, which means that the index of the restriction is non–specific. On the other hand, in referential case like (8-a) and (9-a) there is a set of presupposed entities (for example, a set of presupposed

7 Capitals at the begininning of subsection headings are used to cross–reference with the following material (§5 and §6) where the contexts presented here are used as tests.

stories about Diana whose existence is known to the speaker and the hearer), and this amounts to a D–linked interpretion, or, in Enç's system, a specfic interpretation.

The semantics of *which* presupposes a set of entities defined by the complement of the operator, but this is not the case with interrogatives introduced by *how many*. While in (8-b) and (9-b) above *how many* has a pure cardinal reading, this phrase is actually ambiguous with respect to specificity. In other contexts, *how many* interrogatives can have a referential interpretation, which presupposes the existence of a set of entities. In these circumstances we have antireconstruction effects, as expected. For example, in (10) a familiar set of stories and of lies, respectively, have to be presupposed because of the lexical choice.

(10) a. ?[How many stories about Diana$_i$]$_j$ was she$_i$ really upset by t$_j$? *Specific*
b. [How many lies aimed at exonerating Clifford$_i$]$_j$ did he$_i$ claim that he$_i$ had no knowledge of t$_j$? *Specific* (Heycock 1995: ex. 40)

On the basis of the proposed analysis, antireconstruction effects are a hallmark of the specificity of the extracted element. So if WCO is sensitive to specificity, we expect that in the antireconstruction contexts, WCO effects are absent. In contrast, if a principle C violation shows up, the extracted phrase must be non–specific and WCO effects should arise.

4.2 *B. Weak islands extraction*

Comorovski (1989), Kroch (1989), Rizzi (1990) and most notably Cinque (1990) have originally established that specific DPs can be (at least marginally) extracted from weak islands, contrary to other elements (non D–linked DPs, predicates, parts of arguments, adjuncts). Rizzi (2001a) systematically collects data that support the treatment of the asymmetries in terms of specificity/non–specificity and proposes a theory that plays a crucial role in the analysis of WCO that I argue for here (§§7.2). In this section I will concentrate only on the empirical part, leaving aside the theoretical considerations that will be discussed in §§7.1.

Let's consider a paradigmatic case of the asymmetry:

(11) a. ?Quale dei libri che ti servono non sai dove trovare? *Specific*
'Which (one) of the books (that) you need don't you know where to find?'
b. *Che diavolo non sai dove trovare? *Non–specific*
'What the hell don't you know where to find?' (Rizzi 2001a: ex. 19)

In (11-a) the D–linked *wh*–phrase can be extracted from a weak island, while in (11-b) the extraction of an aggressively non D–linked phrase causes ill–formedness.

Apart from paradigmatic cases of D-linking like (11), Rizzi, following Heycock 1995, notes that *how many* is ambiguous with respect to specificity and weak island extraction possibilities. There are different strategies for disambiguating these phrases: apart from lexical choice (illustrated in §4.1, ex. (10)), the use of some modifiers (*up to how many*, *how many NPs more*) induces a pure quantitative reading of the DP, as observed by Obenauer (1994). Extraction of these phrases from a weak island is impossible (12-b), as expected.

(12) a. ?Quanti problemi non sai come risolvere? *Specific*
'How many problems don't you know how to solve?'
b. *Fino a quanti problemi non sai come risolvere (in un'ora)? *Non–specific*
'Up to how many problems don't you know how to solve (in one hour)?'
(Rizzi 2001a: ex. 24)

On the basis of this proposal, the possibility of weak island extraction of a phrase is thus a diagnostic of its specificity.

4.3 *C. Participial agreement in French*

Obenauer (1994) observes that past participle agreement triggered by object *wh*–movement in French interrogatives is possible only with specific DPs. *Combien de fautes* in (13-a) can only have a specific interpretation; if there is a modifier which excludes this interpretation, agreement is ungrammatical ((13-b)–(13-c)).

(13) a. Dis-moi combien de fautes tu as faites. *Specific*
tell me how many of mistakes you have made-*agr*
b. Jusqu'à combien de fautes ont-ils fait*(es), vos élèves?
up to how many of mistakes have-they made-*(*agr*), your students?
c. Combien de fautes en moins a-t-il fait*(es) cette fois?
how many of mistakes fewer has-he made-*(*agr*) this time?
(Obenauer 1994: 173, ex. 16,17-a,17-b)

Obenauer (1994) notes that these data are quite delicate. First of all, agreement is optional. Moreover, two phenomena interfere with these data: on the one hand, agreement tends to be suppressed in spoken French; on the other, the normative rule taught at school imposes past participial agreement on all cases, and this goes against some of the naturalistic data.

In any case, if we disregard colloquial registers and hypercorrection, the grammaticality of past participle agreement is a good test to appreciate the role of specificity in WCO.

4.4 *D. Clitic doubling in Romanian*

Dobrovie-Sorin (1994: ch. 6) establishes that the distribution of accusative clitic doubling in Romanian Ā constructions depends on the specific vs. non–specific nature of the moved *wh*–phrase: *cine* ('who') and *ce*(N') ('what') do not allow the presence of the clitic (14-b), while *care* ('which') requires it (14-a). As expected, *cîti* ('how many') is ambiguous, and can require or forbid the presence of the clitic according to its interpretive properties.

(14) a. Pe care (băiat) *(l–)ai văzut? *Specific*
pe which (boy) him–have (you) seen?
'Which one (which boy) did you see?'
b. Pe cine (*l–)ai văzut? *Non–Specific*
pe who$_i$ him$_i$–have (you) seen?
'Who did you see?' (Adapted from Dobrovie-Sorin 1994: ex. 3-a,2-a-i,2-b-i)

According to Dobrovie-Sorin's proposal, clitic doubling is therefore a hallmark of the specificity of an extracted phrase.

4.5 *E. Extraction from existential constructions*

The post–copular subject of existential sentences with expletive *there* must be an indefinite DP or, using a term from Milsark 1977, a *weak NP*. This so–called *Definiteness Restriction* is illustrated by the contrast between (15) and (16): *strong NPs* in (16) are incompatible with *there*.

(15) a. *There is John/the man/every man in the room. *Specific*
b. *There are they/the people/most people in the room. *Specific*

(16) a. There is a man/one man in the room. *Non–Specific*
b. There are men/two men/many men in the room. *Non–Specific*

Heim (1987) argues that the *Definiteness Restriction* must be applied at LF, the level where scope ambiguities are disambiguated and wh-elements are subject to partial reconstruction.

According to Heim, *which* phrases fail to reconstruct and bind an individual variable, i.e. a variable ranging over a set of individuals, and syntactically corresponding to a DP gap; this counts as a strong element (in Milsark's sense), violating the definiteness restriction (17-a). *How many* phrases are instead subject to reconstruction of the restrictive term; the operator binds a non-individual variable, corresponding to a subpart of the DP and ranging over a set of quantities or degrees. Since there is no *strong* individual variable, the *Definiteness Restriction* is not violated (17-b).

(17) a. ??[Which one of the two men was there in the room? *Specific*
LF: which one of the two men was there v in the room?
b. [How many soldiers] does John think there were in the infirmary? *Non–specific*
LF: *Wh–Op* does John think there were $x - many\ soldiers$ in the infirmary?
(Heim 1987: ex. 15,14, quoting Safir 1982)

While the question in (17-a) includes an individual variable, a strong element incompatible with *there*, (17-b) involves an occurrence with restricted scope of *x-many N*, which is characterized as a weak phrase (despite the definiteness of the x variable itself).

(18) a. ??The men/many men who there were in the room were eating guavas. *Specific*
LF: The men/many men who there were v in the room were eating guavas
b. The very few books that/$\emptyset$ there were on the shelves were all mysteries. *Amount relative* $\Rightarrow$ *Non–specific*
LF: the very few books *Rel–Op* that/$\emptyset$ there were $x\,few books$ on his shelves were all mysteries (Heim 1987: ex. 33,30, quoting Safir 1982)

The relatives in (18) are examples of *amount relatives* in terms of Carlson 1977, since they involve quantities or degree descriptions. This interpretation is semantically encoded

by the occurrence of *x-many Ns* in argument position, instead of an individual variable, as is the case in (18-a)[8]

Heim's proposal can be reinterpreted in our terms: non–individual variables correspond to a non–specific interpretation, as there is no presupposed set over which the variable bound by the operator ranges. So interrogatives with *how many* and amount relatives with *there* constitute tests for non–specificity: when the trace of an extracted phrase can occur in clauses with existential *there*, the element is non–specific and WCO effects are expected, according to my hypothesis.

4.6 *F. Scope reconstruction*

Longobardi (1986) observed that quantifier scope reconstruction is blocked by weak islands. In the absence of islands, though, the scope properties of an operator are preserved under movement. In (19), for example, no island is crossed by the moved phrase and therefore two interpretations are possible. The moved phrase *quanti pazienti* ('how many patients') can have scope over *ognuno dei medici* ('every one (of the) doctors'). In this case a natural reply to the question is a number, as illustrated in (19-b), without distributive reading. A distributive reading is possible, too: *ognuno dei medici* can take scope over the extracted phrase *quanti pazienti*. In this case, a natural reply to the question is given in (19-a).

(19) [Quanti pazienti]$_i$ pensi che ognuno dei medici riesca a visitare
[how many patients]$_i$ do you think that every one of the doctors can visit
t$_i$ in un'ora?
t$_i$ in one hour?
a. I think Doctor Brown could visit three patients in one hour, Doctor Smith five, . . . *Distributive reading*
b. Only three. *Non–distributive reading* (Adapted from Cinque 1990: ex. 33-a)

The distributive reading implies reconstruction of the interrogative phras, but this reconstruction is impossible if a weak island is crossed. In this case, the question is marginally possible only in the non–distributive reading, asking about a number (20-b).

(20) [Quanti pazienti]$_i$ non pensi che ognuno dei medici riesca a
[how many patients]$_i$ don't you think that every one of the doctors can
visitare t$_i$ in un'ora?
visit t$_i$ in one hour?
a. *I don't think Doctor Brown could visit three patients in one hour, Doctor Smith five, . . . *Distributive reading*
b. ?Three patients. *Non–distributive reading*
(Adapted from Cinque 1990:ex. 34-b)

Cinque (1990) argues that scope reconstruction properties depend on the referential nature of the extracted operator, which is Enç's notion of specificity. Only the non–specific interpretation allows the distributive reading. If a phrase can be extracted from a weak island with a grammatical result (20-b), it should be specific (cf. §4.2), and the possibility

8 Heim also considers comparatives, but to avoid complications I will not discuss this kind of construction here.

of a distributive reading (present in (19-a)) is lost. In fact, as we said, *how many* phrases are ambiguous between a specific and a non–specific reading.

In conclusion, the impossibility of scope reconstruction is a diagnostic of the specificity of the extracted phrase. In other words, only non–specific phrases can reconstruct.

5 METHODOLOGICAL REMARKS

In order to actually use these tests to establish the relevance of specificity for the WCO phenomenology, some preliminary methodological remarks are necessary.

Table 1 is a summary of the operational tests I have introduced and how their grammaticality varies according to the specificity of the involved DP; table 2 illustrates the predictions of these tests with respect to the hypothesis.

	+ SPECIFIC	– SPECIFIC
A. Antireconstruction effect (Heycock 1995)	✓	*
B. Weak Island extraction (Cinque 1990)	✓	*
C. Participial agreement in French (Obenauer 1994)	✓	*
D. Clitic doubling in Romanian (Dobrovie-Sorin 1994)	✓	*
E. Extraction from existential constructions (Heim 1987)	*	✓
F. Scope reconstruction (Cinque 1990)	*	✓

Table 1: Specificity tests

	+ SPECIFIC	– SPECIFIC
A. Antireconstruction effect (Heycock 1995) WCO Effects	✓ absent	* present
B. Weak Island extraction (Cinque 1990) WCO Effects	✓ absent	* present
C. Participial agreement in French (Obenauer 1994) WCO Effects	✓ absent	* present
D. Clitic doubling in Romanian (Dobrovie-Sorin 1994) WCO Effects	✓ absent	* present
E. Extraction from existential constructions (Heim 1987) WCO Effects	* absent	✓ present
F. Scope reconstruction (Cinque 1990) WCO Effects	* absent	✓ present

Table 2: Specificity tests and their predictions

In the cases of antireconstruction A., weak island extraction B., French past participle agreement C., and clitic doubling in Romanian D., the base test gives a grammatical result in the specific case. In the specific case we can combine the base test and WCO in the same configuration; the prediction is that the example remains grammatical whenever

WCO effects are neutralized. In the non–specific case, however, the base test gives an ungrammatical result; therefore the base test and WCO cannot be combined in the same example, or else the potential agrammatically could not be ascribed to a WCO violation. In this case the only possibility is to separate the base test and the WCO configuration into two distinct examples, which constitute a (nearly) minimal pair.

To illustrate this point, consider again the paradigm of weak island extraction, repeated in (21).

(21) a. ?Quale dei libri che ti servono non sai dove trovare? *Specific*
'Which (one) of the books (that) you need don't you know where to find?'
b. *Che diavolo non sai dove trovare? *Non–specific*
'What the hell don't you know where to find?'

In the specific case (21-a) we can add a WCO configuration and the sentence should remain grammatical, if the hypothesis that specificity suspends WCO is true. But in the non–specific case (21-b), the extraction from a weak island is ungrammatical because *che diavolo* ('what the hell') is non–specific. To test what happens in WCO cases we cannot have a configuration with an extraction from a weak island; if we did, we could not ascribe agrammaticality to WCO alone, as it is ungrammatical because of the extraction.

Consider now the case of extraction from existential sentences E., repeated below (22):

(22) a. ??Which one of the two men was there in the room? *Specific*
LF: which one of the two men was there v in the room?
b. How many soldiers does John think there were in the infirmary? *Non–specific*
LF: *Wh–Op* does John think there were $x - \textit{many soldiers}$ in the infirmary?
(Heim 1987: ex. 15,14, quoting Safir 1982)

The test gives a grammatical result with non–specific phrases; here, we can combine the base test with the WCO configuration in the same sentence. The hypothesis predicts that a WCO effect will show up, and the predicted ill-formedness will be ascribed only to this. In the specific case, though, the base test is ungrammatical and, as before, it is necessary to use two different examples; the prediction is that in the WCO configuration the effect does not show up because the *wh*–phrase is specific.

Finally, consider the scope reconstruction paradigm F. :

(23) [Quanti pazienti]$_i$ pensi che ognuno dei medici riesca a
[how many patients]$_i$ (do) you think that every one of the doctors can
visitare t$_i$ in un'ora?
visit t$_i$ in one hour?
a. I think Doctor Brown could visit three patients in one hour, Doctor Smith five, ... *Distributive reading* → *Non–specific*
b. Only three. *Non–distributive reading* → *Specific*

In the base test we have predictions about possible interpretations instead of grammaticality judgments. In the specific case we expect that WCO is suspended but that the only possible reading is the one with wide scope of the *wh*–phrase with respect to another operator, that is without scope reconstruction. In the non–specific case there is scope reconstruction

but WCO effects are predicted; thus a WCO configuration is incompatible with scope reconstruction.

6 SPECIFICITY TESTS

6.1 *A. Antireconstruction*

In order to add a WCO configuration in a pragmatically plausible way, it is necessary to modify the original antireconstruction examples. The sentences in (24) are modified versions of Heycock's original ones. (24-a), with a partitive *wh*–phrase, shows antireconstruction effects; in (24-b) the reference to uncertain future makes it clear that there is not a familiar set, so we have a non–specific interpretation, and a principle C violation emerges, as expected.[9]

(24) a. Dimmi [quale dei colleghi di Maria$_j$]$_i$ pensi che lei$_j$ abbia invitato t$_i$.
'Tell me [which of Maria$_j$'s colleagues]$_i$ do you think she$_j$ invited t$_i$.'

b. *Dimmi [quanti colleghi di Maria$_j$]$_i$ pensi che lei$_j$ incontrerà t$_i$ durante la carriera.
'Tell me [how many of Maria$_j$'s colleagues]$_i$ do you think she$_j$ will meet during her career t$_i$.'

In (25-a), the combined case, there is antireconstruction, and despite the presence of a potential WCO configuration, the effect does not show up. Examples (25-b)–(25-c) test WCO in isolation. The extraction of the phrase that in (24-a) shows antireconstruction does not show WCO effects in (25-b). Instead the extraction of a non–specific phrase, which in (24-b) is subject to principle C, shows WCO:

(25) a. Dimmi [quale dei colleghi di Maria$_j$]$_i$ sua$_i$ moglie pensa che lei$_j$ abbia sedotto t$_i$. *(Combined case)*
'Tell me [which of Maria$_j$'s colleagues]$_i$ does his$_i$ wife think (that) she$_j$ seduced t$_i$.'

b. Dimmi [quale dei colleghi di Maria]$_i$ pensi che sua$_i$ moglie abbia minacciato t$_i$.
'Tell me [which of Maria$_j$'s colleagues]$_i$ do you think (that) his$_i$ wife threatened t$_i$.'

c. *Mi chiedo [quanti impiegati]$_i$ le loro$_i$ mogli sperano che il Presidente assumerà t$_i$ nel corso del prossimo anno.
'I wonder [how many workers]$_i$ do their$_i$ wives hope (that) the President will hire t$_i$ during next year t$_i$.'

6.2 *B. Weak islands extraction*

The extractions in (26) are the basic paradigm modified in order to add WCO. In the example in (26-a) we see the extraction of a D–linked phrase, while the example in (26-b)

9 I use indirect questions with subjunctive in order to avoid subject inversion in Italian and its possible interference with the phenomenon at issue here.

involves an *aggressively non D–linked* phrase. Finally, in (26-c) the modifier forces a non–specific interpretation (Obenauer 1994).

(26) a. (?)Dimmi [quale degli studenti interrogati]$_i$ pensi che Gianni non sappia come valutare t$_i$.
'Tell me [which of the evaluated students]$_i$ do you think John does not know how to grade t$_i$.'
b. ?*Mi chiedo [chi diavolo]$_i$ pensi che Gianni non sappia come valutare t$_i$.
'I wonder [who the hell]$_i$ do you think John doesn't know how to grade t$_i$.'
c. *Mi chiedo [fino a quanti studenti]$_i$ pensi che Gianni non sappia se riuscirà a interrogare in un'ora t$_i$.
'I wonder [at most how many students]$_i$ do you think John does not know if he will be able to evaluate t$_i$ in one hour.'

As far as the specific case is concerned, both a combined question with weak island extraction and WCO (27-a) and one with WCO alone (27-b) are acceptable: no WCO effect arises. In the non–specific case, we test the WCO configuration in isolation and the WCO effect emerges, as expected (27-c)–(27-d).

(27) a. (?)Dimmi [quale degli studenti interrogati]$_i$ pensi che il suo$_i$ insegnante non sappia come valutare t$_i$. *(Combined case)*
'Tell me [which of the evaluated students]$_i$ do you think (that) his$_i$ teacher doesn't know how to grade t$_i$'
b. (?)Dimmi [quale degli studenti interrogati]$_i$ pensi che il suo$_i$ insegnante voglia bocciare t$_i$.
'Tell me [which of the evaluated students]$_i$ do you think that his$_i$ teacher would fail t$_i$
c. ?*Mi chiedo [chi diavolo]$_i$ pensi che il suo$_i$ insegnante voglia bocciare t$_i$.
'I wonder [who the hell]$_i$ do you think (that) his$_i$ teacher would fail t$_i$
d. *Mi chiedo [quanti studenti al massimo]$_i$ pensi che il loro$_i$ insegnante possa interrogare t$_i$ in un'ora.
'I wonder [at most how many students]$_i$ do you think (that) their$_i$ teacher could evaluate t$_i$ (with)in one hour.

The paradigm in (27) shows that the predictions are confirmed by the grammaticality judgments.

6.3 *C. Participial agreement in French*

For the modified base paradigm, my informants gave judgments congruent with those reported in Obenauer 1994. The example in (28-a) is grammatical in the specific interpretation, with past participle agreement; meanwhile, in examples (28-b) and (28-c), the modifiers force a non–specific reading and past participle agreement is ungrammatical.

(28) a. Dis-moi [quelles voitures]$_i$ FIAT a mises sur le marché t$_i$ à prix
tell me [which cars]$_i$ FIAT has put-*agr* on the market t$_i$ at a price
réduit.
reduced

b. ?*Dis-moi [jusqu'à combien de voitures]$_i$ les producteurs ont mises sur
tell me [up to how many cars]$_i$ the producers have put-*agr* on
le marché t$_i$ à prix réduit.
the market t$_i$ at a price reduced

c. ?*Dis-moi [combien de voitures en plus]$_i$ FIAT a mises sur le marché
tell me [how many of cars more]$_i$ FIAT has put-*agr* on the market
t$_i$ cette année.
t$_i$ this year

The example in (29-a) is parallel to that in (28-a): there is a phrase which can trigger agreement, so it is specific and, as expected, it does not give rise to WCO. Instead the examples in (29-b) and (29-c) are parallel to those in (28-b) and (28-c), they involve phrases which cannot trigger agreement and, as predicted, they give rise to WCO.

(29) a. Dis-moi [quelles voitures]$_i$ leur$_i$ producteur a mises sur le marché t$_i$
tell me [which cars]$_i$ their producers have put on the market t$_i$
à prix réduit.
at a price reduced

b. ?*Dis-moi [jusqu'à combien de voitures]$_i$ leur$_i$ producteur a mis sur le
tell me [up to how many cars]$_i$ their producer has put on the
marché t$_i$ à prix réduit.
market t$_i$ at a price reduced

c. ?*Dis-moi [combien de voitures en plus]$_i$ leur$_i$ producteur a mis sur le
tell me [how many of cars more]$_i$ their producer has put on the
marché t$_i$ cette année.
market t$_i$ this year

6.4 *D. Clitic doubling in Romanian*

Dobrovie-Sorin (1994) argues that specific elements like *care (băiat)* ('which (boy)') in (30-b) are not quantificational, whereas *cine* ('who') in (30-a) is quantificational.

(30) a. Pe cine (*l–)ai văzut? *Non–Specific*
pe who$_i$ him$_i$–have (you) seen?
'Who did you see?'

b. Pe care (băiat) *(l–)ai văzut? *Specific*
pe which (boy) him–have (you) seen?
'Which one (which boy) did you see?'

(Adapted from Dobrovie-Sorin 1994: ex. 2-a-i,2-b-i,3-a)

In order to establish her claim, she uses the WCO test.

(31) a. *Pe cine$_i$ a certat mama lui$_i$ t$_i$?
pe who$_i$ has scolded mother his$_i$ t$_i$?

'Who$_i$ did his$_i$ mother scold t$_i$?'

b. *[Ce copil]$_i$ ar pedepsi părinţii lui$_i$ t$_i$?
[what child]$_i$ would punish parents his$_i$ t$_i$?
'[What child]$_i$ would his parents punish t$_i$?'
(Adapted from Dobrovie-Sorin 1994: ex. 12-a,12-b)

(32) a. Pe care$_i$ l$_i$–a certat mama lui$_i$ t$_i$?
pe which$_i$ him$_i$–has scolded mother his$_i$ t$_i$?
'[Which one]$_i$ did his$_i$ mother scold t$_i$?'

b. Pe al cui elev$_i$ îl$_i$ nedreptăţesc prietenii lui$_i$ t$_i$?
pe whose student$_i$ him$_i$ wrong friends his$_i$ t$_i$?
'[Whose student]$_i$ do his$_i$ friends wrong t$_i$?' (Dobrovie-Sorin 1994: ex. 13)

We know that *cine* ('who') and *ce* ('what') have a non–specific interpretation as they do not allow clitic doubling (30-a). Thus (31) is a test that confirms that WCO effects do show up with non–specific antecedents. In contrast *pe care* ('which') and *pe al cui* ('whose') in (32) have a specific interpretation, as they require clitic doubling. As we know, in the specific case we can combine the base test and WCO because we expect a grammatical result if specificity suspends WCO.[10]

6.5 *E. Extraction from existential constructions*

The examples in (33) are modified versions of the ones quoted from the literature.

(33) a. How many soldiers does the commander think there are *t* in the infirmary?

b. These supplies should be enough for the very few soldiers (that) the commander thinks there are *t* in the trenches at this point.

When the trace of an extracted element can occur in *there* contexts the element is non–specific and we expect WCO violations. If we combine the base test and WCO, a WCO violation is expected.

(34) a. ?*[How many soldiers]$_i$ does their$_i$ commander think there are t in the infirmary? *(Combined case)*

b. ?*These supplies should be enough for [the very few soldiers]$_i$ that their$_i$ commander thinks there are t in the trenches at this point. *(Combined case)*

If the base test is ill-formed, the extracted phrase is specific (35-a). In this case we have to keep the base test and the WCO configuration separated in order to see the lack of WCO effects (35-b):

(35) a. ??Which students does the professor think there are t in the great-hall?

b. [Which students]$_i$ does their$_i$ professor think are t in the great-hall?

10 In this test, for the specific case it is not possible to have an example with clitic doubling and WCO separated: the presence of specific *wh*–phrases produces an agrammatical result without clitic doubling (30-b).

6.6 *F. Scope reconstruction*

The question in (36) is parallel to the example in (19). The allowable responses show that both a distributive non–specific interpretation (36-a) and a specific interpretation of *quanti pazienti* are grammatical.

(36) [Quanti pazienti]$_i$ pensi [che ognuno dei medici sostenga che
[how many patients]$_i$ do you think (that) every one of the doctors claims that
Maria ha accompagnato t$_i$]?
Maria has taken t$_i$?
a. Doctor Brown three, Doctor Smith five, . . . *Distributive reading*
b. Three. *Non–distributive reading*

In the test paradigm with WCO in (37) the distributive non–specific reading is unavailable. It is reasonable to interpret this fact as a consequence of the presence of the WCO configuration: it forces the non–distributive specific interpretation (37-b), in order to prevent the potential violation.

(37) [Quanti pazienti]$_i$ pensi [che ognuno dei medici sostenga che
[how many patients]$_i$ do you think (that) every one of the doctors claims that
la loro$_i$ madre ha accompagnato t$_i$]?
(the) their$_i$ mother has taken t$_i$
a. *Doctor Brown three, Doctor Smith five, . . . *Distributive reading*
b. ?Three. *Non–distributive reading*

6.7 *Conclusion*

The results of the tests we discussed in this section confirm the hypothesis that WCO is suspended if the antecedent is specific. The following empirical generalization ensues.

(38) In an Ā chain WCO effects arise only if the extracted phrase is non–specific.

The discussion of some potential counterexamples to this claim is postponed to §§8.2. (38) is the starting point of the next section, which is devoted to a theoretical proposal accounting for specificity effects in terms of LF chains.

7 WCO AND LF CHAINS

My analysis is crucially based on Rizzi's (2001b) account of reconstruction and weak island extraction asymmetries, which I have presented as specificity tests 4.1 and 4.2). In a nutshell, Rizzi reinterprets his own earlier proposal based on the notion of referential index (Cinque 1990; Rizzi 1990) in terms of different LF structures for specific and non–specific elements. These two configurations and the *Weakest Crossover* one give a tripartite typology of LF configurations. A binding mechanism based on non–distinctness of φ features applied to the LF structures accounts for the WCO phenomenology currently under consideration.

7.1 *Specificity and LF chains*

Rizzi's (2001a) proposal is based on the copy theory of traces (Chomsky 1995: ch. 3), the assumption of LF deletion to satisfy the *Principle of Full Interpretation*, and a representational definition of traces/copies.

The author assumes the following definition of chain at LF:[11]

(39) $(A_1, \ldots, A_n)$ is a chain if and only if, for $1 < i < n$
  a. $A_i = A_{i+1}$
  b. A_i C–commands A_{i+1} , A_{i+1} is in a Minimal Configuration with A_i
  (Rizzi 2001a: ex. 15)

Both constructions in (40) should be ungrammatical according to condition (39), but the sentence with a specific DP (40-a) is acceptable:[12]

(40) a. ?Which problem do you wonder how to solve <which problem>?
  b. *How do you wonder which problem to solve <how>? (Rizzi 2001a: ex. 9)

To account for this exception Cinque (1990) and Rizzi (1990) propose that D–linked *wh*–phrases are not subject to the Relatived Minimality condition (RM) (Rizzi 1990). In fact, such phrases can be connected to their traces through a mechanism different from standard chain formation which is subject to locality conditions. In these proposals the notion of *referential index*, an index possessed only by specific arguments, plays a crucial role. Nevetheless this analysis has been criticized on empirical and conceptual ground (Frampton 1991 and others).

Rizzi (2001a) proposes that the restriction of non D–linked *wh*–elements must reconstruct in their base position at LF and that only the operator is allowed to stay in the left periphery (for interpretive reasons) (41). In this way the operator is separated from its restriction and we obtain an unrestricted quantification. On the contrary, the restriction of *D–linked wh*–elements stays in the left periphery at LF because of its topical nature (42).

(41) *Quanti soldi non sai come guadagnare <quanti soldi>? *Non–specific*
  'How much money don't you know how to earn?'
  LF: Quanti <soldi> non sai come guadagnare <quanti> soldi
  (Adapted from Rizzi 2001a: ex. 27-b)

(42) ?Quanti dei soldi che ti servono non sai come guadagnare <quanti dei soldi che ti servono>? *Specific*
  'How much of the money that you need don't you know how to earn?'

11 The notion of *Minimal Configuration*, originally proposed in Rizzi 2001b, is a reformulation of classical *Relativized Minimality* (Rizzi 1990):

(i) Y is in a Minimal Configuration with X if and only if there is no Z such that
  a. Z is of the some strutural type as X, and
  b. Z intervenes between X and Y. (Rizzi 2001b: ex. 4 and Rizzi 2001a: ex. 8)

12 According to the copy theory of traces, traces are complete but silent copies of their antecedents. Copy–traces are expressed by the angle brackets notation.

LF: Quanti dei soldi che ti servono non sai come guadagnare <quanti dei soldi che ti servono> (Adapted from Rizzi 2001a: ex. 27-c)

The deletion of the restriction in the LF representation in (41) triggers a *shrinking* mechanism that redefines the portion of structure that counts as trace/copy in the base position: only *quanti*, is interpreted in the left periphery, has a trace status, while the restriction, being deleted from the left periphery, is not part of the trace structure in base position. This mechanism accounts for reconstruction asymmetries between specific and non–specific cases, since their restriction is interpreted in argumental position. Relativized Minimality (RM) is an LF condition and there are two possible mechanisms to link moved phrases to their base position: long distance binding and chain formation. D–linked elements, which do not undergo reconstruction at LF, can enter into long distance binding with their traces/copies. Non D–linked *wh*–operators, on the other hand, do not have not access to this mechanism, so there is a movement chain subject to RM that produces an ungrammatical result.

Long distance binding (independently justified for pronoun binding by quantifiers) is sensitive to C–command and is restricted to full DPs, as only these can enter into binding relations. Moreover, and crucially for my analysis, Rizzi notes:

> "...The binding relation also involves some kind of matching between binder and bindee, not as strong as the full identity of internal structure holding in chains [...] but at least some condition of non–distinctness of grammatical features." (Rizzi 2001a: 151)

It is plausible to suppose that grammatical features of DPs are φ features.[13]

The binding mechanism accessible to specific DPs is formalized as in (43):

(43) A binds B only if
  a. A and B are DPs non–distinct in grammatical features, and
  b. A C–commands B

(43) can be used as an alternative mechanism to the locality principle expressed in terms of Minimal Configuration, (39-b):

  c. A_{i+1} is in a Minimal Configuration with A_i or is bound by A_i.

13 Rizzi (2001a) analyzes Obenauer's (1994) data on past participle agreement in French 4.3. A non–specific chain cannot trigger agreement because it has φ features only on the tail (ii.), while agreement need to be supported at LF by a DP with matching features in local configuration (i.).

(i) Dis–moi combien de fautes tu as faites
'Tell me how many mistakes you have made+Agr'
LF: Combien de fautes [tu as [<combien de fautes> faites <combien de fautes>]]
(Adapted from Rizzi 2001a: ex. 49)

(ii) Jusqu'à combien de fautes ont–ils fait(*es), vos élèves?
'Up to how many mistakes have they made(+Agr), your students'
LF: Combien [DP avoir [<combien> de fautes fait(es) <combien> de fautes]]
(Adapted from Rizzi 2001a: ex. 50-a)

7.2 *WCO configurations*

Let us now consider the WCO configurations in terms of the two types of LF chains (specific/non–specific) proposed by Rizzi, and the *Weakest crossover* configuration exemplified in the Lasnik and Stowell's (1991) analysis. If we put these together we obtain the three configurations illustrated in (44).

(44) a. *Non–specific chain:* Op [...pro...] [<Op> NP]$_\varphi$
b. *Specific chain:* DP$_\varphi$ [...pro$_\varphi$...] <DP$_\varphi$ >
c. *Weakest Crossover configuration:* DP$_\varphi$ [...pro$_\varphi$...] e$_\varphi$

In my analysis I assume, contrary to traditional accounts (beginning with Chomsky's (1976) influential proposal), that the operator can bind the WCO pronoun directly from its Ā–position if it has the necessary φ features.

In the non–specific chain in (44-a) only the operator stays in the left periphery, without restriction. It doesn't have φ features to satisfy the non–distinctness condition and therefore cannot establish a binding relation with the pronoun. As a result binding is impossible and WCO arises. To be concrete, consider the following example (45) with a non–specific operator:[14]

(45) *[Up to how many students]$_i$ do you think that their$_i$ professor can evaluate in one hour <up to how many students>$_i$?
LF:[Up to how many <students>]$_i$ do you think that their$_i$ professor can evaluate <up to how many> students$_\varphi$

The restriction of the non–specific operator is reconstructed in the LF representation so that we have a bare operator, and not a full DP endowed with φ features, as these are on *students*. Thus *up to how many* cannot bind the pronoun from the C–commanding Ā position and a WCO effect arises.

As for specific chains (44-b), a full DP endowed with φ features is present in the left periphery; these features match those of the pronoun, which can therefore be syntactically bound by the DP operator from the Ā position. Consider the example (46):

(46) [Which famous professor]$_i$ do you think that his$_i$ students admire <which famous professor>?
LF: [Which famous professor$_\varphi$]$_i$ do you think that his$_i$ students admire <which famous professor>

The restriction of the specific *wh* element stays in the left periphery at LF. We threfore have a full DP endowed with φ features possessed by the restriction *professor*. Thus the full DP endowed with φ features *which famous professor* can bind the pronoun from the Ā position and the WCO violation does not appear.

In the *Weakest Crossover* configuration (44-c) (for concreteness, look at the topicalization reported below (47)), there are two distinct chains, since according to Lasnik and Stowell's (1991) hypothesis, the moved DP is referential and the gap is a null referential element *e*.

14 In (45) and other examples with an embedded clause, there is a copy/trace in the Spec of the embedded CP but it is omitted for simplicity.

The pronoun can establish a coreference relation with one of those two categories without having to be syntactically bound by the moved DP (Reinhart 1983).[15] [16]

(47) John$_i$ [*Null Op.*$_i$ [I believe his$_i$ mother loves e$_i$]] (Lasnik and Stowell 1991: ex. 33-a)

The three configurations presented and the features transmission mechanism thus account for the data and open a new perspective on WCO. In the next section a possible extension of the analysis and some empirical problems are presented.

8 FUTURE EXTENSIONS AND REFINEMENTS

In the first part of this section I will show how the analysis developed can be linked to recent proposals on the syntax and semantics of pronominal features. Then some empirical complications for the hypothesis that WCO is suspended when the antecedent is specific are summarized for future inquiry.

8.1 *Feature transmission under variable binding*

Heim (2005) discusses the issue of uninterpreted features on bound pronouns. For instance, the person feature on the possessive pronoun in VP ellipsis contexts can be uninterpreted, hence invisible at LF. This is illustrated in (48-a):

(48) I did my homework, but you didn't.
  a. you didn't do *your* homework.
  b. you didn't do *my* homework. (Adapted from Schlenker 2003: §§§7.1.1)

To account for these data Heim (2005) proposes a principle of *feature transmission under variable binding*: some features of a bound pronoun are not specified on the pronoun itself, but are transmitted to it in the morphological component by the Ā operator which binds it at LF. For this reason these features are invisible on the pronoun at LF but they shape its morphological form.

According to Heim's analysis, in these cases the pronoun is bound from an Ā position. Thus, it is natural to assume that in general they could be bound directly from Ā positions, as I did in my analysis. The detailed development of this connection would link the study of WCO to the syntax and semantics of pronominal features.

8.2 *Some open empirical issues*

The specificity of the antecedent does not neutralize WCO in all potential configurations. There are some cases where the effect is present even if the antecedent seems specific,

15 If we do not adopt the coreference solution, the moved element in (44-c) can legitimately bind the pronoun: as the DP is not a quantifier, it is not possible to separate the operator and the lexical restriction like in (44-a); so the DP in the left periphery has φ features at LF that allow it to bind the pronoun.

16 The C–command requirement has been criticized empirically. In a nutshell, cases where a variable is too deeply embedded to C–command the pronoun but where binding by the operator is possible are problematic. Bianchi (2001) collects the relevant data. See Büring (2004) for an approach to binding cases, without C–command, based on E–type pronouns.

including phrases focalized by in–situ operators, constructions with focalized antecedents, partitive quantificators, and restrictive relatives with definite heads.

The presence of a focalization operator in (49) induces WCO effects even if the antecedent *John* is definite.[17]

(49) ?*His$_i$ mother loves even/only John$_i$.

The new information focus in (50), with main accent on *JOHN* is sensitive to WCO despite the antecedent being a proper name, thus definite.[18] [19]

(50) *His$_i$ mother loves JOHN$_i$.

The sentence in (51) involves a partitive quantifier, a clear case of a specific phrase.[20]

(51) *His$_i$ mother loves [everyone of these children]$_i$.

In English restrictive relatives headed by definite DPs, WCO effects are not neutralized (53). [21] [22]

(52) ?Lo studente$_i$ che i suoi$_i$ insegnanti hanno bocciato t$_i$.
the student$_i$ that his$_i$ teachers have failed.

(53) ?*The man who$_i$ the woman he$_i$ loved betrayed - is despondent.
(Adapted from Chomsky 1976: ex. 100,101)

Concerning the cases which involve focalized elements and quantifiers moved at LF, it is possible to speculate that they move quite low in the structure, to a position where they cannot bind the pronoun. Kayne (1998) discuss data on focus that support an analysis along these lines. As far as the relatives are concerned, there is evidence that the determinate article is outside the head of the relative (Kayne 1994: ch. 8; Bianchi 1999: ch. 2). The detailed study of these cases is left for future inquiry.

17 The main accent in this construction should be on the verb.

18 Since Chomsky's (1976) influential proposal, these cases have been analyzed through LF movement of the focalized phrase that produces a WCO configuration. This analysis is problematic because focalization can involve subparts of phrases.

19 Contrastive focalization of definite elements produces WCO, but the agrammaticality is not as strong as in the cases of new information focus and focalization by operators.

(i) ??GIANNI sua$_i$ madre ha sempre apprezzato t$_i$ (non Piero).
GIANNI his$_i$ mother has always appreciated t$_i$ (not Piero). (Rizzi 1997: ex. 17)

20 According to Enç's (1991) analysis quantifiers are always specific because they operate on presupposed sets of entities.

21 Judgments on English restrictive relatives found in the literature are not entirely congruent; Postal (1993: fn. 1) summarizes the situation. Moreover there seems to be crosslinguistic variation in this respect: e.g. Postal (1993) notes that WCO is absent in French restrictive relatives. In Italian, WCO effects seems to be weaker than in English.

22 This case has been problematic since the first studies on WCO (Wasow 1972; Cole 1974). On this empirical basis the analysis of WCO as Backward Pronominalization was shelved by Chomsky (1976).

9 CONCLUSION

Lasnik and Stowell's (1991) proposal shows that the type of the operator is relevant for WCO, but their dichotomy is not refined enough to fully account for all the empirical data.

Work in the Principles and Parameters framework elaborated a precise notion of specificity and described a series of syntactic contexts where it plays a crucial role in determining grammaticality. Using these empirical tests, I established that specificity is relevant for WCO. The empirical generalization that seems to emerge from the data is that WCO effects show up only if the antecedent is non–specific, and this conclusion is the starting point of my theoretical proposal.

I have proposed a treatment of specificity effects based on a tripartite typology of chains derived from Rizzi's (2001a) analysis of reconstruction and weak island extraction asymmetries and from Lasnik and Stowell's (1991) analysis of *Weakest Crossover* cases. These three configurations and a mechanism of grammatical features non–distinctness would account for the WCO phenomenology.

In conclusion, the current paper is an empirical advancement over Lasnik and Stowell's (1991) standard analysis, opening a new perspective on WCO phenomena and linking it to the study of LF chains and binding mechanisms.

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