Intervention effects in non-local dependencies: evidence from Persian

SADRI MIRDAMADI, Farhad

Abstract
This dissertation deals with intervention effects in non-local dependencies in Persian. The structures taken into analysis include, non-exhaustively, multiple wh-questions, weak-islands and subject-verb agreement. Intervention effects are observed in configurations where an intervener blocks the movement of elements extracted from a hierarchically lower structural position. The theoretical framework on which this dissertation will be based is Chomsky’s (1995) Minimal Link Condition (MLC) in terms of AGREE coupled with Relativized Minimality (RM) (Starke 2001, Rizzi 2004). In this dissertation, the role of various features that can modulate the grammatical status of the above-mentioned non-local dependencies is presented and discussed. Some of these features include [+Wh], [+Top(ic)], [+N], [+PP], and [Loc(ative)]. In addition, the effects of some of these features on general (real-time) processing of non-local dependencies are discussed thoroughly when relevant.

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Intervention effects in non-local dependencies: evidence from Persian

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Prof. Dr. Arsalan Kahnemuyipour (External member)

Prof. Dr. Whitney Tabor (External member)
Epigraph

خواستن توانستن است

Where there is a will, there is a way
Dedication

To my parents Ahmad Mirdamadi & Shahin Hedayat
Acknowledgements

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Preface

Chapter (2), section ‘Superiority effect in multiple wh-questions’ reports research that is accepted for publication in ‘Generative Grammar @ Geneva’, a journal for graduate students at the University of Geneva. The content of this section was presented at the 9th days of Swiss Linguistics international conference, University of Geneva (29 June – 1 July, 2016). Section ‘The role of covert movement in multiple wh-questions: An experimental study’ is mostly based on a paper jointly written with Sandra Villata, Ur Shlonsky and Julie Franck. Farhad Mirdamadi is the first author. The content of this section was presented at the 9th days of Swiss Linguistics international conference, University of Geneva (29 June – 1 July, 2016). Parts of Chapter (3), section ‘The role of the suffix -RA and lexical restriction on extraction from wh-islands’ is published with Ur Shlonky and Julie Franck in the proceeding of Rivista di Grammatica Generativa: Research in Generative Grammar (IGG). Farhad Mirdamadi is the first author. Chapter (4) on object attraction in Persian is based on a joint paper, submitted for publication, by Arsalan Kahnemuyipour and Julie Franck. Farhad Mirdamadi is the first author. The content of this chapter was presented at AMLaP (Architectures and Mechanisms of Language Processing) conference held at the University of Lancaster, United Kingdom (September 7-9, 2017). Other parts of the thesis have been presented at other linguistics conferences from 2014 to 2018.
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# Abbreviations

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<tbody>
<tr>
<td>1SG</td>
<td>1st Person Singular</td>
<td>2SG</td>
<td>2nd Person Singular</td>
</tr>
<tr>
<td>3SG</td>
<td>3rd Person Singular</td>
<td>1PL</td>
<td>1st Person Plural</td>
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<td>2nd Person Plural</td>
<td>3PL</td>
<td>3rd Person Plural</td>
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<tr>
<td>CP</td>
<td>Complementizer Phrase</td>
<td>D-linking</td>
<td>Discourse-linking</td>
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<tr>
<td>EZ</td>
<td>Ezafe Particle</td>
<td>LF</td>
<td>Logical form</td>
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<tr>
<td>Loc</td>
<td>Locative</td>
<td>M</td>
<td>Mean</td>
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<td>MLC</td>
<td>Minimal Link Condition</td>
<td>Neg</td>
<td>Negation</td>
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<tr>
<td>N</td>
<td>Noun</td>
<td>NP</td>
<td>Noun phrase</td>
</tr>
<tr>
<td>PP</td>
<td>Prepositional phrase</td>
<td>Q</td>
<td>Question</td>
</tr>
<tr>
<td>RSVP</td>
<td>Rapid Serial Visual Presentation procedure</td>
<td>RT</td>
<td>Response time</td>
</tr>
<tr>
<td>RM</td>
<td>Relativized Monimality</td>
<td>Spec</td>
<td>Specifier</td>
</tr>
<tr>
<td>SOV</td>
<td>Subject Object Verb</td>
<td>SUV</td>
<td>Superiority violation</td>
</tr>
<tr>
<td>T</td>
<td>Tense</td>
<td>TP</td>
<td>Tense phrase</td>
</tr>
<tr>
<td>Top</td>
<td>Topic</td>
<td>V</td>
<td>Verb</td>
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<tr>
<td>vP</td>
<td>Verb phrase</td>
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Abstract

This dissertation deals with intervention effects in non-local dependencies in Persian. The structures taken into analysis include, non-exhaustively, multiple wh-questions, weak-islands and subject-verb agreement. Intervention effects are observed in configurations where an intervener blocks the movement of elements extracted from a hierarchically lower structural position. As an example, in a multiple wh-question like *what did who buy? the intervening wh-subject who blocks the movement of the wh-object what to the clause-initial position and hence renders the sentence ungrammatical. In matrix and embedded multiple wh-questions, both the intervener and the extractee are wh-words. In subject-verb agreement, a non-local dependency is established between T(ense) (i.e., the probe of AGREE) and the subject NP. The outcome of this AGREE relation is expressed in terms of matching phi-features on the V with the subject thereof. In this work, experimental results will be presented, crucially showing that the AGREE relation can indeed break down when an object NP intervenes between T and the subject in spec vP, triggering an erroneous agreement between the verb with the object NP. The theoretical framework on which this dissertation will be based is Chomsky’s (1995) Minimal Link Condition (MLC) in terms of AGREE (subsumed under Chomsky’s (2000) Probe-Goal Model within the framework of the Minimalist Program), coupled with Relativized Minimality (RM) (Starke 2001, Rizzi 2004). Both MLC and RM treat intervention effects in terms of a locality condition on syntactic relations. However, whereas the former applies to the relation between a Probe and a Goal in terms of AGREE, the latter applies to members of chains created via syntactic movement(s). Nonetheless, there exists a major similarity between these two theories: in both of them, non-local relations are considered through the lens of relevant morpho-syntactic features. In the case of AGREE, the probe searches the closest goal that matches with its feature content; differently, in terms of RM, the proper chain-formation is
sensitive to the feature composition of the intervener and the extractee. In this dissertation, the role of various features that can modulate the grammatical status of the above-mentioned non-local dependencies is presented and discussed. Some of these features include [+Wh], [+Top(ic)], [+N], [+PP], and [Loc(ative)]. In addition, the effects of some of these features on general (real-time) processing of non-local dependencies are discussed thoroughly when relevant.
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Chapter 1

Introduction

1.1 Scope of the Study

One of the most striking properties of human sentences is the presence of non-local dependencies, that is, relationships between two constituents that are non-adjacent to one another in the linear string. All languages have grammatical means to express non-local dependencies. In *Which book did you tell me that you would like to buy?* the wh-phrase *which book* occurs in the initial position where it is interpreted as an interrogative operator - it is moved from its base position (indicated by <> in the structure as the direct object of the verb buy.

Non-local dependencies are unbounded but nonetheless subject to locality constraints. There are domains where certain types of elements (i.e. interveners) occurring on the trajectory of a moving element (i.e. the extractee) have the capacity of blocking movement (Rizzi 1990). Chomsky (1973) provides the data in (1) to show that wh-movement is constrained by a superiority condition. (1b) is ungrammatical because the wh-object *what* is moved over the wh-subject *who*.

1. Who bought what?

b. *What did who buy?*
The superiority constraint accounts for a preference for extracting the structurally higher wh-phrase when two or more elements are eligible for movement. In multiple wh-questions, all wh-elements move to the left periphery but the hierarchically highest element is constrained to move first\(^3\). In Chomsky (1995), the superiority constraint is rephrased in terms of Minimal Link Condition (MLC), (2):

\[(2) \text{ Minimal Link Condition (Chomsky1995).} \]

\[K \text{ attracts } a \text{ only if there is no } b, b \text{ closer to } K \text{ than } a, \text{ such that } K \text{ attracts } b.\]

According to the MLC, in order to establish an AGREE relation between the probing head and the target of movement, the former is constrained to target the highest element in the hierarchical structure. Hence, based on MLC, the ungrammaticality of (1b) can be accounted for on the assumption that the probe can only reach the wh-subject (i.e., the hierarchically higher candidate for movement in the structure). It follows that the lower wh-phrase, the object, cannot move over the wh-subject to appear in the initial position.

There are various reasons, however, to consider the ungrammaticality of (1b) not as a violation of MLC but rather as a violation of the principle that restricts the formation of chains across intervening elements in terms of Relativized Minimality (RM) (Rizzi 1990, and related works). One immediate advantage of RM, specifically of featural RM (fRM - Rizzi 2004, Starke 2001, Friedmann et al. 2009), is that it provides a relatively straightforward way to account for the ungrammaticality of (1b) – accordingly, its ungrammaticality is attributed to the

\[^3\text{ In (1), only one of the two wh-elements is moved to the initial position while the second element remains in-situ. In chapter (2), I will argue that the second wh-element also undergoes movement yet in the form of 'covert movement' based on Huang (1982) to acquire full interpretation in the interface.}\]
intervention of the wh-subject who in the chain linking what and its base position as the object of the verb buy. Since the intervener and the extracted wh-object both have [+Wh] feature, i.e., the feature that is relevant to the wh-probe to establish AGREE, the wh-object cannot move over the wh-subject.

In this thesis, I will examine the grammatical status of certain non-local dependencies in Persian. These structures include multiple wh-questions, weak-islands and subject-verb agreement. I will base my analysis on Chomsky’s (1995) MLC in terms of AGREE (subsumed under Chomsky’s (2000) Probe-Goal Model within the framework of the Minimalist Program) coupled with RM (Starke 2001, Rizzi 2004). In particular, I will discuss the locality effects arising from the intervention of an element on the chain that links two sides of a syntactic dependency. In the case of multiple wh-questions (e.g., *What did who buy <*_i>*?), both the intervener and the extracted wh-element are wh-words. The same is true for extraction from weak-islands (Villata 2017) exemplified in (3), where the wh-object is extracted from an embedded question, moving over the intervening wh-subject:

(3) *What, do you wonder who bought <*_i>*?

Non-local dependencies can also be established between a subject NP and a verb by virtue of agreement. In this respect, I will discuss how the intervention of an object NP in the hierarchical structure can break down the AGREE relationship between T(ense) (i.e., the probe
of AGREE) and the subject NP in spec vP, thus inducing agreement errors in the sense that the verb erroneously accords with the object NP rather than the subject\(^2\).

Some major questions that I will ask (and will tentatively answer) are: what are the relevant features that enter into the AGREE relation in the above-mentioned non-local dependencies? How can RM with a fine-grained featural system account for the grammatical status of sentences involving intervention effects? In this regard, I will aim at identifying the ameliorating/aggravating features and furthermore at establishing a hierarchy of ameliorating features. I will also ask if there is any meaningful similarity between the order of wh-elements in the hierarchical structure and extractability as a function of relevant morpho-syntactic features. The structure of this chapter is as follows. I will provide some general descriptive properties of Persian with respect to word order rearrangements and the presence of a differential object marker (namely the suffix -RA) in sections (1.2) and (1.3), respectively. These properties will become relevant when I discuss the syntactic characteristics of the above-mentioned structures (e.g., multiple wh-questions, wh-islands, and subject-verb agreement) in detail in the rest of the thesis. In section (1.4), I will widely discuss MLC, while in section (1.5), I will examine intervention in terms of locality as defined by f(eatural)RM (Starke 2001; Rizzi 2004; Friedmann et al. 2009 and much related work). Section (1.6) presents the general outline of the thesis.

1.2 Word order rearrangements in Persian

\(^2\) An example for this type of error can be given from French ((e.g., ‘*Le professeur les lisent’; The professor them read)) taken from Franck et al. (2006) in which the verb is produced plural. In this sentence, the verb erroneously accords with the plural pre-verbal object clitic ‘les’ rather than the singular subject ‘le professeur’.
In this section, I will discuss the canonical word order in Persian that manifests an SOV order with the finite verb at the clause final position. Before I begin discussing word order rearrangements in Persian in this section, it must be mentioned that by the canonical word order I refer to the order that obtains the default semantic/pragmatic interpretation in Persian, namely SOV. In this section, I will discuss if the canonical word order (say SOV) is derived from the underlying SVO or if the canonical order is the same as the underlying order. To begin with, let me mention that sentential elements can appear in different positions in the structure in Persian, enabling speakers to produce various word order rearrangements. In (4), I present the orders that elements occupy in the structure when the object is non-RA marked. Note that in section (1.3) of this chapter, I will discuss in detail the relevant properties of the suffix -RA. For now, consider the following examples:

(4)  

a. Hasan ketab kharid.  
    Hasan book bought-3sg  
    ‘Hasan bought a book.’  

b. *Hasan kharid ketab.  
   (SVO)  

c. *Kharid Hasan ketab.  
   (VSO)  

d. *Kharid ketab Hasan.  
   (VOS)  

e. Ketab Hasan kharid.  
   (OSV)  

f. Ketab kharid Hasan.  
   (OVS)  

In (4a), the accusative object occurs in its canonical preverbal position. (4b) shows that the object cannot follow the verb. The same restriction holds for the ungrammatical sentences in (4c) and (4d) with VSO and VOS word orders respectively. The accusative object in (4e) is
contrastively focused and the sentence is felicitous in a context in which ketab ‘book’ is contrasted with something else in the discourse. In this sentence, the speaker wishes to convey the message that what has been purchased by Hasan was precisely a book and not something else. The subject in (4f) is post-verbal but the accusative object precedes the verb. This sentence is felicitous in a context in which the speaker asks a yes/no question to seek for information about whether Hasan bought a book or something else.

Now consider the word order rearrangements when the accusative object is -RA marked. This is exemplified in (5).

(5) a. Hasan ketab-RA kharid. (SOV)
   Hasan book-RA bought.3sg
   ‘Hasan bought the book.’

b. Hasan kharid ketab-RA. (SVO)

c. Ketab-RA Hasan kharid. (OSV)

d. Ketab-RA kharid Hasan. (OVS)

e. Kharid Hasan ketab-RA. (VSO)

f. Kharid ketab-RA Hasan. (VOS)

(5) show that, when the direct object is suffixed with -RA, any word order such as SVO, OSV (even VSO and VOS) in addition to the default SOV is grammatical. In fact, as (5e) and (5f) show, the -RA marked object can appear in the post-verbal position as well.

To complete or perhaps further complicate the picture with respect to the positions that -RA/non-RA marked object occupy in the structure, consider the following sentences with double objects.
As the examples in (6) show, when the sentence conveys its default interpretation (and is thus uttered with the unmarked intonational contour) the position of the non-RA marked accusative is below the indirect object (6a); differently, the -RA marked object occurs above the indirect object, as in (6b). The surface position of the -RA/non-RA objects indicates that, unlike the non-RA marked object that remains adjacent to the verb, the -RA marked object raises to a higher position above the indirect object⁵. The question arises as how to account for the contrast between -RA and non-RA marked objects. Can the surface positions of -RA and non-RA marked objects tell us something more about the canonical word order in Persian?

Kayne (1994) argued that SOV languages must be derived from an SVO order. According to Kayne’s analysis, the object in VO order moves to the pre-verbal position to receive case in a specifier-head configuration. To obtain the canonical SOV word order in Persian, we can assume that the subject is merged in the Spec of vP and then is raised to SpecTP;
whereas the object is moved into the specifier of a functional projection above the verb from the post-verbal position. As for the position of the verb, there are two options: the verb could either remain in-situ (Karimi 2005) or could raise to a head position above V but below v, Travis’s (1991) Asp (Kahnemuyipour 2009), providing an SOV order. In light of our discussion, consider the difference between -RA and non-RA accusative objects. Whereas the -RA marked object can follow the verb, the presence of the non-RA marked object in the post-verbal position is not permissible. This is shown in table (1).

Table 1: The surface order of the -RA/non-RA objects with the verb.

<table>
<thead>
<tr>
<th>Non-RA marked</th>
<th>-RA marked</th>
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<tr>
<td>(S)OV</td>
<td>(S)O-RAV</td>
</tr>
<tr>
<td>*(S)VO</td>
<td>(S)VO-RA</td>
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</table>

With Kayne (1994), if we assume that the object moves to the preverbal position for case assignment, the ungrammaticality of the non-RA-marked VO order is accounted for on the assumption that the object movement to the preverbal position is obligatorily motivated by Case. The SVO-RA order is derived in numerous derivational steps: the object first moves to the pre-verbal position to satisfy Case requirement. It then moves outside vP to a functional position to receive -RA marking (Ghomeshi 1996 a.o.). Finally, the entire vP including the trace of the object undergoes phrasal movement to a higher position above the -RA marked object, providing the surface SVO-RA order.

Now let us imagine that the underlying word order in Persian is the same as the canonical word order and that they are both SOV. As for the grammaticality of the SVO-RA order, we
can assume that the -RA marked object moves outside vP and that vP in turn undergoes phrasal movement to a position above the -RA-marked object. The problem arises as why vP phrasal movement is not possible in the ungrammatical SVO non-RA order. In fact, if vP underwent phrasal movement without taking the non-RA marked object along with it, the result would give rise to a grammatical SVO order, contrary to the facts. With Ghomeshi (1996), Ganjavi (2007), and Kahnemuyipour (2009), I propose that the non-RA marked object remains inside vP adjacent to the verb unlike its -RA marked counterpart. Therefore, any vP movement takes the entire vP together with the non-RA marked object and bring them all to a higher position in the structure. This might be the reason why the presence of the non-RA in the post-verbal position is ruled out.

Clearly, we cannot determine if the basic word order in Persian is SOV or SVO on the basis of the surface positions of the -RA/non-RA marked object in the structure given the data presented so far. However, one piece of evidence that suggests that Persian is actually SVO is the position of clausal arguments of the verb. These elements occur in the post-verbal position in Persian, as illustrated in (7).

(7)  

a. Hasan fekr mikonad ke Maryam name-RA khund.

Hasan think.3sg. that Maryam letter-RA read.3sg

‘Hasan thinks that Maryam read the letter.’

b. *Hasan ke Maryam nama-RA khund fekr mikonad.

See chapter (2) in which I will also provide evidence that the non-RA marked wh-object targets the lowest position in the hierarchy of wh-domain in multiple wh-questions and that the -RA marked wh-object targets the highest position in the same hierarchy.
Further evidence comes from the position of clausal complements in constructions with complex modal verbs such as *majbur budan/shodan* ‘to be/become obliged/forced’ or *momken budan* ‘to be possible’. These elements also occur in the post-verbal position. This is illustrated in (8).

(8)  

a. Hasan majbur shod ke in nama-RA benevise.  

   Hasan oblige was.3sg that this letter-RA write.3sg  

   ‘Hasan was obliged to write this letter.’  

b. *Hasan ke in nama-RA benevise majbur shod.

Can we presume that the clausal complements are base-generated to the left of the verb but they move to a position to its right side? Considering Persian as SOV, in the case of clausal complements, we should assume that these elements obligatorily move to the post-verbal position via some movement operation such as extraposition. There are at least two major problems with this proposal: First, movement is usually assumed to be a leftward operation. Therefore, rightward adjunction is not a legitimate syntactic movement to license the presence of clausal complements in the post-verbal position. Second, there is no syntactic motivation for the rightward movement of the clausal elements. In fact, on the assumption that movement takes place to satisfy some morpho-syntactic requirements, the rightward movement of clausal complement is unwarranted (see Stowell 1981)^5^.

It is usually the case that when a constituent is dislocated, it becomes an island for extraction but that same constituent should be transparent for extraction when it occupies its

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^5^ It is also plausible to assume that clausal complements are moved leftward outside of vP and then the entire vP undergoes movement above them, giving rise to the surface SVO order. I will leave this possibility open for further investigation.
base position (Corver 2006). In fact, sub-extraction from clausal complements can provide a straightforward test to determine if these constituents occupy their base position in the SVO order. Consider (9).

(9) Chi-(RA)$_i$ Hasan fekr mikonad ke Maryam <$,>$ khund?
What-(RA) Hasan think.3sg that Maryam read.3sg

‘What does Hasan think that Maryam read?’

As (9) illustrates, it is possible to sub-extract a wh-element from a complement clause. The wh-element chi-RA ‘what-RA’ is extracted from within the clausal complement and is moved to the matrix position, suggesting that the clausal complement occupies its base position in the SVO order.

So far not so bad. Indeed, the surface position of clausal complements provides evidence that Persian has the underlying SVO word order. Karimi (2005) mentions two theoretical problems with considering the underlying word order in Persian as SVO. First, if SVO is the underlying word order, one should explain why the SOV order receives semantically and discourse functionally an unmarked interpretation as compared to SVO that always conveys additional layers of interpretation such as contrastive focus or topic. In this regard, contrary to Karimi (2005), if we take SVO as the underlying word order, one can assume that the object must move to the pre-verbal position not only for case but also for obtaining the default interpretation. Second, Karimi (2005) claims that if movement to the pre-verbal position is motivated by case assignment, one should explain why PPs need to move to the pre-verbal position as these elements do not require case. With respect to this point, if we assume that PPs are not merged in the post-verbal position but that P is merged to the left of vP, we can then say that the object starts from the post-verbal position in the case of PP and moves to a position
headed by P in the pre-verbal position. This argument supports the PP-V order that I exemplified in (6), repeated below⁶.

(6) Hasan be Maryam ketab dad.
Hasan to Maryam book gave.3sg
‘Hasan gave a book to Mary’

In this thesis, on the basis of the evidence that I provided, I claim that the canonical SOV word order is derived from the underlying SVO, basing my reasoning on Kayne (1994). If we take VPs to be head initial, as I am proposing here, we will then have a uniform analysis with respect to the positions of other head-initial elements in Persian (auxiliaries, PPs and NPs etc) - for which I do not provide any analysis for reasons of space. In fact, when I discuss the syntax of non-local dependencies in next chapters, I will show that the only relevant point for my analysis in this thesis is the positions that -RA versus non-RA marked objects occupy in the structure. As I mentioned earlier, the -RA marked object moves outside vP while the non-RA marked object remain inside vP in the proximity of the finite verb (Ghomeshi 1996, Karimi 2003, Ganjavi 2007, Kahnemuyipour 2009 a.o.). In the next section, I will present some of the relevant descriptive properties of the suffix -RA with respect to its semantic interpretation.

1.3 The suffix -RA

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⁶ In Persian, the PP object can also appear to the right of the verb. This is illustrated below. The derivation of this sentence might include vP movement, consisting of v and the non-RA marked object moving together to a higher position above PP.

(i) Hasan ketab dad be Maryam.
Hasan book gave.3sg to Maryam
The syntax of the suffix -RA (cliticised as ro, -o, -a) in Persian has been the focus of much research in the last couple of decades. Browne (1970) claimed that the suffix -RA is a specificity marker. Karimi (1989, 1990) extended Browne’s analysis to -RA as ‘specific-oblique (=NOT nominative) marker’. Accordingly, a -RA-marked NP is either definite-specific or indefinite-specific. Specificity is defined in terms of strong antecedent, referring to DPs that are previously established in the discourse and are known for both speaker and hearer (Enç 1991). In this sense, definite DPs are always specific but an indefinite DP is specific only if it designates an inclusion relation to previously established discourse. Peterson (1974) and Windfuhr (1979, 1987) hypothesized some topic-marking functions for -RA. Ghomeshi (1996, 1997), on the other hand, challenged all these analyzes and claimed that -RA conveys presuppositionality and syntactically is a phrasal affix heading a KP (Kase Phrase) that case-marks NPs adjoined to vP. In this thesis, I will focus on the semantic interpretation of the suffix -RA which conveys a d(iscourse)-linking interpretation in the sense of Pesetsky (2000). At the end of this section, building on (Rizzi 2011), I will argue that -RA marked elements carry [+Top(ic)] feature, thus generally expressing the properties of d-linking, specificity, presuppositionality, givenness etc.

Let me begin by mentioning that the primary function of -RA is to mark the accusative object. This is illustrated in (10) below. However, -RA can also appear with other nominal expressions, namely, sentence-initial nominal adverbs as exemplified in (11) and sentence-initial nominal expressions that are linked to a clitic in an indirect position as in (12).

(10)  Hasan ketab-RA kharid.

       Hasan book-RA bought.3sg.

   ‘Hasan bought the book.’
To complete the picture, it is also worth mentioning that the suffix -RA does not mark the subject or the indirect object. -RA cannot appear with all types of adverbs either. These adverbs that do not co-occur with -RA include manner adverbs as in (13) or place adverbs as in (14) below.

(13) *Arom-RA ghaza khordam.
Slow-RA food ate.1sg
‘I slowly ate food.’

(14) *To ghatar-RA man ketab mikhunam.
In train-RA I book read.1sg
‘I read a book in the train.’

The semantics of -RA marked objects closely couples with the semantics of definiteness, although it is not exactly the same. Compare the following sentences in (15) including -RA/non-RA marked objects.
(15)  a. Hasan ketab kharid.

    Hasan book bought.3sg

    ‘Hasan bought a book.’

b. Hasan ketab-RA kharid.

    Hasan book-RA bought.3sg

    ‘Hasan bought the book.’

*Ketab* ‘book’ in (15a) has a non-specific interpretation and can refer to any book purchased by Hasan in a given context. (15b), on the other hand, refers to a specific book. This sentence is felicitous in a context in which the speaker and hearer are both aware of Hasan’s purchase.

The presence of -RA on direct objects is not always optional. In certain contexts, such as nouns that co-occur with a determiner, pronouns, or proper nouns, -RA must be suffixed with the direct object. This is illustrated in the following examples (16) – (18) (Note that * in the following examples shows that the presence of -RA is obligatory).

(16) Hasan in ketâb-*(RA) kharid.

    Hasan this book-RA bought-3SG

    ‘Hasan bought this book.’

(17) Hasan un-*(RA) ruye miz gozasht.

    Hasan it-RA on table put-3SG

    ‘Hasan put it on the table.’
(18) Hasan Maryam-(RA) did.

Hasan Maryam-RA saw.3sg

‘Hasan saw Maryam.’

In these examples, the direct objects are specific and refer to a unique entity in the discourse - thus the presence of -RA is obligatory. This unique property makes the interpretation of sentences containing -RA marked objects so different from sentences containing non-RA marked objects. Consider the following sentence in (19) for further elaboration.

(19) Hasan belakhare asb-e siyah-RA kharid.

Hasan finally horse.EZ black-EZ-RA bought.3sg

‘Hasan finally bought the black horse.’

In this sentence, where asb-e siyah ‘black horse’ is marked with -RA, the intended interpretation is that there was a unique black horse and that Hasan bought that specific horse.

Now, consider the sentence in (20), where the direct object is non-RA marked.

(20) Hasan belakhare asb-e siyah kharid.

Hasan finally horse-EZ black bought-3sg

‘Hasan bought a black horse’

Crucially, in this sentence, there is no particular black horse that the speaker is referring to. Instead, the sentence primarily focuses on the event that Hasan was engaged in, namely the event of buying a (black) horse.
With Pesetsky (2000), I argue that -RA marked objects are d-linked. According to Pesetsky’s (2000), d-linking refers to elements that are previously mentioned in a context. For example, elements such as lexically restricted wh-phrases (e.g., *which book*) in a context where the speaker and hearer both know which set of books they refer to are d-linked. In Persian, lexically restricted wh-phrases in the direct object position always appear with -RA. Building on (Rizzi 2011), I further argue that -RA marked elements carry [+Top(ic)] feature. In fact, there is a close connection between topics and d-linking – topics are presupposed entities, are salient in a discourse and are somehow familiar. These are all properties of d-linking. It is worth mentioning that there is also a close connection between the structural position of -RA marked objects, that as I claimed is higher than non-RA marked objects in the structure, and the fact that they carry [+Top] feature. Topics move high in the left periphery (Rizzi 1997). There is also a high topic position inside vP (Belletti 2004), i.e., a position higher than where elements are initially merged in the structure. With this background in mind with respect to the semantic interpretation of the suffix -RA that conveys d-linking (bearing [+Top]) and the position that -RA objects occupy in the structure, i.e., a position higher than non-RA marked objects, I will move to the next sections where I discuss MLC in detail (section 1.4) and the relevant properties of featural RM (section 1.5).

### 1.4 Minimal Link Condition (MLC)

MLC belongs to the Principles and Parameters approach of Generative grammar and in particular to the Minimalist Program (Chomsky 1995). In this framework, the generation of syntactic dependencies is viewed as a succession of formal operations such as MERGE, AGREE, and MOVE. MERGE is an operation that puts two elements together to construct longer constituents. Successive applications of MERGE assemble the thematic nucleus of the
sentence (i.e., the verb and its arguments). The verb merges with its complement, namely the
direct object, to which it assigns the thematic role of patient, theme etc. Then the subject is
merged to the specifier position of an already constructed piece of structural skeleton including
the verb and the direct object. The subject receives the thematic role of agent (or other roles
such as experiencer) from the verb. Further application of Merge introduces a fully-fledged
hierarchical skeleton thereby the subject enters into an AGREE relation with T(ense) phrase
(TP) to establish a subject-verb agreement relationship. The AGREE relation is established via
some formal mechanism in which uninterpretability plays a crucial role – the probe with
uninterpretable features seeks within its c-commanding domain for an appropriate goal with
matching feature(s), which it attracts to delete its uninterpretable feature(s). In the case of
subject-verb agreement, the probing T-head with uninterpretable phi features including number,
person, and gender attracts the subject to its specifier position. This provides a specifier-head
configuration between the probe and the attracted goal (i.e., the subject DP). The AGREE
relation between the subject and probe ensures that the person and number features of T are
valued. Also the subject receives the nominative case from T. In the next stages of the
derivation, the verb is raised to T to obtain appropriate morphological specifications of number
and person features. In some languages (e.g., Hebrew), gender is also specified on the verb
through morphological marking. In languages with superficial SOV word order, like Persian, if
the subject moves from within vP into the specifier of TP and that the verb moves to T to receive
its morphological markings of agreement including number and person markings, the object
must also move to a pre-verbal position to provide the surface SOV word order. Another way
to obtain the surface SOV order is to assume that the verb always remains below the object and
that it receives its appropriate agreement markings through some form of AGREE with T
without actually moving to T. This way, only the features of T are transmitted into the verb and
that the verb does not need to raise to T (see Kahnemuyipour 2009).
In the framework of Minimalist Program, locality is defined hierarchically in terms of c-command. C-command refers to a particular configuration of two nodes in a hierarchical structure: node X c-commands Y if a sister node of X dominates Y, and plays a key role in various linguistic phenomena such as binding and quantifier scope (see Reinhart, 1976). Consider now a situation in which there are more than one candidate in the c-commanding domain of the probing head and that each candidate is equally endowed with the matching features that is required by the probe to establish the AGREE relation. Based on MLC, crucially, the probe is constrained to attract the hierarchically closest candidate in the syntactic structure.

Consider a configuration in which there are two wh-elements, like (21).

(21) Probe [-Wh] … WH1 [+Wh] … WH2 [+Wh]

Suppose that each wh-element is endowed with a feature, [+Wh], that is needed by the probe to delete its uninterpretable feature ([-Wh]) to establish the AGREE relation. The uninterpretable feature of the probe must be erased from the system before the outcome of the derivation is sent to the interface (full interpretation). In order to achieve this goal, the probe needs to find a goal with matching interpretable feature which makes the goal active and ready to enter into an AGREE relation with the probe. In the configuration in (19), the uninterpretable [Wh] feature of the probe must be deleted so that the outcome of the derivation comes to fruition for the interface. If there are two active goals in the search domain of the probe, as in (21), the probe is constrained to attract the hierarchically closest element, namely WH1. Crucially, based on MLC, the probe cannot skip over the first goal (namely WH1) and attract the lower element due to locality.

MLC is rephrased in terms of ‘attract closest’ in Chomsky (1995). This constraint is the backbone of locality principles in generative grammar. It asserts that when the probe enters into
an AGREE relation with a particular goal in a given structure, it is constrained to AGREE with the hierarchically closest one.

In the next section, I will describe locality in terms of RM; I will also provide a brief comparison between MLC and RM in terms of how these two theories differ in some important aspects when they account for the grammatical status of sentences involving intervention.

1.5 Relativized Minimality (RM)

The operation MOVE is central to RM. The moved constituent creates a syntactic chain that links the target position to the base position in the structure. In non-local dependencies, the target of movement is often associated with the scope/discourse layers of interpretation, whereas the base position is linked to the core semantic functions (e.g., agent, theme, patient etc). Chain-formation can exceed clause boundaries but is subject to intervention locality in terms of RM. By intervention locality I mean configurations where an intervening element bearing certain morpho-syntactic properties blocks the local relation between the two sides of a syntactic chain that link the moved element to its base position in the structure. According to RM, in a structure [X . . . Z . . . Y] in which X and Y form a syntactic dependency, a local relation between the two members of the chain is disrupted when

(i) Z structurally intervenes between X and Y in terms of c-command

(ii) Z matches the specification in morpho-syntactic features of X.

For Z to intervene between X and Y, it must occur in a c-commanding position between X and Y and must possess certain morpho-syntactic features that make it a potential intervener. Consider an ungrammatical superiority-violating sentence in (20) below.
(22) * What did who buy <i>? 

In this sentence, who intervenes in the chain that links the extracted what with its base position in the structure. Not only does who c-command the trace of the extracted wh-object, but it also shares matching feature with it. These two elements are both quantificational and contain [+Wh] feature. The ungrammaticality of this sentence is thus accounted for as it violates RM.

RM can be generalized to all syntactic dependencies involving chain-formation. Crucially, based on RM, intervention locality arises when the intervener and the extracted element belong to the same morpho-syntactic feature class. Rizzi (2004) defines the morpho-syntactic feature class as follows.

(23) Morpho-syntactic feature class based on RM

   a. Argumental: person, number, gender, case
   b. Quantificational: Wh, Neg, measure, focus...
   c. Modifier: evaluative, epistemic, Neg, frequentative, celerative, measure, manner,...
   d. Topic

In this respect, whereas intervention arises from members of the same feature class (bearing the same morpho-syntactic feature components), elements that belong to a different class are not potential interveners. To illustrate, consider a grammatical sentence in which there is no superiority violation. This is illustrated in (24).
What did he buy?

In (24), the chain connecting what to its base position, crosses over a chain that belongs to a pronominal element (namely the 3rd person singular pronoun). However, since what is quantificational and he is argumental (hence the two elements belong to different feature class) there is no intervention effect and thus the sentence is grammatical. The sentence in (24) contrasts with cases in which two elements of the same feature class create intervention and thus render the sentence ungrammatical. In (25) and (26), I provide two examples that violate RM. In (25), there are two foci (both belong to the quantificational feature class) and in (26) the presence of two topics in the left periphery renders the sentence ungrammatical.

(24) What did he buy?

(25) *TO MARY, YOUR BOOK you should give.

(26) *John, your car, I convinced to buy.

In sum, RM provides a tool that can be used to account for the grammatical status of various constructions that involve intervention effects such that an intervening element perturbs the syntactic chain that links two elements in the structure. Lastly, I would like to finish this section by providing a brief comparison between RM and MLC as a way of summarizing the important properties of each theory before moving to the next chapters. Importantly, both MLC

7 It seems languages differ in allowing the occurrence of more than one topic in the left periphery (see Haegeman 2012). For example in Persian, it is possible to have more than one -RA marked topics in the left periphery. This is illustrated in the following example.

(i) Maryam-RA ketab-RA Hasan tashvighesh kard behkune.
Maryam-RA book-RA Hasan persuade did.3sg to read.

‘As for Maryam, Hasan persuaded her to read the book.’
and RM can treat intervention as a locality condition on syntactic relations; yet while the former applies to the relation between a Probe and a Goal in terms of AGREE, the latter applies to members of chains formed by movement. Both theories also establish non-local relations among features. In terms of MLC, the probe attracts the closest goal in the hierarchical structure whose feature content matches with the feature content of the probe. With respect to RM, a well-formed chain cannot be constructed across an intervening element that belongs to the same morpho-syntactic feature class. In fact, the two theories are different with respect to one important aspect. According to the MLC, only features that are probed can intervene. While, for RM, any member of the relevant feature class intervenes. Thus, MLC is probe-based while RM is a chain-building algorithm. Another important difference between MLC and RM is that whereas the former is a theory on the derivational relations between the probe and the goal, the latter is a condition on representations. To be more specific, with respect to MLC, locality is evaluated during each derivational cycle in terms of the relationship between the probe and the goal. The outcome of each derivational cycle is then sent to the interface for interpretation. RM, on the other hand, is a constraint that evaluates final representations after the content of each derivation is sent to the interface. Clearly, the two theories differ in terms of timing with respect to when they are applied to evaluate locality. I will leave this discussion open with respect to whether the timing difference between these two constraints has a consequence on how the system evaluates locality.

1.6 General outline

Multiple wh-questions are treated in chapter (2). This chapter consists of three sections each of which deals with different aspects of non-local dependencies in multiple wh-questions. In section ‘multiple wh-questions’ (2.1), I will discuss various strategies that Persian manifests in
forming single and multiple wh-questions. I will show that wh-elements usually stay in the canonical pre-verbal position but can optionally undergo movement to other domains in the hierarchical structure. These domains are: an intermediate position above the embedded subject lower than the complementizer ke ‘that’ and a clausal left-peripheral matrix position on the left side of the matrix subject. In section (2.1.3), I will discuss the syntax of multiple wh-questions in Persian based on two approaches namely “wh-cluster type” approach (Richards 2001, Grewendorf 2001) and “chain crossing” approach (Krapova and Cinque 2008). I will also provide a hierarchy with respect to the positions in which different types of wh-elements occur in the structure. Based on wh-cluster approach, I will argue that wh-elements construct a cluster before moving to any domain higher than their first merge in the structure. Based on chain-crossing approach, I will show that lower wh-elements are only allowed to tuck-in below higher elements such that each chain that links the lower element to its trace position in the structure must only partially intervene on the chain that belong to the higher element. In section (2.1.4), I will discuss optional wh-fronting in Persian and will provide a feature-based account on how wh-elements take their matrix scopes even though movement to the matrix position is only optional. I will also tentatively, and very briefly, discuss the syntax of interrogative sentences in which wh-elements target the intermediate position above the subject in the embedded clause. I will argue that in this case, wh-elements undergo partial movement to a position that is neither their base positions nor their matrix positions. Section ‘superiority effect in multiple wh-questions’ (2.2) deals with superiority violation in multiple wh-questions in Persian. In this section, I will show that the suffix -RA legitimately eliminates the superiority violation and will account for the grammatical status of these sentences in terms feature-based RM. In fact, that the -RA marked wh-object can cross over the structurally higher wh-subject in an apparent violation of the superiority constraint is intriguing and raises questions with respect to how the AGREE relation is established in these sentences in terms of MLC. In section (2.2.5), I will
discuss how the AGREE relation is established in these sentences to the effect that the probe skips the higher wh-subject and attracts the -RA marked wh-object to the initial position. Section (2.3) ‘the role of covert movement in multiple wh-questions: an experimental study’ of this chapter presents the results of an experimental study which examines the pattern of acceptability in sentences containing superiority violation in Persian. Hofmeister et al. (2007, 2013) reported that sentences in which the intervening wh-element is lexically restricted and that the extracted wh-element is bare (i.e., a configuration called Inverse Inclusion) receive higher acceptability than those in which the intervening element is bare and the extractee is a lexically restricted (i.e., a configuration called Inclusion). I will present the results of a grammaticality judgment task that replicates Hofmeister et al.’s results in superiority-violating sentences containing two objects. I will account for the results in terms of covert movement of the in-situ wh-element to the left periphery and will argue that the pattern of acceptability can be explained on the assumption that lexically restricted -RA marked wh-elements have the possibility of moving to a head with [+Wh +Top] feature, a position that is not available for bare wh-elements with only [+Wh] feature.

Chapter 3 deals with extraction from weak-islands. In section (3.1) “the role of the suffix -RA and lexical restriction on extraction from wh-islands” I will present and discuss the results of a grammaticality judgement task which examines the effect of the suffix -RA and of lexical restriction on wh-object fronting in wh-islands. The results show that Persian wh-object fronting is sensitive to extraction from weak-islands and, in particular, while lexical restriction does not improve acceptability, the presence of the suffix -RA significantly increases the acceptability scores. With Rizzi (2011), I will argue that the suffix -RA encodes [+Top] feature and that generates Inclusion configuration in terms of criterial features whereas lexical restriction encodes [+N] feature, creating Inclusion configuration in terms of non-criterial feature. The second part of chapter 3, section (3.2) “extraction from weak-islands: a feature-
based analysis” discusses the similarity between the hierarchy of wh-elements in the wh-domain and the degree of extractability from weak-islands. In this section, I will compare the extractability of various wh-elements including wh-arguments and wh-adjuncts from weak-island domains. The results show that three features on the extracted wh-elements ameliorate extraction. These features are namely [+Top], [+PP] and [+Loc]. Building on Rizzi (2011), I will argue that the role of [+Top], attributed to the presence of the suffix -RA, is paramount as it creates Inclusion configuration in terms of criterial feature. [+PP] is a categorical feature that is related to the extractability of indirect wh-object and [+Loc] is associated to the extractability of the locative wh-adjunct that manifests more extractability than other wh-adjuncts. In this section, I will also discuss adjunct/argument asymmetry that seems to disappear with non-RA wh-objects in Persian. I will argue that the non-RA marked wh-object is non d-linked and as such is a poor extractee.

Chapter 4 presents results on attraction effect in subject-verb agreement (i.e., the third type of non-local dependency discussed in this thesis). In particular, I will discuss if the c-command hierarchical relationship, as compared to the precedence relationship, plays a crucial role in object attraction, i.e., the erroneous agreement of the verb with the object rather than with the controlling subject. Building on previous experimental results in French (Franck et al. 2006; 2010), I will show that when the object intervenes on the AGREE relation between T(ense) (i.e., the probe of AGREE) and the subject in spec vP by c-command it induces stronger attraction than when it intervenes by precedence. Strong attraction will be associated to RM type intervention effect. I will also present some experimental results that show that when the object moves to the initial position as in the OSV word order, it generates stronger attraction than when it occupies the canonical pre-verbal position as in the SOV word order. With respect to the stronger attraction in OSV word order as compared to the SOV word order, I will argue that some processing mechanisms are responsible for such effect. These mechanisms are
namely erroneous structure building and erroneous controller selection during the on-line processes of agreement computation. Erroneous structure building results in mis-parse such that the parser treats the OSV word order as SOV and then computes the subject-verb agreement accordingly in an erroneous manner. Erroneous controller selection occurs when the parser selects the wrong element (namely the object) as the agreement controller because of its similarity with the subject. The experimental results also raise important issues pertinent with respect to the distinction between -RA/non-RA marked objects that I will discuss in the same chapter.
Chapter 2

Intervention effects in multiple wh-questions

2.1 Multiple wh-questions

2.1.1 Data

Persian has optional wh-fronting and exhibits several syntactic strategies for forming single and multiple wh-questions. (1) exemplifies a single wh-question.

(1)  

a. Hasan chi kharid?
   Hasan what bought.3sg
   ‘What did Hasan buy?’

b. Chi, Hasan <i> kharid?

In (1a), the wh-object *chi* ‘what’ remains in the canonical preverbal position whereas in (1b), it is moved to the sentence initial position. (2) exemplifies a case of long distance wh-movement.

(2)  

a. Fekr mikoni (ke) Hasan chi kharid?
   think.2sg that Hasan what bought.3sg
   ‘What do you think that Hasan bought?’

b. Fekr mikoni (ke) chi, Hasan <i> kharid?
think.2sg that what Hasan bought.3sg
c. *Fekr mikoni chi (ke) Hasan <,> kharid?
think.2sg what that Hasan bought.3sg
d. Chi fekr mikoni (ke) Hasan <,> kharid?
what think.2sg that Hasan bought.3sg

In (2a), the wh-element precedes the verb while in (2b), it is moved above the subject of the embedded clause, targeting a position below the complementizer ke. (2c) is ungrammatical, indicating that the wh-element cannot occur above the complementizer ke. In (2d), the wh-element moves to the sentence-initial position.

Turning to wh-adjuncts, these elements occupy different positions as well. This is illustrated in (3).

(3) a. Fekr mikoni (ke) Hasan koja raft?
think.2sg that Hasan where went.3sg
‘Where do you think Hasan went?’
b. Fekr mikoni (ke) koja Hasan <,> raft?
think.2sg that where Hasan went.3sg
c. Koja fekr mikoni (ke) Hasan <,> raft?
Where think.2sg that Hasan went.3sg

The examples in (2) and (3) show that wh-expressions can occupy three domains in the structure, namely:

(i) The pre-verbal position
(ii) The position above the subject and below the complementizer *ke*

(iii) The clause-initial (scope) position

Let us now look at multiple wh-questions to see where wh-elements appear in the structure. Consider (4).

(4) a. Fekr mikoni (ke) Hasan chi-RA be ki dad?
   think.2sg that Hasan what-RA to whom gave.3sg
   ‘What do you think that Hasan gave to whom?’

b. Fekr mikoni (ke) chi-RA<1> Hasan <1,> be ki dad?
   think.2sg that what-RA Hasan to whom gave.3sg

c. Fekr mikoni (ke) chi-RA<1> be ki Hasan <1,> <1> dad?
   think.2sg that what-RA to whom Hasan gave.3sg

d. Chi-RA<1> fekr mikoni (ke) Hasan <1,> be ki dad?
   what-RA think.2sg that Hasan to whom gave.3sg

e. Chi-RA<1> fekr mikoni (ke) be ki Hasan <1,> <1> dad?
   what-RA think.2sg that to whom Hasan gave.3sg

f. Chi-RA<1> be ki fekr mikoni (ke) Hasan <1,> <1> dad?
   what-RA to whom think.2sg that Hasan gave.3sg

In (4a), both wh-elements *chi-RA* ‘what’ and *be ki* ‘to whom’ remain in the pre-verbal position; whereas in (4b) one of the wh-elements is fronted above the subject and one remains
Both wh-elements precede the subject and hence occur below the complementizer *ke* in (4c). In (4d), the first wh-element is fully fronted while the second one stays in the pre-verbal position. In (4e), the first wh-element is in the initial position while the second one occurs in the position above the subject and below the complementizer *ke*. Lastly, in (4f), both wh-elements move to the initial position.

Below, I exemplify various positions that wh-elements occupy in a multiple wh-question with more than two wh-elements. Consider (5):

(5) a. Fekr mikoni (ke) ki chi-RA be ki dad?
   think.2sg that who what-RA to whom gave.3sg
   ‘Who do you think gave what to whom?’

b. Kiₐ fekr mikoni (ke) <i> chi-RA be ki dad?
   who think.2sg that what-RA to whom gave.3sg

c. Kiₐ chi-RAₐ fekr mikoni (ke) <i> <j> be ki dad?
   who what-RA think.2sg that to whom gave.3sg

d. Kiₐ chi-RAₐ be kiₖ fekr mikoni (ke) <i> <j> <k> dad?
   who what-RA to whom think.2sg that gave.3sg

In (5a), all the three wh-elements occur before the verb; whereas in (5b), only the wh-subject is fronted. In (5c), both the wh-subject and the direct wh-object are fronted to the initial position. Lastly, in (5d), both wh-elements move to the initial position.

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8 Later, in this chapter, I will argue that wh-elements in the sentence internal pre-verbal position are not in-situ and that they are dislocated from the post-verbal position to the specifier of a functional projection (namely spec FocP) in the pre-verbal position.
position and in (5d) the three wh-elements including the indirect wh-object be ki ‘to whom’ occur clause initially.

In (5), the subject is a wh. Hence, in this example, it is not possible to determine whether the wh-elements occupy the low pre-verbal position or whether they are all moved to the higher IP domain, below the complementizer ke. Consider the examples in (6), whose subject is not a wh.

(6)  a. Fekr mikoni (ke) Hasan chi-RA be ki koja goft?
    think.2sg that Hasan what-RA to whom where told.3sg
    ‘What do you think Hasan said to whom (and where)?’

    b. Fekr mikoni (ke) chi-RAi be kij koja k Hasan <i> <j> <k> goft?
    think.2sg that what-RA to whom where Hasan told.3sg

    c. Chi-RAi be kij kojak fekr mikoni (ke) Hasan<i> <j> <k> goft?
    what-RA to whom where think.2sg that Hasan told.3sg

These examples show that the wh-elements can appear in three domains when there are more than two wh-elements in the sentence. These domains are: to the left of the verb, above the subject, and in the clause initial position. Clearly, in (6b), all the three wh-phrases are raised above the subject; while in (6c), they are all in the initial position.

In section (2.1.2), I will provide a generalization with respect to the order of wh-elements in multiple wh-questions in Persian.

2.1.2 The hierarchical order of wh-elements

Consider the examples in (7) – (9), which show that the wh-subject precedes the wh-object.
(7) Ki chi khord?
Who what ate.3sg
‘Who ate what?’

(8) Ki ki-RA did?
Who who-RA met.3sg
‘Who met who?’

(9) Ki be ki zang zad?
Who to whom call hit.3sg
‘Who called who?’

Now consider (10) below which shows that the non-RA marked direct object wh-
follows the indirect object wh.

(10) Be ki chi dadi?
To whom what gave.2sg
‘What did you give to whom?’

In (11) and (12), I show that the -RA marked direct object wh precedes the indirect object wh.

(11) Chi-RA be ki dadi?
What-RA to whom gave.2sg
‘What did you give to whom?’

(12) Ki-RA be ki moarefi kardi?
What-RA to whom introduce did.2sg
‘What did you introduce to whom?’

From these examples, we can infer that, whereas the -RA marked direct object is higher than the indirect object as in (11) and (12), the non-RA marked direct object is lower than the indirect object as in (10).

Let us now consider the order of wh-adjuncts in the hierarchical structure as well. To illustrate, consider (13) below.

(13) a. Koja chi kharidi?
    Where what bought.2sg
    ‘Where did you buy what?’

b. Chi-RA koja kharidi?
    What-RA where bought.2sg
    ‘Where did you buy what?’

As (13a) and (13b) show, the locative wh-adjunct precedes the non-RA marked wh-object but follows the -RA marked wh-object, suggesting that the locative wh-element occupies a higher position than the non-RA marked object but a lower position than the -RA marked object in the hierarchical structure.

The locative wh-adjunct occurs higher than the time wh-adjunct, as illustrated in (14)\(^9\).

\(^9\) It must be noted that for some speakers, the time wh-element can precede the locative wh-element, as shown in the example below.

(1) Key koja raft?
    When where went.3sg
(14) Koja key raft?

Where when went.3sg

‘Where did he go when?’

As in (15) below, the locative wh-adjunct precedes the manner wh-adjunct.

(15) Koja chetori raft?

Where how went.3sg

‘Where did he go how?’

In (16) and (17) below, I illustrate the position of the manner wh-adjunct with respect to the position of -RA/non-RA marked wh-object in the structure. The non-RA marked wh-object is below the manner wh-adjunct as in (16) and the -RA marked wh-object is above it as in (17).

(16) Hasan chetori chi khord?

Hasan how what ate.3sg

‘How did Hasan eat what?’

(17) Hasan chi-RA chetori khord?

Hasan what-RA how ate.3sg

‘How did Hasan eat what?’

‘When did he go where?’
Building on Krapova and Cinque’s (2008) analysis of wh-movement in multiple wh-fronting languages such as Romanian, I propose that the order of the fronted wh-elements in Persian is derived from their clause-internal order prior to wh-movement. If we now take into account the order of wh-arguments as well as the order of wh-adjuncts in the structure, we arrive at the following generalization with respect to the hierarchical order of wh-elements in the wh-domain (> means precedes in the sequential order).

(18)  *The hierarchical order of wh-phrases in the wh-domain*

Wh-subject > -RA marked direct object > Indirect wh-object > Place > Time > Manner > non-RA marked direct object

Note that (18) presents the default order in which wh-elements occur in the wh-domain. The wh-subject appears as the first wh-element in the hierarchical order; whereas a non-RA marked wh-object fills the lowest position. Importantly, any rearrangement violates the superiority constraint and hence is ungrammatical. There is, however, one exception to this generalization: the -RA marked wh-element *can* move over the wh-subject in apparent violation of the superiority constraint. I will leave this issue open until section (2.2). For now, there are couple of other questions that can be raised:

(i) How to account for the sequence of wh-elements in Persian?
(ii) If wh-elements occupy three domains in the hierarchical structure, what motivates their movement from one domain to another domain? This question is related to the optionality of wh-fronting in Persian that prompts wh-elements to appear in three domains in the structure rather freely.
(iii) How do wh-elements obtain their appropriate scope if wh-movement to the matrix position is only optional?

(iv) Last but not least, what is the pre-subject position where wh-elements move to?

In what follows, I will first account for the order of wh-elements in the wh-domain presented in (18) and then go back to the questions asked above, and discuss them one by one.

2.1.3 Accounting for wh-order

In what follows, I will account for the order of wh-elements based on two major approaches: namely, the “wh-cluster type” approach (Richards 2001, Grewendorf 2001) and “chain crossing” approach (Krapova and Cinque 2008). The first approach is based on the Probe-Goal model while the second one is based on chain-formation in terms of RM. I will show that both accounts can equally capture the order of wh-elements in multiple wh-questions in Persian.

2.1.3.1 The “wh-cluster” approach

The basic components of the “wh-cluster type” approach are the same as the Probe-Goal model – the wh-probe with an uninterpretable wh-feature looks for a goal with matching interpretable feature which makes the goal active and ready to enter into an AGREE relation. The probe then attracts the goal to its specifier position to establish AGREE. However, based on the “wh-cluster type” approach, all wh-elements in a multiple wh-question occur within the same projection either by targeting multiple specifier positions or by moving as a single wh-cluster to their hosting landing site.
Based on Grewendorf (2001), the internal structure of each wh-element contains a D-head with an uninterpretable [Wh] feature. In multiple wh-questions, wh-elements forms a cluster such that each wh-element acts as landing site for wh-movement. Once one wh-element is moved to the specifier position of the probing head with an uninterpretable [Wh] feature, the AGREE relation is established between the two wh-elements. These two wh-elements in turn act as a probing head to attract another wh-element to form a bigger cluster. In the subsequent stages of the derivation, the entire wh-cluster including three wh-elements is dislocated to a dedicated position in the spec-CP.

Grewendorf expands the clustering analysis to languages that manifest different strategies in forming multiple wh-questions such as Japanese (Saito 1992; Lasnik & Saito 1992; Takahashi 1993), in which wh-movement does not apply in overt syntax; or English, in which only one wh-element overtly occurs in the spec-CP while the remaining wh-elements stay in-situ. The way this analysis works is that the strength of the uninterpretable [Wh] feature on the probing head determines whether the wh-elements within the wh-cluster occur overtly in the spec-CP or rather remain in-situ as in Japanese. The probing head in multiple wh-fronting languages such as Bulgarian has a strong uninterpretable [Wh] feature while it has a weak [Wh] feature in languages like Japanese. The strong [Wh] feature triggers movement of all wh-elements to the spec-CP position in overt syntax.

Based on the “wh-cluster” analysis, we can presume that wh-elements in Persian form a wh-cluster in such a way that the wh-subject precedes other wh-arguments and the wh-arguments including the -RA marked direct object and the indirect object precede wh-adjuncts and finally the non-RA object wh occupies the lowest position in the wh-cluster. The way this derivation works is that the lowest wh-element attracts the second lowest wh-element in its specifier position and then the two wh-elements form a cluster that probes another wh-element to its dedicated specifier position once it is merged in the structure. Regarding the fact that wh-
elements optionally appear in three different domains, one can argue that the wh-feature on each probing wh-head is strong when there is overt movement and weak otherwise. I will defer discussing the optionality of wh-fronting in Persian specifically based on Grewendorf’s analysis in this section but will get back to this topic in section (2.1.4).

2.1.3.2 The “crossing chain” approach

According to the “crossing chain” approach proposed by Krapova and Cinque (2008), the sequence of wh-elements is derived from a constraint on chain-formation in term of RM. This constraint is stated in (19) below, which is a modified version of Chomsky’s (2000, 2001) minimality principle applied to A’-chains:

(19) *The crossing-chain constraint*

Only a whole chain, not just a link of a chain, counts as an ‘intervener’.

Krapova and Cinque (2008) propose the crossing-chain constraint to account for superiority effects in multiple wh-fronting languages such as Bulgarian that manifest strict ordering of wh-elements in the left periphery. In light of this discussion, consider an interrogative sentence in which wh-elements occur in a sequential order that follows the generalization that I provided in (18). For example, consider a grammatical sentence in (20) in which the wh-subject precedes the wh-object.

(20) * Ki chi kharid? Who what bought.3sg ‘Who bought what?’*
Building on the assumption that in multiple wh-questions all wh-elements must move to the left periphery for the sake of obtaining the appropriate scope, a multiple wh-question such as (20) will gives rise to a chain configuration like (21) below.

(21) \[ \text{Ki}_i \text{ chi}_j \langle i \rangle \langle j \rangle \text{ khord?} \]

In (21), the chain that links the two segments of the wh-object (i.e., the head and its tail) crosses one portion of the chain that links the wh-subject to its base position in the structure. Therefore, the grammaticality of (20) is correctly accounted for as it follows the crossing-chain constraint. Now consider an ungrammatical superiority-violating sentence in which the wh-object is moved over the wh-subject in an apparent violation of the above generalization with respect to the hierarchical order of wh-elements. This is illustrated in (22).

(22) \[ * \text{Chi}_j \text{ ki}_i \langle i \rangle \langle j \rangle \text{ khord?} \]

The “crossing chain” constraint correctly rules out the derivation of (21). This is precisely because the subject chain fully intervenes on the chain that links the extracted object to its base position in the structure and thus violates RM. Hence based on Krapova and Cinque’s (2008) analysis of chain-formation, we can account for the order of wh-elements in the hierarchical representation. Based on this analysis, a multiple wh-question contains various chains that connect each wh-element to its trace position. Wh-elements represent the order in which they are merged in the structure. Crucially, each particular chain in a composition of multiple chains must only partially intervene on the subsequent chain that links another element.
to its base position. In section (2.3.5), I will account for the acceptability of sentences containing a superiority violation on the basis of the “crossing chain” constraint.

### 2.1.4 Optional wh-fronting and obtaining scope

In this section, I will discuss two points: first, the optionality of wh-fronting in Persian (remember that in this language wh-elements appear in three domains in the hierarchical structure rather freely); second, how wh-elements are assigned scope correctly, even though movement to the matrix position is only optional. To begin with, consider (23) below, an indirect question.

(23) a. Nemidunam Hasan koja raft?
   Neg-know.1sg Hasan where went.3sg
   ‘I don’t know where Hasan went.’

b. Nemidunam koja Hasan <> raft?
   Neg-know.1sg where Hasan went.3sg

As (23a) and (23b) show, the wh-adjunct koja ‘where’ appears either to the left of the verb (i.e., the canonical pre-verbal position) or to the left of the subject. Crucially, in (23b) it is not possible to determine if the wh-element is situated right above the subject or it has been displaced to the higher embedded CP. Let us consider the position of the wh-adjunct koja ‘where’ in (24), in which the direct object in ketab-RA ‘this book-RA’ is topicalized and there is clitic-doubling.

Neg-know.1sg this book-RA Hasan where put.3sg-it

‘I don’t know where Hasan put this book.’


Neg-know.1sg this book-RA where Hasan put.3sg-it


Neg-know.1sg where this book-RA Hasan put.3sg-it

In (24b), the wh-adjunct occurs above the subject below the topicalized direct object whereas in (24c) it is on the left side of the topicalized object. Presumably, in (24c), the wh-element targets a higher position as it occurs above the topicalized object as compared to (24b) in which the wh-element occurs below the topicalized object, right above the subject. With Rizzi (1997), if we assume that there are two topic positions in the left periphery and a unique FocP is sandwiched between these two topicP in a structure like (25) below, then it is not possible to tell with certainty if the wh-element targets two different positions in (24b) and (24c). It is plausible that the topicalized element is in two different positions, targeting the higher topic in (24b) and the lower one in (24c) and that the wh-element is in the specifier of the same FocP above the subject.

(25) TopP … FocP … TopP …

The question arises as how to account for optional wh-movement that triggers wh-movement from one domain to another domain. The data in (23) and (24) show that wh-elements appear in different positions in indirect questions as well. Another relevant question is how selection is satisfied so that each wh-element is correctly assigned scope. In the light of
our discussion, consider (26) that exemplifies the position occupied by the PP object in double object constructions.

(26) a. Hasan ketab-RA gozasht ru miz.
    Hasan book-RA put.3sg on table
    ‘Hasan puts the book on the table’

b. Hasan ketab-RA ru miz gozasht.
    Hasan book-RA on table put.3sg

As the examples in (26) show, the PP object can occur either before or after the verb.

Now consider (27), in which the PP object is a wh.

(27) a. *Hasan ketab-RA gozasht koja?
    Hasan book-RA put.3sg where
    ‘Where did Hasan put the book?’

b. Hasan ketab-RA koja gozasht?
    Hasan book-RA where put.3sg

As (27a) shows, the wh-object cannot occur post-verbally, unlike its non-wh counterpart (26a). With Kahnamuyipour (2001), I propose that wh-elements are base generated post-verbally but obligatorily moved to the specifier of a functional projection inside vP (namely spec-FocP) to the left of the verb. If wh-elements move from the post-verbal position to the pre-verbal position inside vP, it follows that wh-elements in the pre-verbal position are not in-situ. The question arises as why wh-elements do not always remain in the low Foc position. In fact, if the movement to the low FocP is triggered by a focus or a wh-feature, this movement must be subject to criterial freezing (Rizzi & Shlonsky 2007). Based on criterial freezing, when an element checks an uninterpretable feature of a criterial head (e.g., Foc or Wh) it gets inactivated.
This means that the element cannot move further to the specifier of any other criterial head in the higher domains. So how does wh-movement proceed from the low FocP position to the clausal left peripheral position? I propose that wh-movement to the clausal left peripheral position does not actually go through the low FocP. Instead, no FocP is merged in vP and wh-elements go straight up to the left periphery. Alternatively, in sentences in which wh-elements occur in the low FocP, I propose that they are frozen in spec-FocP due to the criterial freezing.

Building on Karimi and Taleghani (2007), I propose that there is a wh-operator in CP and that each wh-element enters into an AGREE relation with the operator through feature movement. I propose that each wh-element contains two features: a focus feature and a wh-feature. The former triggers wh-movement to the specifier of a criterial focus head. The latter is responsible to establish the AGREE relation with the operator so that each wh-element acquires the appropriate matrix scope to ensure proper interpretation. I propose that the wh-feature is contained within a larger phrase, i.e., FocP, and that it is sub-extracted from FocP to enter into the AGREE relation with the operator. In cases in which wh-elements appear in the clausal left peripheral position of the embedded clause above the subject, wh-elements occupy a position in the structure which is neither their canonical pre-verbal position nor the matrix position. In fact, wh-movement to this position resembles the partial wh-movement strategy in languages like Dutch or German (Fanselow 2006; Barbiers et al. 2010) in which wh-elements are scrambled to an intermediate position in the hierarchical structure. I will not discuss further how the syntax of these wh-questions operates or whether they have different interpretation as compared to other questions in which wh-elements occur in the matrix position. I will leave this discussion open for further investigation. In the next section, I will address superiority violation in multiple wh-questions (i.e., the first type of intervention effect discussed in this thesis).
2.2 Superiority effect in multiple wh-questions*

2.2.1 Introduction

In this section, I will show that (a) wh-fronting in Persian is subject to intervention in terms of locality to the effect that the movement of the structurally lower wh-element over the higher one causes a ‘superiority violation’ in the sense of Chomsky (1973) (subsumed under the Minimal Link Condition Chomsky (1995)); (b) that superiority is a violation of Relativized Minimality (RM) (Starke 2001; Rizzi 2004) and that the d(iscourse)-linking feature morphologically realized by the suffix -RA licenses superiority elimination. Finally, I will discuss the derivation of sentences in which superiority is eliminated due to the presence of the suffix -RA and show how the AGREE relation is established in terms of the Probe-Goal relation (Chomsky 2000) in these sentences.

2.2.2 Data

Lotfi (2003) provides the sentences (1)-(5) to show that multiple wh-questions in Persian are constrained by the superiority condition.

(1) a. *Koja ki-o tou didi?

Where who-RA you saw.2sg

‘Whom did you see where?’

* The content of this section is mostly based on a paper by Farhad Mirdamadi accepted for publication in Generative Grammar @ Geneva (GG@G), a journal allotted to graduate students at the University of Geneva. The content of this section was also partly presented at the 9th days of Swiss Linguistics international conference, University of Geneva, Switzerland (29 June – 1 July, 2016).
b. Ki-o koja tou didi?
   Who-RA where you saw.2sg

(2) a. *Chi ki kharid?
   What who bought.3sg
   ‘What did who buy?’

b. Ki chi kharid?
   Who what bought.3sg

(3) a. *Koja ki raft?
   Where who went.3sg
   ‘Where did who go?’

b. Ki koja raft?
   Who where went.3sg

(4) a. *Kei ki raft?
   When who went.3sg
   ‘When did who go?’

b. Ki key raft?
   Who when went.3sg

(5) a. *Koja ki un-o did?
   Where who that-RA saw.3sg
   ‘Where did who saw that?’
b. Ki koja un-o did?
Who where that-RA saw.3sg

Other examples of superiority violation in Persian are given by Kahnemuyipour (2001) illustrated in (6) – (8):

(6) a. *Ki-o ki did?
Who-RA who saw.3sg
‘Whom did who see?’
b. Ki ki-o did?
Who who-RA saw.3sg

(7) a. *Ali koja ki-o did?
Ali where who-RA saw.3sg
‘Where did Ali see what?’
b. Ali ki-o koja did?
Ali who-RA where saw.3sg

(8) a. *Ali chejuri ki-o did?
Ali how who-RA saw.3sg
‘How did Ali see what?’
b. Ali ki-o chejuri did?
Ali who-RA how saw.3sg
In the above-mentioned ungrammatical sentences that violate the superiority constraint there is a common property – the order of the wh-elements violates the generalization provided in section (2.1.2) and repeated in (9) below with respect to the hierarchy of wh-sequence in the wh-domain in multiple wh-questions. These sentences are ungrammatical because the lower elements in the hierarchy are moved over the higher ones, causing ungrammaticality.

(9) *The hierarchical order of wh-phrases in the wh-domain*

Wh-subject > -RA marked direct object > Indirect wh-object > Place > Time > Manner

> non-RA marked direct object

Lotfi (2003) observed that when the wh-object is marked with the suffix -RA, the superiority violation is eliminated. Consider the examples in (10) – (12).

(10) a. *Armin chi koja kharid?*
    Armin what where bought.3sg

    ‘What did Armin buy where?’

    b. Armin chi-o koja kharid?
       Armin what-RA where bought.3sg

(11) a. *Armin chi key kharid?*
    Armin what when bought.3sg

    ‘What did Armin buy when?’

    b. Armin chi-o key kharid?
       Armin what-RA when bought.3sg
(12) a. *Chi ki kharid?
   What who bought.3sg
   ‘What did who buy?’

b. Chi-o ki kharid?
   What-RA who bought.3sg

What these examples show is that when the wh-object (the lowest element in the hierarchy) is suffixed with -RA, it can move over the hierarchically higher wh-elements in the wh-domain. In (12b), for example, the -RA marked wh-object is moved over the wh-subject, i.e., the leftmost wh-element in the hierarchical order.

Now given that the -RA marked wh-object can move over the wh-subject, i.e., providing the possibility of occurring in the left most position in the hierarchy, we can revise the generalization with respect to the hierarchical order of wh-phrases in Persian. The updated version of the hierarchy of wh-elements in the wh-domain is given in (13).

(13) The hierarchical order of wh-phrases in the wh-domain (updated):

-RA marked direct object > Wh-subject > (-RA marked direct object) > Indirect wh-object > Time > Place > Manner > Bare direct object

Based on (13), the -RA marked wh-object has the possibility of filling the highest position in the wh-domain above the wh-subject and the bare wh-object occupies the lowest position. In the next section, I will discuss the effect of the suffix -RA on licensing the superiority violations.
2.2.3 The effect of -RA on licensing superiority violation

In chapter (1), I have shown that d-linking is morphologically encoded in Persian by the suffix -RA and that -RA marked wh-objects are d-linked in the sense of Pesetsky (1987, 2000). In English, d-linking also plays a role in licensing superiority elimination. A d-linked lexically restricted wh-element can move over another d-linked wh-element. This is illustrated in (14).

(14) Which book did which student buy?

Let us compare (14) in English with (12b) in Persian (repeated below). Unlike (14) in which there are two lexically restricted d-linked wh-elements, in (12b) there is only one d-linked wh-element (namely the -RA marked wh-object).

(12b) Chi-o ki kharid?

What-RA who bought.3sg

‘What did who buy?’

---

10 It is a relevant question to ask whether the amelioration observed in (14) in English is due to d-linking or to some other factor such as the presence of lexical restriction. I will discuss the difference between Persian and English later in this section with respect to the difference between d-linking and lexical restriction. In English, lexically restricted wh-elements are d-linked but bare wh-elements can be d-linked as well when a right context is provided. Villata et al. (2016) compared the effect of d-linking with the effect of lexical restriction in sentences that involved the extraction of wh-object over an intervening wh-subject. They observed that d-linking per se does not improve acceptability but rather it is the presence of lexical restriction that plays a crucial role in modulating acceptability. The problem with distinguishing d-linking and lexical restriction is that it is not possible to have a NON d-linked lexically restricted wh-phrase. Later in this section, I will argue that the relevant feature in licensing superiority elimination is [+Top] that expresses the properties of d-linking, specificity, familiarity presuppositionality etc, attributable to the presence of the suffix -RA in Persian.
When both wh-expressions are suffixed with -RA, the lower wh-object cannot move over the higher one. This is illustrated in (15b):

(15)  

a.  

Ki-RA \_  

ostad  \(_<i_\)  

tashvigh kard  

chi-RA  

bekhune.

who-RA  

professor  

persuade.3sg  

what-RA  

to read

‘Who did the professor persuade to read what?’

b.  

*Chi-RA \_  

ostad  

ki-RA  

tashvigh kard  \(_<i_\)  

bekhune.

what-RA  

professor  

who-RA  

persuade.3sg  

to read

‘What did the professor persuade who to read?’

In fact, the ungrammaticality holds in sentences that contain two -RA marked lexically restricted wh-phrases. Compare (16a) with (16b).

(16)  

a.  

Kodum daneshju-RA \_  

ostad  \(_<i_\)  

tashvigh kard  

kodum ketab-RA  

bekhune.

Which student-RA  

professor  

persuade.3sg  

which book-RA  

to read

‘Which student did the professor persuade to read which book?’

b.  

*Kodum ketab-RA \_  

ostad  

kodum daneshju-RA  

tashvigh kard  \(_<i_\)  

bekhune.

Which book-RA  

professor  

which student-RA  

persuade.3sg  

to read

‘Which book did the professor persuade which student to read?’

(15b) and (16b) contrast with (14) in English: whereas the movement of a (d-linked) -RA marked wh-element over another (d-linked) wh-element is not allowed in Persian, it is possible to move a lexically restricted wh-element over another lexically restricted wh-element in English. In Persian, on the other hand, superiority violation is legitimately eliminated when
the fronted wh-object is marked with -RA and the intervening element does not carry -RA marking as in (12b).

In the next section, I will discuss the grammaticality of (12b) and the ungrammaticality of (15b) and (16b) in Persian. The analysis will be expressed in terms of RM (Rizzi 2004). I will also discuss why it is not possible to move a (d-linked) -RA marked object over another (d-linked) -RA marked object in Persian while the movement of a which-NP over another which-NP is permitted in English.

2.2.4 Superiority is a violation of RM

In chapter (1), I claimed that superiority violations can be accounted for based on chain-formation in the sense of RM. In light of our discussion, let us account for the ungrammaticality of the superiority-violating sentence in (12a) based on RM (repeated below for convenience).

(12) a. *Chi ki kharid?

What who bought.3sg

‘What did who buy?’

The ungrammaticality of this sentence is due to the fact that the wh-object is moved over an intervening wh-subject and that both wh-elements contain an identical morpho-syntactic feature (namely [+Wh]). In fact, the presence of the intervening wh-subject blocks the chain that links the extracted object to its base position.

How about the grammaticality of (12b) in which the presence of the suffix -RA eliminates the superiority violation? Can RM account for the grammatical status of this sentence?
With Rizzi (2004) I claim that, whereas feature Identity is ungrammatical, when the morpho-syntactic features of the intervener are a proper subset of the features of the moved element chain-formation is indeed possible. This configuration is a case of feature Inclusion in which the extracted wh-element is enriched with an additional feature that is absent on the intervening element. It should be noted that based on RM the relevant features are those that trigger movement (Rizzi 2011). For example, [+Wh] is a relevant feature that must be taken into consideration in the computation of chain-formation as defined by RM. [+Wh] triggers the movement of wh-elements to the left-periphery in wh-questions. I have argued that [+Wh] establishes an AGREE relation with an operator in CP to assign an interrogative force to a wh-question in Persian. With Rizzi (2011), I claim that another relevant feature is [+Top] that triggers the movement of topics to the spec TopP. [+Top] expresses the properties of d-linking, specificity, presuppositionality, familiarity etc. In Persian, since d-linked wh-objects obligatorily co-occur with the suffix -RA, I claim that -RA is a morphological marker that encodes [+Top]11.

Of special relevance for our discussion is the configuration of feature Inclusion that, based on RM, should account for the grammaticality of sentences in which superiority is eliminated due to the presence of an additional d-linking feature (namely +Top) on the extracted wh-element.

11 It must be noted that, in Friedmann et al. (2009) and Villata et al. (2016), the authors associated the effect of lexical restriction on the chain-formation across an intervening wh-element to the presence of [+N] feature (attributed to lexical restriction). This feature defines the precise set that a lexically restricted wh-phrase refers to in the discourse (e.g., which book in a context in which both the speaker and hearer know which set of books they refer to in the discourse). They claimed that [+N] is not a criterial feature and that does not trigger movement by itself but specifies the landing site of the lexically restricted wh-phrases in the left periphery.
In (17), I represent the configurations of ‘feature Identity’ and ‘feature Inclusion’ schematically. X is the element moved to the initial position, Y is the unpronounced copy of X in the base position, Z is the intervening element. A and B are the relevant morphosyntactic features that participate in the computation of chain-formation as defined by RM.

(17)

a. Feature Identity

\[ X_{ [+A] } \ldots Z_{ [+A] } \ldots Y_{ [+A] } \]

b. Feature Inclusion

\[ X_{ [+A+B] } \ldots Z_{ [+A] } \ldots Y_{ [+A+B] } \]

Let us now consider the grammaticality of (12b) and the ungrammaticality of (15b), (16b). I repeat these sentences below for convenience.

(12b) Chi-oi ki <i> kharid?

what-RA who bought.3sg

(15b) *Chi-RAi fekr mikoni ostad ki-RA tashvigh kard <i> bekhune?

what-RA think.2sg professor who-RA persuaded.3sg read.3sg

(16b) *Kodum ketab-RAi fekr mikoni ostad kodum daneshju-RA tashvigh kard <i> bekhune?

which book-RA think.2sg professor which student-RA persuaded.3sg read.3sg

Based on RM, (15b) and (16b) are ungrammatical as the feature specification of the fronted wh-elements is identical to the feature specification of the intervening elements (note that the feature specification of the wh-elements in (16b) is larger than the specification of those
in (15b). The grammaticality of (12b) can be accounted for as the feature specification of the fronted wh-object, namely [+Wh +Top] is richer than the feature specification of the intervening wh-subject [+Wh], creating an Inclusion configuration. In (18), I represent the feature specification of the fronted wh-elements, as well as the specification of the intervening wh-elements in the examples (12a), (12b), (15b), and (16b) respectively.

(18)
a. Feature Identity

\*Chi [+Wh] ... Ki [+Wh] ... <Chi [+Wh]> = (12a)

b. Feature Inclusion

Chi-RA [+Wh+Top] ... Ki [+Wh] ... <Chi-RA [+Wh+Top]> = (12b)

c. Feature Identity

\*Chi-RA [+Wh+Top] ... Ki-RA [+Wh+Top] ... <Chi-RA [+Wh+Top]> = (15b)

d. Feature Identity

\*Kodum ketab-RA [+Wh+Top] ... Kodum daneshju-RA [+Wh+Top] ... <Kodum ketab-RA [+Wh+Top]>

> = (16b)\(^\text{12}\)

How about the English example, repeated in (14)? Can Relativized Minimality account for the grammatical status of this sentence?

(14) Which book did which student buy <i>?</i>

\(^{12}\) Here I assume that the feature specification of both the bare and the lexically restricted -RA marked wh-phrases are the same even though the specification of the -RA marked lexically restricted wh-phrase as in (16b) seems to be larger, presumably containing an additional [+N] feature specifying the set that the wh-phrase refers to in a given discourse, than the specification of the -RA marked bare wh-elements as in (15b).
In (14) both wh-elements are lexically restricted and thus d-linked. In fact, if the feature specification of both wh-elements is identical, presumably containing [+Wh +Top] features, the sentence should be ungrammatical, contrary to the facts. Furthermore, if we compare (15b) or (16b) in Persian with (14) in English, we can see that whereas the presence of two lexically restricted wh-phrases is grammatical in English, the movement of a d-linked -RA marked object over another d-linked -RA marked object renders the sentences ungrammatical. So how can we account for the difference between English and Persian?

With Rizzi (2013), I propose that lexically restricted wh-phrases only optionally carry a [+Top] feature. In fact, in right contextual conditions bare wh-elements can be d-linked as well. In Persian, bare wh-objects may be marked with -RA or not. The choice depends on their interpretation as being d-linked or not. Lexically restricted wh-objects, on the other hand, must co-occur with -RA and thus are inherently d-linked. Whenever the wh-object is marked with the suffix -RA in Persian, it obligatorily bears [+Top]. Therefore, if we assume that lexically restricted wh-phrases only optionally carry the [+Top] feature as in English, we can account for the grammaticality of (14) on the grounds that the moved wh-object contains a [+Top] feature and that this feature is absent on the intervening wh-subject. Indeed, based on this analysis, (14) in English creates an Inclusion configuration that is predicted to be grammatical by RM. The difference between English and Persian is that, in Persian, [+Top] is encoded morphologically by the suffix -RA whereas in English this feature is only optionally available by the presence of lexical restriction. When the wh-object is marked with -RA, it carries [+Top] feature irrespective of whether it is lexically restricted or not. This is the reason why the movement of a -RA marked wh-element over another -RA marked wh-element as in (15b) and (16b) is ungrammatical - it gives rise to feature Identity as both elements contain [+Wh +Top] features. In table (2), I present the profile of grammaticality that the Persian examples manifest.
Table 2: The profile of grammaticality attested by the Persian examples.

<table>
<thead>
<tr>
<th>Ki ... Chi</th>
<th>No superiority violation</th>
<th>No intervention</th>
<th>Grammatical</th>
</tr>
</thead>
<tbody>
<tr>
<td>who ... what</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>*Chi ... Ki ...&lt;Chi&gt;</th>
<th>Superiority violation</th>
<th>Feature Identity</th>
<th>Ungrammatical</th>
</tr>
</thead>
<tbody>
<tr>
<td>what ... who ... &lt;what&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chi-RA ... Ki ... &lt;Chi-RA&gt;</th>
<th>Superiority elimination</th>
<th>Feature Inclusion</th>
<th>Grammatical</th>
</tr>
</thead>
<tbody>
<tr>
<td>what-RA ... who ... &lt;what-RA&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>*Chi-RA ... Ki-RA ... &lt;Chi-RA&gt;</th>
<th>Superiority violation</th>
<th>Feature Identity</th>
<th>Ungrammatical</th>
</tr>
</thead>
<tbody>
<tr>
<td>what-RA ... ki-RA ... &lt;what-RA&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>*Kodum ketab-RA ... Kodum daneshju-RA ... &lt;Kodum ketab-RA&gt;</th>
<th>Superiority violation</th>
<th>Feature Identity</th>
<th>Ungrammatical</th>
</tr>
</thead>
<tbody>
<tr>
<td>which book-RA ... which student-RA ... &lt;which book-RA&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In the next section, I will discuss the derivation of the sentences in which the superiority violation is eliminated due to the addition of [+Top] feature in terms of an AGREE relation based on Chomsky’s (2000) Probe-Goal model. I will explain how the grammatical status of these sentences can be accounted for even though the wh-object moves over the intervening wh-subject and that the wh-subject is the closer candidate to the probe in the hierarchical structure.

### 2.2.5 On the derivation of superiority-eliminating sentences

In chapter (1), I claimed that based on Minimal link Condition (MLC), in a situation in which there is more than one legitimate candidate in the c-commanding domain of the probe, the probe is constrained to attract the hierarchically closest candidate. In other words, the probe constructs the closest pathway with the goal for reasons of locality. In light of our discussion, consider the examples of (14) and (12b) from English and Persian in which the superiority violation is eliminated due to the d-linking [+Top] feature. In both sentences, repeated below, the wh-object is moved over the wh-subject occurring in the initial position in an apparent violation of the superiority constraint.

(14) Which book did which student buy <i>?</i>

(12b) Chi-RA<i|i> ki <i>i</i> kharid?

What-RA who bought.3sg

I have argued that, in terms of RM, the grammaticality of these sentences can be accounted for based on the fact that the feature specification of the extracted wh-objects in both sentences contain [+Wh +Top] features, while the feature specification of the intervening wh-
subjects contains [+Wh], creating an Inclusion configuration. The question arises as how the wh-probe skips the wh-subject (i.e., a closer candidate for movement) and reaches the lower wh-object to attract it to the initial position.

I argue that in these sentences the [+Wh] and [+Top] features come to reside in a single attracting head when the probing wh-head incorporates to a higher head, namely, TopP. The spec-TopP is the position that topics target in the left periphery. This position is higher than the spec-FocP where bare wh-elements usually move to in the map of left periphery. The incorporation of two attracting probes gives rise to a complex attracting probe with [+Wh] and [+Top] features. I further assume that the complex probe that contains both [+Wh] and [+Top] searches for a goal that maximally satisfies its feature content. In the search to find the appropriate goal, the complex probe skips the first wh-element which only contains [+Wh] (namely the wh-subject) and continues its search until it finds the second wh-element. The second wh-element (namely the wh-object) contains both [+Wh] and [+Top] and fully matches the feature content of the complex probe. The probe enters into an AGREE relation with the wh-object and attracts it above the wh-subject to its specifier position. In other words, -RA marked wh-objects in Persian are probed qua topic by the complex probe that is enriched with [+Wh +Top] features. Hence, the chain that links the -RA marked wh-object in the initial position to its trace position is a topic-chain that crosses over a wh-chain. In (19), I illustrate the derivation of the sentences in which the superiority violation is eliminated.

(19) The derivation of the superiority-eliminating sentences

First step: two heads (namely Top and Foc) incorporate in the left periphery, forming a complex probing-head bearing [+Wh +Top] features

$$\text{Top}^{[+\text{Top}]} \ldots \text{Foc}^{[+\text{Wh}]} \Rightarrow \text{Top-Foc}^{[+\text{Top} +\text{Wh}]}$$
**Second step:** The complex head attracts the -RA marked wh-object in Persian or the lexically restricted wh-object in English with matching [+Wh +Top] features

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Let me now consider the sentences in which there are two -RA marked wh-elements and see how the proposed analysis can account for their ungrammaticality. Consider (15b), repeated below for convenience.

(15b)  * Chi-RAi ostad ki-RA tashvigh kard <i> bekhune.

`What-RA professor who-RA persuade.3sg to read`

‘What did the professor persuade who to read?’

In this sentence, there are two -RA marked wh-objects. Each wh-element carries [+Wh +Top] features and thus is eligible to enter into an AGREE relation with the complex probe. The ungrammaticality of (15b) is due to the fact that the probe cannot skip the higher wh-element and attract the lower one in violation of MLC as both elements are equally endowed with [+Wh +Top] features.

### 2.2.6 Conclusions

In sum, I argue that superiority is a violation of RM and show that, whereas feature ‘Identity’ gives rise to ungrammaticality, feature ‘Inclusion’ is felicitous. The distinction
between Persian and English is that in the former d-linking is realized by a morpho-syntactic marker, the suffix -RA. In Persian, in fact, d-linking is inevitable when the wh-object is marked with -RA, but optional when it is lexically restricted as in English. I further argue that the grammaticality of a -RA marked wh-object moving over the intervening wh-subject is accounted for on the assumption that the -RA marked object is endowed with [+Wh +Top] features, thus making it the only eligible candidate to establish an AGREE relation with the complex probing-head in the left periphery bearing matching [+Wh +Top] features. In the next section, I will present the results of a grammaticality judgment task which examines the effect of lexical restriction in multiple wh-questions involving superiority violation. The results of this experiment will be germane to the arguments that I provided in this section with respect to the role of the suffix -RA on licensing superiority elimination.
2.3 The role of covert movement in multiple wh-questions: An experimental study

2.3.1 Introduction

In this section, I will present the results of a grammatically judgment experiment that aimed at replicating the previous findings by Hofmeister et al. (2007; 2013) in sentences containing a Superiority violation (SUV). Hofmeister et al. observed that the acceptability of Inclusion and Identity are on a par and that when the feature specification of the intervening wh-element is richer than the specification of the extractee in a configuration called ‘Inverse Inclusion’ (e.g., What did which student buy <i>?</i>?), sentences receive higher acceptability than both Inclusion and Identity. These findings are against the predictions of RM which asserts that Inclusion is more acceptable than Identity. According to RM, what counts is the featural richness of the extracted wh-object relative to that of the intervening wh-subject. In fact, in the Inclusion configuration, the featural set of the extracted element is richer than the one of the intervening element, whereas under both Identity and Inverse Inclusion the featural set of the intervener is either identical to or properly includes the featural set of the extractee. Hofmeister et al.’s findings also contradict what I presented and discussed in the previous section with respect to the role of the suffix -RA that creates Inclusion configuration, eliminating the ungrammaticality incurred by feature Identity in superiority-violating sentences in Persian. I will discuss these issues in this section.

* The content of this section is mostly based on a paper jointly written with Sandra Villata, Ur Shlonsky and Julie Franck. The content was also presented at the 9th days of Swiss Linguistics international conference, University of Geneva, Switzerland (29 June – 1 July, 2016).
The experiment in this section tests SUV in extraction of an object over an intervening object in structures in which both objects were marked with the suffix -RA but the presence of lexical restriction varied. The results show that sentences with a bare extracted element and a lexically restricted intervener (‘Inverse Inclusion’) were more acceptable than those with a lexically restricted extracted element and a bare intervener (‘Inclusion’) which in turn received the same acceptability as Identity with two bare wh-elements. Although this pattern replicates previous findings in SUV by Hofmeister et al (2007; 2013) in English, it is in contradiction with cross-linguistic observations on another structure, namely extraction from wh-islands which attested to a higher acceptability of Inclusion than Identity (Atkinson et al. 2015; Villata, Rizzi & Franck 2016) (see also chapter (3) for the relevant discussion on extraction from weak-islands). I will propose that the contradictory results in SUV and wh-islands, despite their superficial surface similarity, are due to the fact that whereas (overt) extraction from wh-islands is sensitive to the feature content of the extractee and the intervener (i.e., whether or not they are lexically-restricted), the degree of (un)acceptability of SUV hinges on the different landing site options that the features of the extractee and the intervener permit. I will also discuss the sentences in which the suffix -RA eliminates the superiority violation and will claim that the grammaticality of these sentences is due to the fact that -RA on the extracted wh-object (absent on the intervening wh-subject) creates an Inclusion configuration in terms of criterial features in the sense of Rizzi (2011). I will claim that, unlike non-criterial features such as lexical restriction, namely [+N], which is predicted to have a mild impact on acceptability, the suffix -RA eliminates the superiority violation as it creates Inclusion in terms of the criterial [+Top] feature. I will also discuss the grammaticality of these sentences based on chain-formation in the sense that the chain that belongs to the extracted -RA marked wh-object is topic that crosses over a different chain, namely a wh, a derivation that is legitimate based on Krapova and Cinque’s (2008) notion of intervention in terms of unique ‘space’ in the left periphery.
2.3.2 The effect of lexical restriction in wh-islands

Ross (1967) observed that wh-movement of a wh-object out of an indirect wh-question is degraded in English compared to wh-movement out of a non-interrogative complement. Indirect wh-questions belong to ‘islands’, i.e., domains opaque to wh-movement.

(1)  
   a. ??What do you wonder who bought <i>?</i>? Extraction from a wh-island
   
   b. What do you think John bought <i>?</i>? Extraction from a non-interrogative complement clause

Over the years, it has become clear that various factors influence the grammatical status of wh-island violations. One factor that systematically ameliorates wh-movement out of a wh-island is the addition of a lexical restriction to the moved wh. Thus, (2) is typically judged as being only mildly deviant, contrasting with (1a).

(2)  
   ?Which book do you wonder who bought <i>?</i>?  

There are various reasons, however, to consider (1a) not as an island-violation, i.e., as extraction from an opaque domain, but rather as a violation of the principle that restricts the formation of chains across intervening elements in terms of f(eatural)RM (Starke 2001, Rizzi 2004 and subsequent work). Based on fRM, the unacceptability of (1a) is due to the intervention of the wh-subject who in the chain linking what and its copy in the object position of bought. Since the intervener and the target of wh-movement have an identical morpho-syntactic feature, namely [+Wh], a chain relating the surface position of what to its base position is ill-formed, as it violates RM (Rizzi 2004). The relative acceptability of (2) is due to the fact that the lexically
restricted which book contains an additional feature, one that is absent on the intervener who, a bare wh-element. In the previous section, I claimed that this additional feature is [+Top] that expresses the properties of d-linking, specificity and presuppositionality, typically associated with lexically-restricted wh-expressions and -RA marking in Persian. (2) creates a case of (feature) Inclusion, where the feature set of the intervening wh has a [+Wh] feature, while the feature set of the extracted wh has [+Wh,+Top]. The feature specification of (1a) and (2) are illustrated in (3), respectively.

(3)


2.3.3 A Puzzle

Previous experimental results are in line with RM showing that feature Inclusion is more acceptable than feature Identity (see Atkinson et al.’s 2015 results in English, Villata et al.’s 2016 results in French; see also chapter 3 for converging evidence in Persian). The results also show that, when the feature set of the extracted wh is included in the feature set of the structurally intervening wh, manifesting the configuration called Inverse Inclusion (exemplified in (4)), sentences receive the same acceptability ratings as those manifesting feature Identity.

(4) ??What, do you wonder which student bought <,>? Inverse Inclusion

Surprising as it may look, a totally reverse profile of acceptability emerged from studies conducted by Hofmeister et al. (2007; 2013) on SUV structure. Specifically, Hofmeister et al.
observed that Inverse Inclusion as in (5a) was more acceptable than Inclusion (5b), which in turn was judged on par with Identity (5c).

(5) a. ?Mary wondered what which boy read. Inverse Inclusion
    b. *Mary wondered which book who read. Inclusion
    c. *Mary wondered what who read. Identity

In this section, my goal is to account for the higher acceptability of Inverse Inclusion as compared with Inclusion in SUV – a profile of acceptability that is the opposite of the one reported in wh-islands. First, since the pattern of acceptability in SUV between Inverse Inclusion and Inclusion has only been observed in English, I considered important to corroborate Hofmeister et al’s (2007, 2013) results in Persian. In the next section, I will report the results of a grammaticality judgment experiment in which I compared the pattern of acceptability of Inverse Inclusion with Inclusion in an SUV structure involving two wh-objects. In this experiment, both objects were suffixed with -RA but varied with respect to the presence of lexical restriction.

2.3.4 Experiment

2.3.4.1 Method

2.3.4.2 Participants

Forty-One native speakers of Persian participated in this experiment. Participants were students, mostly preparing a PhD or Master’s thesis at the University of Lausanne, Switzerland. They were all naïve to the purpose of the experiment and their participation was voluntary.
2.3.4.3 Materials

The design consisted of a single 4-level variable (Configuration) obtained by crossing the lexical restriction on the wh-object (lexically restricted vs. bare) and the lexical restriction on the wh-subject (lexically restricted vs. bare). The result of this 4-level variable gave rise to two additional configurations, namely Bare Identity with two bare wh-elements and Complex Identity containing two lexically restricted wh-elements. The reason for these two additional configurations in this study was to have a fully-crossed design, manipulating lexical restriction on both wh-elements. In Persian, -RA is obligatory when the direct wh-object is lexically restricted. In order to focus on the effect of lexical restriction, I tested an SUV structure involving two -RA marked wh-phrases. This way, I made sure that if lexical restriction has any impact on modulating grammaticality, it is not due to the presence of the suffix -RA. Hofmeister et al. (2007, 2013) tested SUV in a structure including a subject (i.e., the intervener) and an object (i.e., the extractee). In this experiment, I tested an SUV structure involving two objects. This allowed me to examine if the pattern of acceptability observed by Hofmeister et al. (2007, 2013) can extend to other SUV structures involving two objects. Moreover, it has been observed that subjects and objects do not manifest the same syntactic behavior under extraction (Chomsky 1981; Pesetsky 1982, among others). For example, whereas long extraction of object wh-phrases is generally permissible, long extraction of subject wh-phrases is severely restricted (Rizzi & Shlonsky 2007; Schippers 2016). Testing an SUV structure involving two objects avoided the problem that might arise from the subject/object distinction in extraction. Examples of sentences in the 4 experimental conditions are provided in Table (3) below (see the full list of items in Appendix (1). Eight experimental items were generated together with 96 fillers. In the experimental items, the structurally higher wh-object was always animate and the lower
object was always inanimate. This made the sentences semantically unmarked and easy to comprehend. The matrix verb for half of the experimental items was *tashvigh kardan* (*to persuade*) and for the other half was *majbor kardan* (*to force*). Filler items consisted of non-SUV sentences of the same structure as the experimental items (N = 32) containing two wh-objects in which the higher wh-phrase was fronted to clause initial position while the lower wh-phrase remained in its base position, causing no SUV. The lexical restriction on both wh-phrases was manipulated in order to make the filler items as comparable as possible to the test items. Fillers also contained different structures such as fully acceptable S(O)V sentences with transitive and intransitive verbs (N = 32), and completely unacceptable sentences with mismatches between the verb valency and the number of arguments (N = 32). Test items and fillers were spread into two random lists. Each list contained 16 experimental sentences and 96 fillers. Each participant was asked to judge all the sentences included in a list, which were randomly presented to them.

**Table 3:** Example of item in the experimental conditions.

<table>
<thead>
<tr>
<th>Configurations</th>
<th>Sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bare Identity</strong></td>
<td>Chi-RA ostad ki-RA tashvigh kard bekhune?</td>
</tr>
<tr>
<td></td>
<td><em>What-RA professor who-RA persuade did.3sg to read</em></td>
</tr>
<tr>
<td></td>
<td><em>What did the professor persuade who to read?</em></td>
</tr>
<tr>
<td><strong>Inverse Inclusion</strong></td>
<td>Chi-RA ostad kodum daneshju-RA tashvigh kard bekhune?</td>
</tr>
<tr>
<td></td>
<td><em>What-RA professor which student-RA persuade did.3sg to read</em></td>
</tr>
</tbody>
</table>

82
<table>
<thead>
<tr>
<th><strong>Inclusion</strong></th>
<th>Kodum ketab-RA ostad ki-RA tashvigh kard bekhune?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Which book-RA professor who-RA persuade did.3sg to read</em></td>
</tr>
<tr>
<td></td>
<td>‘Which book did the professor persuade who to read?’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Complex Identity</strong></th>
<th>Kodum ketab-RA ostad kodum daneshju-RA tashvigh kard bekhune?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Which book-RA professor which student-RA persuade did.3sg to read</em></td>
</tr>
<tr>
<td></td>
<td>‘Which book did the professor persuade which student to read?’</td>
</tr>
</tbody>
</table>

### 2.3.4.4 Procedure

The experiment was programmed with IbexFarm (http://spellout.net/ibexfarm/). Sentences were presented once at the time on the computer screen and participants were asked to provide/deliver acceptability judgments on the basis of a 1-7 Likert scale (where 1 corresponded to a completely unacceptable sentence and 7 to a fully acceptable one). Each participant was given a thorough instruction, including three examples illustrating how to use the full scale followed by 10 practice items. There was no time pressure during the experiment.

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13 Ibex: Internet Based Experiments created and maintained by Alex Drummond, accessible at http://spellout.net/ibexfarm/. We also refer the readers to Sprouse (2011) where the author compared the grammaticality judgement data obtained from a web-based system with laboratory data and concluded that both sets of data are indistinguishably reliable.
2.3.4.5 Data analysis

The data were analyzed with linear mixed-effect models estimated with the lmerTest package (Bates et al. 2014) in the R-software environment (R Development Core Team 2015), with Configuration as fixed factor and subject and item variabilities as random intercepts. No data point from the data set was excluded. In addition, in order to directly compare the relative acceptability of the four experimental conditions, an additional lmer model in which contrasts were dummy-coded was conducted, such that the intercept of the model represents the reference level (e.g., Bare Identity) to which the three other structures are compared. The Satterthwaite approximation for degrees of freedom was used to estimate p-values and z-score transformed data were calculated subject by subject in order to avoid bias on using the scale and to improve statistical power.

2.3.4.6 Results

Figure (1) represents the mean acceptability (in raw-scores) and standard errors of the experimental conditions. The effect of Configuration turned out to be significant ($F = 15.05, p < .001$) attesting to differences among the configurations. The results on the subsequent pairwise models revealed that Inverse Inclusion ($M = 3.1$) was more acceptable than Inclusion ($M = 2.7$) ($\beta = -0.253, SE = 0.092, t = -2.745, p < .01$). Regarding the other two additional configurations, namely Bare Identity and Complex Identity, the results showed that the acceptability of Bare Identity ($M = 2.7$) was not significantly different from that of Inclusion ($t < 1$), and that the acceptability of Inverse Inclusion was on a par with that of Complex Identity ($M = 3.3$) ($t < 1$). The profile of acceptability is illustrated in (6).
2.3.5 Accounting for the puzzle

In the previous section, I reported the results of a grammaticality judgment experiment which replicates Hofmeister et al.’s (2007; 2013) results in English and show that Inverse Inclusion is more acceptable than Inclusion in SUV, which in turn receives the same acceptability ratings as Identity. This pattern of acceptability is the opposite of the pattern of acceptability in extraction out of wh-islands. In this regard, converging evidence from various experimental studies has shown that Inclusion is more acceptable than Inverse Inclusion which is equally acceptable as Identity.
With Rizzi (2017) and following Mirdamadi et al (submitted), I claim that the reverse rates of acceptability of Inverse Inclusion and Inclusion in SUV and wh-islands are amenable to a principled analysis if one takes into account a fundamental syntactic difference between Superiority and wh-island configurations - in the case of extraction out of wh-islands, the two wh-elements have scope over two distinct clauses. In light of our discussion, consider (1a) in English, repeated below as (7). In this sentence, the wh-subject who takes its scope in the embedded clause whereas the extracted wh-object what takes its scope in the matrix clause. The position of the two wh-elements corresponds to their scope position.

(7) What do you wonder who bought?

In SUV structures, on the other hand, the wh-elements have scope over the same clause, but only the ex-situ wh is pronounced in its scope position. On the assumption that wh-elements must be in their scope position at the interface with semantic interpretation, there has to be some way for the in situ wh to come to occupy a scope-taking, clause-initial position. The classical analysis of multiple wh-questions posits that the in-situ element undergoes covert movement and comes to occupy its scope position at Logical Form (LF) (Chomsky 1981; Huang 1982. See also Fox 2003; Hornstein 1995; Huang 1995 a.o.). Covert movement does not take place in wh-islands, because each wh-element is overtly moved to its appropriate scope position.

I follow Villata et al. (2016) and Rizzi (2017) and suggest that this formal difference between extraction from wh-islands and SUV lies at the core of the reversal in rates of acceptability of the Inclusion and Inverse Inclusion configurations in the wh-island condition and the SUV condition. The discussion that I provide in this section is based on Mirdamadi et al. (submitted) whose study takes off from Rizzi’s (2017) more explicit execution of this insight.
Let us first consider the contrast in (8) in Persian. In this sentence, the highest wh-element *ki* ‘who’ moves overtly, while the second one stays sentence internally.

(8)  

a. Ki chi kharid?

Who what bought.3sg  
‘Who bought what?’

b. *Chi ki kharid?

What who bought.3sg

Actually, in (8), it is also possible to assume that both wh-elements are moved to the clausal left peripheral position. However, what is crucial for our discussion is that (8a) is a grammatical multiple wh-question while (8b) is a superiority-violating format in which the object (i.e., *chi* ‘what’) is overtly moved across the subject.

With Huang (1981), I propose that both wh-elements need to take appropriate scope position at LF and to do so the lower wh-element undergoes covert movement. Following Richards (1997), I propose that the lower element tucks-in below the higher one. Richards argues that tucking-in involves movement to a lower specifier of the wh-probe. A different implementation would consist in moving only the wh-feature of the sentence internal phrase directly to the wh-probe. In section ‘multiple wh-questions’ I proposed that multiple wh-questions in Persian involve wh-feature movement that allows the wh-element to send its wh-feature to the CP domain to AGREE with an operator to satisfy the selection requirement. The crucial point is the LF representations after the covert movement is implemented. This is illustrated in (9) below (elements surrounded by <> are the lower copies).
The two chains, \((chi, <chi>)\) and \((ki, <ki>)\), intersect in the grammatical (9a) – the covert movement and tucking-in of \(chi\) under \(ki\) only crosses the lower link of the \((ki, <ki>)\) chain. In the ungrammatical (9b), on the other hand, the covert movement of \(ki\) tucks-in under the overtly-moved \(chi\) and the result is that the \((ki, <ki>)\) chain comes to be nested within the wh-object \((chi, <chi>)\) chain.

(9)

a. The LF representation of the Non SUV configuration with two bare wh-elements

\[
\text{Ki chi kharid?} \\
\text{Who what bought.3sg}
\]

\[
\text{LF} \quad \text{Ki} \ldots \text{Chi} \ldots <\text{Ki}> <\text{Chi}> \text{kharid} = (8a)
\]

b. The LF representation of the SUV configuration with two bare wh-elements

\[
*\text{Chi ki kharid?} \\
\text{What who bought.3sg}
\]
In order to bring this formal difference between crossing and nesting under the purview of RM, I will adopt Krapova & Cinque’s (2008) proposal that only full chains and not single links of chains count as interveners. I chapter 1, I claimed that Krapova & Cinque’s analysis is based on multiple wh-fronting in Bulgarian but can be generalized to other languages as well including Persian that manifests superiority violation in multiple wh-questions. On the basis of this analysis, (9b) violates RM – the entire \((ki, <ki>)\) chain can be taken to intervene and render illicit the \((chi, <chi>)\) chain. (9a), however, is well-formed with respect to this interpretation of RM, since only one member of the \((chi, <chi>)\) chain intervenes in the representation of the subject chain \((ki, <ki>)\) chain. (9b) formally corresponds to the Bare Identity condition that was tested in the experiments detailed above (see section 2.3.4.6). To recall, Bare Identity received the lowest acceptability ranking which, in light of this discussion, I attribute to the violation of RM, applying on the representation of chains at LF.

What about the Inclusion and Inverse Inclusion conditions? Recall that the former was judged on par with Bare Identity, while the latter was ranked slightly (but significantly) higher. In Persian, lexically restricted wh-phrases are marked with -RA. In section (2.2.2), I showed that the -RA marked wh-objects have the option to target the highest position in the hierarchy of the wh-domain. A principled grammatical explanation for the distinction between Inclusion and Inverse Inclusion is available if we make the assumption that the -RA marked lexically...
restricted wh-expressions have the option of moving to a higher position in the left periphery and thus are not necessarily forced to tuck-in below the overtly moved wh-element.

Supportive evidence from other languages with respect to the fact that lexically restricted wh-elements target a different position in the map of left periphery, presumably higher than bare wh-elements, comes from other languages such as North Italian dialects and Romanian (see Munaro 1999 and Soare 2009). As an example, Soare (2009) shows that in multiple wh fronting constructions that combine a lexically restricted wh and a bare wh, the lexically-restricted one always precedes the bare one. This is particularly striking in a combination of subject and object whs: both bare and lexically-restricted subject wh must precede a bare wh object but a bare subject must follow a lexically-restricted object. Consider, in light of our discussion, the derivation of Inverse Inclusion and Inclusion, starting from the former. In (10), chi-RA ‘what-RA’ is overtly moved to the specifier of the ‘pure’ [+Wh] head. Kodum daneshju-RA ‘which student-RA’ implements the choice of moving covertly to the higher [+Wh, +Top] head, a position that is available for the -RA marked wh-phrases in the wh-domain, yielding intersecting chains at LF after covert movement takes place. The sentence is therefore predicted to be grammatical by the Krapova & Cinque interpretation of RM.

(10) The LF representation of the Inverse Inclusion configuration

Chi-RA ostad kodum daneshju-RA tashvigh kard bekhune?

What-RA professor which student-RA persuade did.3sg to read
The covert movement reverses the polarity from Inverse Inclusion to Inclusion. In fact, in terms of the feature-based set theoretic interpretation of RM, after the covert movement is implemented, the feature specification of the covertly moved wh-object with [+Wh +Top] features includes the specification of the overtly extracted wh-object with only a [+Wh] feature. This suggests that the grammaticality of (10) is also accounted for on the basis of the feature-based interpretation of RM as it creates an Inclusion configuration after the covert movement is applied. In the LF of the Inclusion configuration, in (11) below, either kodum ketab-RA ‘which book-RA’ is in the specifier of the [+Wh, +Top] head and ki-RA ‘who-RA’ is in the specifier of the [+Wh] head (11a); or kodum ketab-RA is in the specifier of the [+Wh] head and ki-RA tucks-in below it, as in (11b) (perhaps incorporating to the head of the [+Wh] projection)\(^{14}\). Both derivations give rise to nesting chains, predicted to violate RM and thus are ungrammatical. The experimental data support these predictions: The Inverse Inclusion condition is systematically judged more acceptable than the Inclusion condition.

\(^{14}\) With Richards (1997), it must be assumed that tucking-in constrains movement and is not a representational constraint. An expression P can only tuck-in below an expression Q, if Q has already moved. Moving P to a low position and then moving Q to a higher position is not a case of tucking-in. I propose that Q can only move to a position higher than P if it is probed by a higher head, as with -RA marked lexically-restricted wh- that are probed with the complex probing head with [+Wh and +Top] features.
(11) The LF representation of the Inclusion configuration

Kodum ketab-RA ostad ki-RA tashvigh kard bekhune?

Which book-RA professor who-RA persuade did.3sg to read

LF1: $\left[ [+\text{Wh}, +\text{Top}] P \text{ Kodum ketab-RA} \ [+\text{Wh}] P \text{ Ki-RA} \ [\text{TP} <\text{Ki-RA}> <\text{Kodum ketab-RA}>] \right]$

Now, let me consider the grammatical sentence in which the -RA marked wh-object is moved over the intervening wh-subject, discussed in the previous section.

(12) Chi-RA ki kharid?

What-RA who bought.3sg

I claimed that (12) instantiates an Inclusion configuration and that the -RA marked wh-object targets the specifier of the complex probing-head with [+Wh +Top] features. Indeed, if the bare wh-subject tucks in below the -RA marked wh-object that is in the spec of [+Wh +Top] head,
the *ki-ki* chain ends up nested inside the *chi-RA-chi-RA* chain, which based on the analysis that I provided in this section, should lead to the ungrammaticality of (12), contrary to the facts. It is important to compare (12) with the Inverse Inclusion configuration (exemplified in (13) below) which was tested in the experimental study. The results show that (13) received the score of less than 4 in the scale of grammaticality but significantly was judged more acceptable than both Identity and Inclusion. (12) is a completely grammatical sentence in Persian which makes it distinct from the less than perfect Inverse Inclusion in (13). So how to account for the grammatical status of (12)?

(13) ??Chi-RA ostad kodum daneshju-RA tashvigh kard bekhune?

    What-RA professor which student-RA persuade did.3sg to read

    ‘What did the professor persuade which student to read?’

The difference between these two sentences is that in (12) only the extracted wh-object is marked with the suffix -RA whereas in (13) both elements are -RA marked. I propose that in terms of chain geometry, the two chains do not intervene in the grammatical (12) since one chain is topic while the other one is wh. Krapova & Cinque construe this idea in terms of distinct ‘spaces’ in the left periphery. They claim that intervention arises when the two chains belong to the same space, where space is defined by criterial heads such as Wh, Top, Foc in the left periphery. Clearly, the difference between (12) and (13) is that in the former, the two chains are
distinct; while in the latter, the two chains are identical (i.e., both are topics); hence, one chain intervenes with the other one\textsuperscript{15}.

Now, let me consider the grammatical status of the sentences in which there is no superiority violation. It is important to see how the proposed analysis can be extended to these sentences as well. Consider the examples in (14).

(14) a. Ki chi kharid?
   Who what bought.3sg
   ‘Who bought what?’

b. Ki chi-RA kharid?
   Who what-RA bought.3sg

Under the interpretation of Krapova & Cinque (2008), for RM to be respected, the multiple questions in these sentences must involve intersecting chains. If indeed, the wh-subject

\textsuperscript{15} The difference between (12) and (13) can be also accounted for from the perspective of feature-based version of RM. In Rizzi (2015), the degree of grammaticality is defined as a function of similarity among criterial features (see chapter 3 section (3.1) for a comprehensive discussion). These features include [+Wh] and [+Top] (the list is not exhaustive) that trigger movement to the left periphery. (12) creates Inclusion in terms of criterial [+Top] feature, expected to be fully grammatical; while (13) creates Identity with respect to [+Wh], [+Top] features. In (13), the only feature that distinguishes the two wh-elements is lexical restriction that is expected to have a milder impact as compared to the criterial features (Villata 2017). I will leave open the discussion on the distinction between criterial versus non-criterial features in terms of feature-based version of RM and the possibility that the distinction between these two categories of features can account for the difference between (12) and (13). Readers can see Villata (2017) who goes through the difference between criterial versus non-criterial features in detail from the perspective of RM and memory processing.
chain ended up nested within the chain linking the -RA marked wh-object, the result would violate RM To bring that about, covert movement of the in situ wh-elements must target a position below the overtly moved wh-subject. In particular, the -RA marked wh-objects in (14b) must implement the choice of moving to the specifier of the lower [+Wh] head and that it should not move to the higher head with [+Wh +Top] features. At LF, then, the sentences in (14) are derived as in (15a) and (15b), respectively. In both sentences, intersecting chains are obtained.

\[(15)\]

\[
a. \quad [^{[+Wh]} \text{P}\ Ki … [\text{Chi} … [<\text{Ki}> \text{<Chi}>]]] = (14a) \]

Covert movement of \text{chi} tucks-in below \text{ki} which is in [+Wh] head.

\[
b. \quad [^{[+Wh]} \text{P}\ Ki … [\text{Chi-RA} … [<\text{Ki}> \text{<Chi-RA}>]]] = (14b) \]

\[16\] It is also plausible to postulate that the chain belonging to the -RA marked object do not intervene at all on the chain that links the bare subject wh-element to its base position as these two chains are distinct – one is a topic and one is a wh.
Covert movement of Chi-RA (or of the wh feature within it) tucks-in below Ki. In fact, the -RA marked wh-object implements the choice of not targeting the higher [+Wh +Top] head.

### 2.3.6 On the difference between weak islands and superiority configurations

Let me go back to the basic puzzle: the pattern of acceptability of Inclusion and Inverse Inclusion in wh-island violations is reversed in superiority violations. While Inclusion fares better than Inverse Inclusion in the former, it is rated as less acceptable than Inverse Inclusion in the latter. I have attributed the degraded status of Inclusion with respect to Inverse Inclusion in SUV by appealing to Krapova & Cinque’s (2008) proposal that only nested chains give rise to (robust) RM violations: Inclusion configurations involve nested chains while the chains in Inverse Inclusion configurations intersect.

Now, let us consider wh-islands. In wh-islands (e.g., What do you wonder who bought <i>?) , the chain configuration is nesting such that the direct object that is extracted out of a wh-island fully crosses over the chain that belongs to the wh-subject in the embedded clause. This is illustrated in (16) below.

(16) What do you wonder who in <i> bought <j> ?

[Diagram of chain configuration]
Krapova & Cinque’s interpretation of RM as a condition sensitive to chain geometry predicts wh-islands to be uniformly excluded by RM, contrary to the empirical findings. So how to account for the difference between SUV and islands? I propose that intervention effects on chain-formation based on Krapova & Cinque’s analysis are only germane to chains with overlapping or identical scope domains. In wh-islands, the scope of the embedded wh-chain is included in the scope of the matrix wh; the two do not overlap. Consequently, extraction from wh-islands is insensitive to the fact that the subject chain is nested within the extracted object chain. The difference between wh-islands and SUV structures can be also framed in terms of phase theory in the sense of Chomsky (2000). If we assume that CPs are the relevant domains (or phases), the difference between SUV and islands is that in SUV the two chains are constructed within the same CP; whereas in wh-islands, each chain is formed in a separate CP. I follow Rizzi (2017) and claim that RM is a constraint that applies at the end of each phase once the content of the phase is sent to the interface for interpretation. In islands, the chain that belongs to the embedded CP is actually nested within the chain formed in the matrix clause but each chain belongs to a different CP.

In wh-islands in which chain geometry is not relevant, the feature-based implementation of RM can account for the observed differences in acceptability between Inclusion and Inverse Inclusion configurations (see chapter 3 for the empirical evidence for extraction out of wh-islands). [+Top] plays a fundamental role in RM: [+Wh] is the subset of [+Wh +Top] and RM is sensitive to the subset-superset relations among feature bundles. In superiority structure, on the other hand, the features on the wh expressions designate different landing sites for movement. I have argued, in particular, that [+Wh, +Top] enables a wh expression to target a higher position in the left peripheral wh field. It is reasonable to think that the different feature-sensitive landing sites for wh elements are also present in the island configuration, such that an island-forming [+Wh, +Top] expression, as in the Inverse Inclusion configuration exemplified
in (4) (what do you wonder which student bought?), may target a higher position than a bare
wh word. However, the choice of landing site in this case is, in a sense orthogonal since the wh
word moved out of the island will cross over the island-forming wh, whether it sits in Spec/+Wh
or in the higher Spec/+Wh,+Top. I will present the gist of my analysis with respect to all the
sentences discussed in this chapter in (17).
<p>| | | | | |</p>
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<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>Wh-sequence</td>
<td>Configuration</td>
<td>Chain</td>
<td>Status</td>
</tr>
<tr>
<td>a.</td>
<td>Ki … Chi</td>
<td>Non-Intervention</td>
<td>Intersecting after the covert movement of Chi to [+Wh]</td>
<td>Grammatical</td>
</tr>
<tr>
<td></td>
<td>Who what</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>Chi-RA … Ki</td>
<td>Non-intervention</td>
<td>Nesting after the covert movement of Ki to [+Wh]</td>
<td>Grammatical (since one chain is topic and one is wh)</td>
</tr>
<tr>
<td></td>
<td>What-RA who</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>Chi-RA … Kodum daneshju-RA</td>
<td>Inclusion after the covert movement of Kodum daneshju-RA to [+Wh +Top]</td>
<td>Intersecting after the covert movement of Kodum daneshju-RA to [+Wh +Top]</td>
<td>Mild degradation</td>
</tr>
<tr>
<td></td>
<td>What-RA which student-RA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>(Inverse Inclusion)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>Kodum ketab-RA … Ki-RA</td>
<td>Inclusion after the covert movement of Ki-RA to [+Wh]</td>
<td>Nesting after the covert movement of Ki-RA to [+Wh]</td>
<td>Severe degradation</td>
</tr>
<tr>
<td></td>
<td>Which book-RA who-RA</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>(Inclusion)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td>Chi … Ki</td>
<td>Identity</td>
<td>Nesting after the covert movement of Ki to [+Wh]</td>
<td>Severe degradation</td>
</tr>
<tr>
<td></td>
<td>What who</td>
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The line can be drawn between the sentences in (17a) and (17b) on the one hand and those in (17c), (17d), and (17e) on the other. In the former category, the sentences are grammatical; while in the latter category, they are degraded. The variations among the sentences in (17) show that dependencies are sensitive to the feature content of the extracted element in some contexts while in other contexts, the mere nesting of a full chain inside another chain in the structural sense in terms of chain-formation renders them ungrammatical. For example, in (17b), the subject chain is nested inside the chain that links the -RA marked wh-object in the [+Wh +Top] position to its base position in the structure. However, that the two chains are different, the subject chain does not intervene with the chain that belongs to the extracted wh-object, and hence the sentence is fully grammatical. In both (17c) and (17d), the configurations are Inclusion after the covert movement is applied but nevertheless the former receives higher acceptability than the latter that contains nesting chain, argued to be ungrammatical based on Krapova & Cinque’s interpretation of chain-geometry in terms of RM.

2.3.7 Some insights on the comparison between RM and an account in terms of processing

Hofmeister et al. (2007, 2013) attempted to account for the higher acceptability of Inverse Inclusion as compared to Inclusion in SUV. In particular, they argued that the distinction between the two configurations has to do with the effects of lexical restriction on the general processes of long distance dependencies. The idea is that during on-line processing, the parser holds the filler inside the active memory until the gap is reached at the verb position. Here the ‘filler’ refers to the extracted wh-phrase that has to be linked to a dedicated ‘gap’ position in the structure during the processing of non-local dependencies in multiple wh-questions. At the verb position, the parser launches a search in the memory to find the filler item in order to link
it to the verb to obtain full interpretation. According to Hofmeister et al., lexical restriction improves acceptability because it contains more specified syntactic and semantic contents that improve memory processes such as ‘memory storage’ to keep the filler active in memory or the process of the integration of the filler with the verb to obtain full interpretation. Specifically, with respect to the higher acceptability of Inverse Inclusion than Inclusion, they claimed that “intervener accessibility [in terms of memory processes by the means of being lexically restricted] impacts the processing of wh-dependencies as much as, or even more than filler accessibility” (p. 16). Indeed, for the higher acceptability of Inverse Inclusion than Inclusion, if we assume that the intervener accessibility plays a crucial role to improve the memory processes and that its role is more prominent than the filler accessibility; then clearly this model has a uni-directional prediction such that it predicts that Inverse Inclusion should be always more acceptable than Inclusion with no distinction between SUV and wh-islands. Hofmeister et al. explanation can potentially account for the experimental results in SUV reported in this study but it fails to account for the cross-linguistic evidence with respect to the reverse profile of acceptability between wh-islands and SUV. As I have argued in this section, the difference between SUV and islands can be accounted for iff one takes into account the non-trivial structural difference between these two constructions.

2.3.8 The case of Complex Identity configuration

Before I end this chapter, I would also like to discuss the acceptability of Complex Identity in which both the extracted and the intervening wh-element are lexically restricted. The experimental results show that there is no significant difference between Inverse Inclusion and Complex Identity (examplified below in (18) respectively).
(18) a. Chi-RA ostad kodum daneshju-RA tashvigh kard bekhune?

*What-RA professor which student-RA persuade did.3sg to read*

b. Kodum ketab-RA ostad kodum daneshju-RA tashvigh kard bekhune?

*Which book-RA professor which student-RA persuade did.3sg to read*

However, when we scrutinize the experimental results in detail, we can see that the trend of acceptability between these two configurations manifests that Complex Identity is more acceptable ($M = 3.3$) than Inverse Inclusion ($M = 3.1$), suggesting that the lack of effect is perhaps due to lack of power. The reason that I attribute this effect to lack of power is because previous experimental results systematically attest to the highest acceptability of Complex Identity as compared to other configurations (e.g., Hofmeister et al. 2007, 2013; Goodall 2015; Villata et al. 2016). So why is Complex Identity overall more acceptable than other configurations?

Based on RM, the acceptability of Complex Identity is predicted to be on a par with (but not better than) Inverse Inclusion (Rizzi 2011). Consider (18) which represents the LF representation of the Complex Identity configuration. Let us assume that the covertly moved wh-subject entertains the option of moving to the higher [+Wh +Top] head and that the wh-object is in [+Wh] head. The LF representation of Complex Identity then precisely becomes the

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17 Power refers to the probability that the test correctly rejects the null hypothesis. It changes with sample size both with respect to the number of test items and participants tested in an experiment. If an experiment is run on a larger sample size, when a specific effect is not significant with a smaller sample size yet manifests a particular trend, the effect might change as the power increases. I will leave proper investigation of Complex Identity for future as the experimental results are not very clear in this respect.
same as the LF representation of Inverse Inclusion. This implies that the acceptability of both Complex Identity and Inverse Inclusion should be on a par, contrary the experimental findings.

(18) The LF representation of the Complex Identity configuration

Which book did which student buy?

\[
[\{[+Wh, +Top]\} \text{p \ Which student … } [\{[+Wh]\} \text{p \ Which book … } [\langle \text{Which student}\rangle \langle \text{Which book}\rangle]]\]

Hofmeister et al. (2007, 2013) argued that the higher acceptability of Complex Identity comes from the fact these sentences are easier to parse. The reason is that lexically restricted elements, being syntactically/semantically richer, are maximally distinct from one another but in turn minimally sensitive to encoding and/or retrieval interference in memory processes. Encoding interference arises when two elements that share certain feature enter into a competition in maintaining that feature such that one element loses the feature and eventually becomes less active in memory (Nairne 1990). Encoding interference has direct consequence on the process of ‘memory storage’ that is responsible to hold the element in active memory until the gap is reached at the verb position. Retrieval interference, on the other hand, occurs when the non-target element that contains certain feature that is shared with the feature of the to-be-retrieved element, perturbs retrieval processes such as causing the erroneous retrieval of the non-target element at the point in which the to-be-retrieved element must be retrieved and integrated with the verb (McElree & Griffith 1998; McElree et al. 2003). The idea is that
because lexically restricted wh-phrases contain information that is unavailable in bare elements, they require more fine-grained initial processing at encoding which results in higher level of initial activation in the memory. This higher level of initial activation, in turn, enables lexically restricted phrases to survive more successfully until the point in which they must be integrated with the verb in the structure, and thus improves sentence acceptability. Whereas Complex Identity is predicted to receive the highest acceptability score, Bare Identity is predicted to receive the lowest acceptability score as there are two bare wh-elements in this configuration. Hence, an account in terms of processing can explain the acceptability of Complex Identity that receives the highest ratings in comparison to other configurations.

In fact, while RM provides a better fit to some aspects of the data (the higher acceptability of Inverse Inclusion than Inclusion in SUV structure and the opposite pattern in islands), the processing model in terms of how memory deals with the processing of Complex Identity provides a better fit to other aspects the results. I leave the comparison between RM and the memory processing account open. Readers can see Villata (2017) in which the author compares RM and the processing account and discusses the role of different grammatical versus non-grammatical features in certain non-local dependencies\textsuperscript{18}.

\section*{2.3.9 Conclusions}

\textsuperscript{18} In brief, Villata (2017) claims that RM must be taken as a theory that defines the boundaries of grammar. She claims that only criterial features such as [+Wh] or [+Top] must be considered relevant for RM. The role of other features such as lexical restriction, animacy, semantic reversibility etc must be taken outside RM in terms of processing as they give rise to minor impacts. There is also a theoretical argument which is that only criterial features play a role in syntax with respect to the structural well-formedness of sentences, not other features.
I presented the results of an experiment that manipulated lexical restriction in sentences containing SUV in Persian and found that Inverse Inclusion was more acceptable than Inclusion configuration, replicating previous evidence in English by Hofmeister et al. (2007, 2013). This pattern of acceptability is the opposite of the pattern previously reported for wh-islands. I argued that the difference in acceptability judgments between these two structures is rooted in the fact that the derivation of multiple wh-questions involves covert movement of the in-situ wh. Bare wh-elements covertly move to a position below the overtly-moving wh while the -RA marked wh-phrases have the added option of moving to a higher position with [+Wh +Top] features. I argued that the degraded status of the Inclusion configuration can be accounted for on the basis of the Krapova and Cinque’s (2008) interpretation of RM which asserts that nesting chains are ungrammatical. The higher, but not fully acceptable status of Inverse Inclusion on the other hand is due to the fact that the two chains intersect. I claimed that this is precisely because the -RA marked lexically restricted wh-phrases have the option of moving to a higher head with [+Wh +Top] features in the map of left periphery. I have further claimed that the grammaticality of the sentences in which the -RA marked wh-object moves over a bare wh-subject can be accounted for on the assumption that the two chains, namely the chain that belongs to the -RA marked wh-object and the one that is related to the intervening wh-subject, are distinct which based on Krapova and Cinque (2008) do not expect to enter into the computation of chain intervention. In the next chapter, I will discuss intervention effects in extraction from weak-islands including wh-islands. I will show that in these structures feature Inclusion plays a crucial role and that when a criterial feature such as the suffix -RA is compared to a non-criterial [+N] feature namely lexical restriction, the effect of the former is paramount.
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Chapter 3

Intervention effects in weak-islands

3.1 The role of the suffix -RA and lexical restriction on extraction from wh-islands*

3.1.1 Introduction

In this section, I will present and discuss the results of a grammaticality judgment experiment on the effect of the suffix -RA and of lexical restriction on wh-object fronting out of wh-islands. I will show that wh-object fronting in Persian is sensitive to extraction from weak-islands and, while lexical restriction does not improve acceptability, the presence of the suffix -RA significantly does. With respect to the comparison of the effect of the suffix -RA and of lexical restriction in island vs. non-island sentences (i.e., extraction out of non-interrogative embedded clause), the results raise issues pertinent to RM.

* The content of this section is mostly based on a joint paper by Ur Shlonky and Julie Franck published in the proceeding of Rivista di Grammatica Generativa: Research in Generative Grammar (IGG) conference, Università per Stranieri di Perugia, Italy.

19 Weak islands are different from strong islands that refer to certain domains that are fully impervious. In this dissertation, I will defer discussion of impenetrability that basically states that from certain syntactic domains elements cannot be extracted.
3.1.2 Wh-islands and RM

The term wh-island was first introduced in Ross’s (1967) seminal dissertation to refer to the domains that are opaque to movement. (1) compares the extraction from an indirect multiple wh-question (1a) with the extraction from an embedded non-interrogative clause (1b). The former, that creates an island for wh-movement, is strongly degraded, while the latter is fully grammatical.

(1)  
   a. ??What do you wonder who bought <,>? 
       Extraction from a wh-island
   b. What do you think John bought <,>? 
       Extraction from a non-interrogative complement clause

In Rizzi (1990) and much related work, the degradation in (1a) is analyzed as a violation of RM. In this sentence, who, which is a quantificational element that bears a [+Wh] feature, intervenes and blocks the formation of a chain between what (another quantificational element with a [+Wh] feature) and its trace (as the object position of the verb to buy). In the grammatical (1b), on the other hand, the subject John (i.e., a nominal element that does not contain a [+Wh] feature) cannot intervene on the chain that links the extracted wh-object with its trace position, hence the sentence is fully grammatical.

Pesetsky (1987) observed that, when the out-of-island long-extracted wh-element is lexically-restricted, speakers note a clear amelioration. This is illustrated in (2) below.

(2)  
   ?Which book do you wonder who bought <,>?
In terms of RM, the acceptable status of (2) means that the chain can licitly be formed between *which book* and its trace position. Following Starke (2001), Rizzi (2004) proposes that the acceptability of (2) is linked to the fact that the d-linked wh-phrase *which book* contains an additional feature (say, B) that is absent on the intervener *who*, a ‘bare’ wh-element. On the basis of this analysis, (2) creates a feature Inclusion configuration of the type [Wh+[A+B]…Wh+[A]…<Wh+[A+B]>], argued by Friedmann et al., (2009) and Rizzi (2011) to circumvent the intervention effect created by the configuration of feature Identity as [Wh+[A]…Wh+[A]…<Wh+[A]>] (1a), thereby allowing the formation of the chain.

Rizzi (2011) characterizes the relevant feature on “*which-NP*” wh-phrases as [+Top]. In Friedmann et al. (2009) and Villata et al. (2016), on the other hand, the authors argue that the additional feature that is responsible for the amelioration observed in (2) is actually [+N]. They claim that this feature defines the precise landing site of the dislocated wh-element in the left periphery (see Soare 2009 and Munaro 1995 for the cross-linguistic evidence from languages such as Romanian or northern Italian dialects with respect to the role of lexical restriction). Unlike [+Top], [+N] is a non-criterial feature that does not trigger movement to the left periphery per se. Lexically restricted wh-phrases always contain [+N]. This feature specifies

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20 For example, Soare (2009) shows that in multiple wh fronting constructions that combine a lexically restricted wh and a bare wh, the lexically-restricted one always precedes the bare one. This is illustrated in the following examples.

(i)  a. Cine ce a citit?
    who what has read
    ‘Who read what?’

    b. Care student ce a citit?
    which student what has read
    ‘Which student read what?’

    c. Pe care carte cine a citit-o?
    OM which book who has read-it
    ‘Which book did who read?’
the precise set that a lexically restricted wh-phrase refers to in a given context (e.g., ‘*which book*’ in a context in which both the speaker and hearer know which set of books they refer to in the discourse). In the previous chapter, I claimed that in a language like English in which [+Top] is not morphologically marked, lexically restricted wh-phrases only optionally carry this feature. In Persian, on the other hand, the suffix -RA obligatorily encodes [+Top]. I accounted for the grammaticality of a multiple wh-question like *Chi-RA ki kharid?* ‘What did who buy?’ in which the extracted wh-object is -RA marked, and thus is enriched with [+Top] feature. I claimed that this sentence creates an Inclusion configuration. The difference between this sentence in Persian and (2) in English is that the latter is not (fully) grammatical. One way to account for this difference is to say that the amelioration observed in the latter is due to the presence of the non-criterial [+N] feature, which is expected to have a milder impact as compared to the criterial [+Top] feature (see Villata 2017). For featural-based RM (Starke 2001; Rizzi 2004; Friedmann et al. 2009), there exist three major set-theoretic relations between the featural specification of the intervener and the featural specification of the two elements that create a chain between the extractee and its trace position in the structure. Consider the configurations [X . . . Z . . . Y] below, where Z is the intervener and X and Y are the two elements that enter the non-local dependency. A and B are the relevant morphosyntactic features.

(3)

a. $X_{[+A]} \ldots Z_{[+A]} \ldots Y_{[+A]}$  
   (Identity)

b. $X_{[+A]} \ldots Z_{[+B]} \ldots Y_{[+A]}$  
   (Disjunction)

c. $X_{[+A+B]} \ldots Z_{[+A]} \ldots Y_{[+A+B]}$  
   (Inclusion)
According to RM, while interveners with disjoint featural specification (3b) or with a featural specification properly included in the specification of the target (3c) do not interfere with the well-formedness of the question, when the featural specification of the target fully matches the specification of the intervener the result is ungrammatical as in (3a). (3a) is equal to (1a) and (3b) corresponds to (1b) in English. The former is ungrammatical while the latter is fully grammatical. The relevant configuration is the case of feature Inclusion, intended to capture the partial acceptability of (2) that I exemplified above. The difference between (2) in English and Chi-RA ki kharid? in Persian (both claimed to create an Inclusion configuration) shows that a distinction between criterial versus non-criterial features is indeed in order. In (2), the additional feature is [+N], which creates an Inclusion configuration of non-criterial features, while in Chi-RA ki kharid? the additional feature is [+Top], which gives rise to an Inclusion configuration of criterial features. If we include the distinction between criterial versus non-criterial Inclusion in the computation of RM, we obtain a system that correctly distinguishes between 4 levels of acceptability. This is illustrated in (4).

(4)

Feature Identity = Ungrammatical

Non-criterial feature Inclusion (e.g., [+N]) = Partially degraded

Criterial feature Inclusion (e.g., [+Top]) = Grammatical

Feature Disjunction = Grammatical

Based on (4), the cut-off point between sentences that are fully grammatical and those that are not can be drawn from criterial Inclusion, which receives the same grammatical status as feature Disjunction. The status of non-criterial Inclusion shows that the felicity of this
construction lies somewhere between feature Identity on the one hand (that is fully ungrammatical) and criterial Inclusion and feature Disjunction on the other hand.

In Persian, d-linked wh-objects are construed with the suffix -RA. -RA appears both on bare and on lexically-restricted wh-phrases, but its presence is only compulsory with the latter. If we take the suffix -RA to be the morpho-syntactic instantiation of [+Top], the study of Persian weak-islands is of interest because it allows us to assess the effect of -RA and to compare it with the effect of [+N].

The questions posed (and tentatively answered) in this study are the following:

(i) Does Persian show sensitivity to wh-island phenomena?

(ii) Does the appearance of -RA as a criterial [+Top] feature on the fronted wh-object circumvent the violation incurred by the intervention effect in extraction out of wh-islands?

(iii) Does lexical restriction as a non-criterial [+N] feature contribute to improve the acceptability of wh-islands, perhaps showing a cumulative effect with the presence of -RA?

In what follows, I present the results of an acceptability judgment experiment where I manipulated the presence of -RA and lexical restriction of wh-objects in order to evaluate their effects on the acceptability of wh-object extraction from weak-islands. Moreover, I will assess whether these variables have an effect specifically on wh-islands, or more generally on the processing of any sentence involving object extraction (i.e., non-island sentences where extraction is executed from a declarative embedded clause). Based on RM, the acceptability of non-islands is predicted to be at ceiling. It follows that variables such as the suffix -RA or lexical restriction should not affect the acceptability of non-islands which are otherwise predicted to be fully grammatical. For this, in order to compare islands with non-islands, I
manipulated the nature of the intervening subject, which was either a wh-element (wh-islands) or a pronoun (i.e., extraction from a non-interrogative embedded clause). Sentences with pronominal subjects\textsuperscript{21} provided a comparison point against which I was able to assess:

(a) whether Persian is sensitive to weak-islands (in which case acceptability judgments would be expected to be globally higher for pronominal subjects than for wh-subjects), and

(b) whether the ameliorating effect of -RA and lexical restriction is specific to weak-islands, as predicted by RM, or goes beyond to non-islands as well.

3.1.3 Experiment

3.1.3.1 Method

3.1.3.2 Participants

Participants were 40 Persian native speakers, all of which were students at the University of Geneva or Lausanne, Switzerland. They were naïve to the purpose of the experiment and their participation was voluntary.

3.1.3.3 Materials

\textsuperscript{21}Persian is pro-drop yet the reason that is decided to use a pronominal subject rather than a null subject in non-islands was to have sentences minimally comparable with islands in which the intervening element was an overt wh-element.
Items were spread in a fully crossed design involving 8 conditions in which three variables were manipulated: (1) the presence of the suffix -RA on the extracted wh-object (RA vs. non-RA); (2) lexical restriction of the extracted wh-object (Lexically Restricted vs. Bare); (3) the nature of the intervener (wh- vs. pronoun).

All variables were manipulated within-participants and within-items, such that the same sentence appeared in 8 different versions created by the crossing of all three variables. A total of 64 test sentences were created which were interspersed with 64 fillers consisting of fully acceptable S(O)V sentences with transitive and intransitive verbs and completely unacceptable sentences in which there was a mismatch between the verb valency and the number of arguments. Table (4) presents an item in the 8 experimental conditions and a full list of the items is in Appendix (2).

Table 4: Example of item in the experimental conditions.

<table>
<thead>
<tr>
<th>Pronominal intervener</th>
<th>Wh intervener</th>
</tr>
</thead>
<tbody>
<tr>
<td>-RA-LR</td>
<td></td>
</tr>
<tr>
<td>Chi fekr mikoni un kharid?</td>
<td>Chi taajob mikoni ki kharid?</td>
</tr>
<tr>
<td>‘What do you think he bought?’</td>
<td>‘What do you wonder who bought?’</td>
</tr>
<tr>
<td>-RA+LR</td>
<td></td>
</tr>
<tr>
<td>Kodum ketab fekr mikoni un kharid?</td>
<td>Kodum ketab taajob mikoni ki kharid?</td>
</tr>
<tr>
<td>Which book think do.2sg he bought.3sg</td>
<td>Which book wonder do.2sg who bought.3sg</td>
</tr>
<tr>
<td>‘Which book do you think he bought?’</td>
<td>‘Which book do you wonder who bought?’</td>
</tr>
<tr>
<td>+RA-LR</td>
<td></td>
</tr>
<tr>
<td>Chi-RA fekr mikoni un kharid?</td>
<td>Chi-RA taajob mikoni ki kharid?</td>
</tr>
</tbody>
</table>
3.1.3.4 Procedure

The experiment was conducted online through IbexFarm. The participants were given a thorough instruction on how to rate the sentences and provided with practice items (similar to test items and fillers) to help them become fully familiar with the experimental task. They were asked to rate the sentences on a 1-7 Likert scale, where 1 corresponded to a completely unacceptable sentence and 7 to full acceptability. Each sentence appeared only once throughout the experiment and stayed on the screen until the participant made their acceptability choice. After the sentence was rated, the next item appeared. No time pressure was made during the experiment.

3.1.3.5 Data analysis
The data were analyzed with mixed-effect models estimated with the lmerTest package in the R-software environment (R Development Core Team, 2011). -RA, lexical restriction, and the nature of the intervener were treated as fixed factors, while subjects and item variability were considered as random intercepts.

3.1.3.6 Results

Of the whole data set consisting of 2560 data points, 2496 responses were taken into statistical analysis. In fact, one participant had to be excluded as his responses were completely monotonous – he gave the score of 1 to all experimental items and of 7 to all fillers. Figure (2) presents the mean acceptability score of the 8 experimental conditions. The results from the mixed model analysis revealed a main effect caused by the nature of the intervener ($\beta = -0.34$, $t = -7.82$, $p<.001$), attesting to significantly higher rates for sentences in which a pronominal subject was used ($M=4.5$) than sentences where the intervening subject was a wh-element ($M=2.9$). A significant main effect of -RA was found ($\beta = 1.12$, $t = 25.70$, $p < .001$), with significantly higher rates for -RA marked wh-elements ($M=4.4$) than for non-RA marked ones ($M=3.02$). The effect of -RA did not interact with the intervener, attesting that -RA had the same effect for wh- and pronoun interveners ($\beta = -0.06$, $t = -0.64$, $p = 0.52$). A main effect of lexical restriction was also found significant ($\beta = -0.12$, $t = -2.78$, $p < .01$), with higher scores for non-lexically restricted objects ($M=4.02$) than for lexically restricted ones ($M=3.4$). Lexical restriction appeared to not interact with the intervener - the same effect was found for both types of intervening subjects ($\beta = 0.03$, $t = 0.31$, $p = 0.75$). -RA interacted with lexical restriction ($\beta = 0.34$, $t = 3.96$, $p < .001$), suggesting that with non-RA marked objects, lexical restriction penalizes sentence acceptability. Since the interaction between -RA and lexical restriction was modulated by the nature of the intervener, as attested by the 3-way interaction ($\beta = -0.41$, $t = -$
2.37, p < .01), wh-interveners and pronominal interveners were explored separately. The model on wh-interveners showed a main effect of -RA (β = 1.09, t = 19.13, p < .001), a near-significant effect of lexical restriction (β = -0.11, t = -1.88, p = .06) and no interaction (β = 0.14, t = 1.21, p = 0.23). The model on pronominal interveners showed a main effect of -RA (β =1.14, t = 17.72, p < .001), an effect of lexical restriction (β = -0.13, t = -2.08, p < .001) and an interaction between the two factors (β = 0.55, t = 4.26, p < .001). The interaction attested to a significant effect of lexical restriction for non-RA marked objects (β = -0.41, t = -5.65, p < .001), but to a marginally significant effect for –RA marked objects (β = 0.14, t = 1.78, p = 0.07).

**Figure 2:** Mean acceptability scores in the 8 experimental conditions.
3.1.4 Discussion

There are three main findings in this experiment. The first finding is that the extraction of a wh-object over a wh-subject is judged significantly worse than the extraction over a pronominal subject. This evidence, which is based on systematic controlled testing, shows that Persian wh-object fronting is sensitive to extraction across weak-islands - as expected under most if not all theories of locality. This finding is amenable to the general principle under RM in terms of intervention – Whereas extraction across an intervening wh-subject interrupts chain-formation, extraction across a pronominal subject with the disjoint featural composition\textsuperscript{22} than the extracted wh-object does not give rise to the same effect.

The second finding is that the presence of -RA on the object improves its extractability. However, such improvement is found across the board, independently of whether the intervening subject was a wh- or a pronoun. I will discuss this point in what follows.

Based on RM, the effect of -RA as the morphological marker of [+Top] is expected to show in wh-islands, creating an Inclusion configuration to circumvent intervention. Differently, RM predicts that the acceptability of non-island sentences with the pronominal subject should be at ceiling. It follows that -RA should not improve the acceptability of non-islands that are otherwise predicted to be fully grammatical. So the question is: how to account for the fact that the suffix -RA influenced the acceptability of island/non-island sentences to the same degree? In terms of processing, in the resolution of non-local dependencies, the extracted wh-element must be maintained in memory until the verb is reached. Subsequently at the verb position, the element that is kept in memory must be integrated with the verb so that it receives its appropriate thematic role for proper interpretation. It has been suggested that retrieving an element from

\textsuperscript{22} The pronominal subject shares certain features such as phi-features with the intervening wh-element, yet is distinct from it with respect to the criterial [+Wh] that creates intervention in the sense of RM.
memory relies on a cue-based retrieval mechanism (e.g., McElree 2000; McElree et al. 2003; Lewis and Vasishth 2005; Van Dyke & McElree, 2011). In this respect, conceivably, the suffix -RA might provide a highly reliable cue that can be used for object retrieval - and possibly explain why the suffix -RA influenced islands/non-islands equally (the parser used the suffix -RA during object retrieval in both islands/non-islands). Rizzi (P.C) pointed out that one should also consider the effect size (i.e., a quantitative measure of the strength of a variable) which, in the case of an ameliorating feature such as [+Top], is expected to be larger in islands where the role of -RA is crucial in building the chain across the intervening wh-subject compared to non-islands with no intervention. However, as the results do not attest any interaction between -RA and the intervener, the effect of -RA was not stronger in islands than in non-islands. I leave this discussion open – Indeed, one should systematically look into the effect size of ameliorating features across islands/non-islands to explore if it really is stronger in islands than in non-islands.

The third finding is that the lexical restriction of the object fails to ameliorate sentence acceptability; rather, it penalizes it when the object is non-RA marked. Again, the same effect is observed across island/non-island-containing questions (see Figure 2), suggesting that it has nothing to do with the specifics of wh-islands. That lexically restricted wh-objects without -RA would be so weakly rated was expected, given than non-RA marked lexically restricted wh-phrases are ungrammatical in Persian. In fact, lexical restriction provides clear anchoring into discourse by specifying the set over which the question ranges, which in return strongly calls for the presence of -RA as the morphological marking of d-linking. In other words, non-RA marked lexically restricted wh-phrases are torn between two contradictory forces: lexical restriction, anchoring the NP into the discourse on the one hand; and lack of -RA, detaching it from the previously known discourse on the other hand.
It was asked if the presence of lexical restriction could give rise to a cumulative effect in sentences where the extracted lexically restricted wh-object was marked with the suffix -RA. In this regard, the results show that there is no significant difference between sentences with bare -RA marked wh-objects and those with -RA marked AND lexically restricted wh-phrases. How can we account for the lack of cumulative effect of lexical restriction? I claimed that lexical restriction is expected to have a milder impact on acceptability as it creates Inclusion configuration in terms of the non-criterial [+N] feature as compared to the presence of the suffix -RA that creates Inclusion in terms of the criterial [+Top] feature. The fact that lexical restriction did not lead to a cumulative effect suggests that the crucial factor was the presence of the suffix -RA, which facilitates chain-formation across an intervening wh-subject. Based on RM, what counts is the chain that links the extracted wh-object to its trace position across the intervening wh-subject. The suffix -RA establishes such a chain by creating an Inclusion configuration. In fact, the results show that there is no room for lexical restriction to improve acceptability any further because the proper chain has already been established by the presence of the suffix -RA.

What about the role of lexical restriction in memory? Is lexical restriction predicted to facilitate object retrieval and, as a result, to boost acceptability? For the memory processes, both syntactic and semantic cues of the extracted wh-phrase have been argued to play a role during object retrieval (Lewis & Vasishth, 2005; Hofmeister et al. 2007, 2013). As for the effect of lexical restriction, one can postulate that in a sentence like Which book/what do you wonder who bought? the lexically restricted wh-phrase which book can provide richer syntactic/semantic information compared to a bare wh-object like what and that this rich information can be used by the parser to consolidate the link between the verb and the moved wh-object while integrating these two elements after object retrieval. As for Persian, it is possible to presume that lexical restriction could facilitate object retrieval in conjunction with
the presence of the suffix -RA, thus giving rise to a cumulative effect in sentences in which the extracted wh-object is -RA marked AND lexically restricted. For example, Hofmeister et al. (2007, 2013) observed that increasing the syntactic and semantic complexity of the extracted elements facilitate their retrieval, improving the acceptability of the sentence. In a self-paced reading experiment, they tested object-clefts such as (5):

(5) It was a(n) (alleged Venezuelan) communist who the members of the club banned from ever entering the premises.

and found that the reading time is facilitated after the embedded verb banned in sentences requiring the retrieval of complex objects, i.e., an alleged Venezuelan Communist, as compared to those requiring the retrieval of simple objects (i.e., a communist). Interestingly, they observed that faster reading times in the post-verbal regions were accompanied with slower reading times at the NP regions (length being controlled), suggesting that the complex NPs (an alleged Venezuelan communist vs. a communist) required more initial processing endeavor but this cost was paid off by reading facilitation at the verb region where these elements are supposed to get integrated to the structure after retrieval. The lack of the cumulative effect of lexical restriction in this study is against the predictions of the memory model. This finding clearly shows that the role of the morphological marker -RA is paramount and that in its presence lexical restriction does not play any role.

In what follows, I will discuss two points. The first is whether we can consider the extraction of -RA marked wh-object from wh-islands fully grammatical as predicted by RM in the sense that the [+Top] suffix -RA creates a criterial Inclusion configuration. The second one is why the acceptability scores of the sentences with pronominal subjects (i.e., the non-island sentences) are not at ceiling as the experimental results show.
Let me first discuss the grammaticality of extraction of the -RA marked wh-object out of islands. The results show that the extraction of the -RA marked wh-object was less penalizing in sentences with a pronominal intervener (M = 5.3) than in those with a wh-intervener (M = 3.5). By comparing these two scores, one might doubt if the extraction of the -RA marked wh-object from wh-islands is fully grammatical as predicted by RM. To answer to this question, it is important to determine precisely where to draw the cut-off point in the Likert scale to tease apart grammatical versus ungrammatical sentences. 3.5 is indeed low in the scale in which the highest point was 7. However, there are two caveats that should be taken into consideration in this respect. The first one is that sentences with the pronominal intervener (i.e., non-islands) served as base line also received low acceptability scores on average (M = 4.5) in this experiment. This shows that there is no big difference between 3.5 (i.e., the mean acceptability ratings for -RA marked wh-object in islands) and 4.5 (i.e., the mean acceptability ratings for non-islands), suggesting that it is possible to consider 3.5 as a score that represents full grammaticality in a scale where non-islands also received low acceptability ratings. The second one is related to the fact that non-RA marked AND lexically restricted wh-phrases are ungrammatical in Persian. Indeed, if non-RA marked lexically restricted wh-phrases were grammatical, the results would then give us 4 different levels of acceptability. In the spirit of RM, we could categorize non-islands as well as the extraction from islands with -RA marked extractee as grammatical and the rest of the sentences including islands with lexically restricted wh-phrases and islands with bare wh-elements as ungrammatical. I claimed that, based on RM, non-RA marked lexically restricted wh-phrases are expected to receive lower acceptability than -RA marked bare wh-elements (the former contains the non-criterial [+N] feature while the latter contains the criterial [+Top] feature). Additionally, it should be noted that a sentence like *Chi-RA taajob mikoni ki kharid?* ‘What-RA do you wonder who bought?’ with a -RA marked extracted wh-object is fully grammatical in Persian. It is plausible that the reason why this
sentence (among other sentences of the same sort) received the average score of 3.5 out of 7 is that participants were asked to use the full scale from 1-7. Indeed, during acceptability judgement with Likert scale, each set of sentences are compared with other sets including fillers, some of which involved simple declarative sentences with no wh-questions. This might have influenced the overall scores assigned to a sentence like *Chi-RA tuajob mikoni ki kharid?*, which is expected to receive higher acceptability ratings than the average of 3.5 out of 7.

The last point that I would like to discuss is why the acceptability of non-islands is not at ceiling. In fact, they reached around 4.5 on the Likert scale. Generally speaking, it has been observed across languages that object extraction in object relative clauses and in object questions is costly (Gordon et al., 2001; Warren & Gibson, 2002). It has recently been proposed that the processing difficulty of object extraction in object relatives is due to locality - object movement to the left periphery in object relative clauses always crosses the intervening subject (Adani et al., 2010; Friedmann et al., 2009). Nevertheless, even if object extraction is costly, since the non-island sentences are completely grammatical they are expected to trigger higher rates than 4.5 on a 7-point scale. One possibility could be that, Persian being a pro-drop language, the presence of the embedded overt pronominal subject in the sentences made them unnatural and hence affected the results. The main reason that I decided to use a pronominal element as the intervening subject instead of no subject at all in the experiment was that I wanted to make non-islands minimally comparable to islands so that both involve an overt intervener on the path of the extracted wh-object. Fully grammatical SOV filler sentences in this experiment also contained overt subjects, but nevertheless gave rise to an average near-ceiling score of 6.7 - the presence of an overt subject per se is not enough to explain the low scores in the test sentences. Still, it may be that whereas overt subjects are felicitous in SOV structures, they are not as such in OSV structures involving object fronting. Another factor that may have contributed to low acceptability scores in the present experiment lies in the specificity of object
extraction which requires an appropriate context given that the word order is marked in OSV. In Persian, the presence of an appropriate context is perhaps more required in sentences that the extracted object was -RA marked as the suffix links these sentences to a previously known context which the lack of it might render the sentences infelicitous. I will leave these issues open for further investigation.

3.1.5 Conclusions

To sum up, the experiment reported in this chapter aimed at studying the extraction of wh-object out of (weak)-islands in Persian and evaluating the role of feature-based RM in the process. The results pushed forth my claim that the suffix -RA has a facilitating effect in chain-formation (avoiding intervention caused by the intervening wh-subject in the embedded clause). The results show that, in the presence of the suffix -RA, lexical restriction did not improve acceptability further. I also discussed the results based on some basic (but crucial) tenets of memory processes such as integration and object retrieval and argued that a model that takes these processes into account can also capture some aspects of the results. In this thesis, however, I do not aim at comparing RM with a processing model, which provides a link between the specificities of non-local dependencies and the general cognitive processes of sentence comprehension, with the ambition that current experimental results tease these two models apart. An important question that I leave open for future research is how the general processes of memory can handle fine-grained grammatical constraints such as intervention in terms of locality as defined by RM.
3.2 Extraction from weak-islands: a feature-based analysis

3.2.1 Introduction

In chapter 2, I showed that wh-expressions appear in a somewhat rigid hierarchical order in the wh-field such that the d-linked -RA marked wh-object can occupy the highest position and that the bare wh-object fills the lowest position in the structure. It has been shown that the feature specification of the -RA marked wh-object [+Wh +Top] is richer than the specification of the bare wh-object [+Wh] and that the former is more easily extracted than the latter both in superiority and wh-island structures. In this section, I will explore if there is any similarity between the order of wh-elements in the wh-field and extraction from weak-island domains. The working hypothesis is that the higher elements in the hierarchical order are easier to extract than the lower ones thanks to their rich featural composition. In section (3.2.2), I will briefly sketch the theoretical framework of this section in terms of the featural RM (Starke 2001, Rizzi 2004) and provide some evidence to show that elements are not equally extractable from weak-islands. Section (3.2.3) will deal with the argument/adjunct asymmetry in weak-island extraction in Persian. In section (3.2.4), I will examine the extraction of a wh-adjunct across another wh-adjunct. In section (3.2.5), I will conclude by presenting the hierarchy of features that ameliorate extraction and will provide a link between the order of wh-elements in the wh-field and the notion of the ‘easiness’ of extraction. The generalization that I will make is that the lower elements in the hierarchical structure resist more robustly to extraction, unlike higher elements that are more easily extractable. I will attribute this effect to the rich featural composition of hierarchically higher elements.

3.2.2 Intervention in terms of fRM
fRM provides a set-theoretic system to account for the gradience of acceptability in extraction from weak-island domains. In this system, intervention is defined by the degree of similarity between the extracted element and the intervener with respect to their relevant movement-triggering features. Of special relevance for this section is the comparison between feature Identity and feature Inclusion discussed earlier in this thesis (e.g., see section 3.1.2 of this chapter). In the former, the feature specification of the extracted and the intervening element is identical; differently, in the latter the extracted element is enriched with an additional feature that facilitates the mechanism of chain formation across the intervening wh-element. In this regard, several asymmetries have been identified and discussed in the literature. It is not the case that all elements can be extracted to the same degree from weak-islands. I showed that, for example, whereas the extraction of a bare wh-element across an intervening wh-subject is ungrammatical, sentences improve when the extracted wh-element is lexically restricted. This is illustrated in (1):

(1)  a. *What do you wonder who bought <i>?
    b. ?Which book do you wonder who bought <i>?

Another asymmetry is related to a very classical argument/adjunct distinction, as discussed in Huang (1982) (see also Starke 2001). It has been observed that adverbial elements strongly resist wh-extraction from wh-island domains, while wh-arguments are more easily extracted. This is illustrated in (2), where the extraction of the wh-adjunct how gives rise to a RM kind of violation, while the extraction of the argument which book does not lead to the same effect.

(2)  a. ?Which book do you wonder how to read <i>?
    b. *How do you wonder which book to read <i>?
Starke (2001) accounted for the argument/adjunct asymmetry in terms of RM. Based on his analysis, the difference between the argument and adjunct wh-elements is that the former has a N-head (and thus contains [+D] feature as well as the [+Wh] feature) while the latter lacks this nominal head and is purely quantificational ([+Wh])23. Hence, the movement of the wh-adjunct, i.e., a pure quantificational element, over another quantificational element gives rise to a RM violation, differently to the extraction of the wh-argument. This can be conducted to the rich featural composition of the latter, which creates an Inclusion configuration and hence improves extraction.

Another relevant observation is the distinction between d-linked wh-phrases and certain types of wh-expressions that are aggressively non d-linked (e.g., *what the hell). It has been reported that the wh-phrases in the former group are more extractable that those in the latter group (Pesetsky 1987). Consider (3) below for illustration.

(3)  a. *Which book, do you wonder how to read ⟨⟩
    b. *What the hell, do you wonder how to read ⟨⟩

The contrast between (3a) and (3b) also falls under RM to the effect that the extraction of the d-linked wh-phrase creates an Inclusion configuration because it contains the additional [+Top] feature plus the [+Wh] feature that shares with the aggressively non d linked wh-expression (i.e., a pure quantificational wh-element).

The examples in (1) – (3) show that not all elements can be extracted to the same extent from weak-islands. Furthermore, it has been shown that different levels of acceptability with

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23 The [+D] feature used by Starke (2001) is the same as the [+N] that I have claimed to refer to the internal feature composition of lexically restricted wh-phrases (see section 3.1.2).
respect to the extraction from weak-islands can be accounted for in terms RM coupled with feature geometry. In section (3.2.3), I will compare the argument/adjunct asymmetries in Persian.

### 3.2.3 Argument/adjunct asymmetries in Persian

Consider the Persian argument/adjunct asymmetry in (4). The contrast is induced by negation, which creates an island for extraction (Szabolcsi and Zwarts 1997).

(4)  
\[
\begin{align*}
\text{a.} & \quad *\text{Chetori nemiduni chi-RA khord?} \\
& \text{How NEG-know.2sg what-RA ate.3sg} \\
& \text{‘How don’t you know what he ate?’}
\end{align*}
\]

\[
\begin{align*}
\text{b.} & \quad ?\text{Chi-RA nemiduni chetori khord?} \\
& \text{What-RA NEG-know.2sg how ate.3sg} \\
& \text{‘What don’t you know how he ate?’}
\end{align*}
\]

The extraction of the manner wh-adjunct chetori ‘how’ is strongly deviant; while the extraction of the wh-argument chi-RA ‘what’ gives rise to somewhat better judgement. One important point to mention here is that the acceptability judgment of the sentences of the sort (i.e., sentences containing extraction from weak-islands) is not absolute. These examples are deviant to some degree. The crucial point is that there is a clear distinction between the two sentences in (4) in terms of their degrees of acceptability. The same holds for the rest of the examples that I will discuss in this chapter.\(^24\)

\(^{24}\) In order to make sure that my native judgment was compatible with the judgement of other native speakers, I checked each example presented in this section with at least 5 native speakers.
Let us now compare the examples in (5). The -RA marked wh-argument is also a better extractee than the locative wh-adjunct koja ‘where’.

(5)  
a. *Koja ne-miduni ki-RA did?  
   where NEG-know.2sg who-RA saw.3sg  
   ‘Where don’t you know who he saw?’

b. ?Ki-RA ne-miduni koja did?  
   Who-RA NEG-know.2sg where saw.3sg  
   ‘Who don’t you know where he saw?’

Further examples are given in (6) and (7) below.

(6)  
a. *Key ne-miduni chi-RA kharid?  
   When NEG-know.2sg what-RA bought.3sg  
   ‘When don’t you know what he bought?’

b. ?Chi-RA ne-miduni key kharid?  
   What-RA NEG-know.2sg when bought.3sg  
   ‘What don’t you know when he bought?’

(7)  
a. ??Az koja ne-miduni chi-RA kharid?  
   From where NEG-know.2sg what-RA bought.3sg  
   ‘Where don’t you know what he bought?’

b. ?Chi-RA ne-miduni az koja kharid?  
   What-RA NEG-know.2sg from where bought.3sg  
   ‘What don’t you know where he bought?’
In (6), the extraction of the time wh-adjunct key ‘when’ is more deviant than the extraction of the -RA marked wh-argument. There is also a clear distinction between the sentences in (7) in terms of their acceptability – the extraction of the PP locative wh-adjunct *az koja ‘from where’ is worse than the extraction of the -RA marked wh-object. However, the extraction of the PP locative (7a) is judged more acceptable, though the judgement is very subtle, than the extraction of a pure wh-adjunct as in (6a) which is strongly deviant.

In (8) below, I compare the extraction of an indirect wh-object be ki ‘to whom’ with an adjunct wh-element. The former is more easily extracted than the latter.

(8) a. *Koja ne-miduni ketab-RA be ki dad?
   Where NEG-know.2sg book-RA to whom gave.3sg
   ‘Where don’t you know he gave the book to whom?’

   b. ?Be ki ne-miduni ketab-RA koja dad?
   To whom NEG-know.2sg book-RA where gave.3sg
   ‘To whom don’t you know where he gave the book’

Given the data that I presented so far, the hierarchy of extractability with respect to the adjunct/argument asymmetries can be tentatively summarized as follows (9) (> means more extractable than).

(9) Hierarchy of extractability: (Version 1)

a. -RA marked wh-object > wh-adjuncts

b. Indirect wh-object > wh-adjuncts
Clearly, this hierarchy is not exhaustive. For example, one should ask whether there is any difference between the non-RA marked wh-object and wh-adjuncts. Also, it is important to explore if there is any difference between the -RA marked wh-object and the indirect wh-object.

Let me first compare the non-RA marked wh-object with wh-adjuncts to see if these elements manifest different profile of extractability. See (10) and (11) below.

(10) a. *Chetori nemiduni chi khord?
    How NEG-know.2sg what ate.3sg
    ‘How don’t you know what he ate?’

    b. *Chi nemiduni chetori khord?
    What NEG-know.2sg how ate.3sg
    ‘What don’t you know how he ate?’

(11) a. *Key ne-miduni chi kharid?
    When NEG-know.2sg what bought.3sg
    ‘When don’t you know what he bought?’

    b. *Chi ne-miduni key kharid?
    What NEG-know.2sg when bought.3sg
    ‘What don’t you know when he bought?’

As the contrast in (10) and (11) shows, there is no noticeable difference between the non-RA marked wh-object and wh-adjuncts in terms of their extractability. Both elements are not extractable.

In (12) and (13) below, I compare the -RA marked wh-object with the indirect wh-object to see if these elements manifest different behaviors under extraction.
What the contrasts in (12) and (13) show is that the -RA marked wh-object is a better extractee than the indirect wh-object. Recall that, in (9), I provided a hierarchy to show which element is more extractable. Now, following my discussion of the extractability of non-RA marked objects and indirect wh-objects, the hierarchy of extractability seen in (9) can be modified as in (14) (> means more extractable than; = means is equally extractable as).

(14) The hierarchy of extractability (Version 2)

-RA marked wh-object > Indirect wh-object > Wh-adjuncts = non-RA marked wh-object
As this hierarchy manifests, the -RA marked wh-object is the most extractable wh-element as compared to the non-RA wh-object as well as the wh-adjuncts that cannot be extracted. Crucially, the argument/adjunct asymmetry does not hold between the non-RA marked wh-object and wh-adjuncts. I will discuss this important point in more detail in section (3.2.5), where I provide a link between the hierarchical order of wh-elements in the wh-domain and the degree of extractability.

3.2.4 The extraction of a wh-adjunct across another wh-adjunct

The examples in (15) present the extraction of the locative wh-adjunct over the manner wh-adjunct.

(15)  a.  ?Koja ne-miduni chetori rafar koni?
       Where NEG-know.2sg how behave.2sg
       ‘Where don’t you know how to behave?’

   b.  *Chetori ne-miduni koja rafar koni?
       How NEG-know.2sg where behave.2sg
       ‘How don’t you know where to behave?’

The contrast in (15) shows that the locative wh-adjunct is more extractable than the manner wh-adjunct. In (16) below, I compare the extraction of the time wh-adjunct with the extraction of the locative wh-adjunct. The judgement is very subtle in this respect but the
majority of native speakers prefer the extraction of the locative adjunct (16b) as compared to
the extraction of the time adjunct (16a) 25.

(16)  a. ??Key ne-miduni koja beri?
When NEG-know.2sg where go.2sg
‘When don’t you know where to go?’
b. ?Koja ne-miduni key beri?
Where NEG-know.2sg when go.2sg
‘Where don’t you know when to go?’

In (17), I compare the extraction of the time adjunct and the manner adjunct. As the
contrast shows, both elements strongly resist to extraction. Note that (17b) is acceptable if the
manner wh-adject takes scope over the matrix verb and that the sentence means something
like how come someone is not cognizant of particular fact.

(17)  a. *Key ne-miduni chetori zamin khord?
When NEG-know.2sg how ground ate.3sg
‘When don’t you know how he fell’
b. *Chetori ne-miduni key zamin khord?
How NEG-know.2sg when ground ate.3sg
‘How don’t you know when he fell?’

25 The contrast between the locative and time adjuncts is that somehow the former is more argument-like than the
latter. In Persian, for example, it is possible to say aree raftam literally means ‘yes, I went’ which would imply
that there was some silent location in the structure, presumably means ‘yes, I went THERE’. This might explain
why the locative wh-adject is more extractable as compared to a REAL adjunct like TIME.
Since I have now discussed and compared the extractability of wh-adjuncts as well, it is possible to update the hierarchy of extractability. This is given in (18) below.

(18)  The hierarchy of extractability (Version 3)

-RA marked wh-object > Indirect wh-object > Locative > Time = Manner = non-RA marked wh-object

In the next section (section 3.2.5), I will compare the hierarchy of extractability with the hierarchy of the order of wh-elements in the wh-domain (discussed in chapter (2)) and provide a generalization with respect to the relationship between these two hierarchies.

3.2.5 The link between the hierarchy of extractability and the hierarchical order

In (19), I repeat the hierarchical order of wh-phrases that I provided in chapter (2). Based on this hierarchy, the -RA marked wh-object is able to appear in the highest position, whereas the non-RA marked wh-object occupies the lowest position in the hierarchical order.

(19)  The hierarchical order of wh-elements in the wh-domain

-RA marked direct object > Wh-subject > (-RA marked direct object) > Indirect wh-object > Place > Time > Manner > Bare direct object

The hierarchical order of the wh-phrases directly maps onto the scale of extractability in weak islands – i.e., elements that appear in the higher position in the hierarchy are more
extractable than those that occur in the lower position. Note that I did not discuss the extractability of the wh-subject in this chapter. Subject extraction is usually more restricted than object extraction and is constrained by syntactic conditions such as ‘that-trace effect’ (e.g., see Chomsky and Lasnik 1977; Rizzi 1990; Rizzi & Shlonsky 2007). I will leave this discussion open in this chapter.

Let us consider extractability from the standpoint of featural RM. Based on featural RM, when an element is more richly specified, it is a better candidate for extraction than when it is less richly specified. For example, let us compare the -RA marked wh-object with the non-RA marked wh-object. The former is a better extractee than the latter, and is also richer in terms of its featural composition ([+Wh] and [+Top] features vs only [+Wh]). With respect to the hierarchical order, the -RA marked wh-object is also higher than the non-RA marked wh-object in the hierarchy of the wh-domain that I provided in (19). It seems then that there is a close connection between the hierarchy of the wh-domain and the degree of extractability from weak-islands as a function of richness in terms of morpho-syntactic features. The generalization that can be made is that the higher the element is in the hierarchical order, the richer it is in terms of its morpho-syntactic features, and the easier it is to extract it from weak-island domains.26

The question is: what are the features that facilitate extraction given the hierarchy of extractability that I presented in this chapter? Clearly, what makes the -RA marked wh-object so special is the presence of [+Top] feature. I claimed that [+Top] is a criterial feature that

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26 It is important to justify how the correlation between the height of where an element is merged and the degree of extractability on the one hand is related to feature-richness on the other hand. This correlation can be made clear by an example. For example, when an argument such as the direct object is initially merged in the structure, it is only specified by certain features (e.g., phi features) but then when it moves to higher domains (e.g., say the spec TopP in the left periphery), it becomes more richly specified (i.e., the object will then carry phi-features as well as [+Top]).
triggers the movement of the wh-object to the left periphery. Another relevant feature is PP that makes the indirect object more extractable than all wh-elements that occur in the lower position than the indirect object in the hierarchy. This feature is categorical in nature. The fact that the locative wh-adjunct is also a better extractee than the rest of the wh-adjuncts indicates that another relevant feature is [+Loc(ative)]. Clearly, the impact of [+Top] on the degree of extractability is stronger than both [+PP] and [+Loc]. In fact, one way to account for this distinction is to say that while the former is a criterial feature that triggers movement to the left periphery, the latters are non-criterial and thus are expected to have a milder impact. In (20), I present the hierarchy of the ameliorating features that play a role in extraction from weak-islands.

(20) The hierarchy of the ameliorating features with respect to extractability out of weak-islands.

(i) [+]Top in -RA marked wh-objects
(ii) [+]PP in indirect wh-objects
(iii) [+]Loc in the locative wh-adjunct

3.2.6 Lack of argument/adjunct asymmetry with non-RA marked object

In fact, in Persian, the classical argument/adjunct asymmetry does not hold between the non-RA wh-object and wh-adjuncts. I showed that both the non-RA marked wh-object and wh-adjuncts such as manner and time are equally poor extractees. These elements also occupy the lowest position in the hierarchical order. Starke (2001) claimed that the argument/adjunct asymmetry in English is due to the fact that wh-arguments contain [+D] feature and that this feature is absent in wh-adjuncts, i.e., pure quantificational elements. The [+D] feature makes the wh-expressions referential, d-linked and that corresponds to the [+N] feature that I attributed
to the presence of lexical restriction. In terms of the hierarchical order, wh-arguments also precede wh-adjuncts in English (wh-arguments > wh-adjuncts) in the hierarchy of the wh-domain (Laenzlinger and Soare 2017). This is particularly interesting because it shows that the argument/adjunct order in the hierarchical structure is compatible with the degree of extractability of these elements in weak-islands. That is, the structurally superior wh-arguments in the hierarchy are more extractable than wh-adjuncts that appear in the low position in the hierarchy. The reason behind the lack of an argument/adjunct asymmetry with the non-RA wh-object in Persian is due to the nature of this element that is fully non d-linked, and thus an inherently poor extractee. In terms of its hierarchical position in the structure, the non-RA marked wh-object also occupies the lowest position in the hierarchy. As I already claimed, indeed, in languages like English in which there is no morphological marker of d-linking, bare wh-arguments can be interpreted as d-linked if the context triggers such interpretation. By contrast, in Persian, bare wh-objects are always non d-linked and that if the context provides d-linking interpretation, the presence of the suffix -RA becomes obligatory.

### 3.2.7 Conclusions

To sum up, I showed that there is a similarity between the hierarchical order of wh-elements in the hierarchy of wh-domain and the degree of extractability. The generalization was that the hierarchically higher elements are more richly specified in terms of their morpho-syntactic featural composition and that are more easily extractable from weak-islands. Three features have been identified to facilitate extraction from weak-islands. These features are namely [+Top], [+PP], and [+Loc]. [+Top] has a special status among these features. It is a criterial feature that triggers movement to the left periphery. Both [+PP] and [+Loc], on the other hand, have a milder impact on extractability than the criterial [+Top] feature. It is important to take
into account both [+PP] and [+Loc] in the calculation of feature-based RM-effects. In the next chapter, I will discuss the third type of non-local dependency, namely intervention locality in subject-verb agreement relation.
Chapter 4

Intervention effects in subject-verb agreement

4.1 Object attraction in subject-verb agreement

4.1.1 Introduction

In sentence production, a large body of research has been devoted to identify the properties of a phenomenon called ‘attraction’. Attraction refers to the failure in number agreement between the sentential subject and the verb. The most common case of attraction is when the speaker incorrectly produces a verb that agrees with a plural noun situated in a modifying prepositional phrase (PP) linearly intervening between the subject and the verb (e.g., *The time for fun and games are over, taken from Bock and Miller, 1991). Various types of syntactic elements have the potential to trigger attraction\(^27\). These elements include adjuncts (Franck et al., 2004); preverbal object clitics (Franck et al., 2006, 2010) but also elements that are not situated between the subject and the inflected verb in the linear order in constructions such as object

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* The content of this section is mostly based on a joint paper by Arsalan Kahnemuyipour and Julie Franck also presented at AMLaP (Architectures and Mechanisms of Language Processing) conference held at the University of Lancaster, United Kingdom (September 7-9, 2017).

\(^{27}\) There is also attraction with gender (Vigliocco & Franck, 2001) though it appears weaker than with number (see Eberhard et al. 2005; Lorimor et al. 2008) and there is no attraction with person. In this chapter, I will focus on attraction in terms of number feature in subject-verb agreement.
relative clauses (Bock and Miller, 1991; Franck et al., 2006, 2010) and questions (Vigliocco and Nicol, 1998). In this chapter, I will focus on object attraction, i.e., erroneous agreement of the verb with the object in terms of number feature. In particular, I will discuss how the intervention of an object NP in the hierarchical structure can break down the AGREE relationship between T(ense) (i.e., the probe of AGREE) and the subject NP in the spec vP position thus inducing subject-verb agreement attraction errors. The structure of this chapter is as follows: in section (4.1.2) and (4.1.3), I will present previous experimental findings on object attraction in French (an SVO language) and Dutch (an SOV language) respectively. In particular, I will show that objects moved pre-verbally trigger attraction. Moreover, I will show that objects that c-command one of the agreement positions in the hierarchical structure generate stronger attraction than those that linearly precede them (Franck et al. 2006, 2010). Objects that occupy a c-commanding position in the hierarchical structure create RM type intervention effect on the AGREE relation between T and the subject. In section (4.1.4), I will present the relevant properties of Persian with respect to the position of the -RA marked accusative object as compared to the position of the dative object in the hierarchical structure. In section (4.2), I will present the results of an experiment in which errors of subject–verb agreement were elicited through Rapid Serial Visual Presentation procedure (RSVP) followed by verb selection as Staub (2009, 2010). In section (4.3), I will discuss the experimental results and provide some concluding remarks. In brief, based on the experimental results, I will show that the -RA marked accusative object induces stronger attraction than the dative object, both in SOV and OSV, thus validating the prediction that attraction is stronger when the object intervenes by c-command than by precedence. The results also attest to stronger attraction in the OSV word order as compared to the canonical SOV word order. I will argue that the stronger attraction in the OSV word order as compared to the SOV word order can be attributed to the
real-time processes of erroneous structure building and/or erroneous controller selection during subject-verb agreement computation.

4.1.2 Object attraction

Previous experimental results show that the pre-verbal accusative clitic ((1a) below) in French (an SVO language) generates stronger attraction than the dative clitic in the same position (1b) which in turn gives rise to the same degree of attraction as the subject modifier (1c) (Franck et al. 2006, 2010). In (1), the scale of attraction errors is given in percentages by subtracting the error rates when the subject and the object were singular (match) to error rates when the subject was singular and the object was plural (mismatch).

(1)

a. Le professeur les\textsubscript{PL} lit/*lisent\textsuperscript{Accusative clitic (11.2% errors)}
   The teacher them reads/read

b. Le costume leur\textsubscript{PL} convient/*conviennent\textsuperscript{Dative clitic (5% errors)}
   The suit them suits/suit

c. Le professeur des élèves\textsubscript{PL} lit/*lisent\textsuperscript{Subject modifier (6.3% errors)}
   The teacher of students reads/read

Before addressing the question of why the accusative clitic generates stronger attraction than the dative clitic in French, it is crucial to briefly review the formal mechanism by which subject-verb agreement is established in the hierarchical structure.

In linguistic theory, the generation of syntactic dependencies (e.g., subject-verb agreement) is viewed as a succession of formal operations such as MERGE, AGREE, and MOVE. MERGE puts two elements together to construct bigger constituents. Successive applications of MERGE assemble the thematic nucleus of the sentence. Further applications of MERGE introduce a fully-fledged hierarchical skeleton whereby the subject enters into an AGREE relation with T(ense). The AGREE relation is established through some formal
mechanisms in which feature uninterpretability plays a crucial role. T, the probe of AGREE, contains uninterpretable \textit{phi} features including number, person, and gender. It establishes an AGREE relation with the subject in the specifier of vP, by which the unvalued phi features of T get valued. In some languages, e.g. English or French, this AGREE relation is coupled with the movement of the subject to its specifier position. In French, the verb also moves to T. With this background in mind on the mechanics of structure building and how AGREE is established, it is now possible to account for the difference between the accusative clitic and the dative clitic in French attested by the experimental results.

With Franck et al. (2010), I claim that the AGREE relation is subject to intervention in terms of locality stated by RM (Rizzi 1990). Based on RM, in a structure like [X . . . Z . . . Y] the local relation between X and Y is disrupted when: (i) Z structurally intervenes between X and Y in terms of c-command; (ii) Z matches the specification in morpho-syntactic features of Y. Crucially, in this system, Z intervenes between X and Y only if Z c-commands Y.

The clitic is base-generated post-verbally in French (French is SVO) but undergoes movement and transits through the spec of AgrOP (Kayne 1989), intervening on the AGREE relation between T and the subject. Crucially, the accusative clitic occupies a position, spec of AgrOP, intervening by c-command on AGREE as the accusative clitic c-commands the subject that is in the spec vP position. In contrast, the dative intervenes from a position of precedence but it does not c-command the subject as it is inside a Prepositional Phrase (PP), in a way similar to the subject modifier (see Franck et al, 2010, for evidence from floating quantifiers in support of that analysis). The intervention of the accusative clitic and the dative clitic on the AGREE relation is illustrated in (2) schematically. Please note that <> manifests the copies of the subject and the clitics in their base positions.

(2)

a. The intervention of the accusative clitic by c-command
b. The intervention of the dative clitic by precedence

\[
\begin{array}{c}
\text{TP subject [ T ... AgrOP acc clitic ... [ vP <subject> ... [ v <acc clitic> \\
\]

As we can see in (2), the accusative clitic intervenes between T and the subject structurally as it c-commands the base position of the subject. The dative clitic, on the other hand, does not hold this c-commanding relation and its intervention is only by precedence. This distinction between intervention by c-command versus intervention by precedence captures the empirical evidence, showing stronger attraction with the former. As predicted by RM, only the former type of intervention has the potential to vitiate the AGREE relation between T and the subject and thus expected to generate stronger attraction.

4.1.3 Object attraction in an SOV language

Experimental results show that in Dutch (an SOV language), the subject modifier gives rise to a stronger attraction than the preverbal accusative object (Hartsuiker et al. 2001). This is illustrated in (3) below.

(3)

a. Karin zegt dat het meisje de krans en wint/*winnen Accusative object (4.9% errors)
   Karen says that the girl the garlands wins/win

b. Karin zegt dat het meisje met de krans en wint/*winnen Subject modifier (11.2% errors)
   Karen says that the girl with the garlands wins/win
Indeed, the pattern of attraction in (3) is different from the one attested by the French study which shows that the subject modifier generates weaker attraction than the pre-verbal accusative clitic. That the Dutch study gave rise to a different pattern of attraction might be due to several reasons. Note that there is more difference between the subject modifier and the pre-verbal accusative object than their structural position. One crucial difference between the PP modifier and the accusative object is that the former is part of the subject constituent; while the latter forms an independent constituent separated from the subject in the hierarchical structure. This might generally justify why the contrast between the subject modifier and the accusative object is not minimal as compared to the contrast between two object clitics reported by the French study. It is also possible that other confounding variables made the results of these two studies different. For example, Frank et al. (2006) suggested that the accusative object in an SOV language like Dutch remains low in the structure in a position lower than the spec AgrOP from which the French clitic intervenes on AGREE by c-command. Hence, on the assumption that the Dutch accusative object remains low in the structure, the object can only intervene from the position of precedence just like the dative clitic in French. I will leave the discussion on the difference between the French and Dutch results open.

4.1.4 The current study

The current study is aimed to explore whether the c-command hierarchical relationship as compared to the precedence relationship can also capture the object attraction facts in Persian (in a way similar to the French study by Franck et al). In this regard, I will report the results of an experiment in Persian (an SOV language) in which subject–verb agreement was elicited by presenting sentences in RSVP followed by verb selection (Staub 2009, 2010). The experiment compared attraction errors induced by pre-verbal accusative objects versus dative objects in the
canonical SOV word order as well as the OSV word order. As I mentioned in chapter 1, the underlying position of the pre-verbal object is a matter of debate in Persian. Based on Kayne (1994), we can argue that SOV is derived from an underlying SVO order. In this respect, the object moves from the VO order to the pre-verbal position to receive case in a specifier-head configuration. I have claimed that in order to obtain the canonical SOV word order in Persian, one could assume that the subject is merged in the spec-vP and then is raised to the spec-TP after the AGREE relation is established between T and the subject. The object is moved from the post-verbal position to the specifier of a functional projection above the verb. I also mentioned that for the position of the verb in the hierarchical structure, we can think of two options: the verb could remain in-situ (Karimi 2005) or could raise to a head position above V but below v, Travis’s (1991) Asp (Kahnemuyipour 2009), rendering an SOV order. For the analysis in this chapter, the crucial point is the position that the pre-verbal accusative object takes in the hierarchical structure. With Ghomeshi (1996), Karimi (2005), Ganjavi (2007), and Kahnemuyipour (2009), I have claimed that RA-marked accusative objects target a higher position in the structure than their non-RA marked counterparts. For example, following Karimi (2005) in chapter 1, I have presented one piece of evidence that -RA marked accusatives are merged higher than non-RA marked objects. The evidence was based on the position of these objects in double object constructions. This is illustrated in (4).

(4) a. Hasan be Maryam ketab dad.
   Hasan to Maryam book gave.3sg
   ‘Hasan gave a book to Maryam.’

b. Hasan ketab-RA be Maryam dad.
   Hasan ketab-RA to Maryam gave.3sg
   ‘Hasan gave the book to Maryam.’
Whereas the non-RA marked accusative object follows the indirect object (4a), the -RA marked accusative object undergoes object shift to a higher position above the indirect object as in (4b). There are also other evidence in this respect. To mention one more, let us consider the positions of -RA/non-RA with respect to manner adverbs. -RA marked objects are merged higher than manner adverbs unlike their non-RA marked counterparts that appear in a lower position (see Ganjavi 2007). This is illustrated in (5).

    Hasan book-RA fast read.3sg
    ‘Hasan read the book fast.’

b. Hasan tond ketab khund.
    Hasan fast book read.3sg
    ‘Hasan read a book fast.’

Building on Ghomeshi (1996), Karimi (2005), Kahnemuyipour (2009) and Ganjavi (2007), I argue that the -RA marked accusative object moves to a vP peripheral position in the spec of a functional projection (namely AgrOP) and that the non-RA marked accusative object remains within vP. It must be noted that on the assumption that the underlying word order of Persian is SVO based on Kayne (1994), the non-RA marked accusative object still remains low in the structure somewhere inside vP after the object is moved from the post-verbal position to the pre-verbal position. The hierarchical position of the -RA marked accusative object is illustrated in (6) schematically.

(6)

\[
\begin{array}{c}
\text{[TP T ... [AgrOP acc object [-RA ... [vP subject ... [<acc object> V ]]]]]]
\end{array}
\]

As shown in (6), the -RA marked accusative object occupies a position that c-commands the subject in the spec vP position after it is dislocated to the spec AgrOP outside vP. If my
analysis with respect to the hierarchical position of the -RA marked accusative object is on the right track, the prediction is that the -RA marked accusative object intervenes on the AGREE relation by c-command and thus generates strong attraction. In contrast to the -RA marked accusative object, the dative object occupies a lower position in the structure embedded inside a PP, and thus intervenes only by precedence, rather than c-command. As a result, attraction from the dative object is expected to be lower than the -RA marked object that intervenes by c-command. The hierarchical position of the dative object is illustrated in (7) which manifests that the dative object does not c-command the subject by being embedded inside a PP28.

(7)

\[
[TP \ T \ [PP \ P \ [\text{dative object}] \ [vP \ \text{subject} \ [<\text{dative object}> \ V ]]]] \\
\text{---} \text{---} \text{---} \text{---} \text{---} !
\]

As I have argued, the position of the non-RA marked accusative object is inside vP. This follows that the non-RA marked accusative object cannot intervene on the AGREE relation between T and the subject. I expect that the non-RA accusative object triggers the same degree of attraction as the dative object, both intervening by precedence. Unfortunately, in this study, it was not possible to properly test attraction errors induced by the non-RA marked accusative object. This was because sentences with non-RA marked accusative objects are ambiguous between an SOV or an OSV reading, especially when the subject and the accusative object are both animate and that the verb does not provide any semantic clue to distinguish the subject

28 It is also plausible to assume that the dative object stays lower than spec vP position where the subject is merged in the structure in which case the dative object cannot c-command the subject either. This is illustrated schematically as follows:

\[
[TP \ T \ [vP \ \text{subject} \ [\text{PP} \ P \ [\text{dative object}] \ V ]]]
\]
from the object (see section (4.3.3) for the discussion on attraction induced by non-RA marked accusative objects). This ambiguity may obviously influence attraction. I will leave a closer examination of attraction by non-RA marked objects for future research.

Persian also allows objects to move to the front of the sentence in structures like object relatives or topicalization, giving rise to the OSV word order. This is exemplified in (8) in which the -RA marked object is topicalized and thus occurs in the initial position before the subject in the linear order.

(8) Ketab-RA Hasan kharid.
    Book-RA Hasan bought.3sg
    ‘As for the book, Hasan bought it’

With Franck (2010), I argue that attraction only takes place at the stage of the derivation where the object intervenes on the AGREE relation. Hence, attraction is expected to be the same in SOV and OSV orders as object movement to the initial position does not change the configuration with respect to the intervention on AGREE. I predict stronger attraction with accusatives than datives but crucially expect that these two object types give rise to the same degree of attraction in the canonical SOV word order as well as the OSV word order.

It is worth adding that in addition to accuracy (i.e., the scores that manifest attraction error rates), the experimental task that is used in this study (namely RSVP) also provides scores for response time (RT). RTs are given at the point in which speakers are supposed to pick a verb that accords with the subject. Previous results show that RTs usually go up when the accuracy goes down (Staub 2009, 2010). With respect to RTs, I predict longer RTs with accusatives than datives as attraction is stronger in the former than in the latter due to c-command, but similar RTs between SOV versus OSV word order in which attraction is expected to remain the same.

With this brief overview of the syntax of Persian clausal structure and the predictions with
respect to attraction (attested by accuracy scores) and RTs, let me turn to the experimental results presented in the next section.

4.1.5 Experiment

4.1.5.1 Method

4.1.5.2 Participants

Forty Persian native speakers participated in this experiment. Participants were students, mostly completing a PhD or a Master’s degree at the University of Lausanne, Switzerland. They were all naïve to the purpose of the experiment and were paid 10 CHF for their participation in the experiment.

4.1.5.3 Material

Three variables were manipulated in a 2*2*2 design, involving as variables: Number Match between the subject and the object (Match vs. Mismatch), type of Object (Accusative vs. Dative), and Object Movement (SOV vs. OSV). The number feature of the subject DP remained singular throughout the experimental items; the object was singular in the match conditions and was plural in the mismatch conditions. In Persian, the subject and the verb must agree in number: both must be singular, or both must be plural. However, plural inanimate subjects can optionally occur with singular or plural verbs (Sharifian & Lotfi 2007). I decided to use animate subjects and animate objects for which subject-verb agreement is obligatory so as to avoid the confounding effect that might arise due to the optionality with plural inanimate DPs. For plural objects, I used quantifiers such as ‘chand ta’ (several), ‘do ta’ (two), or ‘se ta’ (three), where ta is a classifier, and for the singular ones, I used the indefinite article ‘ye’ (meaning a/an). In
total, there were 256 experimental sentences divided into 8 within-participant lists that each consisted of 32 experimental items. There were also 64 filler items consisting of various other structures involving clefts, raising constructions and normal declarative SOV sentences. Examples of the experimental items are provided in Table (5) and a full list of the items is in Appendix (3).

**Table 5:** Examples of the experimental items in the 8 experimental conditions.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Accusative</strong></td>
<td>SOV</td>
<td>Parastar chand ta/ye mariz-RA did/*didand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nurse several/a patient-RA saw&lt;sub&gt;sg/pl&lt;/sub&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘The nurse saw several/a patient(s).’</td>
</tr>
<tr>
<td><strong>Dative</strong></td>
<td>SOV</td>
<td>Parastar be chand ta/ye mariz komak kard/*kardand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nurse to several/a patient helped&lt;sub&gt;sg/pl&lt;/sub&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘The nurse helped several/a patient(s).’</td>
</tr>
<tr>
<td><strong>Accusative</strong></td>
<td>OSV</td>
<td>Chand ta/ye mariz-RA parastar did/*didand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Several/a patient-RA nurse saw&lt;sub&gt;sg/pl&lt;/sub&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘The nurse saw several/a patient(s).’</td>
</tr>
<tr>
<td><strong>Dative</strong></td>
<td>OSV</td>
<td>Be chand ta/ye mariz parastar komak kard/*kardand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To several/a patient nurse helped&lt;sub&gt;sg/pl&lt;/sub&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘The nurse helped several/a patient(s).’</td>
</tr>
</tbody>
</table>
4.1.5.4 Procedure

The experiment was carried out through E-prime, using a forced-choice response time paradigm with Rapid Serial Visual Presentation procedure (RSVP) following Staub (2009; 2010). Words appeared one word at the time in moving windows of 250 ms followed by the presentation of the two verb forms (one singular and one plural) situated to the left and to the right of the screen, which remained constant in the monitor screen until participants have made their responses. The presentation of each experimental item was separated by a fixation cross and there was no time pressure during the verb selection stage. However, participants were explicitly instructed to make their responses as accurate and as fast as possible. Before the experimental task started, participants were provided with a few practice items including 8 instances of the experimental conditions as well as a couple of filler items to help them become fully familiarized with the experimental task. Participants’ accuracy and their response time (RT) were measured at the verb selection stage.

4.1.5.5 Data analysis

Response times and accuracy proportions were analyzed by way of (generalized) linear mixed-effects regression models with random intercepts for participants and items using the lme4 package in R (R Development Core Team, 2016; Bates et al. 2015). The whole data set consisting of 1280 data points was analyzed without excluding any responses. Response times were analyzed on trials for which participants gave a correct answer and log-transformed to normalize residuals. I used the maximal random-effects structure by participant and by item and the random-effects structure always had the same specification as our fixed effects (e.g., if testing for the interaction, the random structure contained the interaction). Correlations between random effects were not estimated since they often cause the model with maximal random
slopes to fail to converge. Analyses are therefore conservative with respect to the
generalizability of the effects of theoretical interest to new participants and items (Barr, Levy,
Cheepers, and Tily, 2013). P-values were calculated by way of the Satterthwaites’s
approximation to degrees of freedom with the lmerTest package (Kuznetsova, Brockhoff, and
Haubo Bojesen Christensen, 2016).

4.1.5.6 Results

Accuracy: Figure (3) illustrates the distribution of accuracy proportions. Results showed a main
effect of Number Match ($\beta = 0.7937, z = 4.085, p < .001$), with lower accuracy for the mismatch
(M = 0.84) than for the match conditions (M = 0.92). Results also showed a main effect of
Object ($\beta = 0.4596, z = 2.359, p < .05$) with lower accuracy for accusatives (M = 0.85) than
datives (0.91). The interaction between Number Match and Object was significant ($\beta = -0.8941,
z = -2.305, p < .01$), attesting to a stronger effect of match for accusatives than datives. Finally,
results showed a significant interaction between Object Movement and Number Match ($\beta = -
0.7941, z = -2.044, p = .05$), suggesting that the effect of match was stronger when there was
movement than when there was no movement. There was no any other effect among the
variables.
Figure 3: Distribution of accuracy scores.

Response times. Figure (4) illustrates the distribution of RTs. Results attested to a main effect of Number Match ($\beta = -1.914$, $t = -7.350$, $p < .001$), with slower response times for the mismatch conditions ($M = 1861$ ms) than for the match conditions ($M = 1513$ ms). We also found a main effect of Object ($\beta = 8.027$, $t = 3.062$, $p < .001$) with longer response times for datives ($M = 1754$ ms) than for accusatives ($M = 1619$ ms) and a main effect of Movement ($\beta = -2.393$, $t = -9.131$, $p < .001$) with longer response times when there was movement ($M = 1913$ ms) as compared to when there was no movement ($M = 1461$ ms). There was no any other effect among the variables.
4.1.6 Discussion

4.1.6.1 Attraction induced by -RA marked accusatives vs. dative objects

In this study, I compared attraction errors induced by the -RA marked accusative object versus the dative object in Persian that allows full NPs in the pre-verbal position. The attraction errors induced by these two object types were compared in the canonical SOV word order as well as in the OSV word order in which there was an object movement to the clause initial position. The aim of the study was to explore if attraction depends on the position of the object in the
hierarchical structure and is particularly sensitive to the intervention of the object on the AGREE relation between T and the subject in terms of c-command. The summary of the results is as follows: (1) The results showed stronger attraction (attested by lower accuracy) with the -RA marked accusative object than the dative object, and (2) The results showed stronger attraction (attested by lower accuracy) with fronted objects as in the OSV word order than with preverbal objects as in the canonical SOV word order. I will discuss these two findings in turn. The stronger attraction with the -RA marked accusative object than the dative object corroborates my prediction to the effect that attraction is stronger when the object intervenes on AGREE by c-command than by precedence. I have followed much of the literature on Persian syntax in assuming that the -RA marked accusative object undergoes movement to the spec AgrOP position. As this is a position from which the object c-commands the base position of the subject in spec vP, I expect it to intervene on AGREE by c-command, hence creating RM type intervention effect. Unlike the -RA marked accusative object, the dative object is embedded inside a PP and hence it does not c-command the base position of the subject. In other words, the dative object intervenes only by precedence, hence generating only weak attraction. This finding is particularly interesting because it shows that the process of number-agreement computation is structure-dependent and that despite the fact that the two object types occupy the same surface position in the linear string they trigger different attraction rates due to their hierarchical positions in the syntactic tree.

The results also showed stronger attraction in the OSV word order as compared to the canonical SOV word order. It is important to note that, as I argued, the movement of the object to the clause initial position does not change the configuration of object intervention in terms of c-command. In principle, the object intervenes on AGREE before it raises to the initial position to become topicalized, thus similar attraction was expected in both SOV versus OSV word orders (and of course stronger attraction was predicted with accusatives than datives as
the former intervenes on AGREE by c-command before it raises to the topic position). I suggest that the strong attraction in the OSV word order is due to the involvement of processing factors and discuss two possible accounts to explain why the results gave rise to such an effect.

**Erroneous structure building:** The first possibility is to say that Persian speakers generally expect SOV order which is the canonical word order in Persian. They, therefore, treat an initial NP as the subject. Based on the insights of Good Enough Parsing (Ferreira & Patson, 2007), I further hypothesize that when the parser temporarily treats a non-subject NP as the subject, this misinterpretation has a small likelihood of lingering and affecting verb agreement, thus producing attraction. Ferreira & Patson reported that in structures in which there is a garden-path (e.g., *While Anna dressed the baby played in the crib*), people usually misinterpret the NP *the baby* as the object of the verb *dressed* when there is no comma after the verb *dressed*. This misinterpretation results in long reading times at the point in which they are presented with the verb *played* that the NP *the baby* is the subject of. This evidence shows that comprehenders parse the sentences in an anticipatory manner based on the cues that they receive in the initial stages of structure building. Along the same line, I propose that the stronger attraction in the OSV word order as compared to the canonical SOV word order is because speakers misinterpreted the first NP, considered it as the subject of the clause, and based on their misinterpretation; they have built an erroneous structure. This explains why the OSV word order was globally more error-prone than the canonical SOV word order with both accusatives and datives.

It is worth reminding that as I claimed in chapter 2 (section 2.3.7.1), memory processes are subject to encoding interference. I mentioned that during encoding stage of sentence processing, when two elements that share certain features enter into a competition, one element might lose those features and eventually becomes less active in memory. Indeed, erroneous
structure building takes place at the encoding stage of sentence processing. That the object occurs in the initial position in OSV increases the likelihood of being wrongly encoded as the subject NP, thus generating strong attraction. On the other hand, if we assume that both the object NP and the subject NP compete to take the subject slot while the syntactic structure is being built, the fact that the object occurs in the initial position in OSV increases its similarity with the subject NP. Plausibly, when attraction occurs, the object NP wins the competition over the subject NP due to its similarity with the subject in the OSV order and that it takes the subject slot during structure building.

Erroneous controller selection: The second possible explanation for the higher attraction rate in structures with fronted objects is that the structure was correctly built, but what went wrong was the process of agreement per se, which can be conceived of as a process of subject retrieval or “controller selection” (Badecker & Kuminiak 2007; Franck 2017). Controller selection is a mechanism responsible for selecting the controller of agreement during agreement computation. The process of controller selection has been argued to rely on similarity-based interference such that any element that shares typical subject features has the potential to be erroneously selected as the agreement controller 29. Subject retrieval cues include semantic features (e.g., animacy), nominative case, or possibly also structural cues (Alcocer & Phillip 2012). In this view, the strong attraction in the OSV word order can be explained by the fact

29 It is important to mention that there is a common property between RM and the process of controller selection. The two bear a striking resemblance in granting a key role to similarity. In fact, one theoretical move would be to assume that the two processes are two sides of the same coin – one is related to the competence system and in particular, the way elements are organized in the hierarchical structure from the grammatical point of view; while the other one is related to the performance system (see Franck (2017) for some insights on the relationship between competence and performance).
that the fronted object occupies a sentence-initial position, a position that is statistically associated to the subject and may therefore constitute a distributional cue to subject retrieval.

It is important to note that the difference between controller selection and structure building is that the former takes place at the retrieval stage of sentence processing while the latter takes place during encoding stage. Indeed, both processes rely on the fact that the canonical word order is SOV in Persian and that the initial nominal element is expected to be the subject by default. The strong attraction in OSV may be due to wrong parse (i.e., erroneous structure building) such that speakers erroneously take the initial object NP as the subject and that they build an erroneous structure accordingly or due to erroneous selection of the wrong NP as the subject because of its linear position in the structure (i.e., erroneous controller selection). It is important to note that whether the higher attraction in OSV structures is due to the building of the wrong parse or to the selection of the wrong NP as the agreement controller cannot be determined with the experimental data in the current study. One way to distinguish between these processes would be to ask comprehension questions after each experimental trial, specifically targeting thematic roles, in order to determine whether the correct parse was built or not. Conceivably, if speakers answered comprehension questions correctly but made attraction errors regardless, this would mean that attraction was due to an erroneous controller selection. Alternatively, if speakers did not answer the comprehension questions correctly when they made attraction errors, this would suggest that attraction results of erroneous structure building. In line with this, recent evidence suggests that speakers of French, Italian and English make many more comprehension errors of object relatives than expected, sometimes up to 35% errors (Villata et al., in press; Villata & Franck, in preparation). Other preliminary evidence suggests that both erroneous structure building and erroneous controller selection may underlie attraction in these structures (Schmid, Villata & Franck, in preparation). In particular, Schmid, Villata & Franck’s reported that participants make both attraction errors and comprehension-
question errors at the same time in some trials while they make only attraction errors in some other trials. This suggests that agreement errors may arise both because of incorrect structure building and because of erroneous controller selection. I will leave this discussion open about which process underlies the cause of attraction and whether these processes (namely erroneous structure building and erroneous controller selection) are responsible for attraction in other structures such as noun phrase modification or not.

Lastly, with respect to RTs, our results do not meet our predictions. The results attested to longer RTs with OSV than SOV word order and attested to longer RTs for datives than accusatives in both word orders. The fact that the results show longer RTs in the OSV word order as compared to the canonical SOV word order can be readily accounted for as the accuracy was also lower in the OSV than in the SOV word order. In fact, I claimed that it is predicted that when the accuracy goes down, RT is expected to go up. Let me add that it is possible to think that longer RTs in OSV may be an indication that participants took longer to parse the non-canonical OSV order and that they had built the correct parse, but then stronger attraction in this condition arises due to erroneous controller selection. I will leave this discussion open as well about whether longer RTs precisely imply that participants have built the correct parse or not.

Why were datives, which generated less attraction, slower than accusatives? Such a result may reflect a ‘speed-accuracy tradeoff’. One might think that speakers have read the preambles with datives more slowly and more accurately than accusatives and that this gave them enough time to build the correct structure and that as a consequence boosted their accuracy. However, it must be noted that in contrast to accuracy, RTs showed no interaction between Number Match and Object, indicating that longer RTs are not related to the process of number agreement computation or attraction itself; rather, they seem to attest to some general difficulty in the processing of datives. We tentatively propose that the general difficulty with
datives may be due to increased difficulty in the processing of their information structure, however, more work is needed to explore that hypothesis.

4.1.6.2 Some note on the comparison between RM and MLC

Based on the account that I have laid out, intervention by c-command in the sense of RM has been argued to explain why there is stronger attraction with -RA marked accusatives than datives. In my opinion, it is also possible to account for the distinction between these two objects in terms of the Probe-Goal relation based on MLC. In this formulation, attraction arises due to an erroneous link between T (i.e., the probe of AGREE) and the accusative object. Plausibly, that the -RA marked accusative object is moved to spec AgrOP brings the accusative object closer to T as compared to the dative object that is most likely lower than spec AgrOP in the hierarchical structure. Indeed, this makes the dative object less accessible to T than the -RA marked accusative which is higher in the structure, close to T. Another possibility is to assume that both the -RA marked accusative object and the dative object are in spec AgrOP but that the dative object is embedded inside a PP, still making it less accessible to T. In fact, if the -RA marked accusative and the dative are in spec AgrOP, they are both within the c-commanding domain of T, higher than the subject in spec vP. However, the fact that the dative object is encapsulated inside a PP makes it less accessible to T as compared to the -RA marked accusative object which is a DP and hence a viable probe for T.

Based on RM, attraction arises due to the intervention of the object NP on the AGREE relation between T and the subject; whereas based on MLC, attraction arises due to an erroneous AGREE link between T and the object NP. I will leave the comparison between these two accounts for future research. There are couple of important issues to mention at this point. The first one is that we should ask why attraction occurs only occasionally (for example, only around
6% of the time in the SOV word order with -RA marked accusative object in Persian). In fact, if an element intervenes on the AGREE relation, it must always intervene and hence attraction should not remain at the rate of around 11%. Alternatively, if the accusative object in spec AgrOP is closer to T than the subject NP is in spec vP; why isn’t always T AGREE with the object? The answer to the second question might be related to the fact that T is sensitive to the feature content of the probe. What distinguishes the subject from the object is case. Perhaps, the probe uses this feature while establishing the AGREE relation, prompting it to target the subject. These open questions have ramifications on how to account for the underlying cause of attraction. Generally speaking, it seems that performance plays a crucial role when attraction errors are produced. As I mentioned earlier, processes such as erroneous structure building or erroneous controller selection are responsible for the real-time computation of agreement. Importantly, even if we assume that attraction is just closely tied to performance, as the experimental results show in this study, the process of agreement computation is sensitive to the hierarchical representation of the sentence. Hence, we can conclude that the performance system is strongly constrained by the hierarchical structure.

4.1.6.3 Attraction induced by non-RA marked object

It must be added that I also tested attraction errors with non-RA marked accusative objects in both SOV as well as OSV word orders with the same experimental materials that have been used to test -RA marked objects. The results showed no difference between -RA/non-RA marked accusative objects in the canonical SOV word order. However, attraction was stronger with non-RA marked objects as compared to their -RA marked counterparts in the OSV word order. The distribution of accuracy proportions as well as RTs for non-RA marked objects in SOV as well as OSV word orders are presented in figures (5) and (6) respectively.
Figure 5: Distribution of accuracy scores with non-RA marked accusatives.

Figure 6: Distribution of RTs with non-RA marked accusatives.
As I have claimed, the potential ambiguity in the process of non-RA marked objects may have affected the results. In fact, the lower attraction in the SOV word order as compared to the OSV word order was expected as the former represents the canonical word order in Persian. Under both structure building and controller selection, the SOV word order is predicted to be less error prone than the OSV word order in which the object occurs in the initial position. The stronger attraction in the non-RA marked OSV as compared to the -RA marked OSV shows that, basically, the ambiguity with non-RA marked objects affected the results. In the absence of any semantic clue in sentences in which thematic roles are reversible between the subject NP and the object NP, the presence of the suffix -RA is crucial in Persian to indicate which NP is the object. On the assumption that the initial parse is SOV by default, in the O-RASV condition, presumably, the presence of the suffix -RA on the initial NP guided the parser to build the correct structure. It is plausible to think that the presence of -RA could also help the parser during the process of controller selection. In this respect, -RA provides a cue that can be used to distinguish between the subject and the object NPs. These explain why there was less attraction in the O-RASV condition than in the OSV condition without -RA. I must add that the post hoc analysis of the results shows that attraction decreases considerably in conditions when the verb provides a semantic clue to restrict which NP is the agent and which one is the patient. For example, weaker attraction was found in a sentence like ‘The police caught the thief’ than in ‘The nurse saw the patient’ in which the thematic roles can be reversed. This finding suggests that the parser uses semantic cues to build the correct structure and then to correctly identify the subject controller during the real-time computation of agreement. I will leave the proper investigation of attraction effects with non-RA marked objects for future research.
4.1.7 Conclusions

To sum up, the results show that agreement is a structure-dependent process and is computed on the structural hierarchy. In particular, what the results in this study show is that despite the fact that the accusative object was marked with the suffix -RA that could in principle help the parser to distinguish between the subject and the object, the accusative object gave rise to strong attraction. I claimed that the -RA marked accusative object intervenes on the AGREE relation between T and the subject by c-command, generating stronger attraction than the dative object which only intervenes by precedence. The results also show that the presence of objects in the initial position (i.e., the position that is generally associated with subjects) has ramifications with respect to the way the parser deals with the processes of agreement computation. In this regard, I claimed that two processes, namely erroneous structure building and/or erroneous controller selection, might underlie the strong attraction in the OSV word order. I have also shown that attraction is stronger when the accusative object is non-RA marked in the OSV order as compared to when it is -RA marked. I claimed that this finding is related to the fact that the non-RA is ambiguous. In fact, it is highly possible to interpret the OSV order as involving the canonical SOV order when there is no -RA marking on the accusative object. Lastly, the results show that performance-related processes such as structure building and controller selection are closely tied to the hierarchical structure such that they are constrained by it. I should mention that the experiment reported in this thesis is a first-stab attempt to study attraction phenomena in Persian. Clearly, much further experimental and theoretical work is needed in this particular domain, which I hope to pursue in the near future.
Chapter 5

Concluding remarks

5.1 Summary of the most relevant findings

This dissertation explored intervention effects in Persian in structures involving multiple wh-questions, weak-islands and subject-verb agreement. Intervention effects arises when an intervening element that bears certain morpho-syntactic properties blocks the chain that links two sides of a syntactic dependency in the hierarchical structure. In the case of multiple wh-questions and weak-islands, the chain is constructed between the wh-probe and a wh-element. The intervening element is a wh-word as well. It perturbs the A’ dependency between the extracted wh-word and its trace position in the structure. In the case of subject-verb agreement, as I have discussed, the AGREE relation between T and the subject NP can break down by an intervening object NP that occurs in spec AgrOP, c-commanding the subject which is located in spec vP. I have analyzed intervention effects in the above-mentioned structures based on MLC and RM. As I claimed, MLC is probe-based theory while RM is a chain-building algorithm. Based on the former, only features that participate in the Probe-Goal relation can intervene while based on the latter any element that belongs to the same family of feature class intervenes. One crucial similarity between the two theories is that both of them establish non-local relations among features. Hence, a natural theoretical move would be to consider them as
facets of the same process or mechanism that can capture intervention effects in non-local dependencies. In what follows, I will present the summary of the most relevant findings discussed in this thesis.

Chapter 2 examined multiple wh-questions in Persian. In section (2.1) “multiple wh-questions’ I have discussed various strategies that Persian manifests in forming single and multiple wh-questions. I have shown that movement to the pre-verbal position is obligatory but nevertheless wh-elements have the additional possibilities of moving to the intermediate position in the clausal left-peripheral position of the embedded clause or moving all the way to the matrix clause. I have also discussed the syntax of multiple wh-questions based on two approaches namely “wh-cluster type” approach (Richards 2001, Grewendorf 2001) and “chain crossing” approach (Krapova and Cinque 2008). Based on the former, I argued that wh-elements construct a wh-cluster before moving to any domain higher than where they are base generated in the structure. Based on this analysis, the lowest wh-element acts as a probe to attract the second lowest wh-element and then in turn they both probe the highest wh-element, forming a cluster including three wh-elements. Based on chain-crossing approach, I have claimed that lower wh-elements are only allowed to tuck-in below higher elements such that each chain that links the lower element to its trace position in the structure must only partially intervene on the chain that belong to the higher element. The difference between the two approaches is that the former is derivational based on a relationship between a wh-probe and a wh-goal while the latter is representational, asserting how the sequences of wh-elements must appear in the left periphery. I have also provided a feature based account on how the syntax of wh-question is constructed. Building on Karimi and Taleghani (2007), I proposed that there is a wh-operator in CP and that each wh-element enters into an AGREE relation with the operator through feature movement. I claimed that there is a focus feature as well. This feature triggers the movement of each wh-element to the specifier position of dedicated focus head.
In the section “superiority effect in multiple wh-questions” (2.2) I have dealt with superiority violation in multiple wh-questions and have shown that the suffix -RA can legitimately eliminate the superiority violation. In particular, I accounted for the grammatical status of two sets of sentences: Those involving a -RA marked wh-object crossing over a non-RA marked wh-subject in which case the result is fully grammatical and those involving a -RA marked wh-object moving across another -RA marked wh-object in which case the result leads to ungrammaticality. Based on RM, I claimed that the grammaticality of the first configuration is due to the fact that it creates an Inclusion configuration in terms of the criterial [+Top] feature. While, the ungrammaticality of the second configuration is due to feature Identity since the feature specification of the extracted wh-element is identical as the specification of the intervening one, both containing [+Wh +Top] features. In fact, that the -RA marked wh-object can cross over the wh-subject in an apparent violation of the superiority constraint raises questions with respect to how the AGREE relation is established in terms of MLC. In this respect, I have argued that the -RA marked wh-object is probed as being a topic by the complex probe that is enriched with [+Wh +Top] features. That is to say that the chain that links the moved -RA marked wh-object to its trace position is topic and that this chain can legitimately cross over an intervening wh-chain.

Section (2.3) “the role of covert movement in multiple wh-questions: an experimental study” presented the results of an experimental study which examines the pattern of acceptability in sentences containing superiority violation in Persian. In line with Hofmeister et al.’s (2007, 2013) findings, the experimental results show that sentences in which the intervening wh-element is lexically restricted and that the extracted wh-element is bare received higher acceptability than those in which the intervening element is bare and the extractee is a lexically restricted. I accounted for the observed pattern of acceptability based on covert movement and claimed that lexically restricted -RA marked wh-elements have the possibility
of moving to a head with [+Wh +Top] feature after the covert movement is applied. The covert movement of the lower lexically restricted wh-element to [+Wh +Top] position creates a configuration that is compatible with Krapova & Cinque’s (2008) interpretation of RM in the sense that multiple wh-questions are only allowed to have intersecting chains and that a nesting chain is disallowed and thus is ungrammatical. I also claimed that the reverse pattern of acceptability between multiple wh-questions and weak-islands is due to the fact that in the former the two wh-elements have overlapping scope within the same CP (CPs being the relevant domain) while in the latter each wh-element takes its scope within a unique CP. I claimed that RM as a representational constraint only evaluates the content of each CP right after it is sent to the interface. In fact, that the embedded chain in weak-islands is always nested within the matrix chain does not violate the constraint on chain-geometry in the sense of Krapova & Cinque (2008) as these structures involve two separate CPs.

Chapter (3) was concerned with extraction from weak-islands. In section (3.1) “the role of the suffix -RA and lexical restriction on extraction from wh-islands” I presented the results of a grammaticality judgement task which examined the effect of the suffix -RA and of lexical restriction on wh-object fronting in wh-islands. The results showed that while lexical restriction did not improve acceptability, the presence of the suffix -RA significantly increased the acceptability scores. I attributed the results to the distinction between criterial versus non-criterial features based on Rizzi (2011) and claimed that only criterial features have a strong impact on grammaticality. The results in this study also raised issues pertinent with respect to the impact of different features on the overall processes of non-local dependencies. In this regard, I claimed that plausibly the parser uses the suffix -RA to distinguish the object from the subject and that the role of lexical restriction is to provide rich syntactic/semantic information that could facilitate memory processes such as retrieval.
In section (3.2) “extraction from weak-islands: a feature-based analysis” I discussed the similarity between the hierarchy of wh-elements in the wh-domain and the degree of extractability from weak-islands. In this section, I compared the extractability of various wh-elements including wh-arguments and wh-adjuncts from weak-island domains. I have found that three features (namely [+Top], [+PP] and [+Loc]) on the extracted wh-elements ameliorate extraction. With Rizzi (2011), I argued that the [+Top] feature, attributed to the presence of the suffix -RA, plays a strong role as it creates Inclusion configuration in terms of criterial feature. The fact that [+PP] and [+Loc] also played a role suggest that perhaps these features should also be taken into account in the feature-based computation of RM. [+PP] is a categorical feature while [+Loc] is associated to the extractability of the locative wh-adjunct that is more extractable than other wh-adjuncts. In this section, I also discussed the lack of adjunct/argument asymmetry with non-RA wh-objects in Persian and claimed that this effect is due to the fact that non-RA marked wh-objects are non d-linked and hence are poor extractees. I claimed that in languages such as English in which there is no morphological marker of d-linking, bare wh-elements can be d-linked if an appropriate context is provided.

Chapter (4) presented results on attraction effect in subject-verb agreement (i.e., the third type of non-local dependency discussed in this thesis). Building on previous experimental results in French (Franck et al. 2006; 2010), I have shown that when the object intervenes on the AGREE relation between T(ense) (i.e., the probe of AGREE) and the subject in spec vP by c-command it induces stronger attraction than when it intervenes by precedence. This effect has been shown by the distinction between -RA marked accusative object and the dative object. The former is moved from vP internal position to the spec AgrOP, c-commanding the subject in spec vP; while the latter is embedded inside a PP that does not allow the dative object to c-command the subject. I also presented experimental results with respect to attraction errors in the OSV word order. With Franck (2010), I claimed that attraction only takes place at the stage
of the derivation where the object intervenes on the AGREE relation. Therefore, object movement to the initial position does not change the configuration with respect to the intervention on AGREE and thus should not increase attraction. Contrary to this prediction, the results showed that when the object moves to the initial position as in the OSV word order, it generates stronger attraction than when it occupies the canonical pre-verbal position as in the SOV word order. I argued that some processing mechanisms play a role in this respect. These processes are namely erroneous structure building and/or erroneous controller selection that could arise during the on-line processes of agreement computation. Based on the former, the sentence is mis-parsed such that the parser treats the OSV word order as SOV, taking the first NP as the subject. Based on the latter, the correct structure is built but when the parser has to select an NP as the agreement controller, it selects the wrong one (namely the object NP) because of its similarity with the subject NP. That the object NP occurs in the initial position in the OSV word order (i.e., the position that is statistically associated with the subject) increases the likelihood of mis-parse (erroneous structure building) and/or erroneous selection of the controller. I discussed attraction errors with non-RA marked objects as well. I mentioned that the non-RA marked object is ambiguous in conditions in which the verb does not provide semantic clues to indicate which NP is the agent and which one is the patient. In fact, from the hierarchical standpoint, the non-RA marked object does not occupy a c-commanding position as it occurs lower than the spec AgrOP inside vP. It is then predicted that the non-RA marked object intervenes from the position of precedence. The experimental results attested to the same degree of attraction errors between -RA versus non-RA marked objects in the SOV word order but stronger attraction was found with non-RA marked objects than -RA marked ones in the OSV word order. I claimed that these results are not reliable due to the ambiguity with non-RA marked objects and that proper investigation of attraction with these objects must be carried out more precisely when semantic clues are controlled for. Indeed, it is highly plausible that the
ambiguity with non-RA marked objects increases the likelihood of both erroneous structure building and erroneous controller selection, thus triggering strong attraction.

5.2 Further thoughts

5.2.1 Some note on the comparison between MLC and RM

In my opinion, despite many similarities between MLC and RM, the two theories do not have the same explanatory power to account for the grammatical status of certain structures. For example, let us consider the following sentences in (1) that manifest adjunct/argument asymmetry in negative islands.

(1)  a. *How can’t you photograph the house?
    b. What house can’t you photograph?

For MLC, only features that participate in the Probe-Goal relation can intervene; while according to RM, any feature in the same family of feature class intervenes. Let us first consider the ungrammaticality of (1a) and the grammaticality of (1b) based on RM. (1a) is ungrammatical because the chain that links the extracted adverbial element how crosses over negation and both the extracted how and the negative element belong to the same feature class (i.e., quantificational). On the other hand, the grammaticality of (1b) is accounted for on the assumption that the extracted wh-element what (i.e., an argument wh-element) contains an additional feature as compared to the adverbial element how as in (1a), hence creating an Inclusion configuration, which in the spirit of RM is predicted to be grammatical (Starke 2001). In terms of MLC, the negation does not participate in the Probe-Goal relation. Hence, the Q-element (namely how) in (1a) is the only available candidate for the probe to establish the
AGREE relation. The question arises as to why the probe cannot attract “how” as there is no other element closer to the probe than “how”? Possibly, one way to account for the ungrammaticality of (1a) is to say that the negative element creates an island and that the probe cannot reach the goal inside that island domain. The problem arises with the grammaticality of (1b). In fact, if we assume that the negative element creates an island, one should explain how the probe can reach the wh-element in (1b) to establish AGREE. Hence, it seems here more credit should be given to RM as it provides a straightforward way to account for the contrast in (1) based on chain-formation across an intervening element of the same family of feature class and the notion of feature Inclusion.

Let me add another important point for the sake of comparing RM and MLC. Indeed, some languages allow multiple topics in their clausal left-peripheral domains and these topics can appear in any order (Rizzi 1997). Based on RM, topics belong to a unique family of feature class. Hence, a topic-chain is predicted to intervene on the trajectory of another topic. The occurrence of multiple topics is problematic for RM notably when multiple topics can appear in different orders (See Rizzi (2013) who claims that topics lie outside the system of RM in a language like Italian; conversely see Haegeman (2012b) who claims that topics are endowed with Op feature that can intervene for or is intervened by other elements with the same feature in terms of RM). In fact, based on MLC, it is conceivable that a unique head attracts each topic in the left periphery. The question arises as to how MLC can account for the presence of multiple topics that do not show any strict ordering constraint. I think future research should investigate what allows languages to manifest different strategies in allowing multiple topics (see Cinque & Rizzi 2008). Is there any parametrization with respect to how rich the left-periphery might be in allowing multiple topics? Do topics cluster together and then move as a single cluster to a unique topic position in the left-periphery? What is the implementation of MLC in sentences with multiple topics that do not manifest rigid order? Finally, how is chain-
formation constructed in terms of RM in sentences with multiple topics? I will leave these questions for future research.

5.2.2 On the comparison between RM and an account in terms of processing

As I discussed in various parts of the dissertation, the real-time processes of non-local dependencies require memory. I claimed that memory processes are subject to similarity-based interference. In this regard, interference arises when there is an overlap between the cues of the to-be-retrieved target (or the cues of the to-be-encoded target in terms of encoding interference) with any other items present in memory. Both syntactic and semantic cues are claimed to play a role for memory (e.g., Lewis & Vasishth, 2005). For instance, Hofmeister et al. (2013) reported that the semantically rich dependent element such as ‘alleged Venezuelan communist who the members of the club banned from ever entering the premises’ as compared to a semantically less rich element like ‘an alleged Venezuelan Communist’ boosts memory processes such as retrieval. In fact, one major problem with a processing account in terms of memory is that it does not make a distinction among features in terms of their potential impacts. For example, I have shown that [+Top] has a stronger impact than other features such as [+N], [+PP], and [+Loc]. By contrast, RM seems to be more precise in categorizing features into criterial versus non-criterial ones, even though it does not provide a principled explanation in accounting for why in principle criterial features have a stronger role to play in acceptability. One possible line of research might be to explore the effect of various features in terms of real-time memory processes to characterize what makes certain features play a stronger role than others in the processing of non-local dependencies. In terms of RM, it is also important to characterize what causes certain features such as [+PP] or [+Loc] to play a role although these features do not trigger movement to the left periphery but
nevertheless facilitate extraction from weak-islands. I will leave these issues open for future research.

5.2.2 Attraction errors with -RA marked objects

Evidence shows that attraction appears primarily in sentences in which the subject and the intervener have similar case marking or in sentences in which there is no case marking at all (Badecker & Kuminiak, 2007; Hartsuiker et al., 2001; 2003). On the other hand, attraction is virtually nonexistent when the subject and the attractor are distinctively case-marked (Badecker & Kuminiak, 2007; Lorimor et al., 2008; Malko & Slioussar, 2013; Marušič et al., 2015). The question arises as to why the suffix -RA (as a disambiguating marker on the accusative object) did not reduce attraction. In this regard, I will point out two plausible explanations and will raise a couple of questions for future research. The first explanation is related to the sequential order of the suffix -RA with respect to the object NP. -RA is a suffix that appears after the object NP. This makes -RA different from a preposition in dative objects that occurs before the object NP in sequential order. On the assumption that the structure is built in an incremental fashion, the fact that the suffix -RA occurs after the object NP might increase the processing difficulty by allowing the parser to engage in the wrong parse, thus triggering strong attraction. In this respect, it might be interesting to test attraction effects in languages with a prefixal accusative marker or those with postpositional dative objects to explore if these languages manifest different behavior under agreement attraction as compared to Persian. The second possible explanation as to why the morphological -RA marking did not reduce attraction might be due to the fact that in contrast to nominative case, which is a positive cue for subject identification, -RA is a negative cue that only allows for object identification. Negative cues indicate that an element is not the subject controller, without
providing information about which element is the subject. These cues might be accusative case or a preposition in dative objects. Negative cues have been claimed to be less effective than positive ones for subject retrieval (Fodor & Inoue 2000). For example, experimental results show that in garden path sentences the overt nominative case in German is a sufficiently reliable cue that can guide the parser to identify the subject. Instead, negative cues such as a number agreement marker (in conditions in which the agreement marker does not unambiguously manifest if an element is the subject or a fronted object when the fronted NP is not case marked but bears certain number feature) are not as efficient as the nominative case for subject retrieval (Meng and Bader 2000). Let me also add that, generally speaking, the suffix -RA is not a perfectly reliable cue, even the negative one that could help the parser during agreement processes. Indeed, although the primary function of the suffix -RA is to mark the accusative object, there are cases in which the left-dislocated topics including subjects can be -RA marked (see Aghaei, 2006). This is illustrated in (2) below which shows that the subject of the embedded clause co-occurs with -RA in the topic position.

(2) Maryam-RA Hasan fekr mikone bahush hast.
Maryam-RA Hasan think do.3sg intelligent is
‘As for Maryam, Hasan thinks she is intelligent.’

That in some rare cases such as the sentence in (2) the suffix -RA can also mark the subject suggests that the presence of -RA cannot substantially help the parser during the real-time processes of agreement. I will leave proper investigation of positive versus negative cues in agreement attraction open.

At the end, I hope this thesis contributes to our understanding of the syntax of certain non-local dependencies in Persian and some related mechanisms underlying sentence processing thereof, opening new horizons for future research.
References


Appendix 1

کی را فروشنده متقاعد کرد چی را بخره

کدام مشتری را فروشنده متقاعد کرد کدام لباس را بخره

چی را فروشنده کی را متقاعد کرد بخره

کدام لباس را فروشنده کدام مشتری را متقاعد کرد بخره

کی را رییس جمهور مجبور کرد چی را اجرا کنه

کدام وزیر را رییس جمهور مجبور کرد کدام قانون را اجرا کنه

کی را رییس جمهور مجبور کرد کدام قانون را اجرا کنه

کدام وزیر را رییس جمهور مجبور کرد کدام قانون را اجرا کنه

چی را رییس جمهور کی را مجبور کرد اجرا کنه

چی را رییس جمهور کدام وزیر را مجبور کرد اجرا کنه

کدام قانون را رییس جمهور کی را مجبور کرد اجرا کنه

کدام قانون را رییس جمهور کدام وزیر را مجبور کرد اجرا کنه

کی را تماشا گران متقاعد کردند چی را دوباره اجرا کنه

who did the salesperson convince to buy what

which customer did the salesperson convince to buy what

who did the salesperson convince to buy which clothes

which customer did the salesperson convince to buy which clothes

what did the salesperson convince who to buy

what did the salesperson convince which customer to buy

which clothes did the salesperson convince who to buy

which clothes did the salesperson convince which customer to buy

who did the president force to implement what

which minister did the present force to implement what

who did the president forced to implement which law

which minister did the president force to implement which law

what did the president force who to implement

what did the president force which minister to implement

which law did the president force who to implement

which law did the president force which minister to implement

who did the viewers convince to perform what
کدام خواننده را تماشا گران متقاعد کرده‌اند چی را دوباره اجرا کنند؟

who did the viewers convince to perform what

چی را تماشا گران کدام خواننده را متقاعد کرده‌اند دوباره اجرا کنند؟

what did the viewers convince which singer to play

کدام آهنگ را تماشا گران کدام خواننده را متقاعد کرده‌اند دوباره اجرا کنند؟

which song did the viewers convince which singer to play

کدام مریض را دکتر تشویق کرد چی را بخوره؟

which patient did the doctor persuade to eat what

کدام دارو را دکتر تشویق کرد چی را بخوره؟

which medicine did the doctor persuade who to eat

کدام دارو را دکتر کدام مریض را تشویق کرد چی را بخوره؟

which medicine did the doctor persuade which patient to eat

کدام دانش آموز را معلم تشویق کرد چی را بخونه؟

who did the teacher persuade to read what

کدام کتاب را معلم کدام دانش آموز را تشویق کرد چی را بخونه؟

which book did the teacher persuade to read which
کدام دانش‌آموز را معلم تشویق کرد کدام کتاب را بخونه

چی را معلم کی را تشویق کرد بخونه

چی را معلم کدام دانش‌آموز را تشویق کرد بخونه

کدام کتاب را معلم کی را تشویق کرد بخونه

کدام کتاب را معلم کدام دانش‌آموز را تشویق کرد بخونه

کی را زندانیان مجبور کرد چی را دستش کنه

کدام زندانیان کی را زندانیان مجبور کرد چی را دستش کنه

کی را زندانیان مجبور کرد کدام دستبند را دستش کنه

کدام زندانیان کی را زندانیان مجبور کرد کدام دستبند را دستش کنه

چی را زندانیان کی را مجبور کرد دستش کنه

چی را زندانیان کدام زندانیان کی را مجبور کرد دستش کنه

کدام دستبند را زندانیان کی را مجبور کرد دستش کنه

کدام دستبند را زندانیان کدام زندانیان کی را مجبور کرد دستش کنه

کی را استاد مجبور کرد چی را تعییر کنه

کدام شاگرد را استاد مجبور کرد چی را تعییر کنه

کی را استاد مجبور کرد کدام ماشین را تعییر کنه

کدام شاگرد را استاد مجبور کرد کدام ماشین را تعییر کنه

چی را استاد کی را مجبور کرد تعییر کنه

که کدام دانش‌آموز را معلم تشویق کرد کدام کتاب را بخونه

چی را معلم کی را تشویق کرد بخونه

چی را معلم کدام دانش‌آموز را تشویق کرد بخونه

کدام کتاب را معلم کی را تشویق کرد بخونه

کدام کتاب را معلم کدام دانش‌آموز را تشویق کرد بخونه

کی را زندانیان مجبور کرد چی را دستش کنه

کدام زندانیان کی را زندانیان مجبور کرد چی را دستش کنه

کی را زندانیان مجبور کرد کدام دستبند را دستش کنه

کدام زندانیان کی را زندانیان مجبور کرد کدام دستبند را دستش کنه

چی را زندانیان کی را مجبور کرد دستش کنه

چی را زندانیان کدام زندانیان کی را مجبور کرد دستش کنه

کدام دستبند را زندانیان کی را مجبور کرد دستش کنه

کدام دستبند را زندانیان کدام زندانیان کی را مجبور کرد دستش کنه

کی را استاد مجبور کرد چی را تعییر کنه

کدام شاگرد را استاد مجبور کرد چی را تعییر کنه

کی را استاد مجبور کرد کدام ماشین را تعییر کنه

کدام شاگرد را استاد مجبور کرد کدام ماشین را تعییر کنه

چی را استاد کی را مجبور کرد تعییر کنه

which student did the teacher persuade to read

which book

what did the teacher persuade who to read

what did the teacher persuade which student to read

which book did the teacher persuade who to read

which book did the teacher persuade which student to read

who did the prison guard force to wear what

which prisoner did the prison guard force to wear what

who did the prison guard force to wear which handcuffs

which prisoner did the prison guard force to wear which handcuffs

what did the prison guard force who to wear

what did the prison guard force which prisoner to wear

which handcuffs did the prison guard force who to wear

which handcuffs did the prison guard force which prisoner to wear

who did the repair person force to repair what

which repair assistant did the repair person force to repair what

who did the repair person force to repair which car

which repair assistant did the repair person force to repair which car

what did the repair person force who to repair
چی را استاد کدام شاگرد را مجبور کرد تعمیر کنه

کدام ماشین را استاد کدام شاگرد را مجبور کرد تعمیر کنه

کی را کارگردان مجبور کرد چی را بازی کنه

کدام بازیگر را کارگردان مجبور کرد چی را بازی کنه

کی را کارگردان مجبور کرد کدام صحنه را بازی کنه

کدام بازیگر را کارگردان مجبور کرد کدام صحنه را بازی کنه

چی را کارگردان کی را مجبور کرد بازی کنه

چی را کارگردان کدام بازیگر را مجبور کرد بازی کنه

کدام صحنه را کی را مجبور کرد بازی کنه

کدام صحنه را کدام بازیگر را مجبور کرد بازی کنه

what did the repair person force which repair assistant to repair

which car did the repair person force who to repair

which car did the repair person force which repair assistant to repair

who did the director force to play what

which actor did the director force to play what

who did the director force to play which scene

which actor did the director force to play which scene

what did the director force who to play

what did the director force which actor to play

which scene did the director force who to play

which scene did the director force which actor to play
Appendix 2

چی فکرمی کی اون خورد
کدام غذا فکرمی کی اون خورد
چی را فکرمی کی اون خورد
کدام غذا را فکرمی کی اون خورد
چی تعمج می کنی کی خورد
کدام غذا تعمج می کنی کی خورد
چی فکرمی کی اون خواند
کدام غذا فکرمی کی اون خواند
چی را فکرمی کی اون خواند
کدام غذا را فکرمی کی اون خواند
چی تعمج می کنی کی خواند
کدام غذا تعمج می کنی کی خواند
چی را تعمج می کنی کی خواند
کدام غذا تعمج می کنی کی خواند
چی را فکرمی کی اون خرید
کدام ماشین فکرمی کی اون خرید
چی را فکرمی کی اون خرید
کدام ماشین را فکرمی کی اون خرید
چی تعمج می کنی کی خرید
کدام ماشین تعمج می کنی کی خرید
چی را تعمج می کنی کی خرید
کدام ماشین را تعمج می کنی کی خرید
چی فکرمی کی اون ساخت
کدام خونه فکرمی کی اون ساخت
چی را فکرمی کی اون ساخت
کدام خونه را فکرمی کی اون ساخت
چی تعمج می کنی کی ساخت
کدام خونه تعمج می کنی کی ساخت
چی را تعمج می کنی کی ساخت
کدام خونه را تعمج می کنی کی ساخت

what do you think he ate
which dish do you think he ate
what-ra do you think he ate
which dish-ra do you think he ate
what do you wonder who ate
which dish do you wonder who ate
what-ra do you wonder who ate
which dish-ra do you wonder who ate
what do you think he read
which book do you think he read
what-ra do you think he read
which book-ra do you think he read
what do you wonder who read
which book do you wonder who read
what-ra do you wonder who read
which book-ra do you wonder who read
what do you think he bought
which car do you think he bought
what-ra do you think he bought
which car-ra do you think he bought
what do you wonder who bought
which car do you wonder who bought
what-ra do you wonder who bought
which car-ra do you wonder who bought
what do you think he built
which house do you think he built
what-ra do you think he built
which house-ra do you think he built
what do you wonder who built
which house do you wonder who built
what-ra do you wonder who built
which house-ra do you wonder who built
what do you think he brought
which dish do you think he brought
what-ra do you think he brought
which dish-ra do you think he brought
what do you wonder who brought
which dish-ra do you wonder who brought
what-ra do you wonder who brought
which dish-ra do you wonder who brought
what do you think he wore
which clothes do you think he wore
what-ra do you think he wore
which clothes-ra do you think he wore
what do you wonder who wore
which clothes do you wonder who wore
what-ra do you wonder who wore
which clothes-ra do you wonder who wore
what do you think he smelled
which perfume do you think he smelled
what-ra do you think he smelled
which perfume-ra do you think he smelled
what do you wonder who smelled
which perfume do you wonder who smelled
what-ra do you wonder who smelled
which perfume-ra do you wonder who smelled
what do you think he repaired
which car do you think he repaired
what-ra do you think he repaired
which car-ra do you think he repaired
what do you wonder who repaired
which car do you wonder who repaired
what-ra do you wonder who repaired
which car-ra do you wonder who repaired
کدام ماشین را تعجب می‌کنی کی تعمیر کرد
چی فکر می‌کنی کی اون پاره کرد
کدام کتاب فکرمی کنی اون پاره کرد
چی را فکر می‌کنی اون پاره کرد
کدام کتاب را فکرمی کنی اون پاره کرد
چی تعجب می‌کنی کی پاره کرد
کدام کتاب تعجب می‌کنی کی پاره کرد
چی را تعجب می‌کنی کی پاره کرد
کدام کتاب را تعجب می‌کنی کی پاره کرد
چی فکر می‌کنی اون دزدید
کدام ماشین تعجب می‌کنی اون دزدید
چی را تعجب می‌کنی اون دزدید
کدام ماشین را تعجب می‌کنی اون دزدید
چی تعجب می‌کنی کی اون دزدید
کدام کتاب تعجب می‌کنی کی دزدید
چی را تعجب می‌کنی کی دزدید
کدام کتاب را تعجب می‌کنی کی دزدید
چی تعجب می‌کنی کی دزدید
کدام خبر فکرمی کنی اون شنید
چی را فکر می‌کنی اون شنید
کدام خبر را فکرمی کنی اون شنید
چی تعجب می‌کنی کی شنید
کدام خبر تعجب می‌کنی کی شنید
چی را تعجب می‌کنی کی شنید
کدام خبر را تعجب می‌کنی کی شنید
چی فکرمی کنی اون پیش بینی کرد
کدام حادثه فکرمی کنی اون پیش بینی کرد
چی را فکرمی کنی اون پیش بینی کرد
کدام حادثه را فکرمی کنی اون پیش بینی کرد
چی تعجب می‌کنی کی پیش بینی کرد

which car-ra do you wonder who repaired
what do you think he tore up
which book do you think he tore up
what-ra do you think he tore up
which book-ra do you think he tore up
what do you wonder who tore up
which book do you wonder who tore up
what-ra do you wonder who tore up
which book-ra do you wonder who tore up
what do you think he stole
which car do you think he stole
what-ra do you think he stole
which car-ra do you think he stole
what do you wonder who stole
which car do you wonder who stole
what-ra do you wonder who stole
which car-ra do you wonder who stole
what do you think he heard
which news do you think he heard
what-ra do you think he heard
which news-ra do you think he heard
what do you wonder who heard
which news do you wonder who heard
what-ra do you wonder who heard
which news-ra do you wonder who heard
what do you think he predicted
which event do you think he predicted
what-ra do you think he predicted
which event-ra do you think he predicted
what do you wonder who predicted
کدام حادثه تعجب می کنی کی پیش بینی کرد
چی را تعجب می کنی کی پیش بینی کرد
کدام حادثه را تعجب می کنی کی پیش بینی کرد
کدام مواد فکرمی کی اون اختراع کرد
کدام مواد را فکرمی کی اون اختراع کرد
چی تعجب می کنی کی اون اختراع کرد
کدام مواد تعجب می کنی کی اون شکوند
کدام کتاب را تعجب می کنی کی اون شکوند
کدام کتاب فکرمی کی اون شکوند
کدام کتاب را فکرمی کی اون شکوند
چی تعجب می کنی کی اون شکوند
کدام گلدنون فکرمی کی اون شکوند
کدام گلدنون را فکرمی کی اون شکوند
چی تعجب می کنی کی اون شکوند
کدام گلدنون تعجب می کنی کی شکوند
کدام گلدنون را تعجب می کنی کی شکوند
چی فکرمی کی اون اختراع کرد
کدام ابزار فکرمی کی اون اختراع کرد
چی را فکرمی کی اون اختراع کرد

which event do you wonder who predicted
what-ra do you wonder who predicted

which event-ra do you wonder who predicted
what do you think he smoked
which drug do you think he smoked
what-ra do you think he smoked
which drug-ra do you wonder who smoked
what-ra do you wonder who smoked
which drug-ra do you wonder who smoked
what do you wonder who smoked
which book do you think he burnt
what-ra do you think he burnt
which book-ra do you think he burnt
what do you wonder who burnt
which book do you wonder who burnt
what-ra do you wonder who burnt
which book-ra do you wonder who burnt
what do you think he broke
which vase do you think he broke
what-ra do you think he broke
which vase-ra do you think he broke
what do you wonder who broke
which vase do you wonder who broke
what-ra do you wonder who broke
which vase-ra do you wonder who broke
what do you think he invented
which tool do you think he invented
what-ra do you think he invented
کدام ابزار را فکرمی کنی اون اختراع کرد
چی تعمج سی کنی کی اختراع کرد
کدام ابزار تعمج سی کنی کی اختراع کرد
چی را تعمج سی کنی کی اختراع کرد
کدام ابزار را تعمج سی کنی کی اختراع کرد

which tool-ra do you think he invented
what do you wonder who invented
which tool do you wonder who invented
what-ra do you wonder who invented
which tool-ra do you wonder who invented
<table>
<thead>
<tr>
<th>همسان</th>
<th>ترجمه</th>
</tr>
</thead>
<tbody>
<tr>
<td>پلیس چند تا دزد را دستگیر کرد</td>
<td>Police caught several thieves</td>
</tr>
<tr>
<td>پلیس به چند تا دزد دستبند زد</td>
<td>Police put a handcuff on thieves</td>
</tr>
<tr>
<td>رییس دوتأتا کارمند را استفاده کرد</td>
<td>Boss hired two workers</td>
</tr>
<tr>
<td>رییس به دوتأتا کارمند کمک کرد</td>
<td>Boss helped two workers</td>
</tr>
<tr>
<td>رییس جمهور چندتا وزیرا انتخاب کرد</td>
<td>President selected several ministers</td>
</tr>
<tr>
<td>رییس جمهور با چندتا وزیر مشورت کرد</td>
<td>President consulted with several minister</td>
</tr>
<tr>
<td>راننده جنندتا مسافر را سوار کرد</td>
<td>Driver picked up several passengers</td>
</tr>
<tr>
<td>راننده به چندتا مسافر حرف زد</td>
<td>Driver talked with several passengers</td>
</tr>
<tr>
<td>دکتر جنندتا مرضی را ویزیت کرد</td>
<td>Doctor visited several patients</td>
</tr>
<tr>
<td>دکتر به چندتا مرض حرف زد</td>
<td>Doctor talked with several patients</td>
</tr>
<tr>
<td>کارگردن جنندتا فیلم ساز را ملاقات کرد</td>
<td>Director visited several film makers</td>
</tr>
<tr>
<td>کارگردن از جنندتا فیلم سازکمک گرفت</td>
<td>Director asked for help from several film makers</td>
</tr>
<tr>
<td>پرستار دو تا مرض دید</td>
<td>Nurse saw two patients</td>
</tr>
<tr>
<td>پرستار به دوتأتا مرض کمک کرد</td>
<td>Nurse helped two patients</td>
</tr>
<tr>
<td>مرتبی جنندتا بازیگر را گرفت</td>
<td>Coach got several players</td>
</tr>
<tr>
<td>مرتبی با چندتا بازیگر حرف زد</td>
<td>Coach talked with several players</td>
</tr>
<tr>
<td>خلبان سه تا مهمان دار را دید</td>
<td>Pilot saw three flight attendants</td>
</tr>
<tr>
<td>خلبان با سه تا مهمان دار حرف زد</td>
<td>Pilot talked with three flight attendants</td>
</tr>
<tr>
<td>پلیس چند تا متهم را بازداشت کرد</td>
<td>Police prisoned several attackers</td>
</tr>
<tr>
<td>پلیس از چند تا متهم بازجویی کرد</td>
<td>Police interrogated from several attackers</td>
</tr>
<tr>
<td>رییس جنندتا منشی را پیدا کرد</td>
<td>Boss found several secretaries</td>
</tr>
<tr>
<td>رییس به چندتا منشی گوش کرد</td>
<td>Boss listened to several secretaries</td>
</tr>
<tr>
<td>شکارچی جنندتا پرنده را شکار کرد</td>
<td>Hunter hunted several birds</td>
</tr>
<tr>
<td>شکارچی از جنندتا پرنده عکس گرفت</td>
<td>Hunter took photo from several birds</td>
</tr>
<tr>
<td>موتور سوار دوتأتا عابر پیاده را زیر گرفت</td>
<td>Motor cyclist run over two passengers</td>
</tr>
<tr>
<td>موتور سوار به دوتأتا عابر پیاده خورد</td>
<td>Motor cyclist hit two passengers</td>
</tr>
<tr>
<td>رییس جنندتا کارمند را اخراج کرد</td>
<td>Boss fired several workers</td>
</tr>
<tr>
<td>رییس از جنندتا کارمند گلایه کرد</td>
<td>Boss complained from several workers</td>
</tr>
<tr>
<td>ارباب جنندتا کنیز را خرد</td>
<td>Master bought several servants</td>
</tr>
<tr>
<td>ارباب به چندتا کنیز اشاره کرد</td>
<td>Master pointed to several servants</td>
</tr>
</tbody>
</table>
| سازنده | گرفت | گرفت
|---|---|---|
| صاحب خانه | دوتا باغبان را | حرف زد
| ماهی گیر | دو ماهی را | دام انتخاب
| شکارچی | دو سگ را چرخد | 
| شکارچی | با چند سگ رفت | 
| فرش فروش | دو مشتری را | نمودار کرد
| فرش فروش | با چند تا مشتری حرف زد | 
| خواننده | چند تا رقص را | گرفت
| خواننده | با چند تا رقص ازدواج کرد | 
| کبوتر بازیار | چند تا کبوتر را | دوست داشت
| کبوتر بازیار | با چند تا کبوتر دونه ریخت | 
| کشاورز | دو اسب را | کرید
| کشاورز | با دو اسب آمد | 
| مدیر | چند تا معلم را | می خواست
| مدیر | با چند تا معلم غذا خورد | 
| خواننده | چند تا تماساچی را | دوست داشت
| خواننده | با چند تا تماساچی صحبت کرد | 
| فروشنده | چند تا پرنده را | فروخت
| فروشنده | به چند تا پرنده نگاه کرد | 
| کارفرما | چند تا کارگر را | استفاده کرد
| کارفرما | به چند تا کارگر نامه نوشت | 
| طلا ساز | چند تا مشتری را | رد کرد
| طلا ساز | با چند تا مشتری حرف زد | 
| استاد | چند تا دستیار را | استخدام کرد
| استاد | از چند تا دستیار کمک گرفت | 
| خواننده | چند تا نوازنده را | انتخاب کرد
| خواننده | با چند تا نوازنده رقصید | 
| سوارکار | دو اسب را | خرید
| سوارکار | با دو اسب برید | 
| Horse rider | bought two horses | 
| Horse rider | jumped on two horses | 

**Tabel:**

<table>
<thead>
<tr>
<th>English</th>
<th>Persian</th>
</tr>
</thead>
<tbody>
<tr>
<td>House owner got two gardeners</td>
<td>صاحب خانه دوتا باغبان را گرفت</td>
</tr>
<tr>
<td>House owner talked with two gardeners</td>
<td>صاحب خانه با دوتا باغبان حرف زد</td>
</tr>
<tr>
<td>Fisherman caught two fish</td>
<td>ماهی گیر دو ماهی را گرفت</td>
</tr>
<tr>
<td>Fisherman put bait for two fish</td>
<td>ماهی گیر برای دوتا ماهی دام انتخاب</td>
</tr>
<tr>
<td>Hunter bought two dogs</td>
<td>شکارچی دوتا سگ را چرخد</td>
</tr>
<tr>
<td>Hunter went with two dogs</td>
<td>شکارچی با چند سگ رفت</td>
</tr>
<tr>
<td>Carpet seller got two customers</td>
<td>فرش فروش دو مشتری را نمودار کرد</td>
</tr>
<tr>
<td>Carpet seller talked with two customers</td>
<td>فرش فروش با چند تا مشتری حرف زد</td>
</tr>
<tr>
<td>Singer got several dancers</td>
<td>خواننده چند تا رقص را گرفت</td>
</tr>
<tr>
<td>Singer married with several dancers</td>
<td>خواننده با چند تا رقص ازدواج کرد</td>
</tr>
<tr>
<td>Pigeon lover caught several pigeons</td>
<td>کبوتر بازیار چند تا کبوتر دونه ریخت</td>
</tr>
<tr>
<td>Pigeon lover gave food to several pigeons</td>
<td>کبوتر بازیار با چند تا کبوتر دونه ریخت</td>
</tr>
<tr>
<td>Farmer bought two horses</td>
<td>کشاورز دو اسب را چرخد</td>
</tr>
<tr>
<td>Farmer came with two horses</td>
<td>کشاورز با دو اسب آمد</td>
</tr>
<tr>
<td>Principle wanted several teachers</td>
<td>مدیر چند تا معلم را می خواست</td>
</tr>
<tr>
<td>Principle have food with several teachers</td>
<td>مدیر با چند تا معلم غذا خورد</td>
</tr>
<tr>
<td>Singer loved several viewers</td>
<td>خواننده چند تا تماساچی را دوست داشت</td>
</tr>
<tr>
<td>Singer talked with several viewers</td>
<td>خواننده با چند تا تماساچی صحبت کرد</td>
</tr>
<tr>
<td>Seller sold several birds</td>
<td>فروشنده دو پرنده را فروخت</td>
</tr>
<tr>
<td>Seller looked at several birds</td>
<td>فروشنده به چند تا پرنده نگاه کرد</td>
</tr>
<tr>
<td>Boss hired several workers</td>
<td>کارفرما چند تا کارگر را استفاده کرد</td>
</tr>
<tr>
<td>Boss wrote a letter to several workers</td>
<td>کارفرما به چند تا کارگر نامه نوشت</td>
</tr>
<tr>
<td>Gold maker rejected several customers</td>
<td>طلا ساز چند تا مشتری را رد کرد</td>
</tr>
<tr>
<td>Gold maker discussed with several customers</td>
<td>طلا ساز با چند تا مشتری حرف زد</td>
</tr>
<tr>
<td>Professor hired several assistants</td>
<td>استاد چند تا دستیار را استفاده کرد</td>
</tr>
<tr>
<td>Professor asked for help from several assistants</td>
<td>استاد از چند تا دستیار کمک گرفت</td>
</tr>
<tr>
<td>Singer selected several players</td>
<td>خواننده چند تا نوازنده را انتخاب کرد</td>
</tr>
<tr>
<td>Singer danced with several players</td>
<td>خواننده با چند تا نوازنده رقصید</td>
</tr>
<tr>
<td>Horse rider bought two horses</td>
<td>سوارکار دو اسب را خرید</td>
</tr>
<tr>
<td>Horse rider jumped on two horses</td>
<td>سوارکار با دو اسب برید</td>
</tr>
</tbody>
</table>