Persian Quantifiers and Their Scope

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This paper investigates quantifiers and their scope in Persian, proposing that Persian is not a scope rigid language, rather scope rigidity in this language is a construction-specific property controlled by scrambling. More specifically, the availability of scrambling translates into lack of ambiguity. Furthermore, the nature and the size of scrambling is what dictates the presence or absence of scope ambiguity, whereby the *v*P-internal scrambling cases induce ambiguity while the *v*P-external ones do not. Examples from various sentences with two quantifiers show that although Persian exhibits a strong preference for surface scope in general, constructions involving inverse linking, for which only the inverse scope is possible, justify that Quantifier Raising (QR) operation is available in this language, contradicting Karimi (2005). This paper draws on Bobaljik & Wurmbrand's (2012) (B&W) constraint-based proposal and the negative correlation between scrambling and scope ambiguity.

1. Introduction

It is a known fact that English doubly-quantified transitive sentences are ambiguous in a sense that both their subject quantifier and their object quantifier can have a wide scope, as the example in (1) shows. The meaning in (a) is what is called a *surface scope,* and the meaning in (b) is *inverse scope*.

1. Somebody offended everybody.
   a. There is somebody who offended everybody. ∃>∀[1]
   b. For everybody, there is somebody that s/he offended. ∀>∃

(Heim and Kratzer 1998: 194)

[1] Throughout the paper, the > sign shows scope interpretations; whereas ≫ sign shows syntactic precedence.

However, this phenomenon has not been attested cross-linguistically; and in particular East Asian languages such as Chinese, Japanese and Korean (Huang 1982, Hoji 1986, Kim 2008) as well as Slavic languages like Russian (Ionin 2001) have been proposed to lack this property and allow only for the surface scope of their quantifiers. For instance, the only available reading for the following Chinese example in (2) and the Japanese example in (3) is the surface scope, in which the subject quantifier scopes over the object quantifier. These languages are called s*cope frozen* or *scope isomorphic* languages (Huang 1982).

2. meige xuesheng dou mai-le yiben shu.
   every student all buy-ASP[2] one book
   'For every student x, there is one book y such that x bought y.' (Huang 1982: 112)
3. Dareka-ga daremo-o semeta (koto)
   someone-NOM everyone-ACC criticized
   'Someone criticized everyone.' (Hoji 1986, ex. 11)

The controversy among linguists over the existence of inverse scope in the aforementioned languages is ever growing. For instance, Antonyuk (2015) gives compelling data to contradict Ionin's (2001) initial proposal that Russian is scope rigid. Moreover, the rigidity of scope in Mandarin Chinese has been questioned in Wu et al. (2017).

Persian, like many other verb final scrambling languages, has been proposed to belong to the second group with its quantifier scope being dictated by surface order (Karimi 2005, Shafiei 2016, Toosarvandani & Nasser 2017). Sentences like (4) and (5) are claimed to only have one reading, akin to the Chinese example in (2); in particular, the contrast in more robust in (5a) and (5b) with the given contexts.

[2] The abbreviations used in this paper are: ACC: accusative; AD: anti-definite; ASP: aspect; CL: classifier; EZ: ezafeh; DUR: durative; GEN: genitive; IMP: imperative; IND; indefinite; NEG: negative; NOM: nominative; OBL: oblique; PST: past tense; PRF: perfective; PL: plural; PRS: present tense; SG: singular; SBJV: subjunctive; 1, 2, 3: 1st, 2nd, 3rd person

4. **Har** dâneshju-i tu in kelâs **ye** ketâb-i-ro[3] mi-xun-e.
   every student-IND in this class a book-IND-ACC DUR-read-3SG
   'Every student in this class reads one poem.' ∀>∃; *∃>∀ (Karimi 2005: 165)

5. a. Context: There are many dishes at a wedding banquet. Most guests become too full to try all of them. But there is one quest who manages to taste every single of them.
   Ye mehmun **har** qazâ-yi-ro {emtehân kard}[4].
   a guest every food-IND-ACC {test do.PST.3SG}
   'A guest tasted every dish.' ∃>∀; *∀>∃

   b. Context: There are many dishes at a wedding banquet. Nobody manages to try all of them, though each dish is tasted by at least one guest.
   #**Ye** mehmun **har** qazâ-yi-ro {emtehân kard}.
   a guest every food-IND-ACC {test do.PST.3SG}
   'Every dish was tasted by a guest.' #∃>∀; ∀>∃ (Toosarvandani & Nasser 2017, ex. 59)

The existence of inverse scope reading in English has been attributed to an operation called Quantifier Raising (QR) (May 1997, Fox 2000 among others). Therefore, one of the attempts to explain the lack of this ambiguity in scope frozen languages is to propose that these languages lack QR (see Karimi 2005 for example), or that QR respects superiority (Bruening 2001). Furthermore, since most of these languages exhibit free word order or scrambling, some scholars attribute the frozen scope to the presence of scrambling, through which the inverse scope is obtainable in overt syntax (Bobaljik and Wurmbrand 2012) (B&W). This view allows us to get away with parametrizing QR, which is a typological issue, and to reduce the cross-linguistic differences to differences in constructions rather than languages.

This paper investigates quantifier scope in Persian from empirical and theoretical viewpoints in an attempt to answer the following questions:

i. Is there scope ambiguity in any construction in Persian?
ii. Does Persian have constructions where standard theory assumes there is QR, such as inverse linking, and Antecedent-Contained Deletion (ACD)?

[3] I am remaining agnostic as to the nature of Persian *râ.* To be consistent, I gloss it as ACC throughout the paper.
[4] Curly brackets are used to indicate Complex Predicates.

To begin with, the identity of universal and existential quantifiers in Persian is addressed in Section 2. Section 3 provides empirical data from various doubly-quantified constructions in Persian, including transitive, ditransitive, *spray-load* and passive constructions, showing that most of these constructions are scope frozen. In Section 4, the constructions that are used to diagnose QR are presented. The framework adapted (B&W 2012) is introduced in Section 5. Section 6 illustrates how Persian empirical data can be accounted for using a modification of B&W's proposal in a more familiar OT format. Section 7 concludes the paper.

2. Quantifier Types

In order to avoid uncertainty and get clear truth-conditions, one needs to consider sentences with an existential quantifier preceding (and c-commanding) a universal quantifier (∃≫ ∀)[5].

Therefore, we need to identify Persian universal and existential quantifier(s), which is still a controversial topic. To answer this question, one is better to have a look at mathematical and logical analyses of quantified sentences in this language.

2.1. Universal Quantifiers

There has been a debate in the Persian literature about the identity of the universal quantifier in this language. On one hand, Jasbi (2015) claims that Persian lacks the equivalent of English

[5] As discussed in Reinhart (1997), the constructions like (i), in which a universal quantifier precedes an existential quantifier, run into an *entailment* problem. This is because it is impossible to have a reading in (b) without having the reading in (a). In other words, the reading in (b) entails the reading in (a).

i. Every tourist read some guide-book.
   a. (every tourist x (some guide-book y (x read y))
   b. (some guide-book y (every tourist x (x read y)) (Reinhart 1979, ex.10-11)

This entailment is not observed for a sentence like (ii) where the existential quantifier precedes the universal quantifier. The interpretation in (b) is not entailed by the interpretation in (a).

ii. Some tourist read every guide-book.
   a. (some guide-book y (every tourist x (x read y))
   b. (every tourist x (some guide-book y (x read y)) (Reinhart 1979, ex.12-13)

every and the closest universal quantifier (*har*) acts more like *each*. On the other hand, Karimi (2005), Shafiei (2016), and Toosarvandani & Nasser (2017) use *har* in their examples. Interestingly, Persian mathematicians and logicians use *har* as the universal quantifier. Examples in (6) and (7) clarify this point:

6. Har ensân heyvân ast.
   every human animal be.3SG.PRS
   'Every human being is an animal.' (Mosaheb 1969: 621)
7. Har adad fard yâ zowj ast.
   every number odd or even be.3SG.PRS
   'Every number is either even or odd.' (Mosaheb 1969: 623)

Similar examples can be found in logic writings. For example, Safavi (2000) categorizes *har, hame* and *tamâm* as universal quantifiers in Persian, specifying that they are indicated by the ∀ symbol. Consider the following examples:

8. Har chiz-i yâ mâdde ast va yâ enerji.
   every thing-IND either material be.PRS.3SG and or energy
   'Everything is either matter or energy.' (Safavi 2000, ex.36)
9. Har âdam-i yâ zan ast yâ mard.
   every human-IND either female be.PRS.3SG or male
   'Every human is either male or female.' (Safavi 2000, ex.37)
10. Har âdam-i agar be-davad xaste mi-shavad.
    evey human-IND if SBJV-run tired DUR-become
    'Every human will get tired if they run.' (Safavi 2000, ex.37)

In some contexts[6], however, *har* is interpreted as a Free Choice Item (FCI), as (11) shows:

[6] For instance, in the scope of negation, as an antecedent of conditionals, in the scope of (overt and covert) modals. In general, non-episodic environments (just like NP-i with the NPI reading). For instance, Horn (2005) reports that in English, FCI *any* occurs in generic or non-episodic contexts. This seems to be true for Persian as well (see section 2.2, and appendix for discussion on *paralles between NP-i and har*). Moreover, Horn also mentions that prosody plays a role in distinguishing between an FCI or and NPI. What matters is the intonation and discourse context which can help distinguish between the two *any*'s (here the two *har*'s for Persian). As pointed out in Horn (reporting Haspelmath 1993), the FCI's are invariably non-specific and therefore, where non-

11. Har kas agar in xiyâbân râ âsfâlt konad mardom xoshhâl mi-sha-vand.
every person if this street ACC asphalt do people happy DUR-become-3PL
(lit.) 'If every person asphalts this street, people will become happy.'

Movahhed (1989: 217) explains that a sentence like (11) can undergo domain widening to have the existential reading as in (12). The meaning in (12) is compatible with the FCI reading.

12. Agar kas-i in xiyâbân râ âsfâlt konad mardom xoshhâl mi-sha-vand.
if person-IND this street ACC asphalt do people happy DUR-become-3PL
'If some(any) person asphalts this street, people will become happy.'

Other universal quantifiers in Persian are *hame* 'all' and *tamâm* 'all, whole', and *hich* 'none' (Safavi 2000). For the purposes of this paper, *har* 'every' is going be used as the universal quantifier and the contexts in which the FCI reading is realizable will be avoided.

2.2.Existential Quantifiers

Persian has various quantifiers that are considered (Determiner) existential quantifiers, including *ye* 'a/an', cardinal numbers or numerals, as well as the NP–*i* construction (Toosarvandani & Nasser 2017) (T&N). The case with *ye* is clear since it acts just like English existential quantifier 'a/an'. However, the distribution of the enclitic –*i* calls for an explanation.

Persian does not have a marker for definiteness, instead it marks its indefinites with the enclitic –*i* attaching to the end of the noun phrase (Jasbi 2016). Jasbi classifies these constructions as antidefinite which trigger a projective non-uniqueness implication (|⟦NP⟧|≠1). The antidefinite construction (NP-i) is grammatical in non-veridical environments, listed below in (13)[7]:

specifics are not allowed contextually, such as in past perfectives or present progressives, the FC reading is not available. That is the reason why we are going to use past perfectives in this article.

[7] In formal Persian, the clitic -*i* can appear in veridical environments as well, as in (v).

iii. Mâshin-i xarid-am.
car-AD buy-1SG.PST

13. a. **Questions:**
Mâshin-i xarâb-e?
car-AD broken-be.3SG
'Is any car broken?'
b. **Antecedent of conditionals:**
Age mâshin-i xarâb-e, begu.
if car-AD broken-be.3SG, IMP.say
'If any car is broken, say so.'
c. **Under negation:**
In-tori nist ke mâshin-i xarâb bash-e.
this-way NEG.be.3SG that car-AD broken be.SBJV-3SG
'It is not the case that any car is broken.' (Jasbi 2016, ex.13)

The enclitic *–i* can co-appear with the existential *ye* and give us what Jasbi calls *complex indefinites,* as in (14). These complex indefinites introduce an antisingleton implication (|⟦NP⟧|>1), and they also carry a non-uniqueness interpretation similar to antidefinite constructions (NP-i).

14. Ye mâshin-i xarâb-e.
a car-AD broken-be.3SG
'Some car (or other) is broken[8].' (Jasbi 2016, ex.4d)

Given the examples above, the *ye*+NP+*i* which introduces a non-unique indefinite (or antisingleton) seems to be the better choice for an existential quantifier. Moreover, the discussion from the previous section leads us to choose *har* in non-veridical environments (absence of negation (Berjisiyan & Maleki 2011) and conditionals) to be our universal quantifier. Now that we have chosen our quantifiers, we can attend to their scope in various constructions in the next section.

'I bought a/some car.'

[8] The translation is modified to give out-of-context meaning.

3. Doubly-Quantified Sentences

This section deals with various constructions with two quantifiers to uncover the scope of these quantifiers. As we will see in the sections to come, most of the constructions, including some scrambled ones, exhibit scope rigidity. However, it does not translate into lack of QR in this language (as proposed by Karimi 2005), since the constructions that require QR, like inverse linking and ACD, exist in Persian. For the reasons explained earlier, we use the word order in which the existential precedes the universal. The first sections deal with sentences with no movement (scrambling), which will be discussed towards the end of the current section.

3.1.Transitive Sentences

Persian has been claimed to be a scope rigid language by Toosarvandani & Nasser (2017)[9], examples (15), and Shafiei (2016), example (16):

15. a. Context: There are many dishes at a wedding banquet. Most guests become too full to try all of them. But there is one quest who manages to taste every single of them.
Ye mehmun **har** qazâ-yi-ro {emtehân kard}.
a guest every food-AD-ACC {test do.PST.3SG}
'A guest tasted every dish.' ∃>∀; *∀>∃

b. Context: There are many dishes at a wedding banquet. Nobody manages to try all of them, though each dish is tasted by at least one guest.
#**Ye** mehmun **har** qazâ-yi-ro {emtehân kard}.
a guest every food-AD-ACC {test do.PST.3SG}
'Every dish was tasted by a guest.' #∃>∀; ∀>∃ (T&N 2017, ex. 59)

16. Context: There are three empty boxes on the table, the narrator puts a hat in each box and then three girls come one by one, and open the boxes. So, each of these girls sees one of the hats. It is infelicitous to say:
#**Ye** doxtar-i **har** kolâh-i ro did.
a girl-AD every hat-IND ACC see.3SG.PST
'Some girl saw every hat.' *∀>∃, (∃>∀) (Shafiei 2016:56)

[9] T&N acknowledge that *ye* 'a/an' can take narrow and wide scope, however, they assert that it is for independent reasons and not because of scope operations.

Even in environments in which universal quantifier precedes the existential quantifier, Karimi (2005) and Shafiei (2016) state that the only interpretation is the surface scope. The sentences in (17) and (18) clarify this point:

17. **Har** dâneshjoo-i too in kelâs **ye** ketâb-i ro mi-xun-e.
    every student-AD in this class a book-AD ACC DUR-read-3SG
    'Every student in this class reads one book.' ∀>∃, *∃>∀ (Karimi 2005:165)
18. Context: There is a party with some boys and girls. Each boy kisses a different girl.
    Har pesar-i **ye** doxtar-i ro boos-id.
    every boy-AD one girl-AD ACC kiss.PST.3SG
    'Every boy kissed a girl.' (Shafiei 2016: 104)

It seems to be safe to say that doubly-quantified transitive constructions are scope rigid in Persian as claimed by Karimi (2005), Shafiei (2016) and T&N (2017). Let us move to another construction, which is PP dative.

3.2. Ditransitive Sentences

PP dative sentences in English show scope fluidity as the sentences in (19) and (20) show:

19. I gave a doll to each child. each> a, a> each (Bruening 2001, ex.2)
20. The teacher assigned one problem to every student. ∀>∃, ∃>∀ (Larson 1990, ex.20a)[10]

Before giving examples for scope interpretations, we need to familiarize ourselves with the structure of PP datives in Persian. Karimi (2005) proposes the following base structure in (21) for PP datives in Persian:

21. a. [$_{VP}$ [$_{V'}$ PP [$_{V'}$ DP$_{[-specific]}$ V]]
    b. Kimea aghlab barâ mâ sher mi-xun-e.
    Kimea often for us poem DUR-read-3SG
    'It is often the case that Kimea reads poetry for us.' (Karimi 2005: 105)

[10] The double-object counterparts of these sentences do not show ambiguity (Larson 1990, Burening 2001). Persian does not have DOC structure similar to English.

She proposes that when the direct object is specific, it undergoes an object shift to a higher position than the PP, as (22) shows (the specific direct object is underlined).

22. a. [$_{VP}$ $DP_{[+specific]}$ [$_{V'}$ PP [$_{V'}$ ___V]]
    b. Kimea aghlab <u>ye sher az Hâfez ro</u> barâ mâ ___ mi-xun-e.
    Kimea often a poem by Hâfez ACC for us ___ DUR-read-3SG
    'It is often the case that Kimea reads a (particular) poem by Hafez for us.'
    (Karimi 2005: 105)

Keeping these configurations in mind, let us have a look at some ditransitive sentences with two quantifiers in their DO and IO positions. Consider the sentence in (23), which is the counterpart of (19). Surprisingly, the preferred scope interpretation for (23) is the inverse scope.

23. Man **ye** aroosak be **har** bache-i dâd-am.
    I a doll to every child-AD gave-1SG
    'I gave a doll to every/each child.' ∀>∃, ??∃>∀

This can be explained in different ways, one of which is that this sentence includes a movement of the direct object over indirect object, based on our structure in (21), which specifies the non-specific object should start immediately to the left of the verb. And following Karimi (2005), the reason the inverse scope is available is because it is the copy in the tail of the chain that is interpreted. Another explanation could be Fox's (2000) economy principle, which allows quantifiers that are close enough to each other to freely scope over one another. In this paper, this is going to be explained via a markedness constraint that penalizes long distance movements.

Let us now have a look at the sentences in (24) to (26) with two quantifier phrases in the object position. Remember these sentences do not involve object shift.

24. Context: A student was about to fail in the class and the teacher did everything she could to help him pass the course. (no object shift)
    Moallem be **ye** dâneshjoo-i **har** râhkâr-i ro {erâe dâd}.
    teacher to one student-AD every solution-AD ACC {presentation give.PST.3SG}
    'The teacher presented every solution to a/some student.' *∀>∃, ∃>∀

25. Context: We went on a tour to NYC, there were 30-35 tourists and one tour guide. One of the tourists suffered from a hearing loss and the tour guide showed him everything rather than explaining things to him. (no object shift)
    Râhnemâ be **ye** toorist-i **har** manzare-i ro {neshun dâd}.
    guide to one tourist-AD every scenery-AD ACC {show give.PST.3SG}
    'The guide showed every scenery to a/some guest.' *∀>∃, ∃>∀

26. Context: A friend of ours had thrown a big party with lots of desserts. However, there was one very special guest that she wanted to impress. (no object shift)
    Mizbân be **ye** mehmoon-i **har** deser-i ro {târof kard}.
    host to one guest-AD every dessert-AD ACC {offer do.PST.3SG}
    'The host offered every dessert to one guest.' *∀>∃, ∃>∀

Like doubly-quantified transitive sentences, these constructions seem to be scope rigid as well. The next section will look at another construction, the so-called *spray-load* sentences.

3.3. Spray-Load Sentences

This section considers the data from *spray-load* constructions, like the example in (27) and (28).

27. a. The worker loaded one box on every truck. ∀>∃, ∃>∀
    b. The worker loaded one truck with every box. *∀>∃, ∃>∀

28. a. Max sprayed some slogan on every wall. ∀>∃, ∃>∀
    b. Max sprayed some wall with every slogan. *∀>∃, ∃>∀ (Larson 1990, ex. 21-22)

Larson points out that while the first sentences in these sentence pairs are scopally ambiguous, the second sentences with the *with* phrase are not. He (citing Schneider-Zioga (1988)) pairs the sentences in (a) with the oblique dative sentences and the ones in (b) with the DOC's (*reminder: the dative sentences are ambiguous, and the DOC's are not- see examples 19-20 and footnote 12*).

Persian does not have these sentence pairs. In order to construct the sentences in (b), the verb needs to be changed. However, since the sentences in (b) are rigid, their Persian counterparts are not going to be informative, given that most constructions with multiple quantifiers are rigid in this language. Let us have a look at the Persian sentences in (29) to (31), which are in the same format as the sentences in (27a) and (28a).

29. Ali **ye** jabe-i ro bâr-e **har** mâshin-i kard[11].
    Ali a box-AD ACC load-EZ every vehicle-AD do.PST.3SG
    'Ali loaded a box on every vehicle.' ??∀>∃, ∃>∀

30. Ali **ye** shoâr-i ro roo-ye **har** divâr-i nevesht.
    Ali a motto-AD ACC on-EZ every wall-AD write.PST.3SG
    'Ali wrote a motto on every wall.' ∀>∃, ?∃>∀ [12]

31. Ali **ye** mâdde-ye shimiyayi-i ro az **har** makhzan-i {estkhârej kard}.
    Ali a material-EZ chemical-AD ACC from every tank-AD {extraction do.PST.3G}
    'Ali extracted a chemical from every tank.' ∀>∃, ??∃>∀

Interestingly, in these constructions, the inverse scope is preferred. This calls for an explanation. Considering that the base word order for these sentences is OBL≫ACC, in parallel to the base word order for PP datives which is DAT≫ACC (see 22), all these structures involve a movement. The same sentences with the base word order, OBL≫ACC, are unambiguous with only surface scope available. I discuss this point further in Section 6.2.

[11] The only surface interpretation for this sentence is when a box is loaded on a car, then taken and loaded on another car and so on. This sentence includes a Complex Predicate (CPr), which is divided by the oblique object. Another way to say the same sentence is as follows, notice that it does not affect the scope interpretation.

vi. Ali **ye** jabe-i ro too-ye **har** mâshin-i {bâr kard}.
    Ali a box-AD ACC in-EZ every vehicle-AD {load do.PST.3SG}
    'Ali loaded a box on every vehicle.' ??∀>∃, ∃>∀

[12] The ∃>∀ is available in the sense that the same exact motto was written on different walls.

3.4. Passive Sentences

Like active transitive sentences and PP datives, passive sentences in English are also scopally ambiguous. Consider the sentence in (32).

32. Some book was read by every student. ∀>∃, ∃>∀ (Antonyuk 2015: 75)

Karimi (2005) claims that there is no real passive construction in Persian, but the passive sentences are constructed by using the inchoative verb *shodan* 'become'. This means that passive sentences do not involve any movement, unlike what we have in English. Karimi further claims that in these constructions the nonspecific subject does not move to [Spec, TP] and stays inside the predicate phrase (*v*P).

We have seen so far that when there is no movement, the scope is typically frozen. Therefore, it is reasonable to predict that passive constructions in Persian will only have isomorphic scope. This is borne out in (33) and (34). (33) is the passive form of a transitive sentence with the agent PP, while (34) is the passive form of a ditransitive sentence.

33. **Ye** ketâb-i tavassot-e **har** dâneshâmooz-i {khoond-e shod}.
a book-AD by-EZ every student-AD {read.PST.3SG -PRF become}
'A/some book was read by every student.' *∀>∃, ∃>∀
34. Be **ye** moallem-i **har** taghdirnâme-i {dâd-e shod}.
to a teacher-AD every certificate of appreciation-AD {give.PST.3SG-PRF become}
'A teacher was given every certificate of appreciation.' *∀>∃, ∃>∀

Up to this point, we have looked at four different constructions in Persian, namely transitives, ditransitives, *spray-load* sentences and passives. Table 1 summarizes the empirical data showing the different available scopes in different constructions. As the table shows, when there is no movement, the scope is frozen. The next section addresses sentences which include scrambling of their quantified phrases.

Sentence Type	Surface Scope	Inverse Scope	Ambiguity
Transitive	Yes	No	No
Ditransitive	Yes	No (no object shift)	No
Spray-Load	Yes	No (no object shift)	No
Passive	Yes	No	No

Table 1. Summary of The Data (base order)

3.5.Scrambled Sentences

In this section, data from scrambled sentences is provided. The examples cover variety of constructions with *v*P-internal and *v*P-external .

Sentences in (17) and (18), repeated in (35) and (36) respectively, show scrambling cases for transitive sentences. As mentioned earlier, the only available interpretation of the sentence in (35b) for the author is the surface scope. In (36b), still the surface scope is strongly preferred.

35. a. **Har** dâneshjoo-i too in kelâs **ye** ketâb-i ro mi-xun-e.
every student-AD in this class a book-AD ACC DUR-read-3SG
'Every student in this class reads one book.' ∀>∃, *∃>∀
b. [**Ye** ketâb-i ro]$_i$ **har** dâneshjoo-i too in kelâs t_i mi-xun-e.
[a book-AD ACC]$_i$ every student-AD in this class t_i DUR-read-3SG
(lit) 'One book, every student in this class reads.' *∀>∃, ∃>∀

36. a. **Har** pesar-i **ye** doxtar-i ro boos-id.
every boy-AD one girl-AD ACC kiss.PST.3SG
'Every boy kissed a girl.' ∀>∃,*∃>∀ (Shafiei 2016: 104)
b. [**Ye** doxtar-i ro]$_i$ **har** pesar-i t_i boos-id.
one girl-AD ACC every boy-AD t_i kiss.PST.3SG
'A girl was such that very boy kissed her.' *?∀>∃, ∃>∀

Let us have a look at scrambling in ditransitive sentences, (37) and (38) below. The sentences are taken from examples (24) and (25). Those sentences were constructed using the base word order. However, following Karimi (2005), the specific object needs to undergo object shift to a higher position than IO, i.e. to [Spec, *v*P], shown by sentences in (37b) and (38b). As these sentences show, although the surface scope is still preferred, object shift seems to open up the possibility of inverse scope (regardless of how weak it is).

37. a. Moallem be **ye** dâneshjoo-i **har** râhkâr-i ro {erâe
teacher to one student-AD every solution-AD ACC {presentation
dâd}.
give.PST.3SG}
'The teacher presented every solution to a/some student.' *∀>∃, ∃>∀

b. Moallem [**ye** râhkâr-i ro]$_i$ be **har** dâneshjoo-i t_i {erâe
teacher [a solution-AD ACC]$_i$ to every student-AD t_i {presentation
dâd}.
give.PST.3SG}
'The teacher presented a solution to every student.' ?∀>∃, ∃>∀

38. a. Râhnemâ be **ye** toorist-i **har** manzare-i ro {neshun dâd}.
guide to one tourist-AD every scenery-AD ACC {show give.PST.3SG}
'The guide showed every scenery to a/some guest.' *∀>∃, ∃>∀

b. Râhnemâ [**ye** manzare-i ro]$_i$ be **har** toorist-i t_i {neshun dâd}.
guide [a scenery-AD ACC]$_i$ to every tourist-AD t_i {show give.PST.3SG}
'The guide showed a scenery to every guest.' ?∀>∃, ∃>∀

Similar to the *spray-load* constructions for which object shift seems to play a role, these examples show that scrambling does seem to introduce an inverse scope interpretation, albeit being weak.

Sentence Type	**Word order**	**Possible Scope**	
Transitive	Subj Obj V	Subj> Obj, *Obj>Subj	(surface)
	Obj$_i$ Subj t_i V	Obj>Subj, *Subj>Obj	(surface)
Ditransitive	S IO DO V	IO> DO, *DO> IO	(surface)
	S DO$_i$ IO t_i V	DO> IO, ?IO> DO	(ambiguous)
Spray-Load	S Loc DO V	Loc> DO, *DO> Loc	(surface)
	S DO$_i$ Loc t_i V	DO> Loc, ?Loc> DO	(ambiguous)

Table 2. Summary of the empirical data

Although we cannot strongly claim that scrambling or movement induces ambiguity, we cannot deny the possibility of it altogether. The data we have looked so far can be schematically summarized in Table 2. The data shows a mixed behavior with some movements inducing ambiguity and some not. In the analysis section, I will attribute this behavior to the nature and size of the movement, with *v*P-internal one resulting in ambiguity and *v*P-external one freezing the scope in the reverse order.

The next section deals with constructions which require covert QR to be well-formed. Using such constructions is evidence that covert QR exists in this language.

4. Diagnosing QR

There are a number of constructions that can easily be explained through covert QR, including inverse linking and antecedent-contained deletion (ACD). These constructions can be used to diagnose if a language allows for QR of any type. In the sections to come, I use these constructions to show that Persian allows for QR in them.

4.1. Inverse Linking

May (1997) proposes that in sentences like (39) and (40) containing a PP-complement, for which the inverse scope is readily available and the surface scope is almost impossible, we are dealing with cases of Inverse Linking (IL). IL refers to those logical forms, containing two or more quantifiers, where only one of the quantifiers binds a variable in the main predicate.

May elaborates that in these constructions, it is only the quantifier having narrowest scope that does the binding. This is shown in (41), which is the LF for (40). As (41) shows, there is an inverse link between the variable and the binder; hence the name IL. That is what makes it possible for the most embedded PP to have the widest scope and the head quantifier to have the narrowest scope.

39. Some exits from every freeway to a large California city are badly constructed.
    Meaning: There is a large California city, such that for all of the freeways to it, there are exits from those freeways which are badly constructed.
40. Everybody in some Italian city met John.
    Meaning: There is an Italian city, such that all of the people in that city met John.

The logical form for the sentence in (40) is provided below, in (41):

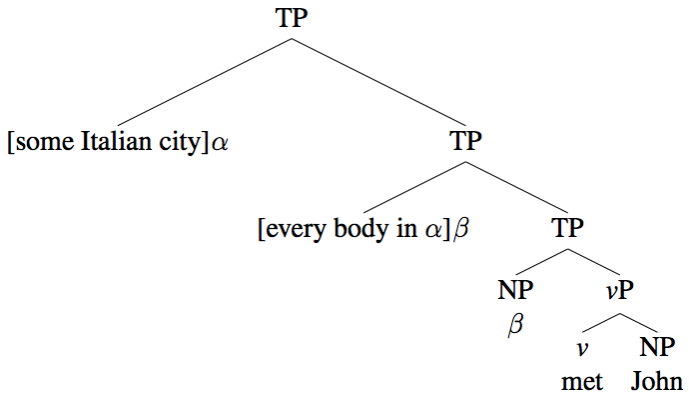
41. [$_{TP}$ [some Italian city]$_{\alpha}$ [$_{TP}$ everybody in α]$_{\beta}$ [$_{TP}$ β met John]]]

Note that this is different from a non-linked LF, represented in (42), in which all quantifiers bind variables.

42. [$_{TP}$ [some politician]$_{\alpha}$ [$_{TP}$[everybody]$_{\beta}$ [$_{TP}$ α met β]]

To make it clearer, we can look at the structure in (43) representing the LF in (41).

43.



The same interpretation holds for the Persian example in (44):

44. [**Har** kas-i az **ye** shahr-e markazi] Ali ro {molâghât kard}.
every person-AD from one city-EZ central Ali ACC {meeting do.3SG}
'Everyone from a/some central city met Ali.' *∀>∃, ∃>∀

Other examples of IL are presented in (45):

45. a. At most two senators on every committee voted for the bill.
Meaning: a maximum of two senators who happen to be on every one of the committees voted for the bill.

b. At most two senators on every committee$_i$ voted to abolish it$_i$.
Meaning: for every one of the committees *x*, a maximum of two senators on each of those committees voted to abolish *x*

c. At least one senator$_i$ on every committee that he$_i$ thought was worthy of his$_i$ attention, voted for the bill.
Meaning: there is at least one senator *x* such that *x* is on every committee he deemed worthy of his attention and *x* voted for the bill. (Antonyok 2015, ex.20)

As Antonyok explains, the difference in the interpretations of these three sentences is due to pronoun binding relations. Since (45a) does not have any pronoun that requires to be bound, it

can have two different scope interpretations. However, both (45b) and (45c) include a pronoun that needs to be bound, by the embedded quantifier *every committee*, and *one senator,* respectively. For these quantifiers to bind the pronoun, they need to be in a position where they can c-command the pronoun, and so, they need to have raised since they cannot c-command the pronoun in their overt syntactic position.

Let us look at the Persian counterparts for the sentences in (46):

46. a. Hadde-aksar **do** nemâyande-ye **har** komite-i be lâyehe
mostly two representative-EZ every committee-AD to bill
ray-e mosbat dâd-an. ∀>∃, ?∃>∀
vote-EZ positive gave.3PL
'At most two senators on every committee voted (positively) for the bill.'

b. Hadde-aksar do nemâyande-ye **har komite-i_i** ray be
mostly two representative-EZ every committee-AD vote to
enhelal-e-**sh_i** dâdan.
abolish-EZ-GEN gave.3PL
'At most two senators on every committee$_i$ voted for its$_i$ abolition.'
Meaning: In every committee, there are at most two senators which voted to abolish that committee (same interpretation as English, where the pronoun is bound by the embedded quantifier phrase *har komite* 'every committee')

c. Hadde-aghal **ye nemâyande$_i$-ye** har komite-i, ke ***pro$_i$***
at-least one representative-EZ every committee-AD, that *pro*
{fekr mi-kard} bara-**sh_i** soodmand-e, be lâyehe ray-e mosbat dâd.
{thought DUR-did} for-GEN useful-be.PRS to bill vote-EZ positive gave.3SG
'At least one senator$_i$ on every committee that he$_i$ thought was worthy of his$_i$ attention, voted for the bill.'
Meaning: From every committee, at least one senator which considered the committee useful for him/herself, voted for the bill (same interpretation as English, where the pronoun is bound by the embedded quantifier phrase *ye nemâyande* 'one senator')

The Persian examples above, in (45) and (46)[13], show that this language does not block QR altogether, at least in the environment where inverse linking occurs. The next section addresses another construction, ACD, which also requires QR to account for the available interpretations.

[13] On the surface, the constructions in (45) and (46) are not exactly the same. (45) includes a PP *az har shahr-i* 'from every city', that can be overtly moved to the beginning of the phrase giving:

4.2. ACD

Ellipsis has been defined as "omission of a syntactic constituent under identity with an antecedent in the preceding [or surrounding] discourse" (Lobeck 1995), or as Fox (2002) calls it Parallelism defined in (47).

47. Parallelism
An elided VP must be identical to an antecedent VP at Logical Form (LF). (Fox 2002:64)

As noticed by Sag (1976) and Williams (1977) (among others), the elided VP in sentences in (48) are contained within the antecedent VP; hence, the name Antecedent-Contained Deletion (ACD) (VPa refers to the *antecedent VP* and VPe refers to the *elided VP*):

48. a. Alan will [$_{VPa}$ eat anything you want him to <$_{VPe}$ eat>].
b. Sandy [$_{VPa}$ hit everyone that Bill <$_{VPe}$ hit/did >].
c. Sandy [$_{VPa}$ ate whatever Tom <$_{VPe}$ ate/did>].
d. Betsy [$_{VPa}$ grabbed whatever she could <$_{VPe}$ grab>]. (Sag 1976: 67, ex.1.3.29)

We mentioned above that the elided VP is identical to the antecedent VP. Containment means that while the antecedent VP reconstructs or is copied to the deleted site, it would contain a copy of the elided VP. This is schematically shown below for the sentence in (48a):

49. Alan will [$_{VPa}$ eat anything you want him to <$_{VPe}$ eat anything you want him to <eat…>>].

---

vii. [[az **ye** shahr-e markazi]$_i$ **har** kas-i t$_i$]
But, the sentences in (46) include DPs with Ezafeh and the argument after Ezafeh cannot be moved to the beginning of the DP, for independent reasons.

viii. *[[Har komite-i]$_i$ hadde-aksar do nemâyande-ye t$_i$]
However, notice that what moves in (45) is a PP and what cannot move in (46) is an NP, and we cannot move the NP in (45) either.

ix. *[[**ye** shahr-e markazi]$_i$ **har** kas-i az t$_i$]
See Samiian (1994) and Larson & Samiian (2018) for discussions on the nature of Ezafeh.

This problem can be resolved by positing a covert movement for the QP, i.e. QR, to a *v*P-external position prior to elision as (50) shows (Sag1976; Williams 1977) [14].

50. [Anything you want him to [$_{VP}$Ø]]$_i$ Alan will [$_{VP}$ eat t$_i$].

ACD cases where the QPs are not always interpreted in their base position can be used to determine the syntactic structures at LF. Persian does not exhibit VP ellipsis, rather it has properties of verb stranding verb phrase ellipsis (VVPE) languages (Toosarvandani 2009, Shafiei 2016, Rasekhi & Shafiei 2018). I adopt Rasekhi & Shafiei's (2018) analysis, who argue that in Persian the verb moves to Focus and then it is the *v*P that undergoes elision. Now, let us look at the sentence in (51), which shows the *v*P deletion after the verb has moved to FocP.

51. Ali [har ketâb-i ro ke Sohrab xund <$_{vPe}$—>] xund.
Ali [every book-AD ACC that Sohrab read.PST.3SG <$_{vPe}$—>] read.PST.3G
'Ali read every book that Sohrab did.'

The deleted *v*P would include the repetition of the *v*P that is already elided and we will run into a never-ending loop as (52) shows:

52. Ali [har ketâb-i ro ke Sohrab xund <$_{vPe}$ har ketâb-i ro ke
Ali [every book-AD ACC that Sohrab read.PST.3SG <$_{vPe}$ every book-AD ACC that
Sohrab xund <$_{vPe}$ har ketâb-i ro ke Sohrab xund <$_{vPe}$…>xund >
Sohrab read.PST.3G <$_{vPe}$ every book-AD ACC that Sohrab <$_{vPe}$…> read.PST.3SG>
xund.
read.PST.3G
(lit) 'Ali <every book that Sohrab read __ <every book that Sohrab read__ <every book that…> read read.'

To resolve this issue, we can propose the same strategy that has been proposed for English, which is that the QP raises prior to deletion. This would give us the configuration in (53).

[14] These structures are explained via another operation, i.e. object raising (see Hornstein 1994 for details).

53. [har ketâb-i ro ke Sohrab xund $<_{vPe}Ø>]_i$ Ali t_i xund.
[every book-AD ACC that Sohrab read.PST.3SG $<_{vPe}Ø>]_i$ Ali t_i read.PST.3SG
'Every book that Sohrab read, Ali (also) read.'

The ACD structures, together with the inverse linking constructions show that Persian does not block the covert movement of QR altogether. Therefore, we cannot rule out the availability of QR in this language and we cannot parametrize this operation.

The next section introduces the framework applied in this paper, and it is explained how it can explain the empirical Persian data.

5. The ¾ Signature of Bobaljik & Wurmbrand (2012)

In this section, I present B&W's economy principles and their ¾ signature. I am going to adapt and refine their tables in a more familiar OT format. I show that their economy constraint is an extension of more familiar constraints of NO-SCRAMBLING and NO-QR, which are, in a way, faithfulness constraints requiring the scope output to be faithful to the word order input. These constraints allow us to account for the same facts covered in B&W.

I also show that to account for Persian (lack of) scope reconstruction, we need another constraint, namely NO-PHASE-CROSSING. This will in effect account for what they call *semantic reconstruction* in a more unified way with the previous two proposed constraints. In other words, every possible construction can be accounted for using familiar OT constraints without resorting to other explanations.

B&W propose economy conditions or soft constraints that favor specific matchings between LF and PF. Moreover, they claim that there is a negative correlation between availability of scrambling and availability of QR, i.e. if scrambling is available, QR is blocked and vice versa. The main constraint that should be considered in all the constructions is called Scope

Transparency (ScoT), presented in (54) below. Other construction-specific constraints can also be implemented in special cases, such as *expletive insertion* and *heavy NP-shift* in English, and reconstruction in English and other languages. For the purposes of this paper, the constraint that is relevant is reconstruction, and will be discussed towards the end of this section.

54. Scope Transparency (ScoT)
    If the order of two elements at LF is A≫B, the order at PF is A≫B, when ≫ means hierarchical order. (Bobaljik & Wurmbrand 2012: 373)

The constraint in (54) indicates that scope interpretation at LF corresponds to the hierarchical order at PF. This enables scrambling languages, which allow for the Object Quantifier Phrase (OQP) to overtly move over the Subject Quantifier Phrase (SQP), to match their LF with this hierarchical order at PF. For all other English-type languages, with no scrambling, this principle is violated as the last resort. Since it is a soft constraint, its violation is tolerated in English-like languages. Example (55c) shows the effect of scrambling for Japanese.

55. a. Some toddler read every book. ∀>∃, ∃>∀
    b. Dareka-ga subete-no hon-o yonda.
    someone-NOM all-GEN book-ACC read
    'Someone read all the books.' *∀>∃, ∃>∀
    c. Subete-no hon-o dareka-ga yonda.
    all-GEN book-ACC someone-NOM read
    'Someone read all the books.' ∀>∃ possible (B&W 2012, ex. 2)

This contrast, i.e. lack of scrambling and scope fluidity versus presence of scrambling and scope rigidity, can be explained via ScoT in Table 3 (A≫B is used to show the base word order).

B&W emphasize that "… ScoT is an economy condition regulating choices among convergent derivations (p.377)". Therefore, the scrambled word orders are not valid PFs to be considered for English and that is why they are highlighted in gray.

German and Japanese Scrambling			
	LF	PF	ScoT
a. ✓	B≫A t_B	B≫A≫t_B	✓
*QR	B≫A≫t_B	A≫B	*
b.✓	A≫B	A≫B	✓
*Reconstruction	A≫B	B≫A≫t_B	*
English			
	LF	PF	ScoT
a.*Scrambling	B≫A≫t_B	*B≫A≫t_B	✓
✓ (QR)	B≫A≫t_B	A≫B	*
b. ✓	A≫B	A≫B	✓
*Scrambling	A≫B	*B≫A≫t_B	*

Table 3. ScoT in German, Japanese and English

Below, I have provided a modified OT version of the Table 3. I am using Quantifier 1 (Q1) and Quantifier 2 (Q2) instead of A and B. B&W explicitly mention that "…LFs serve as the input to the ScoT competition, which determines the appropriate PF form for each admissible LF (B&W 2012: 407)". I am modifying their table to accommodate this fact. In these Tableaux, the LF serves as the input and the (two) possible PFs are evaluated against this LF.

Tableau 1: Q1≫Q2 (Surface Scope)

Q1≫Q2	ScoT
☞ a. PF1: Q1≫Q2	✓
b. PF2: Q2≫Q1 <~~Q2~~>	* (Reconstruction)

Tableau 1': Q2≫Q1 (Inverse Scope)

Q2≫Q1	ScoT
☞ a. PF1: Q2≫Q1 <~~Q2~~>	✓(Scrambling)
b. PF2: Q1≫Q2	* (QR)

The German, Japanese Case

Tableaux 1 and 1' show this modification for German and Japanese. Tableau 1 shows the cases for which the surface scope is the LF we are interested in. There are two competing candidates that can give us this LF. In the first candidate, the order of the arguments is faithful to the order in LF and ScoT is respected, however, in the second candidate ScoT is violated since

the PF order does not match the LF order. The second candidate is ruled out because of this violation (later, we are going to see that this option is in fact available due to reconstruction).

For the inverse scope reading cases, shown in Tableau 1', we also have two possible PF candidates. The first one is faithful to the input LF, but the second one is not. Therefore, the first candidate is licensed while the second candidate is ruled out. Note that the second option corresponds to QR cases, which is not available in these constructions.

These tableaux are going to be slightly different for English. As mentioned above, B&W emphasize that "… ScoT is an economy condition regulating choices among convergent derivations (p.377)". This means that the PFs in which Q2 is scrambled over Q1 are already ruled out in English by other syntactic constraints, and they cannot be input to ScoT (gray rows). The only remaining PF is Q1≫Q2, which although violates ScoT in the cases of QR is licensed since the language has no other option of obtaining the inverse scope.

Tableau 2: Q1≫Q2 (Surface Scope)

Q1≫Q2	ScoT
☞ a. PF1: A≫B	✓
b. *PF2: Q2≫Q1 <~~Q2~~>	*(reconstuction)

Tableau 2': Q2≫Q1 (Inverse Scope)

Q2≫Q1	ScoT
a. PF1: * Q2≫Q1 <~~Q2~~>	✓(Scrambling)
☞ b. PF2: Q1≫Q2	* (QR)

The English Case

As one can see, the ScoT violations originate from the violation of NO-SCR and NO-QR in both language types. The way this constraint is defined allows it to rule out QR in scrambling languages and scrambled orders in non-scrambling languages (let us set aside the fact that scrambled orders are not convergent in such languages). Therefore, it seems that ScoT is a

hybrid of these two constraints. I am positing that we have the following constraints with the ranking provided for scrambling languages and for non-scrambling languages, respectively:

56. Constraint ranking for scrambling languages: NO-QR≫ NO-SCR
57. Constraint ranking for non-scrambling languages: NO-SCR≫ NO-QR

This would give us the following tableaux, which will replace the Tableaux in 1 and 2.

Tableau 3: Q1≫Q2 (Surface Scope)

Q1≫Q2	NO-QR	NO-SCR
☞ a. PF1: Q1≫Q2	✓	✓
b. PF2: Q2≫Q1 <~~Q2~~>	✓	*

Tableau 3': Q2≫Q1 (Inverse Scope)

Q2≫Q1	NO-QR	NO-SCR
☞ a. PF1: Q2≫Q1 <~~Q2~~>	✓	*
b. PF2: Q1≫Q2	*	✓

The German, Japanese Case

Tableau 4: Q1≫Q2 (Surface Scope)

Q1≫Q2	NO-SCR	NO-QR
☞ a. PF1: A≫B	✓	✓
b. PF2: Q2≫Q1 <~~Q2~~>	*	✓

Tableau 4': Q2≫Q1 (Inverse Scope)

Q2≫Q1	NO-SCR	NO-QR
a. PF1: Q2≫Q1 <~~Q2~~>	*	✓
☞ b. PF2: Q1≫Q2	✓	*

The English Case

These tableaux make the exact same predictions that B&W's original table does. I am going to use this format throughout this paper and adjust their tables to fit this format, with the two faithfulness constraints to replace ScoT.

As you might have noticed, the problem arises in reconstruction cases in scrambling languages. The tables do not predict these effects and in fact they rule them out. We know that reconstruction effects have been proposed to be present specifically in long distance or A'-scrambling cases (Saito 1989, Mahajan 1990 among others). Having only one constraint, ScoT,

and having proposed that it cannot be violated in such languages, these constructions should in principle be ruled out. However, the availability of reconstruction effects is attested cross-linguistically, and hence the ¾ signature. This is shown in Table 4 with the possible constructions specified by a checkmark in the first column.

		LF	PF	ScoT
a.	✓	A≫B	A≫B	✓
b.	*	A≫B	B≫A	*
c.	✓	B≫A	B≫A	✓
d.	✓	B≫A	A≫B	*

Table 4. The ¾ signature (B&W, ex.21)

To account for the availability of 3 out of 4 constructions in languages with reconstruction, B&W posit other conditions. Focusing more on Germanic, they propose that in A-scrambling cases, reconstruction is semantic and not syntactic. What this means to say is that traces of the moved phrases can be interpreted as higher copies, in semantics. This would result in scope reconstruction without the actual LF reconstruction. This is shown in the configuration in (58) (B&W 2012: 399), followed by a Dutch A-scrambling example (B&W: 400) in (59), for clarification.

58. a. $[_{\alpha}\ QP_i \ldots [_{\beta}\ t_i\ \langle e\rangle \ldots$ Semantic Scope of QP: α
    b. $[_{\alpha}\ QP_i \ldots [_{\beta}\ t_i\ \langle\langle e,t\rangle,t\rangle \ldots$ Semantic Scope of QP: β

59. weil sie [ein Bild von seinem$_{*i}$ Auftritt] [jedem Kandidaten]$_i$ t_{ACC} zeigte
    since she a.ACC picture of his appearance every.DAT candidate t_{ACC} showed
    'since she showed a picture of his appearance to every candidate' ∃>∀; ∀>∃
    a. Syntax (base): [every candidate] [a pic … his] showed
    b. A-scrambling: [a pic … his] [every candidate] [a pic … his] showed
    c. LF: [a pic … his] [every candidate] [~~a pic … his~~] showed
    d. PF: [a pic … his] [every candidate] [~~a pic … his~~] showed ScoT✓
    e. Semantics [a pic … his] [every candidate] T⟨⟨e,t⟩,t⟩ showed

Notice that in this example, both scope interpretations are possible despite the fact that the pronoun is not licensed. What (a) to (e) show are various possible orders of the two QPs. B&W

explain that if the reconstruction operation was syntactic, it would allow LF binding to occur and the pronoun would be licensed. Therefore, the reconstruction needs to be semantic to only allow for scope interpretations. We see that in *c* and *d*, the LF and PF orders match, and ScoT is satisfied. However, to get the inverse scope interpretation, we need to have a semantic reconstruction shown in (e). This would account for the ¾ signature and the possibility of having *a*, *c*, and *d* constructions (in Table 4) in languages with scrambling and reconstruction.

For A'-scrambling sentences, the story is a little different. Firstly, they state that reconstruction in such cases is in fact syntactic. Secondly, they propose that the availability of this syntactic reconstruction is a result of a mismatch between the LF scope order and the Information Structure (IS) of these examples. Consider the example below:

60. weil seinen$_i$ Sohn jeder Vater$_i$ t_{acc} liebt
since his.ACC$_i$ son every.NOM father$_i$ t_{acc} loves
'Since every father loves his son'

a.	Syntax:	[every father] [his son]$_{TOP}$ loves	
b.	Scrambling:	[his son]$_{TOP}$ [every father] [his son]$_{TOP}$ loves	
c.	LF:	~~[his son]$_{TOP}$~~ [every father] [his son]$_{TOP}$ loves	
	IS:	[his son]$_{TOP}$ [every father] ~~[his son]$_{TOP}$~~ loves	
d.	PF1:	~~[his son]$_{TOP}$~~ [every father] [his son]$_{TOP}$ loves	*ScoT (IS)
	PF2:	[his son]$_{TOP}$ [every father] ~~[his son]$_{TOP}$~~ loves	*ScoT (LF)

The following Tableau shows how these constraints interact with each other. The dashed line shows that the constraints are not in particular order to each other. Therefore, the violation of one of them does not play a role in the outcome as long as the other constraint is also violated, and the two candidates are tied.

Tableau 5. ~~[his son]$_{TOP}$~~ [every father] [his son]$_{TOP}$ loves

	A≫B	ScoT (LF)	ScoT (IS)
☞	a. PF1: A≫B	✓	*(Reconstruction)
☞	b. PF2: B≫A≫t_B	*(Topicalization)	✓

I am going to posit another solution for this issue in Persian by using phase-theory, and showing that the induced ambiguity depends on the size of scrambling. When scrambling crosses a phase, we do not get ambiguity but when it does not, we do. In other words, the reconstruction results in scope ambiguity only in short (*v*P-internal) scrambling cases.

6. The Ambiguity Puzzle

This section deals with the analysis and describes how the two posited constraints can account for most of the data in Persian. However, I also show that we need a third constraint to account for all the empirical data. Let us revisit the facts we gathered from the data, which can be divided into two groups as shown in Table 5.

Sentence Type	**Word order**	**Possible Scope**	
Transitive	Subj Obj V	Subj> Obj, *Obj>Subj	(surface)
	Obj_i Subj t_i V	Obj>Subj, *Subj>Obj	(surface)
Ditransitive	S IO DO V	IO> DO, *DO> IO	(surface)
	S DO_i IO t_i V	DO> IO, ?IO> DO	(ambiguous)
Spray-Load	S Loc DO V	Loc> DO, *DO> Loc	(surface)
	S DO_i Loc t_i V	DO> Loc, ?Loc> DO	(ambiguous)

Table 5. Summary of the empirical data (repeated from Table 2)

The first group includes the sentences with no movement, which are scope frozen; and the second group contains the structures involving movement. This group can be divided into two subcategories of the sentences with *v*P-internal and *v*P-external movement. As Table 5 summarizes, the *v*P-external movement cases do not induce ambiguity, while the *v*P-internal cases do (in most parts). The following subsections address these two movement types and explain how they can be accounted for using constraints.

The two proposed constraints, i.e. NO-SCR and NO-QR, can account for most of the Persian data. Starting with the first set of data, i.e. base order plus *vP-external* scrambled sentences, we can see how these two constriants capture these constructions, as shown in Tableaux 7 and 7'.

There is nothing surprising here. These tableaux mirror the ones we had before. It is because the *v*P-external scrambling cases freeze scope in the other order, and our constraints could already capture this fact.

Tableau 7: Q1≫Q2 (Surface Scope)

Q1≫Q2	NO-QR	NO-SCR
☞ a. PF1: Q1≫Q2	✓	✓
b. PF2: Q2≫Q1 <~~Q2~~>	✓	*

Tableau 7': Q2≫Q1 (Inverse Scope)

Q2≫Q1	NO-QR	NO-SCR
☞ a. PF1: Q2≫Q1 <~~Q2~~>	✓	*
b. PF2: Q1≫Q2	*	✓

Persian Base Order vs. vP-external scrambled Sentences

As these tableaux show, there are two acceptable word orders (PFs) for these constructions, namely Q1≫Q2 and Q2≫Q1. The first one would give the scope for unscrambled sentences and the second one would give the reverse scope for their scrambled counterparts. The two constraints predict the scope relations correctly, however, we run into the problem of lack of reconstruction in such constructions. This is not a challenge for our proposed constraints. In fact, this is directly predicted from the constraints in Tableau 5. But, lack of ambiguity in scrambled sentences in Persian poses a typological issue, since it has been proposed in the literature that long distance or A'-scrambling involves reconstruction (see Saito 1989, Mahajan 1990 among others), and B&W also assert that A'-scrambling requires syntactic reconstruction.

While the discussion of the presence or absence of reconstruction and the reasons behind it is beyond the scope of this paper, I attempt to explain why in these constructions, scrambling does not induce ambiguity as we would expect. Let us have a look at the *v*P-external and *v*P-internal scrambling cases again, repeated from examples (36) and (38), respectively.

61. a. **Har** pesar-i **ye** doxtar-i ro boos-id.
every boy-AD one girl-AD ACC kiss.PST.3SG
'Every boy kissed a girl.' ∀>∃,*∃>∀ (Shafiei 2016: 104)
b. [**Ye** doxtar-i ro]$_i$ **har** pesar-i t_i boos-id.
one girl-AD ACC every boy-AD t_i kiss.PST.3SG
'A girl was such that very boy kissed her.' *?∀>∃, ∃>∀

62. a. Râhnemâ [be **ye** toorist-i]$_j$ [**har** manzare-i ro]$_i$ {neshun dâd}.
guide [to one tourist-AD]$_j$ [every scenery-AD ACC] {show give.PST.3SG}
'The guide showed every scenery to a/some guest.' *∀>∃, ∃>∀
b. Râhnemâ [**ye** manzare-i ro]$_i$ be **har** toorist-i t_i {neshun dâd}.
guide [a scenery-AD ACC]$_i$ to every tourist-AD t_i {show give.PST.3SG}
'The guide showed a scenery to every guest.' ?∀>∃, ∃>∀

Another construction which shows the same property as (62) is the *spray-load* construction. The sentence in (63a) is the un-moved form of the sentence in (30) or (63b). As (63a) shows, while (30) is ambiguous, its base order form is unambiguous.

63. a. Ali roo-ye **har** divâr-i **ye** shoâr-i ro nevesht.
Ali on-EZ every wall-AD a motto-AD ACC write.PST.3SG
(lit.) 'Ali, on every wall, wrote a motto.' ∀>∃, *∃>∀
b. Ali [**ye** shoâr-i ro]$_i$ roo-ye **har** t_i divâr-i nevesht.
Ali [a motto-AD ACC]$_i$ on-EZ every t_i wall-AD write.PST.3SG
'Ali wrote a motto on every wall.' ∀>∃, ?∃>∀

These examples lead us to assume that *v*P-internal movement induces ambiguity. These constructions are similar to the A-scrambling in German, for which B&W have proposed a semantic reconstruction, where either the lower or higher copy of the QP can be interpreted. It is in line with Karimi's (2005) analysis that in ambiguous cases involving scrambling, either the lower copy or the higher copy in the chain can be interpreted. In other words, in *v*P-internal scrambling cases, the ¾ signature of B&W holds for Persian. It is the *v*P-external cases that show idiosyncrasies.

To account for this difference between the two scrambling cases, I am appealing to phase-theory without claiming anything about the nature of this reconstruction (or lack thereof)[15]. Chomsky (2008) assumes that *v*Ps are phases. Comparing (61) and (62), I propose that lack of reconstruction is due to crossing a phase boundary in (61), and so we need to have a constraint that can account for this. Thus, I propose that although scrambling is possible, it cannot cross a phase, hence the constraint NO-PHASE-CROSSING. This constraint holds for reconstruction as well requiring it to be within a phase[16].

We have three constraints up to now, NO-QR, NO-SCR and NO-PHASE-CROSSING. We already know that NO-QR is ranked above NO-SCR. Where does this leave our new constraint? Since this language allows for scrambling, the NO-SCR constraint should be ranked below anything else. For the same reason, because Persian does not favor QR in general, NO-QR should be ranked the highest. This would leave us with the following order for these three constraints:

64. NO-QR ≫NO-PHASE-CROSSING ≫ NO-SCR

The question is whether or not we can do without the NO-SCR constraint. As the Tableau 8 shows for *v*P-external cases, the only possible word order to have the surface order is the base order, i.e. PF 1 in Tableau 8. The PF2 which contains a reconstruction from the scrambled order is ruled out because of the NO-PHASE-CROSSING constraint since reconstruction crosses a phase. To get the inverse scope reading, there are two possible options, QR and scrambling. However,

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[15] Although I am remaining agnostic as to the kind of reconstruction that is (un-)available, and the nature of the scrambling (A or A'), it seems to be the case that Persian seems to allow for syntactic reconstruction in the cases of *v*P-external scrambling, as the example (xii) shows:

x. [$_{TP}$ [hamdiga-ro$_i$]$_k$ [$_{vP}$ bachche-ha$_i$ t_k [$_{PredP}$ busid-an]]].
eachother-ACC child- PL t_k kiss.PST.3PL
(lit.) 'Each other, the children kissed.' (Karimi 2005: 175)

[16] This claim is only for scope purposes. I am not making any claims regarding other movement or reconstruction types.

as Tableau 8' shows, the PF1 containing QR is ruled out via NO-QR, and the PF2 which is the scrambling order wins although the movement crosses a phase.

Tableau 8. Q2 Q1 [vP Q2 V] (vP-external)

LF: Q1≫Q2	NO-QR	NO-PHASE-CROSSING	NO-SCR
☞ a. PF1: Q1≫Q2	✓	✓	✓
b. PF2: Q2≫ Q1 <~~Q2~~>	✓	*	*

Tableau 8'. Q2 Q1 [vP Q2 V] (vP-external)

LF: Q2≫Q1	NO-QR	NO-PHASE-CROSSING	NO-SCR
a. PF1: Q1≫Q2	*	✓*	✓
☞ b. PF2: Q2≫ Q1 <~~Q2~~>	✓	*	*

*Example: **ye doxtar-i ro** har pesar-i [$_{vP}$ **ye doxtar-i ro** boosid]*

The predictions for *v*P-internal cases are shown in Tableaux 9.

Tableau 9. [$_{vP}$ Q2 Q1 Q2 V] (vP-internal)

LF: Q1≫Q2	NO-QR	NO-PHASE-CROSSING	NO-SCR
☞ a. PF1: Q1≫Q2	✓	✓	✓
☞? b. PF2: Q2≫ Q1 <~~Q2~~>	✓	✓	*

Tableau 9'. [$_{vP}$ Q2 Q1 Q2 V] (vP-internal)

LF: Q2≫Q1	NO-QR	NO-PHASE-CROSSING	NO-SCR
a. PF1: Q1≫Q2	*	✓	✓
☞ b. PF2: Q2≫ Q1 <~~Q2~~>	✓	✓	*

Example: Râhnemâ **ye manzare-i ro** be har toorist-i **ye manzare-i ro** {neshun dâd}.

As Tableau 9 shows, the surface scope reading is available via either the surface order (PF1) or the scrambling order with reconstruction (PF2). The reason being that reconstruction does not cross a phase. The inverse scope interpretation, on the other hand, is only available via the scrambled order. Since the surface order and QR violate NO-QR, as in the case of *v*P-external scrambling cases, the only option for the inverse scope is scrambling.

One thing to notice though is that the PF2 option in the reconstruction case in Tableau 9 violates the NO-SCR constraint. If we follow the OT principles closely, this option should be ruled

out, hence the question mark. One thing that can be done is to discard of this constraint and just evaluate the first two constraints, i.e. NO-QR and NO-PHASE-CROSSING. However, I would like to make another proposal here. By keeping the NO-SCR constraint, we can actually account for speaker variation. The abstract nature of syntax and lack of consensus in speaker judgements, with some having only rigid scope and some interpreting ambiguity easily, might be stemming from the availability of scrambling for different speaker groups. It seems plausible to say that perhaps scrambling is more marked for some speakers than for others, and therefore, the markedness of it dictates the availability of inverse scope and/or reconstruction in the such cases. I am keeping the NO-SCR constraint for these reasons believing it can nicely account for speaker variation.

7. Conclusion

In this paper, I investigated the scope of quantifiers in Persian. The paper addressed the issues regarding the choice of universal and existential quantifiers by using the analyses used in logic and mathematical books on Persian. Moreover, it looked at different constructions, which included two quantifiers, to determine their scope. These examples included transitive and ditransitive constructions, as well as *spray-load* and passive sentences. These constructions show a preference for surface scope in general. However, the data from inverse linking and ACD constructions which always require QR, are pieces of evidence suggesting that we cannot rule out the existence of covert QR in this language altogether. Identifying that Persian shows possibility of QR, I concluded that scope rigidity is construction-specific rather than language specific.

I also looked at scrambling cases. I categorized the scrambling cases into *v*P-internal and *v*P-external movements, respectively. I showed that while *v*P-internal scrambling induces ambiguity,

even though weak, *v*P-external movements only reverse the scope between the two quantifiers. I showed that in cases of *v*P-internal movements, Persian has the ¾ signature, while in the cases of *v*P-external movements, it is not the case. To account for this variability, I refined ScoT into two sub-components, i.e. NO-QR, NO-PHASE-CROSSING and NO-SCR. The NO-QR is a general constraint that Persian does not violate (except in the cases where scrambling is not allowed), whereas NO-PHASE-CROSSING can be violated is the cases of *v*P-external scrambling cases, hence NO-QR≫ NO-PHASE-CROSSING. The NO-SCR constraint is ranked below the other two constraints as Persian is a scrambling language and this constraint can be violated.

Keeping the NO-SCR constraint can help us identify speaker variations in cases where the inverse scope is weakly available. I attributed this variation into markedness of this constraint, which could vary from speaker to speaker.

These set of constraints, efficiently accounting for scope readings for a scrambling language like Persian, can be expanded to other scrambling languages probably with some modifications or with different rankings.

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Appendix:

Parallels between NP-i and har

Horn (2005) discusses the distribution of the English NPI *any* and FCI *any*, and provides a unified account of these two homophonic items. Although English uses a separate quantifier to indicate universality, i.e. *every*, the environments in which the FCI *any* appear can be generalized cross-linguistically. Given that, I propose that Persian FCI *har* appears in non-veridical, non-episodal and generic environments (with the exception of questions where the presence of *har* is ungrammatical), in parallel with the Persian NPI (the NP-i construction).

1. **a. Questions:**
   *Har mâshin-i xarâb-e?
   every car-AD broken-be.3SG
   'Is every car broken?'

   b. Antecedent of conditionals:
   Har kas agar in xiyâbân râ âsfâlt konad mardom xoshhâl mi-sha-vand.
   every person if this street ACC asphalt do people happy DUR-become-3PL
   (lit.) 'If every person asphalts this street, people will become happy.' / 'If some(any) person asphalts this street, people will become happy.' (Movahhed 1989:217)

   c. Under negation:
   Bâ har kas-i ezdevâj ne-mi-kon-am.
   with every person-AD marriage NEG-DUR-do-1SG
   'I won't marry (just) anyone.'

   d. Generic:
   Ali har ghazâ-yi ro mi-xor-e.
   Ali every food-AD ACC DUR-eat-3SG
   'Ali eats (just) any food.' (Ali would eat any food.)

To show that the Persian NPI (shown with the construction *NP-i*) and the FCI *har* in Persian act like English NPI *any* and FCI *any*, I provide the following diagnostic employed in Horn (2005). Horn explains that insertion of the expletive *there* would cause ungrammaticality with FCI *any* (just like it does for universal *every* in (a)), while being grammatical with NPI *any*, as examples below show (From Horn 2005, ex.6-7). Let's look at the parallel examples in Persian with NPI

(*NP-i*) and FCI *har.* (Persian does not have *there,* this construction is represented with the presence of copula *hast* 'there exists').

2. a. There is {somebody/*everybody} that can swim the Channel. (∃ ✓, ∀ ✗)
   a'. Kas-i /*har kas-i hast ke be-toon-e too in kânâl
   person-AD/*every person-AD exist.3SG that SBJV-can-3SG in this channel
   {shenâ kon-e}. (∃ ✓, ∀ ✗)
   {swim can-3SG}
   'There is a/some/*every person who can swim in this channel.'

   b. There isn't anybody that can swim the Channel. (NPI ✓)
   b'. Kas-i ni-st ke be-toon-e too in kânâl
   person-AD NEG-exist.3SG that SBJV-can-3SG in this channel
   {shenâ kon-e}. (NPI ✓)
   {swim can-3SG}
   'There is not anyone who can swim in this channel.'

   c. * There is anybody that can swim the Channel. (FCI ✗)
   c'. *Har kas-i hast ke be-toon-e too in kânâl
   every person-AD exist.3SG that SBJV-can-3SG in this channel
   {shenâ kon-e} (FCI ✗)
   {swim can-3SG}
   (lit). '*There is everyone who can swim in this channel.'

Based on the discussion above, the environments in which *har* acts like an FCI were avoided in doubly-quantified sentences in this paper to ensure that *har* acts like a true universal in such examples.