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Indefinites in negated intensional contexts: An argument for world-skolemized choice functions*

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Abstract This paper introduces a novel scope paradox. Providing data from Farsi, I show that indefinites in the surface syntactic scope of negated intensional operators yield a reading in which the indefinite appears to take wider scope over the negation, and narrow scope with respect to the intensional operator. Genuine generalized quantifiers, in contrast, do not yield such readings. The uniqueness of indefinites in giving rise to such wide pseudo-scope *de dicto* readings, which are also found within a simple clause, provides evidence that indefinites differ from generalized quantifiers, not only in their ability to take exceptional scope across clause boundaries, but also in their local scopal properties. I argue that the existence of such wide pseudo-scope *de dicto* readings not only poses a problem for the generalized quantifier view of indefinites, but also for any approach that takes indefinites to scope via syntactic movement. In-situ accounts of indefinites, on the other hand, can straightforwardly account for the new data, without over-generating wide scope *de dicto* readings (a.k.a. the "fourth readings") which are widely believed to be impossible (von Fintel & Heim 2011, Keshet & Schwarz 2019, Elliott 2023). I argue that an account in terms of world-Skolemized choice functions is more successful in accounting for the full pattern of the wide pseudo-scope *de dicto* reading in Farsi, as well as cross-linguistic variation in the availability of such readings.

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1 A scope paradox

With an empirical observation in Farsi[1], I present a novel scope paradox in which an indefinite under the surface syntactic scope of a negated intensional operator yields a reading in which the indefinite appears to take wider scope than the negation, but narrower than the intensional operator. I will refer to such interpretations as wide pseudo-scope *de dicto* readings. The example (1) illustrates this paradox. The indefinite DP *some of the books* in the complement clause of a negated neg-raising predicate *think* has a reading such that it is interpreted under the scope of *think*, but above the matrix negation.

> *Context: Rodica knows that Carl has to read five books for his exam. She also knows that it takes 1 hour for Carl to read a book. She learns that Carl has started reading books 3 hours ago. Given Carl's speed in reading a book, Rodica believes that there are at least two books that he did not have time to read but she does not know which books.*

(1) Rodica fekr ne-mi-kon-e ke Carl { **čand-ta**/ **ye** }
Rodica thought NEG-IMPF-do-3SG that Carl some.PL-CL/ some
ketab ro xunde bash-e.
book RA studied be.SUBJ-3SG
Rodica does not think that Carl read some of the books.
think ≫ *some*≫ ¬[2]

In the intended reading of (1), the indefinite is interpreted under the scope of the intensional verb *think* (*de dicto*), since there is no specific book(s) x such that Rodica has formed the belief that Carl did not read x. Rather, Rodica has a literal belief that there are some books that Carl did not read. In other words, the witness of the indefinite can vary across Rodica's belief worlds. To clarify this reading, the sentences can be continued with "*but she does not know which books*." At the same time, the indefinite takes wide scope over

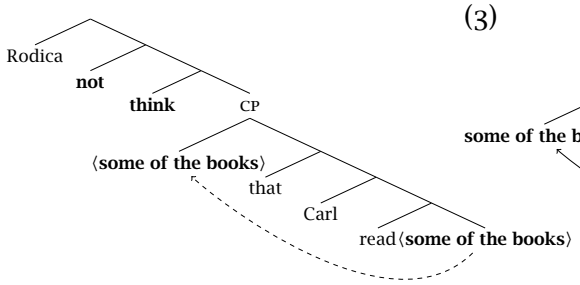
1 The judgments reported in this paper come from the native-speaker judgments of the author, which have been confirmed in consultation with other native speakers, both linguists and non-linguists.

2 The intended reading is available with both singular (*ye*) and plural (*čand*) indefinites alike.

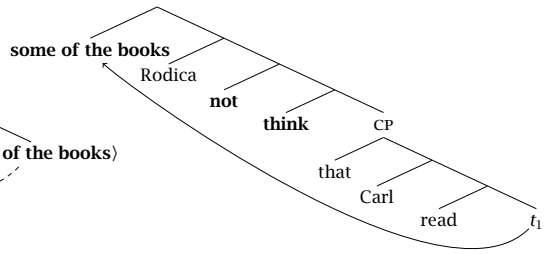
negation. The low scope reading of the indefinite with respect to negation, which is equivalent to "Rodica thinks that it is not the case that Carl read any of the books", is clearly false in this scenario.

As shown in (2), both negation and *think* reside in the matrix clause, and the indefinite *some of the books* is syntactically below both of them. Under the intended reading, the indefinite is interpreted within the scope of *think* but outside the scope of negation. Assuming the scope of an element is determined by its syntactic position at Logical Form, (1) is predicted to give rise to two readings, none of which is the intended reading. Under the first reading, the indefinite stays in its local clause, as in (2), and thus it is interpreted below both negation and *think*. The corresponding reading is one in which Rodica thinks that it is not the case that Carl read any of the books. Note that movement of the indefinite to the edge of the embedded CP does not lead to a new interpretation, as the indefinite in this position is still below both negation and *think*. Alternatively, the indefinite can move to the higher clause, as in (3), in which case it is interpreted above both negation and *think*. This yields a reading in which there are some specific books x such that Rodica has formed the belief that Carl did not read x. Although (1) can in principle have these readings, neither (2) nor (3) can illustrate the reading of (1) in the given scenario. In the intended reading of (1), the embedded indefinite appears to take narrow scope with respect to *think*, but wide scope with respect to negation. Therefore, the indefinite has to be simultaneously under *think*, and above negation. This is impossible because there is no such syntactic position available. Therefore, we have a scope paradox.[3]

(2)



(3)



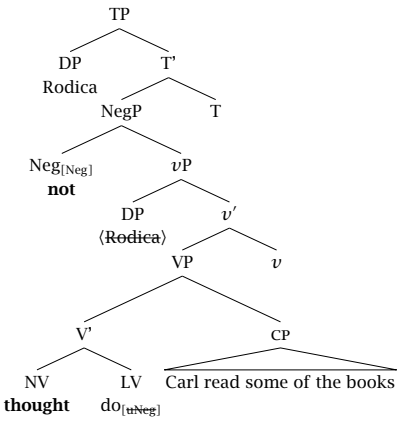
1.1 It is not about RA-marking

Let us first establish that such readings are not limited to indefinites in the object position, in order to rule out the possible hypothesis that the object marker RA plays a role in giving rise to such readings (for an extensive review of different accounts of RA and arguments against analyzing RA as marking definiteness or specificity, see Jasbi 2014, 2020). Consider the example (4) in the following scenario:

> *Context: Rodica is the instructor of a big class. She has observed that there are at least two submissions missing for every assignment. She expects the same on the next assignment, but she has no clue which students will not submit their assignment this time.*

(4) Rodica fekr ne-mi-kon-e ke { **čand-ta/ ye** } daneshju
Rodica thought NEG-IMPF-do-3SG that some.PL-CL/ some student
mašq-esh(un) ro tahvil be-dah-and/ad.
assignment-their RA submit SUBJ-give-3PL/SG
Rodica does not think that some student(s) will submit their assignment.

3 The verb *think* is a complex predicate in Farsi (*fekr kardan*). I follow Megerdoomian 2001, 2012 in taking complex predicates to consist of a non-verbal element (NV) and a light verb (LV) that form a constituent, as shown in the structure below. To keep things simple and avoid confusion, however, I will abstract away from the details of Farsi morpho-syntax throughout the paper, as they do not bear on my analysis. The only crucial point is that like in English, both negation and *think* are in the same clause in Farsi. The sentential negation is syntactically higher than the verb (see Zeijlstra 2022, who argues that is a general cross-linguistic constraint). The negation marker is morphologically realized on the closest verb through Agree relation (Karimi 2005, Taleghani 2008, among others).



Here again, the indefinite *some students* is interpreted under the scope of the intensional verb *think* (*de dicto*), since there are no specific students x such that Rodica has formed the belief that x will not submit their assignments. Rather, Rodica has a literal belief that there are some students who will not submit their assignments. To clarify this reading, the sentences can be continued with "*but she does not know which students.*" At the same time, the indefinite takes wide scope over negation. The low scope reading of the indefinite with respect to negation, which is equivalent to "Rodica thinks that it is not the case that any students will submit their assignments", is clearly false in this scenario.

1.2 It is not only neg-raising predicates

One might argue that the wide pseudo-scope *de dicto* reading of the indefinite in (1) arises because negation can be interpreted lower than its surface position, due to the special properties of the predicate *think* as a *neg-raiser*. There are two main approaches to account for the neg-raising phenomenon. Under the semantic-pragmatic approach to neg-raising (Bartsch 1973, Horn 1989, Gajewski 2005, Romoli 2013, Homer 2015, and Zeijlstra 2017, among others) neg-raising predicates (NRP) are taken to come with an excluded middle presupposition (or with an excluded middle alternative (Romoli 2013)).

Under this approach, negation is generated and remains in the matrix clause. The neg-raising reading is a logical consequence of this presupposition and the literal meaning of the sentence. For instance, the sentence *'John doesn't think that Bill left.'* has the presupposition that the speaker either thinks that Bill left or thinks that Bill didn't leave. Taking together the assertion, and the excluded middle presupposition, the neg-raising reading is inferred.

(5) **Assertion:** $\neg$ **NRP(S)** $\neg$[John thinks Bill left]
Presupposition: **NRP(S)** $\vee$ **NRP** $\neg$**(S)**
John thinks Bill left $\vee$ John thinks Bill didn't leave.
$\therefore$ John thinks Bill didn't leave.

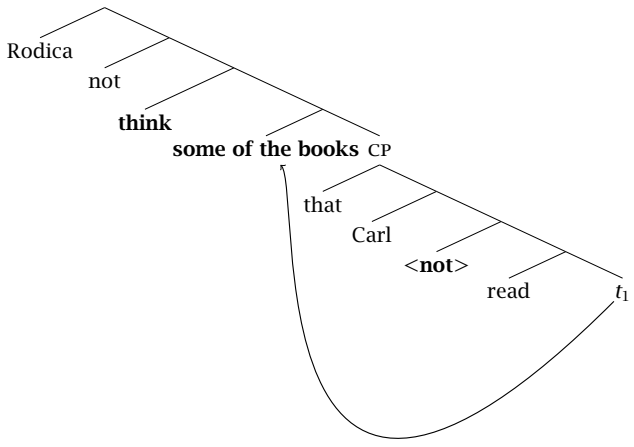
The semantics-pragmatics approach, therefore, predicts that negation should always take wide scope over the embedded proposition. As a result, the wide pseudo-scope *de dicto* reading of the indefinite in (1) cannot be inferred from the assertion and the excluded middle presupposition. As the

reader can confirm, the resulting interpretation presented in (6) does not correctly reflect the intended meaning of (1).

(6) **Assertion:** ¬ **NRP(S)** ¬[Rodica thinks [Carl read some of the books]]
Presupposition: NRP(S) ∨ **NRP** ¬**(S)**
Rodica thinks [Carl read some of the books] ∨ Rodica thinks ¬ [Carl read some of the books]
∴ Rodica thinks ¬ [Carl read some of the books]

Under the syntactic approach to neg-raising, which goes back to Fillmore 1963 and has recently been revived by Collins & Postal 2014, negation is base-generated in the embedded clause and then raises to the higher clause. The lowest instance of NEG is semantically interpreted, and the highest copy of NEG is phonologically realized. This approach predicts that the negation, originating in the embedded clause, should be able to enter into scopal interactions with other elements in the embedded clause (Romoli 2013). This seems to provide an easy solution to the wide pseudo-scope *de dicto* interpretation of the indefinite in (1). Negation and the indefinite *some of the books* are located in the embedded clause of *think*. The indefinite can locally move to a position above negation. This yields the intended reading of (1).

(7)



Note that the assumption about the movement of negation is essential to derive the intended reading. It was shown in (2) and (3) that the movement

of the indefinite alone cannot give rise to wide pseudo-scope *de dicto* readings. To argue against the analysis of wide pseudo-scope *de dicto* readings in terms of the movement of negation, we need to show that these readings can also be observed when the indefinites are embedded under non-neg-raising predicates, where it is obvious that the negation is not base-generated in the embedded clause. The examples in (8a)-(9a) illustrate this fact. Wide pseudo-scope *de dicto* reading of indefinites can also be observed when they are in the scope of negated non-neg-raising modals such as '*necessary*' and '*can*'.[4] This confirms that these readings are not due to neg-raising.[5]

4 The examples below show that *necessary* is not a neg-raiser:

(i) lazem ni-st be-r-id
necessary NEG-be.3SG SUBJ-go-2PL
It is not necessary for you to go.↛ It is necessary for you to not go.

5 Other non-neg-raising predicates that intensionally interact with the DPs in their embedded clause are also expected to permit wide pseudo-scope *de dicto* readings of indefinites. While this can be easily shown for *sure*, as illustrated below, constructing an appropriate context that illustrates such readings for indefinites in the embedded clause of non-neg-raising predicates like *claim*, *know*, *realize* is more challenging. In any case, since we can find non-neg-raising predicates that allow for wide pseudo-scope *de dicto*, my main point in this section remains viable that the existence of these reading is not limited to neg-raising environments. The claim that wide pseudo-scope *de dicto* readings are possible does not entail that they will always be available. Independent semantic and pragmatic factors can play a role in facilitating or hindering such reading. I leave it as an open question why it is hard to detect such readings in the scope of certain non-neg-raising predicates.

Context: Rodica knows that Carl has to read five books for his exam. She thinks that it should take at least an hour to read a book. She learns that Carl has started reading books 3 hours ago. Rodica suspects that there are at least two books that he didn't have time to read but she doesn't have a clue which ones.

(i) a. Rodica motmaen nist ke Carl čand-ta ketab ro xunde
Rodica sure NEG-be-3SG that Carl some-CL book RA studied
bash-ad.
SUB.be-3SG
"*Rodica isn't sure that Carl read some of the books.*"

b. False paraphrase in the scenario: *Rodica entertains the possibility that Carl read none of the books.*

c. Possible paraphrase: *Rodica entertains the possibility that some of the books are such that he didn't read.*

Context: There are five questions on the exam. Each question is worth 10 points. To get the full points on the exam (30 points), students only need to answer three questions. Students can pick any three questions to answer. An examiner to the students:

(8) a. lazem ni-st **do-ta** soal ro javab be-d-id
necessary NEG-be.3SG two-CL question RA answer SUBJ-give-2PL
You do not have to answer two of the questions. (literally: it is not necessary that you answer two of the questions.)

b. False paraphrase in the scenario: *it is permissible to answer any number of questions provided that it is not exactly two /more than two.*

c. Possible paraphrase: *It is allowed for two of the questions to not be answered.*

The indefinite *two questions* in (8a) is interpreted *de dicto*, as there are no specific questions that are marked as a bonus question. The numeral is interpreted above negation; the intended reading of this sentence, which is given in (8c), is that students are allowed to not answer (exactly) two questions. The interpretation of the numeral indefinite under negation, (8b), says that it is permissible to answer any number of questions provided that it is not more than two or exactly two (corresponding to one-sided or two-sided semantics of numerals). This reading is clearly false in this scenario. The sentence in (9a) shows a similar pattern. The numeral indefinite *two of the cards*, which is under the negated existential modal *cannot* can also get a wide scope *de dicto* reading.

Context: The rule of a card game is such that each player is given five cards in every round. Each player can see any three cards of their choice from the other player's cards. An instructor explaining the rules to players:

(9) a. **do-ta** kart ro ne-mi-tun-id be-bin-id
two-CL card RA NEG-IMPF-can-2PL SUBJ-see-2PL
You cannot see two of the cards.

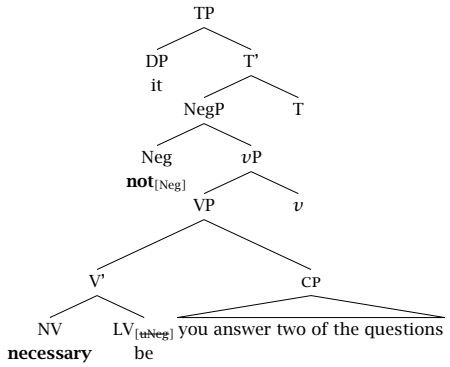
b. False paraphrase in the scenario: *it is necessary to see any number of cards provided that it is not exactly two /more than two.*

c. Possible paraphrase: *It is necessary that two of the cards be such that you do not see them.*

Note that negation is syntactically higher than neg-raising predicates and non-neg-raising modals alike.[6] However, due to the neg-raising effect, *think* is interpreted above negation. As the interpretation of sentences containing a negated non-neg-raiser modal in (8a) and (9a) shows, these modals are interpreted under the scope of negation in accordance with their syntactic scope. These readings have been paraphrased with the help of their corresponding dual (i.e. '*not have to*' is paraphrased as '*it is allowed/permissible not to*' and '*cannot*' is paraphrased as '*it is necessary not to*').[7]

While the neg-raising effect gives rise to the illusion that the observed readings of indefinites is a scope phenomenon, as shown in (10), wide pseudo-scope *de dicto* readings of indefinites under non-neg-raising modals cannot be represented in terms of scopal relations. Since in the LF corresponding to the intended reading, the modal is under the scope of negation, there cannot be any position in that LF which is simultaneously higher than negation but below the modal.

6 Similar to "think" and many other verbs in Farsi, the adjectival modal *necessary* also forms a complex predicate structure with the light verb "be" (Taleghani 2008). Negation is structurally higher than the verb in Farsi (Karimi 2005).



7 In the remainder of the paper, I will make use of these corresponding duals to visually represent the intended readings of indefinites under non-neg-raising modals, as shown in (i).

(i) **Indefinites under negated non-neg-raising modals**:

a. Syntactic scope: $\neg \gg \Box \gg$ INDEF $\longrightarrow$ interpreted as: $\Diamond \gg$ INDEF $\gg \neg$

b. Syntactic scope: $\neg \gg \Diamond \gg$ INDEF $\longrightarrow$ interpreted as: $\Box \gg$ INDEF $\gg \neg$

(10) **Indefinites under negated neg-raising *think*:**
Syntactic scope:
¬ ≫ *think* ≫ INDEF ⟶ interpreted as: *think* ≫ INDEF ≫ ¬

So even if a syntactic analysis of neg-raising could explain examples involving 'think', the availability of wide pseudo-scope *de dicto* interpretation of the indefinite under non-neg-raising predicates in (8a) and (9a) would remain unexplained.

1.3 Indefinites are unique

Strikingly, genuine quantifiers like modals and universal quantifiers that in principle can scopally interact with negation do not give rise to wide (pseudo)-scope *de dicto* readings. Let us start with universal quantifiers. (11a) shows that universal quantifiers can scope above negation in simple sentences. The sentence (11a), in which the universal quantifier *all of the children* is accented, cannot be true in a scenario in which some children came and some did not. Rather, it is true in a scenario where no children came. This indicates that the sentence is interpreted with the universal quantifier scoping above negation. However, when embedded under the negated neg-raising predicate *think*, as in (11b), universal quantifiers can only take narrow scope with respect to negation. The sentence (11b) can only be true in a situation in which the speaker thinks some children came and some did not. This indicates that the sentence cannot be interpreted with the universal quantifier scoping above negation.

(11) a. [Hame-e bache-ha]$_F$ na-yumad-and.
all-EZ child-PL NEG-come.PST-3.PL
All of the children did not come. *all of the children* ≫ ¬

b. fekr na-kon-am hame-e bache-ha oumade baš-and.
think NEG-do-1SG all-EZ child-PL come.PP be.SUBJ-3.PL
I do not think all of the children came.
∗*think*≫ *all of the children* ≫ ¬

Similarly, universal quantifiers under other negated modals do not give rise to a reading where they are interpreted *de dicto* with respect to the negated modal, but take wide scope over negation at the same time. The unavailability of such readings to universal quantifiers is shown in (12)–(13).

(12) a. lazem ni-st hame-e soal-ha ro javab
necessary NEG-be.3SG all-EZ question-PL RA answer
be-d-id
SUBJ-give-2PL
You do not have to answer all of the questions.

b. Possible paraphrase: *it is permissible to not answer all of the questions.*
✓ ¬ ≫ □ ≫ *all of the questions* ⟺ ◇ ≫ ¬ ≫ *all of the questions*

c. Impossible paraphrase: ∗*It is allowed for all questions not to be answered.*
∗◇ ≫ *all of the questions* ≫ ¬

(13) a. hame-e kart-ha ro ne-mi-tun-id be-bin-id
all-EZ card-PL RA NEG-IMPF-can-2PL SUBJ-see-2PL
You cannot see all of the cards.

b. Possible paraphrase: *it is necessary that not all cards be such that you see them.*
✓ ¬ ≫ ◇ ≫ *all of the cards* ⟺ □ ≫ ¬ ≫ *all of the cards*

c. Impossible paraphrase: ∗*It is necessary that all cards be such that you do not see them.*
∗□ ≫ *all of the cards* ≫ ¬

Now let us look at the interaction of modals and negation in Farsi. The modal *must* in Farsi is not a PPI, and it can take both narrow and wide scope over negation in a simple clause.[8]

Context: Disagreeing with someone's argument:

(14) a. lozuman na-bayad in tor baš-e.
necessarily NEG-must this way be.SUBJ-3SG
It does not necessarily have to be the case.
¬ ≫ *must* (weak disagreement)

b. manteqan na-bayad in tor baš-e.
logically NEG-must this way be.SUBJ-3SG
Logically, it must not be the case.
must ≫ ¬ (strong disagreement)

Under a negated neg-raising predicate, only the narrow scope of *must* with respect to negation is available.

8 I thank Masoud Jasbi for pointing out to me that *logically* can enforce the wide scope of *must*.

Context: Disagreeing with someone's argument:

(15) a. fekr na-kon-am lozuman bayad in tor baš-e.
think NEG-do-1.SG necessarily must this way be.SUBJ-3SG
I do not think it necessarily has to be the case.
think ≫ ¬ ≫ *must*

b. #fekr na-kon-am manteqan bayad in tor baš-e.
think NEG-do-1.SG logically must this way be.SUBJ-3SG
I do not think it must logically be the case.
∗*think* ≫ *must* ≫ ¬

It is worth noting that the uniqueness of indefinites in taking wide (pseudo)-scope *de dicto* readings shows that the existence of such readings cannot be due to syntactic movement of negation, even in neg-raising environments. We have seen that negation cannot interact scopally with other operators in the embedded clause of neg-raising predicates. In fact, given that the apparent wide scope of indefinites with respect to the negation of neg-raising predicates has gone unnoticed in the neg-raising literature,[9] it has been widely assumed that negation can only take wide scope over the complement of neg-raising predicates (Seuren 1972, Romoli 2013, Collins & Postal 2014, Homer 2015). The lack of scopal interaction between negation and operators in the embedded clause of neg-raising predicates has been taken as an argument against the syntactic account of neg-raising (Bartsch 1973, Horn 1989, Gajewski 2005, Romoli 2013, Homer 2015, and Zeijlstra 2017, among others). In order to tackle this problem, Collins & Postal (2014) have to introduce a stipulative constraint, known as the *highest-operator constraint*, according to which negation can only raise out of an embedded clause when it is the highest operator within it (Seuren 1972, Collins & Postal 2014). The new observation presented in this paper makes the problem for the syntactic approach even harder, because now the highest-operator constraint has to be modified in such a way that it does not apply to indefinites. It is not clear, however, whether the concept of operator can be defined in a way that it includes adverbs, modals, and universal quantifiers, but excludes indefinites.

9 The scopal interaction of indefinites with negation under neg-raising predicates is briefly discussed in (Iatridou & Zeijlstra 2013) and Homer 2015. They only discusses the narrow scope reading of *some* with respect to the matrix negation, in the context of the PPI-hood of *some*.

In sum, I have shown that the wide pseudo-scope *de dicto* reading is only available to indefinites.[10] Other scope-taking elements embedded under negated modals do not enter into a similar scopal interaction with the negation. Having ruled out the role of neg-raising in giving rise to such readings, I conclude that a special scopal property of indefinites must be responsible for the existence of wide pseudo-scope *de dicto* readings.

In this paper, I argue that the paradox at hand provides a strong case in favor of in-situ accounts of the scope of indefinites. I show that movement-based accounts, irrespective of whether or not island-escaping movement is syntactically allowed, fail to capture the availability of wide pseudo-scope *de dicto* readings for indefinites without over-generating unattested genuine wide scope *de dicto* readings (a.k.a. fourth readings).

The rest of this paper is structured as follows: In Section 2, I compare movement-based (Charlow 2014, Demirok 2019) and in-situ approaches (Reinhart 1997, Winter 1997, Kratzer 1998, Matthewson 1998) to the scope of indefinites in their handling of the new data. I argue that only in-situ accounts of indefinites can account for the availability of the wide pseudo-scope *de dicto* reading of indefinites. I then discuss a problem for in-situ accounts in terms of intensional choice functions (Heim 1994, Winter 1997, Romero 1999). The problem is reminiscent of the *fixed set* problem familiar from the literature on choice functions, which arises when there needs to be variation in the output of a choice function that applies to a fixed set (Winter 1997, Kratzer 1998, Geurts 2000, Abels & Martí 2010). Section 3 aims to solve this problem. I propose a modification to the choice functional analysis such that an indefinite determiner denoting a choice function can introduce a world variable (F. Schwarz 2012). This proposal, which amounts to Skolemizing choice functions with a world variable, can solve the fixed-set problem. Finally, I argue that an account in terms of world-skolemized choice func-

10 An anonymous reviewer points out that the quantifier "*xeili*" (roughly, "many") can generate a similar reading. Specifically, in the example (i), "xeili" can have both narrow and wide scope relative to negation.

(i) fek na-kon-am xeili az bache-ha ro da'vat karde bashe
think NEG-do-1SG many of child-PL RA invite do-PP be.SUBJ-3.SG
I do not think that s/he invited many of the kids.

I agree with the judgment. However, it is hard to show that the two readings are independent, as the construal with high scope of negation relative to xeili "it is not the case that she invited many kids" is always true when "many kids are such that s/he did not invite them" is true.

tions is more successful than other in-situ accounts in explaining the full pattern of the scope of indefinites in Farsi as well as cross-linguistic variation in the availability of the wide pseudo-scope *de dicto* reading of indefinites. Section 4 concludes the paper.

2 "Scope" of indefinites

Indefinites have been shown to differ from generalized quantifiers in their scope-taking behavior. It has been widely claimed that the scope of quantifiers is clause-bounded (May 1978), as the unavailability of the given paraphrase for (16) shows.

(16) A colleague believes that every paper of mine contains an error.
'For every paper of mine, there is a (potentially different) colleague who believes that it contains an error.' ✗ every paper ≫ a colleague

Indefinites, in contrast, can scope out of even islands (Fodor & Sag 1982), as shown in (17).

(17) Each teacher overheard the rumor that a student of mine had been called before the dean.
'There is a student of mine, say Mary, and each teacher overheard the rumor that Mary was called before the dean.'
✓ a student ≫ each teacher

It has also been shown that indefinites can take intermediate scope out of islands (Farkas 1981, Ludlow & Neale 1991, Abusch 1993). In (18), for instance, the indefinite *some condition proposed by Chomsky* can take scope out of the relative clause, which is a scope island, and be interpreted as scoping under *each student*. When the indefinite takes intermediate scope, (18) means that for each student x, there is some condition y proposed by Chomsky such that x has to hunt down every paper showing that y is wrong.

(18) Each student has to hunt down every paper which shows that some condition proposed by Chomsky is wrong.

This unique island-escaping behavior of indefinites has led to approaches that take indefinites as inherently different from generalized quantifiers (Abusch 1993, Reinhart 1997, Winter 1997, Brasoveanu & Farkas 2011, Charlow 2014, 2020). There are two main approaches within this group to ex-

plain the exceptional scope of indefinites: (i) movement-based approaches, which posit that indefinites have access to special movement-based scope taking mechanisms, unavailable to generalized quantifiers (Charlow 2014, 2020, Demirok 2019), and (ii) in-situ approaches, which posit that indefinites do not depend on syntactic movement in order to take scope (Reinhart 1997, Winter 1997, Kratzer 1998, Brasoveanu & Farkas 2011).

In the previous section, I have shown that differences between scopal properties of indefinites and generalized quantifiers can be also observed within a clause. While an indefinite under a negated modal gives rise to wide pseudo-scope *de dicto* readings, generalized quantifiers do not. The contrast between the behavior of the indefinite in (9a) and the universal quantifier in (13), repeated here as (19a) and (19b), is particularly important, as it shows that the asymmetry between indefinites and quantifiers are also observed within clause boundaries. Therefore, indefinites are not only unique in their ability to take exceptional scope, but also in their local scopal properties. This provides further evidence for the view that indefinites are inherently different from generalized quantifiers.

(19) a. **do-ta** kart ro ne-mi-tun-id be-bin-id
two–CL card RA NEG-IMPF-can-2PL SUBJ-see-2PL
You cannot see two of the cards. ✓□ ≫ *two of the cards* ≫ ¬

b. hame-e kart-ha ro ne-mi-tun-id be-bin-id
all-EZ card-PL RA NEG-IMPF-can-2PL SUBJ-see-2PL
You cannot see all of the cards. ✗ □ ≫ *all of the cards* ≫ ¬

The rest of this section discusses the predictions of the two approaches that take indefinites to be unique with respect to the availability of the wide pseudo-scope *de dicto* reading of indefinites. I will argue that a movement-based approach fails to account for such readings. Under this approach, the indefinite takes wide scope over negation by moving to a position above negation. Such a position, however, unavoidably outscopes the intensional operator. Therefore, the indefinite can no longer be construed *de dicto*. I take this as an argument in favor of in-situ accounts of indefinites' scope. I then show that while it has remained unnoticed, the existence of the wide pseudo-scope *de dicto* readings is predicted by all in-situ approaches that separate the existential quantification from the descriptive content of indefinites.

Before starting the theoretical discussion, however, I will first give a brief overview of the scopal properties of Farsi indefinites beyond their ability to give rise to wide pseudo-scope *de dicto* readings (See Toosarvandani & Nasser

2017 for a survey of quantification in Farsi, and Jasbi 2016 for a discussion of other indefinite expressions in Farsi).

2.1 "Scope" of Farsi indefinites

The Farsi indefinites that are the focus of this paper contain an indefinite determiner or a numeral.[11]

(20) { **ye**/ **čand-ta**/ **do-ta** } ketab
some/ some.PL-CL/ two-CL book

These indefinite expressions have flexible scope. They can take narrow scope (22a) or wide scope (22b) with respect to other operators in the clause.

(21) hame-e danešju-ha { **ye**/ **čand-ta**/ **do-ta** } ketab ro
all-EZ student-PL some/ some.PL-CL/ two-CL book RA
xun-d-and
read-PST-3PL
All students read { some, several, two } of the books.

(22) a. There exists {some, several, two} book(s) x such that all students y read x.
b. For all students y, there exists {some, several, two} book(s) x such that y read x.

Like their English counterparts, they can also escape island boundaries and take intermediate scope. In addition to narrow scope, the indefinite *'a syntactic puzzle'* in (23) can take wide and intermediate scope corresponding to (24a) and (24b), respectively.

(23) hame-e danešju-ha har rahehal-i ke baraye **ye** mas'ale-e
all-EZ student-PL every solution-INDF that for a puzzle-EZ
nahvi vojood dar-e ro motale'e kar-d-and
syntactic existence have-3.SG RA study do-PST-3PL
All students studied every solution that exists for a syntactic puzzle.

11 In this paper, I put aside the indefinite reading of other kinds of DPs in Farsi. For accounts of indefinite readings of Farsi DPs that contain the suffix *-i* ((determiner) NP-i) see Deal & Farudi 2007, Jasbi 2016, Alonso-Ovalle & Moghiseh 2019a, and Alonso-Ovalle & Moghiseh 2019b. Note that the suffix *-i* can also attach to (universal NP-i), e.g., *har rahehal-i* in (23). Building on this fact, Deal & Farudi 2007 and Toosarvandani & Nasser 2017 take *-i* to lack any quantificational force. Rather, it restricts the domain of quantification to contextually relevant members of the extension of its NP predicate.

(24) a. There is some syntactic puzzle y such that each student x has read every solution that exists for y.
b. For each student x, there is some syntactic puzzle y such that x has read every solution that exists for y.

We have already seen that Farsi indefinites can take scope above negation. It has also been shown that singular indefinites in Farsi can take narrow scope with respect to sentential negation (Modarresi 2014, Toosarvandani & Nasser 2017).[12] The example in (25) illustrates this scope possibility of Farsi singular indefinites.

(25) koll-e tatilat-e Norouz, **ye** mehmoon bara-moon
whole-EZ holidays-EZ Norouz some guest for-us
na-youm-ad
NEG-come-3SG
We did not have a guest during Norouz holidays.

Although it needs some contextual support, plural indefinites in Farsi can also take narrow scope with respect to negation (see Solt & Waldon 2019 who provide experimental evidence that numerals generally require contextual support to felicitously occur under the scope of negation).

Context: As part of its population planning, a hypothetical government has a policy of rewarding families that have at least two kids with long-term low interest loans.

(26) agar { **do-ta**/ **čand-ta** } bačče na-dar-id, vam be-toon ta'aloq
if two-CL/ several child NEG-have-2PL, loan to-you belong
ne-mi-gir-e
NEG-IMPF-get-3SG
If you do not have {two/ several} children, you are not qualified for the loan.

Let me end this part with a quick note on the pragmatics of these indefinites. Our main examples show that these indefinite expressions do not encode speaker knowledge. However, they do not encode speaker ignorance either. The example in (27) illustrates this fact. The context makes it clear that the

12 The wide scope of Farsi indefinites with respect to negation is more prominent, perhaps due to pragmatic competition with bare nominals that generally take narrow scope under negation (Karimi 2008, Modarresi 2014).

speaker knows the doctor(s) she talked to. The sentence implies that the identification of doctors is irrelevant to the question under discussion.

Context: Sara has cancer and has discussed treatment options with her doctor(s). She reports this to her friend:

(27) ba { **ye**/ **čand-ta**/ **do-ta** } doktor harf zad-am.
with { **ye**/ **čand-ta**/ **do-ta** } doctor talk hit.PST-1SG
I talked to {some, several, two} doctors.

I will now turn to discussing the predictions of the movement-based and in-situ approaches with respect to the availability of the wide pseudo-scope *de dicto* reading of indefinites.

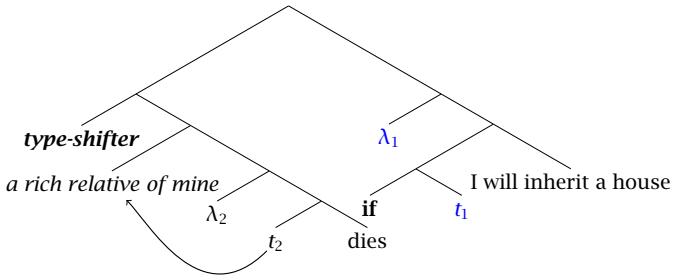
2.2 Scoping via movement

In this section, I focus on the movement-based accounts that make use of pied-piping (Charlow 2014, 2020, Demirok 2019). The innovation of this approach is that it only relies on bona fide scope mechanisms to explain indefinite scope. At the same time, this approach takes indefinites to be different from generalized quantifiers by treating them as alternative-generating expressions, in line with alternative semantics (Ramchand 1997, Kratzer & Shimoyama 2002, 2017) and inquisitive treatments of indefiniteness (Ciardelli, Roelofsen & Theiler 2017). I argue that despite its obvious appeal, the movement-based approach fails to account for the new data, leaving an in-situ 'scope' mechanism as the only tenable approach to explain wide pseudo-scope *de dicto* readings of indefinites. This provides compelling evidence that even with pied-piping in its toolbox, grammar still needs in-situ 'scope' mechanisms, contra Demirok 2019.

Recently, new movement-based accounts have been developed to derive the exceptional scope of indefinites out of islands via a sequence of island-obeying movement (a.k.a. *pied-piping*), (Charlow 2014, 2020, Demirok 2019). The essential parts of these accounts are: (i) there is a scope position at the edge of an island to which the indefinite DP can move; and (ii) subsequently the island can be type-shifted into a scope-taking expression, which itself moves to a higher position in the structure. Under this approach, the structure of (28a) is roughly (28b).

(28) a. If [a rich relative of mine dies], I'll inherit a house.

b.



First, the indefinite *a rich relative of mine* moves to the edge of the island. After the island is type-shifted to a scope-taking object, it is pied-piped over the conditional.

Building on the system proposed by Charlow (2014), an intensionalized version of this system has also been developed by Demirok (2019) and Elliott (2023), which aims to explain the exceptional *de re* readings of quantificational DPs that cannot scope out of islands. For instance, (29) shows that while the quantifier *every* in (29) cannot scope out of the if-clause island, it can get a *de re* reading. The DP *everyone in this room* in (29b) is construed *de re* relative to the intensional operator governing the conditional. As no one can be in this room and outside in the same world, the *de dicto* interpretation of *everyone in this room* creates a non-sensical reading.

(29) a. If [every rich relative of mine dies], I'll inherit a house.

∗every≫if

b. If [everyone in this room were outside], it would be empty.

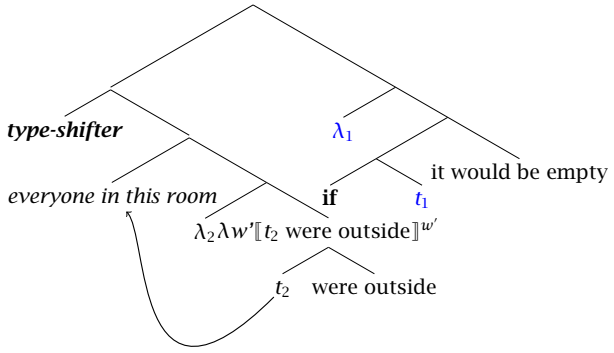
everyone≫if

This system assumes a scope analysis of intensionality, according to which a DP embedded under an intensional operator can only get a *de re* construal if it moves to a position higher than the intensional operator in the structure (Keshet 2008, 2010a,b, Charlow 2014, 2020, Demirok 2019, Elliott 2023). The special pied-piping mechanism introduced in this system (Charlow 2020, Demirok 2019, Elliott 2023), however, allow DPs to take exceptional *de re* interpretations, without violating island constraints.

Under this view, quantificational DPs can take *de re* readings out of syntactic islands via movement to the edge of the island. Then, the island itself

moves to a higher position, as shown in (30). Unlike indefinites, however, quantificational DPs like *every* leave a higher order trace of type ⟨⟨e,t⟩,t⟩ behind, forcing it to semantically reconstruct for scope into the syntactic position of the trace. The crucial point here is that the syntactic position of the higher order trace marks the scope of the quantifier, capturing the fact that it cannot outscope an island. The intensionality of quantifiers, on the other hand, is determined by their final syntactic position at LF with respect to the intensional operator. Therefore, quantifiers can outscope an intensional operator, even when embedded in an island, to be construed *de re*, but their quantificational scope can never escape that island.

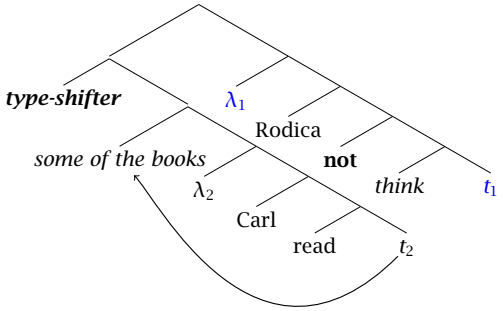
(30)



The existence of wide pseudo-scope *de dicto* readings of indefinites creates a serious problem for this approach. To get the intended reading, the indefinite has to move to a position higher than the negation in the matrix clause and yet under the intensional verb *think* in order to be interpreted *de dicto*. However, there are only two licit movements: (i) moving the indefinite to the edge of the embedded clause, which is not above negation, or (ii) shifting the embedded clause to a scope taking object and then moving it to a higher position. This movement puts the indefinite above negation, but as the indefinite now outscopes the intensional operator, it cannot be interpreted *de dicto* anymore. This is illustrated in (31b).

(31) a. Rodica does not think that Carl read some of the books.

b.



In a system that takes the syntactic position of indefinites to determine their quantificational scope, the observed reading of (31a) constructs a case of wide scope *de dicto* reading (a.k.a. *the fourth reading*), in which the determiner of a DP scopes above an intensional operator, while its restrictor is interpreted below the scope of the intensional operator. This fourth reading is deliberately excluded by the main theories of intensionality (Percus 2000, von Fintel & Heim 2011, Keshet & Schwarz 2019, Elliott 2023). As we saw in (30), *de re* construal of DPs does not necessarily come with wide quantificational scope. However, wide quantificational scope necessarily comes with a *de re* interpretation, as the intensionality of a DP is still determined by its final syntactic position with respect to an intensional operator. According to all of these theories, a DP can only get a *de dicto* reading when it is under the scope of an intensional operator. If a DP moves in order to take wide scope with respect to the intensional operator, it can no longer be construed *de dicto*.

Finally, the contrast between indefinites and universal quantifiers in (19), repeated here as (32), shows that even when no island boundaries are involved, the scopal behavior of indefinites and universal quantifiers differ.

(32) a. **do-ta** kart ro ne-mi-tun-id be-bin-id
two–CL card RA NEG-IMPF-can-2PL SUBJ-see-2PL
You cannot see two of the cards.
$\neg \gg \Diamond \gg$ *two of the cards* $\longrightarrow \Box \gg$ *two of the cards* $\gg \neg$

b. **Hame**-e kart-ha ro ne-mi-tun-id be-bin-id
all-EZ card-PL RA NEG-IMPF-can-2PL SUBJ-see-2PL
You cannot see all of the cards.
$\neg \gg \Diamond \gg$ *all of the cards* $\not\longrightarrow \Box \gg$ *all of the cards* $\gg \neg$

It is not clear how a movement-based approach to indefinites could distinguish between local movement mechanisms available to universal quantifiers and indefinites. In order to capture this asymmetry, the movement-based account should posit that indefinites under the scope of a negated modal, and crucially only indefintes, can undergo movement to a syntactic position above the negation and below the intensional operator. Firstly, as we have discussed in Section 1.2, this position does not exist in the relevant LF that represents the scopal relation between negation and the modal. Secondly, without altering the standard assumptions about movement within island boundaries, this cannot explain why such a local intermediate position, if it wasn't a logical impossibility in the case under consideration, is not a possible landing site for universal quantifiers.

The data above seem to also provide evidence against a strong interpretation of what Barker (2022) calls *the exceptional scope conspiracy*, i.e. the interpretation that non-QR scoping mechanisms are not needed in the grammar.

(33) **The exceptional scope conspiracy** (Barker 2022)
Non-QR scoping mechanisms deliver the same truth conditions that QR would have delivered if we ignored islands.

While Barker (2022) does not discuss intensional interpretations of indefinites in details, he notes that "intensionality is potentially relevant for evaluating the claim that QR delivers the same interpretations as other scoping mechanisms." Crucially, Barker (2022) leaves the possibility of non-QR scoping mechanisms open for cases where they can be motivated for reasons other than "a mistaken belief that clauses are scope islands" (Barker 2022). The data in (32a) precisely presents such a case. Since there is no island involved in (32a), we have independent evidence that indefinites can give rise to intensional interpretations that cannot be explained in terms of movement mechanisms available to quantifiers.

I would like to end this section by noting that the case of neg-raising *think* alone would not be a strong counter-example to the conspiracy, as the syntactic account of neg-raising can derive the readings. In doing so, however, it requires some unwarranted stipulations. As we have seen in Section 1.3, the uniqueness of indefinites in taking wide (pseudo)-scope *de dicto* readings shows that even in neg-raising environments, the existence of such readings cannot be solely due to syntactic movement of negation and requires redefining the *highest-operator constraint* to exclude indefinites. If this reasoning

is on the right track, the syntactic account of neg-raising has independent problems, which are not related to islands. Given that the assumption about the syntactic account of neg-raising is essential to derive the intended truth-conditions (i.e. *think* ≫ ∃ ≫ ¬), and that this account is not tenable without further stipulations, I believe that even the neg-raising cases can be counter-examples to the exceptional scope conspiracy.

2.3 In-situ "scope"

The island-escaping behavior of indefinites led to a search for a non-movement account of indefinite scope. A major line of thinking has been to separate the existential quantification and the descriptive content of indefinites. In line with Heim 1982 and Kamp 1981, many have taken indefinites to only contribute some kind of variable and rely on the freely available existential closure mechanism to account for the existential power of indefinites (Abusch 1993, Reinhart 1997, Winter 1997, Jäger 2007, Onea 2015). There is a huge deal of variation in how this idea is technically implemented. Focusing on the choice functional accounts, I will first show that in-situ accounts of indefinites can straightforwardly account for the existence of wide pseudo-scope *de dicto* readings of indefinites. Discussing a new variant of the data that we have seen in this paper, I will then argue that only in-situ accounts that allow the determiner of indefinite DPs to have an independent world variable can capture the full pattern of the data.

A successful in-situ account of island-free scope of indefinites, within static semantics, takes indefinites to denote choice/skolem functions (Reinhart 1997, Winter 1997, Kratzer 1998, Matthewson 1998, Steedman 2011). A *choice function* is a function that maps any non-empty set onto an element of that set. Therefore, it is a function of type ⟨⟨e,t⟩, e⟩, which applies to the property denoted by the nominal predicate of type ⟨e,t⟩ and returns an individual of type e that has that property. According to Reinhart (1997) and Winter (1997), an indefinite determiner may introduce a *choice function* variable in-situ, which takes the restrictor of the indefinite as argument. Since the choice function variable is assumed to be bound by an existential quantifier which can freely appear at any level, this analysis predicts that an indefinite may have narrow, intermediate, or wide scope with no sensitivity to scope islands.

(34) Every linguist studied every solution that some problem that intrigued him/her might have.

a. $\forall x[\ \text{linguist}'(x) \rightarrow \exists f \forall z[\text{solution-to}'(z, f(\text{problem}')) \rightarrow \text{studied}'(x,z)\ ]]$

b. $\exists f \forall x[\ \text{linguist}'(x) \rightarrow \forall z[\text{solution-to}'(z, f(\text{problem}')) \rightarrow \text{studied}'\ (x,z)\ ]]$

On the intermediate scope reading in (34a), for every linguist x, there is a way f of choosing a problem such that x studied every solution to the chosen problem by f(problem), so the problem chosen can vary with the linguists. On the wide-scope reading in (34b), there is a way of choosing problem f such that every linguist x studied every solution to the chosen problem by f(problem).

Unlike Reinhart (1997) and Winter (1997), Kratzer (1998) does not posit that an existential quantifier binds choice functions. According to Kratzer (1998), choice functions are interpreted as free variables, whose values are provided by the context. Therefore, they always act as if they get maximal scope. Because there is no existential quantifier introduced to bind free choice function variables, Kratzer's account does not generate intermediate readings, at least not as freely as existentially closed choice functions proposed by Reinhart (1997) and Winter (1997) do. To account for the intermediate scope of indefinites, Kratzer proposes to use *Skolemized choice functions* which are Skolem functions that have both set and individual-variable arguments. This Skolem function applies to a binary relation between *linguists* and *problems* and for each linguist, it returns a problem that intrigued them, as shown in (35a). This is basically equivalent to the reading with the intermediate existential closure over a choice function, as given in (35b).

(35) a. $\forall x[\ \text{linguist}'(x) \rightarrow \forall z[\text{solution-to}'(z, f(x, \text{problem}')) \rightarrow \text{studied}'(x,z)\ ]]$

b. $\forall x[\ \text{linguist}'(x) \rightarrow \exists f \forall z[\text{solution-to}'(z, f(\text{problem}')) \rightarrow \text{studied}'(x,z)\ ]]$

Skolemization of choice functions with an individual variable also helps to solve a problem for choice functions that arises when the set of elements to which the choice function applies is fixed. In such cases, a choice function, being a function, always picks out the same element from a given set, which might not be the intended reading (Abusch 1993, Kratzer 1998, Chierchia

2001 and Abels & Martí 2010, among others). Consider the example (36a) with the intermediate reading of the indefinite, as in (36b).

(36) a. Every linguist studied every solution that some problem that intrigued them might have.
b. ∀x[linguist′(x) → ∃*f* ∀z[solution-to′ (z, *f* (problem′)) → studied′ (x,z)]]

In a situation in which the members of the set of linguists {A, B} are intrigued by the same set of problems {weak crossover , donkey sentences}, the non-skolemized choice function *f* applies to the set {weak crossover, donkey sentences} and since it is a function, it has to give a unique value. Therefore, it would go wrong either for linguist A or for linguist "B" in certain contexts. Skolemization solves this problem. When Skolemized, a choice function that applies to a relation between A and the set {weak crossover, donkey sentences} can return a value that is different from the value it returns when it applies to a relation between B and the same set {weak crossover, donkey sentences}.

(37) a. *f* (A, {weak crossover, donkey sentences}) = weak crossover
b. *f* (B, {weak crossover, donkey sentences}) = donkey sentences

It has been suggested that intensionalizing the choice function can solve this problem (Reinhart 1997, Winter 1997). An intensional choice function (Heim 1994) takes an intensional property ($\langle s, \langle e, t\rangle\rangle$) as argument, and returns an individual concept ($\langle s, e\rangle$).[13] Instead of applying to the set of problems, for instance, *f* applies to an intensional property of the form 'being a problem that intrigued *x*', and since there are presumably possible worlds in which linguists A and B are intrigued by different problem, we can now differentiate between 'being a problem that intrigued *x*, with *x* standing for the linguist A' and 'being a problem that intrigued *x*, with *x* standing for the linguist B', even if they are intrigued by the same problems in reality.

In what follows, I will first show that although it has remained unnoticed, in-situ accounts of indefinites that make use of a default existential closure over intensional variables predict the existence of wide pseudo-scope *de dicto*

13 Winter (1997) and Reinhart (1997) implement this idea differently. According to them, an intensional choice function is of type $\langle\langle s, \langle e, t\rangle\rangle, e\rangle$. It takes an intensional property and returns an individual in the extension of this property. See Geurts 2000 for a criticism of this implementation.

readings of indefinites. I will showcase this with an account in terms of intensional choice functions (Heim 1994, Winter 1997, Romero 1999, Keshet 2010a). However, an intensional version of any in-situ approach that separates the existential force and the descriptive content of indefinites (Abusch 1993, Reinhart 1997, Winter 1997, Jäger 2007, Onea 2015) generates wide pseudo-scope *de dicto* readings in the same way. I will then argue that the account in terms of intensional choice functions still runs into a problem when the set of elements that the choice function applies to is fixed. I propose a different version of intensional choice functions in terms of skolemization with world variables, which solves the fixed-set problem. I will also argue that this account does a better job of explaining cross-linguistic variation in the availability of such readings.

Let us start by applying the current choice functional analysis on one of our example in (1), repeated here as (38).

(38) Rodica fekr ne-mi-kon-e ke Carl { **čand-ta**/ **ye** }
Rodica thought NEG-IMPF-do-3SG that Carl some.PL-CL/ some
ketab ro xunde bash-e.
book RA studied be.SUBJ-3SG
Rodica does not think that Carl read some of the books.

As the books that Carl did not have time to read can vary in different worlds, we need a way to get variation in the output of the choice function that applies to the books Carl has to read. In other words, we need the choice function to pick possibly different books Carl did not read in each world. Following Heim 1994, Winter 1997, Romero 1999, I take the choice function to apply to the intensional property 'being a book x that Carl has to read for his exam'. I also assume the semantic-pragmatic account of neg-raising, according to which negation is in the matrix clause and does not move from under *think*. Given the denotation of the neg-raising predicate *think*, as a generalized quantifier over possible worlds, and the negation of the embedded proposition as a result of the excluded middle presupposition, we will have (39a):

(39) a. **Assertion:**
$\neg[\forall w' \in \text{Beliefs(Rodica},w_0\text{):[read}_{w'}\text{ (Carl, } f(\text{book}_{w'}\text{))]]}$

b. **Presupposition:**
$\forall w' \in \text{Beliefs(Rodica},w_0\text{):[read}_{w'}\text{ (Carl, } f\text{ (book}_{w'}\text{))]} \vee$
$\forall w' \in \text{Beliefs(Rodica},w_0\text{):}\neg\text{[read}_{w'}\text{ (Carl, } f(\text{book}_{w'}\text{))]}$

c. $\therefore \forall w' \in \text{Beliefs(Rodica},w_0\text{)}: \neg\text{[read}_{w'}\text{ (Carl, } f(\text{book}_{w'}\text{))]}$[14]

The truth conditions in (39a) give us the intended reading of (38). For (39a) to be true, Rodica does not have to have a specific book in mind. In fact, it might be the case that Rodica and her source are mistaken and Carl does not even have an exam to read books for. For every one of Rodica's belief worlds w, the choice function *f* can pick out an individual concept 'being a book x that Carl has to read for his exam but did not have time to'. Therefore, although negation syntactically takes wider scope than the indefinite, thanks to the wide pseudo-scope effect of choice functions, the indefinite can appear to take wider scope than negation, without actually moving to a higher position than negation in the structure.

So far, we have seen that the movement approach fails to account for wide pseudo-scope *de dicto* readings of indefinites, but adapting an analysis of indefinites in terms of intensional choice functions straightforwardly accounts for the availability of such readings to indefinites. However, intensional choice functions run into a problem when the context in which (38) is uttered is changed.

Let us imagine the following context. Rodica and Carl are students of a course on Covid-19. The final exam is tomorrow. Students have to read the only five books ever written on the topic {A,B,C,D,E}. Rodica learns that Carl has started studying for his exam three hours ago. Rodica is convinced that Carl is reading for the course on Covid. Knowing that it takes at least one hour to read any of those books, Rodica believes that there are at least two books that he did not have time to read but she does not know which books. Unknown to Rodica, Carl has dropped that course and is reading for another exam that happens to also take place tomorrow. For that exam, he does not have to read any book, rather he has to read some articles. The same sentence in (38), repeated here as (40), is true in this context.

(40) Rodica fekr ne-mi-kone ke Carl { **čand-ta/ ye** }
Rodica thought NEG-IMPF-do-3SG that Carl some.PL-CL/ some
ketab ro xunde bash-e.
book RA studied be.SUBJ-3SG
Rodica does not think that Carl read some of the books.

The indefinite is still interpreted above negation and under the scope of intensional verb *think*. Here too, there is no specific book(s) x such that Rodica

14 I have assumed the presupposition account of neg-raising (Gajewski 2005), but the exact process via which a neg-raising reading is inferred does not concern us here. The indefinite takes wide pseudo-scope over negation in the assertion level.

has formed the belief that Carl did not read x, and the witness of the indefinite can vary across Rodica's belief worlds. However, the truth conditions given in (39a), repeated here as (41), no longer give us the intended reading.

(41) $\lambda w.\forall w'' \in \text{Beliefs(Rodica,}w\text{)}:\neg[\ \text{read}_{w''}\ (\text{Carl},\ f\ (\text{book}_{w''}\ ))]$

As Rodica knows that there are only five books written on the subject of the exam, there cannot be a world in her belief worlds in which the intensional property of 'being a book Carl has to read for his exam' contains books different from those five books. The intensional choice function applies to the intensional property 'being a book Carl has to read for his exam', but since the set of books Carl has to read is fixed across all of Rodica's belief worlds, it always returns the same output, say A.

(42) $f(\ \{\text{A,B,C,D,E}\}) = \text{A}$

Therefore, (41) gives rise to the wide pseudo-scope (*de re*) reading of the indefinite, which is not the intended reading of (40). To get the intended reading, the choice function needs to pick different elements from a single set across Rodica's belief worlds. But our current machinery does not provide a way to do this. This shows that intensional choice functions still runs into the fixed-set problem (Abels & Martí 2010).

The question I aim to answer here is how the variation of books across Rodica's belief worlds can be explained. As mentioned before, the variation in the output of the choice function can be captured in terms of skolemization (Kratzer 1998). It is obvious, however, that skolemization with an individual variable does not help; as there is just one individual "Carl", the output of the choice function will still be a unique element. In the next section, I will show that a similar mechanism that skolemizes choice functions with a world variable can solve this problem (A similar solution is alluded to in Abels & Martí 2010, Homer 2015, and Onea (2015) who attributes the idea to Ede Zimmermann[15], but the prediction such an account makes with regard to the wide pseudo-scope *de dicto* reading of indefinites has not been discussed before.)

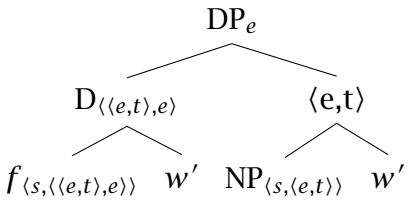
3 World-skolemized choice functions

I follow F. Schwarz's (2012) proposal that determiners can introduce a world variable (a situation variable in his system). I propose that Farsi indefinite

15 I thank an anonymous reviewer for bringing this to my attention.

determiners denote a choice function of type $\langle s, \langle\langle e, t\rangle, e\rangle\rangle$. This choice function takes a world variable as its first argument, then it applies to the characteristic set of an ⟨e,t⟩-type NP, and it returns an individual of type e, as shown in (43).

(43)



This amounts to skolemization, whereby a variable that is bound by a higher operator is introduced as an argument of a choice function, in order to trigger variation in the output of the choice function with respect to that variable. Instead of an individual variable (Kratzer 1998), however, we have a world variable (see Abels & Martí 2010, Homer 2015 for a similar proposal to account for the split scope readings of negative indefinites). Therefore, I propose that in addition to an optional individual argument (Kratzer 1998), choice functions are always skolemized with a world variable. When this world variable is bound by an intensional operator, the choice function can return a different output for every world.

As (43) shows, I take NPs to be of type $\langle s, \langle e, t\rangle\rangle$. Therefore, DPs can contain two world variables, one introduced with the NP, and one with the determiner. However, as F. Schwarz (2012) argues, there is no evidence for the intensional independence of NPs. Therefore, I take the world argument of NP to be obligatorily bound locally; thus it is always evaluated relative to the same world as its determiner.[16] This yields two possible configurations:

(i) When the world variables of the choice function and the NP are set to the actual world, we have $f(w_0, (\text{NP } (w_0)))$. The world argument is constant, and the effect will be as if there is no skolemization, f(NP).

(ii) When the world variables of the choice function and the NP are bound by an intensional operator, we have $f(w', (\text{NP } (w')))$.

Let us see how this proposal accounts for the intended reading of (40). As Rodica is convinced that Carl is studying for the course on Covid, the

16 This is an extension of F. Schwarz's (2012) account in which only determiners carry an independent situation variable, and which produces the same results.

extension of the set of books Carl is supposed to read (i.e. {A,B,C,D,E}) is fixed across Rodica's belief worlds. The indefinite is interpreted *de dicto*, as Rodica is mistaken about the exam for which Carl is studying. With the new machinery of skolemization with world variables, we have a way of ensuring cross-world variation in the output of the choice function. The world argument of the determiner of the indefinite, i.e. the choice function variable, can be bound by the intensional operator. Given the new semantics of indefinites as a choice function skolemized with a world variable and the negation of the embedded proposition as a result of the excluded middle presupposition (Bartsch 1973, Horn 1989, Gajewski 2005, Romoli 2013, Homer 2015, and Zeijlstra 2017, among others), the truth conditions of (40) are (44).

(44) $\forall w'' \in \text{Beliefs(Rodica,}w_0\text{)} : \neg[\ \text{read}_{w''}\ \text{(Carl, } f(w'',\text{(book}(w'')))))]$

(44) gives us the intended reading of (40). The function *f*, which is skolemized with a world variable, can pick different values for different worlds (i.e. cross-world variation):[17]

(45) a. $f(w_1, \{A,B,C,D,E\}) = A$
b. $f(w_2, \{A,B,C,D,E\}) = C$
c. $f(w_3, \{A,B,C,D,E\}) = E$

Although both world-skolemized choice functions and intensional choice function (Heim 1994, Romero 1999) can account for cross-world variation in cases where the extension of the NP is not a fixed set across worlds, an account in terms of skolemization with world variable has the additional advantage of solving the fixed-set problem.

Let us apply this machinery to a similar example, now involving a clause-mate modal. Consider the sentence (32a), repeated here as (46).

17 Note that I have only shown atomic individuals for convenience. More precisely, I take NPs in Farsi to denote sets consisting of both atomic and plural entities (see Krifka & Modarresi 2016 for more details on the number neutrality of bare singulars in Farsi). The choice function denoted by the indefinite determiner can choose an atomic or a plural entity, depending on its meaning.

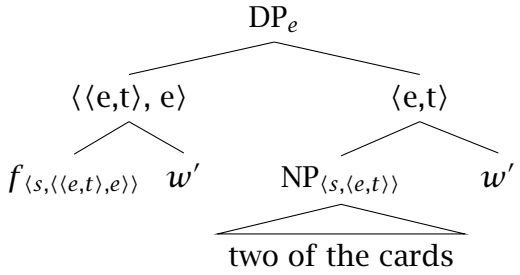
(i) $[\![\ \text{book}\ ]\!]$={A,B,C,D,E, A⊕B, A⊕C, A⊕D, A⊕E, B⊕C, B⊕D, B⊕E, C⊕D, C⊕E, D⊕E, A⊕B⊕C, A⊕B⊕D, A⊕B⊕E, A⊕D⊕E, B⊕C⊕D, B⊕C⊕E, B⊕D⊕E, A⊕D⊕E, A⊕C⊕E, C⊕D⊕E, A⊕B⊕C⊕D, A⊕B⊕C⊕E, B⊕C⊕D⊕E, A⊕C⊕D⊕E, A⊕B⊕D⊕E, A⊕B⊕C⊕D⊕E}

Context: The rule of a card game for two players is such that each player is given five cards in every round. Each player can see any three cards of their choice from the other player's cards. An instructor explaining the rules to players:

(46) **do-ta** kart ro ne-mi-tun-id be-bin-id
two-CL card RA NEG-IMPF-can-2PL SUBJ-see-2PL
You cannot see two of the cards.

As numeral DPs behave like other indefinites in their scope-taking properties, they have also been argued to contain a null choice functional determiner (Reinhart 1997, Winter 1997, Kratzer 1998, Ionin & Matushansky 2006, among others). According to this view, numeral noun phrases denote a plural individual e, which is the output of a choice function f which applies to the set of all plural individuals x, such that each x is divisible into *number* non-overlapping individuals, and returns a single such x. A DP such as *two of the cards* has the structure (47). It is a plural individual of type e which consists of two non-overlapping individuals, each of which is a card. This plural individual is the output of the choice function f applied to the set of all plural individuals consisting of two cards.

(47)



Given the denotation of the numeral noun phrase *two of the cards*, (48) is the truth conditions of (46).

(48) $\lambda w.(\exists f)\neg\exists w' \in W$ [[the game rules in force in w are obeyed in w'] $\wedge$ see' (you, $f(w'$,(cards(w')))]

This give us the intended reading. The indefinite can appear to take wide scope over negation thanks to the choice function, and because the world variable of the choice function is bound by the intensional operator, the indefinite is construed *de dicto*.

Finally, it is important to note that nothing in the analysis rules out the possibility that a world-skolemized choice function can be further skolemized with an individual variable. In the same context, the rule of the game can be stated with a universal quantifier in the subject position that outscopes both negation and the indefinite, as shown in (49). The truth conditions of this sentence with a doubly-Skolemized choice function are given in (50a). As discussed in the previous section, however, the same reading can be derived via an intermediate existential closure over the choice function, as in (50b). The skolemization with world variable is necessary under both approaches.[18]

(49) harkas-i ke tu bazi-e ne-mi-tun-e **do-ta** kart ro
everybody-EZ that in game-be.3SG NEG-IMPF-can-3SG two-CL card RA
be-bin-e
SUBJ-see-3SG
Everybody who is in the game cannot see two of the cards.

(50) a. $\lambda w.(\exists f)\forall x[$ person$(x)\wedge$ is-in-the-game$(x) \rightarrow \neg\exists w' \in W$ [the game rules in force in w are obeyed in w'] $\wedge$ see (x, $f(w'$, (**x**, cards$(w'))))]$

b. $\lambda w.\forall x[$ person$(x)\wedge$ is-in-the-game$(x) \rightarrow \exists f.\neg\exists w' \in W$ [[the game rules in force in w are obeyed in w'] $\wedge$ see (x, $f(w'$, cards$(w')))]]$

3.1 Other in-situ accounts

Note that the main motivation for skolemizing choice functions with a world variable is to explain the intuition that the witness of an indefinite can vary across possible worlds, even though the extension of the restrictor NP is a fixed set. As we saw in the previous section, wide pseudo-scope *de dicto* readings that do not involve a fixed set are predicted to exist under an intentional choice function (Winter 1997, Heim 1994, Romero 1999). In fact, all it takes to account for wide pseudo-scope *de dicto* readings is to allow for the descrip-

18 I do not take a stand on whether the choice function variable is bound (Winter 1997, Reinhart 1997, Matthewson 1998) or remains free (Kratzer 1998, 2003). The existence of wide pseudo-scope *de dicto* reading is compatible with both approaches. The tendency of plural indefinites to outscope negation (if it turns out that this tendency is more stable than a pragmatic account predicts) does not settle this debate, as it can be captured both in terms of Kratzerian free choice functions and Matthewson-style choice functions that are closed at the topmost level of the derivation. It is the low scope of indefinites with respect to negation that determines this choice.

tive content of the indefinite to stay under the intensional operator while the existential quantification outscopes the negation. Other in-situ approaches in terms of a default existential closure can easily generate such readings[19], and as they do not involve choice functions, they do not even run into the fixed set problem. However, given the ease with which such accounts generate wide pseudo-scope *de dicto* readings of indefinites, we would expect such readings to be cross-linguistically more widespread than they really are.

My English consultants, all linguists, have reported that corresponding English examples also give rise to wide pseudo-scope *de dicto* readings. However, there appears to be variation among English speakers, as some English speakers report that they find such readings hard or even impossible. Others share the reported judgments for some, but not all of the key examples. My German and French consultants find these readings impossible in their languages. A native speaker of Japanese reports that the wide pseudo-scope *de dicto* readings are available in Japanese. The judgments in Farsi are quite straightforward. I have not encountered much variation in the availability of the reported readings among my consultants[20]. While more research needs to be done to explore cross-linguistic variation in intensional properties of indefinites that can take exceptional wide scope, the analysis presented in this

19 The account of wide scope of indefinites in terms of topicality (Cresti 1995, Ebert 2009) cannot explain the data. As Ebert (2009) points out, since this account correlates topicality and wide scope, it predicts that purely unspecific *de dicto* scope indefinites cannot be topical (wide scope).

20 An anonymous reviewer, who is a native speaker of Farsi, reports that it is easier for them to get the wide pseudo-scope *de dicto* readings with numerals and singular indefinites than with plural indefinites *čand*. They suspect that this might be due to competition with alternative ways of conveying the same meaning (i.e. $\neg \gg \forall$). I completely agree that the pragmatic factors, including pragmatic competitions, play an integral role in making a certain reading more salient. The following example provides a case where the plural indefinite is more felicitous than *all*, perhaps because the instruction containing *all* would be a bit misleading.

> *Context: There are 15 questions on the exam. Each question has 10 points. To get the full points on the exam (100 points), students only need to answer ten questions. Five of the questions are marked as obligatory. Students can pick five out of the remaining ten questions to answer. An examiner to students:*
>
> (i) lazem ni-st { **čand-ta** soal/ ?**hame**-e soal-ha } ro javab
> necessary NEG-be.3SG some-CL question/ all-EZ question-PL RA answer
> be-d-id
> SUBJ-give-2PL
> *You do not have to answer {some/all} of the questions.*

paper does a better job in accounting for the apparent rarity of such readings. According to the analysis proposed in this paper, the wide pseudo-scope *de dicto* reading of indefinites is only available if choice functional indefinite determiners in a given language come with an independent world/situation argument.

F. Schwarz (2012) notes that determiners can vary with respect to whether or not they combine with such a world/situation pronoun. This opens up a locus of variation across languages. A choice functional determiner may be able to combine with a world pronoun in one language like Farsi, and not in another one, like German or French. As for English, F. Schwarz (2012) proposes that it can be assumed that there are two variants of the indefinite determiner *some*: one that takes a situation pronoun argument, and one that does not. It can be argued that the grammar of English speakers for whom the reported readings are impossible only has indefinite determiners that lack a situation variable. Others might have both versions in their grammar, but show a preference for one of them.

Before ending this section, I would like to briefly discuss an alternative in-situ account proposed by Brasoveanu & Farkas (2011). According to this proposal, the semantics of an indefinite determines whether the witness choice it contributes is dependent on or independent of variables that are syntactically accessible to the existential.[21] This is represented by the choice of the superscript variable set on the existential quantifier, as shown in (51). Given that the indefinite a^{y} *paper* is evaluated after the universal quantifier *every*^{x} *student*, it can be interpreted relative to the non-empty set of variables $\{x\}$ (i.e. taking narrow scope), or as fixed $\varnothing$ (i.e. taking wide scope).

(51) Every^{x} student read a^{y} paper.

a. $\forall x[\textsc{stud}(x)](\exists^{\varnothing} y[\textsc{paper}(y)](\textsc{read}(x,y)))$

b. $\forall x[\textsc{stud}(x)](\exists^{\{x\}} y[\textsc{paper}(y)](\textsc{read}(x,y)))$

To account for the scopal relation between negation and indefinites, Brasoveanu & Farkas (2011) take negation to be a universal quantifier over possible worlds. For instance, if the superscript on the existential is the singleton set containing the actual world variable $\{w^{@}\}$, as in (52), the indefinite

21 This view is essentially an intensional version of the singleton account of indefinites (Schwarzschild 2002), according to which wide scope readings of indefinites arise when indefinites' restrictions are pragmatically constrained to a singleton set. Consequently, the issues raised in this section similarly afflict the singleton account of indefinites (Schwarzschild 2002).

an umbrella has wide scope relative to negation. If the superscript on the existential is $\{w\}$, as in (52b), the indefinite *an umbrella* has narrow scope relative to negation.

(52) John did not bring an umbrella.

a. $\forall w[\exists^{\{w^@\}} x[\text{UMBRELLA}(w^@, x)](\text{BRING}(w, \text{JOHN}, y))] \quad (w \neq w^@)$

b. $\forall w[\exists^{\{w\}} x[\text{UMBRELLA}(w, x)](\text{BRING}(w, \text{JOHN}, y))] \quad (w \neq w^@)$

Like choice functional analyses, this system allows the determiner and its restrictor to have independent world variables. However, Brasoveanu & Farkas (2011) do not lay out the predictions of their system about the scopal interaction between negation and modals. It seems that the existential determiner under a negated modal would need to have two world variables, one contributed by the modal and one contributed by negation. To get the wide pseudo-scope *de dicto* reading, the existential would have to be simultaneously interpreted relative to the actual world (to get the wide scope over negation) and *de dicto* with respect to the modal. This does not seem to be a plausible explanation for the availability of wide pseudo-scope *de dicto* readings.

3.2 Binder Roof Constraint

We have seen that world-skolemized choice functions can derive the full pattern of wide pseudo-scope *de dicto* readings of indefinites in Farsi, while avoiding the overgeneration of such readings cross-linguistically. Before concluding this paper, I address one potential worry about choice functional accounts. Under the choice functional analysis, no limitation on the exceptional upward scope of indefinites is predicted to exist. As observed by Abusch (1993) and extensively discussed in Chierchia 2001, B. Schwarz 2001 and B. Schwarz 2011, this account overgenerates.

It has been shown that an indefinite cannot scope over a quantifier that binds into its restrictor. Brasoveanu & Farkas (2011) refer to this limitation on the scope of indefinites as the Binder Roof Constraint. The example (53a) by B. Schwarz (2001) shows this. Consider a scenario where Sue wrote two papers SP={S_1,S_2} but only submitted S_1, and Mary wrote two papers MP={M_1,M_2} but only submitted M_2.

(53) a. No candidate$_1$ submitted *a* paper they$_1$ had written.

b. $(\exists f)$[No candidate$_1$ λ_1[t_1 submitted f [paper they$_1$ had written.]]]

The choice functional account overgenerates, as it can assign the LF in (53b) to the sentence (53a). This LF conveys that there is a way of choosing among papers that each candidate wrote such that no candidate submitted whatever paper is selected by f for them. As we can find such a function, namely a function that picks S_2 for Sue, and M_1 for Mary, the choice function account predicts that the sentence (53a) should be judged true in this scenario, contrary to the fact. The sentence in (53a) only means that for no candidate x, there is a paper y and x wrote y such that x submitted y.

Several solutions in terms of restricting the domain or range of quantification for the choice function have been suggested, which I will not discuss here (see Reinhart 1997, Kratzer 2003, Steedman 2007). However, I would like to highlight that the Binder Roof Constraint is not as worrisome as it may seem. First, not all indefinites are subject to the Binder Roof Constraint. B. Schwarz (2001, 2011) and Kratzer (2003) show that a corresponding sentence containing *a certain* indefinites does in fact have the reading presented in (53b). The sentence (54) is judged true in the scenario described above.

(54) No candidate$_1$ submitted *a certain* paper they$_1$ had written.

The availability of such readings is problematic for accounts that completely rule out violations of the Binder Roof Constraint. They undergenerate attested readings of *a certain* indefinites. Moreover, the cross-linguistic studies on the scopal properties of indefinites have revealed that the constraint does not hold across languages. Renans (2018) and Dawson (2020) show that indefinites in Ga and Tiwa pattern with English *a certain* indefinites in their ability to give rise to the wide scope reading in downward-entailing contexts. Farsi indefinites present another case where the Binder Roof Constraint does not hold. Indefinites in Farsi can outscope a downward-entailing quantifier that binds into them. The same sentence can also be true in a scenario where no one has submitted any of their assignments, with a focus on *ye*.

(55) hič danešjuy-i **ye** mašq-eš ro tahvil na-dade
any student-INDF some assignment-their RA submit NEG-give.PP
ast.
AUX.3SG
No student submitted a certain*/an assignment of theirs.*

Moreover, despite the fact that wide pseudo-scope *de dicto* readings are easily available to Farsi indefinites, in-situ accounts that can generate such

readings but rule out violations of the Binder Roof Constraint (Jäger 2007, Onea 2015) are not viable accounts for Farsi indefinites. The challenge for all accounts of indefinite scope is to derive the variation among different kinds of indefinites within and across languages. We might need multiple scope mechanisms to account for the diversity of indefinite expressions both within and across languages.[22] Despite the claims to the contrary, however, choice functions remain a successful approach to account for a cross-linguistically well-attested group of indefinites.

4 Conclusion

In this paper, I have presented novel data from Farsi that show that indefinites under negated intensional operators can have wide pseudo-scope *de dicto* readings, without movement of either the indefinite or negation. I have argued that the existence of such readings is a problem for movement-based approaches to the scope of indefinites (Charlow 2014, Demirok 2019). The existence of true wide scope *de dicto* readings (a.k.a. *the fourth reading*) is excluded in all theories of intensionality (Keshet & Schwarz 2019, Elliott 2023), as DPs need to be under the scope of an intensional operator to be interpreted *de dicto*. Under a movement-based approach, wide pseudo-scope *de dicto* readings of indefinites would also fall under the category of the fourth reading. To take scope over negation, the indefinite has to move to a position higher than negation in the structure. After this movement, however, the indefinite will no longer be under the scope of the intensional operator to be construed *de dicto*.

Under in-situ accounts of indefinites, on the other hand, indefinites embedded under a negated intensional operator can appear to take wide scope over negation without having to leave their syntactic position under the scope of an intensional operator. Thus in-situ approaches can account for the wide pseudo-scope *de dicto* reading of indefinites while ruling out the existence of genuine wide scope *de dicto* readings for bona fide quantifiers.

Moreover, I have shown that such wide pseudo-scope *de dicto* readings also arise when the indefinite and the negated modal are in the same clause. The uniqueness of indefinites in giving rise to such readings provides further evidence that indefinites are inherently different from generalized quantifiers. Unavailability of such readings for generalized quantifiers shows that indefinites are not only unique in their ability to take exceptional scope, but

22 This was also pointed out to me by an anonymous reviewer.

also in their local scopal properties. Finally, I have shown that an account in terms of world-skolemized choice functions successfully captures the full pattern of the wide pseudo-scope *de dicto* readings in Farsi, while avoiding the overgeneration of such readings cross-linguistically, which is a goal that few in-situ accounts of indefinites achieve.

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