

# Indefinites in Negated Intensional Contexts: An argument for *world-skolemized* choice functions

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## Abstract

Presenting novel data, I show that indefinites in the surface syntactic scope of a negated intensional operator can 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, cannot yield such readings. I argue that the existence of such wide pseudo-scope *de dicto* readings poses a problem for the generalized quantifier view of indefinites, as well as any approach that takes indefinites to scope via syntactic movement. I show that an in-situ account of indefinites, i.e. the choice functional account (Reinhart, 1997; Winter, 1997; Kratzer, 1998; Matthewson, 1999) can straightforwardly account for the new data, without over-generating genuine wide scope *de dicto* readings (a.k.a. the fourth readings) which are widely believed to be impossible (von Stechow & Heim, 2011; Keshet & Schwarz, 2019; Elliott, 2020). The uniqueness of indefinites in giving rise to such wide pseudo-scope *de dicto* readings, which is also found within a simple clause, provides evidence that indefinites differ from generalized quantifiers, not only in their ability to take exceptional scope, but also in their local scopal properties.

**Keywords** Indefinite, Scope, Choice function, Skolemization, Intensionality, World variable, Neg-raising, the fourth reading

## 1 Introduction

This paper presents a novel observation about the scope of indefinites in negated intensional contexts. I will show that indefinites under the surface syntactic scope of a negated intensional operator can yield a reading in which the indefinite appears to take wider scope than the negation, but narrower than the intensional operator. I will refer to this interpretation as wide pseudo-scope *de dicto* readings. Bona fide generalized quantifiers cannot yield such readings. I argue that movement of either negation or indefinites cannot account for the availability of wide pseudo-scope *de dicto* readings. I will show that the asymmetry between indefinites and generalized quantifiers in giving rise to wide pseudo-scope *de dicto* readings can also be observed within a clause domain. This indicates that

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indefinites are not only unique in their ability to take exceptional scope, but also in their local scopal properties. Therefore, the observation provides further evidence for analyses of indefinites that take them to be inherently different from true generalized quantifiers. This observation introduces a new scope paradox, which lends support to an in-situ approach to the scope of indefinites. Movement-based approaches to the scope of indefinites fail to capture the existence of these readings, as under such approaches, this pseudo-scope effect would fall under wide scope *de dicto* readings, also known as *the fourth reading* (Fodor, 1970), which are notoriously considered to be impossible (von Stechow & Heim 2011; Keshet & Schwarz 2019; Elliott 2020 ; but also see Szabó (2010) and Santorio (2013) for arguments in favor of the existence of the fourth reading). The empirical focus of the paper will be on Farsi data, but the observations can be replicated in other languages.

Indefinites have been shown to differ from generalized quantifiers in their scope-taking behavior. While the scope of quantifiers is clause-bounded, indefinites can scope out of islands (Fodor & Sag, 1982).

- (1) A colleague believes that every paper of mine contains an error.  
 $\not\rightarrow$ ‘For every paper of mine there is a potentially different colleague who believes that it contains an error.’ \*every paper  $\gg$  a colleague<sup>1</sup>
- (2) Each colleague believes that a paper of mine contains an error  
 $\rightsquigarrow$ ‘There is a paper of mine, say paper (b), and each colleague believes that it contains an error.’ ✓ a paper  $\gg$  each colleague

Assuming that the scope of a quantifier is determined by its syntactic position at Logical Form, the exceptional scope of indefinites seems to violate well-established island constraints on syntactic movements. This unique scopal property of indefinites led to approaches treating indefinites as inherently different from generalized quantifiers (Fodor & Sag, 1982; Heim, 1982; Abusch, 1993; Reinhart, 1997; Winter, 1997; Brasoveanu & Farkas, 2011; Charlow, 2014, 2020). Within this group, there are two main approaches to explain the exceptional scope of indefinites: movement-based approaches, and in-situ approaches to the scope of indefinites. There have been several proposals within movement-based approaches, to explain the island-violating scopal property of indefinites, by postulating special scope taking mechanisms, which are only available to indefinites (Geurts, 2000; Schwarzschild, 2002; Charlow, 2014, 2020; Demirok, 2019). I will discuss a group of such proposals that derive exceptional scope of indefinites via pied-piping, without vio-

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<sup>1</sup>Throughout the paper, I will mark an impossible reading with \*, and a possible reading which is false in a given scenario with  $\not\rightarrow$ .

lating island constraints (Charlow, 2014, 2020; Demirok, 2019). Under in-situ approaches, indefinites do not depend on syntactic movement in order to take scope. In this paper, I focus on a family of such proposals, within static semantics, which take indefinites to denote choice/skolem functions (Reinhart, 1997; Winter, 1997; Kratzer, 1998; Matthewson, 1999; Steedman, 2012).

With a novel empirical observation in Farsi<sup>2</sup>, I present a scope paradox in which an indefinite embedded under a negated neg-raising predicate *think*, as in (3), can take a reading such that it is interpreted under the scope of *think*, but above 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 didn't have time to read but she doesn't know which books.*<sup>3</sup>

- (3) Rodica fekr ne-mi-kon-ad ke Carl čand-ta ketab ro xunde bash-ad.  
 Rodica thought NEG-IMPF-do-3SG that Carl some.PL-CL book RA studied SUB.be-3SG  
 “Rodica doesn't think that Carl read some of the books.” *think* » *some* » ¬

In (3), the indefinite is interpreted under the scope of intensional verb *think* (*de dicto*), since there is no specific book(s) *x* such that Rodica has formed the belief that Carl didn't read *x*. Rather, Rodica has a literal belief that there are some books that Carl didn't 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 doesn't know which books.*” At the same time, the indefinite takes wide scope over negation. The low scope reading of 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 (4), negation and *think* reside in the matrix clause, and the indefinite *some of the books*, is syntactically below both of them. Assuming the scope of an element is determined by its syntactic position, (3) is predicted to give rise to two readings. The indefinite can stay in its base-generated position, as in (4), 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.

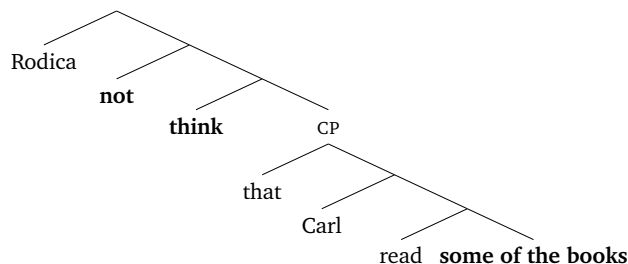
Alternatively, the indefinite can move to the higher clause, as in (5), in which case it is interpreted above both negation and *think*. This yields a reading in which there are some specific books *x* such that Rodica has formed the belief that Carl didn't read *x*. Although (3) can in principle have these readings, neither (4) nor (5) can illustrate the reading of (3) in

<sup>2</sup>My English consultants have also reported that corresponding examples also give rise to such readings. I will only discuss Farsi data, but the analysis can be extended to other languages with choice functional indefinites.

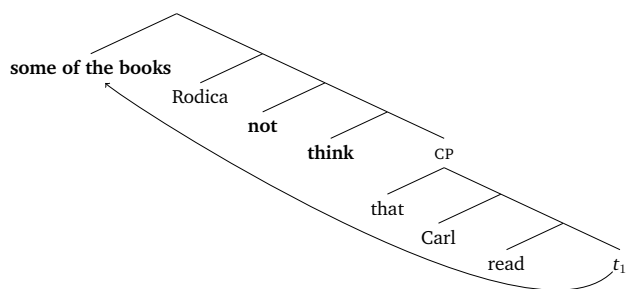
<sup>3</sup>I thank Ekaterina Vostrikova for the context and helpful discussion.

the given scenario. In the intended reading of (3), 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.

(4)



(5)



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 in Farsi, 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, 2019)). Consider the example (6) in the following scenario:

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

- (6) Rodica fekr ne-mi-kon-ad ke čand-ta daneshju mašq-eshun ro  
 Rodica thought NEG-IMPV-DO-3SG that some-CL student assignment-their RA  
 tahvil be-d-and.  
 submit SUB.give-3PL

*“Rodica doesn’t think that some students will submit their assignment.”*

Here again, the indefinite *some students* is interpreted under the scope of 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 doesn’t know which students.”* At the same time, the indefinite takes wide scope over negation. The low scope reading of 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.

There are two important players in these examples: (i) the fact that the negated predicate is *think*, which is a *neg-raising* predicate and (ii) the fact that *indefinites* are unique

in participating this particular scopal interaction, genuine quantifiers cannot yield such readings.

The rest of this paper is structured as follows. In section 2, I provide arguments that these readings cannot be attributed to special properties of neg-raising predicates. I show that both syntactic (Fillmore, 1963; Horn, 1978; Collins & Postal, 2014) and pragma-semantic approaches (Bartsch, 1973; Horn, 1989; Gajewski, 2005; Romoli, 2013; Homer, 2015; Zeijlstra, 2018) to neg-raising rule out the existence of readings in which negation scopes below a true scope-taking element in the embedded clause. Moreover, I show that indefinites can also have a wide pseudo-scope *de dicto* reading under a clause-mate negated modal that is not a neg-raiser.

In section 3, I compare movement-based (Charlow, 2014; Demirok, 2019) and in-situ approaches (Reinhart, 1997; Winter, 1997; Kratzer, 1998; Matthewson, 1999) to the scope of indefinites in their handling of the new data. While the availability of the wide pseudo-scope *de dicto* of indefinites can be straightforwardly captured by a choice functional account of indefinites, the existence of such readings is ruled out under a movement-based approach. I will also mention a problem for an analysis in terms of intensional choice functions (Heim, 1994; Winter, 1997; Romero, 1999), which arises when there needs to be variation in the output of choice function that applies to a fixed set (Winter, 1997; Kratzer, 1998; Geurts, 2000; Abels & Martí, 2010). Section 4 is aimed 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 (Schwarz, 2012). This proposal, which amounts to skolemizing choice functions with a world variable, can solve the fixed-set problem. Section 5 concludes the paper.

## 2 Neg-raising

One might argue that the wide pseudo-scope *de dicto* reading of the indefinite in (3), arises because negation can be interpreted lower than its surface position, due to the special properties of the predicate *think* as a *neg-raiser*. In this section, I will discuss two arguments against this objection: (i) indefinites are special in giving rise to such readings. Negation cannot be interpreted lower than other scope taking elements embedded under a negated *neg-raising* predicate; (ii) this reading is not restricted to neg-raising environment. Indefinites under other negated modals can also give rise to such wide pseudo-scope *de dicto* readings.

There is an old observation that the negation of certain predicates, like *think*, can give rise to readings in which negation is interpreted in the embedded clause. For example, (7a) is

interpreted as (7b). These predicates are referred to as *neg-raising* predicates (NRP).

- (7) a. John doesn't think Bill left.  
 b. John thinks Bill didn't leave.

Other predicates, which are not neg-raisers, don't give rise to such readings. For example, (8a) can't be interpreted as (8b).

- (8) a. John didn't say Bill left.  
 b. John said Bill didn't leave.

There are two main approaches to account for this apparent scope phenomenon. Neg-raising was first explained in terms of syntactic movement of negation, hence the term *neg-raising*. Under this syntactic approach, 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. The syntactic structure of (7a) would then be as in (9).

- (9) John NEG think Bill <NEG> left.

Since the syntactic approach runs into several problems (see Gajewski 2005; Romoli 2013; Zeijlstra 2018; Crowley 2019), *neg-raising* has been reanalyzed as an inference. This semantic-pragmatic approach to *neg-raising* (Bartsch 1973; Horn 1989; Gajewski 2005; Romoli 2013; Homer 2015, and Zeijlstra 2018, among others) takes *neg-raising* predicates (NRP) 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 (7a) has the presupposition that the speaker either thinks that Bill left or thinks that Bill didn't leave. Taking together the assertion in (7a), and the excluded middle presupposition, (7b) is inferred.

- (10) **Assertion:**  $\neg \text{NRP}(S)$   $\neg[\text{John thinks Bill left}]$  (7a)  
**Presupposition:**  $\text{NRP}(S) \vee \text{NRP} \neg(S)$   
John thinks Bill left  $\vee$  John thinks Bill didn't leave.  
 $\therefore$  John thinks Bill didn't leave. (7b)

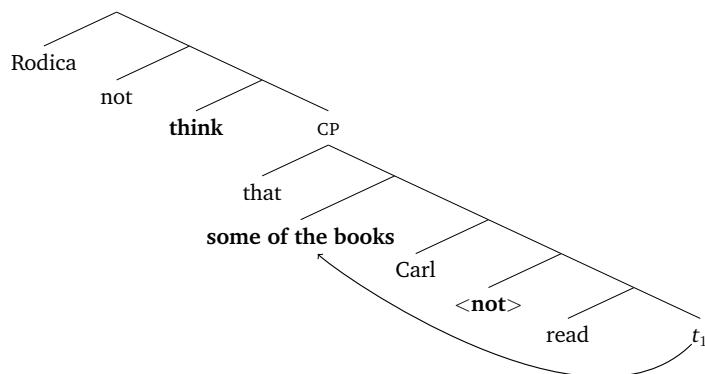
## 2.1 Neg-raising and the scope of Negation

The two approaches make different predictions about the scope of negation in the embedded clause of *neg-raising* predicates.

The syntactic approach predicts negation, originating in the embedded clause, should be able to enter into scopal interaction with other elements in the embedded clause (Romoli, 2013). This provides an easy solution to the wide pseudo-scope *de dicto* interpretation

of the indefinite in (3). 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 (3).

(11)



The semantics-pragmatics approach, on the other hand, predicts that negation should always take wide scope over the embedded proposition. As shown in (12), the wide pseudo-scope *de dicto* reading of the indefinite in (3) cannot be inferred from the assertion and the excluded middle presupposition.

(12) **Assertion:**  $\neg \text{NRP}(\text{s})$   $\neg[\text{Rodica thinks } [\text{Carl read some of the books}]]$

**Presupposition:**  $\text{NRP}(\text{s}) \vee \text{NRP } \neg(\text{s})$

Rodica thinks [Carl read some of the books]  $\vee$  Rodica thinks  $\neg$  [Carl read some of the books]

$\therefore$  Rodica thinks  $\neg$  [Carl read some of the books]

At this point, the data seems to provide an argument for the syntactic approach to neg-raising. Exploring the scopal interaction of other elements in the complement clause of neg-raising predicates with negation, however, shows that both syntactic and semantic-pragmatic theories of neg-raising fail to capture the full pattern of the scope of negation with respect to embedded scope-taking elements. I take this as evidence that the wide pseudo-scope *de dicto* readings of indefinite under negated *think*, presented in (3), cannot be due to special properties of neg-raising contexts.

I will review the behavior of three elements that in principle can scopally interact with negation: universal quantifiers, modals, and adverbs. Let us start with universal quantifiers. (13a) shows that universal quantifiers can scope above negation in simple sentences. The sentence (13a), when the universal quantifier *all of the children* is accented, cannot be true in a scenario in which some children came and some didn't. It's rather 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 negated neg-raising predicate *think*, as in (13b), universal quantifiers can only take narrow scope with respect to negation. The sentence (13b) can only be true in a situation in which the speaker thinks some children came and some didn't. This indicates that the sentence cannot be interpreted with the universal quantifier scoping above negation.

- (13) a. [Hame-ye bache-ha]<sub>F</sub> na-yam-ad-and.  
 all-EZ child-PL NEG-come-PST-3.PL  
*All of the children didn't come.* *all of the children* >> ¬
- b. fekr na-konam hame-ye bache-ha oumade baš-and.  
 think NEG-do-1SG all-EZ child-PL come-PP SUB-be-3.PL  
*I don't think all of the children came.* *\*think* >> *all of the children* >> ¬

Homer (2015) shows a similar contrast for modals *must* and *might*. In simple sentences, *must* and *might*, being PPIS, cannot stay under the scope of negation. The modal *must* can only be interpreted as taking a wide scope over negation. Therefore, the sentence in (14a) only means that there is an obligation for John not to jog, and cannot mean that it is not necessary for John to jog. Similarly, the sentence in (14b) can only mean that it is possible that he is not very intelligent, and not that it is not possible that he is very intelligent.

- (14) a. John must not jog. *\*¬* >> *must* ; *must* >> ¬
- b. He might not be very intelligent. *\*¬* >> *might* ; *might* >> ¬

When embedded under an epistemic neg-raiser, however, the picture reverses. Modals in (15a) and (15b) can only take narrow scope with respect to the matrix negation. (15a) means that the doctor thinks that it is not necessary for John to jog, and (15b) means that the speaker thinks that it is not possible that he is very intelligent.

- (15) a. The doctor doesn't think that John must jog.  
*\*think* >> *must* >> ¬; *think* >> ¬ >> *must*
- b. I don't think that John might be very intelligent.  
*\*think* >> *might* >> ¬; *think* >> ¬ >> *might*

The modal *must* in Farsi is not a PPI, and can take both narrow and wide scope over negation in a simple clause. <sup>4</sup>

*Context: Disagreeing with someone's argument:*

- (16) a. lozuman na-bayad in tor baš-ad.  
 necessarily NEG-must this way SUBJ.be-3SG  
*It does not necessarily have to be the case.* ¬ >> *must* (weak disagreement)
- b. manteqan na-bayad in tor baš-ad.  
 logically NEG-must this way SUBJ.be-3SG  
*Logically, it must not be the case.* *must* >> ¬ (strong disagreement)

<sup>4</sup>I thank Masoud Jasbi for pointing out to me that *logically* can enforce the wide scope of *must*.



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

*Context: Disagreeing with someone's argument:*

- (17) a. fekr na-kon-am lozuman bayad in tor baš-ad.  
 think NEG-do-1.SG necessarily must this way SUBJ.be-3SG  
*I don't think it necessarily has to be the case.* *think* >> ¬ >> *must*
- b. #fekr na-kon-am manteqan bayad in tor baš-ad.  
 think NEG-do-1.SG logically must this way SUBJ.be-3SG  
*I don't think it must logically be the case.* *\*think* >> *must* >> ¬

Adverbs also show a similar scopal interaction with negation. In simple sentences, they can take either wide or narrow scope (Schäfer, 2004). When the adverb *intentionally* is syntactically above negation, the sentence in (18a) has the interpretation that Ali did not upset Swati, and this was intentional. When embedded under neg-raising predicates, however, negation necessarily takes scope over the adverb *intentionally*. The sentence in (18b) can only mean that the speaker thinks that Ali upset Swati, but it was not intentional.

- (18) a. Ali amdan Swati ro narahat na-kar-d.  
 Ali intentionally Swati RA upset NEG-do-PST  
*Intentionally, Ali didn't upset Swati* *intentionally* >> ¬ *upset*
- b. fekr na-konam Ali amdan Swati ro narahat kar-de baš-ad.  
 think NEG-do-1.SG Ali intentionally Swati RA upset do-PP SUBJ.be-3SG  
*I don't think Ali intentionally upset Swati.* *\*think* >> *intentionally* >> ¬ *upset*

As we saw, indefinites are unique in taking apparent wide scope over the negation of neg-raising predicates. 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,<sup>5</sup> 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 have been taken to be an argument, in favor of the semantic-pragmatic approach to neg-raising. In order to account for the unavailability of low scope of negation, which is a problem for the classical syntactic approach to neg-raising, Collins & Postal (2014) had to introduce a stipulative constraint, known as the *highest-operator constraint*, according to which negation can only be raised out of an embedded clause when it is the highest operator (Seuren, 1972; Collins & Postal, 2014). Note that the new observation presented in this paper, makes the problem for the

<sup>5</sup>The scopal interaction of indefinites with negation under neg-raising predicates is briefly discussed in Homer (2015). He only discusses the narrow scope reading of *some* with respect to the matrix negation, in the context of PPI-hood of *some*.

syntactic approach even harder, because now the highest-operator constraint has to be modified in such a way so that it does not apply to indefinites. It is not, however, clear whether the concept of operator can be defined in a way that it includes adverbs, modals, universal quantifiers, to the exclusion of indefinites.

Therefore, I conclude that the wide scope of indefinite with respect to negation in the embedded clause of a neg-raising predicate cannot be explained in terms of properties of neg-raising predicates, as the availability of such readings is a problem for both existing approaches to neg-raising. The semantic-pragmatic approach rules out the possibility of negation taking scope under the scope-taking elements within the embedded clause of neg-raising predicates. The syntactic account of neg-raising fails to explain why such readings are only available to indefinites. I take this to suggest that indefinites take an apparent wide scope over the negation of neg-raising predicates because there is something unique about them, not about the neg-raising environment they appear in.

With this, I will provide my second argument against attributing such reading to properties of neg-raising predicates.

## 2.2 Other Negated Modals

Here, I will show that indefinites can also yield wide pseudo-scope *de dicto* readings, when they are under the syntactic scope of other negated modals. This provides further evidence that such readings are not due to peculiarities of neg-raising environments. Moreover, it will be shown that such readings, which also arise when the indefinite and the negated modal are clause-mates, are not available to genuine quantifiers. This indicates that indefinites differ from genuine quantifiers, not only in the ability to take exceptional scope, but also in local scopal properties.

Unlike the case of neg-raising predicates which can give the illusion that the observed reading is a scope phenomenon, wide pseudo-scope *de dicto* readings of indefinites under other negated modals cannot be represented in terms of scopal relations. I will illustrate these readings with the help of the duality relations  $\neg\Box \iff \Diamond\neg$  and  $\Box\neg \iff \neg\Diamond$ , as shown in (20). Crucially, however, duality relations are just logical equivalences, and do not have a syntactic manifestation.

### (19) Negated neg-raising predicates:

surface syntactic scope:  $\neg \gg \Box \gg \text{INDEF} \longrightarrow$  interpreted as:  $\Box \gg \text{INDEF} \gg \neg$

### (20) Other negated modals:

a. surface syntactic scope:  $\neg \gg \Box \gg \text{INDEF} \longrightarrow$  interpreted as:  $\Diamond \gg \text{INDEF} \gg \neg$

b. surface syntactic scope:  $\neg \gg \Diamond \gg \text{INDEF} \longrightarrow$  interpreted as:  $\Box \gg \text{INDEF} \gg \neg$

In the same context as for (3), one can utter (21a), where the indefinite is under a negated universal modal which is not a neg-raising predicate.

*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.*

- (21) a. Rodica motmaen nist ke Carl čand-ta ketab ro xunde bash-ad.  
 Rodica sure NEG-be-3SG that Carl some-CL book RA studied 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.*  
 $\times \neg \gg \square \gg \text{some of the books} \iff \diamond \gg \neg \gg \text{some of the books}$
- c. Possible paraphrase: *Rodica entertains the possibility that some of the books are such that he didn't read.*  
 $\checkmark \diamond \gg \text{some of the books} \gg \neg$

In this context, the indefinite is interpreted *de dicto*, as there are no specific books such that Rodica is not sure whether or not Carl read them. The indefinite is interpreted above negation, because the sentence (21a), in this context, doesn't mean that Rodica allows for the possibility that Carl read no book, as shown in (21b). Rather, the intended reading of this sentence is equivalent to (21c), which means that Rodica entertains the possibility that there are some books that Carl didn't read.

Other indefinites like numerals also give rise to such wide pseudo-scope *de dicto* readings, as shown in (22a).

*Context: There are five questions on the exam. Each question has 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 students:*

- (22) 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 don't have to answer two questions.
- b. False paraphrase in the scenario: *it's permissible to answer any number of questions which is not exactly two /more than two.*  
 $\times \neg \gg \square \gg \text{two questions} \iff \diamond \gg \neg \gg \text{two questions}$
- c. Possible paraphrase: *It is allowed for two questions not to be answered.*  
 $\checkmark \diamond \gg \text{two questions} \gg \neg$

The indefinite *two questions* in (22a), is interpreted *de dicto*, as there is no specific questions that is marked as a bonus question. The numeral is interpreted above negation, the intended reading of this sentence is equivalent to (22c), which means that students are al-

lowed to not answer (exactly) two questions. The interpretation of the numeral indefinite under negation, (22b), says that it's permissible to answer any number of question which 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 availability of such reading is not limited to the scope of negated universal modals. The sentence in (23a) shows that the numeral indefinites *two cards* which is under the negated existential modal *can't* can also get a wide scope *de dicto* reading.

*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:*

- (23) a. do-ta kart ro ne-mi-tun-id be-bin-id  
two-CL card RA NEG-IMPF-can-2PL SUBJ-see-2PL  
"You can't see two cards."  
b. False paraphrase in the scenario: *it's necessary to see any number of cards which is not exactly two /more than two.*  
 $\times \neg \gg \diamond \gg \text{two cards} \iff \square \gg \neg \gg \text{two cards}$   
c. Possible paraphrase: *It is necessary that two cards be such that you don't see them.*  
 $\checkmark \square \gg \text{two cards} \gg \neg$

Universal quantifiers under a negated modal cannot 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 (24)-(26).

- (24) a. Rodica motmaen nist ke Carl hame-ye ketab-ha ro xunde bash-ad.  
Rodica sure NEG-be-3SG that Carl all-EZ book-PL RA studied SUB.be-3SG  
"Rodica is not sure that Carl read all of the books."  
b. Possible paraphrase: *Rodica entertains the possibility that not all of the books are such that Carl read.*  
 $\checkmark \neg \gg \square \gg \text{all of the books} \iff \diamond \gg \neg \gg \text{all of the books}$   
c. Impossible paraphrase: *\*Rodica entertains the possibility that all of the books are such that Carl didn't read.*  
 $*\diamond \gg \text{all of the books} \gg \neg$
- (25) a. lazem ni-st hame-ye soal-ha ro javab be-d-id  
necessary NEG-be.3SG all-EZ question-PL RA answer SUBJ-give-2PL  
*You don't have to answer all of the questions.*  
b. Possible paraphrase: *it's permissible to not answer all of question.*  
 $\checkmark \neg \gg \square \gg \text{all of the questions} \iff \diamond \gg \neg \gg \text{all of the questions}$   
c. Impossible paraphrase: *\*It is allowed for all questions not to be answered.*

- \*◇ ≫ *all of the questions* ≫ ¬
- (26) a. hame-ye kart-ha ro ne-mi-tun-id be-bin-id  
 all-EZ card-PL RA NEG-IMPF-can-2PL SUBJ-see-2PL  
*You can't see all cards.*
- b. Possible paraphrase: *it's necessary that not all cards be such that you see them.*  
 ✓ ¬ ≫ ◇ ≫ *all cards* ⇔ □ ≫ ¬ ≫ *all cards*
- c. Impossible paraphrase: *\*It's necessary that all cards be such that you don't see them.*  
 \*□ ≫ *all cards* ≫ ¬

The contrast between the behavior of the indefinite in (23a) and the universal quantifier in (26), repeated here as (27a) and (27b), is particularly important, as it shows that the asymmetry between indefinites and quantifiers can also be observed within clause boundary. 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.

- (27) a. do-ta kart ro ne-mi-tun-id be-bin-id  
 two-CL card RA NEG-IMPF-can-2PL SUBJ-see-2PL  
 “*You can't see two cards.*” ✓ □ ≫ *two cards* ≫ ¬
- b. hame-ye kart-ha ro ne-mi-tun-id be-bin-id  
 all-EZ card-PL RA NEG-IMPF-can-2PL SUBJ-see-2PL  
*You can't see all cards.* ✗ □ ≫ *all cards* ≫ ¬

In sum, in this section I have provided two arguments to establish that the availability of the wide pseudo-scope *de dicto* readings of indefinites cannot be reduced to special properties of *think* as a neg-raiser. Firstly, such apparent wide scope with respect to the negation of neg-raising predicate is only available to indefinites. Other scope-taking elements embedded under negated neg-raising predicates do not enter into a scopal interaction with the matrix negation. None of the existing theories of neg-raising can account for the full pattern of the scopal interaction between the negation of neg-raising predicate and embedded scope-taking elements. Secondly, the wide pseudo-scope *de dicto* reading of indefinites is not limited to indefinites in the complement clause of neg-raising predicates. Indefinites under the syntactic scope of other negated modals can also give rise to such readings. In the next section, I will explore properties of indefinites that might be responsible for giving rise to such a wide pseudo-scope *de dicto* reading.

### 3 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, 1977), as the unavailability of the given paraphrase for (28) show.

(28) A colleague believes that every paper of mine contains an error.

# 'For ever paper of mine there is a potentially different colleague who believes that it contains an error.'  $\times$  every paper  $\gg$  if

Indefinites, in contrast, can scope out of islands (Fodor & Sag, 1982), as shown in (29).

(29) 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.'  $\checkmark$  a student  $\gg$  if

It is also shown that indefinites can take intermediate scope out of islands (Farkas, 1981; Ludlow & Neale, 1991; Abusch, 1993). In (30), 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, (30) 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.

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

This unique scopal property of indefinites 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 explain 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 rest of this section, I will review these two approaches, and their predictions about 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 via moving a position above negation. Such a position, however, unavoidably outscopes the intensional operator. Therefore, the indefinite can no longer be construed *de dicto*. I will show that the choice functional account of

indefinites, on the other hand, can straightforwardly account for such readings, because under this approach, indefinites embedded under a negated intensional operator, can appear to take wide scope over negation, without having to move their syntactic position under the scope of an intensional operator.

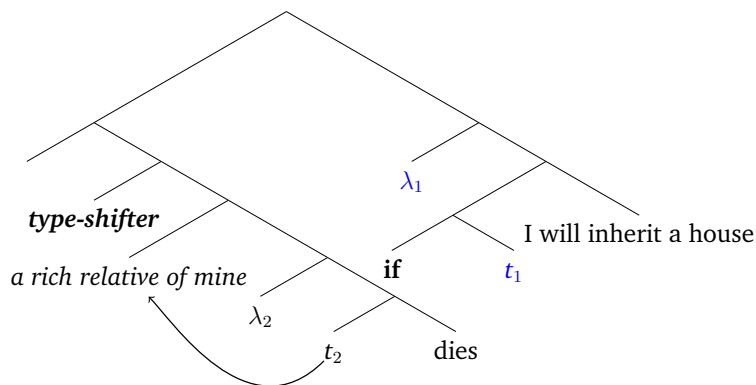
Let us first see how movement-based approaches to the scope of indefinites can account for the new data. I will focus on the movement-based accounts in terms of pied-piping (Charlow, 2014, 2020; Demirok, 2019).

### 3.1 Pied piping

Recently, new movement-based accounts have been developed to derive the exceptional scope of indefinites out of island via a sequence of island obeying movements (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 island edge 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 higher position in the structure. Under this approach, the structure of (31a) would roughly be (31b).

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

b.



First, the indefinite *a rich relative of mine* would move 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 the system has also been developed by Demirok (2019) and Elliott (2020), which aims to explain the exceptional *de re* readings of quantificational DPs that cannot scope out of islands. For instance, (32) shows that while the quantifier *every* in (32) cannot scope out of the if-clause island, it can get a *de re* reading. The DP *everyone in this room* in (32b) is construed *de re* relative to the intensional operator governing the conditional. As no one

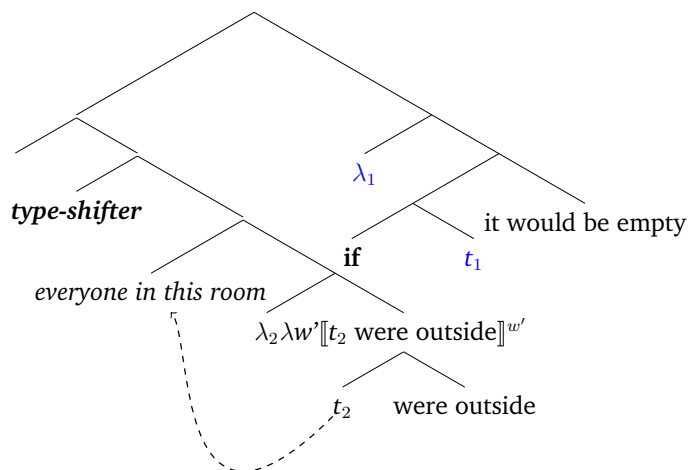
can be in this room and outside in the same world, the *de dicto* interpretation of *everyone in this room* creates a non-sensical reading.

- (32) 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.

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, 2020). The special pied-piping mechanism introduced in this system (Charlow, 2020; Demirok, 2019; Elliott, 2020), however, allow DPs to take exceptional *de re* interpretation, 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 can move to a higher position, as shown in (33). Unlike indefinites, however, quantificational DPs like *every* leave a higher order trace of type  $\langle\langle e,t \rangle, t \rangle$  behind, forcing it to semantically reconstruct 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 quantifiers, capturing the fact that they cannot outscope an island. The intensionality of quantifiers, on the other hand, is determined by their final syntactic position 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 an island.

(33)

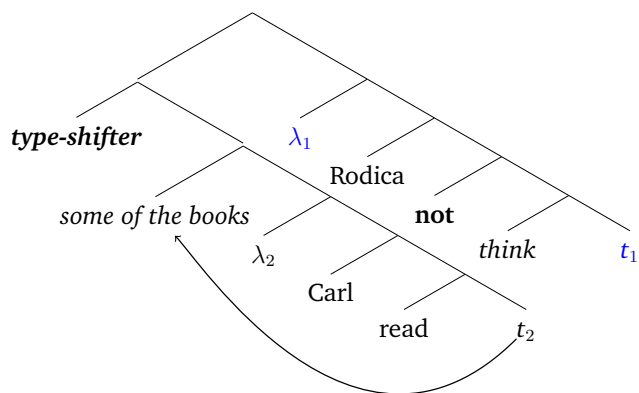


The existence of wide pseudo-scope *de dicto* readings of indefinites creates a serious problem for this approach. To get the intended reading, the indefinite has to move to a position higher than negation in the matrix clause, and yet under the intensional verb *think* in or-



der to be interpreted *de dicto*. However, there are only two licit movements: (i) moving the indefinite to the edge of the embedded clause, but this position is not above negation. (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 (34b).

- (34) a. Rodica doesn't think that Carl read some of the books.  
 b.



In a system, which takes the syntactic position of indefinites to determine their quantificational scope, the observed reading of (34a) constructs a case of a wide scope *de dicto* reading (*the fourth reading*), which is excluded by the main theories of intensionality (Percus, 2000; von Stechow & Heim, 2011; Keshet & Schwarz, 2019; Elliott, 2020). As we saw in (33), *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 (27), repeated here as (35), shows that indefinites can get wide pseudo-scope *de dicto* readings under the scope of a clause-mated negated modal, but universal quantifiers cannot. 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.

- (35) a. do-ta kart ro ne-mi-tun-id be-bin-id  
 two-CL card RA NEG-IMPF-can-2PL SUBJ-see-2PL  
 “You can’t see two cards.”       $\neg \gg \diamond \gg \text{two cards} \rightarrow \square \gg \text{two cards} \gg \neg$

- b. hame-ye kart-ha ro ne-mi-tun-id be-bin-id  
 all-EZ card-PL RA NEG-IMPFF-can-2PL SUBJ-see-2PL  
*You can't see all cards.*  $\neg \gg \diamond \gg \text{all cards} \not\rightarrow \square \gg \text{all cards} \gg \neg$

I conclude that a movement-based approach fails to derive wide pseudo-scope *de dicto* readings of indefinites. In order to take such readings, an indefinite under the scope of a negated modal has to move to a syntactic position which is above negation, but below the intensional operator. Such a position simply does not exist in the syntactic structure. In the next subsection, I will review the choice functional account of indefinites to see if it can account for the new data.

### 3.2 Choice functions

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, 1999; Steedman, 2012). 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  $\langle \langle e,t \rangle, e \rangle$ , which applies to the property denoted by the nominal predicate of type  $\langle e,t \rangle$  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.

(36) 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 (36a), for every linguist  $x$ , there is a way  $f$  of choosing a problem such that  $x$  studied every solution to the chosen problem by  $f(\text{problem})$ , so the problem chosen can vary with the linguists. On the wide-scope reading in (36b), there is a way of choosing problem  $f$  such that every linguist  $x$  studied every solution to the chosen problem by  $f(\text{problem})$ .

Unlike Reinhart (1997) and Winter (1997), Kratzer (1998) does not posit existential quantifier to bind choice functions. According to Kratzer (1998), choice functions are interpreted as free variables, with values to be provided by the context. So they always act as if they get maximal scope. Because there are no existential quantifier introduced to bind free choice function variables, Kratzer's account does not generate intermediate read-

ings, 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, she proposes to use *Skolemized choice functions* which are skolem functions that have both set and individual-variable arguments. So, this skolem function applies to the binary relation *some problem* and *the linguist variable x* and returns a problem that intrigued linguist *x*, as shown in (37a). This is basically equivalent to the reading with the intermediate existential closure over a choice function as given in (37b).

- (37) 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 that the choice function applies to 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 (Kratzer 1998, Chierchia 2001 and Abels & Martí 2010, among others). Consider the example (38a) with the intermediate reading of indefinite, as in (38b).

- (38) a. Every linguist studied every solution that some problem that intrigued him/her might have.  
 b.  $\forall x[\text{linguist}'(x) \rightarrow \exists f\forall z[\text{solution-to}'(z, f(\text{problem}')) \rightarrow \text{studied}'(x,z) ]]$

In a situation in which the members of the set of linguists {A and 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. 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 which is different from the value it returns when it applies on a relation between B and the set {weak crossover, donkey sentences}.

- (39) a.  $f(A, \{\text{weak crossover, donkey sentences}\}) = \text{weak crossover}$   
 b.  $f(B, \{\text{weak crossover, donkey sentences}\}) = \text{donkey sentences}$

Winter (1997) proposes a different solution to this problem (Reinhart, 1997; Winter, 1997). He suggests that the choice function's argument can be construed intensionally. An intensional choice function takes an intensional property ( $\langle e, \langle s, t \rangle \rangle$ ) as argument, and returns an individual concept  $\langle s, e \rangle$  (Heim, 1994). 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 possible worlds, presumably, 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 in reality they are intrigued by the same problems.

In what follows, I will first present an account of wide pseudo-scope *de dicto* readings of indefinites in terms of intensional choice functions (Heim, 1994; Winter, 1997; Romero, 1999), but I will argue that this account still runs into problem when the set of elements that the choice function applies to is fixed. I will propose a different version of intensional choice functions in terms of skolemization with world variables, which can solve the fixed-set problem.

Let us start with applying the current choice functional analysis on one of our example in (3), repeated here as (40).

- (40) Rodica fekr ne-mi-kon-ad ke Carl čand-ta ketab ro xunde  
 Rodica thought NEG-IMPf-DO-3SG that Carl some.PL-CL book RA studied  
 bash-ad.  
 SUB.be-3SG  
 “Rodica doesn’t think that Carl read some of the books.”

As the books that Carl didn’t have time to read can vary in different worlds, we need a way to get variation in the output of the choice function which applies to the books Carl has to read. In other words, we need the choice function to pick possibly different books Carl didn’t 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 doesn’t move under *think*. Given the denotation of the neg-raising predicate *think*, as a generalized quantifier over world, and the negation of the embedded proposition as a result of the excluded middle presupposition, we will have (41a):

- (41) a. **Assertion:**  $\neg[\forall w'' \in \text{Beliefs}(\text{Rodica}, w): [\text{read}_{w''}(\text{Carl}, f(\text{book}_{w''}))]]$ <sup>6</sup>  
 b. **Presupposition:**  $\forall w'' \in \text{Beliefs}(\text{Rodica}, w): [\text{read}_{w''}(\text{Carl}, f(\text{book}_{w''}))] \vee$   
 $\forall w'' \in \text{Beliefs}(\text{Rodica}, w): \neg[\text{read}_{w''}(\text{Carl}, f(\text{book}_{w''}))]$   
 c.  $\therefore \forall w'' \in \text{Beliefs}(\text{Rodica}, w): \neg[\text{read}_{w''}(\text{Carl}, f(\text{book}_{w''}))]$ <sup>7</sup>

The truth-conditions in (41a) give us the intended reading of (40). For (41a) to be true, Rodica doesn’t have to have a specific book in mind. In fact, it might be the case that Rodica and her source are mistaken and Carl doesn’t even have an exam to read books for.

<sup>6</sup>I follow Kratzer (1998, 2003) in taking a choice function variable to be free, in order to avoid problems with the scope of existential closure under downward-entailing environments (Schwarz, 2001, 2011; Chierchia, 2001).

<sup>7</sup>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 a wide pseudo-scope over negation in the assertion level.

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 didn’t have time to”. Therefore, although negation 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 pied-piping approaches fail to account for wide pseudo-scope *de dicto* readings of indefinites, but adapting an analysis of indefinites in terms of intensional choice functions can straightforwardly account for the availability of such readings to indefinites. I take this to be an argument in favor of the choice functional account. However, an intensional choice function also runs into problem when the context in which (40) 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 tomorrow exam 3 hours ago. Rodica is convinced that Carl is reading for the course on Covid. Knowing that it takes at least an hour to read any of those book, Rodica believes that there are at least two books that he didn’t have time to read but she doesn’t 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 (40), repeated here as (42), is true in this context.

- (42) Rodica fekr ne-mi-kon-ad ke Carl čand-ta ketab ro xunde  
 Rodica thought NEG-IMPf-do-3SG that Carl some.PL-CL book RA studied  
 bash-ad.  
 SUB.be-3SG  
 “Rodica doesn’t 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 has formed the belief that Carl didn’t read  $x$ , and the witness of the indefinite can vary across Rodica’s belief worlds. However, the truth-conditions given in (41a), repeated here as (43), do not longer give us the intended reading.

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

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 different books other than 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.

$$(44) f(\{A,B,C,D,E\}) = A$$

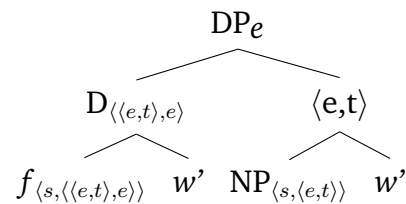
Therefore, (43) gives rise to the widest pseudo-scope (*de re*) reading of the indefinite, which is not the intended reading of (42). To get the intended reading, the choice function needs to pick different elements from a single set across Rodica’s belief worlds. But our current machinery doesn’t provide a way to do this. This shows that an intensional choice function can still run into the fixed-set problem (Abels & Martí, 2010). So, how can we capture the variation of books across Rodica’s belief worlds?

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 doesn’t help, as there’s 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 which skolemizes choice functions with a world variable can solve this problem (see also Abels & Martí (2010) and Homer (2015) for a similar proposal).

#### 4 world-skolemized choice functions

I follow Schwarz’s 2012 proposal that determiners can introduce a world variable (a situation variable in his system). I propose that a choice function introduced by an indefinite determiner can be of type  $\langle s, \langle \langle e, t \rangle, e \rangle \rangle$ . They take world variables as their first argument, then they apply on a set of type  $\langle e, t \rangle$ , and return an individual of type  $e$ , as shown in (45).

(45)



This amounts to skolemization, whereby a variable that is bound by a higher operator is introduced as an argument of choice functions, in order to trigger variation in the output of choice functions 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 (45) 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 Schwarz (2012) argues, there is not evidence for 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.<sup>8</sup> This yield two possible configurations:

(i) When the world variables of the choice function's and the NP's are set to the actual world, we will have  $f(w_0, (NP (w_0)))$ . 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's and the NP's are bound by an intensional operator, we will have  $f(w', (NP (w')))$ .

Let us see how this proposal can account for the intended reading of (42). As Rodica is convinced that Carl is studying for the course on Covid, the 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 indefinite as a choice function skolemized with a world variable, and the negation of the embedded proposition as a result of the excluded middle presupposition, we will have (46) as the truth-conditions of (42).

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

(46) will give us the intended reading for (42). The function  $f$ , which is skolemized with a world variable, can pick different values for different worlds (cross-world variation):

- (47) 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 NP is not a fixed set across worlds, an account in terms of skolemization with world variable has the 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 (35a), repeated here as (48).

*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*

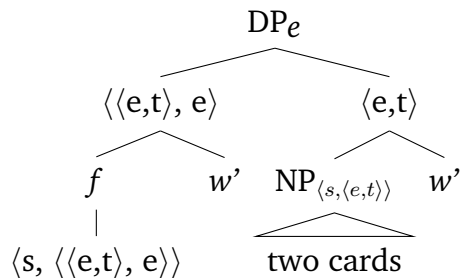
<sup>8</sup>This is an extension of Schwarz's 2012 account in which only determiners carry an independent situation variable, and produces the same results.

player's cards. An instructor explaining the rules to players:

- (48) do-ta kart ro ne-mi-tun-id be-bin-id  
 two-CL card RA NEG-IMPF-can-2PL SUBJ-see-2PL  
 "You can't see two cards."

As numeral noun phrases 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 cards* has the structure (49). 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 on the set of all plural individuals consisting of two cards.

(49)



Given the denotation of the numeral noun phrase *two cards*, we will have (50) as the truth-conditions of (48).

- (50)  $\neg \exists w' \in W$  [the game rules in force in  $w$  are obeyed in  $w'$ ]  $\wedge$  see' (you,  $f(w', (\text{cards}(w')))$ )

This give us the intended reading. The indefinite can appear to take wider scope over negation thanks to the choice function, and as the world variable of the choice function, which is bound by the intensional operator, the indefinite is construed *de dicto*. 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, a subset of wide pseudo-scope *de dicto* readings, which do not involve a fixed set, are also predicted to exist under an intentional choice function Winter (1997); Heim (1994); Romero (1999). I end this paper with a point about the cross-linguistic variation. Schwarz notes that determiners can vary with respect to whether or not they combine with such a world/situation pronoun. This also 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. As for English, for instance, 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. More research needs to be done to explore cross-linguistic variation in intensional properties of indefinites that can take exceptional wide scope.

## 5 Conclusion

In this paper, I have presented novel data from Farsi that show that indefinites under negated intensional operators can take wide pseudo-scope *de dicto* reading, without movement of either indefinites or negation. I have argued that the existence of such readings create a problem for movement-based approaches to the scope of indefinites (Charlow, 2014; Demirok, 2019). The existence of true wide scope *de dicto* readings is excluded in all theories of intensionality (Keshet & Schwarz, 2019; Elliott, 2020), 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 a choice functional account 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. This account still rules out the existence of true wide scope *de dicto* readings.

I have also shown that such wide pseudo-scope *de dicto* reading also arises 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 essentially different from generalized quantifiers. Unavailability of such readings to generalized quantifiers shows that indefinites are not only unique in their ability to take exceptional scope, but also in their local scopal properties.

Finally, I have proposed that a choice functional determiner in Farsi takes a world variable as its first argument. I have shown that this proposal amounts to a mechanism of skolemization of choice functions with a world variable, which can account for cross-world variation in the output of a choice function applying on a fixed set.

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