

Functional and non-functional wide scope indefinites in Russian¹

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Abstract. We report on two experimental studies designed to establish the scopal and functional properties of the two Russian indefinites *koe-wh* and *wh-to*. We then discuss the strengths and weaknesses of the Kratzer (1998) (Skolemized) choice function account, and the Schwarzschild (2002), singleton existential quantifier account with respect to the Russian data. We argue that neither account has a problem in accounting for *koe-wh* indefinites. However, while either can explain the range of readings attested for *wh-to*, they both need to appeal to additional assumptions to explain some of its non-functional readings, and the two accounts differ in how appealing or compatible those additional assumptions are.

1 INTRODUCTION

There are numerous attempts in the literature that aim to capture the behavior of exceptional wide scope indefinites and explain away the fact that they seem to give rise to readings that violate basic constraints in syntax (see, among others, Abusch 1994, Brasoveanu and Farkas 2011, Breheny 2003, Charlow 2014, Endriss 2009, Farkas 2002, Fodor and Sag 1982, Kratzer 1998, Martí 2007, Matthewson 1999, Onea 2015, Reinhart 1997, Schwarz 2001, 2011, Schwarzschild 2002, Winter 1997). Exceptional wide scope indefinites can escape islands, such as relative clauses ((1)), antecedents of conditionals, and *because*-clauses. The literature has examined both widest scope readings (WSRs from now on), as in (1)a, and intermediate scope readings (ISRs), as in (1)b, where the indefinite escapes an island but takes scope underneath a higher quantifier. (1)c is a narrow scope reading (NSR):

- (1) Every student read every article that *a* (*certain*) professor recommended.
- a. There is a specific professor *x*, such that for every student *y*, *y* read every article that *x* recommended. [WSR]
 - b. For every student *y*, there is a (potentially different) professor *x*, such that *y* read every article that *x* recommended. [ISR]
 - c. For every student *y*, *y* read every article that was recommended by some professor or other. [NSR]

There is agreement in the literature that English *a certain* can give rise to WSRs and ISRs in environments such as (1), whereas English *a* can give rise to NSRs as well (Farkas 2002, Fodor and Sag 1982, Hintikka 1986, Ionin 2010, Kratzer 1998, Schwarz 2001, 2011, among others).²

¹ We are grateful to Tatiana Luchkina, Barbara Partee and Natalia Slioussar for their invaluable assistance with the data collection, to Tatiana Luchkina and Sea Hee Choi for the data entry, and to Svitlana Antonyuk and audiences at the London Semantics Day 2015, the 25th Colloquium in Generative Grammar in Bayonne, France and the XPrag 2015 in Chicago, USA for comments and questions. This study was funded by a Small Research Grant from the British Academy/Leverhulme Trust to Luisa Martí and by a University of Illinois Campus Research Board grant to Tania Ionin.

² We will speak of island contexts such as that in (1) as *long distance contexts* (as opposed to *local contexts*, where no island intervenes between the surface position of the indefinite and the position at which it seems to take scope). All the ISRs we consider are *long distance readings*. WSRs and NSRs may be long distance readings or *local readings* (depending on whether an island intervenes or not). Indefinites which can take scope outside of syntactic islands are *long distance indefinites* or *exceptional wide scope indefinites*.

Two important approaches to exceptional wide scope indefinites are the proposal in Kratzer (1998) (further discussed in Schwarz 2001, 2011) that indefinites may denote a contextually supplied, Skolemized choice function variable, and the approach in Schwarzschild (2002) in which exceptional indefinite scope is the result of domain restriction down to a singleton set. Either account can explain the scopal properties exceptional wide scope indefinites such as English *a certain*.

Both approaches generate only *functional* readings in non-WSRs cases, however (for both ISRs and NSRs, though it is functional ISRs (f-ISRs) that have received most of the attention). The existence of indefinites, such as English *a*, that seem to give rise to non-functional ISRs (non-f-ISRs) prompted Schwarz (2001, 2011) to propose that there must be an additional mechanism for the derivation of such readings, such as island-escaping QR or Reinhart (1997)/Winter (1997)-style choice functions.

A third approach discussed below is indeed the Reinhart (1997)/Winter (1997) idea that indefinites can denote (unambiguously in the case of Winter) choice function variables that are closed off by an existential operator at different points in the syntactic tree. As we will see, while this approach can account for the behavior of English *a*, it does not seem well-suited to account for other exceptional wide scope indefinites and, as argued for by Chierchia (2001) and Schwarz (2001, 2011), must be restricted so as not to generate weak readings in downward-entailing contexts.

Our point of departure is the following question: if there are two types of wide scope indefinites, namely, functional and non-functional indefinites, are there indefinites that are ambiguous between the two? If so, how should their properties be accounted for? Our empirical finding is that Russian *wh-to* is one such indefinite. The two accounts we focus on here, the Kratzer approach and the Schwarzschild approach, can be modified or added to to predict the required range of readings for such indefinites. We show, however, that the two approaches differ in how appealing or compatible these modifications or additions are. Our theoretical goal in this paper is to highlight these differences, and to show that the Kratzer approach, if appropriately supplemented, might in the end be better suited to account for the properties of *wh-to*.

The two empirical studies we present here are, to our knowledge, the first experimental studies ever done on the scope of Russian indefinites, though Russian indefinites have indeed received attention in the theoretical literature (Eremina 2012, Geist 2008, Haspelmath 1997, Kagan 2011, Paducheva 1985, Pereltsvaig 2008, Yanovich 2005). Our experimental results complete and modify the received empirical picture in several ways. First, they confirm that both *koe-wh* and *to-wh* indefinites can take exceptional wide scope, and establish that this is the case for a range of different syntactic islands. Second, they establish the functional nature of *koe-wh*—interestingly, as long as they are functional, we found that even NSRs are possible for *koe-wh*. Third, they establish that *wh-to* indefinites give rise to a wider range of readings than *koe-wh* and than previously thought, since non-functional readings are also possible for *wh-to*. Finally, they establish that ISRs are indeed possible for both indefinites, something which was not clear before.

Our two studies include, in addition, a third Russian indefinite, *wh-nibud'* indefinites. *Wh-nibud'* indefinites are dependent indefinites (Farkas 1997, 2002, Henderson 2014, among others) that never seem to give rise to wide scope. We will not be able to provide a justified analysis of *wh-nibud'* indefinites in this paper—however, they were included in the tests as a means to control and compare our results for *koe-wh* and *wh-to*.

We will not be able to properly discuss other worthy accounts of exceptional indefinite scope, such as Breheny (2003), Charlow (2014), Endriss (2009), Onea (2015),

among others. It is of course likely that, among these accounts, or others, mechanisms can be found or developed that achieve the same effects as the accounts we discuss here. We wish to lay out our argument in detail anyway because, as far as we know, the two approaches we compare here are indistinguishable in terms of the overall predictions they make, but differ in the *way* they make those predictions. We hope that, by making this point, we provide a basis for a more complete assessment of weaknesses and strengths in comparisons with approaches not studied here.

The organization of the paper is as follows. In section 2, we introduce the two approaches to indefinite wide scope that we focus on in the paper, and discuss functional vs. non-functional readings and natural classes of indefinites. In section 3 we present our experimental findings. Section 4 contrasts the two possible analyses of the Russian data in detail. Section 5 is the conclusion.

2 EXCEPTIONAL WIDE SCOPE

2.1. The Kratzer (1998) and Schwarzschild (2002) approaches

Kratzer (1998) proposes that indefinite NPs may introduce choice function variables, of type $\langle et, e \rangle$, that stay free and receive a value according to what is contextually salient. That is a value that the speaker has in mind.³ Such indefinites will seem to take the widest possible scope—their contextual provision makes them effectively scopeless.⁴ This will be the case whether the indefinite is embedded in a syntactic island for scope or not, and thus it will seem that these indefinites take scope outside of syntactic islands. Kratzer herself, Schwarz (2001, 2011), and Ionin (2010), who experimentally tests the scope of English indefinites, entertain this analysis for English *a certain*. English *a certain* gives rise to WSRs, f-ISR, and f-NSR (see Farkas 2002, Fodor and Sag 1982, Hintikka 1986, Ionin 2010, Kratzer 1998, Schwarz 2001, 2011, among others). Consider the version of sentence (1) with *a certain*:

(2) Every student read every article that *a certain* professor recommended.

The WSR for (2) says that there is a professor such that every student read every article recommended by that professor. This reading involves one, and only one, professor (e.g., Professor Smith). A representation of this reading in the Kratzer approach is as follows (syntactic islands are indicated in square brackets):

(3) Every student read every article [that f(professor) recommended]

The representation in (3) translates into the statement that every student x is such that x read every article that the professor given by a contextually salient function the speaker has in mind recommended:

(4) $\forall x$ [student(x) \rightarrow $\forall y$ [article(y) & recommend (f(professor), y) \rightarrow read (x, y)]]

³ The hearer may or may not know which function this is. This may or may not be problematic for the account, depending on other assumptions. For some discussion, see Schwarz (2011: 882).

⁴ Despite the fact that in this and other theories of exceptional wide scope, the postulated mechanisms generate only *pseudo-scope* readings (i.e., readings not achieved by actually scoping out the indefinite), we will continue using the word *scope*.

This is indeed equivalent to the WSR we are after. A WSR is also generated, of course, via the same mechanism when the indefinite is not in an island context:

- (5) Every athlete talked with *a certain* psychologist.
- (6) Every athlete talked with $f(\text{psychologist})$
- (7) $\forall x [\text{athlete}(x) \rightarrow \text{talk}(x, f(\text{psychologist}))]$

Kratzer choice functions may be Skolemized by adding an additional argument to them (making them of type $\langle e, \langle et, e \rangle \rangle$). With Skolemization, a higher c -commanding quantifier can bind that additional argument, and the argument can vary systematically with the values introduced by the higher quantifier. This will generate f-ISRs and f-NSRs. Consider the following representations for (2) and (5), respectively:

- (8) every student _{x} read every article [that $f(x)$ (professor) recommended]
- (9) every athlete _{x} talked with $f(x)$ (psychologist)

The representation in (8) translates into a f-ISR that says that for every student x there is a contextually salient function that the speaker has in mind that, given x , returns a professor of x such that x read every article that the professor recommended. That is, the speaker has a function in mind which, for each student, can return a different professor associated with that student in some way (it might be possible to name the function; e.g., the function which picks each student's literature professor). (9) translates into a f-NSR that says that for every athlete x there is a contextually salient function that the speaker has in mind that, given x , returns a psychologist of x such that x talked with the psychologist so chosen. Again, the speaker has a function in mind which, for each athlete, can result in a different psychologist (the function can, again, be named: e.g., the function which picks each athlete's favorite psychologist).

Notice that if an indefinite is a Kratzer choice function variable, it is predicted to *not* give rise to non-functional readings. The reason for this is that there are only two possibilities for the Kratzer choice function: either the function is Skolemized and bound from above, and only f-ISRs (in long distance contexts) and f-NSRs (in local contexts) are generated, or the function is not Skolemized, and only WSRs are generated. This indeed makes the correct predictions for *a certain*. For example, the sentence in (2) cannot mean that every student read every article that was recommended by any professor (that's a non-f-NSR). Likewise, (5) cannot mean that every athlete talked with some psychologist or other, where having talked with any psychologist is sufficient (another non-f-NSR).⁵

The possibility exists in this account that an indefinite is, either in addition or as an alternative, a run-of-the-mill existential generalized quantifier (type $\langle et, t \rangle$) whose scope taking is restricted syntactically in the usual ways. A run-of-the-mill existential generalized quantifier would give rise to WSRs and non-f-NSRs in local contexts and only

⁵ If binding into the indefinite is a possibility, as is required in this account for f-ISRs, then we may expect a f-NSR when the indefinite inside of the island is bound, not by the subject quantifiers, but by the head of the relative clause, as in (i) (thanks to Yasu Sudo for raising this possibility):

- (i) every student read every article that a certain fan recommended
- (ii) every student _{x} read every article _{y} [that $f(y)$ (fan) recommended]

This reading would say: every student x is such that x read every article y that was recommended by a fan of y . It may be truth-conditionally distinct from the f-ISR. It is not clear to us whether it is attested, though nothing in the Kratzer account (or the Schwarzschild account discussed later) would seem to prevent it.

to non-f-NSRs in long-distance contexts. Schwarz (2001, 2011) entertains the possibility that an indefinite may be an existential generalized quantifier whose scope taking is *not* subject to island constraints. English *a* could be such an indefinite. That’s because it gives rise to WSRs, non-f-ISR and non-f-NSRs in long distance contexts (Ionin 2010, Schwarz 2001, 2011), such as (1), repeated here:

- (10) Every student read every article that *a* professor recommended.
 (11) Every athlete talked with *a* psychologist.

English *a* gives rise to WSRs, non-f-ISRs, and non-f-NSRs in sentences such as (10), and to WSRs and non-f-NSRs in sentences such as (11).⁶ This is not expected if English *a* introduces a Kratzer choice function variable, because doing so will give *a* the same range of readings as English *a certain*. This is contrary to fact. For example, consider the non-f-ISR of (10). This reading says that for every student there is a professor such that the student read every article the professor recommended. The difference with the f-ISR that *a certain* gives rise to is that there need not be a systematic relation between the students and the teachers in the case of *a*—a Kratzer function, however, would result in such a systematic relationship. In section 2.3, we discuss contexts where functional and non-functional readings come apart truth-conditionally.

The behavior of English *a* is expected, however, if this indefinite is an existential generalized quantifier that can QR out of islands. The non-f-ISR of (10) can be derived if the existential quantifier *a professor* QRs out of the island and scopes in between the two universal quantifiers:

- (12) [[every student]₂ [[a professor]₁ [t₂ read every article that t₁ recommended]]]

Consider also the non-f-NSR of (11). That reading says that for every athlete, there is a psychologist such that the athlete talked with the psychologist, where, again, there need not be a systematic relation between the athletes and the psychologists. This is a non-f-NSR that can be obtained by having the indefinite scope below the universal. In both examples, QRing the indefinite above the universal in subject position will give the indefinite wide scope.

Of course, assuming that there are instances of QR that do not obey otherwise well-established syntactic constraints is very problematic. Another possibility for English *a* is to say that it introduces a Reinhart-style choice function variable, that is, a choice function variable that gets closed off by an existential operator at different points in the syntactic tree (see Matthewson 1999, Reinhart 1997, Winter 1997). If the point at which existential closure of this choice function variable takes place is the top, root node, a WSR obtains, as in (13):

- (13) $\exists f$ [every student read every article [that f(professor) recommended]]

Other points of closure give rise to non-f-ISRs and non-f-NSRs (these options are not available in Matthewson’s analysis, see footnote 10 for more on this):

⁶ Ionin (2010) (also Ionin 2014) shows experimentally that, while the three readings are available for *a*, the NSR is preferred. She argues that this is due to the ease with which local scope is processed as compared to non-local scope, a processing principle defended in Anderson (2004), Tunstall (1998), and others. We will ignore this complication here, noting that in Ionin’s analysis, the three readings for *a* still have to be generated by the grammar. See also footnote 23.

- (14) [every student ... \exists f... [read every article [that f(professor) recommended]]]
 (15) [every student read every article ... \exists f... [that f(professor) recommended]]]

In the representation in (14), existential closure occurs below the highest quantifier and above the next one down, giving rise to a non-f-ISR. In (15), it occurs below both, giving rise to a non-f-NSR. These readings are not functional because this approach does not require a systematic relationship between, for example, professors and students. All that is required is that there be a function that chooses, for each student, a professor, where that way of picking professors may be different for, e.g., students Susan and Albert (for Susan, the function may pick her favorite maths teacher, for Albert, his most hated teacher at university). Thus, there isn't a single way in which the students and the professors need be related. The NSR in (15) is non-functional for similar reasons: the way of picking professors may vary per student and/or article, and there is no requirement that the professors be systematically related to them—the reading that is so obtained thus says that for every student and every article, there is a professor who recommended the article and the student read the article.

Schwarzschild's (2002) proposal for wide scope indefinites is as follows. Suppose that indefinites are always existential generalized quantifiers, even exceptional wide scope indefinites. They are not ambiguous, and they do not QR out of syntactic islands. As opposed to other generalized quantifiers like *every*, however, indefinites can have their domain reduced to a singleton set. When the domain of an indefinite is a singleton set, WSRs and f-ISRs arise. Consider again the following sentence:

- (16) Every student read every article that *a certain* professor recommended.

Suppose that *a certain* is an indefinite that forces its domain to be a singleton set. Reducing its domain to a singleton renders it essentially scopeless, and thus a reading arises that is, for all intents and purposes, a WSR ('C' stands for the domain of the quantifier in question, a set of individuals):⁷

- (17) [[every student x] [[every article y] [$\exists z$ C(z) & |C|=1 & professor (z) & recommended (z, y) & read (x, y)]]

A certain professor is an existential generalized quantifier and in this approach QR is island-bound. This means that its existential force stays within the island. Nevertheless, its domain is a singleton set, so the sentence receives a WSR. Consider now (18), where *a certain professor* is bound by the upstairs quantifier *every student*:

- (18) [[every student x] [[every article y] [$\exists z$ C(z) & |C|=1 & professor (x, z) & recommended (z, y) & read (x, y)]]

The representation in (18) gives rise to an f-ISR. The reading so generated says that for every student x, there is a professor of x such that x read every article that the professor recommended. The domain of *a certain professor* is still a singleton, but which singleton set that is can vary per student. For example, suppose that the singleton set associated

⁷ Fodor and Sag (1982) already made the observation that when the domain of an indefinite is reduced to a singleton, their scope is neutralized, that is, they are deemed effectively scopeless, like a definite. But Fodor and Sag thought this meant indefinites are lexically ambiguous between quantificational and referential meanings. What is also missing in Fodor and Sag's proposal, as is well-known, is an account of ISRs.

with each student contains the student's favorite professor. The sentence in (16), as noted before, can have this reading. Note that there isn't a fundamental difference between having a choice function in mind, as in the Kratzer approach, and reducing a set of individuals to a singleton set, as in this approach: in both cases, an individual is chosen from a set of individuals on the basis of a systematic relationship between, in this case, students and professors. This entails that both the Kratzer approach and the Schwarzschild approach generate a f-ISR for (18).⁸

With the domain of the indefinite in (19) obligatorily a singleton set and no binding into that domain, a WSR results, as in (20):

(19) Every athlete talked with *a certain* psychologist

(20) [[every athlete x] [∃z C(z) & |C|=1 & psychologist (z) & talked (x, z)]]

The other option for *a certain*, as before, is that the higher quantifier binds into the indefinite. This results, correctly, in an f-NSR:

(21) [[every athlete x] [∃z C(z) & |C|=1 & psychologist (x, z) & talked (x, z)]]

As in the Kratzer approach, this analysis does not give rise to the constellation of readings available for English *a*—this indefinite does not seem to give rise to functional readings, and it gives rise to NSRs in long distance contexts. An additional exceptional wide scope mechanism must thus be invoked. Note that the account has no problem predicting that *a* will give rise to non-f-NSRs. When the domain of the indefinite is not a singleton set, as in (23) and (25), only non-f-NSRs result:⁹

(22) Every student read every article that *a* professor recommended.

(23) [[every student x] [[every article y] [∃z C(z) & professor (z) & recommended (z, y) & read (x, y)]]

(24) Every athlete talked with *a* psychologist.

(25) [[every athlete x] [∃z C(z) & psychologist (x, z) & talked (x, z)]]

Thus, an indefinite like English *a certain* may be a Kratzer indefinite or a Schwarzschild indefinite, and as such, it does not give rise to non-functional readings. The two approaches make the same predictions for this indefinite. For English *a*, both approaches must appeal to an alternative mechanism (above, either island-escaping QR, or Reinhart choice functions) in order to correctly capture its scope behavior.

2.2. A problem with top existential closure of choice function variables

Schwarz (2001), building on Chierchia (2001), shows that it is Kratzer choice functions, and not choice function variables that are existentially bound by an operator in the syntax

⁸ Schwarzschild's singleton indefinites are indeed generally taken to derive f-ISRs (see, e.g., Ionin 2010 for explicit discussion).

⁹ Breheny (2003) makes a proposal that is in some ways similar to Schwarzschild's. He proposes that exceptional wide scope is also a by-product of domain restriction, but in his case, this is domain restriction by an 'identifying condition' the speaker has in mind. Another difference is that he proposes that even then indefinites like *a certain* are lexically ambiguous, its bound version giving rise to ISRs and its unbound version giving rise to WSRs. We do not provide a comparison with this proposal here.

(as in Matthewson 1999, Reinhart 1997, Winter 1997) that should be used for exceptional wide scope indefinites (or, at the very least, that the latter type of choice function cannot be postulated without accompanying, possibly quite idiosyncratic, constraints on existential closure). The argument is based on examples like the following, with the indefinite in a downward-entailing environment. A pronoun in its restriction is bound by the upstairs negative quantifier to rule out WSRs:

(26) [No boy]₁ talked with *a certain* female relative of his₁ about girls

The sentence in (26) is true when no boy talked with a particular kind of female relative about girls, e.g., if the boys talked with their sisters, grandmothers, etc., about girls, but no boy talked with his mother about girls. If choice function variables can (or must, in the case of Matthewson) be existentially closed off at the top level, weaker truth-conditions than desired are, however, predicted:

(27) $\exists f$ [[no boy]₁ talked with f(female relative of his₁) about girls]]

All that (27) requires is the existence of a way, any way, of choosing female relatives such that no boy talked with the female relative of his so chosen about girls. For boy Oliver, this function could choose his Aunt Lucy. For boy Billie, the function chooses his mother. For boy William, the choice is his paternal grandmother. This means that as long as no boy talked with all of his female relatives, (27) is true. That is, (26) is erroneously predicted to have the same meaning as *No boy talked with all of his female relatives about girls*. On the other hand, the Kratzer-style representation for this example is as in (28):

(28) [[no boy]₁ talked with f(female relative of his₁) about girls]]

The representation in (28) introduces a choice function variable that is contextually provided and is a choice function the speaker has in mind. This already effects the necessary restriction on the choice function being considered. E.g., if the speaker has the mother-of choice function in mind, the sentence is predicted to be true, correctly, in a scenario in which no boy spoke with his own mother about girls. It is no longer the case that the existence of just any choice function that chooses a female relative for each boy is sufficient for the sentence to be true.

We note that, just like Kratzer choice functions, Schwarzschild singleton indefinites do not suffer from this problem. Because the existential force of the indefinite stays put in Schwarzschild's account and *a certain* is an obligatorily singleton indefinite, f-NSRs are correctly predicted in the scope of downward-entailing quantifiers, as in (29) for (26):

(29) [[no boy x] [$\exists z$ C(z) & female_relative(x, z) & talked_about_girls(x, z)], for |C| = 1

The representation in (29) gives rise to the following reading: for no boy x is it the case that there exists this one female relative of his such that he talked with her about girls. This leaves open the possibility, correctly, that each of the boys talked with some female relative of his about girls, just not with the one that is the only member of the reduced, singleton domain of *a certain female relative of his*. The predicted reading is a functional reading because there is one way that the domain of the indefinite is reduced to a singleton set (e.g., the reduction of the domain of female relatives for each boy to the set containing just the boy's mother).

Thus, the top existential closure of Reinhart choice functions must be blocked when the indefinite is in a downward-entailing environment (a constraint that undermines Matthewson’s proposal, since she argues that the only option available for wide scope indefinites in St’át’imcets is precisely the top existential closure of the choice function variable they introduce)¹⁰. Neither the Kratzer nor the Schwarzschild approach are problematic when the relevant indefinite is in a downward-entailing environment.

2.3. Functional and non-functional readings

The contrast between examples (26) and (30) shows that f-NSRs and non-f-NSRs are indeed distinct readings, as argued for by Schwarz:

(30) [No boy]₁ talked with *a* female relative of his₁ about girls

Example (30) clearly contrasts in meaning with example (26). Whereas both examples must be read with narrow scope, given the binding relation between *his* and *no boy*, (30) is true only when no boy talked with any female relatives of his about girls, a non-f-NSR. *A certain* only gives rise to f-NSRs in these contexts.

A similar argument shows that f-ISRs and non-f-ISRs are also distinct readings. Consider the following examples:

(31) [No boy]₁ tried every dish that *a certain* female relative of his₁ had made

(32) [No boy]₁ tried every dish that *a* female relative of his₁ had made

Example (31) allows for a f-ISR in which no boy tried every dish that, for example, his mother made—though each boy could have tried every dish that some other female relative of his made. Example (32) is false in this kind of scenario. Instead, that sentence seems to give rise to a non-f-ISR in which no boy tried every dish made by any of his female relatives.

Given (26)-(30) and (31)-(32), proposals that the source of non-functional readings of indefinites is functional will over-generate readings for *a certain*, under-generate readings for *a*, or not be able to draw the required distinctions between the two.¹¹

¹⁰ The choice function proposal in Matthewson seems in fact wrong for St’át’imcets. Consider (i) (Matthewson 1999: 91, 110):

| | | | | | | | |
|-----|----------------------------|---------|-------------|-----|---------------|---------|--------|
| (i) | cw7aoz | kw-s | áz'-en-as | [ti | sta'úqwaz'-a] | kw-s | Sophie |
| | NEG | DET-NOM | buy-TR-3ERG | DET | fish-DET | DET-NOM | Sophie |
| | 'Sophie didn't buy a fish' | | | | | | |

(i) has a WSR in which there is a fish that Sophie didn't buy (Matthewson also notes that the sentence does not have a NSR, 'Sophie bought no fish'). However, the WSR predicted in her account for (i) is (ii):

(ii) $\exists f$ [CH(f) & ¬(buy f(fish) (Sophie))]

The truth-conditions so derived are very weak, since as long as there is a fish, even fish the speaker never intended to make claims about, that Sophie didn't buy, the sentence in (i) is predicted to be true. That is, (i) is predicted to be true as long as there are fish in the world and Sophie didn't buy all of it. We take it, however, that (i) makes a stronger claim, namely, the claim that Sophie didn't buy a particular fish.

¹¹ An additional problem for such proposals, originally noted by Ruys (2006), is examples such as (i); since negation is not a variable binder, binding cannot be the source for the attested non-f-ISR of (i):

(i) John wasn't examined by every professor competent on *some problem*

Proposals that the source of functional readings is non-functional will over-generate readings for *a*, under-generate readings for *a certain*, or not be able to draw the required distinctions between the two.

Thus, the behavior of English *a* is problematic for both the Kratzer approach and the Schwarzschild approach. In order to predict the non-functional readings attested in (30) and (32), the Kratzer approach cannot use choice function variables. But, if English *a* does not introduce choice function variables, how can it achieve exceptional wide scope? In order to predict the exceptional wide scope taking capabilities of *a*, its domain has to be allowed to be a singleton set in the Schwarzschild approach. But if its domain can be a singleton set in exceptional scope cases, why can't it also be a singleton set in (30) or (32)? Both approaches wrongly predict, if anything, functional readings in these cases.

2.4. Natural classes of indefinites

Thus, local indefinites behave like regular quantifiers: they give rise to WSRs and non-f-NSRs, but cannot scope out of an island. Long distance indefinites, in contrast, *can* scope out of an island. Functional indefinites are indefinites which have functional readings, independently of their scope-taking properties. Functional indefinites may take wide scope (either locally or out of an island), and may also have ISRs or NSRs, in which case they are bound by a higher quantifier.

If indefinites are existential generalized quantifiers, constrained by the same island constraints as other generalized quantifiers, then they should have only local readings. If long distance QR of indefinites is possible, or if indefinites are derived by Reinhart choice functions, then they should have both local and long-distance readings. However, none of these analyses can derive functional readings.

Functional readings can be derived in the Kratzer approach or in the Schwarzschild approach. These two analyses cannot, however, derive ISRs which are not functional.

Table 1 summarizes the different readings at issue, and shows which readings can be derived by which mechanism. Note that Reinhart choice functions can account for any reading that long distance QR can account for, and vice-versa. In the same vein, implicit domain restriction can account for any reading that contextually determined choice functions can account for, and vice-versa. Thus, empirical data do not allow us to tease apart long distance QR from existentially closed choice functions, or the singleton analysis from contextually determined choice functions:

| | QR, constrained by islands | QR, not constrained by islands | Reinhart choice functions | Kratzer choice functions | Schwarzschild singleton indefinites |
|----------------------|----------------------------------|--------------------------------------|---------------------------------|--------------------------------|---|
| a. local WSR | ✓ | ✓ | ✓ | ✓ | ✓ |
| b. long distance WSR | × | ✓ | ✓ | ✓ | ✓ |
| c. non-f-ISR | × | ✓ | ✓ | × | × |
| d. f-ISR | × | × | × | ✓ | ✓ |
| e. non-f NSR | ✓ | ✓ | ✓ | × | × |
| f. f-NSR | × | × | × | ✓ | ✓ |

Table 1. Summary of possible readings of indefinites and scope mechanisms

Given **Table 1**, we expect to see three types of indefinites, as follows:

- (33) Type 1: indefinites derived by local/island-constrained QR (readings a, e)
Type 2: indefinites derived by non-local/non-island-constrained QR *or* by Reinhart choice functions (readings a, b, c and e)
Type 3: indefinites derived by Kratzer choice functions *or* by Schwarzschild singleton indefinites (readings a, b, d and f)

Type 1 indefinites are local, non-functional indefinites. Type 2 and Type 3 indefinites are exceptional wide scope indefinites. Type 2 indefinites are non-functional, whereas type 3 indefinites are functional. English *a certain* indefinites are Type 3. *A* indefinites are Type 2 (though, as mentioned earlier, *a* prefers NSRs in long distance contexts).

We also expect to find indefinites that belong to more than one type. Type 1+Type 2 indefinites would have the same range of readings available to them as those that are simply Type 2—this case is, thus, not particularly interesting. But the other cases are. Type 1+Type 3 indefinites would be functional exceptional wide scope indefinites that also allow non-f-NSRs. Type 2+Type 3 indefinites would have all readings available to them, including non-f-ISRs.

Even though both the Kratzer approach and the Schwarzschild approach predict Type 3 indefinites to constitute a natural class, the two accounts are not equivalent in how they predict Type 1+Type 3 indefinites to be a natural class. They are also not equivalent in whether they predict Type 2+Type 3 indefinites to be a natural class. Consider the latter case, which will be most relevant in what follows. Type 2+Type 3 indefinites are predicted to be a natural class in the Schwarzschild account if we accept that the QR of certain existential generalized quantifiers is not subject to island constraints: Type 2+Type 3 indefinites would be indefinites whose domain is optionally a singleton set and which can QR out of islands. Since island-unbound QR is by no means without objection, and since it can be argued that assuming it undermines Schwarzschild's overall project, we need to consider the case in which we reject it. If we reject island-unbound QR, Type 2 indefinites must be accounted for using Reinhart choice functions (appropriately constrained so as to prevent weak readings in downward-entailing contexts). In this case, Type 2+Type 3 indefinites are not predicted to be a natural class in the Schwarzschild approach, since the existential generalized quantifiers of the Schwarzschild approach are Reinhart choice functions are not reducible to one and the same mechanism. Thus, for the Schwarzschild account, predicting Type 2+Type 3 indefinites to be a natural class comes at the (possibly unbearable) cost of appealing to island-unbound QR.

Type 2+Type 3 indefinites are not predicted to be a natural class in the Kratzer account if Type 2 indefinites are accounted for by island-unbound QR: Kratzer choice functions and generalized quantifiers are not reducible to one and the same mechanism. Type 2+Type 3 indefinites might be predicted to be a natural class in the Kratzer approach if Kratzer choice functions and Reinhart choice functions can be unified. Such a unified account could be one in which choice function variables introduced by indefinites can be left unbound (in which case the Kratzer treatment of these variables is triggered) or can be existentially closed in the syntax (where existential closure of choice function variables has to be appropriately constrained so as to prevent weak readings in downward-entailing contexts, as before). We do not know of any work that develops such a unified account, but it shouldn't be ruled out *a priori*. Thus, for the Kratzer account, predicting Type 2+Type 3 indefinites to be a natural class requires a unification with

(suitably constrained) Reinhart choice functions. Thus, if Type 2+Type 3 indefinites exist, it is Kratzer’s, and not Schwarzschild’s account, that seems better.¹²

In the next section, we examine the distribution of two Russian indefinites, *koe-wh* and *wh-to* indefinites, and ask which type they correspond to. We show that *koe-wh* indefinites are clearly Type 3. We also show that *wh-to* indefinites are, interestingly, Type 2+Type 3 indefinites (with a caveat; see below).

3 RUSSIAN WIDE SCOPE INDEFINITES: EXPERIMENTAL STUDIES

Most of what we know about the properties of Russian indefinites originates in the seminal work of Paducheva (1985). Further data and recent discussion can be found in Eremina (2012), Geist (2008), Haspelmath (1997), Kagan (2011), Pereltsvaig (2008) and Yanovich (2005). Russian has a number of indefinite series based on *wh*-words (see Haspelmath 1997: 273). Our focus is on a subset of these, *wh-to* indefinites and *koe-wh* indefinites. A third type, *wh-nibud’* indefinites, is set apart from *koe-wh* and *wh-to* indefinites in that they must be licensed by an appropriate quantificational expression and are thus what is known as dependent indefinites in the literature, attested in several languages (Farkas 1997, 2002, Henderson 2014, among others). Thus, where example (34) is grammatical with *koe-wh* or with *wh-to*, it is ungrammatical with *wh-nibud’*:

- (34) Maša pročitala *koe-kakuju/kakuju-to/*kakuju-nibud’* knigu.
 Mary read KOE-WH/WH-TO/WH-NIBUD’ book
 ‘Mary read a/some book.’¹³

A feature of these indefinites that figures prominently in the literature is what is known as identifiability: whereas *koe-wh* indefinites require the speaker of a sentence like (35) to be able to identify the student that Masha talked with (as evidenced by the fact that the continuation that explicitly denies this knowledge is infelicitous, (35)a), *wh-to* indefinites require a certain degree of non-identifiability on the part of the speaker (as evidenced by the pattern of felicity in the continuations illustrated in (35)b; see Kagan 2011). *Wh-nibud’* indefinites are not sensitive to this distinction:

¹² The issues raised by Type 1+Type 3 indefinites are as follows. In the Schwarzschild account, Type 1+Type 3 indefinites are indeed predicted to constitute a class: these are the indefinites whose domain is optionally a singleton set. When the domain of the indefinite is not a singleton, the properties associated with Type 1 indefinites follow. When the domain is a singleton, the properties associated with Type 3 indefinites follow. Because in both cases the indefinite is an existential generalized quantifier, the Schwarzschild account need not appeal to lexical ambiguity, just to optionality of singletonness, a possibility that is perfectly compatible with Schwarzschild’s account. In the Kratzer account, on the other hand, Type 1+Type 3 indefinites must be described using two different mechanisms and are thus not predicted to be a natural class: indefinites must be ambiguous between Kratzer choice function variables and existential generalized quantifiers. If Type 1+Type 3 indefinites are attested empirically, Schwarzschild’s account seems superior to Kratzer’s.

¹³ All translations into English are approximate.

- (35) a. Masha pogovorila s *koe-kakim* studentom, i ja znaju, kto èto/
 Mary talked with KOE-WH student and I know who this
 #ja ne znaju, kto èto.
 I not know who this
 ‘Mary talked with some student, and I know/don’t know who it is.’
- b. Masha pogovorila s *kakim-to* studentom, #i ja znaju, kto èto/ja ne znaju, kto
 èto.
 ‘Mary talked with some student, and I know/don’t know who it is.’

In other words, *koe-wh* indefinites are what is otherwise known as epistemically specific indefinites. *Wh-to* indefinites are ignorance, or epistemically non-specific, indefinites (Aloni and Port 2015, Alonso-Ovalle and Menéndez-Benito 2015 and references cited there, Jayez and Tovenà 2006, Kratzer and Shimoyama 2002, among others) (see footnote 22 for further discussion of this issue).

The literature on Russian indefinites suggests that both *koe-wh* and *wh-to* are exceptional wide scope indefinites. Both of them thus appear potential candidates for indefinites of Types 2 and 3, or for indefinites ambiguous between multiple types (since *koe-wh* and *wh-to* clearly allow exceptional wide scope, as shown below, they cannot be Type 1). Our experimental studies were carried out in order to determine which indefinite types *koe-wh* and *wh-to* indefinites correspond to. We included *wh-nibud’* indefinites for comparison only: since these indefinites are well-known to allow NSRs and to disallow WSRs, they provide a baseline and help us ensure that our experimental studies worked as planned. For example, if *koe-wh* and *wh-to* indefinites were found to lack NSRs, we would not know whether this is because they are derived by a mechanism that disallows NSRs, or because the contexts testing NSRs were poorly designed. But, if *wh-nibud’* is accepted with NSRs, and the other two indefinite types are not, then we know the issue is with the indefinite type, not with the design.

We conducted two separate studies on the properties of *koe-wh*, *wh-to*, and *wh-nibud’* indefinites. The two studies used somewhat different methodology, and tested a different (though overlapping) range of contexts. Convergent results from the two studies would thus provide the most convincing evidence for the (non-)existence of particular readings.

3.1. Experimental study 1

The first study is our first attempt at testing experimentally the range of possible scope readings available to *koe-wh*, *wh-to*, and *wh-nibud’* indefinites. The long distance scope configuration that we tested in this study was relative clauses headed by a universal quantificational expression, as in example (1).

3.1.1. Procedure and participants

We used a Sentence-pair Acceptability Judgment Task (AJT) in which participants rated the acceptability of the second sentence in each pair as a continuation to the first sentence, on a scale from 1 (unacceptable) to 4 (acceptable). The test contained 36 target items and 68 fillers. For all the target items, the first sentence contained an indefinite, and the second sentence established the target scope reading. The fillers tested a variety of other linguistic phenomena, including the scope of universal quantifiers relative to negation, cardinal vs. proportional readings of *many* quantifiers, and different readings of comparative expressions.

A between-subjects design was used to prevent participants from explicitly comparing the three types of Russian *wh* indefinites to one another. Thus, separate test versions were constructed for *koe-wh*, *wh-to*, and *wh-nibud'* indefinites: each participant saw only one test version, with only one indefinite type. Except for the type of indefinite tested, the three test versions were identical in terms of the content and ordering of test items; the fillers were the same in all three versions.

The participants were 83 adult native Russian speakers (26 native Russian speakers were tested on *koe-wh*, 28 on *wh-to*, and 29 on *wh-nibud'*). 52 of the participants took the test online (using a Google Docs link) whereas the remaining 29 took it on paper (in a linguistics class in St. Petersburg). To ensure that the testing context was not confounded with the test version, both internet-based and paper-based test participants were distributed evenly across the three test versions.

There were nine categories of target items (four tokens per category), corresponding to four separate experiments. We report on three of those experiments here. The fourth experiment, not reported here, addressed availability of *de re* vs. *de dicto* readings, a topic not explored in the present paper.¹⁴

The data from each experiment were analyzed using mixed ANOVAs in SPSS, with determiner type (3 levels) as the between-subjects variable, and scope interpretation (2 levels) as the within-subject variable, and the mean rating (on a scale from 1 to 4) as the dependent variable. Significant interactions were followed up by pairwise comparisons (by means of t-tests) among the individual category/determiner combinations; a Bonferroni correction was manually implemented (setting the alpha level to .05 divided by the number of pairwise comparisons) in order to avoid inflating the Type I error rate.

3.1.2. Experiments and predictions

Experiment 1.1 tested scope readings in a local environment, while experiments 1.2 and 1.3 tested availability of long-distance readings out of relative clause islands.

No function was made explicit in the context or follow-up for any of the NSRs and ISRs tested in Study 1 (see examples in the following sub-sections). We know, at least since Kratzer (1998), that functional readings are particularly available when favored (e.g., by pronoun binding, or by mentioning the function in question). When not so favored, we have no evidence of a functional reading. We make the conservative assumption that, in such circumstances, no functional reading is available. Thus, we assume that study 1 tested for non-functional readings, not for functional readings.¹⁵

Table 2 lays out which readings are expected to be available for each type of indefinite outlined in (33); the numbers in **Table 2** refer to example numbers in the following sub-sections:

¹⁴ In that fourth experiment, we found that *wh-nibud'* allows only *de dicto* readings. As for *koe-wh* and *wh-to*, both *de re* and *de dicto* readings were allowed, with a preference for *de re* readings. While there are interesting interactions between theories of *de re/de dicto* readings and theories of exceptional indefinite wide scope, space constraints force us to leave the matter for future study.

¹⁵ According to Kratzer, functional readings (more specifically, f-ISRs), are brought about (or brought about more easily) if the higher quantificational expression binds a pronoun in the indefinite, as in “*Every student read every book that a professor of his recommended.*” In a pilot study, we examined whether including a bound variable pronoun in the indefinite affected availability of functional readings in Russian, and found that it did not. Therefore, we dispensed with bound variable pronouns in our studies, in order to keep the test items shorter and more manageable. Despite this, we continue to assume that contextual saliency of a function does bring about functional readings in Russian.

| | Experiment 1.1 local configuration, universal subject | Experiment 1.2 long distance configuration (RC) | Experiment 1.3 long distance configuration (RC) |
|---|--|--|--|
| | local WSR (36)a vs. non-f-NSR (36)b | long distance WSR (37)a vs. non-f-NSR (37)b | long distance WSR (38)a vs. non-f-ISR (38)b |
| Type 1 (local, non-functional) | (36)a, b | (37)b | none |
| Type 2 (long distance, non-functional) | (36)a, b | (37)a, b | (38)a, b |
| Type 3 (long distance, functional) | (36)a | (37)a | (38)a |

Table 2. Predictions about acceptable readings for each type of indefinite

As shown in **Table 2**, quantificational indefinites which are constrained by islands (Type 1) can have only local WSRs or non-f-NSRs; indefinites unconstrained by islands (Type 2) can have all the possible readings tested in the present study; while indefinites which are obligatorily functional (Type 3) should lack the non-functional NSRs and ISRs.

The empirical question is how *koe-wh* and *to-wh* behave with respect to the predictions in **Table 2** (recall that *wh-nibud'* indefinites are included for comparison only; they are not expected to pattern like any of the three types above).

Below, we describe each of the three experiments in turn, presenting sample test items for each category as well as the results.

3.1.3. Experiment 1.1: local WSRs and NSRs

In experiment 1.1, we tested WSRs vs. NSRs in a local configuration. In (36)a, the second sentence sets up a singleton continuation in which a single psychologist is imposed as the referent of the indefinite in the previous sentence. This continuation is logically compatible with both the WSR and the NSR of the indefinite, since in this syntactic configuration, the WSR entails the (non-functional) NSR (if there is one specific psychologist that every athlete talked to, then every athlete talked to at least one psychologist). The non-singleton continuation in (36)b is compatible only with the NSR, as only this reading allows for a plurality of psychologists to have been talked to by athletes¹⁶. A wide scope indefinite should be felicitous only in (36)a, whereas a narrow scope indefinite should be felicitous in (36)b and possibly also in (36)a (unless it has a non-singleton requirement). Note that the NSR in (36)b is non-functional, in that no functional relationship is established between the athletes and the psychologists; thus, an indefinite which requires functional readings should be infelicitous in (36)b:

¹⁶ The possibility arises that the plural continuation is judged unacceptable simply because it is strange to use the plural after a singular indefinite. Our results show that this was not the case.

- (36) Každyj sportsmen pogovoril s koe-kakim/kakim-to/kakim-nibud' psixologom.
 every athlete talked with *koe-wh/wh-to/wh-nibud'* psychologist
 a. local WSR/singleton (also logically compatible with non-f-NSR)
 Ètot psixolog ostalsja dovol'nym provedennymi besedami.
 this psychologist remained satisfied taken.place conversations
 'Every athlete talked with some psychologist. This psychologist was satisfied with the conversations.'
 b. local NSR/non-singleton
 Èti psixologi ostalis' dovol'nymi provedennymi besedami.
 these psychologists remained satisfied taken.place conversations
 'Every athlete talked with with some psychologist. These psychologists were satisfied with the conversations.'

The results for the first experiment are presented in Figure 1. A mixed 3X2 ANOVA revealed a marginal effect of determiner ($F(2,80)=2.84, p=.064$), and no effect of scope interpretation ($F(1,80)=2.97, p=.089$). However, there was a significant determiner by scope interaction ($F(2,80)=24.8, p<.001$):

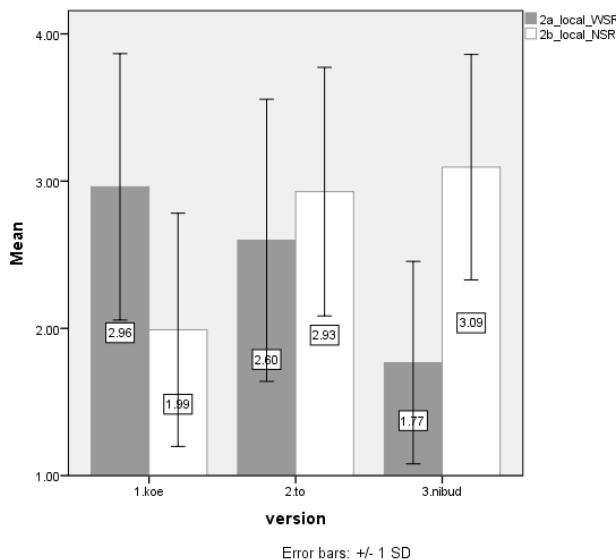


Figure 1: Results for experiment 1.1

Follow-up comparisons revealed the following. First, the three indefinites showed three distinct patterns: *koe-wh* indefinites were rated significantly higher with the WSR/singleton continuation than with the NSR/non-singleton continuation, whereas the opposite was the case for *wh-nibud'* indefinites; for *wh-to* indefinites, the two categories did not significantly differ. Second, in the WSR category, *koe-wh* and *wh-to* indefinites were both rated significantly above *nibud'* indefinites, and no differently from one another, whereas in the NSR category, *wh-to* and *wh-nibud'* indefinites were rated significantly above *koe-wh* indefinites, and no differently from each other.

Thus, we see that *wh-nibud'* indefinites strongly resist the singleton continuation in (36)a, even though this continuation is logically compatible with the NSR as well as the WSR. This suggests that *wh-nibud'* indefinites are anti-singleton, requiring co-variation, as discussed in the literature (Geist 2008, Pereltsvaig 2008). The high acceptability of *wh-nibud'* indefinites in the NSR context furthermore shows that this context was quite felicitous, and that the lower acceptability of the other two indefinite types in this context must be due to the properties of these indefinites, not to problems with the context.

We further see that *koe-wh* indefinites resist the NSR, requiring a WSR/singleton reading, while *wh-to* indefinites are quite compatible with both types of readings. These results speak in favor of *koe-wh* being a Type 3 indefinite, but do not inform us about the status of *wh-to* indefinites, which are compatible with Types 1 and 2, as well as with ambiguity among multiple types.

3.1.4. Experiment 1.2: WSRs vs. NSRs in long-distance environments

In experiment 1.2, we tested the scope of indefinites inside relative clause islands. The two possible readings considered in this experiment were the long-distance WSR (out of the island), as in (37)a, and the NSR, as in (37)b. As in experiment 1.1, we used singleton vs. non-singleton continuations to set up the WSR vs. NSR; the NSR inside an island is clearly non-functional. Note that in this case, the entailment relation is the opposite of that in local configurations, with the NSR entailing the WSR rather than the other way around (if Anastasia solved every problem assigned by any instructor whatsoever, it follows that there is at least one specific instructor such that Anastasia solved all of this professor's assigned problems):¹⁷

- (37) Anastasija rešila každuju zadaču, kotoruju predložil
 Anastasia solved every problem which assigned
 koe-kakoj/kakoj-to/kakoj-nibud' universitetskij prepodavatel'.
koe-wh/wh-to/wh-nibud' university instructor
 a. long distance WSR:
 Ètot prepodavatel' byl očen' strogim.
 this instructor was very strict
 'Anastasia solved every problem which some university instructor assigned. This instructor was very strict.'
 b. NSR (also logically compatible with WSR):
 Èti prepodavateli byli očen' strogimi.
 these instructors were very strict
 'Anastasia solved every problem which some university instructor assigned. These instructors were very strict.'

The results are given in Figure 2. A mixed 3X2 ANOVA found a significant effect of determiner ($F(2,80)=78.7, p<.001$) and a significant effect of scope interpretation ($F(2,80)=50.7, p<.001$), as well as a significant interaction between the two ($F(2,80)=78.7, p<.001$):

¹⁷ Experiment 1.2 did not test for ISRs. If *Anastasia* were replaced with a universal phrase such as *every student*, then the sentence would in principle be three-way ambiguous between the WSR, ISR and NSR. However, the format of our continuations did not allow us to tease apart ISRs from NSRs: the plural continuation with "these instructors" would be equally compatible with both. This is why tested ISRs differently, as in experiment 1.3.

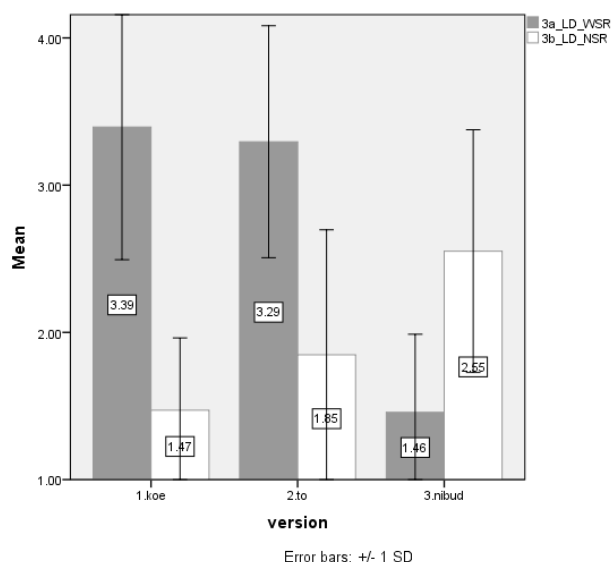


Figure 2: Results for experiment 1.2

Follow-up pairwise comparisons revealed the following. First, both *koe-wh* and *wh-to* indefinites were rated significantly higher with the WSR than the NSR continuation, while the opposite was the case for *wh-nibud'* indefinites. Second, with the NSR continuation, *wh-nibud'* indefinites were rated significantly above the other two indefinite types, whereas the opposite was the case with the WSR continuation. The *koe-wh* and *wh-to* indefinite types did not differ from one another on either category.

Even though the NSR continuation in (37)b logically entails the WSR, both *koe-wh* and *wh-to* indefinites were rated very low in this category, indicating that they need a singleton reading. We note that the behavior of *wh-to* indefinites is quite different in experiment 1.1 (where they allow both NSRs and WSRs) than in experiment 1.2 (where they allow WSRs only).

The behavior of *wh-nibud'* indefinites is once again consistent with their requiring licensing and lacking wide-scope readings. Both *koe-wh* and *wh-to* indefinites behave like Type 3 indefinites in their unavailability of local, non-functional NSRs.

3.1.5. Experiment 1.3: long-distance WSR vs. ISR

Finally, in experiment 1.3, our goal was to test the availability of WSRs vs. ISRs in a long-distance context. In order to rule out the NSR, we set up a context where the NSR would be highly uninformative: e.g., in (38), the NSR would be paraphrased as “Every waiter served every guest whose last name began with a letter, any letter whatsoever”. However, since everyone’s last name begins with a letter, this is a pragmatically odd thing to say:

- (38) Každýj oficiant obslužil každogo posetitelja, ch'ja familija
 every waiter served every visitor whose surname
 načinalas' s koe-kakoj/kakoj-to/kakoj-nibud' bukvy.
 started with *koe-wh/wh-to/wh-nibud'* letter
 a. long-distance WSR (also logically compatible with ISR)
 A imenno, s bukvy "A".
 and namely with letter A
 'Every waiter served every guest whose last name started with some letter. Namely, the letter 'A.'

b. long-distance ISR (also logically compatible with NSR)

Familiì ètih posetitelej načinalis' s dvadcati raznyh bukv.
 surnames these visitors started with twenty different letters
 'Every waiter served every guest whose last name started with some letter. The last names of these guests started with twenty different letters.'

The continuation in (38)a brings out the WSR, via a singleton continuation, exactly as in experiments 1.1 and 1.2. We note that logically, this continuation is also compatible with the ISR (if every waiter served every guest whose name begins with the letter 'A', then it follows that for every waiter, there is a letter—namely, 'A'—such that the waiter served every guest whose name begins with that letter). In contrast, the continuation in (38)b is compatible with the ISR but not with the WSR, since the letters vary with the waiters. This ISR is non-functional, since no relationship between waiters and letters is established. The continuation is also compatible with the NSR but, as noted above, the NSR is pragmatically odd. For *koe-wh* and *wh-to* indefinites, we have seen in experiment 1.2 that the WSR is fully available but the NSR is not; thus, if these two indefinites are accepted in the category in (38)b, this would indicate availability of the ISR. For *wh-nibud'* indefinites, which allow the NSR but not the WSR, acceptability of (38)b could in principle mean acceptance of the (pragmatically odd) NSR rather than acceptance of the ISR.

The results are in Figure 3. A mixed 3X2 ANOVA yielded a significant effect of determiner ($F(2,80)=4.1$, $p=.019$), a significant effect of scope interpretation ($F(2,80)=6.0$, $p=.016$) and a significant interaction between the two ($F(2,80)=29.7$, $p<.001$):

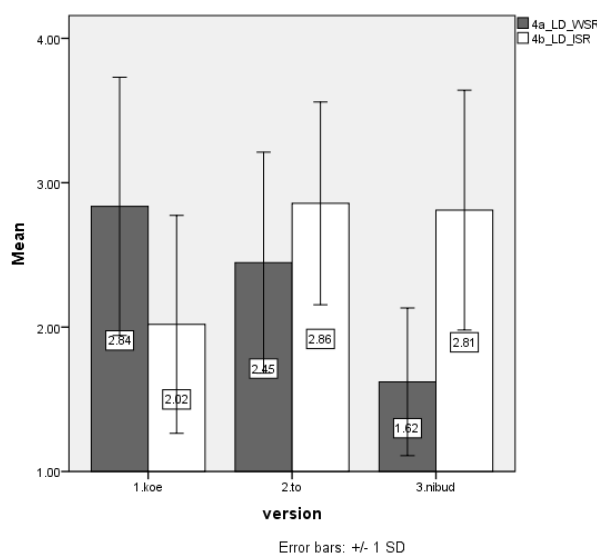


Figure 3: Results for experiment 1.3

Results of follow-up pairwise comparisons revealed the following. First, *koe-wh* indefinites were rated significantly higher with the WSR than the ISR continuation, while the opposite was the case for *wh-nibud'* indefinites. For *wh-to* indefinites, both WSR and ISR continuations were allowed, with marginally higher ratings for the latter. Second, in the WSR category, *koe-wh* and *wh-to* indefinites were rated significantly above *wh-nibud'* indefinites, and no differently from each other, exactly as in experiment 1.2. In contrast, in the ISR category, *wh-to* and *wh-nibud'* indefinites were rated significantly above *koe-wh* indefinites and no differently from each other.

Thus, we see that *wh-nibud'* indefinites consistently disallow WSRs. The results of experiment 1.3 suggests that *wh-nibud'* indefinites allow ISRs; however, it could also be the case that the reading allowed for *wh-nibud'* indefinites in (38)b is actually the pragmatically odd NSR: if the 20 letters of the alphabet are the only ones under consideration (i.e., if there happened to be no clients whose names started with the remaining letters), then the NSR would be true. This means that we do not know whether it is the ISR or the NSR that is causing *wh-nibud'* indefinites to be so acceptable here.

We furthermore see that *koe-wh* indefinites have a strong preference for WSRs, not allowing either non-functional NSRs (exp. 1.2) or non-functional ISRs (exp. 1.3), which reinforces an analysis of them as Type 3 indefinites. In contrast, for *wh-to* indefinites, a comparison across experiments 1.2 and 1.3 indicates that they allow long-distance WSRs, and disallow NSRs inside an island; however, they do appear to allow non-functional ISRs. This does not straightforwardly map onto any of the available indefinite types.

3.1.6. Study 1: summary

The behavior of *koe-wh* and *wh-to* indefinites in the three experiments in Study 1 is summarized in **Table 3** below, in reference to the predictions from **Table 2**. The behavior of *koe-wh* indefinites is quite consistent across the three experiments: they allow WSRs, but not NSRs or ISRs. Given that the NSRs and ISRs tested in study 1 were all non-functional, the behavior of *koe-wh* indefinites is most compatible with an analysis of them as Type 3 indefinites, derived by means of contextually determined choice functions or implicit domain restriction. The prediction is that *koe-wh* indefinites should, therefore, allow f-ISRs and f-NSRs; this prediction was tested in our follow-up study.

The behavior of *wh-to* indefinites is not as clear. On the one hand, *wh-to* indefinites clearly allow local NSRs (exp. 1.1) and ISRs (exp. 1.3) in the scope of a higher quantifier, even though no functional relationship was established in the context; this would point to an analysis of them as Type 2 indefinites, derived by existentially closed choice functions or by long-distance QR. At the same time, however, *wh-to* indefinites appear to lack NSRs inside islands (exp. 1.2), which is more consistent with an analysis of them as functional indefinites.

| | experiment 1.1 | experiment 1.2 | experiment 1.3 |
|--|--|---|---|
| | local configuration, universal subject | long distance configuration (RC) | long distance configuration (RC) |
| | local WSR (36)a vs. non-f-NSR (36)b | long distance WSR (37)a vs. non-f-NSR (37)b | long distance WSR (38)a vs. non-f-ISR (38)b |
| Type 1 (local, non-functional) | (36)a, (36)b | (37)b | none |
| Type 2 (long distance, non-functional) | (36)a, (36)b | (37)a, (37)b | (38)a, (38)b |
| Type 3 (long distance, functional) | (36)a | (37)a | (38)a |
| <i>koe-wh</i> indefinites | (36)a | (37)a | (38)a |
| <i>wh-to</i> indefinites | (36)a, (36)b | (37)a | ?(38)a, (38)b |

Table 3. Predictions and results for study 1, compared: readings found to be acceptable (? indicates marginal acceptability, close to the midpoint of 2.5 on the 1-4 scale).

A limitation of study 1 is that experiment 1.3 did not completely rule out NSRs in the ISR sentence type in (38)b, which means that we may not have succeeded at testing the availability of ISRs. Another limitation is that only one type of scope island was tested (relative clauses), and we do not know whether our findings would generalize to other types of scope islands. Finally, study 1 tested only non-f-NSRs and non-f-ISRs, and thus provides us with no information about the (un)availability of functional readings. These considerations led us to conduct our second experimental study.

3.2. Experimental study 2

Study 2 had three goals: (i) to address the availability of ISRs, teasing them apart from WSRs and NSRs to a greater extent than was done in study 1; (ii) to distinguish functional and non-functional readings; and (iii) to test several different types of scope islands, in order to determine whether the results generalize beyond one syntactic environment. In addition to testing relative clause islands (which were also tested in study 1), study 2 tested *if*-clauses and *because*-clauses as well. As shown below, in Russian, just as in English, *if*-clauses and *because*-clauses are scope islands for non-indefinite (e.g., universal) quantifiers. To our knowledge, the behavior of the three indefinites in *because*-clauses has never been described:

(39) Dva mal'čika budut rady, esli každaja devočka pridet na večerinku.
 two boys will happy if every girl comes on party
 'Two boys will be happy if every girl comes to the party.'
 two>every: There are two specific boys, such that these boys will be happy if all the girls come to the party.
 *every>two: For every girl, if that girl comes to the party, then two (potentially different) boys will be happy.

(40) Dva mal'čika pošli na večerinku, poskol'ku tuda prišla každaja devočka.
 two boys went on party because there came every girl
 'Two boys went to the party because every girl went there.'
 two>every: There are two specific boys, such that these boys came to the party because all the girls were there.
 *every>two: For every girl, because that girl came to the party, two (potentially different) boys came to the party.

3.2.1. Procedure and participants

In study 2, we used an AJT in which each item consisted of a sentence followed three different paraphrases, all beginning with *Točnee...* ('More precisely/that is...'). Participants rated the acceptability of each paraphrase of the original sentence, on a scale from 1 (unacceptable) to 4 (acceptable), as before. The reason we switched to this format (paraphrases) was that the format used in study 1 (continuations) did not readily allow us to tease apart ISRs and NSRs, or to establish functional readings.

The AJT consisted of 20 target items and 24 fillers. For the target items, the original sentence contained an indefinite, and the three paraphrases disambiguated in favor of three readings, respectively: the WSR, the NSR, and a functional reading (either f-ISR or f-NSR, depending on the syntactic configuration). The fillers tested other grammatical phenomena, as in study 1.

Also as in study 1, a between-subjects design was used, with separate test versions for *koe-wh*, *wh-to*, and *wh-nibud'*. Except for the type of indefinite tested, the three test versions were identical in terms of the content and ordering of test items; the fillers were the same in all three versions. The participants were 53 adult native Russian speakers (18 native Russian speakers were tested on *koe-wh*, 15 on *wh-to*, and 20 on *wh-nibud'*). All participants resided in the city of Oryol and completed a paper-version of the test.

The target items corresponded to five separate experiments (four tokens per experiment). Each experiment tested scope interpretation in a different syntactic configuration. The results of each experiment were analyzed using a mixed ANOVA in SPSS, with determiner (3 levels) as the between-subjects variable, and scope interpretation (as determined by the paraphrase; 3 levels) as the within-subjects variable, and the mean rating (on a scale from 1, unacceptable, to 4, acceptable) as the dependent variable. Significant interactions were followed up by six additional comparisons: three one-way ANOVAs comparing the three determiner types to each other for each paraphrase, and three repeated-measures ANOVAs comparing the three paraphrases to each other for each determiner type. A Bonferroni correction was manually implemented (setting the alpha level to .05 divided by 6, the number of follow-up comparisons) in order to avoid inflating the Type I error rate.

3.2.2. Experiments and predictions

Table 4 lays out which readings are expected to be available for each type of indefinite outlined in (33); the numbers in **Table 4** refer to example numbers in the following subsections:

| | exp. 2.1 | exp. 2.2 | exp. 2.3 | exp. 2.4 | exp. 2.5 |
|--|---|---|---|---|---|
| | local configuration, universal subject | local configuration, negative subject | long distance configuration, <i>if</i> -clause | long distance configuration, <i>because</i> -clause | long distance configuration, RC |
| | local WSR (41)a vs. f-NSR (41)b vs. non-f-NSR (41)c | local WSR (42)a vs. f-NSR (42)b vs. non-f-NSR (42)c | long distance WSR (43)a vs. f-ISR (43)b vs. non-f-NSR (43)c | long distance WSR (44)a vs. f-ISR (44)b vs. non-f-NSR (44)c | long distance WSR (45)a vs. f-ISR (45)b vs. non-f-NSR (45)c |
| Type 1 (local, non-functional) | (41)a, (41)b, (41)c | (42)a, (42)c | (43)c | (44)c | (45)c |
| Type 2 (long distance, non-functional) | (41)a, (41)b, (41)c | (42)a, (42)c | (43)a, (43)b, (43)c | (44)a, (44)b, (44)c | (45)a, (45)b, (45)c |
| Type 3 (long distance, functional) | (41)a, (41)b | (42)a, (42)b | (43)a, (43)b | (44)a, (44)b | (45)a, (45)b |

Table 4. Predictions for which readings should be found acceptable for each type of indefinite, for study 2

In experiment 2.1, we tested a basic local scope configuration, with a universal quantifier in subject position; as discussed below, in this configuration, the functional NSR entails the non-functional NSR, which is why non-functional indefinites are predicted to allow the functional NSR in **Table 4**. In contrast, experiment 2.2 tested a local scope

configuration in the context of downward entailment (with a negative quantifier in subject position), which means that the functional NSR will be available only to truly functional indefinites (Type 3). Finally, experiments 2.3 through 2.5 tested three types of scope islands, in which the ISR is set up as a functional reading, and the NSR as a non-functional one. In the island configuration, the WSR entails the ISR (functional or not), which is why the ISR is expected to be available to all types of indefinites which allow long-distance scope.

3.2.3. Experiment 2.1: Local scope configuration

In experiment 2.1, we tested the indefinites in a local scope configuration with a universal quantifier in subject position, as in experiment 1.1. There were three possible continuations: one which was compatible with a WSR (and, by entailment, with a NSR, either functional or not) (41)a; one which was compatible with a f-NSR (and, by entailment, with a non-f-NSR) but incompatible with a WSR (41)b; and one which did not support a functional interpretation and thus is deemed to be compatible only with a non-f-NSR (41)c. This design allows us to tease apart indefinites of Type 3 (which are functional, and hence do not allow non-functional NSRs) and the other two types (where non-functional NSR are allowed):

- (41) Každýj doktor osmotrel koe-kakogo/kakogo-to/kakogo-nibud' pacienta.
 every doctor examined koe-wh/wh-to/wh-nibud' patient
 'Every doctor examined some patient'
- a. WSR (logically compatible with NSR):
 Točnee, vse doktora osmotreli odnogo i tego že pacienta.
 more.precisely all doctors examined one and same PART patient
 'That is, all the doctors examined the same patient.'
- b. f-NSR (logically compatible with non-f-NSR):
 Točnee, každýj doktor osmotrel samogo bol'nogo pacienta v ego
 more.precisely every doctor examined most sick patient in his
 otdelenii.
 unit
 'That is, every doctor examined the sickest patient in his unit.'
- c. non-f-NSR:
 Točnee, vse doktora osmotreli raznyh pacientov.
 more.precisely all doctors examined different patients
 'That is, all the doctors examined different patients.'

The results of experiment 2.1 are given in Figure 4. The results of a mixed 3X3 ANOVA revealed no significant effects of either determiner ($F(2,50) = .37, p = .69$) or interpretation ($F(2,100)=1.71, p=.19$), but there was a significant interaction between the two ($F(4,100)=9.76, p<.001$):

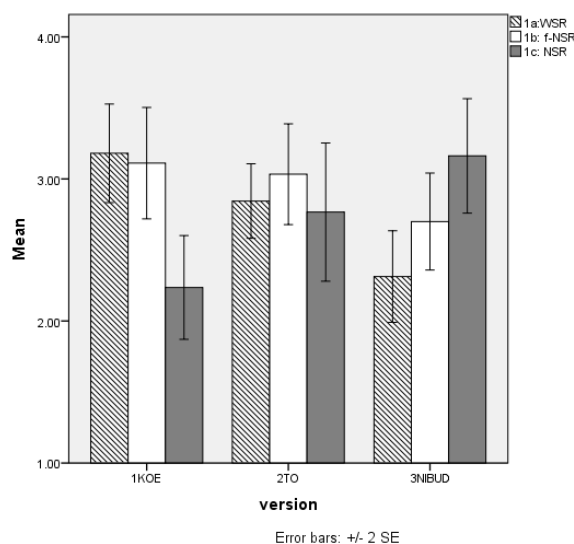


Figure 4: Results for experiment 2.1

Follow-up comparisons revealed that for *koe-wh*, both the WSR and the f-NSR were rated significantly above the non-f-NSR, while for *wh-nibud'*, the WSR was rated significantly below each type of NSR. For *wh-to*, there were no differences in the ratings of the three interpretations. For both the WSR and the non-f-NSR, ratings for *koe-wh* and for *wh-nibud'* differed significantly (in the opposite direction), while there were no differences on the f-NSR.

The behavior of *koe-wh* indefinites suggests, again, that they are Type 3 indefinites, which have functional but not non-functional NSRs. At the same time, *wh-to* indefinites behave like indefinites of either Type 1 or Type 2, which allow both types of NSR. However, experiment 2.1 leaves open the question of whether *wh-to* indefinites have functional readings. While they were rated quite highly in the f-NSR context (41)b, this could be due to availability of the regular, non-functional NSR: if every doctor treated some patient or other (non-f-NSR), it follows that every doctor treated the sickest patient in his unit (the f-NSR established in (41)b). In order to tease apart the functional and non-functional NSRs fully, we need to consider a downward-entailing context, which is precisely what we did in experiment 2.2.

3.2.4. Experiment 2.2: Local downward-entailing scope configuration

In experiment 2.2, the same range of readings as in experiment 2.1 was tested in a downward-entailing context, where the f-NSR is truth-conditionally distinct from both the WSR and the non-f-NSR. Only the WSR is true in (42)a, only the f-NSR is true in (42)b, and both the non-f-NSR and, by entailment, the WSR, are true in (42)c. This experiment is crucial in that it allows us to tease apart functional from non-functional readings, and hence tease apart indefinites of Type 3 (which lack non-functional NSRs) from the other two indefinite types (which lack functional NSRs). One possible confound here is that it is very difficult to obtain a non-f-NSR for the sentence in (42)c, with any Russian *wh*-indefinite, because Russian is a negative concord language, and the NSR is best expressed by a negative indefinite, e.g., *ni odnogo prestupnika*, 'not a single criminal'. We did indeed find that (42)c was quite unacceptable for many speakers (see below):

(42) Ni odin policejskij ne arestoval koe-kakogo/kakog-to/kakogo-nibud' prestupnika.
 NEG one policeman NEG arrested *koe-wh/wh-to/wh-nibud'* criminal
 'No policeman arrested some criminal.'

a. WSR:

Točnee, policejskie ne arestovali izvestnogo mafiozi, kotoryj podkupil
 more.precisely policemen NEG arrested famous mafiosi which bribed
 vsju policiju.
 all police
 'That is, the policemen did not arrest a famous mafiosi who had bribed the entire
 police department.'

b. f-NSR:

Točnee, ni odin policejskij ne arestoval togo prestupnika,
 more.precisely NEG one policeman NEG arrested that criminal
 kotoryj dal emu vzjatku.
 which gave him bribe
 'That is, no policeman arrested the criminal who gave him a bribe.'

c. non-f-NSR (also logically compatible with the WSR):

Točnee, policejskie voobščee ne arestovali nikakih prestupnikov.
 more.precisely policemen at.all NEG arrested no.wh criminals
 'That is, the policeman did not arrest any criminals at all.'

The results of experiment 2.2 are given in Figure 5. The results of a mixed 3X3 ANOVA revealed no significant effects of determiner ($F(2,50) = 1.36, p=.27$), but there was a significant effect of interpretation ($F(2,100)=4.59, p=.012$), as well as a significant interaction between the two ($F(4,100)=5.84, p<.001$):

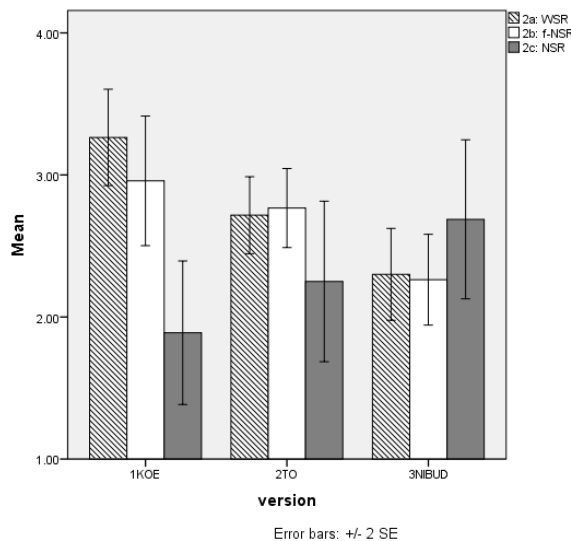


Figure 5: Results for experiment 2.2

Follow-up comparisons found that for *koe-wh*, the non-f-NSR was rated significantly below the WSR, while the three readings were not rated significantly differently for the other two indefinite types. Furthermore, *koe-wh* was rated significantly above *wh-nibud'* for the WSR, and marginally above it for the f-NSR. There were no other significant differences.

Thus, for *koe-wh*, we see that both the WSR and the functional NSR are available, as in experiment 2.1. A similar pattern is exhibited by *wh-to*, but the difference with regular,

non-functional NSR does not reach significance. For *wh-nibud'*, the regular NSR is numerically the most preferred reading, but again, this difference does not reach significance. The relative infelicity of the regular NSR expressed without negative concord is most likely lowering the ratings for the non-functional NSR even for indefinites (*wh-to* and *wh-nibud'*) for which it would otherwise be available. The fact that no reading is very acceptable for *wh-nibud'* can be explained if this indefinite only allows non-f-NSR, which in this context is pragmatically odd.

The results of experiment 2.2 further support the analysis of *koe-wh* as a Type 3, obligatorily functional, indefinite. The analysis of *wh-to* is not very clear, but the fairly high ratings of the functional NSR suggest that *wh-to* does have functional readings available to it.

3.2.5. Experiment 2.3: long-distance scope configuration, *if*-clause

In experiments 2.3, 2.4 and 2.5, we tested the scope of the relevant indefinite in different long-distance scope configurations. Experiment 2.3 tests the configuration in which the indefinite is embedded in the antecedent of a conditional. We tested for WSRs, f-ISR and NSRs in this category (only the regular NSR was tested; we did not test the functional NSR, which was already tested in experiments 2.1 and 2.2). Notice that (43)a is true on the WSR and, by entailment, on the ISR, and that (43)c is true on the NSR and, by entailment, on the WSR and the non-f-ISR (since no function is established in (43)c, the f-ISR is not supported). (43)b is true only on the ISR, either functional or non-functional:

- (43) Každýj vos'miklassnik budet rad, esli koe-kakaja/kakaja-to/kakaja-nibud'
 every eighth-grader will glad if *koe-wh/wh-to/wh-nibud'*
 devochka pridet na vecherinku.
 girl comes on party
 'Every eighth-grade boy will be happy if some girl comes to the party.'
- a. WSR (logically compatible with ISR):
 Točnee, vse vos'miklassniki budut rady, esli samaja populjarnaja
 more.precisely all eight-graders will glad if most popular
 devochka v klasse pridet na vecherinku.
 girl in class comes on party
 'That is, all the eight-grade boys will be happy if the most popular girl in the class comes to the party.'
- b. f-ISR (logically compatible with non-f-ISR):
 Točnee, každyj vos'miklassnik budet rad, esli ta devochka,
 more.precisely every eighth-grader will glad if that girl
 kotoraja emu osobenno nravitsja, pridet na vecherinku.
 which him especially appeals comes on party
 'That is, every eighth-grade boy will be happy if the girl that he particularly likes comes to the party.'
- c. non-f-NSR (logically compatible with WSR and non-f-ISR):
 Točnee, každyj vos'miklassnik budet rad, esli xot' odna
 more.precisely every eighth-grader will glad if at.least one
 devochka, kakaja ugodno, pridet na vecherinku.
 girl which whatsoever comes on party
 'That is, every eighth-grade boy will be happy if at least one girl, any one, comes to the party.'

The results of experiment 2.3 are given in Figure 6. The results of a mixed 3X3 ANOVA revealed no significant effects of determiner ($F(2,50) = 1.13, p=.33$), but there was a significant effect of interpretation ($F(2,100)=4.43, p=.014$), as well as a significant interaction between the two ($F(4,100)=12.7, p<.001$):

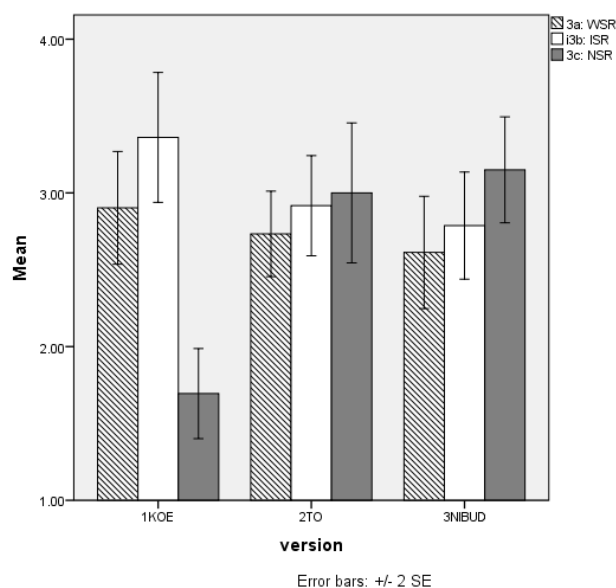


Figure 6: Results for experiment 2.3

Follow-up comparisons found that for *koe-wh*, the NSR was rated significantly below the WSR and the ISR, while the WSR was rated marginally below the ISR; the three readings were not rated significantly differently for the other two indefinite types. Finally, *koe-wh* was rated significantly below the other two indefinite types for the NSR. There were no other significant differences.

Thus, we continue to see the same pattern as before for *koe-wh*, with local NSR unavailable, but the WSR and the ISR available. As before, *wh-to* allows all scope readings. Unexpectedly, *wh-nibud'* received rather high ratings on the WSR, even though numerically they are lower than the ISR and the NSR, and we have seen in other experiments (1.2 and 1.3) that *wh-nibud'* indefinites disallow the WSR. Since *wh-nibud'* indefinites are not the focus of our investigation, we lay this issue aside, and focus on the other two indefinite types. The results of exp. 2.3 are consistent with *koe-wh* being analyzed as Type 3 indefinite, whereas the behavior of *wh-to* indefinites, which allow non-f-NSRs, is compatible with Type 2 indefinites.

3.2.6. Experiment 2.4: long-distance scope configuration, *because*-clause

In experiment 2.4, we tested the scope of an indefinite embedded in a *because*-clause. Again, we tested for WSRs, f-ISRs and NSRs, as shown in (44):

(44) Každýj junoša použinal v ètom restorane, poskol'ku
 every youth dined in this restaurant because
 koe-kakaja/kakaja-to/kakaja-nibud' devushka poet tam po vecheram.
 koe-wh/wh-to/wh-nibud' girl sings there in evenings
 'Every young man ate supper in this restaurant because some girl sings there in the evenings.'

a. WSR (logically compatible with ISR):

Točnee, vse junoši použinali v ètom restorane, poskol'ku samaja
 more.precisely all youths dined in this restaurant because most
 populjarnaja devushka v gorode poet tam po vecheram.
 popular girl in city sings there in evenings
 'That is, all the young men ate supper in this restaurant because the most popular girl in the city sings there in the evenings.'

b. f-ISR (logically compatible with non-f-ISR):

Točnee, každýj junoša použinal v ètom restorane, poskol'ku ta
 more.precisely every youth dined in this restaurant because that
 devushka, s kotoroj on sobiraetsja poženiťsja, poet tam po vecheram.
 girl with which he plans marry sings there in evenings
 'That is, every young man ate supper in this restaurant because the girl whom he plans to marry sings there in the evenings.'

c. non-f-NSR (logically compatible with WSR and non-f-ISR):

Točnee, vse junoši použinali v ètom restorane, poskol'ku tam po
 more.precisely all youths dined in this restaurant because there in
 večeram byvaet penie.
 evenings be singing
 'That is, every young man ate supper in this restaurant because there is singing there in the evenings.'

The results of experiment 2.4 are given in Figure 7. The results of a mixed 3X3 ANOVA revealed no significant effects of determiner ($F(2,50) = 1.27, p=.29$), but there was a marginal effect of interpretation ($F(2,100)=2.9, p=.059$), as well as a significant interaction between the two ($F(4,100)=11.8, p<.001$):

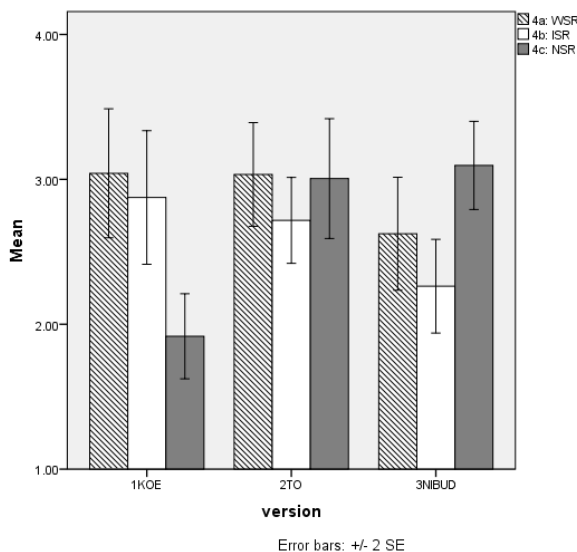


Figure 7: Results for experiment 2.4

Follow-up comparisons found that for *koe-wh*, the NSR was rated significantly below the WSR and marginally below the ISR; for *wh-nibud'*, both the WSR and the ISR were rated significantly below the NSR. The NSR received significantly lower ratings with *koe-wh* than with the other two indefinite types, while there were no differences among determiners for the WSR and the ISR.

Thus, we continue to see that the NSR is the preferred reading for *wh-nibud'* and the unavailable reading for *koe-wh*, while all three readings are available to *wh-to*. Once again, this supports an analysis of *koe-wh* as a Type 3 indefinite, and one of *wh-to* as a Type 2 indefinite.

3.2.7. Experiment 2.5: long-distance scope configuration, relative clause

Finally, in experiment 2.5, we tested for the scope of an indefinite embedded in a relative clause (as we did in experiments 1.2 and 1.3). Once again, we tested WSRs, f-ISRs, and regular NSRs, as illustrated in (45):

- (45) Každýj pacient prinjal každoe lekarstvo, kotoroe propisal
 every patient took every medication which prescribed
 koe-kakoj/kakoj-to/kakoj-nibud' doktor.
koe-wh/wh-to/wh-nibud' doctor
 'Every patient took every medication that some doctor prescribed.'
- a. WSR (logically compatible with ISR):
 Točnee, vse pacienty prinjali vse lekarstva, propisannye glavnym
 more.preciselyall patients took all medications prescribed main
 kardiologom v bol'nice.
 cardiologist in hospital
 'That is, all the patients took all the medications that the head cardiologist in the hospital prescribed.'
- b. f-ISR (logically compatible with non-f-ISR):
 Točnee, každyj pacient prinjal vse lekarstva, propisannye ego lečaščim
 more.preciselyevery patient took all medication prescribed his treating
 vračom.
 doctor
 'That is, every patient took all the medications that his case doctor prescribed.'
- c. non-f-NSR (logically compatible with WSR and non-f-ISR):
 Točnee, vse pacienty prinjali vse lekarstva, propisannye
 more.preciselyall patients took all medications prescribed
 kakimi by to ni bylo doktorami.
 some whatsoever doctor
 'That is, all the patients took all the medications that any doctor prescribed.'

The results of experiment 2.5 are given in Figure 8. The results of a mixed 3X3 ANOVA revealed no significant effects of either determiner ($F(2,50) = .85, p=.43$) or interpretation ($F(2,100)=.89, p=.42$), but there was a significant interaction between the two ($F(4,100)=9.67, p<.001$):

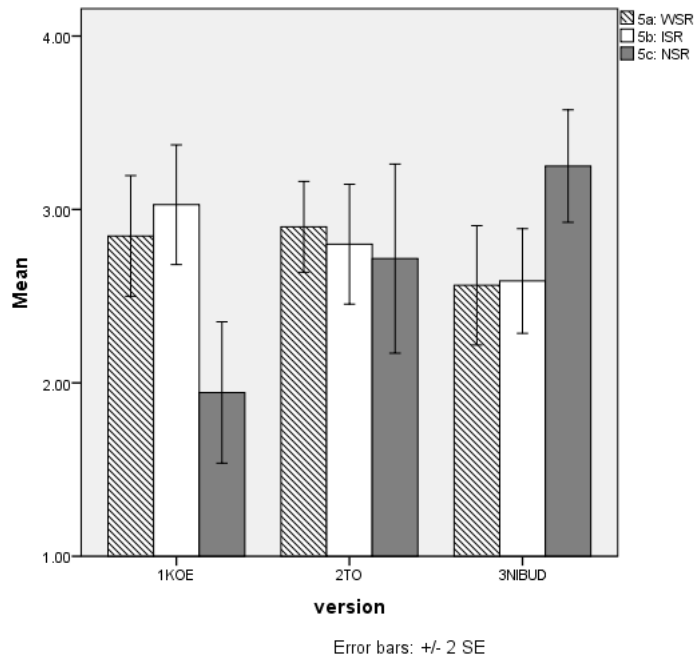


Figure 8: Results for experiment 2.5

Follow-up comparisons found that for *koe-wh*, the NSR was rated significantly below the WSR and the ISR; for *wh-nibud'*, both the WSR and the ISR were rated marginally below the NSR. With the NSR, *koe-wh* was rated marginally lower than *wh-to* and significantly lower than *wh-nibud'*. There were no other significant differences.

Thus, we continue to see that the NSR is the preferred reading for *wh-nibud'* and the unavailable reading for *koe-wh*, while all three readings are available to *wh-to*. As in the prior two experiments, the results support the analysis of *koe-wh* as Type 3, and of *wh-to* as Type 2. We further note that the results of exp. 2.5 for *wh-to* contradict those of exp. 1.2: even though both experiments tested the same configuration (relative clause islands), the NSR was found to be unavailable to *wh-to* in exp. 1.2, but fully available in exp. 2.5.

3.2.8. Study 2: summary

The behavior of *koe-wh* and *wh-to* indefinites in the three experiments in study 2 are summarized in **Table 5** below, in reference to the predictions from **Table 4**. The behavior of *koe-wh* indefinites is quite consistent across all five experiments: they consistently allow WSRs and functional readings (both functional NSRs, in exp. 2.1 and 2.2, and functional ISRs, in exp. 2.3 through 2.5), but disallow the regular, non-functional NSRs. This is exactly the behavior that we expect from Type 3 indefinites.

| | exp. 2.1 | exp. 2.2 | exp. 2.3 | exp. 2.4 | exp. 2.5 |
|--|---|---|---|---|---|
| | local configuration, universal subject | local configuration, negative QP subject | long distance configuration, <i>if</i> -clause island | long distance configuration, <i>because</i> -clause island | long distance configuration, RC island |
| | local WSR (41)a vs. f-NSR (41)b vs. non-f-NSR (41)c | local WSR (42)a vs. f-NSR (42)b vs. non-f-NSR (42)c | long distance WSR (43)a vs. f-ISR (43)b vs. non-f-NSR (43)c | long distance WSR (44)a vs. f-ISR (44)b vs. non-f-NSR (44)c | long distance WSR (45)a vs. f-ISR (45)b vs. non-f-NSR (45)c |
| Type 1 (local only) | (41)a, (41)b, (41)c | (42)a, (42)c | (43)c | (44)c | (45)c |
| Type 2 (long distance, non-functional) | (41)a, (41)b, (41)c | (42)a, (42)c | (43)a, (43)b, (43)c | (44)a, (44)b, (44)c | (45)a, (45)b, (45)c |
| Type 3 (long distance, functional) | (41)a, (41)b | (42)a, (42)b | (43)a, (43)b | (44)a, (44)b | (45)a, (45)b |
| <i>koe-wh</i> indefinites | (41)a, (41)b | (42)a, (42)b | (43)a, (43)b | (44)a, (44)b | (45)a, (45)b |
| <i>wh-to</i> indefinites | (41)a, (41)b, (41)c | (42)a, (42)b, ?(42)c | (43)a, (43)b, (43)c | (44)a, (44)b, (44)c | (45)a, (45)b, (45)c |

Table 5. Predictions and results for Study 2, compared: readings found to be acceptable (? indicates marginal acceptability, close to the midpoint of 2.5 on the 1-4 scale)

The behavior of *wh-to* indefinites is not as straightforward. Across the five experiments in study 2, *wh-to* indefinites appear to allow all possible readings. This by itself could indicate a problem with the experimental design, where participants simply accept all continuations due to a yes-bias or fatigue with the test. However, a comparison between *wh-to* and the other two indefinite types shows that this cannot be the case: participants from the same population clearly distinguished between the different readings for *koe-wh* indefinites (lowered ratings for non-functional NSRs), as well as for *wh-nibud'* indefinites (lowered ratings for WSRs), yet allowed all the possible readings for *wh-to* indefinites. This suggests that *wh-to* indefinites do indeed have all the readings available to them.

The only reading which received quite low ratings for *wh-to* indefinites was the non-f-NSR in experiment 2.2. However, recall that this reading was somewhat infelicitous, since the non-f-NSR in the scope of a negative quantifier is best expressed by means of negative concord. Even *wh-nibud'* indefinites, which are well-established to have NSRs, received somewhat lowered ratings for the NSR in exp. 2.2 (relative to the NSRs in the other experiments).

The only experiment which fully teased apart functional readings from non-functional ones was experiment 2.2; the results for the f-NSR category in this experiment indicate that the functional readings are indeed available to *wh-to*. This suggests that *wh-to* indefinites are definitely Type 3 indefinites and that in addition they are either Type 1 or Type 2 indefinites.

4 A COMPARISON BETWEEN THE TWO APPROACHES

As discussed above, the behavior of *koe-wh* indefinites is remarkably consistent across the two studies and all seven experiments. Taken together, the results of study 1 (where *koe-wh* indefinites were found to lack non-f-ISR and non-f-NSR and allow only WSRs) and the results of study 2 (which showed f-ISR and f-NSR, but not non-f-NSR, to be available to this indefinite type) indicate that *koe-wh* indefinites are not simply wide scope indefinites, but rather functional indefinites. Their behavior is straightforwardly captured by either a contextually determined choice function analysis or an implicit domain restriction analysis.

The behavior of *wh-to* is more complex. **Table 6** summarizes the behavior of *wh-to* across experiments, and indicates which types of indefinites can best capture its behavior:

| | readings available vs. unavailable to <i>wh-to</i> | compatible with indefinites of type... |
|----------|--|--|
| exp. 1.1 | √local WSR, √non-f NSR | Type 1 and Type 2 |
| exp. 1.2 | √LD WSR, *non-f NSR | Type 3 |
| exp. 1.3 | ?LD WSR, √non-f ISR | Type 2 |
| exp. 2.1 | √local WSR, √f-NSR, √non-f NSR | Type 1 and Type 2 |
| exp. 2.2 | √local WSR, √f-NSR, ?non-f NSR | Type 3 |
| exp. 2.3 | √LD WSR, √f-ISR, √non-f NSR | Type 3, or ambiguous between Type 3 and another type |
| exp. 2.4 | √LD WSR, √f-ISR, √non-f NSR | |
| exp. 2.5 | √LD WSR, √f-ISR, √non-f NSR | |

Table 6. Summary of the behavior of *wh-to* indefinites across experiments

We can disregard Type 1 indefinites, since *wh-to* clearly allows long distance readings. On the one hand, the results of experiments 1.1, 1.3, 2.1, 2.3, 2.4 and 2.5 indicate that *wh-to* indefinites have non-f-ISR and non-f-NSR available to them, which speaks in favor of analyzing them as Type 2 indefinites. At the same time, the results of experiments 1.2 and 2.2 indicate unavailability of the non-f-NSR, coupled with, in experiment 2.2, availability of the f-NSR—a finding that speaks in favor of their analysis as Type 3 indefinites.

We do not have an account of why *wh-to* behaves differently in some experiments than in others. However, we believe that the very existence of this variability speaks in favor of analyzing *wh-to* indefinites as indefinites which have both functional and non-functional readings available to them. Across experiments, the functional reading appears to be preferred to the non-functional: f-ISR and f-NSR, as well as the WSR, are always available, whereas we see variability in the availability of non-functional readings.

A further question is whether *wh-to* indefinites have non-f-ISR. Our data clearly show that non-f-NSR are available (experiments 1.1, 2.1, 2.3, 2.4 and 2.5), as well as f-ISR (experiments 2.3, 2.4 and 2.5). But even though experiment 1.3 tested for non-f-ISR, this experiment did not fully tease apart the ISR from the (non-f) NSR; on the basis of this experiment alone, we do not have sufficient grounds to argue that *wh-to* indefinites have non-f-ISR. Experiment 2 did not allow us to tease apart f-ISR from non-f-ISR. Recall from section 2.3 that downward-entailing contexts such as that exemplified in (31)/(32), repeated here, allow us to tease apart these two kinds of readings:

(46) [No boy]₁ tried every dish that a (*certain*) female relative of his₁ had made

The native Russian speakers we consulted for introspective judgments deemed the Russian equivalents of (46) very complex and hard to judge, more so than the other items in the experiment (a problem we encountered to a lesser extent in the simpler sentences of experiment 2.2; see section 3.2.4) and were thus not tested. Including such items in our experiment would have introduced additional, extraneous factors to control for. Given the known difficulty in distinguishing f-ISR from non-f-ISR (see Ebert *et al.*'s 2007 attempt at doing so by embedding under verbs of saying, and Ionin's 2015 attempt to do so with supporting contexts), we don't think it is possible to successfully control for these factors with our current methodology. To the extent that we can tell, the empirical picture that emerges from our consultation with speakers is that *koe-wh* indefinites allow only f-ISRs, making them Type 3, truly functional, indefinites, and that *wh-to* indefinites allow both f-ISRs and non-f-ISRs, making them Type 2+Type 3 indefinites. These intuitions are compatible with the results for f-ISRs that we obtain in the experiments.

We now compare the Kratzer and the Schwarzschild accounts on their treatment of *koe-wh* and *wh-to* indefinites.

4.1 *Koe-wh* indefinites

Koe-wh indefinites, or Type 3, functional indefinites, more generally, are problematic for neither the Kratzer nor the Schwarzschild accounts.

In the Kratzer account, *koe-wh* indefinites introduce choice function variables that are left unbound but their value is contextually provided and in the mind of the speaker. These functions are optionally Skolemised; when they are, the additional argument is bound by a c-commanding quantifier. The readings available to *koe-wh* are represented as follows:

(47) WSR: every athlete talked with $f(\text{psychologist})$

(48) f-NSR: $[\text{every athlete}]_x$ talked with $f(x)(\text{psychologist})$

(49) WSR:
every student read every article $[\text{RC that } f(\text{professor}) \text{ recommended}]$

(50) f-ISR:
 $[\text{every student}]_x$ read every article $[\text{RC that } f(x)(\text{professor}) \text{ recommended}]$

Since there are no other analytical possibilities for *koe-wh*, these representations exhaust, correctly, the range of possible readings available for this indefinite.¹⁸ In this account, *koe-wh* indefinites do not give rise to non-f-NSRs because they are not quantificational.

Koe-wh indefinites are indeed proposed to introduce contextually provided choice function variables in Eremina (2012) and Geist (2008). The choice function variable is always free and assigned a value by the speaker/contextually. Eremina and Geist do not consider the possibility to Skolemized choice function variables, but clearly that is needed in order to account for the functional readings that these indefinites give rise to.

In the Schwarzschild account, *koe-wh* indefinites are existential generalized quantifiers whose domain is obligatorily a singleton:

¹⁸ It is also possible to treat *koe-wh* indefinites as contextually provided obligatorily Skolemised choice functions. In that case, when the additional argument is not bound by a c-commanding quantifier, we can say it is bound to the speaker—this will result in WSRs, as desired.

(51) $[[koe-wh_c]] = \lambda P.\lambda Q.\exists x C(x)=1 \ \& \ |C|=1 \ \& \ P(x)=1 \ \& \ Q(x)=1$

Koe-wh indefinites allow binding into their domain by an upstairs quantifier, but they do not require it. This entails that WSRs are always an option for these indefinites and that the only non-WSRs they allow are f-NSRs or (f)-ISRs. Both predictions are, as we know from section 3, correct. Thus, we obtain representations such as the following:

(52) WSR:¹⁹ [every athlete] talked with [*koe-wh_c* psychologist], $|C|=1$

(53) f-NSR: [every athlete]_x talked with [*koe-wh_{c_x}* psychologist], $|C|=1$

(54) WSR:
every student read every article [_{RC} that [*koe-wh_c* professor] recommended], $|C|=1$

(55) f-ISR:
[every student]_x read every article [_{RC} that [*koe-wh_{c_x}* professor] recommended],
 $|C|=1$

All of these readings work just as they do in Schwarzschild's original proposal. No non-f-NSRs are, correctly, predicted for *koe-wh* indefinites because such readings require the quantifier to have a non-singleton domain.

4.2 *Wh-to* indefinites

The two accounts differ in their treatment of *wh-to* indefinites, that is, of Type 2+Type 3 indefinites. Since the readings that *wh-to* indefinites give rise to are a superset of the readings that *koe-wh* indefinites give rise to, both the Kratzer account and the Schwarzschild account need to appeal to an additional mechanism to derive the additional readings.

In the Kratzer account, *wh-to* indefinites introduce Kratzer choice functions and have the range of analysis available for *koe-wh* in (47)-(50). The next question for this analysis is how non-functional readings, both non-f-ISRs and non-f-NSRs, are to be generated. We've considered two analyses that generate non-functional readings, the Reinhart analysis, and the island-violating QR analysis proposed in Schwarz' work.

In addition to raising important general theoretical issues, at the heart of the island-violating QR analysis is the idea that the indefinite in question denotes an existential generalized quantifier. Being two fundamentally different types of entities, (Kratzer) choice functions and existential generalized quantifiers do not seem to be reducible to one and the same mechanism. Thus, if the Kratzer analysis appeals to island-violating QR in its analysis of *wh-to*, it must postulate two different types of indefinite wide scope mechanisms. In this analysis, *wh-to* indefinites are lexically ambiguous between Kratzer choice functions and existential generalized quantifiers. Non-functional readings obtain when the existential generalized quantifier interpretation is chosen.

On other hand, the Kratzer analysis may appeal to (suitably constrained) Reinhart choice functions to account for the non-functional readings of *wh-to*. This seems to be a better

¹⁹ In another derivation, *koe-wh* indefinites QR above the quantified expression in subject position, since, as far as we know, Russian allows local QR (Antonyuk 2015, Ionin and Luchkina 2017). This also gives rise to a WSR.

option for the Kratzer analysis: the problems of the island-violating QR analysis are avoided, and it might be possible to reduce the two kinds of choice functions into one and the same mechanism. Under this analysis, *wh-to* indefinites unambiguously introduce choice function variables. We now add that choice functions may or may not be Skolemized, and that choice functions may or may not be existentially closed off in the syntax. When not existentially closed off in the syntax, choice function variables are bound to the speaker, as per Kratzer. When they are existentially closed off in the syntax, they are the choice function variables of Reinhart. This permits all of the options in (47)-(50) for *wh-to*, and, in addition, those in (56)-(60)²⁰:

- (56) WSR: $\exists f$ [every athlete talked with f (psychologist)]
- (57) non-f-NSR: [every athlete]₁ [$\exists f$ [t_1 talked with f (psychologist)]]
- (58) WSR:
 $\exists f$ [every student read every article [_{RC} that f (professor) recommended]]
- (59) non-f-ISR:
 [every student]₁ [$\exists f$ [t_1 read every article [_{RC} that f (professor) recommended]]]
- (60) non-f-NSR:
 [every student read every article $\exists f$ [[_{RC} that f (professor) recommended]]]

The main issue in this analysis is how to understand the seemingly arbitrary constraints on existential closure in downward-entailing contexts that Schwarz argues for. All else being equal, it would seem that, for the Kratzer account, this is a less problematic avenue of analysis. Under this analysis, it is thus possible to predict Type 2+Type 3 indefinites to be a natural class. Eremina (2012) and Geist (2008) indeed treat *wh-to* as introducing a contextually provided, possibly Skolemized choice function variable (Yanovich 2005 does not use Skolemization for *wh-to*). Even though none of Eremina, Geist or Yanovich can account for non-functional readings for *wh-to* indefinites, as *wh-to* indefinites in these accounts unambiguously introduce Kratzer choice function variables, the extensions of the Kratzer account proposed here of course compatible with their analyses.

Overall, the situation seems to be more problematic for the Schwarzschild account. We begin by assuming that *wh-to* indefinites denote existential generalized quantifiers whose domain may, but need not, be a singleton set. The lexical entry for these indefinites would be as in (61):

- (61) [[*wh-to*_C]] = $\lambda P.\lambda Q.\exists x C(x)=1 \ \& \ P(x)=1 \ \& \ Q(x)=1$

²⁰ If Reinhart choice functions are also allowed to be Skolemized for *wh-to*, then there are additional representations to consider, though these are equivalent to some of (56)-(60). For example, consider (i):

- (i) $\exists f$ [[every athlete]_x talked with $f(x)$ (psychologist)]

The representation in (i) is equivalent to (56) and does not, in particular, give rise to a f-NSR—the sentence still comes out true iff there is a choice function f such that every athlete x talked a psychologist chosen by that function, which now happens to be associated with each x . The function is still the same for all athletes. Or, consider (57) but with a Skolemized choice function—Skolemization here allows the functions to vary with the athletes, but that is something that is already allowed in the non-Skolemized version, resulting in either case in a non-functional reading.

The same representations as in (52)-(55), and hence, the same readings, would be available for *wh-to*. In addition, the possibility of not reducing its domain to a singleton set would give rise to non-f-NSRs, as in (62) or (63):²¹

(62) Non-f-NSR: [every athlete] talked with [wh-to_C psychologist]

(63) Non-f-NSR:
[every student] read every article [_{RC} that [wh-to_C professor] recommended]

The only reading yet to account for is non-f-ISR. There are two options here. The first option is to assume that *wh-to* indefinites can QR out of islands without restriction. This would allow the generation of non-f-ISRs but island-unbound QR is not without objection, and in fact it might be taken to undermine Schwarzschild's overall project. If we reject island-unbound QR, non-f-ISRs must be accounted for using (suitably constrained) Reinhart choice functions. However, in this case, ambiguity must be postulated, for choice functions and existential generalized quantifiers are two separate mechanisms and cannot be reduced to one. Thus, it seems that, for the Schwarzschild analysis to account for *wh-to* indefinites, either very unappealing island-violating QR, or an additional, separate wide scope mechanism, must be assumed. The existence of these indefinites, in other words, does not follow straightforwardly from Schwarzschild's account.^{22, 23}

²¹ This account also allows the following representation:

(ii) [every student]_x read every article [_{RC} that [wh-to_{C_x} professor] recommended]

That is, since the domain of *wh-to* need not be a singleton set, it is possible that binding into the domain occurs when no singleton reduction has been effected. The domain from which the professor is picked contains more than one member and can vary by student. This is not a WSR, since the domain is not a singleton. Instead, this is a non-f-NSR, where the non-singleton domain of the existential quantifier may vary with the choice of student. If variation does obtain, it need not be systematic: the professor-recommended articles need not be the students' first professors, or their literature professors, etc.

²² The epistemic non-specificity of *wh-to* indefinites is not a problem for either the Kratzer or the Schwarzschild accounts, or the extended versions of these accounts discussed here. As emphasized in Kratzer (2003), one can know a function without knowing its outputs. The Kratzer approach can say that *wh-to* indefinites impose the additional constraint that the speaker cannot be fully informed of the identity of the outputs of the function that s/he has in mind. Since we've argued in section 4.2 that a Kratzer approach to *wh-to* indefinites also requires the use of (suitably constrained) Reinhart choice functions, we note that nothing in the Reinhart approach to choice functions requires the speaker to know which is the function whose existence is asserted, nor is that account committed to the idea that the speaker must know the output of such function. The Kratzer approach must also then add conditions on the use of *koe-wh* as well, e.g., to the effect that the speaker must be able to identify the outputs of the relevant function.

The Schwarzschild approach can say that the reduction of the domain of an indefinite to a singleton need not involve speaker knowledge: the reduction can take place even if the speaker does not know the identity of the only individual in that reduced domain. Thus, an additional constraint can be introduced for *wh-to* to the effect that the speaker cannot be fully informed about the individual in question. For the case of *koe-wh*, this approach can also add an additional constraint to the effect that the individual that is the only member of that singleton set must be known to the speaker.

²³ A question for both approaches is why the functional reading is apparently preferred for *wh-to* indefinites over the simple quantificational reading. A possible answer may lie in the fact that the non-functional, quantificational reading is available to *wh-nibud'* indefinites. That is, in contexts where both *wh-to* and *wh-nibud'* indefinites are in principle grammatical, there may be a kind of Gricean competition at work. Hearers may reason along the following lines: in the presence of a higher quantifier, a *wh-to* indefinite may be interpreted as either functional/singleton or non-functional/non-singleton. However, the non-functional/non-singleton reading is unambiguously captured by a *wh-nibud'* indefinite. Thus, if the speaker chose to use the ambiguous *wh-to* rather than the unambiguous *wh-nibud'*, she was probably

5 CONCLUSION

We have shown that two important approaches to exceptional wide scope which are usually taken to be equivalent to each other, the Kratzer approach and the Schwarzschild approach, can actually be distinguished on the basis of indefinites that allow both functional and non-functional readings. Our argument is based not on whether the correct predictions are made for these indefinites (they are, in both cases), but on the appeal that additional assumptions or mechanisms have when viewed within each approach, assumptions or mechanisms needed to explain the full range of readings.

Type 2+Type 3 indefinites presented the limiting, most difficult case from a theoretical perspective. Type 2+Type 3 indefinites allow all possible readings, including non-f-ISRs. We proposed detailed Kratzer and Schwarzschild analyses for these indefinites and showed that they are problematic for both accounts, but possibly less so on a Kratzer account combined with (suitably constrained) Reinhart choice functions.

On the empirical side, we presented two experimental studies that probed the scopal properties of two Russian wide scope indefinites: *koe-wh* and *wh-to* indefinites. *Koe-wh* indefinites are well-behaved Type 3 indefinites: that is, they are truly functional indefinites. *Wh-to* indefinites were shown to be Type 2+Type 3 indefinites, giving rise to both functional and non-functional readings. Thus, the more problematic case for the theories above, we claim, seems to be attested in Russian, and is thus a problem that the two approaches to exceptional wide scope must address. We encountered difficulties when testing for non-f-ISRs, as the resulting test sentences are very complex and difficult to judge. Thus, one final conclusion of our work is that better devices must be designed for the testing for ISRs in general and for non-f-ISRs in particular.

intending to convey the functional/singleton reading. In this approach, when *wh-nibud'* is not an option grammatically, there is no way to tell whether *wh-to* indefinites are functional or not. Since *koe-wh* and *wh-to* differ in their epistemic conditions, they wouldn't compete with each other—thus, if the speaker intends a functional/singleton reading without also conveying identifiability, then *wh-to* is the only option.

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Word count: 18791