Wide scope indefinites in Russian: an experimental investigation

Luisa Martí and Tania Ionin
Queen Mary, University of London, and University of Illinois at Urbana-Champaign

Abstract This paper contributes to the cross-linguistic study of indefinites by reporting on two experimental studies on the scopal and functional properties of the two Russian indefinites *koe-* and *-to*. We show that *koe-* allows not only wide scope readings out of syntactic islands, but also functional readings, much like English *a certain*. *-to*, on the other hand, allows all possible scopal readings and both functional and non-functional readings. We then discuss this state of affairs from the perspective of a number of prominent theories of indefinite scope.

1 Introduction

There is a long, well-known tradition in the formal semantics literature focused on indefinite existential scope (see, among others, Abusch 1994, Brasoveanu and Farkas 2011, Breheny 2003, Charlow 2014, Endriss 2009, Farkas 2002, Fodor and Sag 1982, Ionin, 2006, 2010, 2015, Kratzer 1998, Martí 2007, Matthewson 1999, Onea 2015, 2016, Portner 2002, Portner and Yabushita 1998, 2001, Reinhart 1997, Schwarz 2001, 2011, Schwarzschild 2002, Winter 1997. See Brasoveanu and Farkas 2016 for a recent overview). Particular attention has been devoted to exceptional wide scope indefinites, that is, to indefinites whose scope reaches (or, according to some, seems to reach) outside of syntactic islands. Consider three possible readings for the sentence in (1), with *a (certain)*: two readings that involve scope outside of the relative clause island (in brackets), namely, a wide scope reading (WSR from now on) in (1)a, and an intermediate scope reading (ISR) in (1)b (where the indefinite escapes an island but takes scope underneath a higher quantifier, *every* in this case), and a third reading that does not, the narrow scope reading (NSR) in (1)c:

(1)   Every student read every article [that *a (certain)* professor recommended].
   a. There is a 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 professor-recommended. [NSR]

A situation that makes the NSR ((1)c) true is one in which all students read all professor-recommended articles (a situation that, by entailment, also makes the WSR and the ISR true). A situation that makes both the WSR ((1)a) and ISR ((1)b) true, but the NSR false, is one in which two professors each recommended articles, but the students read only the articles recommended by one of the professors, say, Dr Smith. The WSR is true because there is indeed a professor, namely, Dr Smith, such that every student read all the articles recommended by her. The ISR is true because for each student it is possible to find a professor, Dr Smith again, such that the student read every article recommended by that professor (the ISR does not *require* the professors to be different, though this would be compatible with this reading too). 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; see (2)). All the ISRs we consider in this paper are *long distance readings*. WSRs will 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.*

Consider yet another situation, one in which each student is in a special relation to a different article-recommending professor, e.g., the favorite-professor relation. If each student only read the articles recommended by her favorite professor, each student has a distinct, unique favorite professor, and there are non-favorite, article-recommending professors, only the ISR is true. Readings which rely on such systematic relationships are known as *functional readings*: the ISR in (1)b in this case is called a functional ISR (cf. Kratzer 1998, Schwarzschild 2002, among others; functional readings are also well-known in the literature on *wh*-questions, see Chierchia 1993, Krifka 2001). In other words, which professor is relevant for the truth of the functional ISR of (1)b depends on which student we are considering. NSRs can also be functional, as in (2):

(2) Every student saw *a (certain)* professor

 In the functional NSR of (2), a systematic relation obtains between students and professors, such that the professor each student saw is not just any professor, but the one that stands in that relation to him/her (e.g., again, his/her favorite professor).

Functional readings stand to opposition to *non-functional* readings (both ISRs and NSRs may be non-functional). In non-functional readings, the relation between, say, students and professors in (2) is not mediated by a function: there are student-professor pairs, but their pairing is not systematic. Student Rose might have seen Dr Jones, her maths professor (much hated by Rose), student Amy might have seen Dr Smith, her favorite professor, student Bill might have seen Dr Stevens, his literature professor, etc.

The English sentences in (1) and (2) are possible with either the indefinite *a* or with the indefinite *a certain*. However, not all of the readings just described are (equally) available to both indefinites, as is well known from the literature. We do not address this issue in this paper (but see Farkas 2002, Fodor and Sag 1982, Hintikka 1986, Ionin 2010, 2015, Kratzer 1998, Schwarz 2001, 2011, among others for more on English *a* and *a certain*).

In addition to exploring the question of how to generate these readings, important work in this area has aimed at establishing a cross-linguistically valid typology of indefinite scope. We know that there are indefinites whose scope can never be wide, as is the case for bare plurals (see Carlson 1977 and much subsequent work) and that there are dependent indefinites, which require an appropriate licensor and never take widest scope (such as Hungarian reduplicated indefinites and Romanian *cite*, as in Farkas 1997, 2002, 2007, and Russian *-nibud'*, as in Geist 2008, Pereltsvaig 2008, Onea 2016, Onea and Geist 2011, Yanovich 2005 and below; see Brasoveanu and Farkas 2011 and Henderson 2014 for general remarks on dependent indefinites). Conversely, there are indefinites (often termed 'specific' or 'referential') that obligatorily take the widest possible scope in all circumstances (i.e., in both local and long distance contexts); this seems to be the case for German *gewiss* (Ebert, Ebert and Hinterwimmer 2013) and English *this*-indefinites (Ionin 2006). There are also indefinites, such as English *a certain*, that are more permissive, in that they also allow functional readings. We might also expect to find the most permissible of exceptional wide scope indefinite, those that allow all possible

readings. We know of no previous claim that such permissible indefinites are attested. Table 1 summarizes this discussion:[1]

type of indefinite	WSR	functional ISR or NSR	non-functional ISR or NSR	examples
wide-scope only	yes	no	no	German *gewiss*, English *this*-indefinites
functional	yes	yes	no	English *a certain*
all scope readings	yes	yes	yes	?

Table 1 Types of wide scope indefinites

Our goal in this paper is to contribute to this typology by examining the scopal and functional properties of Russian *koe-* and *-to* indefinites. We show that the most permissible type of indefinite is indeed attested, Russian *-to* being, we argue, an example. We also show that Russian *koe-* is in the same class as English *a certain*; the case of *koe-* is less surprising from the perspective of this typology, but our results challenge the received view in the literature that *koe-* does not allow functional readings.

The two empirical studies we present here are, to our knowledge, the first experimental studies ever done on the scope of Russian indefinites, though indefinites in this language have indeed received attention in the theoretical literature (Eremina 2012, Dahl 1970, Geist 2008, Haspelmath 1997, Kagan 2011, Paducheva 1985, Onea 2016, Onea and Geist 2011, Pereltsvaig 2000, 2008, Yanovich 2005). Our experimental results complete and modify the received empirical picture in several ways. First, they confirm that both *koe-* and *to-* indefinites can take exceptional wide scope. Second, our findings establish the functional nature of *koe-*: interestingly, as long as they are functional, we found that even NSRs are possible for this indefinite. Third, we establish that *-to* indefinites give rise to a wider range of readings than *koe-* and than previously thought. Finally, we establish that ISRs are indeed possible for both indefinites, something which is also not clear in the existing literature. Our two studies include, in addition, a third Russian indefinite, the dependent indefinite *-nibud'* , which serves as a control for *koe-* and *-to*.

Once the scopal properties of *koe-* and *-to* are established, the question arises as to how to account for their behavior. We will not defend a particular analysis in this paper, but we do offer brief comments on how some prominent theories of indefinite scope, including Brasoveanu and Farkas (2011, 2016), Kratzer (1998, 2003), Onea and Geist (2011) and Schwarzchild (2002), might account for our data.

The organization of the paper is as follows. In section 2, we review what we know so far about the scopal and other properties of these two Russian indefinites. In section 3 we present our experiments and their results. Section 4 briefly discusses possible accounts of the data. Section 5 is the conclusion.

2   Previous literature on Russian indefinites

Our study challenges aspects of the received empirical picture for both *koe-* and *-to* from the literature, and it is that received empirical picture that we summarize in this section. Most of what we know about Russian indefinites originates in the seminal work of

---

[1] English *a* might be considered an example of a non-functional exceptional wide scope indefinite, though non-NSRs in long-distance contexts seem to be dispreferred by *a* (cf. Ionin 2010, 2015, Schwarz 2001, 2011).

Paducheva (1985), with additional developments and insights in Eremina (2012), Dahl (1970), Geist (2008), Haspelmath (1997), Kagan (2011), Onea (2016), Onea and Geist (2011), Pereltsvaig (2000, 2008) and Yanovich (2005). The discussion and examples in this section are based on this literature. Russian has several indefinite series based on *wh*-words (Haspelmath 1997: 273), including the *-to*, *koe-*, *-nibud'*, *-libo* and *ni-* series. Each of these series has variants for person (e.g., *kto-to* 'somebody' (lit. who-to)[2], *ni-kto* 'nobody' (lit. NEG-who)), thing (*čto-to* 'something' (lit. what-to), *koe-čto* 'a certain thing' (lit. koe-what)), place, time, manner, and amount, as well as a determiner variant (*kakoj-to* 'some' (lit. which-to)) (see Haspelmath 1997: 272-275 for more discussion and further references).

Our focus in this paper is on wide scope indefinites, that is, on *-to* and *koe-*. We contrast their scopal behavior with that of *-nibud'*, a dependent indefinite which must be licensed by an appropriate quantificational expression. Example (3) is grammatical with *koe-* or with *-to* but ungrammatical with *-nibud'* because of the lack of licensor (the judgments reported in this section largely reflect the consensus in the literature, see the references cited above):

(3) Maša   pročitala   **koe-kakuju/kakuju-to/*kakuju-nibud' knigu**.
    Mary   read   koe-wh/wh-to/wh-nibud'   book
    'Mary read a book.'

Another difference with *koe-* and *-to* is that these indefinites give rise to *de re* readings in intensional contexts, whereas *-nibud'* indefinites give rise only to *de dicto* readings. In (4), *koe-* and *-to* give rise to a reading in which there is a particular book that Mary wants to read (not any book will do), whereas, in the case of *-nibud'*, which is licensed in this environment, Mary wants to read anything that can be described as a book:

(4) Masha   <u>xochet</u> prochitat'   **koe-kakuju/kakuju-to/kakuju-nibud' knigu**.
    Mary   wants   read-inf   koe-wh/wh-to/wh-nibud'   book
    'Mary wants to read a book.'

Regarding their scope properties, the received view from the literature is that *koe-* and *-to* allow WSRs and that NSRs are either unavailable or dispreferred for them. *-nibud'* indefinites give rise to NSRs only. Consider a local context, in (5):

(5) <u>Kazhdyj student</u>   prochital   **koe-kakuju/kakuju-to/kakuju-nibud' knigu**.
    every   student   read-past   koe-wh/wh-to/wh-nibud'   book
    'Every student read a book.'

Koe- and *-to* only give rise to the WSR here ("there is a book x such that every student read x"), while *-nibud'* gives rise only to a NSR ("every student read a potentially different book"). In long distance contexts, *koe-* and *-to* give rise to WSRs, whereas *-nibud'* does not. (6) exemplifies with a relative clause island (indicated by brackets; cf. (1)): (6) with *koe-* or *-to* is claimed in the literature to allow the WSR ((1)a), but only the NSR ((1)c) with *-nibud'*:

(6) <u>Kazhdyj student</u>   prochital   <u>kazhduju   knigu</u>, [kotoruju
     every   student   read   every   book   which
     porekomendoval   **koe-kakoj/kakoj-to/kakoj-nibud' professor**]
     recommended   koe-wh/wh-to/wh-nibud'   professor
     'Every student read every book that some professor recommended.'

It is unclear in the literature what the availability of ISRs is. ISRs are claimed to be available for *-to* and *wh-nibud* only, if available at all (Eremina 2012, Yanovich 2005). NSRs are only clearly available for *-nibud'*, but the situation for *-to* is unclear (Yanovich 2005). NSRs are claimed not to be available at all for *koe-* (Eremina 2012, Onea 2016, Onea and Geist 2011).

Finally, whereas *koe-* indefinites require the speaker of a sentence like (7) 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, (7)a), *-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 (7)b); *-nibud'* indefinites are not sensitive to this distinction:

(7) 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 ne znaju, kto   èto/
         Mary   talked   with wh-to   student   and I not know who   this
         #ja   znaju,   kto èto.
         I   know   who this
         'Mary talked with some student, and I know/don't know who it is.'

In other words, *koe-* indefinites are what is otherwise known as epistemically specific indefinites. *-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 Tovena 2006, Kratzer and Shimoyama 2002, among others). Additionally, as discussed in Kagan (2011), Onea (2016), and Onea and Geist (2011), *koe-* indefinites add a "secretive" component, such that the speaker of (7)a conveys not only that s/he knows who the student is, but also that s/he is not willing to reveal this knowledge.

In summary, *koe-* is considered to be an exceptional wide scope indefinite which disallows NSRs altogether; *-to* is taken to allow both exceptional WSRs and NSRs, but to prefer WSRs; *-nibud'* is a dependent indefinite. The availability of exceptional ISRs for any of them is unclear.

3   Russian wide scope indefinites: experimental studies

Our experimental studies were carried out in order to clarify this picture, in particular, with regards to the scopal properties of *koe-* and *-to* indefinites. We included *-nibud'* indefinites for comparison only: since *nibud'* indefinites are well-known to allow NSRs and to disallow WSRs, they provide a baseline and help us ensure that our experiments worked as planned. For example, if *koe-* and *-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 *-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-, -to,* and *-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.

Our broad research questions are as follows. RQ1: Do both *koe-* and *–to* indefinites readily allow long-distance scope readings? RQ2: Do both *koe-* and *-to* indefinites allow ISRs? RQ3: Do either *koe-* or *–to* indefinites allow and/or require functional readings? Both experimental studies reported below addressed RQs 1 and 2, but only the second experiment addressed RQ3.

3.1. Experimental study 1

The first study was our first attempt at testing experimentally the range of possible scope readings available to *koe-, -to*, and *-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 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).[3] For all the target items, the first sentence contained an indefinite, and the second sentence established the target scope reading.[4] 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-, -to,* and *-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-*, 28 on *-to*, and 29 on *-nibud'*)[5]. 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

---

[3] An anonymous reviewer questions our decision to have an even number of points on the scale; we did so in order to prevent the scale from having a midpoint, which participants could potentially choose simply to avoid making a choice.

[4] As discussed in more detail below, in some cases the continuations were in principle compatible with more than one scope reading, due to entailment relations; the goal of the continuation was to make one of the readings more salient. Ultimately, our conclusions are based on comparisons among different conditions, rather than on performance within a single condition.

[5] Three additional participants, all from the online version of the test, were excluded from analysis due to their age being significantly above that of all other participants. These three participants were 59 or older, whereas all others were below 50, and most were in their 20's and 30's. The exclusion as intended to preserve the homogeneity of the sample.

with the test version, both internet-based and paper-based test participants were distributed evenly across the three test versions.

3.1.2. Experiments and predictions

Each of the three test versions contained nine categories of target items (four tokens per category), for a total of 36 target items, plus 68 fillers; the items were randomized for order of presentation. The 36 target items corresponded to four different sub-experiments, which, by virtue of being part of the same test instrument, were responded to by the same set of participants, within the same testing session. We report on three of those experiments here, each of which was tested was tested by two of the target categories, i.e., eight tokens (four per category). The fourth experiment, not reported here, addressed availability of *de re* vs. *de dicto* readings, a topic not explored in the present paper (this fourth experiment was tested via three test categories, thus encompassing the remaining 12 target items).[6]

The three experiments reported here were as follows. Experiment 1.1 (section 3.1.4) tested scope readings in a local environment, examining the availability of WSRs vs. NSRs in simple sentences containing no scope islands. Experiments 1.2 and 1.3 (sections 3.1.5 and 3.1.6, respectively) both tested availability of long-distance readings out of relative clause islands. Experiment 1.2 compared the availability of long-distance WSRs to that of local NSRs, while Experiment 1.3 compared the availability of long-distance WSRs to that of long-distance ISRs. Thus, each experiment in study 1 compared two types of scope readings within-subjects, and also compared the three indefinite types between-subjects (by examining performance on the three versions with *koe-, -to* and *-nibud'* indefinites). The full list of test items is available in the online supplement.

The predictions, based on prior literature, are as follows. We expect *-nibud'* indefinites to allow NSRs in both local (experiment 1.1) and long-distance (experiment 1.2) environments, as well as to disallow WSRs in all three experiments. Conversely, *koe-* indefinites are expected to allow WSRs in all three experiments, and to disallow NSRs in both local and long distance configurations. If *-to* indefinites have both WSRs and NSRs, they should be accepted in the corresponding contexts in all three experiments. The status of ISRs (experiment 1.3) for the three indefinite types is not clear, so we make no predictions.

3.1.3. Data analysis

Given that Likert scale data are ordinal rather than continuous, the rating data from each experiment were analyzed using a mixed effects model for ordinal data, with fixed and random variables (the cumulative link mixed model). The analysis was implemented using the R software package (R Development Core Team 2014). The *clmm()* function of the *ordinal* package (Christensen 2018) was used for the analysis. We introduced the following fixed effects: *indefinite* (*koe-* vs. *-to* vs. *–nibud'*) and *scope* (WSR vs. NSR for Experiments 1.1 and 1.2; WSR vs. ISR for Experiment 1.3). The fixed effect *indefinite * scope* was introduced as the interaction term. Dummy contrast coding was used in the model. For the factor *indefinite*, which has three levels, the reference level was set to -

---

[6] In that fourth experiment, we found that *-nibud'* allows only *de dicto* readings. As for *koe-* and *-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.

nibud', and the other two indefinite types (*koe-* and *-to*) were compared to it; this decision was motivated by the fact that we were most interested in how the two types of wide-scope indefinites (*koe-* and *-to*) behave, with the non-wide-scope, dependent indefinite *-nibud'* serving as a control. For the factor *scope*, which has two levels, the reference level was NSR. Participants (N=83) and items (N=4) were introduced as random effects in each experiment.[7]

The code used for each experiment is given in (8)a. Significant interactions (below the alpha level of .05) were followed up by pairwise comparisons, by means of the *lsmeans* function in R (Lenth 2016); the code is given in (8)b (the confidence level used by *lsmeans* was .95). The Tukey method of adjustment for multiple comparisons was automatically implemented in R:[8]

(8) a. ordinalIND=clmm(rating ~ indefinite * scope + (1|ID) + (1|item), data=indefinites)
      b. lsmeans(ordinalIND, list(pairwise~indefinite*scope))

3.1.4. Experiment 1.1: local WSRs and NSRs

In experiment 1.1, we tested WSRs vs. NSRs in a local configuration. (9) is a sample experimental item (indefinite phrases are in bold, other quantifiers are underlined):

(9) <u>Každyj sportsmen</u> pogovoril s   **koe-kakim/kakim-to/kakim-nibud'**
     every   athlete talked   with koe-wh/wh-to/wh-nibud'
     psixologom.
     psychologist
     'Every athlete talked with some psychologist.'
     a. WSR (singleton) context (both WSR and NSR true)
     Ètot psixolog ostalsja   dovol'nym provedennymi besedami.
     this psychologist remained   satisfied taken.place   conversations
     'This psychologist was satisfied with the conversations.'
     b. NSR (non-singleton) context (only NSR true)
     Èti psixologi ostalis'   dovol'nymi provedennymi besedami.
     these psychologists remained   satisfied   taken.place   conversations
      'These psychologists were satisfied with the conversations.'

In (9)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 ("there is a psychologist x such that every athlete talked with x") and the NSR ("for every athlete y, there is a pontentially different psychologist x such that y talked with x") of the indefinite. That is because in this

---

[7] As explained in section 3.1.2, each experiment in study 1 was tested by means of 8 tokens, corresponding to two categories (e.g., a WSR and an NSR category in experiment 1.1, see below), 4 tokens per category. The reason that item as a random variable has N=4 rather than N=8 is that 'item' in R corresponds essentially to 'token set', and the tokens from the two different categories within each experiment were created as token sets (see, e.g., example (9), where both the WSR and the NSR versions use the same preceding context and maximally similar target sentences).

[8] We note that in the paper-and-pencil version of the test, it was possible for participants to skip some test items. However, for the target items reported here, this was attested for only one participant, who skipped a single item in experiment 1.1 and a single item in experiment 1.2. The mixed models analysis, by considering performance on individual items rather than means, takes missing items into account.

syntactic configuration, the WSR entails the NSR (if there is one psychologist that every athlete talked to, then every athlete talked to at least one psychologist). The non-singleton continuation in (9)b is compatible only with the NSR, as only this reading allows for a plurality of psychologists to have been talked to by athletes.[9] A wide scope indefinite should be felicitous only in (9)a, whereas a narrow scope indefinite should be felicitous in (9)b and possibly also in (9)a (unless it has a non-singleton requirement). Note that no functional relationship is established between the athletes and the psychologists in the NSR in (9)b, which may make a potential functional indefinite less felicitous (if the indefinite requires the function to be explicit in some way, but also simply if speakers in our experiment fail to supply the function themselves).

The results for the first experiment are presented in Figure 1, with the statistical output in Table 4 in the Appendix.
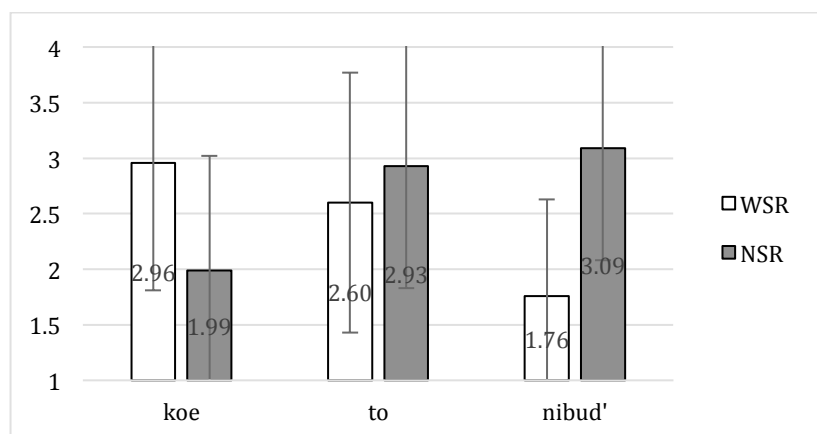
Figure 1. Results of Exp. 1.1: mean ratings (error bars represent 1 standard deviation)

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

Thus, we see that *-nibud'* indefinites strongly resist the singleton continuation in (9)a, even though this continuation is logically compatible with the NSR as well as the WSR. This suggests that *-nibud'* indefinites are anti-singleton, requiring co-variation, as discussed in the literature (Geist 2008, Pereltsvaig 2008). The high acceptability of *-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-* indefinites resist the NSR, requiring a WSR/singleton reading, while *-to* indefinites are quite compatible with both types of readings.

---

[9] 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.

3.1.5 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, as in (10)a ("there is a university instructor x such that Anastasia solved every problem assigned by x"), and the NSR, as in (10)b ("For every problem y there is a potentially different university instructor x such that Anastasia solved y and y was assigned by x"). As in experiment 1.1, we used singleton vs. non-singleton continuations to set up the WSR vs. NSR. 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. For example, consider the situation in which there are five instructors assigning problems, and Anastasia solves all of the assigned problems: in such a scenario, (10) is true on both the NSR (Anastasia solved every problem assigned by any instructor whatsoever) and, by entailment, on the WSR (there is a specific instructor – any one out of the five – such that Anastasia solves every problem assigned by this instructor). Conversely, if all five instructors assign problems, but Anastasia solves all the problems assigned by instructor A, but not those assigned by the other instructors, then (10) is true on the WSR but false on the NSR.[10] Thus, the continuation in (10)b should logically be compatible with both WSR and NSR; however, the plural continuation may be dispreferred for indefinites that have a singleton denotation. In contrast, (10)a should be available only to indefinites that allow for a WSR/singleton reading.

(10) Anastasija   rešila   <u>každuju   zadaču</u>,   kotoruju   predložil
      Anastasia   solved   every   problem   which   assign
      koe-kakoj/kakoj-to/kakoj-nibud' universitetskij   prepodavatel'.
      koe-wh/wh-to/wh-nibud'   university   instructor
      'Anastasia solved every problem which some university instructor assigned.'
      a. WSR (singleton) context (only WSR true)
      Ètot prepodavatel' byl   ochen'   strogim.
      this instructor   was very   strict
      'This instructor was very strict.'
      b. NSR (non-singleton) context (both NSR and WSR true):
      Èti   prepodavateli   byli   ochen' strogimi.
      these instructors   were   very   strict
      'These instructors were very strict.'

The results are given in Figure 2, and the statistical output in Table 5 in the Appendix.

---

[10] Experiment 1.2 did not test for ISRs. If *Anastasia* were replaced with a universal quantifier phrase such as *every student*, then the sentence would in principle be three-way ambiguous between the WSR, ISR and NSR (cf. (1)). 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 we tested ISRs differently, as in experiment 1.3.
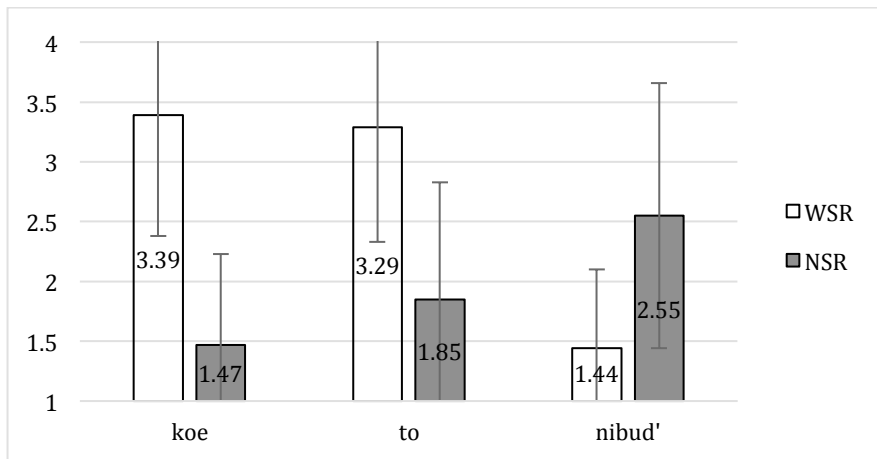
Figure 2. Results of Exp. 1.2: mean ratings (error bars represent 1 standard deviation)

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

The behavior of *-nibud'* indefinites is once again consistent with their requiring licensing and lacking wide-scope readings. Both *koe-* and *-to* indefinites seem to lack NSRs. Even though the NSR continuation in (10)b logically entails the WSR, both *koe-* and *-to* indefinites were rated very low in this category, indicating that they need a singleton reading. We note that the behavior of *-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). We further note that even though statistically *-to* is indistinguishable from *koe-* in experiment 1.2, descriptively, Figure 2 shows that *-to* falls in between the other two indefinite types: its ratings for WSR are slightly lower than for *-koe* and much higher than for *-nibud'*, while its ratings for NSR are about halfway between the other two indefinites. This pattern of *-to* falling in between the other two indefinite types can be observed in Figure 2 as well as in Figure 1.

3.1.6 *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 (11), 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:

(11) <u>Každyj   oficiant</u>   obslužil   <u>každogo   posetitelja</u>,   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
      'Every waiter served every guest whose last name started with some letter.'

11

a. WSR context (WSR and ISR true)

A	imenno,	s		bukvy	"A".
and	namely	with		letter	A

'Namely, the letter *A*.'

b. ISR context (ISR true; NSR true, but pragmatically odd)

Familii	ètih	posetitelej	načinalis'	s	dvadcati	raznyh	bukv.
surnames	these	visitors		started	with	twenty	different	letters

'The last names of these guests started with twenty different letters.'

The continuation in (11)a brings out the WSR ("there is a letter such that every waiter served every guest whose last name begins with that letter"), via a singleton continuation, exactly as in experiments 1.1 and 1.2. We note that, logically speaking, this continuation is also compatible with the ISR ("for every waiter, there is a letter such that the waiter served every guest whose name begins with the letter"): if every waiter served every guest whose name begins with, say, 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 (11)b is compatible with the ISR but not with the WSR, since the letters vary with the waiters. The continuation is also compatible with the NSR but, as noted above, the NSR is pragmatically odd. For *koe-* and -*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 (11)b, this would indicate availability of the ISR. For -*nibud'* indefinites, which allow the NSR but not the WSR, acceptability of (11)b could in principle mean acceptance of the (pragmatically odd) NSR rather than acceptance of the ISR.

The results are given in Figure 3, and the statistical output in Table 6 in the Appendix.
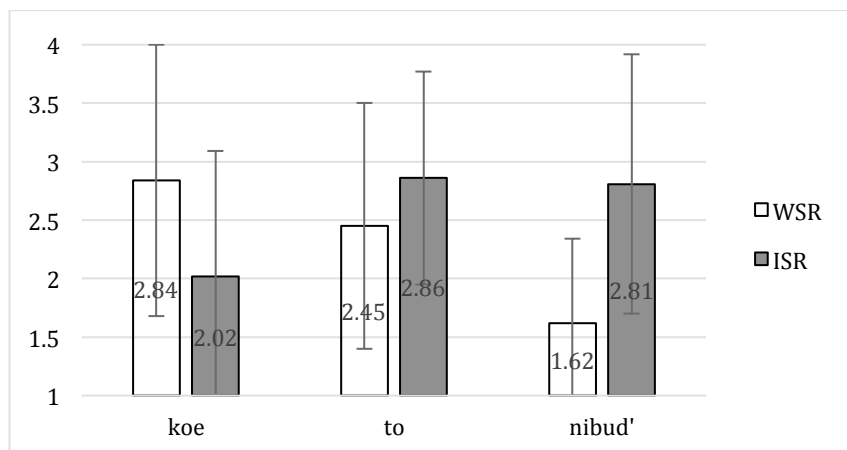
Figure 3. Results of Exp. 1.3: mean ratings (error bars represent 1 standard deviation)

We followed up the significant interaction that obtained with pairwise comparisons, which revealed the following. First, *koe-* indefinites were rated significantly higher with the WSR than the ISR continuation, while the opposite was the case for both -*to* and -*nibud'* indefinites. Second, in the WSR category, *koe-* and -*to* indefinites were rated significantly above -*nibud'* indefinites, and no differently from each other, exactly as in experiment 1.2. In contrast, in the ISR category, -*to* and -*nibud'* indefinites were rated significantly above *koe-* indefinites and no differently from each other.

Thus, we see that *-nibud'* indefinites consistently disallow WSRs. The results of experiment 1.3 suggests that *-nibud'* indefinites allow ISRs; however, it could also be the case that the reading allowed for *-nibud'* indefinites in (11)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 *-nibud'* indefinites to be so acceptable here.

We furthermore see that *koe-* indefinites have a strong preference for WSRs, not allowing ISRs (or NSRs, which is confirmed in experiment 1.2). In contrast, for *-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 ISRs, and indeed, prefer ISRs to WSRs in experiment 1.3.

3.2.8 Study 1: summary and limitations

The behavior of *koe-* indefinites is quite consistent across the three experiments: they allow WSRs, but not NSRs or ISRs. On the other hand, *-to* indefinites clearly allow local NSRs (experiment 1.1) and ISRs (experiment 1.3) in the scope of a higher quantifier and appear to lack NSRs inside islands (experiment 1.2). The empirical picture that arises from study 1 is not too different from that in the existing literature, specially with respect to *koe-* indefinites.

One limitation of study 1 is that experiment 1.3 did not completely rule out NSRs in the ISR sentence type in (11)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 did not tease apart functional from non-functional readings, which may have resulted in an incomplete picture about the behavior of at least *koe-* indefinites. 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 to the extent possible; and, in addition, (iii) to test different types of scope islands, in order to determine whether the results generalize beyond one syntactic environment. Goal (i) was addressed by implementing a different experimental methodology, one in which each reading (WSR vs. ISR vs. NSR) was paraphrased, as will be shown below. With regards to goal (iii), in addition to relative clause islands (which were already tested in study 1), study 2 tested *if*-clauses as well (cf. Yanovich 2005).

Turning to goal (ii), we think that one reason why *koe-* indefinites might not have given rise to ISRs or NSRs in study 1 is that this study was not designed to tease apart functional from non-functional readings. Study 1 did not provide support (in the form of a bound variable in the indefinite phrase, for example, cf. Kratzer 1998; or in the form of naming the function) for functional readings; if functional readings do in fact need this support, then it is possible that study 1 had the results it did not because ISRs or NSRs are absent for, e.g., *koe-* indefinites, but because functional readings were not properly supported. An important question for study 2 is thus how to best test for functional vs. non-functional readings. Given that doing so is far from trivial, a discussion of the assumptions we make here regarding functional and non-functional readings is in order before we present the experiment itself.

It has been known since at least Kratzer (1998) that functional ISRs are 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 in such examples affected availability of functional readings in Russian, and found that it did not. Experimental items in study 2 did not include bound variable pronouns in the indefinite for this reason. Turning to non-functional ISRs, consider Endriss' (2009) German example in (12) (the example is meant to be read with stress on *ein* 'a'):

(12) | Jeder | deutsche | Star | hat | schonmal | der | Bildzeitung |
      | Every | German | star | has | once | the | newspaper.Bild |
      | gedroht, | sie | zu | verklagen, | wenn | EIN | **Photo von** | **ihm** |
      | threatened | her | to | sue | if | some | photo of | him |
      | veröffentlicht | warden | sollte. |
      | published | will | should |

'Every German star has threatened to sue the *Bild* newspaper if some photo of him is published.'

Endriss argues that the pair-list elaboration in (13) cannot have a function as its source, since there is no systematic relationship between the star and the photo that triggers his suing of the newspaper:

(13) For Wolfgang Petry it was a picture of him without his wristlets, for Stefanie Härtl it was a picture of her with her daughter…And I have no idea why they threatened to sue *Bild* because of these photos

The claim is that the ISR of (12) is a non-functional reading. This argument, however, is based on the assumption that a functional source for a reading can *only* be entertained by a speaker if she or he can name the function, if the function is 'natural' (in some sense of that word) or if, at the very least, the speaker knows its description—the speaker must know more about that function that the mere set of pairings (one can describe the pairings in (12) as provided by that function which has the output 'picture of Wolfgang Petry without his wristlets' for the input 'Wolfgang Petry'; the output 'picture of Stefanie Härtl with her daughter' for the input 'Stefanie Härtl', etc.). However, nothing rules out a functional source in a situation in which the function cannot be named, is not natural, or the speaker cannot do more than list a set of pairings, though we do think that it is quite unlikely that such a function is accessed in such a context.

Bearing this in mind, we reason as follows. If a function is named, natural, etc., then the functional reading is supported, and an indefinite which has a functional reading should be acceptable; however, nothing rules out the availability of a non-functional reading in the same context, so an indefinite which has only non-functional readings would also be acceptable in this context. If a function is not named, natural, etc., then the context is probably only compatible with the non-functional reading, and only indefinites which have non-functional readings would be acceptable. In principle, a functional indefinite could still be accepted because a function is accessed even though it's not named or natural; however, this is quite unlikely. We will conclude as follows in study 2: (a) if a context that supports a functional reading is accepted with indefinite X but not with indefinite Y, we conclude that X but not Y has a functional reading (though the question does arise as to why Y is not being accepted with a non-functional reading); (b) if a context that does not support a functional reading allows indefinite Y but not X, we

conclude that X lacks the non-functional reading, while Y has it; and (c) an indefinite which is equally acceptable in contexts which support functional readings and those that do not has at least the non-functional reading, and may or may not also have a functional reading.[11]

Another way to tease apart functional from non-functional readings can be found in Schwarz (2001, 2011), based on Chierchia (2001). Schwarz shows that downward-entailing environments can help tease apart functional from non-functional readings, both NSRs and ISRs, truth-conditionally. Consider (15), which contrasts with (14):

(14) [No boy]$_1$ talked with *a certain* female relative of his$_1$ about girls.
(15) [No boy]$_1$ talked with *a* female relative of his$_1$ about girls.

Both examples rule out wide scope for *a female relative of his* with respect to *no boy*, given the binding relation between *his* and *no boy*. *A certain*, as in (14), only gives rise to functional readings in these contexts: the sentence is true when no boy talked with a particular kind of female relative—the one that stands in the mother-of relation with each of them, for example. The sentence in that case would be true if the boys talked with their sisters, grandmothers, etc., about girls, but no boy talked with his mother about girls. This is a functional narrow scope reading (functional NSR). (15), on the other hand, is true only when no boy talked with <u>any</u> female relatives of his about girls. Sentence (15) does not introduce a particular relation between boys and female relatives—it is thus a non-functional narrow scope reading, which we term just NSR from now on. Study 2 thus included an experiment that tested for functional vs. non-functional NSRs in downward-entailing environments such as (14)/(15) (see experiment 2.2).

Schwarz shows that functional and non-functional ISRs can be teased apart in a similar way, as in (16) and (17). One complication that arises here is the complexity of the examples, which include a negative quantifier, pronoun binding, and an indefinite. This problem arises already in the case of examples such as (14)/(15) but it is more severe once ISRs come into the picture.

(16) [No boy]$_1$ tried every dish that *a certain* female relative of his$_1$ had made
(17) [No boy]$_1$ tried every dish that *a* female relative of his$_1$ had made

Example (16) allows for a functional 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 (17) is false in this kind of scenario. Instead, that sentence seems to give rise to a non-functional ISR in which no boy tried every dish made by any of his female relatives. To the complications of examples such as (14)/(15), we now add embedding, an additional quantifier, and a syntactic island. Not surprisingly, the native Russian speakers we consulted for introspective judgments deemed the Russian equivalents of (16)/(17) very complex and hard to judge, and we therefore decided against including such sentence types in this study.[12]

---

[11] Other attempts at teasing apart these readings can be found in Ebert, Endriss and Hinterwimmer (2007) and Ionin (2015), among others. These attempts didn't prove useful for our purposes.

[12] The empirical picture that emerges regarding functional and non-functional ISRs from our consultation with speakers is that *koe-* indefinites allow only functional ISRs in examples such as (16) and (17), and that *-to* indefinites allow both functional and non-functional ISRs in such examples. These intuitions are compatible with the results we obtain in the experiments that follow.

3.2.1 Procedure and participants

In study 2, we used an Acceptability Judgment Task in which each item consisted of a sentence followed by three different paraphrases, all beginning with *Tochnee…* ('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. For the target items, the original sentence contained an indefinite, and the three paraphrases were intended to bring out one of the three readings: the WSR, the NSR, and a functional reading (either functional ISR or functional NSR, depending on the syntactic configuration).[13] We took the presence of a named function in the paraphrase to be indicative that a functional reading is supported, as explained above. 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-, -to,* and *-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-*, 15 on *-to*, and 20 on *-nibud'*). All participants resided in the city of Oryol and completed a paper-version of the test.

3.2.2 Experiments and predictions

Each of the three test versions contained five categories of target items (four tokens per category), for a total of 20 target items (each with three continuations), plus 24 fillers (also with three continuations each); the items were randomized for order of presentation. The 20 target items corresponded to five different sub-experiments, which, by virtue of being part of the same test instrument, were responded to by the same set of participants, within the same testing sesion. We report on four of the five experiments here.[14]

The four experiments were as follows. In experiment 2.1 (section 3.2.4), 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 even non-functional indefinites are predicted to allow the functional NSR. In contrast, experiment 2.2 (section 3.2.5) 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. Finally, experiments 2.3 and 2.4 (sections 3.2.6 and 3.2.9, respectively) tested two 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 . The syntactic configuration is an antecedent of the conditional island in experiment 2.3, and a relative clause island in experiment 2.4. The full list of test items is available in the online supplement.

To sum up, experiments 2.1 and 2.2, which tested local configurations, contrasted the WSR, the "regular" (non-functional) NSR, and the functional NSR. Experiments 2.3 and

---

[13] As in the case of study 1, the paraphrases could not in all cases fully disambiguate the scope, since, as discussed below, some readings entail others. Therefore, our conclusions are based on comparisons among different conditions, which do allow us to determine which scope readings are (un)available.

[14] The fifth experiment tested the scope of indefinites inside *because*-clauses. The results were largely similar to those of the other two experiments (2.3 and 2.4) which tested indefinites inside islands. We do not report on the *because*-clause experiment here, due to a reviewer's concern that the NSRs and ISRs are particularly difficult to tease apart in this configuration.

2.4, which tested island configurations, contrasted the WSR, the functional ISR and the (regular, non-functional) NSR. Thus, each experiment in study 2 compared three types of scope readings within-subjects, and also compared the three indefinite types between-subjects (by examining performance on the three versions with *koe-*, *-to* and *-nibud'* indefinites).

Based on the literature, and on the results of study 1, we predict that *koe-* indefinites should allow WSRs across all experiments, and disallow the non-functional NSRs; they may or may not allow functional ISRs and NSRs. In contrast, *-to* indefinites are expected to allow WSRs as well as functional readings, and may or may not allow non-functional NSRs. Finally, *-nibud'* indefinites should allow NSRs and may or may not allow functional readings; WSRs should be disallowed for this indefinite type.

3.2.3   Data analysis

As in study 1, the rating data from each experiment were analyzed using a mixed model for ordinal data, with fixed and random variables. The analysis was implemented using R, and the *clmm()* function of the *ordinal* package was used for the analysis. We introduced the following fixed effects: *indefinite* (*koe-* vs. *-to* vs. *–nibud'*) and scope (WSR vs. functional reading – either functional ISR or functional NSR, depending on the experiment – vs. NSR). The fixed effect *indefinite * scope* was introduced as the interaction term. Dummy coding was used in the model; for the factor *indefinite*, which had three levels, the reference level was set to *nibud'*, and the other two indefinite types (*koe* and *to*) were compared to it, as in study 1. For the factor *scope*, which had three levels in study 2, the reference level was set to NSR, and the other two readings were compared to it, given that we were particularly interested in the availability of WSRs and functional readings. Participants (N=53) and items (N=4) were introduced as random effects in each experiment.

The code used for each experiment is given in (18)a. Significant interactions (below the alpha level of .05) were followed up by pairwise comparisons, implemented via the *lsmeans* function in R, as in study 1; the code is given in (8)b (the confidence level used by *lsmeans* was .95). The Tukey method of adjustment for multiple comparisons was automatically implemented in R. [15]

(18) a. ordinalINDexp2=clmm(rating ~ indefinite * scope + (1|ID) + (1|item),
          data=exp2indefinites)
      b. lsmeans(ordinalINDexp2, list(pairwise~indefinite*scope))

3.2.4   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. The first one, where all doctors examined one and the same patient, was compatible with a WSR ("there is a patient that all doctors examined"), exemplified in (19)a. By entailment, this continuation is compatible with a NSR ("for every doctor x

---

[15] As in the case of study 1, we note that the paper-and-pencil format made it possible for participants to skip some test items. Four participants who consistently skipped items across whole pages of the test were excluded from analysis (these participants are not included in the counts reported in section 3.2.1). Of the participants retained for analysis, one participant failed to respond to a single item in Experiment 2.1, otherwise all responses to target items were complete.

there is a potentially different patient y such that x examined y"), either functional or not, since different patients are not required for this reading to be true. The second continuation explicitly supported a functional NSR by mentioning the sickest-patient function (though it did not rule out a regular, non-functional NSR) and is incompatible with a WSR, (19)b. The third continuation is in principle compatible with either a functional or a non-functional NSR, but it did not explicitly support a functional interpretation, hence we term it simply NSR (19)c:

(19) <u>Každyj   doktor</u> 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 context (no function supported; WSR and NSR true):
      Točnee,   vse   doktora osmotreli pacienta, kotoryj   privlek
      more.precisely all   doctors examined patient which   attracted
      vseobščee   vnimanie   svoimi   neobyčnymi   simptomami.
      everyone's   attention   self's   unusual   symptoms
      'That is, all the doctors examined the patient who attracted everyone's attention with his unusual symptoms.
   b. functional NSR context (function supported; NSR true):
      Točnee,   každyj   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. NSR (no function supported; NSR true):
      Točnee,   vse   doktora   osmotreli   raznyh   pacientov.
      more.precisely   all   doctors   examined   different   patients
      'That is, all the doctors examined different patients.'

   The results are given in Figure 4, and the statistical output in Table 7 in the Appendix ('f-NSR' stands for 'functional NSR').
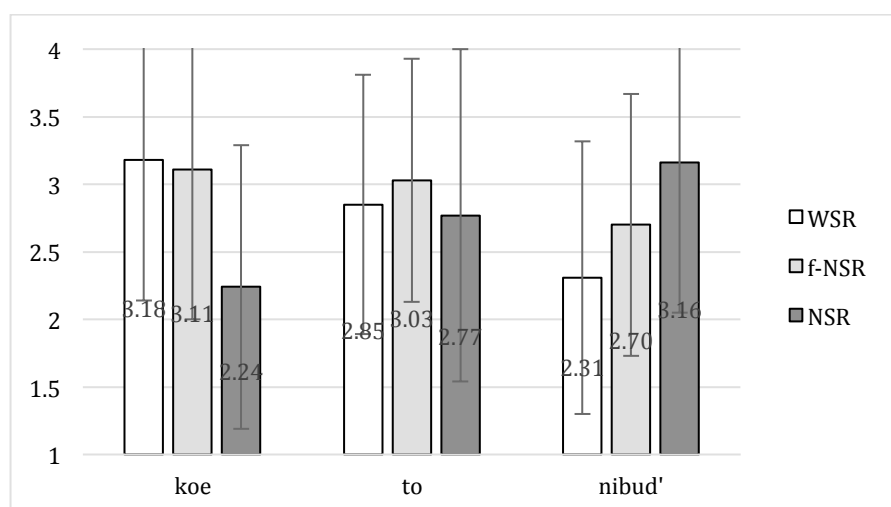

Figure 4. Results of Exp. 2.1: mean ratings (error bars represent 1 standard deviation)

As the table shows, the factors *scope* and *indefinite* interacted across all levels. Follow-up comparisons via *lsmeans* revealed that for *koe-*, both WSR and functional NSR were rated significantly above (regular) NSR, while for *-nibud'*, the opposite was the case: NSR was rated significantly above both WSR and functional NSR. For *-to*, there were no differences in the ratings of the three interpretations. For both WSR and (regular) NSR contexts, ratings for *koe-* and for *-nibud'* differed significantly (in the opposite directions), while there were no differences for the functional NSR context. There were no other significant differences.

The behavior of *koe-* indefinites suggests that they likely give rise to functional NSRs when the function in question is explicitly supported (as in (19)b). Their NSR is infelicitous when no such function is supported, as in (19)c. This suggests that they do not give rise to non-functional NSRs, and furthermore that the functional NSR is unavailable when a function is not explicitly supported. In contrast, *-to* indefinites allow NSRs in both circumstances, as well as WSRs. Finally, *-nibud'* indefinites appear to have a preference for regular, non-functional NSRs, given their higher rating in (19)c than in (19)b (though note that their functional NSRs were rated about the same as the functional NSRs of the other indefinites).

3.2.5   Experiment 2.2: Local downward-entailing scope configuration

In experiment 2.2, the functional NSR ("no policeman x arrested a criminal y and y is functionally related to x") is truth-conditionally distinct from both the WSR ("there is a criminal no policeman arrested") and the regular, non-functional NSR ("no policeman arrested any criminal"). Only the WSR is true in (20)a, only the functional NSR is true in (20)b, and both the regular NSR and, by entailment, the WSR, are true in (20)c. Notice that the functional NSR of (20)b is properly supported by the explicit mention of a function. This experiment is crucial in that it allows us to tease apart functional from non-functional readings truth-conditionally, as discussed above. One possible confound here is that it is very difficult to obtain a non-functional NSR for the sentence in (20)c, with any Russian *wh*-indefinite. This is 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 (20)c was quite unacceptable for many speakers:

(20) <u>Ni   odin   policejskij</u> ne   adrestoval **koe-kakogo/kakog-to/kakogo-nibud'**
       NEG one   policeman NEG arrested   koe-wh/wh-to/wh-nibud'
       prestupnika.
       criminal
       'No policeman arrested a criminal.'
       a. WSR context (WSR true)
          Točnee, policejskie   ne   arestovali izvestnogo mafiozi, kotoryjpodkupil
          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. functional NSR context (function supported, functional NSR true):
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. NSR context (no function supported, NSR and WSR true):
Točnee,   policejskie   voobšče   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.'

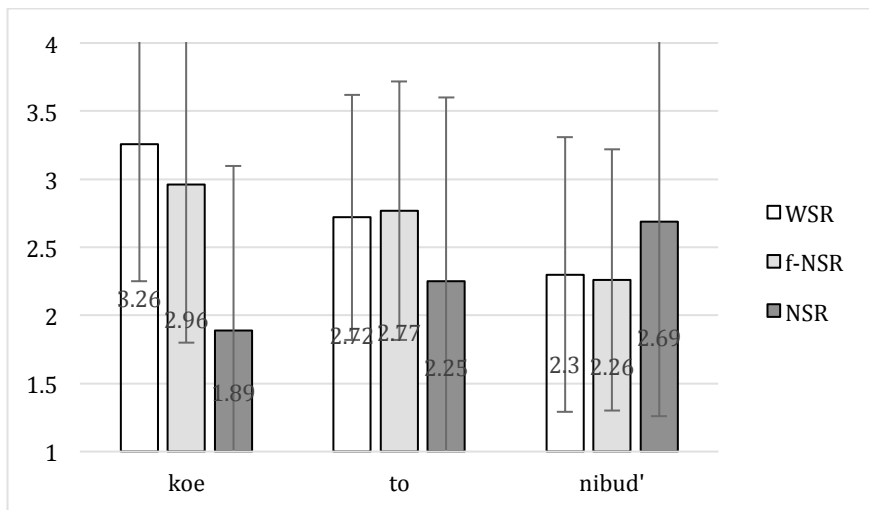The results are given in Figure 5, and the statistical output in Table 8 in the Appendix.

Figure 5. **Results of Exp. 2.2: mean ratings (error bars represent 1 standard deviation)**

Once again, *scope* and *indefinite* interacted across all levels. Follow-up comparisons found that for *koe-*, the regular NSR context was rated significantly below the other two contexts, which did not differ from each other. The three contexts were not rated significantly differently for the other two indefinite types. Furthermore, *koe-* was rated significantly above *-nibud'* for the WSR, marginally above it for the functional NSR, and significantly below it for the regular NSR. There were no other significant differences.

Thus, for *koe-*, we see that both the WSR and the functional NSR are available. A similar pattern is exhibited by *-to,* but the difference with regular NSR does not reach significance. For *-nibud'*, the regular NSR is numerically the most preferred reading, but again, this difference does not reach significance. The relative infelicity of the regular, non-functional NSR expressed without negative concord is most likely lowering the ratings for the sentence type in (20)c even for indefinites (*-to* and *-nibud'*) for which this reading would otherwise be available (but note that the regular NSR did receive significantly higher ratings for *-nibud'* than for *koe-*). The fact that no reading is very acceptable for *-nibud'* can be explained if this indefinite only allows regular, non-functional NSRs, which in this context are pragmatically odd.

Comparing these results with those of experiment 2.1, the behavior of *koe-* indefinites in experiments 2.1 and 2.2 suggests that they do indeed give rise to functional NSRs. The analysis of *-to* is not very clear, but the fairly high ratings of the functional NSR suggest that *-to* does give rise to functional readings.

3.2.6 Experiment 2.3: long-distance scope configuration, if-clause

Experiment 2.3 tested the configuration in which the indefinite is embedded in the antecedent of a conditional. We tested for the availability of an ISR in this configuration when the context explicitly supports a functional ISR. Notice that (21)a is true on the WSR ("there is a girl x such that every eighth-grade boy will be happy if x comes to the party") and, by entailment, on the ISR ("for every eighth-grade boy y, there is a potentially different girl x such that y will be happy if x comes to the party"). Notice also that (21)c is true on the NSR ("every eighth-grade boy will be happy if any girl comes to the party") and, by entailment, on the WSR and the ISR. (21)b is true only on the ISR, and provides support for a functional interpretation:

(21) <u>Každyj vos'miklassnik</u> budet rad, <u>esli</u> **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 context (no function supported, WSR and ISR true):
  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. ISR (function supported, ISR true):
  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. NSR (no function supported; NSR, WSR and ISR true):
  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 girl, comes to the party.'

The results are given in Figure 6, and the statistical output in Table 9 in the Appendix.
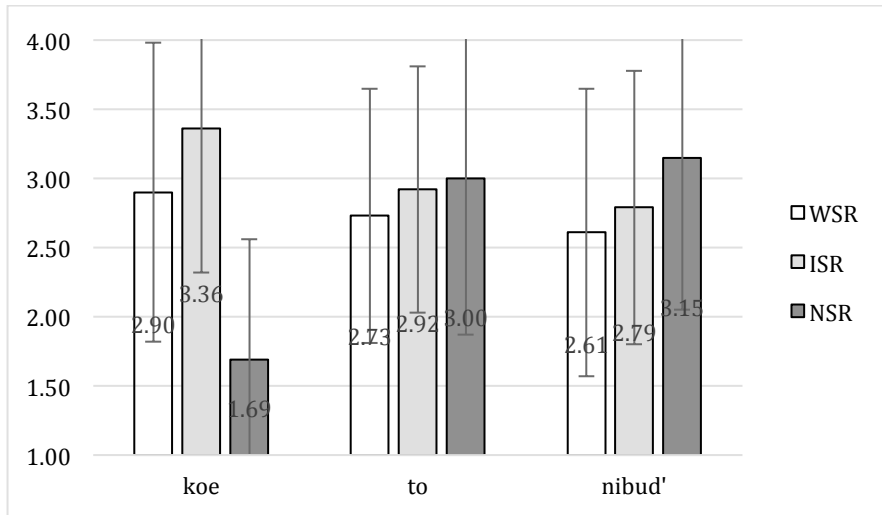
Figure 6. Results of Exp. 2.3: mean ratings (error bars represent 1 standard deviation)

As shows, there was no interaction between *scope* and *indefinite* when the *-to* indefinites were compared to the reference level (*-nibud'* indefinites): i.e., *-to* and *–nibud'* indefinites were affected in the same way by the scope configuration, with the highest ratings in the NSR context, and the lowest in the WSR context. In contrast, *scope* and *indefinite* did interact when *koe-* indefinites were compared to the reference level. Follow-up comparisons found that for *koe-*, the regular, function-unsupported NSR context ((21)c) was rated significantly below the WSR and the function-supported ISR contexts, while the WSR was rated significantly below the function-supported ISR. For *-nibud'*, the function-unsupported NSR was rated significantly above the WSR and marginally above the ISR. Finally, *koe-* was rated significantly below the other two indefinite types for the function-unsupported NSR, and significantly above *-nibud'* for the ISR. There were no other significant differences.

Thus, we continue to see the same pattern as before for *koe-*, with non-functional readings unavailable, but the WSR and the functional ISR available (with the latter preferred). As before, *-to* allows all scope readings and is not sensitive to function support. Unexpectedly, *-nibud'* received rather high ratings (similar to the ones for *-to*) on the WSR, even though these are significantly lower than for the NSR. We have seen in other experiments (1.2 and 1.3) that *-nibud'* indefinites disallow the WSR. Since *-nibud'* indefinites are not the focus of our investigation, we lay this issue aside, and focus on the other two indefinite types.

3.2.9 Experiment 2.4: long-distance scope configuration, relative clause

Finally, in experiment 2.4, 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 for WSR ("there is a doctor such that every patient took every medication that he prescribed"), functional ISR ("for every patient x, there is a doctor y such that x took all the medication that y prescribed"), and functionally unsupported NSR ("every patient x is such that x took every medication that was doctor-prescribed"), as illustrated in (22):

(22) <u>Každyj pacient</u> prinjal <u>každoe lekarstvo,</u> 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 context (no function supported, WSR and ISR true):
Točnee,   vse pacienty prinjali   vse lekarstva,   propisannye glavnym
more.precisely all 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. ISR context (function supported, ISR true):
Točnee,   každyj   pacient prinjal vse lekarstva,   propisannye ego lečaščim
more.precisely every patient took all medication prescribed his treating
vračom.
doctor
'That is, every patient took all the medications that his case doctor prescribed.'

c. NSR (no function supported; NSR, ISR and WSR true):
Točnee,   vse   pacienty prinjali vse lekarstva,   propisannye
more.precisely all 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 are given in Figure 7, and the statistical output in Table 10 in the Appendix.
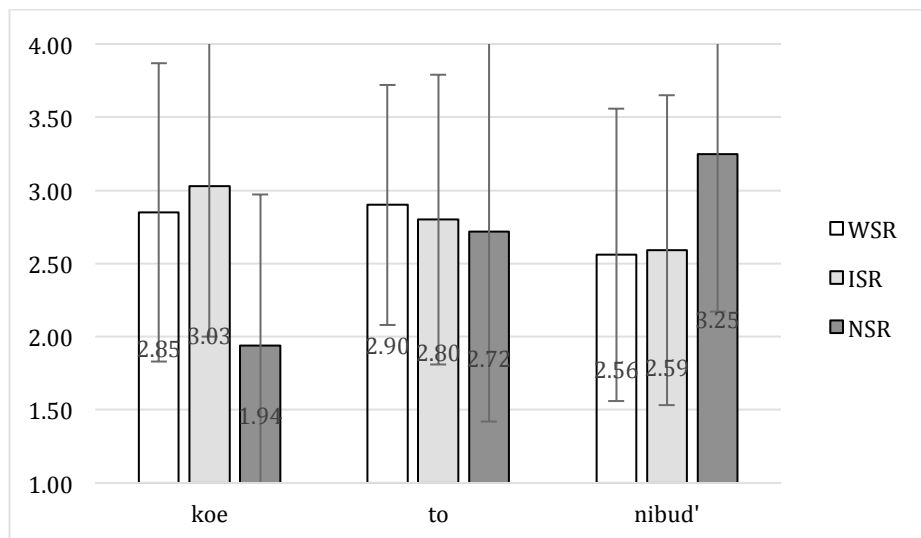
Figure 7. Results of Exp. 2.4: mean ratings (error bars represent 1 standard deviation)

As in experiments 2.1 and 2.2, *scope* and *indefinite* interacted across all levels of comparisons. Follow-up comparisons found that for *koe-*, the NSR context was rated significantly below the WSR and function-supported ISR contexts; for *-nibud'*, both the WSR and the function-supported ISR contexts were rated significantly below the NSR. For *-to,* there were no differences among the three contexts. With the NSR, *koe-* was rated

significantly lower than the other two indefinite types. There were no other significant differences.

Thus, we continue to see that the regular NSR (one not requiring function support) is the preferred reading for *-nibud'* and the unavailable reading for *koe-*, while all three readings are available to *-to*. As in experiment 2.3, the WSR receives higher ratings for *-nibud'* than we would expect given that this indefinite is supposed to lack WSRs; however, the highest-rated reading for *-nibud'* is still the NSR, as expected.

We note that the results of exp. 2.4 for *-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 *-to* in exp. 1.2, but fully available in exp. 2.4.

3.3. Summary and discussion of experimental results

We summarize here both the results of study 1, in Table 2, and the results of study 2, in Table 3. The tables report on both statistical comparisons (> means 'significantly higher rating than', while = means 'no significant difference in rating') and raw means (**<u>bold and underlined</u>**= rating above 3.0; **bold** = rating above 2.5 but below 3.0; regular font = rating above 2.0 but below 2.5; and *italics* = rating below 2.0):

	experiment 1.1	**experiment 1.2**	**experiment 1.3**
	universal QP subject	RC island	RC island
koe-	**WSR** > *NSR*	**<u>WSR</u>** > *NSR*	**WSR** > ISR
-to	**WSR** = **NSR**	**<u>WSR</u>** > *NSR*	**ISR** > WSR

Table 2. Results of study 1: summary

	experiment 2.1	**experiment 2.2**	**experiment 2.3**	**experiment 2.4**
	universal QP subject	negative QP subject	*if*-clause island	RC island
koe-	**<u>WSR</u>** = **<u>functional NSR</u>** > NSR	**<u>WSR</u>** = **functional NSR** > *NSR*	**<u>functional ISR</u>** > **WSR** > *NSR*	**<u>functional ISR</u>** = **WSR** > *NSR*
-to	**<u>functional NSR</u>** = **WSR** = **NSR**	**functional NSR** = **WSR** = NSR	**NSR** = **functional ISR** = **WSR**	**WSR** = **functional ISR** = **NSR**

Table 3. Results of study 2: summary

We now revisit our research questions, repeated here, along with the responses based on our findings. RQ1 asked whether both *koe-* and *-to* indefinites readily allow long-distance scope readings. Our answer to this question is that indeed both indefinite types allow long-distance scope readings. RQ2 asked whether both *koe-* and *-to* indefinites allow ISRs. Our answer is that they do, but while *-to* indefinites allow ISRs fairly freely, *koe-*indefinites require ISRs to be functional. RQ3 asked whether *koe-* or *-to* indefinites allow and/or require functional readings. The evidence suggests that *koe-* indefinites require ISRs and NSRs to be functional, disallowing non-functional readings; in contrast, *-to* indefinites allow but do not require functional readings.

The behavior of *koe-* indefinites is quite consistent across all experiments in study 2: they consistently allow WSRs and readings that involve functional support (functional

NSRs in experiments 2.1 and 2.2, and functional ISRs in experiments 2.3 and 2.4) and disallow NSRs in the absence of functional support. This is very similar to the behavior of *koe-* indefinites in study 1.

The behavior of *-to* indefinites is not as straightforward. Across the four experiments in study 2, *-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 *-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-* indefinites (lowered ratings in the absence of functional support), as well as for *-nibud'* indefinites (lowered ratings for WSRs), yet allowed all the possible readings for *-to* indefinites. This suggests that *-to* indefinites do indeed have all readings available to them. The only experiment which fully teased apart functional readings from non-functional ones was experiment 2.2; the results for the functional NSR category in this experiment indicate that the functional readings are indeed available to *-to*.

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

Taken together, the results of study 1 (where *koe-* indefinites were found to lack NSRs in the absence of functional support, and allow WSRs) and the results of study 2 (which showed WSRs and ISRs/NSRs in the presence of functional support to be available to this indefinite type) suggest that *koe-* indefinites are exceptional scope functional indefinites. It is very clear in these studies that ISRs/NSRs for *koe-* indefinites require function support, and one plausible way of making sense of that need is to say that they introduce a function whose content needs to be supported in the context. In other words, it would be implausible to postulate no function in the semantics of *koe-* if supporting a function in the context makes *koe-* felicitious on the relevant readings.

The results indicate that *-to* indefinites do not need function support (experiments 1.1, 1.3, 2.1, 2.3, 2.4, though cf. experiments 1.2 and 2.2), which may be taken to mean that they can give rise to non-functional readings. Experiment 2.2 suggests availability of the functional NSR, and experiments 2.3 and 2.4, availability of the ISR in the presence of functional support. Experiments 1.2, 2.3 and 2.4 suggest availability of long-distance WSRs. We do not know why *-to* behaves differently across experiments. However, we believe that the very existence of this variability speaks in favor of analyzing *-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: functional ISRs and functional NSRs (or at least, ISRs and NSRs in the presence of function support), as well as the WSR, are always available, whereas we see variability in the availability of non-functional ISRs and NSRs (that is, ISRs/NSRs where a function is not supported). A further question is whether *-to* indefinites have non-functional ISRs. Our data clearly show that NSRs are available to *-to* in the absence of function support (experiments 1.1, 2.1, 2.3, and 2.4) while ISRs are available in the presence of function support (experiments 2.3 and 2.4). The only experiment that tested ISR in the absence of functional support was experiment 1.3. While it did find the ISR to be available to *-to,* this experiment did not tease apart the ISR from the NSR; on the basis of this experiment alone, we do not have sufficient grounds to argue that *-to* indefinites have non-functional ISRs. Given that *-to* indefinites do not seem to need function support,

and that informal intuitions point to the availability of ISRs in the absence of function support (see ft. 12), we think it plausible that these indefinites do actually give rise to non-functional readings, making them unmarked indefinites, that is, indefinites that allow both functional and non-functional readings.

The most important findings of our experimental studies with respect to the literature is that both ISRs and NSRs (in local or long-distance contexts) are available for *koe-* indefinites when they are functional readings (or, at the very least, when the context supports a function). In addition, both functional and non-fucntional ISRs and NSRs appear to be available for *-to* indefinites.

4 Analysis of *koe-* and *-to*

Exceptional scope functional indefinites, such as (on our analysis) Russian *koe-*, are well-known from the literature on indefinite scope. In fact, theories of indefinite scope, such as Kratzer (1998) and Schwazrschild (2002), were designed to capture the behavior of such indefinites. Thus, not surprisingly, the previous literature on Russian indefinites makes use of Krazter's contextually provided choice function variables in the analysis of *koe-* indefinites (Eremina 2012, Geist 2008, Onea and Geist 2011; cf. Matthewson 1999, Schlenker 2006, Winter 1997, among others). From the perspective of theories such as these, the account of *-to*, with its, we claim, varied behavior, is less straightforward, a point we elaborate on in what follows. In turn, more modern theories of indefinite scope, such as Brasoveanu and Farkas (2011), are better equipped for dealing with *-to*, and have little trouble accounting for *koe-*. We thus show that the analysis traditionally assumed for Russian indefinites is problematic, but, while we do discuss a more modern analysis that, we think, fares better, our discussion here is not intended as a review of all theoretical options and there are theories of indefinite scope we do not discuss.[16]

Kratzer proposes that indefinite NPs may introduce choice function variables, of type <et, e>, that stay free and receive a value according to what the speaker has in mind. Such indefinites will seem to take the widest possible scope—their contextual provision makes them effectively scopeless. This will be the case whether the indefinite is embedded in a syntactic scope island or not, and thus it will always seem that they take scope outside of such islands. This results in exceptional wide scope indefinites like German *gewiss* or English *this*-indefinites (recall Table 1). Kratzer choice functions may be Skolemized by adding an additional argument to them (making them of type <e, <et,e>>). With Skolemization, a higher c-commanding quantifier can bind that additional argument, and thus it can vary systematically with the values introduced by the higher quantifier—this is what we want for functional ISRs and functional NSRs. This is a plausible account for *koe-*. Eremina and Geist do not consider the possibility of Skolemized choice function variables (that is, choice functions with added parameters) for *koe-*, but clearly that is needed in order to account for their functional readings (if these do indeed exist, which we think they do). Eremina and Geist treat *-to* as introducing a contextually provided, possibly Skolemized choice function variable (Yanovich 2005 does not use Skolemization for *-to*); this would account for all readings except for non-functional ISRs. In order to predict these readings, if they indeed exist, this type of

---

[16] In part because they raise additional issues we cannot do justice to here. These include Charlow (2014) and Onea (2015, 2016), among others.

account would have to be supplemented with the possibility of (suitably constrained)[17] existential closure of choice function variables for *-to*, as in Reinhart (1998) (something which doesn't seem desirable in principle, as suggested by Brasoveanu and Farkas 2016 and others).

The behavior of *koe-* indefinites is also consistent with the singleton indefinites analysis of Schwarzschild (2002), a possibility not considered in the literature on Russian indefinites with the exception of Onea and Geist (2011), discussed below. Schwarzschild proposes 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. Indefinites, however, can have their domain reduced to a singleton set (cf. Portner 2002, Portner and Yabushita 1998, 2001). When the domain of an indefinite is a singleton set, WSRs and functional ISRs arise (for functional ISRs, binding into the restriction by a c-commanding quantifier is assumed). If *koe-* is taken to obligatorily reduce its domain to a singleton, the constellation of readings uncovered here for these indefinites is predicted. As for *-to*, it is amenable to such a treatment as well, as long as the reduction of their domain to a singleton set is optional, and as long as its non-functional ISRs can be accounted for.[18]

Onea and Geist (2011) propose that Schwarzschild's domain narrowing be implemented as referential anchoring to discourse items, an operation of pragmatic enrichment whereby Skolem functional dependencies may be introduced pragmatically into the restriction of the indefinite. Like Schwarzschild (2002), Onea and Geist assume that indefinites are existential quantifiers. Like Kratzer (1998), they assume pragmatically-triggered Skolem functions may operate on their domain. Functional and non-functional readings may be generated in this account (non-functional readings are treated as a special case of functional readings, which don't arise from natural or nameable functions). Referential anchoring may be conventionalized, and thus may become part of the lexical contribution of indefinites, such as Russian *-to* and *koe-*. In their account, *koe-* lexicalizes a constraint whereby referential anchoring is restricted to the speaker and what the speaker has in mind, giving rise to WSRs only. The referential anchoring of *to-wh* indefinites is not necessarily bound to the speaker, though it may be. If it is bound by a c-commanding quantifier, *-to* imposes the constraint that the function must be nameable; Onea and Geist argue that this generates WSRs and functional ISRs only for *-to*. This proposal falls short of the empirical picture we have uncovered in this study for *koe-*, since non-WSRs are possible for this indefinite as long as they are functional (or function-supported); their analysis for *-to* seems better suited for *koe-*. The mechanism that generates functional ISRs in fact also generates functional NSRs, contrary to Onea and Geist's claims, since nothing in their account blocks it from taking place when just two quantifiers are involved—so the properties of *koe-* would be accounted for indeed. If *-to* gives rise to all possible readings, this indefinite is better treated as an unconstrained indefinite in this account.

---

[17] Suitably constrained because top-most existential closure must not be allowed, for reasons discussed Chierchia (2001) and Schwarz (2001, 2011), contra Matthewson (1999). Schwarz (2001, 2011) shows that intermediate existential closure of choice function variables, as in Reinhart (1997), gives rise to non-functional ISRs.

[18] As suggested by an anonymous reviewer, whom we thank for pointing out this possibility to us, this may be done with von Fintel's (1999, 2000) domain restriction via subset selection functions, which may be singleton and which may be optionally existentially closed off at intermediate levels.

Brasoveanu and Farkas' (2011) account naturally predicts the existence of unconstrained indefinites, such as -to, and functional indefinites, such as *koe-*. It relies on the notion of variable independence and on the idea that indefinites are special because they are capable of choosing which variables they are (in)dependent of (an idea which is reminiscent of choice function approaches). It is part of the interpretation of an existential quantifier that that it must make a choice regarding its evaluation index with respect to the variables introduced by c-commanding quantifiers. Wide scope is independence from the variables provided by c-commanding quantifiers, while intermediate and narrow scope involve dependence on those variables. An indefinite may impose different constraints on this (in)dependence. Which particular variables from those thus made available is chosen is not a syntactic choice—thus, syntactic islands have no role to play here, correctly. Non-indefinite quantifiers in this account do not allow variable choice—hence, their scope is constrained differently, also correctly. Wide, intermediate and narrow scope readings of an indefinite are three different ways of interpreting the relation between the index of evaluation of the indefinite and the variables introduced by higher quantifiers. If there are two such quantifiers Q_x and Q'_z, where Q_x c-commands Q'_z, on making a choice for its index of evaluation, the indefinite can choose no variables to be dependent on (indicated by the empty set symbol in (23)):

(23) $Q_x \ldots Q'_z \ldots [\ldots \text{indef}^{\varnothing} \ldots]$

This entails that it will be independent of both x and z, with the effect that, no matter what the value of x and z, the values of the indefinite are fixed—this gives rise to widest scope. The indefinite can instead make its evaluation index dependent on x:

(24) $Q_x \ldots Q'_z \ldots [\ldots \text{indef}^{x} \ldots]$

This entails that it will be independent only of z. In this case, the indefinite co-varies with x, but is fixed with respect to z, giving rise to an ISR. The third possibility is for the indefinite to choose its index of evaluation to be dependent on both x and z, in which case it will co-vary with both of the variables, giving rise to an NSR:

(25) $Q_x \ldots Q'_z \ldots [\ldots \text{indef}^{x, z} \ldots]$

In this account, an indefinite like Russian -to could be treated as an unmarked indefinite: it allows co-variation but imposes no contraints on its evaluation index, allowing all readings. Functional interpretations for -to would not be separate interpretations—a systematic relationship between the value of the indefinite and the variable(s) it depends on is possible, but not necessary, for -to. In this type of account, as opposed to the accounts discussed above, nothing special needs to be said about -to. It would be *koe-* that requires an additional constraint. We can follow Brasoveanu and Farkas' account of English *a certain* in our treatment of *koe-*: *koe-* adds a constraint to the effect that its index of evaluation depends on both a higher quantifier and a suitable function F. Given a c-commanding quantifier Q_x, as in (26), *koe-* gives rise to an functional NSR with respect to Q_x when it chooses its index of evaluation to depend on x, which ensures that the value of the indefinite, let us call it y, co-varies with x. In addition, the values of y are constrained, as they have to be provided by a suitable function F (given any co-varying x and y, F(x)=y):

(26) $Q_x \ldots [\ldots koe\text{-}_x \ldots]$

A quantifier Q'_z c-commanded by Q_x need not change the relation between Q_x and *koe-*, and in such a case a functional ISR obtains:

(27) $Q_x \ldots Q'_z \ldots [\ldots koe\text{-}_x \ldots]$

Koe- gives rise to a WSR when it chooses to have no variables to depend on, and, in addition, it requires there to be a suitable function F such that it has y as its only value—F is just the individual y in this case:

(28) $Q_x \ldots Q'_z \ldots [\ldots koe\text{-}_\varnothing \ldots]$

In general, functional indefinites in this account constrain the variable they depend on by means of an added functional dependency.

5   Summary

This paper has contributed to our understanding of the cross-linguistic typology of indefinites by showing that Russian *koe-* indefinites, contra much previous literature, plausibly allow functional readings in addition to exceptional wide scope readings, thus establishing the validity of the indefinite category represented by English *a certain* across languages. In particular, contrary to standard assumption, *koe-* indefinites do allow ISRs and NSRs when function-supported. Our data, collected experimentally, also shows that -*to* indefinites are unmarked with respect to scope and functional readings (or functional support), allowing all possible readings—they are a clear case of an unmarked indefinite. We also discussed how our data may be accounted for in a number of different approaches, highlighting the additional assumptions these approaches have to introduce in order to account for the behavior of the two indefinites.

Competing interests

The authors have no competing interests to declare.

References

Abusch, Dorit. 1994. The Scope of Indefinites. *Natural Language Semantics* 2, 83-136. https://doi.org/10.1007/BF01250400

Aloni, Maria and Angelika Port. 2015. Epistemic Indefinites and Methods of Identification. In Luis Alonso-Ovalle and Paula Menéndez-Benito (2015), 117-140.

Alonso-Ovalle, Luis and Paula Menéndez-Benito (2015) *Epistemic Indefinites. Exploring*

Modality Beyond the Verbal Domain, Oxford University Press: Oxford.

Brasoveanu, Adrian and Donka Farkas. 2011. How Indefinites Choose their Scope. *Linguistics and Philosophy*, 34, 1-55. https://doi.org/10.1007/s10988-011-9092-7

Brasoveanu, Adrian and Donka Farkas. 2016. Indefinites. In Maria Aloni and Paul Dekker (eds.) *The Cambridge Handbook of Formal Semantics*, Cambridge University Press, 238-266

Breheny, Richard. 2003. Exceptional Scope Indefinites and Domain Restriction. In Matthias Weisgerber (ed.), *Proceedings of Sinn und Bedeutung 7*, Arbeitspapier Nr. 114, FB Sprachwissenschaft, 38-52, Universität Konstanz.

Carlson, Greg. 1977. Reference to kinds in English. PhD dissertation, University of Massachusetts, Amherst

Charlow, Simon. 2014. *On the Semantics of Exceptional Scope.* PhD dissertation, New York University

Chierchia, Gennaro. 1993. Questions with Quantifiers. *Natural Language Semantics*, 1, 181-235. https://doi.org/10.1007/BF00372562

Chierchia, Gennaro. 2001. A Puzzle about Indefinites. In Carlo Cecchetto, Gennaro Chierchia, and Maria Teresa Guasti (eds.), *Semantic interfaces: Reference, anaphora, and aspect.* Stanford: CSLI.

Christensen, Rune Haubo Bojesen. 2018. ordinal - Regression Models for Ordinal Data. R package version 2018.4-19. http://www.cran.r-project.org/package=ordinal/ .

Dahl, Östen. 1970. Some Notes on Indefinites. *Language* 46, 33–41. 10.2307/412405

Ebert, Christian, Cornelia Endriss and Stefan Hinterwimmer. 2007. Embedding Topic-Comment Structures Results in Intermediate Scope Readings. In Anisa Schardl, Martin Walkow and Muhammad Abdurrahman (eds.), *Proceedings of NELS 38*, vol. 1., 246-259, GLSA Publications

Ebert, Christian, Cornelia Endriss and Stefan Hinterwimmer. 2013. The Interpretation of the German Specificity Markers *Bestimmt* and *Gewiss*. In Christian Ebert and Stefan Hinterwimmer (eds.) *Different Kinds of Specificity Across Languages*, Springer, 31-75.

Endriss, Cornelia. 2009. *Quantificational Topics. A Scopal Treatment of Exceptional Wide Scope Phenomena.* Studies in Linguistics and Philosophy 86. Springer

Eremina, Olga. 2012. *The Semantics of Russian Indefinite Pronouns: Scope, Domain Widening, Specificity and Proportionality and their Interaction.* PhD dissertation, Michigan State University

Farkas, Donka. 1997. Dependent Indefinites. In Francis Corblin, Danièle Godard & Jean-Marie Marandin (eds.), *Empirical Issues in Syntax and Semantics*, 243–267. Bern: Peter Lang.

Farkas, Donka. 2002. Extreme Non-Specificity in Romanian. In Claire Beyssade (ed.), *Romance languages and linguistic theory 2000*, 127–151. Amsterdam: John Benjamins.

von Fintel. Kai. 1999. Quantifier Domain Selection and Pseudo-Scope. Talk presented at the Context Dependence Conference, Cornell University.

von Fintel. Kai. 2000. Singleton Indefinites (re. Schwarzschild 2000), ms., MIT

Fodor, Janet and Ivan Sag. 1982. Referential and Quantificational Indefinites. *Linguistics and Philosophy*, 5, 355-398. https://doi.org/10.1007/BF00351459

Geist, Ljudmila. 2008. Specificity as Referential Anchoring: Evidence from Russian. In A. Grønn (ed.), *Proceedings of Sinn und Bedeutung 12*, 151-164. Oslo: ILOS

Haspelmath, Martin. 1997. *Indefinite Pronouns*. Oxford: Oxford University Press.

Henderson, Robert. (2014) Dependent Indefinites and their Post-Suppositions. *Semantics and Pragmatics*, 7, 1-58. http://dx.doi.org/10.3765/sp.7.6

Hintikka, Jaakko. 1986. The Semantics of *a certain*. *Linguistic Inquiry* 17, 331-336.

Ionin, Tania. 2006. *This* is Definitely Specific: Specificity and Definiteness in Article Systems. *Natural Language Semantics*, 14, 175-234. https://doi.org/10.1007/s11050-005-5255-9

Ionin, Tania. 2010. The Scope of Indefinites: an Experimental Investigation. *Natural Language Semantics*, 18, 295-350. https://doi.org/10.1007/s11050-010-9057-3

Ionin, Tania. 2014. Epistemic and Scopal Properties of *Some* Indefinites, in Ana Aguilar, Bert Le Bruyn, and Joost Zwartz (eds.), *Weak Referentiality*. Amsterdam: John Benjamins.

Ionin, Tania. 2015. Certain Properties of Certain Indefinites: an Experimental Perspective. In Luis Alonso-Ovalle and Paula Menéndez-Benito (2015), 183-210.

Jayez, Jacques and Lucia Tovena. 2006. Epistemic Determiners. *Journal of Semantics*, 23, 217-250. https://doi.org/10.1093/jos/ffl002

Kagan, Olga. 2011. On Speaker Identifiability. *Journal of Slavic Linguistics* 19, 47-84

Kratzer, Angelika. 1998. Scope or Pseudo-scope: Are there Wide-scope Indefinites? In Susan Rothstein (ed.), *Events in Grammar*, 163-196. Dordrecht: Kluwer.

Kratzer, Angelika. 2003. A Note on Choice Functions in Context, ms. University of Massachusetts Amherst

Kratzer. Angelika and Junko Shimoyama. 2002. Indeterminate Pronouns: The View from Japanese. In Yukoi Otsu (ed.), *The Proceedings of the Third Tokyo Conference on Psycholinguistics*, 1-25. Tokyo: Hituzi Syobo.

Krifka, Manfred. 2001. Quantifying into Question Acts. *Natural Language Semantics*, 9, 1-40. https://doi.org/10.1023/A:1017903702063

Lenth, Russell. 2016. Least-squares means: The R package lsmeans. *Journal of Statistical Software* 69, 1-33. 10.18637/jss.v069.i01

Martí, Luisa. 2007. Restoring Indefinites to Normalcy. An Experimental Study on the Scope of Spanish 'algunos'. *Journal of Semantics*, 24, 1-25. https://doi.org/10.1093/jos/ffl010

Matthewson, Lisa. 1999. On the Interpretation of Wide-scope Indefinites. *Natural Language Semantics* 7, 79-134. https://doi.org/10.1023/A:1008376601708

Onea, Edgar. 2015. Why Indefinites can Escape Scope Islands. *Linguistics and Philosophy* 38, 237-267. https://doi.org/10.1007/s10988-015-9167-y

Onea, Edgar. 2016. Potential Questions at the Semantics-Pragmatics Interface. Current Research in the Semantics/Pragmatics Interface 33. Brill

Onea, Edgar and Ljudmila Geist. 2011. Indefinite Determiners and the Pragmatics of Referential Anchoring. *International Review of Pragmatics* 3, 194-227. 10.1163/187731011X597514

Paducheva, Elena. 1985. *Vyskazyvanie i ego sootnesennost' s dejstvitel'nost'ju. The statement and its correlation with reality*. Moscow: Science

Pereltsvaig, Asya. 2000. Monotonicity-Based vs. Veridicality-Based Approaches to Negative Polarity: Evidence from Russian. *Formal Approaches to Slavic Linguistics* 8, 328–346

Pereltsvaig, Asya. 2008. Russian *nibud'*-series as Markers of Co-Variation. In Natasha Abner and Jason Bishop (eds.), *Proceedings of the 27th West Coast Conference on Formal Linguistics*, 370-378, Somerville, MA: Cascadilla Proceedings Project.

Portner, Paul. 2002. Topicality and (non)-Specificity in Mandarin. *Journal of Semantics* 19, 275-287. https://doi.org/10.1093/jos/19.3.275

Portner, Paul and Katsuhiko Yabushita. 1998. The Semantics and Pragmatics of Topic Phrases. *Linguistics and Philosophy* 21, 117-157. https://doi.org/10.1023/A:1005311504497

Portner, Paul and Katsuhiko Yabushita. 2001. Specific Indefinites and the Information Structure Theory of Topics. *Journal of Semantics* 18, 221-297. https://doi.org/10.1093/jos/18.3.271

R Core Team. 2014. R: A language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing. http://www.r-project.org/

Reinhart, Tania. 1997. Quantifier Scope: How Labor is Divided between QR and Choice Functions. *Linguistics and Philosophy* 20, 335-397. https://doi.org/10.1023/A:1005349801431

Schlenker, Philippe. 2006. Scopal Independence: a Note on Branching and Wide Scope Readings of Indefinites and Disjunctions. *Journal of Semantics* 23: 281-314. https://doi.org/10.1093/jos/ffl005

Schwarz, Bernhard. 2001. Two Kinds of Long Distance Indefinites. In Robert van Rooy and Martin Stokhof (eds.), *Proceedings of the Thirteenth Amsterdam Colloquium*, 192-197. Universiteit van Amsterdam: Institute for Logic, Language and Computation.

Schwarz, Bernhard. 2011. Long Distance Indefinites and Choice Functions. *Language and Linguistics Compass* 5, 880-897. 10.1111/j.1749-818X.2011.00315.x

Schwarzschild, Roger. 2002. Singleton Indefinites. *Journal of Semantics* 19, 289-314. https://doi.org/10.1093/jos/19.3.289

Winter, Yoad. 1997. Choice Functions and the Scopal Semantics of Indefinites. *Linguistics and Philosophy* 20, 399-467. https://doi.org/10.1023/A:1005354323136

Yanovich, Igor. 2005. Choice-functional Series of Indefinites and Hamblin Semantics. In Efthymia Georgala and Jonathan Howell (eds.) *Proceedings of Semantics and Linguistic Theory 15*, 309–26. Cornell University, Ithaca, NY: CLC Publications.

Appendix: Statistical tables, output of experiments

fixed effects	estimate	standard error	z-value	p-value
indefinite *koe-*	-2.0138	0.3568	-5.645	<.001***
indefinite *-to*	-0.2357	0.3436	-0.686	.493
scope wsr	-2.4246	0.2647	-9.160	<.001***
indefinite *koe-* * scope wsr	4.2600	0.3958	10.762	<.001***
indefinite *-to* * scope wsr	1.7899	0.3621	4.943	<.001***
random effects	variance	sd		
participants	.7721	.8787		
items	<.0001	<.0001		

*** p<.001

Table 4. Experiment 1.1, output of cumulative link mixed model

fixed effects	estimate	standard error	z-value	p-value
indefinite *koe-*	-2.7178	0.5209	-5.218	<.001***
indefinite *-to*	-1.5098	0.4863	-3.104	.002**
scope wsr	-2.6295	0.2996	-8.778	<.001***
indefinite *koe* * scope wsr	7.6271	0.5396	14.134	<.001***
indefinite *-to* * scope wsr	6.1313	0.4744	12.924	<.001***
random effects	variance	sd		
participants	2.2986	1.5161		
items	.0809	.2844		

*** p<.001, **p<.01

Table 5. Experiment 1.2, output of cumulative link mixed model

fixed effects	estimate	standard error	z-value	p-value
indefinite *koe-*	1.60108	-0.39588	-4.044	<.001***
indefinite *-to*	0.01703	0.37608	0.045	.964
scope wsr	-2.49517	0.27350	-9.123	<.001***
indefinite *koe-* * scope wsr	4.27229	0.40728	10.490	<.001***
indefinite *-to* * scope wsr	1.74888	0.36048	4.851	<.001***
random effects	variance	sd		
participants	1.146	1.070		
items	0	0		

*** p<.001, **p<.01

Table 6. Experiment 1.3, output of cumulative link mixed model

fixed effects	estimate	standard error	z-value	p-value
indefinite *koe-*	-1.8854	0.4798	-3.930	<.001***
indefinite *-to*	-0.7673	0.5076	-1.511	.131
scope f-NSR	-1.0189	0.3099	-3.288	.001**
scope wsr	-1.7014	0.3167	-5.373	<.001***
indefinite *koe-* * scope f-NSR	2.7160	0.4578	5.933	<.001***
indefinite *-to* * scope f-NSR	1.3232	0.4672	2.832	.005**
indefinite *koe-* * scope wsr	3.5117	0.4678	7.507	<.001***
indefinite *-to* * scope wsr	1.7111	0.4747	3.605	<.001***
random effects	**variance**	**sd**		
participants	1.137	1.066		
items	0	0		

*** p<.001, **p<.01

Table 7. Experiment 2.1, output of cumulative link mixed model

fixed effects	estimate	standard error	z-value	p-value
indefinite *koe-*	-1.6632	0.4329	-3.842	<.001***
indefinite *-to*	-0.9421	0.4435	-2.124	.034*
scope f-NSR	-0.7154	0.3073	-2.328	.020*
scope wsr	-0.6559	0.3085	-2.126	.033*
indefinite *koe-* * scope f-NSR	2.8086	0.4656	6.032	<.001***
indefinite *-to* * scope f-NSR	1.6967	0.4635	3.661	<.001***
indefinite *koe-* * scope wsr	3.3043	0.4743	6.967	<.001***
indefinite *-to* * scope wsr	1.5655	0.4625	3.385	<.001***
random effects	variance	sd		
participants	.6111	.7817		
items	0	0		

*** p<.001, *p<.05

Table 8. Experiment 2.2, output of cumulative link mixed model

fixed effects	estimate	standard error	z-value	p-value
indefinite *koe*	-3.0808	0.4507	-6.835	<.001***
indefinite *to*	-0.3731	0.4558	-0.819	.413
scope isr	-0.9296	0.3129	-2.971	.003**
scope wsr	-1.1948	0.3143	-3.802	<.001***
indefinite *koe* * scope isr	4.4072	0.4884	9.024	<.001***
indefinite *to* * scope isr	0.6082	0.4623	1.316	.188
indefinite *koe* * scope wsr	3.5832	0.4670	7.672	<.001***
indefinite *to* * scope wsr	0.5580	0.4627	1.206	.228
random effects	variance	sd		
participants	.7274	.8529		
items	<.0001	<.0001		

*** p<.001, **p<.01

Table 9. Experiment 2.3, output of cumulative link mixed model

fixed effects	estimate	standard error	z-value	p-value
indefinite *ko-e*	-2.8589	0.4566	-6.261	<.001***
indefinite *-to*	-1.1908	0.4784	-2.489	.013*
scope isr	-1.5076	0.3193	-4.722	<.001***
scope wsr	-1.5714	0.3162	-4.969	<.001***
indefinite *koe* * scope isr	3.6950	0.4699	7.863	<.001***
indefinite *-to* * scope isr	1.5169	0.4766	3.183	.001**
indefinite *koe* * scope wsr	3.3495	0.4565	7.336	<.001***
indefinite *-to* * scope wsr	1.7050	0.4720	3.612	<.001***
random effects	variance	sd		
participants	.8312	.9117		
items	.0136	.1164		

*** p<.001, **p<.01 *p<.05

Table 10. Experiment 2.4, output of cumulative link mixed model