Certain Properties of Certain Indefinites: An Experimental Perspective

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Abstract
This paper revisits the status of long-distance intermediate-scope readings of indefinites (Kratzer 1998, Schwarz 2001, Endriss 2009, among others). An experimental study with native English speakers investigates two questions: whether intermediate-scope readings are distinct from functional readings; and whether there is any difference in the availability of functional readings to a indefinites vs. to a certain indefinites. The findings indicate that intermediate-scope readings are equally available in contexts that set up a functional relationship and in contexts that do not set up such a relationship. At the same time, intermediate-scope readings are found to be more readily available to a certain indefinites than to a indefinites. Implications of these findings for claims about the status of functional and intermediate-scope readings (Schwarz 2001, Endriss 2009) are discussed; the findings point to the methodological difficulty of setting up contexts that tease apart functional and non-functional readings of indefinites.
1. INTRODUCTION

It is well-established in the semantic literature that indefinites can escape scope islands: syntactic configurations which disallow wide scope for other quantifiers, such as relative clauses and antecedents of conditionals (Fodor and Sag 1982, and much subsequent literature). Furthermore, indefinites have been observed to take intermediate scope, outside of the scope island but underneath a higher quantifier (see Farkas 1981, Ruys 1992, Abusch 1994, Reinhart 1997, Winter 1997, Kratzer 1998, among many others). The different scope readings available to English indefinites are illustrated in (1), for the sentence in (1a): on the widest-scope reading (WSR, in (1b)), the indefinite scopes above all other scope-bearing elements in the sentence; on the intermediate-scope reading (ISR, in (1c)) it scopes underneath the higher quantifier, but outside the relative clause; and on the narrow-scope reading (NSR, in (1d)), it scopes locally. The WSR and ISR illustrated in (1b-c) are also termed long-distance or exceptional scope readings. Note that the sentence in (1a) can be used with either an a indefinite or an a certain indefinite; I will come back later to differences between the two.

The long-distance scope readings in (1b-c) can be brought about by certain continuations. For example, a continuation such as ‘namely (the book that) Professor Brown (assigned)’, which singles out a specific professor, brings out the WSR in (1b). A continuation that lists pairs of students and professors, as in ‘for Joan it was Professor Brown, for Karen it was Professor Lorenz, for Bill it was Professor Bloom…’ supports the ISR in (1c). It is often assumed (e.g., Kratzer 1998, Schwarzschild 2002, among others) that the ISR in (1c) is actually a functional reading (schematized in (1e)) which can be brought out just as easily by a functional continuation such as ‘namely (every book assigned by) the professor that the respective student likes most’. However, other authors (notably Schwarz 2001 and Endriss 2009) argue that the functional reading is actually distinct from the ISR. The distinction between functional and pair-list readings is more familiar from question semantics, where it is established that pair-list readings (which are comparable to the ISR in (1b)) and functional readings have to be kept strictly apart when it comes to analysing possible answers to wh-constituent questions (cf. Chierchia 1993, Krifka 2001). For example, a question such as Which dish did every guest make? can be answered either by listing pairs of guests and dishes (e.g., Mary made the soup, John made the chicken, etc.), or by stating the functional relationship between the guests and the dishes (e.g., Every guest made the dish that he or she is particularly good at).

(1) a. Every student read every book that a (certain) professor assigned.
   
   b. WSR of indefinite: a professor > every student > every book
      paraphrase: There is a particular professor such that every student read every book that this professor assigned.

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c. ISR of indefinite: \textit{every student} > \textit{a professor} > \textit{every book}

\textit{paraphrase:} For every student, there is a (potentially different) professor such that the student read every book that this professor assigned.

d. NSR of indefinite: \textit{every student} > \textit{every book} > \textit{a professor}

\textit{paraphrase:} Every student read every book that any professor assigned.

e. functional reading of indefinite: \textit{f}_{\text{students}} \rightarrow \textit{professors} > \textit{every student} > \textit{every book}

\textit{paraphrase:} There is a functional relationship between students and professors, such that every student read every book that the professor who stands in that functional relationship to the student assigned.

A related but separate question is whether the functional ISR and/or the non-functional ISR is available to only some types of indefinites. With regard to the topic of this volume, an interesting question is whether availability of particular scope and/or functional readings is related to epistemic specificity. In particular, \textit{a certain} indefinites are often analyzed in the literature as being \textit{epistemically specific} (e.g., Farkas 2002), and this indefinite type is also singled out by Schwarz (2001), who argues that functional readings are available to \textit{a certain} indefinites but not to \textit{a} indefinites. In contrast, Endriss (2009) argues that all types of indefinites can have functional readings, but that these are separate from non-functional, genuine ISRs.

In light of the disagreements in the literature, the following questions are posed: (1) Are functional and non-functional ISRs distinct? and (2) Are there differences between \textit{a} indefinites and \textit{a certain} indefinites in the availability of either functional or non-functional ISRs, and is this related to the status of \textit{a certain} indefinites as epistemically specific? This paper reports on an experimental study that addresses these questions; this study is one of several recent studies that have examined the availability of intermediate-scope readings to different types of indefinites in English (Ionin 2010), Spanish (Alonso-Ovalle and Menendez-Benito 2007), German (Cieschinger, Degen, Ebert and Schütze 2010) and Greek (Giannakidou, Paradopoulou and Stavrou, in press).

2. Theoretical Background and Prior Findings

This section briefly reviews the relevant theoretical literature on long-distance scope and functional readings, as well as prior experimental findings bearing on these issues. The prior findings come primarily from Ionin (2010), a study with native English speakers in which participants were asked to judge whether sentences containing indefinites were true or false in the contexts of preceding stories, where the stories matched the WSR, ISR, NSR and/or functional reading of the indefinite.¹

2.1. Comparison of \textit{a} indefinites and \textit{a certain} indefinites

It is well-established that \textit{a certain} indefinites have many properties that differentiate them from \textit{a} indefinites (see Hintikka 1986, Kratzer 1998, Schwarz 2001, Farkas 2002, among many others). First, \textit{a certain} indefinites are known to obligatorily scope above some intensional operators, such as \textit{want}: while (2a) allows both the WSR and the NSR of the \textit{a} indefinite, (2b)

¹ Experiment 1 in Ionin (2010) asked participants to indicate whether the sentence was (in)appropriate in the context of the preceding story, by selecting either ‘yes’ or ‘no’. However, since participants afterwards reported basing their responses on the truth or falsity of the sentence, Experiments 2 and 3 probed truth-values directly, asking participants to select either ‘true’ or ‘false’ for each sentence.
disallows the NSR of the \textit{a certain} indefinite, as indicated by the continuations. (However, see Farkas 2002 on evidence that \textit{a certain} indefinites are allowed within the scope of weak intensional predicates such as \textit{dream} and \textit{believe}). The difficulty that \textit{a certain} indefinites have in scoping underneath intensional operators was confirmed by Experiment 1 in Ionin (2010), where sentences with \textit{a certain} indefinites were accepted between 15\% and 30\% of the time (depending on the condition) in contexts that made the NSR true and the WSR false (in contrast, corresponding sentences with \textit{a} indefinites were accepted 100\% of the time in the same contexts).

(2) a. Glenn wants to read a book… but can’t find it / but can’t find one.
    b. Glenn wants to read a certain book… but can’t find it / #but can’t find one.

Second, it has been noted that use of \textit{a certain} facilitates long-distance scope in island configurations such as (1a) (Fodor and Sag 1982, Kratzer 1998, among others). This observation receives empirical support from Experiment 2 in Ionin (2010), which tested sentences such as (1a) in contexts that made the WSR and/or the ISR true, and the NSR false. It was found that variants of (1a) with \textit{a certain} indefinites were judged as true significantly more often than variants with \textit{a} indefinites (see section 2.3 below for more discussion of these findings).

Third, \textit{a certain} indefinites are considered to be a type of \textit{epistemically specific} indefinites, which carry a condition of ‘identifying property’ (Abusch and Rooth 1997, Kratzer 1998, Farkas 2002, Breheny 2003, among many others): for example, a sentence such as \textit{A certain student is outside} indicates that the speaker knows an identifying characteristic that sets this student apart from other students. In contrast, \textit{A student is outside} conveys no such information. Many proposals have argued that \textit{a certain} requires identifiability by the speaker: for example, Breheny (2003) proposes that \textit{a certain} denotes an identifying property \textit{P} such that the speaker knows \textit{P} (see also Yanovich 2005, Kagan 2006, and Ionin, in press, for related discussion of indefinites in Russian; Jayez and Tovena 2006 on \textit{un certain} in French; and Ebert, Ebert and Hinterwimmer, in press, on the specificity markers \textit{bestimmt} and \textit{gewiss} in German). In contrast, Farkas (2002, 2007) proposes that \textit{a certain} indefinites carry a condition of ‘inherent identifiability’, requiring the entity under discussion to be in principle identifiable, even if it not identifiable to the speaker or anyone in the context. Note that identifiability – whether identifiability by the speaker, or inherent identifiability – can explain why \textit{a certain} indefinites cannot scope underneath an intensional operator such as \textit{want}, in (2b): if Glenn wants to read any book, rather than a specific book, then no one book is identifiable.

Finally, it has also been known since Hintikka (1986) that \textit{a certain} indefinites have functional readings, as in Hintikka’s example \textit{Every husband had forgotten a certain date – his wife’s birthday}. In this sentence, \textit{a certain date} is in the scope of \textit{every husband} (each husband forgot a potentially different calendar date), yet it does not seem to have a regular narrow-scope reading: there is a functional relationship between the husbands and the dates that they have forgotten. Note, however, that in this example, the functional reading, while intuitively different from the NSR, entails the NSR: if every husband forgot a date which is his wife’s birthday (the functional reading), it is also true that each husband forgot at least one date (the NSR). The functional reading and the NSR can be teased apart in a downward entailing environment, as in \textit{No husband forgot a certain date}, as discussed in section 2.3 below.\footnote{Another way to tease apart the two readings would be to have the sentence \textit{Every husband forgot a certain date} in a context where there is no particular relationship between the husbands and the dates they have forgotten – e.g., one husband forgot his wife’s birthday, another – his wedding anniversary, a third – his high school graduation date, and so on. If \textit{a certain} indefinites}
2.2. Deriving long-distance and functional readings

There are several different ways of deriving long-distance and functional readings of indefinites. We briefly discuss two approaches to functional readings here: the choice function (CF) approach, on which a CF applies to the set denoted by the indefinite and returns a member of that set (Reinhart 1997, Winter 1997, Kratzer 1998, and much subsequent literature; see Schwarz 2011 for a recent review); and the domain restriction approach, on which the domain of the indefinite is contextually restricted to a singleton set (Schwarzschild 2002).

There are at least two distinct variants of the CF approach. For Reinhart (1997) and Winter (1997), the CF variable can be existentially closed at different levels, deriving both WSRs and ISRs (and for Winter, even NSRs), as schematized in (3), for the sentence in (1a). In contrast, on Kratzer’s (1998) analysis, long-distance WSRs are derived via a contextually determined CF: for example, for (1a), a contextually determined CF applies to the set of professors and picks out the professor that the individual has in mind, as schematized in (4a) (this approach is close in spirit to Fodor and Sag’s 1982 analysis of WSRs as referential readings). On this approach, ISRs are derived via a Skolem function, which maps individuals to CFs (see Kratzer 1998, Matthewson 1999, Chierchia 2001, Schwarz 2001). A Skolemized CF bears a Skolem index which is bound by the higher quantifier, as schematized in (4b), where the Skolemized CF maps every student to a CF that picks out the professor that is in a particular functional relationship to the student (e.g., the professor who gave the student a bad grade). In (4a), the choice of a function that selects a professor from the set of professors is contextually determined; whereas in (4b), the choice of functional relationship between students and professors is contextually determined.

(3) Existentially closed CF:
   a. WSR: ∃f [[every student] λ₁ [t₁ read every book that f(professor) assigned]]
   b. ISR: [[every student] λ₁ ∃f [t₁ read every book that f(professor) assigned]]
   c. NSR: [[every student] λ₁ [t₁ read every book ∃f [that f(professor) assigned]]]

(4) Contextually determined CF (the subscript s stands for “speaker”)
   a. WSR: [[every student] λ₁ [t₁ read every book that fₛ(professor) assigned]]
   b. ISR: [[every student] λ₁ [t₁ read every book that fₛ¹(professor) assigned]]

On the contextually determined CF approach, ISRs are necessarily functional; on the existentially closed CF approach, they are non-functional (that is, (3b), unlike (4b), does not necessitate a functional relationship between students and professors whose assignments they followed). While both approaches work equally well for sentences like (1a), Schwarz (2001) shows that they make different predictions in other environments, as discussed in the next section.

An alternative approach that is very close in spirit to the contextually determined CF approach, but which derives long-distance readings without reference to CFs, is that of implicit domain restriction (e.g., Schwarzschild 2002, Breheny 2003, among others). On the singleton indefinite approach of Schwarzschild (2002), indefinites always scope locally inside the island, but can give the illusion of long-distance scope as a result of scope neutralization. For instance, the WSR in (1b) is derived by restricting the set of professors to a singleton via implicit domain restriction, as schematized in (5a): if ‘a professor’ is intended to mean ‘a professor who teaches Syntax I’ (with the italics indicating covert material), and there is only one professor who teaches are obligatorily functional, they should be unacceptable in such a context. This is precisely the kind of test done in the present experiment (see section 3).
Syntax I, then the WSR in (1b) is truth-conditionally indistinguishable from the NSR in (1d). According to Schwarzschild’s analysis, the apparent WSR is in fact an NSR with implicit domain restriction.

The same logic is applied to ISRs, with the further provision that the covert material inside the indefinite may contain a bound variable. The ISR in (1b), for example, would be derived by covert material that specifies a functional relationship between students and professors, as schematized in (5b). The same result is achieved as on Kratzer’s (1998) approach, but via implicit domain restriction rather than Skolemized CFs. As on Kratzer’s approach, for Schwarzschild (2002), ISRs are necessarily functional.

(5) Implicit domain restriction:
   a. WSR: Every student read every book that a professor who teaches Syntax I assigned.
   b. ISR: Every student_1 read every book that a professor who teaches her_1 favorite subject assigned.

Finally, both the CF approaches and the domain restriction approach allow for the possibility that indefinites can also be simple existential quantifiers, with no domain restriction, whenever they have a local (as opposed to a long-distance) reading (one exception is Winter 1997, for whom all readings of indefinites are derived by CFs). Such local, quantificational readings are necessarily non-functional. At the same time, nothing prevents even a local indefinite in the scope of a higher quantifier from being interpreted functionally, as in the example Every husband forgot a certain date. The functional reading of a certain date in this example can be derived both on the contextually determined CF approach, schematized in (6a) (where the Skolemized CF maps every husband to the date that is his wife’s birthday), and on the implicit domain restriction approach, as schematized in (6b).

(6) Local functional readings:
   a. contextually determined CF approach: \([\text{every husband}] \lambda t_1 \{f_{t_1}(\text{date})\}\]
   b. implicit domain restriction: Every husband_1 forgot a date that is his_1 wife’s birthday.

Both the contextually determined CF approach and the domain restriction approach can in principle capture the identifiability condition on a certain indefinites discussed in section 2.1. On the apparent WSR, the speaker can name an identifying property that sets the relevant individual apart from others in the set denoted by the NP (e.g., for (5a), the identifying property might be \(x \text{ teaches Syntax I}\)); on the apparent ISR, the speaker can identify a functional relationship (e.g., between students and professors in (5b)). In contrast, the existentially closed CF approach cannot by itself capture the properties of a certain indefinites (however, it may in principle be compatible with an additional mechanism for capturing identifiability). At the same time, a potential problem for the contextually determined CF and implicit domain restriction approaches is that they predict all ISRs to be functional; while this may be a desirable conclusion for a certain indefinites, it does not appear to work for other types of indefinites, as discussed below.

2.3. Functional vs. non-functional readings

Schwarz (2001) argues that functional readings are distinct from regular NSRs and ISRs. The relevant evidence comes from downward-entailing contexts, where functional and non-functional readings yield different truth-conditions (cf. Chierchia 2001, Winter 2001). Consider, for example, the non-island configuration in (7) (see section 4 for discussion of island configurations where functional and non-functional ISRs yield different truth-conditions). The fact that the
indefinite in (7a) contains a bound variable rules out the WSR, so we are left with the choice between the NSR (7b) and the functional reading (7c).

(7)  a. No girl talked with a (certain) teacher of hers.
    b. non-functional NSR: no girl > a teacher
        paraphrase: There is no girl such that this girl talked to any teacher of hers.
    c. functional reading: f_{girls \rightarrow teachers} > no girl
        paraphrase: There is a functional relationship between girls and their teachers such that no girl talked with the teacher of hers that is in this functional relationship to her.

The relevant context needed to tease apart the readings in (7b-c) is given in (8). In this configuration, (7a) is false on the NSR in (7b) (it is false that no girl talked with any teacher, since each girl did talk to some teachers), but true on the functional reading in (7c): the functional relationship can be paraphrased as “x gave y a bad grade”, and no girl talked to the teacher who gave her a bad grade.

(8) At the party in this girls’ school, each student made great efforts to avoid the teacher that had given her a bad grade. Different students were avoiding different teachers: for example, Helen made sure not to talk to Mr. Loe, while she did talk to all the other teachers; on the other hand, Janet talked to Mr. Loe just fine, but made sure to avoid Ms. Jenkins. And so on for the other students.

The question, of course, is whether functional readings that are truth-conditionally distinct from genuine ISRs and NSRs in fact exist. Schwarz (2001) argues that functional readings are available for a certain indefinites, but not for a indefinites (see also Schwarz 2011 for more discussion). Schwarz predicts that given the scenario in (8), the sentence in (7a) will be false if a teacher of hers is used but true if a certain teacher of hers is used: the a indefinite has only the NSR in (7b), while the a certain indefinite has the functional reading in (7c). Extending this logic to long-distance environments, Schwarz argues (following Kratzer 1998) that a certain indefinites are obligatorily functional, and that, consequently, ISRs of a certain indefinites are actually functional readings; in contrast, a indefinites are non-functional, and have ISRs which are derived by a different, non-functional mechanism (such as existentially closed CFs).

Schwarz’s proposal receives empirical support from Experiment 1 in Ionin (2010), which tested sentences such as (7a) in contexts such as (8), with the form of the indefinite varied between a and a certain. The finding was that sentences with a certain indefinites were accepted 54% of the time in configurations like (8), compared to 14% for corresponding sentences with a indefinites. Since acceptance indicates availability of the functional reading (7c), these results provide evidence that functional readings are available to a certain indefinites but not to a indefinites.

However, this result has two potential problems. First, the 54% acceptance rate for sentences with a certain indefinites was very low, suggesting that the functional reading was not readily available. Second, the low (14%) acceptance rate for sentences with a indefinites does not necessarily indicate unavailability of functional readings, but may instead indicate a strong

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3 An alternative possibility is that a functional reading was available, but not the one supported by the context. As discussed by Kratzer (2003), in a reply to Chierchia (2001), the functional reading of an example like (7a) will not necessarily give rise to a ‘true’ response in a context such as (8). If the functional relationship is taken to be something like “x did not give y a bad grade”, then (7a) will actually be false in the context of (8). Thus, it is possible that the participants were giving a functional reading of (7a), as schematized in (7c), but adopting a different functional relationship than the one supported by the context in (8). However, it is not clear why this should be the case.
preference for NSRs. This alternative explanation is supported by other findings in Ionin (2010), for contexts such as (9a) and (10a) below.

(9) a. Mr. Clark is not a very popular teacher. The students tend to avoid him outside of class. So at the school party, Mr. Clark stood by himself while the other teachers talked with students. But not a single student came to talk to Mr. Clark.

b. No student talked with a (certain) teacher.

(10) a. The teenagers who live in this neighborhood are film buffs, and closely follow the film reviews in the local newspaper. The newspaper has two reviewers, Paige and Robert, and the teenagers tend to trust Paige’s judgment more. This week, for instance, the teenagers watched all the movies recommended by Paige, but they completely ignored Robert’s recommendations.

b. Every teenager watched every film that a (certain) reviewer had recommended.

In the context of (9a) (tested in Experiment 1 in Ionin 2010, for comparison with the context in (8)), the sentence in (9b) is true on the WSR (there is a specific teacher, namely Mr. Clark, that no student talked to), but false on the NSR (it is false that no student talked with any teacher, since the students did talk to some teachers). Similarly, in the context in (10a) (tested in Experiment 2 in Ionin 2010), the sentence in (10b) is true on the WSR (there is a specific reviewer, namely Paige, whose recommendations every teenager followed) but false on the NSR (it is false that the teenagers watched all the films recommended by any reviewer, since they ignored Robert’s recommendations). The finding was that the variants with a indefinites were accepted 28% and 38% of the time in the context of (9a) and (10a), respectively, while the corresponding acceptance rates for the variants with a certain indefinites were 80% and 88%, respectively. In contrast, a indefinites were accepted around 90% of the time in contexts that made the sentence true on the NSR.\(^4\)

These numbers suggest that the NSR is the preferred reading for a indefinites, and thus the 14% acceptance rate in the context of (8) (where the NSR makes (7a) false) does not necessarily indicate unavailability of functional readings – only a strong preference for the NSR. Furthermore, since the sentence in (7a) does not contain any scope islands, this configuration does not get at the question of whether either a indefinites or a certain indefinites have genuine ISRs that are distinct from functional ISRs.

Suggestive evidence bearing on this issue comes from contexts such as (11a), tested in Experiment 2 in Ionin (2010). The context in (11a) makes the sentence in (11b) false both on the WSR (there is no one reviewer all of whose recommendations were followed by every student) and the NSR (it is false that every student watched every film recommended by any reviewer, since everyone left some films unwatched). (11b) is only true on the ISR: for every student, there is a specific reviewer (Bob for some, Debbie for others), such that the student watched every film recommended by this reviewer. At the same time, the context in (11b) does not explicitly set up a functional relationship between the students and the reviewers whose recommendations they followed.

(11) a. The students in this film class pay a lot of attention to the entertainment section of the school newspaper. There are two staff writers, Bob and Debbie, who review movies for

\(^{4}\) The question of why a indefinites prefer NSRs to other readings is beyond the scope of this paper, but see Ionin (2010) for discussion. One possibility is that a indefinites are by default quantificational, non-functional and non-topical, and hence preferentially interpreted locally (cf. Anderson 2004 on the Scope Economy Principle, which predicts surface-scope readings to be easiest to process).
the newspaper. This week, Bob reviewed several recent American films, while Debbie reviewed several foreign films. Half of the students in the class watched the movies that Bob had recommended in his review, and half followed the recommendations that Debbie had made. No one had time to follow both sets of recommendations.

b. Every student watched every film that a (certain) reviewer had recommended.

Interestingly, acceptance rates in the context of (11a) were relatively low both for variants of (11b) with a indefinites (judged as true 26% of the time), and variants with a certain indefinites (judged as true 41% of the time). In the case of a indefinites, this may be attributable to a general preference for NSRs (as discussed above, sentences with a indefinites were generally judged false in contexts where the NSR was false, regardless of what other readings – WSR, ISR, functional – were true). But for a certain indefinites, it was found that WSRs (10) were freely allowed, in comparison to ISRs (11). This finding is not expected on the existentially closed CF approach, which freely generates both WSRs and ISRs. However, any approach that takes the context into account (contextually-determined CFs, or implicit domain restriction) can potentially explain the relatively low acceptance rate of a certain indefinites in the scenario in (11): on these approaches, ISRs of a certain indefinites are obligatorily functional, but the context in (11a) does not strongly support a functional reading.

2.4. Genuine vs. functional ISRs

Endriss (2009) argues that all indefinites have functional readings available to them, through a mechanism such as implicit domain restriction or contextually determined CFs (Endriss disagrees with Schwarz’s judgment that only a certain indefinites, and not a indefinites, can be functional). She proposes that genuine, non-functional long-distance scope readings (both WSRs and ISRs) are derived by an information-structure-driven operation of topicality. In German, topicality with indefinites is marked by emphatic stress on the determiner ein (‘a/one’). Consider first examples contrasting WSRs and NSRs, in (12) (Endriss 2009:115). If stress falls on the NP, as in (12a), the indefinite can only be interpreted in the scope of the universal QP, which makes the sentence infelicitous, since it states that Professor Müller gives preference to PhD students who come from universities – but all PhD students come from universities. The WSR (on which a specific university is under discussion) is not available. If university in (12a) is replaced by a longer NP such as German university, then the WSR becomes available, arguably as a result of domain restriction: it is easier to accommodate the existence of just one German university (in the relevant discourse domain) than of just one university. In contrast, if stress is on the determiner, as in (12b), the indefinite is interpreted as scoping over the universal QP, so that there is a specific university (e.g., Humboldt University) under discussion – even though the NP university is still unmodified. It is highly implausible that putting stress on einer somehow facilitates implicit domain restriction; Endriss argues that stress on einer makes the indefinite topical and makes genuine WSR available.

(12) a. Professor Müller bevorzugt jeden Doktoranden, der von
Professor Müller gives-preference every PhD student who from

5 Modification of the indefinite is known to facilitate long-distance scope readings (cf. Fodor and Sag 1982, among others), most probably because it restricts the domain to a singleton set. Supporting this idea, Experiment 3 in Ionin (2010) shows that when modification of the indefinite does not restrict the domain to a singleton set (e.g., when the modified indefinite a teacher who teaches social studies is used in a context containing two social studies teachers), it has no effect on availability of long-distance scope readings.
a. Professor Müller gives preference to every PhD student who comes from a university.

b. Professor Müller bevorzugt jeden Doktoranden, der von Professor Müller gibt preference every PhD student who from some university kommt.

“Professor Müller gives preference to every PhD student who comes from a/some particular university.” (Namely, from Humboldt University in Berlin).

In the case of ISRs, Endriss (2009) as well as Ebert, Endriss and Hinterwimmer (2009) argue that genuine, topical, non-functional ISRs are made possible by embedding underneath a topic-comment operator. Speech operators such as say are considered to be a type of topic-comment operators. Consider the German sentences in (13), where the indefinite is inside an antecedent of the conditional island. On Endriss’s analysis, in German, stress on ein ensures that a genuine, topical WSR is available. With regard to ISRs, Ebert et al. (2009) predict that (13a), without embedding, lacks a genuine ISR and has only a functional reading, but that (13b), with embedding of the indefinite under say, has a genuine ISR (as well as a functional reading).

(13) a. Jeder Student geht, wenn EIN Professor kommt.
   “Every student will leave if a professor comes.”

b. Jeder Student hat gesagt, er geht, wenn EIN Professor kommt.
   “Every student said he will leave if a professor comes.”

This prediction was tested experimentally by Cieschinger et al. (2010), who auditorily presented sentences such as those in (13) (with and without embedding) in the context of picture-based scenarios. The pictures represented three students with speech bubbles; the WSR scenario for (13a-b) showed each student saying that he would leave if Professor Müller comes. The ISR scenario showed one student promising to leave if Professor Müller comes, the second – if Professor Schmidt comes, and the third – if Professor Meier comes. Participants accepted sentences such as (13a-b) 82% of the time in WSR scenarios, and 66% of the time in ISR scenarios. There were no differences in acceptance rates of sentences with vs. without embedding ((13a) vs. (13b)) in either scenario. Thus, the findings failed to provide support for Ebert et al.’s hypothesis that embedding facilitates genuine ISRs. However, as Cieschinger et al. point out, it is possible that the participants were mentally inserting the speech operator sagen ‘say’ even in the sentence with no embedding (13a) – a plausible explanation, in light of the fact that the pictures emphasized what each student said. Additionally, it is quite possible that participants were allowing the indefinite to have a functional ISR; according to Ebert (2009), all indefinites, including those that allow genuine ISRs, also in principle allow functional ISRs. While the ISR context in Cieschinger et al. (2010) focused on the pair-list interpretation, it cannot exclude the functional interpretation: e.g., (13a) could be interpreted functionally as “Every student will leave if a professor that he named in his speech bubble comes.” If functional ISRs are accessed for (13a-b), then the lack of a difference between (13a) and (13b) may not say anything informative about the effects of embedding on availability of genuine ISRs.
2.5. Summary of prior experimental findings

To sum up, the experimental study by Ionin (2010) has established the following data points: (1) \textit{a certain} indefinites allow WSRs more readily than \textit{a} indefinites; (2) neither indefinite type readily allows ISRs (at least in contexts where functional relationships were not explicitly established); and (3) functional readings are available, to a limited extent, to \textit{a certain} indefinites, but not for \textit{a} indefinites – however, this may be due to a strong preference for NSRs with \textit{a} indefinites. Additionally, the study of Cieschinger et al. (2010), designed to test the predictions of Ebert et al. (2009) about the relationship between embedding and ISRs in German, yielded a null result.

Based on these prior studies, the status of ISRs remains unclear. First, both Ionin (2010) and Cieschinger et al. (2010) found ISRs to be less readily available than WSRs even for those indefinite types that generally allow long-distance readings (\textit{a certain} indefinites in English, stressed \textit{EIN} indefinites in German). Second, neither study directly compared functional and non-functional contexts for ISRs, and thus it is unclear to what extent (un)availability of ISRs, for any indefinite type, is related to the (un)availability of functional readings. The present study was designed to investigate precisely this question.

3. Experimental study of functional and non-functional ISRs

The goal of this study was to determine whether functional and non-functional ISRs can be teased apart, and whether either one is more available to \textit{a certain} indefinites or to \textit{a} indefinites. Specific predictions based on (un)availability of functional readings are spelled out below, after the test contexts are presented.

3.1. Participants and procedure

The participants in this study were 28 native English speakers, undergraduate students at a large U.S. university. They were linguistically naïve informants, recruited from general education courses in linguistics, and had no prior exposure to formal semantics, or to the interpretation task methodology. The participants completed a language background questionnaire and the test instrument described below, both of which were placed online using a the survey gizmo tool. Participants were provided with the url of the test, and completed the test on their own computers, at a time convenient to them. The test was untimed, but had to be completed within a single sitting. The participants received course extra credit for their participation.

3.2. Test instrument

The online interpretation task consisted of 48 story-sentence pairs. The participants were asked to judge the target sentence as true or false in the context of the story, by selecting either TRUE or FALSE. There were two test versions, each administered to 14 participants. Each test version consisted of 24 test items and 24 distractor items, arranged into blocks and randomized for order of presentation.

The 24 test items corresponded to eight conditions, in a 4X2 design: the factor ‘context’ (four levels, corresponding to four distinct story types) was crossed with the factor ‘indefinite’ (two

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6 Ten additional participants were excluded from the analysis due to not being native monolingual speakers of English.
levels, corresponding to the presence of an *a* indefinite vs. an *a certain* indefinite in the target sentence). The indefinite always occurred inside a relative clause island, and the preceding story was designed to match the WSR, pair-list ISR, functional ISR, or NSR of the indefinite. Each test version contained three tokens for each of the eight conditions. The test was fully counterbalanced across the two versions, so that each participant saw each story with either an *a* indefinite or an *a certain* indefinite, never both. The four test context types are illustrated in (14) through (17). The (a) examples contain the stories, and the (b) examples contain the target sentences (as described above, participants saw each story paired with only one target sentence variant – with either an *a* indefinite, or an *a certain* indefinite). The contexts were modeled upon those used in Ionin (2010), Experiment 2.

(14) **WSR: context matches widest-scope reading of indefinite**
   a. Clara, James and Bill are teenagers who live in this neighborhood. They are film buffs, and closely follow the film reviews in the local newspaper. The newspaper has three reviewers, Paige, Sarah and Robert, and the teenagers tend to trust Paige’s judgment the most. This week, for instance, the three reviewers all recommended different films that were playing over the weekend. The three teenagers watched all the movies recommended by Paige, but they completely ignored Sarah’s and Robert’s recommendations.
   b. Every teenager watched every film that a (certain) reviewer had recommended.

(15) **Pair-list ISR: context matches pair-list intermediate-scope reading of indefinite**
   Nora, Charlie and Mika are taking a film class, so they pay a lot of attention to the entertainment section of the school newspaper. There are three staff writers, Bob, Nina and Debbie, who review movies for the newspaper. This week, the three reviewers each recommended several different films that were playing in the local theatre over the weekend. The students couldn’t possibly watch all of the recommended films. Nora watched all the films that Bob recommended, because she trusts Bob’s judgments the most, based on his past recommendations. Charlie watched all the films recommended by Nina, because Nina is his girl-friend, and he can’t ignore her recommendations. Finally, Mika watched all the films recommended by Debbie, because Debbie’s recommendation list was the shortest (she recommended just two films!), and Mika didn’t have much time. So, the three students all followed different reviewers’ recommendations
   b. Every student watched every film that a (certain) reviewer had recommended.

(16) **Functional ISR: context matches functional intermediate-scope reading of indefinite**
   Ted, Judith, and Ben are majoring in cinema studies, and they follow internet film reviews quite carefully. There are three reviewers on the internet – Rob, Casey and Kim – whose opinions the three cinema students particularly respect. Last weekend, Rob, Casey and Kim each made some recommendations for which recent new releases to watch on DVD. The students couldn’t possibly follow all of the recommendations, so they decided to divide up the recommendations, as follows: they would each watch the movies recommended by the reviewer whose opinion they respect the most. Ted respects Rob the most, so he watched all the films recommended by Rob; Judith has the most respect for

As pointed out by an anonymous reviewer, three tokens per condition is very little, with most experimental studies having at least four tokens per condition. The reason for the small number of tokens per condition was that, with eight conditions, the test was already quite long. We acknowledge that this is a limitation of the study. In future research, it would be a good idea to have more items per condition, and to cut down on the number of conditions by using a between-subjects design, with different participants tested on *a* indefinites vs. on *a certain* indefinites. As pointed out by a reviewer, such a between-subjects design would also ensure that participants do not compare *a* and *a certain* indefinites directly.
Casey, so she watched all the movies Casey recommended; and Ben respects Kim the most, so he followed all of Kim’s recommendations. So, the three friends all watched different films, in the end.

b. Every student watched every film that a (certain) reviewer had recommended.

(17) NSR: context matches narrow-scope reading of indefinite

a. Eric, Kevin and Bruce are boys who live in the same neighborhood. They love watching movies, and they decided to watch as many movies as possible during their spring break. They looked through the week-end edition of the town newspaper, and read all the film reviews written by the paper’s three reviewers – Eric, Yolanda, and Will. These three reviewers all recommended different films, but the boys watched them all anyway. This kept them busy for the entire week.

b. Every boy watched every film that a (certain) reviewer had recommended.

With relative clause islands, the NSR of the indefinite entails the WSR, which entails the ISR. Thus, in the context in (17a), (17b) is true on any reading of the indefinite (if every boy watched every film recommended by at least one reviewer, it follows that there is a specific reviewer all of whose recommendations were followed by all the boys, and it further follows that for every boy, there is a specific reviewer whose recommendations that boy followed). In contrast, (14b) is false on the NSR of the indefinite in context (14a), but true on both the WSR and the ISR. In the two ISR contexts ((15a) and (16a)), the corresponding sentences ((15b) and (16b)) are false on both the WSR and the NSR: here, it is false that one reviewer had all his or her recommendations followed (WSR) but it is also false that every student watched every movie recommended by at least one reviewer (NSR). The sentences are true only on the ISR, namely that for every student, there exists a reviewer whose recommendations the student followed in their entirety. The difference between (15) and (16) is that a functional reading between the students and the reviewers is established in (16a), but not in (15a), where the students all had different reasons for choosing the reviewers that they chose. The context in (15a) supports the non-functional ISR schematized in (18a) while the context in (16a) supports the functional ISR schematized in (18b). Note that (18b) entails (18a): if every student followed the recommendations of every reviewer in a functional relationship to him/her (18b), then it follows that for every student, there is a reviewer whose recommendations the student followed (18a). Thus, an indefinite that has a non-functional ISR available to it should be acceptable in the context of both (15a) and (16a). In contrast, an indefinite that has only a functional ISR available to it should be acceptable only in the context of (16a), and not (15a).

(18) a. non-functional ISR: every student > a reviewer > every film

b. functional ISR: f_{students}>reviewers> every student > every film

The 24 distracters were similar in surface complexity to the test items; all distracters included quantifiers inside an embedded clause or a relative clause, and some also tested anaphor interpretation, as shown in the examples in (19). Nine of the distracter items were unambiguously true, and 15 were unambiguously false; the predominance of false distracters was meant to balance out the test items, many of which were expected to receive ‘true’ responses.

(19) a. Sample ‘true’ distracter

Three little girls – Tyler, Jordan and Brittany – were playing ball in the park. Then a friendly dog came up to the girls and clearly wanted to play with them. So Tyler took the ball that she and her friends had been playing with, and threw it to the dog. The dog caught
the ball, and was very pleased with itself. Then Jordan and Brittany also took turns throwing the ball to the dog. And the dog successfully caught it every time! Everyone had a good time.

A dog caught the ball that every girl had played with.

b. Sample ‘false’ distracter

Perry, Evelyn, Lorraine and Andrew went to the school library to get some books to read. They had to read three books assigned by their English teacher, Ms. Campbell, as well as two books assigned by their history teacher, Mr. Jones. Each of the four children took out these five assigned books; additionally, each child took out two more books that he or she wanted to read for pleasure. The four children are all good students, and all of them read the five assigned books. But they had no time to read the books that they had gotten just for pleasure reading; they were so busy reading the assigned books, they never got to the books that hadn’t been assigned.

Every child read every book that no teacher had assigned.

c. Sample ‘false’ distracter, with anaphor

Brenda is the new coach for a young girls’ swimming team. The girls are all new to swimming and very unsure of their abilities. Brenda is teaching them to swim, and also trying to improve their self-confidence. The girls are very fond of their new coach and think she is the greatest. There are a couple girls on the team, to be sure, who don’t like Brenda much. However, Brenda can tell that most of the girls are in fact very fond of their coach.

Brenda thinks that no girl has a good opinion of her.

3.3. Predictions

Let us consider what would be predicted for the participants’ performance on the different approaches discussed above. If Schwarz (2001) is right, and a certain indefinites are derived by contextually determined CFs, then we should see higher rates of ‘true’ responses for sentences with a certain indefinites in the functional context (16a) than in the non-functional one (15a). Sentences with a certain indefinites should also obtain high rates of ‘true’ responses in the WSR context (14a) as well as the NSR context (17a) (recall that the NSR context makes the sentence true on the WSR as well as the NSR, by entailment). Full availability of WSRs for a certain indefinites is expected both on Schwarz’s analysis (if a certain indefinites are derived by contextually determined CFs) and based on prior findings in Ionin (2010).

With regard to a indefinites, we expect them to be fully acceptable in the NSR context (17a) and less so in the WSR context (14a), given the prior findings of Ionin (2010) that a indefinites strongly prefer NSRs; by the same logic, a indefinites are expected not to have very high acceptance rates in either of the ISR contexts ((15a) and (16a)). On Schwarz’s (2001) proposal, whether the context sets up a functional relationship or not is not expected to make any difference: a indefinites cannot have functional readings, but they can have non-functional ISRs (derived by a mechanism such as existentially closed CFs), and the contexts in (15a) and (16a) are equally compatible with non-functional ISRs, as discussed above.

On the other hand, Endriss (2009) and Ebert et al. (2009) predict that in the absence of an embedding operator, the genuine ISR should be unavailable, and only the functional ISR available; and that, furthermore, all indefinites have functional ISRs. By this logic, both a
indefinites and *a certain* indefinites are expected to be accepted more in contexts that support the functional ISR (16a) than in those that do not (15a).

The predictions that Schwarz (2001) and Endriss (2009), respectively, make for availability of ISRs are given in Table 1. Note that both proposals predict more acceptance (more ‘true’ responses) for *a certain* indefinites in the functional than the pair-list context, but differ on their predictions for *a* indefinites.

Table 1. Predictions for relative proportions of ‘true’ responses for pair-list ISR contexts (15) and functional ISR contexts (16).

<table>
<thead>
<tr>
<th></th>
<th><em>a</em> indefinites</th>
<th><em>a certain</em> indefinites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schwarz (2001)</td>
<td>pair-list = functional</td>
<td>pair-list &lt; functional</td>
</tr>
<tr>
<td>Endriss (2009)</td>
<td>pair-list &lt; functional</td>
<td>pair-list &lt; functional</td>
</tr>
</tbody>
</table>

3.4. Results

We first considered performance on the distracter items, in order to ensure that participants were paying attention to the test. On the nine unambiguously true items, the mean rate of true responses was 86%, while on the 15 unambiguously false items, the mean rate of false responses was 91%. This indicates that participants were paying attention, and clearly distinguishing between true and false items. We now move on to the results of the test items.

3.4.1. Overall group results

Table 2 presents the results for the four contexts. This table also presents the truth-values for each pairing of context type with scope interpretation. The results reported correspond to mean percentage of ‘true’ responses to each category. Recall that TRUE and FALSE were the only two possible response options. The same results are presented visually in Figure 1.

Table 2. Results: truth-values and proportions of ‘true’ responses (mean (std))

<table>
<thead>
<tr>
<th>context (example)</th>
<th>WSR of indefinite</th>
<th>ISR of indefinite</th>
<th>NSR of indefinite</th>
<th>% TRUE responses of <em>a</em> indefinites</th>
<th>% TRUE responses of <em>a certain</em> indefinites</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSR (14a)</td>
<td>TRUE</td>
<td>TRUE</td>
<td>FALSE</td>
<td>63% (40%)</td>
<td>76% (30%)</td>
</tr>
<tr>
<td>Pair-list ISR (15a)</td>
<td>FALSE</td>
<td>TRUE (functional reading not supported)</td>
<td>FALSE</td>
<td>52% (34%)</td>
<td>63% (38%)</td>
</tr>
<tr>
<td>Functional ISR (16a)</td>
<td>FALSE</td>
<td>TRUE (functional reading supported)</td>
<td>FALSE</td>
<td>55% (33%)</td>
<td>61% (36%)</td>
</tr>
<tr>
<td>NSR (17a)</td>
<td>TRUE</td>
<td>TRUE</td>
<td>TRUE</td>
<td>94% (13%)</td>
<td>82% (31%)</td>
</tr>
</tbody>
</table>

[INSERT FIGURE 1 HERE]

A repeated-measures 4X2 ANOVA was conducted on the results, with context and indefinite as the within-subject variables. There was a significant effect of context ($F_1(2.3, 62)=9.3$, $p<.001$, Greenhouse-Geisser correction for violation of sphericity; $F_2(3, 15)=12$, $p<.001$), due to the NSR context eliciting a significantly greater number of ‘true’ responses than any of the other three contexts (the NSR and WSR contexts differed significantly on the by-items analysis, but marginally on the by-subjects analysis). The WSR and the two ISR contexts did not differ from
one another. There was no significant effect of indefinite type (F₁(1,27)=1.5, p=.23; F₂(1,5)=2.1, p=.21). Indefinite type interacted significantly with context on the by-subjects analysis only (F₁(2.7, 73)=3.4, p<.05; F₂(3,15)=2.1, p=.14). The source of the interaction on the by-subjects analysis was that a certain indefinites were accepted more than a indefinites in the WSR and the two ISR contexts, while the reverse was the case in the NSR context.

Post-hoc comparisons were conducted in order to explore the differences among indefinite types within each context, as well as differences among context types for each indefinite. A total of 16 pairwise comparisons (using paired-samples t-tests) were done: four comparisons between a and a certain indefinites within each context; six comparisons between each pair of contexts for a indefinites; and six comparisons between each pair of contexts for a certain indefinites. In order to avoid inflating the Type I error rate, we set the alpha level at .003 (Bonferroni correction: .05 divided by 16, the number of comparisons). The difference in proportion of ‘true’ responses for sentences with a indefinites vs. a certain indefinites was marginally significant in the NSR context on the by-subjects analysis only (p=.03) and in the WSR context on the by-items analysis only (p=.028); there was no significant difference between indefinite types in the two ISR contexts.

In the case of a indefinites, there was a significantly higher proportion of ‘true’ responses for the NSR context than for each of the other three contexts (p<.003), on both by-subjects and by-items analyses (the difference between the NSR and the pair-list ISR context was marginal on the by-items analysis, p=.004). The WSR and the two ISR contexts did not differ from one another. For a certain indefinites, the only differences that were significant (p<.003) were between the WSR and the functional ISR contexts, as well as between the NSR and the pair-list ISR contexts, on the by-items analysis only. Additionally, there was a marginal difference between the NSR and the functional ISR contexts, on both by-subjects (p=.03) and by-items (p=.04) analyses.

As the above analyses indicate, there was no statistical difference between the two ISR contexts for either indefinite type; nor was there a difference between a and a certain indefinites in either of the ISR contexts. This was rather surprising, both in light of Schwarz’s and Endriss’s proposals, as well as in light of prior findings (Ionin 2010) that functional readings are more readily available to a certain than to a indefinites.8 In order to explore this null result further, we conducted some follow-up analyses, on both group and individual level.

3.4.2. Test order effects

Following the advice of an anonymous reviewer, we considered whether item order had any effect on performance. Given the high density of similar-looking test items, it is possible that participants simply started accepting everything, regardless of context; this could be due to priming effects from similar items, or just to general boredom with the test. If this were the case, we would expect higher rates of ‘true’ responses in the second half of the test (as participants became more tired, as well as primed by items from the first half) than in the first half of the test. In order to address this, we computed mean performance for each condition on each test half; the results are shown in Figure 2. As this figure shows, the proportion of ‘true’ responses was higher

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8 Following the suggestion of an anonymous reviewer, we pooled together the results for each indefinite type across the two ISR contexts, and conducted a further follow-up comparison to determine whether ISRs (of any kind) were more readily available to a certain indefinites than to a indefinites. Even though there was a numerical difference (the proportion of ‘true’ responses across both ISR contexts was 62% for a certain indefinites vs. 53% for a indefinites), this difference did not reach statistical significance on either by-subjects (p=.09) or by-items (p=.22) analysis.
in the second half than the first half of the test for nearly all conditions, consistent with priming and/or boredom effects. However, the change was particularly striking for a indefinites in the two ISR contexts, where the rates of ‘true’ responses went up by more than 20 percentage points, from 40% to 64% (pair-list ISR context) and from 40% to 69% (functional ISR context). In contrast, in all the other conditions, the change was ten percentage points or less. What this suggests is that participants are initially reluctant to allow ISRs for a indefinites, but become more willing to do so as they become primed on similar test items. In contrast, for a certain indefinites, rates of ‘true’ responses in the two ISR contexts remain consistently high, between 60% and 70% in both halves of the test.

[INSERT FIGURE 2 HERE]

In order to determine the statistical effect of test order, we conducted another mixed ANOVA on the results. Given that there was an odd number of items per condition (n=3), the distribution of items across conditions was not consistent across participants or across token sets. Within each test version, one item from each condition occurred in the first half, and two in the second, or vice-versa, with full counterbalancing across the two test versions. Thus, only a by-items analysis was possible, and context type had to be treated as a between-items variable; test half was also a between-items variable, and indefinite type was a within-items variable. On this analysis, there was a significant effect of context type (F(3,16)=14, p<.001) and a marginally significant effect of test half (F(1,16)=4.4, p=.051); the latter was due to significantly higher rates of ‘true’ responses in the second half than the first half of the test. There was no significant effect of indefinite type (F(1,16)=1.7, p=.21), and no significant interactions between any of the variables.

We next conducted follow-up analyses on just the first half of the test, on the hypothesis that performance on this half is more indicative of participants’ judgments before priming and/or boredom effects set in. The same 16 follow-up comparisons were conducted on the first half of the test as had been done on the test as a whole (see section 3.4.1), except that now, comparisons across contexts were done using independent samples t-tests (since context was a between-items variable) instead of paired-samples t-tests; once again, the alpha level was set to .003 (.05 divided by 16, the number of comparisons).

The differences between a and a certain indefinites did not reach significance in any of the four test contexts, not even the two ISR contexts, where the differences were numerically quite large (functional ISR, p=.095; pair-list ISR, p=.32). For a indefinites, the overall rate of ‘true’ responses was higher in the NSR context than in the other three contexts, in the first half of the test exactly as in the test as a whole. For the first half of the test, the difference between the NSR context than and the functional ISR context reached significance (p=.001); the difference between the NSR and WSR contexts was marginal (p=.006), as was the one between the NSR context and pair-list ISR contexts (p=.06). While in the test as a whole, the WSR context for a indefinites did not differ from the two ISR contexts, when only the first half of the test was considered, there was a higher rate of ‘true’ responses in the WSR context (62%) than in either of the ISR contexts (40%). The difference between the WSR and the functional ISR contexts reached significance (p=.003), but the one between the WSR and the pair-list ISR contexts, while numerically just as high, did not (p=.28); the two ISR contexts did not differ from one another. In the case of a certain indefinites, no difference among contexts was significance, although the one between NSR and pair-list ISR contexts was marginal (p=.068).
To sum up, the small number of items per condition in the first test half (n=3, when pooled across both test versions) meant that few follow-up comparisons came out as significant. Even so, a notable difference between performance on the first half of the test vs. the test as a whole was a (at least numerical, and in some cases statistical) lower rate of ‘true’ responses in the two ISR contexts with a indefinite, in comparison both to the WSR context with a indefinite, and to the two ISR contexts with a certain indefinite. Thus, before priming effects set in during the second half of the test, the ISR of a indefinite appears to be strongly dispreferred, in comparison to other readings.

3.4.3. Individual participant analysis

Finally, given the very high variability in responses, we also examined the performance of individual participants on the pair-list and functional ISR conditions ((15) and (16)) to determine whether any consistent patterns emerged. Of the 28 participants, 11 allowed both functional and pair-list readings for both a and a certain indefinites (operationalized as giving at least two ‘true’ responses to the three tokens in each of these conditions). Four participants disallowed both pair-list and functional readings for both indefinite types, giving ‘true’ responses to no more than one out of three tokens in each condition. The remaining 13 participants showed a great variety of patterns, with some allowing pair-list and/or functional readings only for a certain, and others only for a, and with some allowing pair-list but not functional readings, or vice-versa, for one or both types of indefinites. No consistent patterns (e.g., participants preferring functional readings for a certain but not for a indefinites) emerged in the data.

Looking just at a indefinites, we find that 11 participants allowed both functional and pair-list readings, five allowed only functional readings, six allowed only pair-list readings, and six allowed neither. Looking just at a certain indefinites, we find that 16 participants allowed both functional and pair-list readings, one allowed only functional readings, three allowed only pair-list readings, and six allowed neither. To the extent that anything can be concluded from these numbers, it is that ISRs are slightly more accessible for a certain than for a indefinites, consistent with the findings of the group analysis. However, there is no evidence that functional ISRs are more accessible for either indefinite type than pair-list ISRs, or vice-versa.

3.5. Discussion

We first consider performance across WSR, ISR and NSR contexts (grouping the two ISR contexts together for the time being), in comparison to Experiment 2 in Ionin (2010), on which the present study was modeled. Overall proportions of ‘true’ responses in the present study were much higher than in Ionin (2010). It is not clear what the reason for this is; one possibility is that the present study had a greater density of similar test contexts, priming participants to respond ‘true’ to similar-looking contexts more often (however, as noted above, only two conditions – ISRs with a indefinite – were numerically affected by priming effects, as evidenced by increased rates of ‘true’ responses in the second half of the test). Despite this, patterns very similar to those found in Experiment 2 of Ionin (2010) emerged. For sentences with a indefinite, the present study, just like Ionin (2010), found close to 100% rates of ‘true’ responses in the NSR condition, but lower rates of ‘true’ responses in the WSR and ISR conditions. This is fully consistent with the idea that a indefinites preferentially take local scope, with any non-local reading being dispreferred.

For a certain indefinites, the present study, just like Ionin (2010), found high rates of ‘true’ responses in both WSR and NSR contexts, and lower rates of ‘true’ responses in the ISR
contexts (in the present study, given the overall higher rates of ‘true’ responses, this difference did not reach significance, but was nevertheless numerically present). Recall that the NSR context (17a) makes the sentence (17b) true on both the NSR and the WSR; in contrast, the two ISR contexts ((15a) and (16a)) make the corresponding sentences false on the WSR. The findings indicate that *a certain* indefinites are found to be most acceptable when the sentence is true on the WSR.

Comparing across the two indefinite types, we see that *a certain* indefinites were accepted to a higher extent than *a* indefinites with ISRs, especially in the first half of the test, but this difference failed to reach statistical significance. The lack of a significant difference between *a* and *a certain* indefinites may well be due to low statistical power; numerically, the results do suggest greater availability of ISRs to *a certain* than to *a* indefinites. In the WSR context as well, *a certain* indefinites were accepted to a greater extent than *a* indefinites. The greater availability of long-distance readings to *a certain* than to *a* indefinites is consistent with prior findings of Ionin (2010); it is also consistent with the view that *a certain* indefinites are epistemically specific, and as such, require identifiability, either of the entity that the speaker has in mind (the WSR), or of a functional relationship (the ISR).

At the same time, we find absolutely no difference, either numerical or statistical (in either test half), between availability of pair-list vs. functional ISRs to either indefinite type. This does not accord with the predictions of either Schwarz (2001) or Endriss (2009), spelled out in Table 1. The lack of a difference between pair-list and functional ISRs for *a* indefinites is expected on Schwarz’s analysis, which would say that long-distance readings of *a* indefinites are derived by a non-functional mechanism such as existentially closed CFs. However, the corresponding lack of a difference for *a certain* indefinites is not expected under either analysis, and is not expected if *a certain* indefinites are epistemically specific indefinites that require identifiability: in the pair-list ISR context, there was no readily identifiable functional relationship.

This said, however, we have to be very careful at interpreting a null result: the fact that we found no difference between pair-list and functional readings does not necessarily indicate that there is no distinction between functional and non-functional ISRs. Rather, it could mean that the test instrument in the present study was not successful at establishing a contrast between functional and non-functional ISRs: for example, it is possible that even the pair-list context in (15a) was construed as establishing a functional relationship. Even though the context explicitly states that each student’s reason for following a particular reviewer’s recommendations is completely different, a functional relationship between students and reviewers can still be established, along the lines of *a reviewer whose recommendations the student decided to follow* or even *a reviewer who was mentioned in the context in reference to the student*. If this is the case, and both (15a) and (16a) are construed as establishing a functional relationship, then the lack of a difference is not surprising, and the results are in principle compatible with both Schwarz’s and Endriss’s analyses. As discussed earlier, the same issue arises for the results of Cieschinger et al. (2010): while that study aimed to test genuine, non-functional ISRs, it is not possible to rule out the possibility that functional ISRs were nevertheless available.

Suppose then that our test instrument simply did not succeed at teasing apart functional and non-functional ISRs, and that participants were always able to access a functional interpretation. In light of this possibility, it is very interesting that both types of ISRs were accepted more for *a certain* than for *a* indefinites; even though this difference did not reach statistical significance, it was numerically present, and was particularly striking in the first half of the test (see Figure 2). One way of interpreting these results is as support for Schwarz’s (2001) proposal: functional
readings are available only to a certain indefinites, and as long as participants are able to set up a functional relationship (in any of our ISR contexts), they accept sentences with a certain indefinites to a higher extent than those with a indefinites. In contrast, a indefinites lack functional readings, and have only genuine, non-functional ISRs which, however, are relatively unavailable. One reason for the unavailability of ISRs to a indefinites could be simply that a indefinites strongly prefer NSRs, as found by Ionin (2010). However, a simple preference for NSRs over long-distance readings cannot explain why, in the first half of the test (upper half of Figure 2), a indefinites were accepted more with WSRs than with ISRs (this difference reached significance only in the functional ISR context). A possible explanation is that, per Endriss (2009), ISRs – but not WSRs – require a topic-comment operator, which was not present in our target sentences.

Thus, at least numerically, the results provide tentative support both for Schwarz’s view that a certain indefinites have functional readings, and for Endriss’s view that genuine ISRs are not readily available unless a topic-comment operator is present (however, we lack more direct evidence that the presence of such an operator would facilitate ISRs). The above explanations are necessarily tentative, in light of the lack of statistically significant differences between a and a certain indefinites, and in light of the limitations of the test instrument (high density of test items, and relatively few tokens per condition).

4. Conclusion

On the theoretical level, the present study is unable to shed any new light on the issue of whether indefinites have functional readings that are distinct from non-functional ISRs. The findings of this study (namely, that ISRs are more readily available to a certain than to a indefinites) provide only indirect evidence bearing on Schwarz’s (2001) and Endriss’s (2009) proposals, as discussed above. On the methodological level, the study shows that it is virtually impossible to rule out the possibility that a functional reading of an indefinite is being accessed even when the context strives to set up a non-functional reading.

If functional readings can be established so easily, even in contexts which do not explicitly set up a functional relationship, then functional and non-functional ISRs cannot be teased apart by varying the presence or absence of a functional relationship in the context. An alternative way of probing functional vs. non-functional ISRs is to test those contexts where the two readings yield different truth-conditions, as in (20a) (cf. Experiment 1 in Ionin 2010). However, this methodology faces its own problem, since the functional ISR in an island configuration such as (20a) has the same truth-conditions as the NSR.

The relevant context would be one along the lines of (21). In the context of (21), (20a) is false on the WSR in (20b) (it is false that there is a specific teacher such that no student read every book this teacher assigned). (20a) is also false on the non-functional ISR in (20c) (it is false that for no student a teacher exists whose assigned books the student read). But, (20a) is true on the functional ISR in (20d) (there is a function that maps each student to a teacher she dislikes, and it is true that no student read all the books assigned by the teacher mapped to her by this function). At the same time, (20a) is also true on the NSR in (20e) (it is true that no student

9 At the same time, if the relevant function maps each student to a teacher that she likes, then the functional ISR in (20d) will actually make (20a) false in the context of (21) (see the discussion in Kratzer 2003, and footnote 3 above). I am grateful to the volume editors for pointing out this possibility to me. A response of ‘false’ to (20a) in the context of (21) will thus not necessarily mean that the functional reading in (20d) is absent, and will not be very informative. However, my focus here is on what happens if a ‘true’ response to (20a) is obtained, and what this can tell us about the availability of functional readings.
read every book assigned by any teacher, since in fact neither Maggie nor Sue read all the assigned books).

(20)  

a. No student read every book that a (certain) teacher assigned.

b. WSR: a teacher > no student > every book  
   paraphrase: There exists a teacher such that no student read the book that this teacher assigned.

c. non-functional ISR: no student > a teacher > every book  
   paraphrase: There is no student such that there exists a teacher such that the student read every book assigned by that teacher.

d. functional ISR: \( f_{\text{students} \rightarrow \text{teachers}} > \text{no student} > \text{every book} \)  
   paraphrase: There is a functional relationship between students and teachers, such that no student read every book which the teacher who stands in that functional relationship to the student assigned.

e. NSR: no student > every book > a teacher  
   paraphrase: No student read every book that was assigned by any teacher.

(21) Maggie and Sue are students. Mr. Smith and Ms. Greene are their teachers. Maggie really likes Mr. Smith and dislikes Ms. Greene. Sue really likes Ms. Greene and dislikes Mr. Smith. Maggie read all the books assigned by Mr. Smith but only some of the books assigned by Ms. Greene. Sue did the opposite, and read all the books assigned by Ms. Greene but only some books assigned by Mr. Smith.

Thus, a response of ‘true’ to (20a) in the context of (21) will not tell us whether the NSR or the functional ISR is being accessed. Of course, the NSR and the functional reading can be teased apart in non-island configurations such as that tested in Experiment 1 in Ionin (2010) (see example (7) above). For a certain indefinites, a comparison across these contexts would be informative: if a certain indefinites truly have functional readings, then rates of ‘true’ responses would be quite similar regardless of whether the NSR also happens to be true or not. However, for a indefinites, prior findings indicate that the NSR is the strongly preferred reading: we would most likely find that a indefinites get high rates of ‘true’ responses when the NSR is true, and high rates of ‘false’ responses when the NSR is false, regardless of whether the functional reading is also available. This would not inform us (just as Experiment 1 in Ionin 2010 did not) about whether functional readings for a indefinites are unavailable, or only dispreferred in comparison to NSRs. The present experiment attempted to determine whether setting up a functional relationship in the context facilitated ISRs (in a context where the NSR is false), but as discussed above, the findings were inconclusive.

This means that, with the kind of methodology used here as well as by Cieschinger et al. (2010), the existence of functional readings (as distinct from genuine long-distance scope readings) can be established with any certainty only for those indefinites which readily take long-distance scope (such as a certain) and not those that strongly prefer local scope (such as a indefinites). An interesting question is what would happen with some indefinites. For example, Schwarz (2001) argues that functional readings are available only to a certain indefinites in English, and not to some or a indefinites. At the same time, some indefinites seem more compatible with long-distance scope than a indefinites (examples of long-distance readings in the literature often use some instead of a; experimental data reported in Ionin, under review, also
indicate that long-distance WSRs are more readily available to *some* than to *a*). Furthermore, *some* indefinites are often analyzed as positive polarity items which cannot have NSRs with respect to a negative quantifier (i.e., if used in a sentence like (20a), *some* cannot mean *any*; cf. Giannakidou 2011).

A comparison of *a certain* and *some* indefinites could potentially allow us to tease apart functional and non-functional ISRs. If it can be shown that ‘true’ responses to (20a) in the context of (21) are not due to the NSR (due to *some* indefinites lacking NSRs in the scope of a negative quantifier), then a ‘true’ response would clearly be indicative of availability of a functional reading (20d). Then, the competing predictions of Schwarz (2001) and Endriss (2009) can be tested: Schwarz predicts that functional readings should be available to *a certain* indefinites but not to *some* indefinites, while Endriss predicts that functional readings are available to all definite types. If Schwarz is right, then functional readings are related to the status of *a certain* indefinites as epistemic indefinites; if Endriss is right, then availability of functional readings is not dependent on epistemic specificity. We leave this as an issue to pursue in future research. Another direction for future research would be coming up with an alternative methodology that could tease apart functional and non-functional readings, and that would not rely on setting up these readings in a preceding context.

**References**


Figure 1. Results: mean proportion of ‘true’ responses, by category

Error bars: +/- 1 SD
Figure 2. Results: mean proportion of ‘true’ responses, by category, divided by test half

Error bars: +/- 1 SD