Two kinds of long-distance indefinites*

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Indefinite noun phrases are known to have the option of taking scope from inside syntactic islands. Recent analyses have sought to account for such long-distance indefinites by construing indefinite articles as variables ranging over choice functions. This variable is either taken to remain free (Kratzer 1998) or existentially quantified (Reinhart 1997). Building on observations in Chierchia (2001), this paper argues that unrestricted existential quantification over choice functions leads to overgeneration, and therefore does not improve on accounts relying on long-distance scope shifts. However, it will be argued that there are two kinds of long-distance indefinites, only one of which should be analyzed in terms of scope shifting. The other kind lends itself to a choice function analysis without existential closure.

1. Introduction

Suppose Smith and Baker are teachers who each recommended a number of books, and that Mary read every book Smith recommended, but not every book Baker did. For most speakers, sentence (1a) below is false in this scenario.

(1) a. Mary read every book at least one teacher had recommended.

b. [at least one teacher] λ_1[Mary read every book t_1 had recommended]

This judgment indicates that (1b), where *at least one teacher* has covertly extracted to a topmost position, is not available as a logical form for the surface form (1a). For in the scenario given, we do find at least one teacher, in fact exactly one, such that Mary read every book he recommended. It is to be concluded that the syntactic scope of *at*

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least one teacher at logical form is restricted to the relative clause modifying *book*.

That scope should be so restricted does of course not come as a surprise. After all, relative clauses are commonly thought to be islands for all varieties of syntactic movement, including covert scope shifts targeting quantificational noun phrases like *every teacher*, *no teacher*, *most teachers*, or *at least one teacher*. Accordingly, theories of syntax typically ensure that structures like (1b) violate conditions on locality.

This is why examples like (2a) below are interesting. In generalized quantifier theory, *at least one teacher* and the indefinite *some teacher* both characterize the set of those properties that at least on teacher has. It might therefore be expected that (1a) and (2a) are synonymous. But they are not.

(2) a. Mary read every book some teacher had recommended.

b. [some teacher] λ_1[Mary read every book t_1 had recommended]

Sentence (2a) seems to have a reading in common with (1a), a reading that is false in the scenario given above. However, speakers agree that (2a) may also be used as an appropriate and truthful description of this scenario. Thus, (2a) seems to allow for a reading expressed by the logical form in (2b), even though the covert scope shift it posits is as long-distance as the one in (1b) above.

What makes indefinites differ in this way from quantificational noun phrases? As its title suggests, this paper will argue that the correct answer must distinguish two different cases. It will be argued that a long-distance indefinite like *some teacher* is to be analyzed differently from a long-distance indefinite like *a certain woman he* *knows*. The argument will be prepared by a close examination of some previous analyses of long-distance indefinites, which are therefore summarized in the remainder of this introduction.

One conceivable analysis is, obviously, that indefinites are not subject to syntactic locality conditions, and hence that non-local semantic scope is due to long-distance scope shifts.[1] In this view, aptly called the *scope shifting analysis*, (2b) is considered well-formed after all and held responsible for the relevant reading of (2a).

An alternative to the scope shifting analysis is formulated in Fodor and Sag (1982). This account, the *referential analysis* of long-distance indefinites, maintains that indefinites are subject to the usual locality conditions, but considers them ambiguous between a quantificational and a referential interpretation. In the quantificational interpretation, *some teacher* denotes the same generalized quantifier as *at least one teacher.* This interpretation accounts for the local scope reading of (2a), the one it shares with (1a). In the referential interpretation, *some teacher* is interpreted much like the complex demonstrative *this teacher*. The indefinite is assumed to refer directly to a specific teacher, some teacher the speaker has in mind. This interpretation is considered the source of the long-distance reading of (2a). It accounts for non-local scope without positing long-distance scope shifts. Irrespective of its actual syntactic scope, a directly referential expressions like *this teacher* is interpreted as if it appeared in topmost position. In the referential analysis this feature

1Some authors have proposed to replace actual long-distance scope shifts with equivalent operations that do not technically violate islands constraints. Abusch (1994) formulates a storage mechanism which lets indefinites escape islands. Cresti (1995) suggests that indefinites give the appearance of shifting long-distance by virtue of being topic marked. Both proposals can be considered versions of the scope shifting analysis for the purposes of this paper.

carries over to long-distance indefinites.

Accordingly, the referential analysis predicts that long-distance indefinites are never perceived as being in the scope of another quantifier. Even though Fodor and Sag believed this prediction to be borne out, there is by now agreement that it is not. For concreteness, let us extend the above scenario by assuming that Mary and Sue are the students, and that Sue read every paper Baker recommended, but not every paper Smith did. Many speakers would consider (3a) below, where the quantifier *every student* replaces *Mary* in (2a), a felicitous and true description of this extended scenario.

(3) a. Every student read every book that some teacher had recommended.

b. [every student] λ_1[[some teacher] λ_2[t_1 read every book t_2 had recommended]]

The referential analysis cannot account for these judgments, because in the reading under discussion the teachers vary with the students, indicating that *some teacher* is not referential. The scope shifting analysis, by contrast, can credit this reading of (3a) to the logical form in (3b). There, the indefinite has shifted from the relative clause to an intermediate position, that is, a position within the scope of the higher subject.[2]

2As Reinart (1997) points out, intermediate scope is most clearly attested in case where other scope orders yield pragmatically marked readings. This is illustrated by the examples in (i) and (ii).

(i) Most students have studied every article that some professor has published.

(ii) Each boy ate the cookies someone had brought.

That the referential analysis is not sufficient can also be demonstrated with the help of verb phrase ellipsis. Sentence (4a) below, where (2a) is conjoined with the elliptical sentence *Sue did, too*, describes our extended scenario at least as well as (3a) above. Note that in the relevant reading, the two conjuncts talk about different teachers. According to most theories of verb phrase ellipsis, this should be impossible if *some teacher* was directly referential. In fact, if *some teacher* is replaced with *this teacher*, the two conjuncts can only be understood as talking about the same teacher.

(4) a. Mary read every book some teacher had recommended, and Sue did, too.

b. Mary $\lambda_1[_{VP}$ [some teacher] $\lambda_2[t_1$ read every book t_2 had recommended]] and Sue λ_1[did Δ too]

The scope shifting analysis copes with this example as indicated in (4b). There the indefinite has adjoined to the higher verb phrase. Assuming ellipsis is resolved at logical form through copying, (4b) can be turned into a logical form with the desired interpretation by copying the first verb phrase into the ellipsis site.[3]

It might be concluded from these considerations that long-distance indefinites are to be analyzed in terms of non-local scope shifting after all. However, some

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Note that in its narrow scope reading, sentence (i) is implausibly strong. In (ii), lexical semantics ensures that both the narrow and the wide scope reading, if available at all, are close to inconsistent.

3It should be clear that the argument made here is actually independent of the analysis of ellipsis. That verb phrases ellipsis is resolved through copying was proposed in Williams (1977).

authors have explored ways of avoiding this conclusion. In the analysis of Reinhart (1997) and Winter (1997, to appear), the long-distance reading of sentence (2a) above is credited to the logical form sketched in (5).

(5) $\exists f$[Mary read every book [f teacher] had recommended]

Here the indefinite stays in situ. The variable f, which translates the indefinite article, is intended to range over choice functions, functions mapping any non-empty set in their domain to an element of this set. Accordingly, (5) says that there is a way of choosing a teacher such that Mary read every book the so chosen teacher had recommended. Since there is a one-to-one correspondence between teachers and choices of teachers, (5) is equivalent to the logical form with scope shifting in (2b).

Actually, the last claim is not quite accurate. If choice functions have the empty set in their domain, then (5) and (2b) are not equivalent. For suppose there are no teachers. This assumption makes (2b) false, but it is compatible with the truth of (5). After all, there are plenty of functions which map the empty set to Sue, for example, and Mary may well have read every book that Sue recommended. In this case (5) would be true. The problem is, of course, that a competent speaker does not judge (2a) true if there are no teachers. A natural way of solving this problem is to withdraw the assumption that choice functions have the empty set in their domain. In that case, the scope of existential closure ($\exists f$) in (5) will not have a truth value (under any assignment) if there are no teachers. Suppose now that $\exists f \phi$ has a truth value only if ϕ does (under some assignment). This means that (5) as a whole will have a truth value only if there is at least one teacher. In this view, then, indefinite articles interpreted as choice functions trigger an existence presupposition in much the way the definite article does in a Fregean analysis. Accordingly, the analysis does not quite make (5) equivalent to (2b), which does not presuppose, but merely entails, the existence of a teacher. However, since judgments on (2a) seem quite compatible with such an existence presupposition, the present account may well be correct. Note that we may characterize the semantic relationship between (2b) and (5) as follows. Whenever the presuppositions of both logical forms are satisfied, then they must have the same truth value. In the terminology of von Fintel (1999), the two logical forms are *Strawson equivalent*.[4] In the present view, choice functions thus provide logical forms which are Strawson equivalent to their scope shifting counterparts. For ease of exposition, this consequence of the account will be considered adequate in the following without further discussion. However, section 7 below will return to the problem of empty restrictions and show that the arguments made in the paper do not depend on the particular solution adopted here.[5]

Just like the referential analysis, the choice function analysis may assume that indefinites are ambiguous and credit local scope readings to their generalized quantifier meanings. But how does it apply to the problematic intermediate readings of (3a) and (4a)? One possible answer, the one given by Reinhart and Winter, is that existential closure is distributed freely. Specifically, it may occur in the scope of another quantifier, and it also may occur more than once in a logical form. This

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4This choice of terminology is appropriate in view of a famous passage in Strawson (1952).

5Reinhart and Winter propose interpretations in which, in effect, the presupposition triggered by the choice function variable is always accommodated. Reinhart considers two different options, which amount to global and local accommodation in the sense of Heim (1983). Winter's proposal amounts account, call it the *multiple choice* analysis, allows for the logical forms in (6) below. These express the intended readings of (3a) and (4a) in a transparent fashion (provided ellipsis is resolved as before).

(6) a. [every student] λ_1[$\exists f$[t_1 read every book [f teacher] had recommended]]

b. $\exists f$[Mary λ_1[$_{VP}$ t_1 read every book [f teacher] had recommended]] and $\exists f$[Sue λ_1[did Δ too]]

Another way of dealing with intermediate readings, call it the *sloppy choice* analysis, credits the problematic readings to a silent anaphor within the indefinite. More accurately, the function denoted by f is assumed to take an additional argument. At logical form, this argument may appear as an index on the function variable, call it *Skolem* index, which is bound by the higher quantifier. The sloppy choice account, formulated explicitly in Chierchia (2001), combines proposals by Kratzer (1998) and Matthewson (1999). It applies to (3a) and (4a) as shown in (7).

(7) a. $\exists f$[[every student] λ_1[t_1 read every book [f_1 teacher] had recommended]]

b. $\exists f$[Mary λ_1[$_{VP}$ t_1 read every book [f_1 teacher] had recommended] and Sue λ_1[did Δ too]]

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to mandatory local accommodation.

Here f is intended to range over *Skolemized* choice functions, that is, functions from individuals to choice functions.[6] The Skolem index is bound by the higher subject, ensuring that the choice of teacher may vary with the students in (7a), and may differ in the two conjuncts of (7b).[7] Through this variance of choice, the logical forms in (7) come out equivalent to those in (6). Note that in (7), existential closure only occurs in topmost position, and hence occurs only once. The sloppy choice analysis in fact holds that the distribution of existential closure is always restricted in this way.

Building on observations presented in Chierchia (2001), this paper demonstrates that for a large class of cases, the multiple choice analysis and the sloppy choice analysis derive readings which are not in fact attested. It is argued that, to avoid overgeneration, these accounts would have to be combined with tight constraints on the distribution of existential closure. These constraints would have to be stipulated, in effect, to keep the theory from generating any readings not generated under an account with long-distance scope shifting. This result might invite the conclusion, drawn for different reasons in Geurts (2000), that some sort of long-distance scope shifting is after all preferable to the use of choice functions in the analysis of long-distance indefinites. However, building on observations by Kratzer (1998) and Winter (to appear), it is argued that there are two kinds of long-distance

6The term *Skolemized choice function* is due to Chierchia (2001). Kratzer (1998) was the first to use Skolimzed choice functions in the analysis of indefinites.

7This analysis of long-distance intermediate readings is analogous to the standard analysis of so-called *sloppy* identity in verb phrase ellipsis cases like *John likes his hat, and Bill does, too* (see Partee 1972, Keenan 1971, and many others). The terminology chosen here is meant to highlight this analogy.

indefinites and that choice functions seem to be needed in the analysis of one of these kinds. Specifically, it is suggested that *functional* indefinites like *a certain woman he likes* may receive the choice function account proposed in Kratzer (1998). This account aims to generalize Fodor and Sag's referential analysis, and differs from the sloppy choice analysis only in that does away with existential closure.[8]

Section 2 reviews the observation due to Chierchia (2001) that the sloppy choice analysis undergenerates in downward monotone contexts. Section 3 expands on this observations, and shows that in the relevant cases, sloppy choice in effect gives indefinites universal force. To avoid overgeneration the theory must therefore stipulate constraints on the distribution of existential closure. Section 4 demonstrates that such constraints are also needed to keep the multiple choice analysis from overgenerating. Section 5 discusses a proposal by Winter (to appear) which conflicts with this result in an interesting way. While the proposal is argued to be inadequate, it raises the important question how long-distance indefinites relate to functional indefinites, a question taken up in section 6. It is argued that the two kinds of indefinites call for different accounts. Tying up a loose end, section 7 concludes the paper.

2. Monotonicity and undergeneration

The multiple choice analysis achieves the effect of long-distance scope shifting through long-distance existential closure. In particular, long-distance shifts to

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8The consequences of this difference for the semantics of long-distance indefinites might be thought to be minor (see e.g. Matthewson 1999, Chierchia 2001, Geurts 2000). We will see in section 6 below, however, that in certain cases the difference is in fact crucial.

intermediate positions are simulated through intermediate existential closure. The sloppy choice analysis, by contrast, aims to achieve this effect through variable binding. It has not been proven, however, that sloppy choice can simulate multiple choice in the whole range of cases. In fact, Chierchia (2001) shows that it cannot. Specifically, Chierchia observes that sloppy choice fails to derive intermediate readings for cases where the quantifier in topmost position is downward monotone.[9] Consider again (3a), (6a), and (7a) above, repeated in (8) for ease of reference.

(8) a. Every student read every book that some teacher had recommended.

b. [every student] $\lambda_1[\exists f[t_1$ read every book [f teacher] had recommended$]]$

c. $\exists f[$[every student] $\lambda_1[t_1$ read every book [f_1 teacher] had recommended$]]$

We have seen above that (8b) is equivalent to (8c). Let us now compare (8) with (9) below, where downward monotone *not every student* substitutes for upward monotone *every student*.

(9) a. Not every student read every book that some teacher had recommended.

b. [not every student] $\lambda_1[\exists f[t_1$ read every book [f teacher] had

9A noun phrase α is *upward/downward monotone* if and only if for all f and g such that $f \subseteq g / g \subseteq f$: if recommended]]

c. $\exists f$[[not every student] λ_1[t_1 read every book [f_1 teacher] had recommended]]

The multiple choice structure in (9b) expresses the negation of (8b). The former is true if and only if the latter is false. By contrast, the sloppy choice structures (9c) and (8c) are consistent with each other. Take the following scenario, familiar from above. Smith and Baker are the teachers, Mary and Sue are the students, Mary read every book Smith recommended, but not every book Baker did, whereas Sue read every book Baker recommended, but not every book Smith did. Both (8c) and (9c) turn out to be true in this situation. For we can find Skolemized choice functions f and f' such that f(Mary)(the teachers) = f'(Sue)(the teachers) = Smith and f(Sue)(the teachers) = f'(Mary)(the teachers) = Baker. In the scenario given, f verifies (8c) and f' verifies (9c).

This observation presents a problem for the sloppy choice analysis. For, in agreement with the multiple choice analysis, sentence (9a) can indeed be taken to express the negation of (8a), hence can be judged to be false in our scenario. Similar problems arise with other downward monotone quantifiers. For illustration, consider *no student*.

(10) a. No student read every book that some teacher had recommended.

b. [no student] λ_1[$\exists f$[t_1 read every book [f teacher] had recommended]]

″α≥(f) = 1 then ″α≥(g) = 1.

c. $\exists f \big[$[no student] $\lambda_1 \big[$$t_1$ read every book [f_1 teacher] had recommended$\big]\big]$

Sentence (10a) is judged false in the situation specified. After all, Mary read every book some teacher recommended, and Sue did, too. The multiple choice structure (10b) accounts for this judgment, but the sloppy choice structure (10c) does not. The Skolemized choice function f' from above verifies (10c) as much as it does (9c).

The sloppy choice analysis thus suffers from a problem of undergeneration. There are cases of intermediate long-distance readings that the analysis does not account for. We have seen that the logical forms to which one would like to credit these readings have overly weak truth conditions.[10]

This is the time to ask what exactly the truth conditions of these logical forms are. Specifically, we should ask whether (9c) and (10c) above express possible interpretations of (9a) and (10a), respectively. Chierchia seems to assume that they do. In section 3, we will see that, for the examples at hand, this assumption is correct. However, we will also see that there are many cases where the sloppy choice analysis predicts readings which are clearly not attested.

3. Monotonicity and overgeneration

The sloppy choice analysis assigns an indefinite scope immediately below the quantifier binding its Skolem index. In the complex cases discussed in section 1, this amounts to intermediate scope. In simpler cases like (11) below, it amounts to narrow

10In his paper, Chierchia also discusses an interesting restriction on intermediate readings, which he relates to the analysis of weak crossover. Although very interesting and highly relevant, these facts will not be discussed in the present paper.

scope. Thus (12a) below is Strawson equivalent to (12b).

(11) Every student read a book I had recommended.

(12) a. $\exists f$[[every student] λ_1[t_1 read f_1 [book I had recommended]]]

b. [every student] λ_1[[some book I had recommended] λ_2[t_1 read t_2]]

Note that, since (12b) does not violate locality constraints, (12a) is not in fact needed in the analysis of sentence (11). However, the goal of this section is to study the logic of sloppy choice somewhat more systematically than above, and for this purpose, it is convenient to focus on relatively simple examples like (11). Let us begin by actually proving that the two logical forms in (12) are Strawson equivalent.

This amounts to showing that under the assumption that I recommended at least one book, (12a) and (12b) must agree in truth value. To show this, we need to attend to the logical forms in (13) below, the scopes of *every student* in (12). We will see that these logical forms relate as stated in (14). Building on this result we will then prove Strawson equivalence of (12a) and (12b).

(13) a. λ_1[t_1 read f_1 [book I had recommended]]

b. λ_1[[some book I had recommended] λ_2[t_1 read t_2]]

(14) a. For every g, if I recommended at least one book, then

″(13a)≥^{g} ⊆ ″(13b)≥^{g}

b. For every g, if I recommended at least one book, then

for some Skolemized choice function f, ″(13b)≥^{g} = ″(13a)≥$^{g[f/f]}$.

Suppose, then, that ″(13a)≥^{g}(x) = 1. This implies that I recommended at least one book, that x read g(*f*)(x)(the books I recommended), and hence that x read some book I recommended. Thus ″(13b)≥^{g}(x) = 1, which proves (14a). Now suppose that I recommended at least one book. This allows us to construct a Skolemized choice function f that satisfies the following condition. For every x: if x read a book I recommended, then f(x)(the books I recommended) is a book that x read. It is apparent that ″(13b)≥^{g} = ″(13a)≥$^{g[f/f]}$, which proves (14b).

Building on (14), we can now prove that (12a) and (12b) are equivalent under the assumption that I recommended at least one book. Suppose first that ″(12a)≥^{g} = 1. This means that I recommended at least one book and that for some f, ″*every student*≥^{g}(″(13a)≥$^{g[f/f]}$) = 1. Given (14a), upward monotonicity of *every student* ensures that ″*every student*≥^{g}(″(13b)≥$^{g[f/f]}$) = 1, hence that ″*every student*≥^{g}(″(13b)≥^{g}) = 1. Thus ″(12b)≥^{g} = 1. Conversely, suppose that ″(12b)≥^{g} = 1 and that I recommended at least one book. By (14b), we then have that for some f, ″(13b)≥^{g} = ″(13a)≥$^{g[f/f]}$. Together with ″(12b)≥^{g} = ″*every student*≥^{g}(″(13b)≥^{g}) = 1, this implies that for some f, ″*every student*≥^{g}(″(13a)≥$^{g[f/f]}$) = 1. Hence ″(12a)≥^{g} = 1, which completes the proof.

Note that the proof just given exploits the fact that *every* is right upward monotone, that is, forms upward monotone noun phrases.11 But it does not otherwise

11That is, a determiner δ is *right upward/downward monotone* if and only if for all f, g, and g' such that depend on the semantics of *every*. This means that replacing *every* in (12) with any other right upward monotone determiner will preserve Strawson equivalence. We may moreover conjecture that more generally, logical forms of the shapes in (15) and (16) always relate as stated in (17).12

(15) $\exists f\big[[\delta\ \alpha]\ \lambda_i\big[[f_i\ \ \beta]\ \gamma\big]\big]$

(16) $[\delta\ \alpha]\ \lambda_i\big[[\textit{some}\ \beta]\ \gamma\big]$

(17) For all α, β, γ, and right upward monotone δ,

(15) is Strawson equivalent to (16)

The sloppy choice analysis is in fact committed to the truth of (17). After all, it is (17) which ensures that intermediate scope can be simulated through wide scope existential closure at least in cases like those we started out with in section 1. Without having seen a fully general proof, we will therefore take (17) for granted and examine its consequences.

In view of the observations reported in section 2, we are particularly interested in the consequences for those instances of (15) where δ happens to be right downward

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$g\subseteq g'/g'\subseteq g$: if $''\delta\geq(f)(g) = 1$ then $''\delta\geq(f)(g') = 1$.

12Note that (12a) can be brought into the format of (15), with no effect on interpretation, by shifting the indefinite leftward, yielding $\exists f[[\textit{every student}]\ \lambda_1[f_1\ [\textit{book I had recommended}]\ \lambda_2[t_1\ \textit{read}\ t_2]]]$. Note also that (17) cannot be true if α, β, and γ may host free occurrences of f. Let us therefore assume that they do not.

monotone. Consider (18) below, for example, where right downward monotone *no* replaces right upward monotone *every*, and its logical form in (19a). What we will see is that (19a) is Strawson equivalent to (19b), where a universal noun phrase corresponds to the indefinite in (18).

(18) No student read a book I had recommended.

(19) a. $\exists f$[[no student] λ_1[t_1 read f_1 [book I had recommended]]]

b. [no student] λ_1[[every book I had recommended] λ_2[t_1 read t_2]]

Since sentence (18) evidently does not have the reading expressed by (19b), this is a problem for the sloppy choice analysis. However, discussion of possible reactions to this problem will be deferred to section 4. First let us see that the logical forms in (19) indeed relate as claimed.

Just like the proof on (12), the proof on (19) proceeds in two steps. Specifically, we will first see that the logical forms in (20), the scopes of *no student* in (19), relate as stated in (21). Building on this result we will then prove Strawson equivalence of (19a) and (19b).

(20) a. λ_1[t_1 read f_1 [book I had recommended]]

b. λ_1[[every book I had recommended] λ_2[t_1 read t_2]]

(21) a. For every g, if I recommended at least one book, then

″(20b)≥^{g} ⊆ ″(20a)≥^{g}

b. For every g, if I recommended at least one book, then

for some Skolemized choice function f, ″(20b)≥^{g} = ″(20a)≥$^{g[f/\mathrm{f}]}$.

Suppose, then, that I recommended at least one book and that ″(20b)≥^{g}(x) = 1. This entails that x read every book I recommended, and in particular that x read g(f)(x)(the books I recommended). Hence ″(20a)≥^{g}(x) = 1, which proves (21a). Now suppose again that I recommended at least one book. This allows us to construct a Skolemized choice function f that satisfies the following condition. For every x: if x did not read every book I recommended, then f(x)(the books I recommended) is a book that x did not read. It is apparent that ″(20b)≥^{g} = ″(20a)≥$^{g[f/\mathrm{f}]}$, which proves (21b).

Building on (21), we can now prove that (19a) and (19b) are equivalent under the assumption that I recommended at least one book. Suppose first that ″(19a)≥^{g} = 1. This means that I recommended at least one book and that for some f, ″*no student*≥^{g}(″(20a)≥$^{g[f/\mathrm{f}]}$) = 1. Given (21a), downward monotonicity of *no student* ensures that ″*no student*≥^{g}(″(20b)≥$^{g[f/\mathrm{f}]}$) = 1, and hence that ″*no student*≥^{g}(″(20b)≥^{g}) = 1. Thus ″(19b)≥^{g} = 1. Conversely, suppose that ″(19b)≥^{g} = 1 and that I recommended at least one book. By (21b), we then have that for some f, ″(20b)≥^{g} = ″(20a)≥$^{g[f/\mathrm{f}]}$. Together with ″(19b)≥^{g} = ″*no student*≥^{g}(″(20b)≥^{g}) = 1, this implies that for some f, ″*no student*≥^{g}(″(20a)≥$^{g[f/\mathrm{f}]}$) = 1. Hence ″(19a)≥^{g} = 1, which completes the proof.

Note that, in analogy to the proof on (12), the proof on (19) exploits the fact that *no* is right downward monotone but does not otherwise depend on the semantics of *no*. Accordingly, replacing *no* in (19) with any other right downward monotone determiner will again preserve Strawson equivalence.

The reader will moreover have noticed that in a transparent sense, the proof on (19) is the mirror image of the proof on (12). Specifically, the way in which the proof on (19) relates the semantics of *every* to downward monotonicity is analogous to the way in which the proof on (12) relates the semantics of *some* to upward monotonicity. This symmetry between (12) and (19) indicates that, more generally, if (15) with right upward monotone δ can be proved Strawson equivalent to (16), then (15) with right downward monotone δ can be proved Strawson equivalent to (22) below. Thus, (17) above cannot be true without (23) below being true as well.

(22) $[\delta\ \alpha]\ \lambda_i[[\mathit{every}\ \beta]\ \gamma]$

(23) For all α, β, γ, and right downward monotone δ,
(15) is Strawson equivalent to (22)

Having established this general result, let us in the remainder of this section examine some more particular instances of the schematic logical form in (15). To begin, we are now in a position to return to the examples presented in section 2 to show that the sloppy choice analysis undergenerates. Consider again example (10a), repeated in (24), and its sloppy choice logical form (10c), repeated in (25a).

(24) No student read every book that some teacher had recommended.

(25) a. $\exists f[[\text{no student}]\ \lambda_1[t_1 \text{ read every book } [f_1 \text{ teacher}] \text{ had recommended}]]$

b. $[\text{no student}]\ \lambda_1[[\text{every teacher}]\ \lambda_2[t_1 \text{ read every book } t_2 \text{ had recommended}]]$

We have already seen that (25a) does not express the intermediate reading of sentence (24). Given (23), we moreover know that (25a) is Strawson equivalent to (25b).13

This result might seem to contradict the claim, made at the end of section 2, that (25a) expresses a possible reading of (24). After all, a universal interpretation of the indefinite appears no more adequate in (24) than it does in (18) above. The apparent conflict disappears, however, in view of the elementary observation that the intermediate scope universal in (25b) has the effect of a narrow scope existential. That is, (25b) is equivalent to (26), which transparently expresses a possible reading of (24).

(26) $[\text{no student}]\ \lambda_1[t_1 \text{ read every book } [\text{some teacher}]\ \lambda_2[t_2 \text{ had recommended}]]$

In this particular case, then, a semantic accident keeps the sloppy choice analysis from deriving an unattested interpretation. Much the same can be said about sentence (9)

13Note that (23) does not directly apply to (25a) as it stands, given that (25a) is not an instance of (15). However, we can shift the indefinite to the left, with no effect on interpretation, arriving at the logical form $\exists f[[\text{no student}]\ \lambda_1[[f_1 \text{ teacher}]\ \lambda_2[t_1 \text{ read every book } t_2 \text{ had recommended}]]]$, which indeed is an instance of (15). Analogous comments apply to all other relevant examples discussed below.

above, repeated here as (27).

(27) Not every student read every book that some teacher had recommended.

(28) a. $\exists f$[[not every student] λ_1[t_1 read every book [f_1 teacher] had recommended]]

b. [not every student] λ_1[[every teacher] λ_2[t_1 read every book t_2 had recommended]]

The sloppy choice analysis assigns (27) the logical form (28a), which we know is Strawson equivalent to (28b). This might again seem incorrect but in fact is not. For (28b) is equivalent to (29a), where the existential takes narrow scope, and which accordingly expresses a possible reading of (27). Note, moreover, that (29a) is in turn equivalent to (29b), where the existential takes widest scope. Thus (28a) by accident expresses both the narrow and the wide scope reading of (27).

(29) a. [not every student] λ_1[t_1 read every book [some teacher] λ_2[t_2 had recommended]]

b. [some teacher] [[not every student] λ_1[t_1 read every book [t_2 had recommended]]]

To conclude this section, let us address a question which naturally arises from the above presentation. How can we describe the truth conditions of (15) if δ is right non-monotone, that is, neither right upward nor right downward monotone? It will be sufficient, for the present purposes, to consider a concrete example. Take sentence (30) below, featuring the non-monotone quantifier *exactly three students.* Note that, as expected, the sentence allows for an intermediate scope reading. Its sloppy choice logical form is given in (31).

(30) Exactly three students read every book that some teacher had recommended.

(31) $\exists f$[[exactly three students] λ_1[t_1 read every book [f_1 teacher] had recommended]]

We do not expect Strawson equivalence between (31) and either of the logical forms in (32) below. It fact, it can be shown that (31) instead is Strawson equivalent to the conjunction of the two logical forms in (33), where upward monotone *at least three students* and downward monotone *at most three students* substitute for *exactly three students*.

(32) a. [exactly three students] λ_1[[some teacher] λ_2[t_1 read every book t_2 had recommended]]

b. [exactly three students] λ_1[[every teacher] λ_2[t_1 read every book t_2 had recommended]]

(33) a. [at least three students] λ_1[[some teacher] λ_2[t_1 read every book t_2 had recommended]]

b. [at most three students] λ_1[[every teacher] λ_2[t_1 read every book t_2 had recommended]]

This means, obviously, that (31) does not express the intermediate reading of (30). In fact, it is clear that (31) does not express any attested reading of the sentence. Thus the sloppy choice analysis copes with right non-monotone quantifiers no better than it does with right downward monotone quantifiers.14

We have seen in this section that the sloppy choice analysis overgenerates. This discovery might invite the conclusion that sloppy choice is to be replaced with multiple choice. We will see in section 4, however, that the multiple choice analysis does not in fact improve on the sloppy choice analysis as much as one would hope.

4. Multiple choice and monotonicity

Suppose we wanted to minimally revise the sloppy choice analysis so as to avoid the problems detected above. One the one hand, this revision would have to ensure that logical forms of the shape (34i) (where λ_i is intended to bind the Skolem index i) are well-formed only if the noun phrase [δ α] is upward entailing. This would prevent the theory from predicting unattested readings for examples like (18) or (30).

14Chierchia credits P. Schlenker for the observation that non-monotone quantifiers are problematic for the sloppy choice analysis in much the same way downward monotone quantifiers are.

(34) i. $\exists f[[\delta\ \alpha]\ \lambda_i[\ldots f_i \ldots]]$

ii. $[\delta\ \alpha]\ \lambda_i[\exists f[\ldots f_i \ldots]]$

On the other hand, the revision would have to provide logical forms for intermediate readings in all the relevant cases above. It seems that the smallest revision to that effect would withdraw the assumption that existential closure always takes widest scope. Specifically, the revised analysis would have to assume that logical forms of the shape (34ii) (where λ_i is again meant to bind the Skolem index) are well-formed whenever $[\delta\ \alpha]$ is not upward monotone. In that case, (24), (27), and (30), repeated in (35) below, could be assigned the logical forms in (36). It is not hard to see that these logical forms indeed express the intended intermediate readings.

(35) a. No student read every book that some teacher had recommended.

b. Not every student read every book that some teacher had recommended.

c. Exactly three students read every book that some teacher had recommended.

(36) a. [no student] $\lambda_1[\exists f[t_1$ read every book $[f_1$ teacher] had recommended$]]$

b. [not every student] $\lambda_1[\exists f[t_1$ read every book $[f_1$ teacher] had recommended]]

c. [exactly three students] $\lambda_1[\exists f[t_1$ read every book $[f_1$ teacher] had recommended]]

This minimal revision of the sloppy choice analysis would account for all the data presented so far. However, it must be admitted that the revision relies on assumptions which lack independent motivation. There is no independent motivation for the assumption that in some but not all cases the binder of the Skolem index can intervene between the choice function variable and its existential closure. And there is no independent motivation for the particular way the analysis refers to monotonicity properties.

These objections suggests that the sloppy choice analysis should undergo some less minimal revisions than those considered above. In fact, they suggest that it should be given up in favor of the multiple choice analysis. Assuming that this analysis does not provide variables ranging over Skolemized choice functions in the first place, it straightforwardly excludes all logical forms of shape (34i) (irrespective of the monotonicity of [δ α]). Moreover, recall that the multiple choice analysis assumes free distribution of existential closure. Accordingly, it allows for logical forms which take the shape (34ii) minus the Skolem index (again irrespective of the monotonicity of [δ α]). Specifically, it allows for the following logical forms, where (37a) repeats (10b) and (37b) repeats (9b).

(37) a. [no student] $\lambda_1[\exists f[t_1$ read every book [f teacher] had recommended$]]$

b. [not every student] $\lambda_1[\exists f[t_1$ read every book [f teacher] had recommended$]]$

c. [exactly three students] $\lambda_1[\exists f[t_1$ read every book [f teacher] had recommended$]]$

We have already seen in section 2 that (37a) and (37b) express the intended intermediate readings, and it is not hard to see that (37c) does, too. (In general, omitting the Skolem index in (34ii) does not affect interpretation, which is why the revised sloppy choice analysis and the multiple choice analysis are equally successful at deriving intermediate readings.) It appears, then, that the multiple choice analysis avoids all of the problems that plague the original sloppy choice analysis, and that it does so with fewer stipulations than the revised sloppy choice analysis.

Appearance, however, is misleading. For the multiple choice analysis inherits a version of one of the problems associated with the sloppy choice analysis. Specifically, the problem of overgeneration reappears in cases where the descriptive content of an indefinite hosts a variable bound from outside. For illustration, consider first example (38) in a reading (of course!) where *he* is anaphoric to *every candidate*. The multiple choice analysis provides (39a) as a possible logical form for this reading.

(38) Every candidate submitted a paper he had written.

(39) a. $\exists f$[[every candidate] λ_1[t_1 submitted f [paper he_1 had written]]]

b. $\exists f$[[every candidate] λ_1[t_1 submitted f_1 [paper he_1 had written]]]

According to (17), the logical form (39b), where f carries a Skolem index, is Strawson equivalent to (40) below. What we will see in a moment is that (17) renders (39a) Strawson equivalent to (40) as well. More accurately, we will see that this is so under the (almost) trivial assumption that no two individuals wrote the same papers.[15]

(40) [every candidate] λ_1[[some paper he_1 had written] λ_2[t_1 submitted t_2]]

We can show this by proving equivalence of (39a) and (39b). One the one hand, if some choice function f verifies (39a), then we can define a Skolemized choice function f' verifying (39b) as follows. For every individual x and set of individuals h, f'(x)(h) = f(h). On the other hand, if some Skolemized choice function f verifies (39b), we can can define a (partial) choice function f' verifying (39a) as follows. For any assignment g, f'(″paper he_1 had written≥^{g}) = f(g(1))(″paper he_1 had written≥^{g}). Note that the assumption that no two individuals wrote the same papers guaranties that f' relates a unique individual to each set in its domain (and therefore is indeed a function). For this assumption guaranties that g(1) = g'(1) whenever ″paper he_1 had written≥^{g} = ″paper he_1 had written≥$^{g'}$, thus f'(g(1))(″paper he_1 had written≥^{g}) =

15Following Heim (1983), we may take (39a,b) to presuppose that every candidate has written at least one paper. Accordingly, (39a,b) are Strawson equivalent to (40) just in case the logical forms agree in truth value whenever this presupposition is satisfied.

$f'(g'(1))(''\text{paper he}_1\text{ had written}\geq^{g'})$.

The Strawson equivalence of (39a) and (40) is a of course a welcome result for the multiple choice analysis, as it shows that (38) is assigned a reading which is actually attested. Note, moreover, that sentence (38) is unambiguous as long as *him* is read as anaphoric to *every candidate*. This means that the multiple choice analysis is in fact committed to the Strawson equivalence of (39a) and (40), and therefore, more generally, that the multiple choice analysis is committed to the truth of (17) as much as the sloppy choice analysis is.

As the reader will guess, this commitment is a problem for the multiple choice analysis. For we know from above that (17) and (23) are two sides of the same coin. One is not to be had without the other. For concreteness, consider example (41) below, where downward monotone *no candidate* substitutes for upward monotone *every candidate*.

(41) No candidate submitted a paper he had written.

(42) a. $\exists f[[\text{no candidate}]\ \lambda_1[t_1 \text{ submitted } f \text{ [paper he}_1 \text{ had written]]]}$

b. $\exists f[[\text{no candidate}]\ \lambda_1[t_1 \text{ submitted } f_1 \text{ [paper he}_1 \text{ had written]]]}$

(43) $[\text{no candidate}]\ \lambda_1[[\text{every paper he}_1 \text{ had written}]\ \lambda_2[t_1 \text{ submitted } t_2]]$

According to (23), the sloppy choice logical form in (42b) is Strawson equivalent to (43). Moreover, it can be shown in the same way as before that the multiple choice logical form (42a) is equivalent to (42b) under the assumption that no two individuals wrote the same papers. Needless to say that (41) does not allow for the reading expressed by (43). In the case at hand, then, the multiple choice analysis suffers from the same inadequacy as the sloppy choice analysis.16

The point remains much the same if in (41) we substitute non-monotone *exactly three candidates* for downward monotone *no candidate*. Under the multiple choice analysis, (45a) below is a possible logical form for sentence (44).

(44) Exactly three candidates submitted a paper they had written.

(45) a. $\exists f$[[exactly three candidates] λ_1[t_1 submitted f [paper they_1 had written]]]

b. $\exists f$[[exactly three candidates] λ_1[t_1 submitted f_1 [paper they_1 had written]]]

We know from the discussion of (30) above that (45b), a possible logical form of (44) in the sloppy choice analysis, is Strawson equivalent to the conjunction of the logical forms in (46) below. Assuming again that no two individuals wrote the same papers, (45a) can be shown to be equivalent to (45b). Again, the multiple choice analysis is no less inadequate than the sloppy choice analysis.

16Note that Strawson equivalence between (42a,b) and (43) would actually be harmless if (42a,b) were assumed to carry inconsistent presuppositions. However, there is no good independent motivation for this assumption. If we rely on Heim (1983), the strongest presupposition one might expect (42a,b) to carry is that every candidate has written at least one paper.

(46) a. [at least three candidates] λ_1[[some paper they$_1$ had written] λ_2[t$_1$ submitted t$_2$]]

b. [at most three candidates] λ_1[[every paper they$_1$ had written] λ_2[t$_1$ submitted t$_2$]]

The observations made above indicate that the multiple choice analysis is to be supplemented with a constraint on well-formedness that excludes logical forms of the shape (47) (where λ_i is intended to bind i) whenever [δ α] is not upward monotone.

(47) $\exists f[[\delta\ \alpha]\ \lambda_i[\ldots f\ [\ldots\ _i \ldots] \ldots]]$

Of course, one might again object that reference to the monotonicity properties of [δ α] is not motivated by independent consideration. This objection may be met by assuming that all logical forms of shape (47) are ill-formed, irrespective of the monotonicity of [δ α]. For all we have seen, there is no need for such logical forms.

However, whether one decides to exclude some or all instances of (47), under the multiple choice analysis a constraint to that effect remains a stipulation. The need for such a constraint may therefore be interpreted as an argument against the multiple choice analysis and for the scope shifting analysis of long-distance indefinites. The scope shifting analysis is evidently not afflicted by any of the problems for the choice analyses discussed above. Accordingly, it seems to require fewer stipulations than the multiple choice analysis does.[17]

But the current goal is not in fact to choose between the scope shifting analysis and the (suitably constrained) multiple choice analysis. The purpose of the remainder of this paper is rather to show that neither of these two analyses accounts for the whole range of long-distance indefinites. Some cases call for a different account. We will encounter such a case in section 5.

5. Functional indefinites

The main result of the previous two sections is that choice analyses must make sure that, at least for downward monotone and non-monotone [δ α], both kinds of logical forms in (48) are ill-formed (λ_i is intended to bind each occurrence of i; (48a) repeats (47) above).

(48) a. $\exists f\big[[\delta\ \alpha]\ \lambda_i[\ldots f\,[\ldots {}_i \ldots] \ldots]\big]$

b. $\exists f\big[[\delta\ \alpha]\ \lambda_i[\ldots f_i\,[\ldots {}_i \ldots] \ldots]\big]$

Assuming, as suggested above, that choice analyses should not in fact make reference to monotonicity properties, we seem to be forced to exclude such logical forms by stipulating that a choice function variable and its existential closure can never be

17Reinhart and Winter argue that data on plural indefinites reported in Ruys (1992) provide evidence against long-distance scope shifting. However, von Stechow (2000) argues that the evidence is not in fact conclusive.

separated by an operator that binds into the indefinite.

This stipulation, call it the *integrity condition*, conflicts in an interesting way with a proposal that has been made in the literature.[18] Translated into the present format, Winter (to appear) proposes that the argument of a function variable (the descriptive content of an indefinite) may host a free variable i which is bound from outside just in case the function variable also carries i as a Skolem index. This constraint, call it the *matching condition*, is more permissive than the integrity condition.[19] While it, too, renders (48a) ill-formed, it allows for (48b) to be well-formed. The matching condition introduces much of the power of sloppy choice, and in view of the results reached above, we already know that this cannot be quite correct. However, Winter argues in some detail that the matching condition is in fact supported by the data. Let us examine this argument in the following.

Consider example (49a) below, a variant of (38) above, and the logical form (49b), which is structurally analogous to (39a). It can be shown that (49b) does not express a possible reading of (49a).

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18 Chierchia proposes a constraint very similar to the integrity condition, and offers a way of implementing it which in fact derives the integrity condition. Interestingly, however, Chierchia's motivation for this constraint comes from a restriction on intermediate readings which he relates to weak crossover, thus seems rather different from the present motivation for the integrity condition.

19 The matching condition presupposes a version of multiple choice where Skolemized choice function variables and Skolem indices are not generally excluded. Specifically, Winter proposes that a function variable may carry index i just in case i also occurs free in the associated descriptive content. This principle, the reverse of the matching condition, will not be crucial in the following.

(49) a. Every student read a book I had recommended to him.

b. $\exists f[[\text{every student}]\ \lambda_1[t_1 \text{ read } f\ [\text{book I had recommended to him}_1]]]$

For suppose John and Bill are students to whom I recommended some books, and moreover that I recommended the same books to both of them. Under this assumption, (49b) entails that there is a book that both John and Bill read. This is a consequence of the fact that, by virtue of being functions, choice functions relate each set in their domain to a unique individual. It is obvious, however, that (49a) cannot in fact be interpreted in this way. The sentence does not have a reading in which it is incompatible with the assumption that two students were recommended the same books but did not read the same book.

This observation, which goes back to Kratzer (1998), is Winter's argument against logical forms of the shape (48a). The problem it presents, dubbed *same choice* problem in von Stechow (2000), is stipulated away both by the integrity condition and by the matching condition, and therefore will not further concern us in the following.20

Consider now sentence (50a) below. Suppose I am convinced that every child who hates his mother will develop a serious complex. It seems that sentence (50a) would be a possible (though perhaps somewhat secretive) way for me to express this

20Winter (1997) proposes to solve the same choice problem by assuming that choice functions variables have an intensional semantics. One feels inclined to agree with Geurts (2000), who rejects this solution as a stipulation without linguistic interest. In fact, Winter (to appear) replaces it with the more interesting solution described in the text.

belief.

(50) a. Every child who hates a certain woman he knows will develop a serious complex.

b. $\exists f \big[$every $\big[$child $\lambda_1[t_1$ hates f_1 [woman he_1 knows]]$\big]$ [will develop a serious complex]$\big]$

Note that the relevant reading of the sentence is quite consistent with the existence of a child who hates, say, one of his aunts and does not develop a complex. This indicates that the reading in question is not due to a narrow scope construal of the indefinite. On the other hand, it is also evident that the indefinite is not construed as taking wide scope in the usual sense. How, then, does this *functional* reading of (50a) arise?

Winter proposes that it should be credited to the logical form in (50b). Note that (50b) violates the integrity condition as much as logical forms of type (48b) do. Here, too, the indefinite is bound into from a position within the scope of existential closure. But, again just like (48b), (50b) is compatible with the matching condition. Winter points out that under the assumption that every child knows some woman or other, (50b) is equivalent to the first-order formula in (51).

(51) $\forall x\big[\text{child}(x) \rightarrow \exists y\big[\text{woman}(y)\ \&\ \text{knows}(x,y)\ \&\ [\text{hate}(x,y) \rightarrow \text{complex}(x)]\big]\big]$

Winter remarks that this formula may be paraphrased as follows. For every child, there is some woman he knows such that if he hates her, he will develop a complex. Which appears to capture the relevant reading of (50a).

Note that, if this analysis of (50a) were correct, it would call for a rather erratic well-formedness constraint on logical forms. On the one hand, to exclude logical forms like (42b) above, it would have to be more restrictive than the matching condition. On the other hand, to allow for logical forms like (50b), it would have to be more permissive than the integrity condition.

Fortunately, however, a constraint with these properties is not in fact needed. To begin, consider the first-order formula in (52), which in its canonical English paraphrase says that every child who hates every woman he knows will develop a complex.

(52) $\forall x\big[\big[\text{child}(x)\ \&\ \forall y[[\text{woman}(y)\ \&\ \text{knows}(x,y)] \rightarrow \text{hate}(x,y)]\big] \rightarrow \text{complex}(x)]\big]$

On the one hand, it is safe to say that (52) does not express a possible reading of sentence (50a). On the other hand, (52) is provably equivalent to the formula in (51). It follows that (51) does not express a possible reading of sentence (50a), either. Accordingly, the fact that Winter's paraphrase comes close to describing such a reading merely indicates that it does not adequately capture the truth conditions of (51).21

We may conclude, then, that the logical form in (50b) must be excluded after all, hence that the integrity condition is descriptively adequate, for all we have seen,

21The reason for this is, presumably, that the English paraphrase translates material implication as a conditional sentence.

whereas the matching condition is overly permissive.

Note that this conclusion presupposes that Winter is indeed correct in claiming that (50b) is equivalent to (51), hence equivalent to (52), under the assumption that every child knows a woman. Since (50b) can be assumed to have a truth value under this assumption, the claim is, in effect, that (50b) is Strawson equivalent to (51) and (52). As the reader may be aware, this Strawson equivalence is exactly what we expect.

To make this point obvious, consider the examples in (53) below and their sloppy choice logical forms in (54). We in effect already know how to prove that (54a) is Strawson equivalent to (55a) and that (54b) is Strawson equivalent to (55b).

(53) a. More than one student who read a book I had recommended dropped out.

b. At most one student who read a book I had recommended dropped out.

(54) a. $\exists f\big[$[more than one] $\big[$student λ_1[t_1 read f_1 [book I had recommended]]$\big]$ [dropped out]$\big]$

b. $\exists f\big[$[at most one] $\big[$student λ_1[t_1 read f_1 [book I had recommended]]$\big]$ [dropped out]$\big]$

(55) a. [more than one] $\big[$student λ_1[[some book I had recommended] λ_2[t_1 read t_2]]$\big]$ [dropped out]

b. [at most one] [student λ_1[[every book I had recommended] λ_2[t_1 read t_2]]] [dropped out]

To begin, we have already shown in section 3 that the predicate in (56) relates to the predicates in (57) as stated in (58).

(56) λ_1[t_1 read f_1 [book I had recommended]]

(57) a. λ_1[[some book I had recommended] λ_2[t_1 read t_2]]

b. λ_1[[every book I had recommended] λ_2[t_1 read t_2]]

(58) a. For every g, if I recommended at least one book, then
$''(56)\geq^{g} \subseteq ''(57a)\geq^{g}$ and
$''(57b)\geq^{g} \subseteq ''(56)\geq^{g}$

b. For every g, if I recommended at least one book, then
for some Skolemized choice function f, $''(57a)\geq^{g} = ''(56)\geq^{g[f/\mathrm{f}]}$ and
for some Skolemized choice function f, $''(57b)\geq^{g} = ''(56)\geq^{g[f/\mathrm{f}]}$.

Building on (58), we can prove Strawson equivalence of (54a) and (55a) by exploiting left upward monotonicity of *more than one* and the semantics of *some*. In the same fashion, we can prove Strawson equivalence of (54b) and (55b) by exploiting left downward monotonicity of *at most one* and the semantics of *every*.22 This part the proof can also be copied, with trivial modifications, from section 3 above.

What we learn from this case study, not surprisingly perhaps, is that the logic of sloppy choice does not differentiate between left and the right arguments of determiners. That is, direction of monotonicity always has the same effect on a choice function indefinite, whether it appears in the restrictor or the scope. Accordingly, assuming that (17) and (23) above are accepted, the schematic logical forms in (59) and (60) below cannot fail to relate as stated in (61).23

(59) $\exists f\big[\delta\ [\alpha\ \lambda_i[[f_i\ \beta]\ \gamma]]\ \sigma\big]$

(60) i. $\delta\ [\alpha\ \lambda_i[[\textit{some}\ \beta]\ \gamma]]\ \sigma$

ii. $\delta\ [\alpha\ \lambda_i[[\textit{every}\ \beta]\ \gamma]]\ \sigma$

(61) i. For all α, β, γ, σ, and left upward monotone δ,

(59) is Strawson equivalent to (60i)

ii. For all α, β, γ, σ, and left downward monotone δ,

(59) is Strawson equivalent to (60ii)

Since *every* is a left downward monotone determiner, we now know that the logical

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22A determiner δ is *left upward/downward monotone* if and only if for all f, f', and g such that f⊆f'/f'⊆f: if ″δ≥(f)(g) = 1 then ″δ≥(f')(g) = 1.

23It is assumed here that α, β, γ, and σ do not host free occurrences of *f*.

form in (50b) is Strawson equivalent to the logical form (62), which evidently is equivalent to (52), hence is equivalent to (51) as well. Thus (50b) and (51) are indeed Strawson equivalent.

(62) every $\big[$child λ_1[[every woman he$_1$ knows] λ_2[t$_1$ hates t$_2$]]$\big]$ [will develop a serious complex]

The main result of this section can be summarized as follows. The functional reading of sentence (50a) cannot be derived in a standard scope shifting account. A sloppy choice analysis, having more expressive power than a standard scope shifting account, might be hoped to derive this reading. We have seen, however, that the reading expressed by (50b) is not in fact a possible reading of sentence (50a), let alone the intended functional reading. We must therefore continue to insist that choice analyses must be constrained through the integrity condition.

This negative result leaves us with the question what the proper analysis of functional readings looks like, and how the analysis of functional readings bears on the theory of long-distance indefinites. We will address these questions in section 6.

6. Two kinds of long-distance indefinites

We are back, then, to the question of how to analyze functional indefinites, specifically, the functional reading of sentence (50a) above, repeated in (63) below. What we know is that standard scope shifting is not sufficient. We also know that sloppy choice does not yield the intended interpretation.

(63) Every child who hates a certain woman he knows will develop a serious complex.

(64) $\exists f\big[$every $\big[$child $\lambda_1[t_1$ hates f_1 [woman he_1 knows]]$\big]$ [will develop a serious complex]$\big]$

More specifically, we know that sloppy choice yields truth conditions which are too weak. Being Strawson equivalent to (62) above, the logical form in (50b), repeated here in (64), incorrectly predicts the functional reading of (63) to be true whenever every child likes some woman he knows.

What is the source of this undesirable weakness? One possible answer, the correct answer in fact, is that (64) owes its weakness to unrestricted quantification over Skolemized choice functions. For suppose existential closure in (64) quantifies not over the set of all Skolemized choice functions, but only over a small subset of such functions, perhaps functions the speaker has in mind. Take the mother function, which maps any child x and the women x knows to x's mother, and the maternal grandmother function, which maps every child x and the women x knows to x's maternal grandmother. If the domain of existential closure was implicitly restricted to just these two functions, then (64) would be true if and only if every child who hates his mother will develop a serious complex, or every child who hates his maternal grandmother will develop a serious complex. Hence (64) would no longer be Strawson equivalent to (62), and might well account for intuitions on the functional reading of (63).

A version of the analysis just sketched has in fact been proposed in the literature. Kratzer (1998) suggests that functional readings come about through logical forms featuring function variables, but no existential closure of the open sentences hosting these variables. Concretely, Kratzer would credit the functional reading of (63) to the logical form in (65) which differs form (64) merely in the absence of $\exists f$.

(65) every $[$child $\lambda_1[t_1$ hates f_1 [woman he_1 knows]$]]$ [will develop a serious complex]

This analysis can be thought of as a special case of the implicit domain restriction account described above, given that leaving the function variable free is tantamount to existential quantification over a singleton set of functions. Kratzer suggests that the value of a free function variable is contextually determined. It may be a function the speaker has in mind (the mother function, say) but does not reveal to the audience.24

For the purposes of this paper, there is no need to chose between the domain restriction account of functional readings and the specific version of it proposed by Kratzer. For concreteness and ease of exposition, let us adopt Kratzer's proposal, referred to as *specific sloppy choice* analysis in the following.

With a promising analysis of functional readings in hands, we are now ready to ask what functional indefinites tell us about the analysis of long-distance indefinites, after all the main topic of this paper. To the extent that the literature takes

24As Kratzer remarks, her analysis may be thought of as a slight modification of Fodor and Sag's referential analysis of long-distance indefinites. Kratzer also points out that the analysis gives rise to the same choice problem described in section 5. It thus appears that the analysis must be supplemented with something like Winter's matching condition.

a stand on the issue, the answer appears to be unanimous. There seems to be consensus that functional indefinites and long-distance indefinites are the same class of expressions and hence that the proper analysis of functional indefinites is also the proper analysis of long-distance indefinites. Kratzer (1998) and Chierchia (2001) are most explicit in expressing this hypothesis, but Winter (to appear), Matthewson (1999), Geurts (2000), and Schwarzschild (2000), among others, can also be read as accepting it.

Even though favored in previous literature, however, the hypothesis is not in fact supported by the evidence.[25] While it is true that indefinites which allow for functional readings always have the potential for long-distance intermediate scope, the reverse generalization does not hold. Moreover, long-distance intermediate readings with functional indefinites differ in certain ways from long-distance intermediate readings with non-functional indefinites. The remainder of this section is dedicated to providing support for these claims.

To begin, as already argued by Kratzer, evidence suggests that functional

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25Kratzer and Chierchia deserve credit not just for stating the hypothesis explicitly, but also for explicitly arguing that it is supported by the facts. Kratzer proposed that only indefinites of a certain shape (like *a certain woman he knows* or *some woman he knows*) have the potential of being functional and that in fact only these indefinites have a potential for non-local scope. Reinhart showed that long-distance indefinites can take other shapes as well (like *some teacher* or *a friend of mine*). Accepting Reinhart's assessment, Chierchia seems to claim that functional indefinites, too, can take other shapes (like *some teacher* or *a friend of mine*), hence may be considered the same class as long-distance indefinites after all. While Chierchia presents an example due to P. Schlenker in support of this claim, the text below presents robust evidence to the effect that two kinds of indefinites must be distinguished.

indefinites always have the potential for long-distance intermediate scope. Sentence (66) below, which is to be compared to (63) above, illustrates this for our familiar functional indefinite *a certain woman he knows*.

(66) Every boy finished the cookies a certain woman he knows had brought.

A speaker might use (66) as a (somewhat secretive) means to express her belief that every boy finished the cookies his mother had brought. The sentence then entails that for every boy there is a woman such that he finished the cookies she had brought, and thereby indeed expresses an intermediate reading of sorts.

More data of the same kind is provided in (67) through (70) below. The (a) cases illustrate the functional readings of different indefinites with *a certain* in different contexts. The (b) cases show that these indefinites also allow for intermediate readings. Sentence (67a), for example, may be uttered by a (somewhat secretive) speaker who aims to express that no student who was not supported by her advisor received a graduate school fellowship. Sentence (67b) has an intermediate reading in that it can be understood to entail that for every student there is a professor such that she read every article that professor has published. The examples in (68) through (70) are similar and left for the reader to assess.

(67) a. No student whom a certain professor didn't support received a graduate school fellowship.

b. Most students have studied every article that a certain professor has published.

(68) a. Almost no boy invited a certain girl from his class.

b. More than one boy devoured every cookie a certain girl from his class had brought.

(69) a. No student who works on a certain topic she doesn't care about will finish her degree.

b. Every student will read every paper that deals with a certain topic she doesn't care about.

(70) a. Every boy whom a certain girl from a neighboring town called criticized her.

b. Each boy finished the cookies a certain girl from a neighboring town had brought.

Having established that functional indefinites always have the potential for long-distance intermediate scope, we will now see that the reverse is not true. Consider the example pairs in (71) through (75) below. In each pair, the (a) case hosts an indefinite which may be read as taking long-distance intermediate scope. The (b) cases show that the same indefinites do not allow for functional readings. Take the example pair in (71). In its only consistent reading, sentence (71a) says that for every boy, there is some person such that the boy ate all the cookies that person had brought. Thus, sentence (71a) allows for intermediate scope of *someone*. In sentence

(71b), *someone* might, perhaps, take widest scope, in which case it says that there is someone such that every boy who hates her will develop a complex. The indefinite may also take narrow scope, in which case the sentence says that every boy who hates anyone will develop a complex. But (71b) does not seem to have a third reading, in particular it lacks a functional reading of the sort found in (63) above.

(71) a. Each boy ate all the cookies someone had brought.

b. Every boy who hates someone will develop a serious complex.

(72) a. Most students have studied every article that some professor has published.

b. No student who some professor had invited showed up.

(73) a. More than one boy devoured every cookie a girl from his class had brought.

b. Almost no boy invited a girl from his class.

(74) a. Every student will read every paper that deals with some topic she doesn't care about.

b. No student who works on some topic she doesn't care about will finish her degree.

(75) a. Each boy finished the cookies a girl from a neighboring town had brought.

b. Every boy whom a girl from a neighboring town called criticized her.

The remaining examples can be given analogous descriptions. In each case, the most plausible reading of the (a) sentence is the long-distance intermediate reading.26 And yet, it is extremely hard, if not impossible, to read the (b) sentence in a functional way.

The data presented above establishes that the set of functional indefinites is properly contained in the set of long-distance indefinites. The theory of long-distance indefinites thus must distinguish between two kinds of cases. By what we have seen in this paper, the theory may do so as follows. Functional indefinites receive long-distance intermediate scope through specific sloppy choice. Non-functional indefinites, by contrast, gain long-distance intermediate scope through multiple choice, or, more likely, long-distance scope shifting.

In the relevant cases above, both mechanisms, specific sloppy choice and scope shifting, yield intermediate readings of sorts. We know, however, that these readings are not exactly identical and would expect that in some cases they come apart clearly. We will close this section be showing that this expectation is correct. Consider the example pairs in (76) below. Sentence (76a) hosts an indefinite which we have seen to be non-functional. In (76b), this non-functional indefinite has been

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26The anaphoric interpretation of the pronoun in (73a) and (74a) in particular may prevent its host indefinite from taking widest scope. The same is true for (75a), if *neighboring* is read as having an implicit anaphoric connection to the subject quantifier, much like *adjacent to the town he lives in*.

replaced with a functional one.

(76) a. No boy finished the cookies someone had brought.

b. No boy finished the cookies a certain woman he knows had brought.

While both examples allow for a reading in which the indefinite takes neither wide nor narrow scope, this reading is not the same in the two cases. Suppose some boy finished the cookies a friend of mine had brought. This assumption makes (76a) false whereas (76b) may still be true. Conversely, the fact that no boy finished the cookies his mother had brought may be sufficient for the truth of (76b), but certainly not for the truth of (76a).

It is apparent that these judgments are precisely what is predicted under the analyses adopted here. The scope shifting account credits the relevant reading of (76a) to the logical form (77a). The specific sloppy choice analysis assigns (76b) the logical form in (77b).

(77) a. [no boy] λ_1[[someone] λ_2[t_1 finished the cookies t_2 had brought]]

b. [no boy] λ_1[[t_1 finished the cookies f_1 [woman he$_1$ knows] had brought]]

Given downward monotonicity of *no boy*, the truth conditions of (77a) are much weaker than those of (77b). Thus, the functional reading of (76b) does not entail the intermediate reading of (76a). This is why, in this case, the functional reading does not approximate a genuine intermediate scope reading in the way it does in (66) and the (b) cases of (67) through (70).

The example pairs in (78) through (81) below show contrasts analogous to the one in (76). Again, the nature of these contrasts are correctly accounted for by analyzing the functional and non-functional indefinites through specific sloppy choice and scope shifting, respectively.

(78) a. No student has studied every article that some professor has published.

b. No student has studied every article that a certain professor has published.

(79) a. At most one boy ate every cookie a girl from his class had brought.

b. At most one boy ate every cookie a certain girl from his class had brought.

(80) a. No student read every paper that deals with some topic she doesn't care about.

b. No student read every paper that deals with a certain topic she doesn't care about.

(81) a. Not every boy finished the cookies a girl from a neighboring town had brought.

b. Not every boy finished the cookies a certain girl from a neighboring town had brought.

We have now justified the claim made by the title of this paper. There are two kinds of long-distance indefinites. Functional long-distance indefinites lend themselves to a choice function analysis without unrestricted existential quantification over these functions. The analysis of non-functional long-distance indefinites, by contrast, need not make reference to choice functions.

7. Conclusion

Before summarizing the main results of this paper, let us reexamine an assumption which was made throughout the arguments made above, but which skeptics might question or reject. The assumption, adopted in section 1, is that a choice function indefinite triggers an existence presupposition which projects to its host sentence. For illustration, consider again the logical forms in (12) above, repeated here in (82).

(82) a. $\exists f$[[every student] λ_1[t_1 read f_1 [book I had recommended]]]

b. [every student] λ_1[[some book I had recommended] λ_2[t_1 read t_2]]

We have been assuming that the logical form (82a) presupposes that I recommended at least one book. Since its scope shifting counterpart (82b) is not assumed to carry this presupposition, the semantic relation between the two logical forms is not equivalence, but merely Strawson equivalence.

Reinhart (1997) agrees that choice function variables are presupposition triggers, but assumes that the presuppositions they trigger never survive as presuppositions of their host sentence. In effect, the existence presupposition is taken to always be accommodated. Reinhart explores two specific options, which, in the terminology of Heim (1983), amount to global and local accommodation. In the local variant, ingeniously implemented in Winter (1997, to appear), the logical forms in (82) come out fully equivalent. In the global variant, (82a) is equivalent to the conjunction of (82b) and the logical form in (83).

(83) [some book] λ_1[I recommended t_1]

It turns out that these alternatives to the analysis adopted in the text above do not solve the problems for the choice analyses described there. Specifically, consider again the logical forms in (84), which repeats (19). Under the global variant, (84a) is equivalent to the conjunction of (84b) and (83).

(84) a. $\exists f\big[$[no student] $\lambda_1\big[t_1$ read f_1 [book I had recommended]$\big]\big]$

b. [no student] $\lambda_1\big[$[every book I had recommended] $\lambda_2[t_1$ read $t_2]\big]$

The local account, by contrast, makes (84a) equivalent to the disjunction of (84b) and the negation of (83). Needless to say that these outcomes are as inadequate as the Strawson equivalence of (84a) and (84b). More generally, it is apparent that the accommodation analyses do not solve the problems described above.

To conclude, building on observations presented Chierchia (2001), this paper has shown that choice analyses of long-distance indefinites overgenerate. Specifically, if a downward monotone quantifier binds into an indefinite from a position within existential closure, the indefinite may in effect be assigned universal force. Choice analyses must therefore stipulate that such logical forms do not appear in the input to semantic interpretation. This may suggest that a standard scope shifting of long-distance account is after all preferable to a choice analysis. However, we have seen that a choice analysis that does away with existential closure, as proposed in Kratzer (1998), has its use. Specifically, as intended by Kratzer, it accounts for so-called functional indefinites. But we have also seen that functional indefinites do not in fact exhaust the class of long-distance indefinites, and that non-functional long-distance indefinites do not lend themselves to Kratzer's analysis.

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