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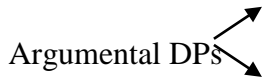### (In)Definites, Locality, and Intentional Identity.*

1. Introduction

Consider the following two theses:

(A) Definites are free variables (over individuals or choice functions)[1]
Examples:
i. he is boring ➔ boring (x)
ii. The teacher is boring ➔ boring$(f(teacher))$

(B) Indefinites are existentially closed variables (over individuals or choice functions).
Example:
i. A teacher is out to get me ➔ $\exists_D x$ [teacher $(x) \wedge$ out to get me (x)]
ii. If a (certain) teacher won't show up, I'll feel more relaxed ➔ $\exists_D f$ [show up $(f(teacher) \rightarrow relax(I)]$

In the present paper I explore an approach to (in)definites based on claims (A)-(B). My main contention is that without such claims one would miss important aspects of how (in)definites work, pertaining, in particular, to scope, anaphora, and intensionality. Thus, (A)-(B) are, I will argue, a necessary component of the grammar of (in)definites. It would be particularly interesting, moreover, if it turned out that (A)-(B), in fact, *exhaust* what Universal Grammar specifies on (in)definites. This would entail, among other things, that important and much debated notions like "familiarity" or "uniqueness" would have no autonomous standing in grammar, their effects being derivable solely from (A)-(B) and independently needed assumptions. If (A)-(B) turn out to be not just necessary but also sufficient as a characterization of (in)indefinites, it would be quite remarkable. For (A)-(B), jointly taken, are so simple as to arguably deserve the status of null hypothesis. At any rate, even if such a hypothesis turns out to be wrong in its strong form, we might learn something/a lot from pursuing it.

A key presupposition to the present proposal is the following. It is a widely accepted observation that D(eterminer) P(hrase)s may live in different semantic types, some predicative ($<e,t>$) other argumental. Argumental DPs can be classified further in referential (of type e) and quantificational (of type GQ = $<<e,t>,t>$):

(1)   Quantificational (denotation of type $<<e,t>,t>$; e.g. *every man*)
Argumental DPs
Referential   (denotation of type e; e.g. *the man*) [2]

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[1] There are several ways of unifying formally individual level variables with functional variables, which I won't pursue here (cf. also fn 8 below). On choice functions, see, in particular, Reinhart (1997), Winter (1997, 2001) and references therein.

Crucially, what turns DPs into arguments is not just and not necessarily the doing of specific lexical items. Argument creation, typically, takes place through a small set of operators (/type shifting devices) whose functioning is tightly governed by UG. This picture has been motivated and articulated in its modern form for the first time in Partee (1987); and has been pursued further in a number of ways since. The present attempt is to be understood in light (and as a development) of such a paradigm. In particular, Partee argued that two main shifting devices responsible for the creation of (in)definite arguments are $\exists$ (the existential closure operator) and ι (the maximality/uniqueness operator). It will be argued here that ι, which is a very specific choice function, is to be generalized to *arbitrary* choice functions f with covert parameters (i.e. Skolemized Choice Functions -- SCF). Furthermore, indefinites can shift in the same way as definites, but are subject to closure via $\exists$ (a morphological requirement of indefinite morphology). We will see, finally, that the binding of a choice function variable and that of its (covert) arguments is subject to a rather tight locality condition (an "Immediate Scope Constraint"-- ISC). Such a constraint not only is needed to get scope assignment right (as proposed in Chierchia 2001); it also provides an account of several outstanding puzzles related to what has come to be known as "intentional identity" (Geach 1967). I will proceed as follows. First, in the remainder of this section, I will review the debate on the scope of indefinites and the problems it leaves open (as I understand them). In section 2 I will address such problems by modifying Partee's proposals on the semantics of DPs in a way that incorporates theses (A)-(B). In section 3, I will discuss consequences of my proposal with respect to scope, which will lead us to the formulation of ISC. Finally some tentative conclusions will be put forth.

With respect to the picture in (1), indefinites (like *a man*, *some man* etc.) have generally been analyzed as quantificational. However, they are also felt to have what have been variously called as "specific" or "referential" uses (often, though not always, associated with the modifier *certain* as in *everyone likes a (certain) friend of mine*). On such uses, they are felt to be rather similar to definites. In addressing the issue of how these varying uses of indefinites are to be understood, it might be useful to review the range of facts to be taken into account. They are complex, and we will be able to consider them only in broad outline. In what follows, I indicate a list of key properties of indefinites (along with examples exemplifying them), taking the indefinite article as representative of a possibly broader class (including, for example, the numerals).

(2)   *A*-indefinites
        a. They have an existential import in episodic contexts
                A student walked by
        b. They support discourse anaphora
                A student walked by. *He* used to be in my class.
        c. They support "donkey" anaphora
                If Sue sees *a student* in trouble, she talks to *him*
        d. They admit of predicative uses.
                John is a student
        e. They support existential constructions.
                There is a student in that building
        f. They display "Quantificational variability" effects
                i. If a cat has blue eyes, it rarely is intelligent   (Carlson 1977)
                ii. A Texan is often tall
        g. They have (quasi) universal interpretation in generic contexts
                A dog barks

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[2] According to this view, referential NPs are not to be simply understood as linguistic constituents that "refer" in some pretheoretical sense, but as constituents whose semantic denotation (in appropriate, felicitous contexts) are of the same type as that of individuals.

In contrast with this, there is another important class of indefinites, exemplified by *some,* that share with *a* the properties in (2a-c), but not those in (2d-g).

(3)   *Some*-indefinites.
      a. They have an existential import
              Some student came to see me
      b. They support discourse anaphora
              Some student came to see me. *He* looked angry
      c. The support "donkey" anaphora
              If I have *some money*, I spend *it* right away
      d. No (or marginal) predicative uses.
              ?? John is some student
      e. No (or marginal) in existential constructions.
              *There is some boy in the garden
      f. No (or marginal) QV effects.
              i. ?? if some cat has blue eyes, it normally is intelligent
              ii. ?? some Texan is rarely short
      g. No (or marginal) quasi universal interpretation in generic contexts.
              some dog barks   (≠ all ("normal") dogs bark)

Each one of these structures has its own complexity, to which we won't be able to do justice here. However, I'll briefly comment on the facts in (2c,f,g) and (3c,f,g), to spell out what I will be assuming about them. "Quantificational variability" of indefinites has been object of intense inquiry. An important turning point has been the work of Kamp (1981) and Heim (1982), which, among other developments, led to dynamic semantics. Also situation based approaches together with the idea that pronouns can sometimes be elliptic descriptions, are important and influential in this connection. In general, it is held that quantificational adverbs (Q-adverbs) introduce a tripartite structure, with a restriction and a scope. This structure affects the quantificational force and anaphoric potential of indefinites in ways that depend on the specifics of the semantics of Q-adverbs. I will adopt such a picture together with the idea that the quantification in general (and ∃ in particular) is dynamic. Though the latter assumption is perhaps independent of the main claims to be defended in the present paper (viz. (A)-(B)), it facilitates considerably their presentation. I will provide further background as needed.

      While indefinites, as we just saw, vary significantly in many respects, a property they do seem to share, not listed in (2)-(3), concerns their scope possibilities. Both *some*- indefinites and *a*-indefinites (with differences that, for our purposes, can be neglected) do not appear to be subject to the restrictions on scope that quantifiers like *every* are subject to. I'll use pairs such as those in (4) as an illustration. (Many convincing examples can be found in the literature, which I will not review here.)

(4)   a. Every student read some/a paper that had been written by every professor
      a'. * every student$_i$ [every professor$_j$ [t$_i$ read a/some paper [that had been written by t$_j$]]
      b. Every student read every paper that had been written by a/some professor
      b'. every student$_i$ [some professor$_j$ [t$_i$ read every paper [that had been written by t$_j$]]

In (4a) *every*, which occurs in a relative clause, cannot be understood as having scope over *a/some*, which is outside the relative clause; that is sentence (4a) cannot mean: for every student x and every professor y there is a (possibly different) paper z such that y wrote z and x read z. This reading corresponds to the LF in (4a'), which is disallowed, presumably because relative clauses are islands. The only available reading of sentence (4a) is one according to which every student read a paper written jointly by every professor (a pragmatically odd state of affairs). In contrast with this,

sentence (4b) can have a reading where for each student x there is some professor y such that x read every paper y wrote. Such a reading is represented by the LF in (4b'). It is usually referred to as an "intermediate scope" reading. In it, the indefinite gets assigned scope in violation of island constraints.

Purely "referential" interpretations of indefinites are also possible for sentences like (4b). For example, one can understand it as saying that every student read every paper that a particular professor, say professor Brown, wrote. Such reading could be accounted for by assigning to *some professor* topmost scope (plus straightforward pragmatic considerations). So, referential interpretations and intermediate readings can both be regarded as cases of "long distance" scope assignment to indefinites.[3]

Minimally a theory of indefinites should account for their common properties and be at least compatible with (and, ideally, derive) the differences among different types. This is what several current proposals try to do, with varying degree of success. In fact, the debate on the peculiar scopal properties of indefinites has been rather intense, with several possibilities being explored. I will now briefly review the main positions that have been taken, so as to get a feeling for where we stand, in so far as I can make out. One possibility (advocated, e.g. by Geurts 2000) is assume that indefinites have a standard syntax and semantics, but are assigned scope in violation of scope constraints. So if scope is assigned via movement (i.e. Quantifier Raising –QR), then constraints on movement have to be relaxed for indefinites. This line faces the obvious difficulty of having a low explanatory force. Why would fairly general principles of locality have to be abandoned for indefinites? If it is an idiosyncratic lexical property of certain NPs that they do not respect scope islands, it is surprising such a class is so uniform (and, in fact, crosslinguistically stable). This state of affairs cries out for the identification of some independent syntactic or semantic property of indefinites responsible for such behavior.[4]

Another strategy might be to look at pragmatics. A clever attempt in this direction, based on domain selection, has been proposed in Schwarzschild (2002). As is well known, use of quantifiers involves implicit reference to a domain of quantification, which may vary across occasions of use of DPs. The following example (due to Andrea Bonomi) illustrates.

(5)   a. Every linguist voted for a linguist
        b. Every linguist$_D$ voted for a linguist$_{D'}$

It is easy to imagine situations in which the linguists who voted and those voted for must belong to different domains for sentence (5a) to make sense. So that the interpretation of (5a) can be made explicit as in (5b), where D and D' are the different domains. If each DP can select for a domain freely, on pragmatics grounds, nothing prevents such a domain from being small; in particular, nothing would prevent it from being a singleton. The effect of long distance scope might be a simple consequence of this particular choice. Look at example (4b) again. To get the "referential" reading, one might assume that the domain associated with the indefinite *some professor* on the intended reading is the one that includes only the relevant professor (say, professor Brown). To get

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[3] Modifiers like *certain* seem to disambiguate indefinites in favor of long distance construals. Thus, in particular, a sentence like (4b), repeated here, must be understood as indicated by the continuations in (i) and (ii) below, which correspond to the intermediate scope and the "referential" (or topmost scope) construals:
(a) Every student read every paper that a certain professor wrote
            i.   namely, his or her advisor
            ii.   namely, Professor Brown

[4] The argumentative line developed by Guerts is that the cure is worse than the disease. Namely the proposals developed to explain the behaviour of indefinites all lead to more difficulties than simply biting the bullet of relaxing scope constraints. I believe that his arguments only have some force against specific and incomplete versions of the choice function approach. And, in so far as I can see, none of them applies to the approach developed here.

intermediate readings, we have to assume that domain selection may vary in the scope of quantifiers. For example we might imagine a structure of the following sort:

(6)   Every student$_i$ read every paper that some$_{D(i)}$ professor wrote

where D is a function from individuals to domains that maps, say, each student x into a domain that contains just x's advisor. So, sentence (6) says that every student x read every paper that some professor (in a singleton domain dependent on x) wrote.

      This strategy, if it worked, would have clear advantages. It would explain the behavior of indefinites in terms of an independent and well documented phenomenon, namely domain selection. But, as articulated by Schwarzschild, such a strategy runs into the difficulty of systematically assigning wrong truth conditions to sentences containing downward entailing operators. Let me illustrate why. Imagine I tell you:

(7)   No linguistics graduate student ever read *every* paper written by some linguist[5]

By (7) I don't mean to say that there is some linguist such that no grad student ever read all of his/her papers, nor do I mean that no grad student ever read every paper authored by linguists. Both of these facts are so likely to be true as to wedge on triviality. What I mean to convey is something more informative: there aren't graduate students for which you can find linguists so special to them such that students read all of the paper by those linguists. Such a reading (which, for (7), is favoured by focus on *every*) is adequately represented by:

(8) No student ($\lambda x \exists y$ linguist(y) $\wedge \forall z$ [paper by (z, y) $\rightarrow$ read(x,z)])[6]

This is a typical intermediate reading. Question: can this reading be captured by an approach like Schwarzschild's, which eschews any form of (intermediate) quantificational closure? No, it seems to me. The only reasonable candidate LF, on Schwarzchild's approach, would be something like:

(9)   No grad student$_i$ [every paper$_j$ written by some linguist $_{D(i)}$ [t_i read t_j]]

Here D is a *particular* function from students into singleton sets containing a linguist. The problem is that I simply find no way to specify (or otherwise accommodate) such a function in a general enough fashion. Suppose I try with the following: D is a function that maps a graduate student x into a linguist special to x; say the one x loves the most; or the one x hates the most or the one x has the strongest feelings about. That wouldn't work. For here comes Lee, a graduate student at Corynth College; to whom no linguist is particularly special; still, Lee happened to have read all the paper by say, Fred Landman, without having any clue as to who Fred was and without even knowing that all those beautiful papers were written by the same scholar. Lee would make (7) clearly false on the intended reading (viz. one equivalent to (8)); but (9) on the specification of D I just gave would *not* come out false. On that specification D(Lee), would probably be undefined, and (9) would come out true or undefined, depending on the details of the partial semantics one adopts.

      Try any way to specify D; and counterexamples will immediately be found. The reason I have such difficulty in specifying a reasonable value for D in (9) is, I submit, that (9) is simply not what I mean. What I mean could be represented by (10a), or , equivalently, 10b):

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[5] Actually, *some professor* in (7) is not in an island. This is done just to simplify the example. All I say in the text would extend to counterparts of (7) where the indefinite is embedded in a relative clause (such as (4b)).

[6] Warning: we can trivially verify (8) by picking a linguist that wrote no paper. But this can reasonably be avoided by appealing to some kind of contextual restriction (naturally arising from some reasonable story on presupposition projection). Contextual restrictions on quantifiers *are* always necessary and ubiquitous.

(10)   a. ∀ D [no student$_i$ read every every paper that some$_{D(i)}$ professor wrote]
        b. no student$_i$ ∃ D [t$_i$ read every every paper that some$_{D(i)}$ professor wrote]

The LFs in (10) are equivalent to (8) and *asymmetrically* entail (9). I see no way to squeeze out of (9) something equivalent to (10) (or to (8)). The conclusion I see myself forced to is that domain restrictions through context are certainly necessary to any approach to long distance indefinites. But they are, however, not sufficient. One needs some form of quantificational closure at intermediate levels.[7]

 So, in spite of valiant attempts, the scopal behavior of indefinites remains a mystery, unless their semantics is somewhat different from what we thought. Reinhart (1997) and Winter (1997, 2001) have proposed that they should be interpreted as choice functions, subject to free existential closure. Winter (1997, 2001) has argued further that such functions may have, in fact, hidden arguments, and thus resemble Skolem functions. This is an arguably principled hypothesis on the semantics of indefinites that would explain their peculiar scopal behavior. One question that arises, however, is how come the interpretation of indefinites is so different from that of other DPs. How does such a semantics fit with a general theory of DP denotation? In what follows I address this question and point out that the semantics of indefinites in fact turns out to be identical to that of definites, the only difference being that the former undergo quantificational closure and the latter do not. Then, I'll discuss in what ways the scope of indefinites is not quite as free as Reinhart and Winter would have it.

2. Towards a unified theory of definite and indefinite descriptions

In the present section I will sketch a theory that provides a unitary view of definite and indefinites. I will first discuss definites and then move on to indefinites. Building on Partee's (1987) fundamental insight, I will be arguing, in particular, that (in)definite articles have to be regarded as type shifting devices (or operators) that create argumental types, rather than as lexical entries with a fixed meaning.

2.1. Definites as choice functions.

The "classical" (presuppositional) theory of definite descriptions (e.g. the one assumed in Partee 1987) rests on the assumption that something like *the boy* requires that the extension of the noun *boy* contains just one element; if that is so, then *the boy* denotes that element. Roughly:
(9)   the boy = ι(boy) = the unique member of the set of boys   (if there is one; else undefined)
The denotation of *the boy* can then be lifted, when needed, to the type of quantifiers, along the lines discussed in Partee' work. This approach has been generalized (originally, in Sharvy 1980) to plurals and mass nouns along the following lines. Plural denotations of nouns (like *boys*) apply to pluralities and are closed under sum (or group) formation. Mass nouns (like *water*) are true of

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[7] This argument, which generalizes to all scopeless theories of indefinites is made more extensively in Chierchia (2002). Kratzer (p.c.) appropriately underscores that intermediate closure, in turn, cannot function without domain restrictions. We noticed this in connection with the example (8) (Cf. fn 6). Another kind of example where this is immediately obvious is the following:
(a) Why where those students dismissed?
        i. each of them didn't read any paper that some professor had recommended

        ii. each of them$_i$ ∃ D [every paper that some$_{D(i)}$ professor recommended   [t$_i$ didn't read t]]
For each student x it is usually easy to find some professor y such that x won't have read what y had recommended. This enables us to construct a function D that makes (ii) trivially true. For the intended reading, we need, instead, a contextual restriction whereby ∃ D in (ii) ranges over functions that map each student x into a professor y that recommended books that x had to read (for whatever reason). Once more, contextual restrictions are necessary. But the point of the example in the text is to show that they are not sufficient.

amounts of water and the resulting denotation is also closed under sum (or mereological fusion). DPs like *the boys* or *the water* refer to the maximal group or amount that the N is true of. The definite article *the* is, accordingly, a choice function that selects the maximal entity the noun applies to. In the case of singular nouns, which hold of singular individuals, there won't be in general a maximal element, unless it so happens that we are in a situation in which the noun is true of just one thing. In such a case the unique thing the noun applies to will also be, trivially, the maximal one. So given the maximality presupposition, we derive the uniqueness presupposition on singular count nouns as a special case.

Consider now the following variant of the classical theory (proposed, in a slightly different terminology, in Chierchia 1995):

(10)   a. *the* denotes a variable over choice functions
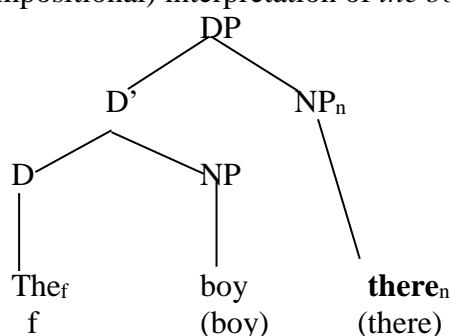   b. the$_f$ boy arrived ==> arrive (f(boy))

This analysis of definite descriptions, supplemented by elementary pragmatic considerations, is, I claim, equivalent to the classical one. If a sentence like (10b) is analyzed in terms of variables over choice functions, for communication to be successful, the context will have to supply a unique (or a maximally salient) value for the function variable (much like it has to supply a unique value for *he* in *he smokes*). In the case of singulars, if there are two or more (equally salient) boys, then there will be two or more (equally salient) choice functions; and communication failure will ensue. It follows that we can felicitously use *the boy* only in contexts in which there is one (or one maximally salient) boy. The same holds, mutatis mutandis, for plural and mass nouns. In the latter case, it seems natural to maintain that if no specific group or amount is maximally salient, then the totality will candidate itself to maximal salience; whence the maximality presupposition. This provides us with a natural way of understanding where the uniqueness *and* maximality presupposition on definites may come from. With respect to the classical theory, we loose nothing; and we arguably no longer have to stipulate maximality, as that now follows from pragmatic considerations.

As is well known, definite descriptions may depend on the utterance situation in many ways. For example it is natural to understand (11a) as in (11b):

(11)   a. Hey, the boy looks angry
        b. The boy over there looks angry

A way of understanding this is in terms of domain selection (i.e. we select a salient domain which contains only the relevant boy). An alternative way of understanding what is going on is in terms of a hidden parameter on choice functions, so that definites can be analyzed as functions from individuals into choice functions. Such hidden parameters can be thought of as covert pronouns syntactically projected at Logical Form. This is exemplified in what follows:

(12)   a. The boy is angry ➜ angry (f(boy)(there))
            f : a (variable over a) function from locations into choice functions
        b. LF and (compositional) interpretation of *the boy* in (a):

```
                        DP
                       /  \
                      /    \
                    D'     NP_n
                   /  \      \
                  /    \      \
                 D'    NP      \
                 |      |       \
                 |      |        \
               The_f   boy     there_n
                 f     (boy)   (there)
```

One benefit of this way of thinking of definites is that some of their more recalcitrant properties (recalcitrant from the point of view of the classical theory) fall immediately into place. For example, so called anaphoric associative uses such as those reported in (13) (discussed in, e.g., Heim 1982), follow straightforwardly:

(13)   a. Every student read a book and reported on the author
        b. Every student read a $book_i$ and reported on the_f $author^i$
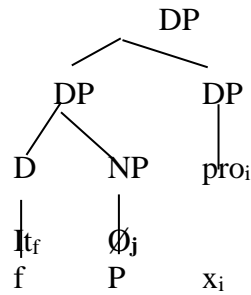   f: a function such that for every book x, f(author)(x) is x's author

I adopt here the graphic convention that the implicit pronoun adjoined to a definite as in (12) is notated as a superscript on the definite in schematic LF representations such as those in (13b). The possibility of anaphoric associative uses like the one in (13a) derives from the well known fact that pronouns, beside having indexical uses can also be anaphorically bound. So in (13a) the choice of author will vary with the book (i.e. we literally interpret *the author* as *its author*). In fact, we expect such (covert) pronouns to be subject to canonical constraints on binding, which will rule out certain, a priori conceivable, interpretive options. A well known constraint on binding is weak crossover, illustrated in (14a-b). Indeed, anaphoric associative uses of indefinites appear to be subject to interpretive constraints that seem to parallel those in (14a-b). This is illustrated in (14c-d).

(14)   a. * His_i mother loves $everyone_i$ ➔ $everyone_i$ [his_i mother loves t_i]
        b. $Everyone's_i$ mother loves him_i
        c. Everyone that read a $book_i$ selected by our panel was very impressed by the_f $author^i$
        d. * The_f $author^i$ impressed [everyone that read a $book_i$ selected by our panel]

The facts about week crossover are well known: sentence (14a) cannot be interpreted as sentence (14b); so the representation in (14a) is ruled out by a condition on binding. The relevant observation here is that something similar seems to happen for sentences (14c-d): while in (14c) the author may vary with the choice of book, such an interpretation is impossible or extremely hard in (14d). And whatever rules out the structure in (14a), under the present view, will automatically extend to the one in (14d).

It is useful to point out how this strategy potentially sheds light on other kinds of definite DPs. As is well known, pronouns sometimes appear to be interpretable as elliptic descriptions (so called "laziness" or "E-type" pronouns). All is needed to generalize to such uses of pronouns the present approach is the hypothesis that pronouns may have the very same structure and interpretation as full referential DPs. Here is an illustration:

(15)   a.
```
                        DP
                     ／    ＼
                 DP            DP
               ／   ＼          |
             D       NP        pro_i
             |        |
            It_f     Ø_j
             f        P        x_i
```

b. Every student$_i$ who wrote only [one paper]$_j$ presented it$_j^i$ twice (cf. Heim & Kratzer 1998)

c. every student$_i$ [who$_i$ wrote only [one paper]$_j$]   t$_i$ presented f(paper)(x$_i$) twice]

d. $[[it_j^i]]^g = g(j)(\alpha)(g(i))$, where:
   i.   g(j) is of type $<<e,t>,e>$
   ii. $\alpha = [[NP_j]]^g$,   for some NP present in the discourse structure and coindexed with it$_j$

The idea here, following an insight originally due to Postal, is that pronouns are definite determiners with a missing NP argument. Such an argument needs to be retrieved via an interpretive procedure that links it to a suitable antecedent. Or, perhaps, has simply been elided under identity (for a recent approach along this line cf. Elbourne 2001). Functional pronouns have a range (determined by the antecedent NP) and a domain (determined by the null pronoun present in their structure). In schematic LF representations, I notate the link of a pronoun to its antecedent by a subscript in boldface, while the null pronoun is represented by superscript as before (cf.15b-c). A simplified version of the interpretive procedure that fixes the range of functional pronouns is given in (15d).[8]

It should be noted that, as one would expect, implicit parameters associated with laziness pronouns are also subject to weak crossover. Here is a simple illustration:

(16)   a. * It$_i^j$'s abstract was presented by every student$_j$ who wrote only one paper$_i$
       b. every student$_j$ who wrote only one paper$_i$ [it$_i^j$'s abstract was presented by t$_j$]

In sentence (16a), we cannot interpret the pronoun *it* as linked to *one paper* (and varying with the choice of student). The indexing in (16a) would result in the LF in (16b), after scoping, which parallels (15d); but such LF is ruled out as a crossover violation.

This analysis also derives, as a special case, so called "paycheck" phenomena, as well as the interpretive constraints on such phenomena:

(17)   a. John gave his paycheck$_i$ to Sue.[Bill/everyone else]$_j$ gave it$_i^j$ to Mary.
       b. Everyone got something for the holiday season. Only Bill was pleased by his present.
          i. Everybody else hated it
          ii. ?? It irritated everyone else

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[8] There are various ways to attain an integrated analysis of laziness and "ordinary" (c-command bound) pronouns. For example, one might assume that in the latter case the antecedent simultaneously fixes the range of the function and binds also the implicit argument and pronouns are interpreted as identity maps (e.g. everybody likes his mother = every person x is such that x likes the mother of the person identical to x). Or perhaps next to argument taking ("transitive") pronouns there are non argument taking ("intransitive"/0-place functions) ones interpreted as ordinary individual level variables. Mostly for simplicity, I will be assuming some version of the latter strategy.

Sentence (17a) is a version of Karttunen's famous example. The contrast between (17b.i) and (17b.ii) illustrates that also paycheck pronouns display crossover effects.

These schematic considerations cannot constitute a full fledged analysis of definites. They arguably suffice, however, to make a case that definite descriptions (both overt and in the form of laziness pronouns) can fruitfully be viewed as parametrized choice functions (SCFs). Partee's ι is to be generalized to an arbitrary choice function f (with maximality emerging as a kind of pragmatic default). The proposal is formally simple, perhaps as simple as the classical theory. There is no loss of empirical coverage. And, in fact, several aspects of the interpretation of definites become reduceable to independent constraints on binding. [9]

Now the step towards understanding the behavior of *in*definite description becomes straightforward.

2.2. Indefinites as choice functions

The basic idea is that definite and indefinites have essentially the same range of interpretations, which includes Skolemized choice functions. Indefinites are subject to a further requirement (associated with indefinite morphology), namely that they undergo existential closure. I will now sketch an implementation of this idea (within type-driven semantics).

Suppose the article is simply a feature ± DEF associated with the category D, without a meaning of its own. + DEF is spelled out as the indefinite article; - DEF as the indefinite one. The semantic role of determiners (including the articles for languages that have them) is to shift something of type <e,t> into an argumental type (e or <<e,t>,t>). It is natural enough to imagine that [$_D$± DEF] does so through a mapping of the following sort:

(18)   a. - DEF = shift via ∃-closure
        b. + DEF = don't shift via ∃- closure

In fact, one might take (18a) as basic and derive (18b) via some version of the "elsewhere" condition (in Chierchia 1998 I formulate a general condition of this sort and dub it "blocking principle").

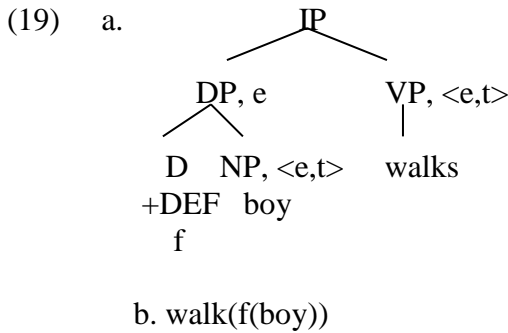To see how this simple mapping works, let us consider a concrete example:

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[9] Since Heim (1982), interesting formal theories of definites have been developed, based on the concept of "familiarity". If one wants to talk in terms of familiarity, within the present approach, then it is clear that we would have to countenance familiarity with respect to the function (i.e., the concept, if you wish), rather than familiarity with respect to the individual as such (whatever the latter may mean). The kind of familiarity we would have to rely on, that is to say, is of the same type as that exhibited by definites of the following sort:
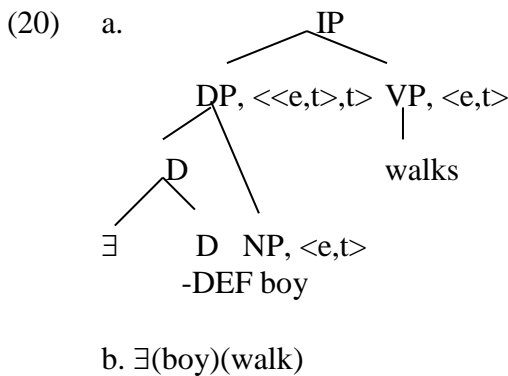(a) The first baby to be born in the year 2050 will be a boy
Perhaps the notion of "weak familiarity", as developed in Roberts (2003) (which I hadn't had a chance to see until after the present paper was completed) might be suitably adapted.
.   However, as pointed out in the introduction, there is also room for a more radical stand one can take. Our proposal enables us to explore the possibility that the notion of familiarity (while constituting a useful heuristics) ultimately has no formal status within Universal Grammar. Exploring these alternatives more fully (working into our proposal a notion of familiarity or eliminating such a notion all together) exceeds the limits of what we can do here.
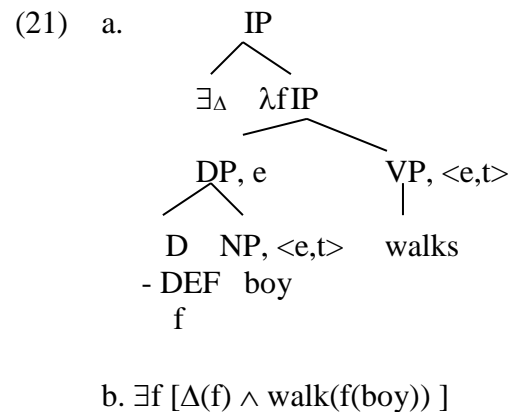   Similar considerations apply to notions related to familiarity, such as the notion of "salience" developed in, e.g. von Heusinger (1996).

(19)   a.

```
                    IP
            ┌───────┴───────┐
        DP, e              VP, <e,t>
      ┌──┴──┐                │
      D   NP, <e,t>        walks
    +DEF   boy
      f
```

   b. walk(f(boy))

In (19), we have [D+DEF], which is spelled out as *the* in English. How is it to be interpreted? Given that –DEF must shift via ∃, that way to go is blocked. Thus we can only shift via f.[10] So we get the interpretation (19b) and that is the end of the story. Consider now the same structure with an indefinite, which forces shifting with ∃. In this case, there are two options. Here is the first:

(20)   a.

```
                        IP
              ┌─────────┴─────────┐
        DP, <<e,t>,t>           VP, <e,t>
        ┌───┴────┐                │
        D         │             walks
      ┌─┴─┐       │
      ∃   D   NP, <e,t>
        -DEF  boy
```

   b. ∃(boy)(walk)

In (20), the switch to an argumental type is directly obtained by applying ∃ to the noun. In fact, given the type of ∃, there is no other possible site for ∃–closure. The DP becomes a generalized quantifier which will function as is familiar (be assigned scope in canonical ways, etc.). On top of this, there is another option, however, given that type shifting is freely available (modulo blocking). We can first shift by f; then, in order to meet the mapping condition on [–DEF], we must apply ∃– closure to f. [11]

(21)   a.

```
                    IP
            ┌───────┴───────┐
          ∃Δ              λf IP
                    ┌───────┴───────┐
                DP, e              VP, <e,t>
              ┌──┴──┐                │
              D   NP, <e,t>        walks
           - DEF   boy
              f
```

   b. ∃f [Δ(f) ∧ walk(f(boy))]

---

[10] Actually there is also shifting to kinds. As a matter of fact, the definite article is indeed the canonical way of shifting to kind-level interpretation. But discussing kind reference would take us too far afield. So I will ignore it here throughout. Se Chierchia (1998) for discussion. For recent interesting alternatives and developments in a wide range of languages, cf. Dayal 2003 and Doron (2003).

[11] The existence of an overt definite article in English, does not block use of f with indefinites (i.e. does not prevent indefinites from shifting via f). This should be so because only mappings that have to be lexically stipulated induce blocking. And the mapping [+ DEF] ➔ no ∃ is not a primitive one, set in the lexicon. Such a mapping is itself derived from the blocking principle.

Given the type of the protagonists, closure of f cannot take place too locally; f combines with the noun yielding and individual; this then combines with the verb resulting in something of type t. It is at this level that closure of the choice function variable can take place. And, in fact, nothing forces it to happen at the closest available level of type t. So closure of f can also take place at higher scope sites.[12]

Let me be slightly more explicit. I assume that there is only one $\exists$, which is a relation among sets (be they sets of individuals or higher order entities, as in the case at hand, ways of choosing individuals). Since there are no lexical quantifier restrictions (i.e. no noun) for choice functions, if one wants to quantify over them, the restriction (i.e. the first argument) has to be supplied by the context (the contextualized restriction is represented by Δ in (21)). And since there are no verbs that apply to choice functions, the second argument must be obtained via abstraction at scope sites, the usual way in which the second argument (or scope) of quantifiers is obtained.

So definites and indefinites have a uniform meaning; such a meaning is obtained by using a (putatively) universal and highly constrained system of type shifting principles for DPs (a generalized version of what Partee (1987) proposes). The $\exists$-closure requirement is specific to indefinite morphology. On such an approach, which can be generalized to languages with no articles, e.g. along the lines explored in Chierchia (1998), the peculiar scopal properties of indefinites fall right out. Indefinites are not lexically ambiguous. The requirement of $\exists$-closure associated with indefinite morphology can be satisfied either directly and very locally (forming a GQ) or indirectly (by exploiting f, which is independently available). The indirect way leads to a form of $\exists$–closure that must happen at scope sites and is thus expected to have a different behavior (and different locality conditions) than the direct way to shift.

One legitimate worry concerns the different presuppositional status of definites vs. indefinites. Contrast the pair:

(22)   a. I doubt John saw the student with fleas
        b. I doubt John saw a student with fleas

Sentence (22a) presupposes that there is a student with fleas. Sentence (22b) does not. This follows from the fact that in (22a) the choice function variable is free; hence interpretability requires finding a value for such variable; and this will in turn be possible only if there is a unique (salient) student (whence the presuppositional requirement on definites). In (22b), the choice function variable is bound. Notice, furthermore, that we want (22b) to be defined and true if there are no students with flees. How can we ensure that ? This issue (addressed in Winter (1997, 2001) in a slightly different way) is best handled, I believe, by simply excluding from the domain of choice functions the empty set. Quantification is limited to (partial) choice functions undefined for the empty set.

(23)   Let $D_{<<e,t>,<e,e>>}$ the set of all partial functions of type $<<e,t>,<e,e>>$, then
        $\Delta \subseteq \{ f \in D_{<<e,t>,<e,e>>} : \varnothing \notin DOM(f)$ and for any $a \in D\, D_{<e,t>}$ and $u \in D_e$, $f(a)(u) \in a \}$

The idea is that the restriction for $\exists$, when it comes to choice functions, indicated in the examples above as Δ, is some contextually salient subset of the set of Skolemized choice functions that don't have the empty set into their domain. Under this straightforward assumption, it is easy to see that things come out right. Here are some simplified examples.

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[12] A conceivable extension of this approach might be that economy considerations force use of (20) for short distance $\exists$–closure and limit use of (21) to long distance $\exists$–closure. I must leave the exploration of this a priori reasonable possibility to some other occasion.

(24)   a. *a man walks*

      i. $\exists_\Delta \, \lambda f \, [a_f \, man^l \, walks]$ (l = the context location)

      ii. $\exists f \, [\Delta \, (f) \wedge walk \, (f(man)(l))]$

Sentence (a), if there are no men at the context location, is false, not undefined; i.e. (ii) is provably equivalent to:

      iii. $\exists x[man(x) \wedge walk \, (x)]$

    b. *it is not the case that a man walks*

      i.   not $\exists_\Delta \, \lambda f \, [a_f \, man^l \, walks \,]$

      ii. $\neg \, \exists f \, [\Delta \, (f) \wedge \, walk \, (f(man)(l))]$

Sentence (b), if there are no men (or if no man walks), is true; i.e. (bi) is provably equivalent to:

      iii. $\neg \, \exists x[man(x) \wedge walk \, (x)]$

By assuming that the restriction on $\exists$, when it quantifies over choice functions, is some subset of Skolemized choice functions undefined for the empty set, we get a pretty "normal" behavior of indefinites. No unwanted presupposition unduly slides in.

    Of course, the present proposal is just a beginning. We saw that the range of indefinites is rich and diversified. We cannot possibly do justice to that richness here. But let me point out a few possibilities one might explore.

    Nothing prevents some indefinites determiners from being associated with choice functions as their lexical meaning. For example, *some* could be a [– DEF] determiner with the following semantics:

(25) $[[some_i]]^g = g(i)$, where $g(i)$ is of type $<<e,t>,<e,e>>$

Under this assumption, *some man walks* would be interpreted as (21b).[13] Accordingly, some-indefinites would be able to exploit only one of the options available to a-indefinites; namely existential closure of choice functions. And perhaps, at least some of the differences pointed out in (2)-(3) between a-indefinites and some-indefinites might be derivable directly from this simple assumption. Let us speculate on this for a minute.

    Consider, as an example, the marginality of *some* in there-sentences. This might be due to the fact that the core meaning of *some N* (before $\exists$–closure) is identical with the semantics of *the N* . Take, for illustration, a Barwise and Cooper style account of the definiteness effect associated with there-sentences (cf. Barwise and Cooper 1981; see also Zucchi 1995 for relevant discussion). It would go roughly as follows:

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[13] The semantics of *certain* could be spelled out along similar lines. The role of certain would then be that of disambiguating a-indefinites in favor of the functional interpretation (*certain* also has a prominent kind-level reading, which needs to be factored in).

In connection with (25), an anonymous referees wonders why the semantics for *some* in (5) doesn't block shifting via f of the indefinite article *a*. This is a very legitimate worry. However, there are reasons to believe that blocking must be limited only to *articles* (however characterized) and cannot be extended to determiners in general. By any reasonable set of criteria, *some* is not an article and hence doesn't block. Notice, in fact, that every articleless language has morphemes equivalent to *some*. For (still very preliminary) discussion of this issue, see Chierchia (1998, 373 ff.).

(26)   a. (be) [$_{SC}$ there DP] ➜ EXIST (DP)[14]
        b. there is some boy ➜ EXIST(f(boy))

where EXIST is defined only for DPs that don't presuppose their restriction to be non empty. Notice that ∃–closure presumably can apply at the earliest at the level of the small clause. But by then, EXIST will have already applied to the DP, which in the case of *some* will be, at that stage, semantically fully parallel to definites. Hence the presuppositional properties of EXIST (or however one implements Barwise and Cooper's proposal) will follow their usual course and rule the structure out.

Or consider, in a similarly sketchy vein, the marginality of generic uses of *some*. One leading current view of generics involves the forming of tripartite quantificational structures induced by a modalized universal Q-adverb (presumably linked to aspect). The elements that occur in the restriction of such an adverb are construed as topical (cf. on this Krifka et al. 1995). Now, it is not unreasonable to hypothesize that functions, by themselves, form poor topics. The following minimal contrast is suggestive:

(27)   a. * As for one's mother, she is a source of trouble
        b.   As for one's mother, one should never let her take over one's life

In (27) we try to force the functional construal of the relational noun *mother* in the restriction of a generic sentence, by making it highly topical. In (27a), there is no DP other than the pronoun *she* that could occupy the topic slot (i.e. the restriction). But the result is ungrammatical, suggesting that functions (being dependent on an argument) cannot be topics all by themselves. In (27b) there is another DP (the indefinite pronoun *one*) that can act as topic and the functional construal of the pronoun *her* works well. If this is on the right track, then in a sentence like *a dog barks*, the indefinite *a dog* can be topical by itself (on the non functional construal) and thus occupy the restriction of the generic operator; on the other hand, in *some dog barks*, the DP *some dog* which only admits of a functional interpretation, cannot be by itself a topic. We would need some independent topic in the restriction of the generic operator.

These promissory notes are just meant to lend preliminary plausibility to our basic proposal, an elaboration of the one put forth in Reinhart (1997) and Winter (1997, 2001). Specifically, we have set the choice function idea within an arguably very simple theory of definites (in turn, a variant of the classical theory) and of shifting within DP-types (which ultimately goes back to Partee (1987)). We now turn to some consequences of this view.

2.3. Some consequences

It will come as no surprise to the reader, at this point, that long distance scope construals of indefinites, as it involves binding of covert pronouns, will be subject to crossover effects. Compare the minimal pair in (28). While (28a) clearly has the intermediate scope reading, (28b) does not.

(28)   a. every student was impressed by every book that some professor wrote
        b. every book that some professor wrote impressed every student [no "intermediate" reading]

Why? If *some* is interpreted as a choice function and existential closure is free, the intermediate scope reading for (28b) should be there, as the following schematic LF illustrates:

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[14] I am adopting a Stowell (1978) style syntax according to which there is merged in the subject position of a small clause and then raised to the subject position. But nothing would change if we adopted a different take on there-sentence, like, for example, Moro (1996), according to which there is a pro-predicate.

(29)   every student$_i$ $\exists_f$ [every book that [some$_f$ professor] wrote impressed t_i]
        |————————————————————————————|

There seems to be nothing wrong with (29). But imagine that choice functions *must* have an implicit argument, which *must* be bound. Then the only way to get the intended reading would be as follows:

(30)   a. Every book that [some$_f$ professor]^i wrote impressed every student$_i$
        b. every student$_i$ [every book that [some$_f$ professor]^i wrote impressed t_i]
            |————————————————————————————|

The null pronoun associated with *some professor* has to be bound by the lower *every student* in order to get the intended reading. But that will bring about a crossover violation. Thus, the contrast in the availability of intermediate scope readings in (28a-b) is accounted for in terms of a well known phenomenon. This seems to be a correct prediction of the present proposal.

Indefinites are known to give rise to de re construals in propositional attitude contexts. In traditional approaches to this phenomenon such construals appear to involve a violation of locality conditions on scope. For example, the de re interpretation of the embedded indefinite in (31a) is usually represented as in (31b), which involves moving the indefinite long distance out of a tensed embedded clause (something that quantified DPs cannot usually do):

(31)   a. John believes that some football player scratched his car
        b. some football player$_i$ [John believes that t_i scratched his car]
Under the present proposal, these now become straightforward cases of long distance scope assignment, with the aid of independently motivated assumptions. The assumptions are: (i) that each expression carries a world variable (Groenendijk and Stokhof 1984) , (ii) that the world variable of an embedded clause must be locally bound (i.e. abstracted over) at the level of its complementizer (Percus 2000), and (iii) that world variables associated with arguments can be set more or less freely (modulo considerations of pragmatic plausibility – Enc 1986). These assumptions, together with our view of indefinites, yield the following alternative representation for the de re construal of (32a):

 (32)   *De re/transparent reading*
        a. $\exists f$ John$_i$ believes$_{w0}$ λw [a$_f$ footballplayer$_{w0}{}^i$ scratched$_w$ his car]
        b. $\exists f$ believe$_{w0}$ (j, λw [SCR$_w$ (f(fottballplayer$_{w0}$)(j))])

        De dicto/Opaque reading
        c. John$_i$ believes$_{w0}$ λw $\exists f$ [a$_f$ footballplayer$_w{}^i$ scratched$_w$ his car]
        d. believe$_{w0}$ (j, λw $\exists f$ [SCR$_w$ (f(footballplayer$_w$)(j))])

In (32a-b) I provide the LF and TY2 translation of (31a) on the de re/transparent reading. In (32c-d), I provide, for comparison, the LF and TY2 translation of the de dicto/opaque reading (I use *w0* as a variable over the actual world). The LF for the de re/transparent construal is obtained by closing quantificationally the indefinite at the root level (and simultaneously setting to the actual world the world-variable of the embedded noun). The sentence winds up saying that there is some function f mapping John into a football player such that John believes of that person that he

scratched his car. [15] No special mechanism or relaxation of standard locality constraints appears to be called for.

Our current assumptions on (in)definites also predict the existence and distribution of the famous "intentional identity" statements, which have been at the center of an intense debate since first discussed by Geach (1967). Such statements too simply become a case of long distance scope construal of indefinites:

(33)   a Hob believes that a witch blighted his mare and Nob believes that she stole his pig
        b. $\exists f$ [Hob believes that $\lambda w[a_f$ witch$_w{}^{Hob}$ blighted his mare] and Nob believes that
           $\lambda w[she_{f(witch\overline{w})}{}^{Hob}$ stole his pig]]
        c. $\exists f$ [BELIEVE$_{w0}$ (Hob, λw [BL $_w$ (f(witch$_w$)(Hob))]) $\wedge$
           BELIEVE$_{w0}$ (N, λw [SP $_w$ (f(witch$_w$)(Hob))])

In (33) we close the embedded indefinite at the level of the root clause. Under this construal, the first sentences winds up saying that there is a witch-concept associated with Hob (i.e. a function that picks a witch in Hob's belief worlds) such that Hob believes that whatever such concepts picks out blighted his mare. The pronoun *it* in the second clause must be construed functionally to be anaphoric. Consequently, the second clause will say that Nob believes that the witch that Hob believes to have blighted his mare stole his (Nob's) pig.

This is a plausible reading for sentence (a). On this reading, Nob's concepts depend on Hob's ones. It is what Geach calls an asymmetric reading. It is not the only possible one. There's also a symmetric reading, salient in, e.g., the so-called witch-mania context. Such a context would be one in which the reporter describes what is going on in a community in which a witch mania spread out. On such a reading the parameter of the witch-concept is contextually set to a collective agent (say, the community of which Hob and Nob are part):

(34) $\exists f$ [Hob believes that $\lambda w[a_f$ witch$_w{}^c$ blighted his mare] and Nob believes that $\lambda w[she_{f(witch\overline{w})}{}^c$ stole his pig]]

The only difference between the two readings is in the choice of what binds the implicit argument of the witch-function: Hob in (33b), Hob's community in (34). On the latter construal, the following would be a fair paraphrase of (33a): there is a witch concept that the community c has (i.e. a function that selects a witch in the shared believe-worlds of the community members) and Hob believes that whatever satisfies such concept blighted his mare, while Nob believes that whatever satisfies such concept stole his pig. Notice that this predicts that if you imagine Hob and Nob as part of two distinct and causally disconnected communities, with accidentally similar belief systems (e.g. two unrelated cases of witch hunting), the sentences is expected to become infelicitous. This seems to be so and follows from our system as a straightforward case of presupposition failure (there is no function mapping the sum of the two communities into a shared witch concept). So, prima facie, the issue of intentional identity seems to be deflated to an ordinary case of long distance construal of indefinites.

The final consequence of the present approach I wish to discuss concerns donkey anaphora. It is a fact that intermediate scope construals of indefinites support donkey anaphora. In the set of examples below, we have indefinites embedded in a scope island which bind a pronoun in typical donkey anaphora environments.

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[15] There are other possible readings that have been argued for in the literature (from the early work of Fodor 1979, to, more recently, Bonomi 1995 and Kratzer 1998). For example, there is also a de dicto/transparent reading of sentence (28), which would correspond to the following LF:

(a) John $_i$ believes$_{w0}$ λw $\exists f$ [a $_f$ footballplayer$_{w0}{}^i$ scratched$_w$ his car]

Such a reading would be appropriate to a context in which John finds his car scratched and sees a rowdy group of youngsters nearby. He forms the belief that one of them did it. Knowing that they are the local football team, we can truthfully (and felicitously) report such a state of affairs using (28).
For further possibilities, cf. the discussion of intentional identity below.

(35) a. every student that read every book that **a professor** wrote decided to take a course with **her.**

   b. If a student reads every paper that **a professor** wrote, it's because he decided to take a course with **her**

   c. Most linguists that studied every solution that **some problem** had became crazy over **it**

   d. If John forms the opinion that **a student** is intelligent, **he or she** is indeed typically quite smart

   e. If John thinks he may need **a credit card**, he will carry **it** along

For illustration purposes, focus on (35a). Its most natural interpretation is: for every student x and every professor y such that x read every paper by y, x decided to take a course with y. In order to get such a reading, the indefinite must take scope outside of the relative clause within which it is embedded. The same holds for the examples in (b)-(e). The present approach paves the way to an account of these dependencies. The details of such an account will depend on what one assumes about donkey anaphora in general. A framework that straightforwardly predicts the readings that the sentences in (35) exibit, once coupled with the present view of (in)definites, is Dynamic Binding. Such framework is based on the assumption that meanings are functions from contexts into contexts. This view naturally leads to an interpretation of indefinites according to which they change the input context by setting up a discourse referent (an index), available to subsequent anaphoric links. This, in turn, also makes available indefinites embedded in the restrictor of a quantifier as semantic binders for pronouns in the quantifier's scope. Accordingly, the logical form and semantic interpretation of, say, (35a) comes out as follows:

(36) a. every student$_i$ $\exists_f$ [that read every book that a$_f$ professor^i wrote] decided to take a course with her$_{f(professor)}{}^i$

   b. $\forall$x [student (x) $\land$ $\exists$f $\forall$y [book(y) $\land$ wrote(f(professor)(x), y)] $\Rightarrow$[read (x, y)]]

   $\Rightarrow$ [decided to take a course with (x,f(professor)(x)]

   c. Every student x for which there is a way f of picking a professor f(x) such that x read every book written by f(x) is such that for every such f, x decided to take a course with f(x).

On the dynamic interpretation of the quantifiers and connectives in formula (36b) such a formula yields the truth conditions spelled informally out in (36c).[16] These seem to be the right truth conditions for (35a). The case of functional indefinites is fully parallel to that of non functional ones. And, again, no construction specific assumption is called upon.

  Summing up, the unified approach to (in)definites proposed in sections 2.1-2.2 enables us to make sense of the following properties of the relevant constructions:

(37) a. crossover effects on intermediate scope construals

   b. de re readings

   c. anaphora across intentional contexts

   d. donkey anaphora with intermediate scope readings

If the present proposal is on the right track, the phenomena in (37a-d), which give rise to an intricate pattern, seem to fall into place.

  Not quite. A further qualification seems necessary, which will rightly lead the reader to a more cautious assessment of the proposal than the one I've tried to project so far.

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[16] For details, see e.g. Chierchia (1995), Kanazawa (1994). The interpretation of the functional pronoun in (36c) is the "universal" one, discussed in Kanazawa's work.

3. A scope constraint

Let us go back to our use of crossover constraints in order to explain the absence of certain intermediate scope construals. To obtain such an account in the case of in sentences like (28b) above, repeated here as (38a), I suggested that functional indefinites must always have an implicit argument and such argument must always be bound. It follows from this that the only way to obtain the relevant reading would result in a crossover violation (whence its non existence).

(38)   a. every book that some professor wrote impressed every student
        b. every student$_i$ [every book that [some$_f$ professor]^i wrote impressed t $_i$]
             |—————————————————————————————|

However, there is a problem with this view. We cannot prevent the implicit pronoun in (38a) from being indexically fixed (or "bound by the context", if you wish). There are plenty of cases where this must be so. If I say "hey, the boy looks tired", we mean something like "the boy there": the missing pronoun has to be construed indexically, not anaphorically. But then an indexical option will also be available for sentences like (38a). Thus, in particular, we can have a LF of the following sort:

(39)   every student$_i$ $\exists f$ [every book that [some$_f$ professor]^k wrote impressed t $_i$]
        where k is contextually bound (i.e. fixed indexically by some feature of the context of use)

As the reader be able to verify, the LF in (39) does not constitute a violation of any known grammatical constraint, does have a (context bound) implicit argument as required and, alas, yields truth conditions corresponding to the intermediate scope construal for the indefinite, resulting in an interpretation that the sentence in question does not have. So, the unwanted reading that we had quite successfully pushed out of the door as a weak crossover violation, slides back in from a contextual window.

        One might conclude that there is something wrong with the present set of assumptions. But let us not give up quite so readily.

3.1 Context binding

Deictic and indexical elements have a value determined by the context. Now, let us take literally the idea that such elements (including personal pronouns like *I, you*, etc.) are (sortally restricted) variables that must get bound through the context. A simple way of doing so would be assuming that such variables are abstracted over at the topmost level and then applied to contextually supplied arguments. Thus, in particular, something like (40a) would have the LF in (36b):

(40)   a. You look tired
        b. λx_{you} [x_{you}look tired]

The property in (40b) is then applied to an appropriate feature of the actual context. The λ-operator in (40b) plays the role of the contextual binder. (Something in this spirit has been proposed for the pronoun *I* by Heim 1991). This is, of course, very rough and will have to substantially modified (see, e.g. Schlenker 2003); but it will suffice for our limited purposes.

        Let us see what this move affords us in the case (39). Since k is an indexical element, the logical form of sentence (39) would be the following:

(41) λ k [every student$_i$ $\exists f$ [every book that [some$_f$ professor]^k wrote impressed t $_i$]]

Now notice that between the binder of the function (namely, $\exists f$) and the binder of its argument (namely, λk) there is an intervener (namely, every student$_i$). I.e. we find here an intervening element that could potentially bind the argument of the function and fails to do so. This configuration is well known from much work in syntax as the source of "minimality" or "intervention" effects. In Rizzi's (2001) words " a relation between X and Y is disturbed by an intervening Z, which might in its own right establish the relevant relation with Y". An application of this idea to wh-islands is sketched in (42):

(42)   a. I wonder who could solve the problem in this way
         b. * **How** do you wonder **who** could solve the problem t ?

Sentence (42b) is ungrammatical because the relation between *how* and its trace is disturbed by the intervention of another wh-element. Sentences like (41) seem to run into a similar problem. In particular, we might state the relevant constraint along the following lines:

(43)   **The immediate scope constraint (ISC)**
         Closure of a Skolemized choice function f must take place in the immediate scope of the binder B of f's argument i (for any f, B and i)

        This rules out the LF in (41). Given that the LF in (38b), being a crossover violation, is not an option, there is no way to assign to (38a) and related sentences the unwanted reading. Thus, in terms of ISC, we may be able to shut down the contextual window from which the unwanted reading was sliding back in.
        Let us take stock. The proposed approach to indefinites, while accounting in arguably simple ways for many intricate facts, seems to run in a theory internal problem (one of overgeneration for sentences like (38) above). In cases of this sort, if fixing the problem up gets cumbersome, one should seriously consider trying something else. However, in the specific case at hand, under the assumption that indexicals are in some sense also bound variables (contextually bound that is), the fix up has a form that is very familiar from much work on locality in syntax. This is per se no warranty of being on the right track. For that matter, in so far as I can make out, most intervention/minimality effects identified and discussed in the literature are high level descriptive generalizations; they constitute the (often enlightened) formulation of a problem, rather providing an explanation for it. ISC, as proposed in (49), is certainly no exception. But it has, at least, the merit of exposing an intriguing possible connection of $\exists$–closure to other forms of locality in syntactic binding.
        A consequence of ISC is that the sites amenable to $\exists$–closure get considerably constrained. For example in the case of intermediate scope readings of sentences like (44a), of the sites in (44b) and (44c), only the latter is compatible with ISC.

(44)   a. every student read every book that some professor wrote
         b. *$\exists f$ every student $_k$ read every book that [some$_f$ professor]^k wrote
         c. every student$_k$ $\exists f$ read every book that [some$_f$ professor]^k wrote

On intuitive grounds alone, it is impossible to check whether this is a welcome result or not.
        So far, ISC is motivated by our wish to rule (41) out. It sole empirical support, therefore, seems to be its partaking in the ruling out the unwanted readings of sentences like (38a). If this is so, it would be hard to deny that its empirical support is rather thin, too much so to warrant strong conclusions. As it turns out, however, there a totally unrelated domain in which ISC seems to play a role.

3.2. Intentional identity: reprise

According to the proposal sketched above, intentional identity stems from three independently motivated assumptions: (i) indefinites can be existentially closed "high up", (ii) the world variable of an indefinite can be bound independently of where the indefinite is assigned scope and (iii) definites and indefinites have exactly the same range of interpretive options. It is an immediate consequence of (iii) that the quantifier associated with a (functional) indefinite can bind a (functional) pronoun; and it is an immediate consequence of (i) and (ii) that this can happen across belief contexts. The outcome of our proposal embodies a version of the old idea that pronouns can be interpreted as elliptic descriptions (variously dubbed "pronouns of laziness" or " E-type "). Edelberg (1986) has raised a serious objection against any such type of approach. His point is that any such approach is bound to overgenerate: it is predicts the existence of readings that appear systematically excluded. Let me sketch the problem, using a (slight) variant of Edelberg's own example.

The story involves two characters Fred and Charlie and their respective wives Janet and Mabel. Fred's wife, Janet plays a practical joke on Fred. She makes him believe she bought him a new car, which is awaiting for him in George's garage. Charlie's wife, Mabel, plays the same joke on Charlie. She makes him believe she bought him a new car, which is awaiting for him in George's garage. To get it straight, let us schematically summarize the situation by means of the following chart:

(45)

Belief holder	Belief state
Fred	Janet gave him a car which is in George's garage
Charlie	Mabel gave him a car which is in George's garage

Now, the following statement is a felicitous and true characterization of the belief states of Fred and Charlie against the given background:

(46)   Fred believes a new car is in George's garage and Charlie believes that the new car in George's garage is a gift from Mabel.

However, we could *not* characterize such a belief state using a pronoun as follows:

(47)   Fred believes a new car is in George's garage and Charlie believes it is a gift from Mabel

Clearly, (47) does cannot be used to convey what (46) does. The question is why. If pronouns sometimes act as descriptions, why does this seem to be impossible in (47)? Why pragmatic priming does not help in forcing the interpretation of the pronoun *it* in (47) to be interpreted as the description in (46)?

The puzzle becomes even more dramatic once we realize that the following slight variant of (47) is perfect in the very same context:

(48)   Charlie believes that his new car is George's garage. Fred believes it is a gift from Mabel.

Sentence (48) is a typical "paycheck" sentence. So what is going on? Is there any hope to detect general principles behind these judgement patterns? In so far as I know, this puzzle remains outstanding.

Let us see the form the puzzle takes on the approach we have been exploring. Let us begin by looking at (48), where the pronoun appears to be felicitous on the intended reading. The LF of (48), irrelevant details aside, will have the following structure:

(49)　　a. Charlie$_i$ believes that his$_i$ new car is in George's garage. Fred$_j$ believes he got it$_{new\ car}$^{j} as a gift from Mabel
　　　　　　Where Charlie$_i$ = λPP(Charlie) λx_i [ϕ] and Fred$_j$ = λPP(Fred) λx_j [ϕ]

　　　　b. believes$_{w0}$ (Charlie, λw [is in G's garage$_w$ (f(new car$_w$)(Charlie))] $\wedge$
　　　　　believes$_{w0}$ (Fred, λw [got from M$_w$ (f(new car$_w$)(Fred))]

Here is how to read (49a). Suppose that proper names, to act as binders, must undergo QR and be construed as quantifiers in the manner shown (I make this assumption only for explicitness sake; there are several other ways of obtaining the same effect). Non pronominal definites (*his new car*) are choice functions. Pronouns (non c-command bound) are also functions. In particular, the subscript on *it* in (49) fixes the function variable (and its range) to that of the antecedent. *It* also has an anaphoric index, bound by *Fred$_j$*. This results in the correct interpretation, shown in (49b). The structure of (49) is indeed isomorphic to that of paycheck sentences (cf. (17) above). The only difference is that the description is embedded within an intentional contexts (and hence the world variable – not marked in (49) only for ease of readability – will be affected by this). The truth conditions are, thus, those in (49b). So far so good.

　　　　Now let us turn to (47), repeated here, which constitutes the problematic case.

(47)　　Fred believes a new car is in George's garage and Charlie believes it is a gift from Mabel

Sentence (47) differs from (48) only in that the definite antecedent *his new car*, gets replaced by an indefinite one *a new car*. Indefinites differ from definites in that they must undergo $\exists$–closure. And $\exists$–closure (of functions) can take place non locally. Maybe even at the text level. Or, equivalently, in a dynamic setting, at the level of the first root clause in (47); then, in virtue of the dynamics, $\exists$ will bind across sentence boundaries into the second clause. In either case, we seem to get inesorably something of the following sort:

(50)　　$\exists$f[Charlie$_i$ believes that a$_f$ new car^i is in George's garage. Fred$_j$ believes he got it$_{new\ car}$^{j} as a gift from Mabel]

This, resulting in a "sloppy" construal of the pronoun *it*, yields precisely the reading that (47) does *not* have. We seem to be stuck with Edelberg's puzzle.

　　　　But wait. We forgot ISC. The LF in (50) clearly violates it. Closure of the indefinite does not take place in the scope of the binder of the argument i. We need the following:

(51)　　Charlie$_i$ $\exists$f [t$_i$ believes that a$_f$ new car^i is in George's garage]

Does this help? Actually, in a dynamic setting, not quite. Or not yet. $\exists$f would still create an active file, i.e. set up discourse referent that can reach out of their syntactic scope. Thus, $\exists$f in (51) is still able to bind into subsequent stretches of discourse. So eventually we would still get something fully equivalent to (50). However, there is the binder *Fred$_j$*. That does intervene between $\exists$f and its (second) argument. And this time there is no way around it. (Closing again existentially *f* in the scope of *Fred$_j$* is impossible, for $\exists$–closure is only induced by indefinite morphology). So ISC does rule (50) out. We have now an account for Edelberg's puzzle. And we find independent, and perhaps surprising, empirical support for ISC. Edelberg's puzzle is dissolved by a syntactic constraint on scope.

　　　　Notice that the following representation is, per contrast, well formed:

(52)   a. Charlie$_i$ ∃□f [ʈ believes that a$_f$ new car^i is in George's garage]. Fred believes
          he got it$_{new car}$^{i} as a gift from Mabel]

       b. ∃ f [believes$_{w0}$ (Charlie, λw [is in G's garage$_w$ (f(new car$_w$)(Charlie))]) ∧
          believes$_{w0}$ (Fred, λw [got from M$_w$ (f(new car$_w$)(Charlie))]

In (52), binding of the indefinite respects ISC. Under the plausible assumption that *Charlie$_i$* ,like *∃f* , also sets up a discourse referent that can bind into subsequent discourse, we get that the implicit argument on the functional pronoun *it*, can get discourse bound by *Charlie$_i$*. Consequently Fred's belief would have to be about Charlie's car. This seems precisely the reading that such a sentence would have to have. Indeed, an intentional identity (asymmetric) reading.

     The present approach makes a further prediction. Suppose we replace *Charlie$_i$* with a quantifier like *every man$_i$* in (51). Such a quantifier creates a scope barrier for *∃f* (i.e. for the indefinite *a new car*), known as "accessibility" in Discourse Representation Theory and related frameworks. Banning special cases (e.g., "telescoping"), indefinites in the scope of quantifiers like *every* are not accessible antecedents for pronouns in subsequent discourse. (cf. *Every one has a donkey. It gets beaten regularly*). In dynamic semantics terms , *every* is externally static. With respect to the cases under discussion, this means that the functional pronoun (namely *f(car)*) in the second clause will remain free (while, at the same time, having a linguistic antecedent, that fixes the range of *f*). Thus the possibility of getting a sloppy reading for the pronoun *it* in the second clause should increase, for ISC is not longer an issue. Here is a relevant example (use of stereotypes is only meant to bring to salience the intended reading).

(53)   Everyone in this archaic community believes in guardian angels that assist people in key
       junctures of their lives. In particular,
       every man believes that a guardian angel protects him at war and every woman believes that
       it protects her at child birth.

Factually, the prediction seems to be born out. The pronoun *it* in (53) seems to admit of a sloppy construal (roughly equivalent to "her guardian angel"). Let us see how this comes about. In what follows I provide the logical forms of the two conjuncts separately:

(54)   a. [**every man$_i$** ∃f believes a$_f$ guardian angel^i protects him while at war] and
       b. **every woman$_j$** believes it$_{f(guardian angel)}$^{j} protects her during child birth

     In (53a), we interpret the indefinite functionally. The covert argument of the function is bound by the subject *every man*. Hence, ISC requires that ∃–closure takes place within the immediate scope of the latter. The pronoun *it* in (54b) is also interpreted functionally. Its antecedent is *a guardian angel*, which fixes the function variable and its range, as in the previous case. So far, everything is like in the puzzle sentence (51). Here comes the difference. *Every* is externally static. So it prevents *∃f* in (54a) from binding the function variable in (54b). As a result, the latter function remains free. Its value has to be fixed indexically (while its range is set semantically, through the antecendent or via ellipsis). Since the existence of a function from guardian angels to their assisted ones is explicitly claimed to obtain, fixing the value of the function variable should be unproblematic. Whence the increased acceptability of the sentence and the contrast in grammaticality judgement vis a vis the puzzle sentence.

     What emerges from these considerations is a remarkable systematicity behind a seemingly intricate pattern of grammaticality judgements. In weakly theory bound terms, the generalization that emerges is that indefinites license sloppy construals of discourse pronouns less readily that definites. However, when embedded under a quantifier like *every*, the availability of sloppy

construals of pronouns with indefinite antecedents increases. We now see why. It follows from the canonical properties of discourse (here couched in dynamic semantics approach) and the ISC.

4. Concluding remarks

Partee (1987) has first developed the idea that DP meanings are to be obtained through a limited set of universal type shifting devices (in a type driven semantics). That idea has been explored further in many different directions. One of them, pursued in Chierchia (1998), seeks to generalize Partee's insight to languages which vary as to allowing bare, determinerless arguments. There, I've proposed that the shifts from predicates to arguments are naturally ranked in terms of "meaning preservation" and can be freely used following this ranking, subject to a "blocking" constraint (if a morpheme is linked to a type shift, then free use of such shift is blocked). The present contribution places itself in this line of inquiry and qualifies it with two simple hypotheses. First, languages with articles are languages in which overt pieces of morphology are specifically tagged to type shifts. In particular the core mapping for such languages would be: $[- DEF] \Rightarrow \exists$; the other half of the mapping ($[+ DEF] \Rightarrow \iota$) , is derivable via blocking (or some other sort of "elsewhere" condition). Moreover, and this is the second hypothesis, ι is to be generalized to arbitrary (skolemized) choice functions f (with maximality as no more than a pragmatically derivable default). Under this view, a definite must shift with f ($\exists$–closure being blocked by overt indefinites). An indefinite can either shift directly with $\exists$ (obtaining a generalized quantifiers). Or it can also shift with f (the presence of a definite article would not prevent this, as $[+ DEF] \Rightarrow \iota/f$, being derivable, has no autonomous status as a lexical constraint). If an indefinite shifts via f, it still needs to satisfy $[- DEF] \Rightarrow \exists$, and hence it still must undergo $\exists$–closure. But that will have to come in later in the derivation (i.e. not at the NP-level, given plausible assumptions on the type of Ns). The bulk of the properties of (in)definites follows from this (putatively universal) picture and independent principles (governing the dynamics of discourse, interpretation of world variables, and the like). We detected, furthermore, what looks like a locality condition that links the binder of a function to the binder of its arguments (ISC). The puzzling distribution of sloppy vs. strict readings in intentional identity contexts seems to be characterizable in terms of such a constraint.

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