Donkey Anaphora through Choice Functions and Strengthening*

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Donkey anaphora have traditionally led to a surrender of classical static semantics in favor of either dynamic or situation semantics. If we admit a choice function analysis of (in)definites and covert strengthening in grammar, however, such surrender may be staved off. This note presents an initial exploration of how the two mechanisms may conspire to yield donkey anaphora.

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*Thanks to be added.

1 Donkey sentences and their challenges

The behavior and interpretation of anaphoric elements in natural language constitutes one of the most attended to areas of study in linguistic theory. One focal point of this study consists of examples that do not align with the received structural constraints on binding. Two such examples are provided in (1): these sentences can convey that every farmer and every donkey are such that if the farmer saw the donkey, the farmer fed the donkey, as represented in (2). This means that the interpretation of the pronoun and the definite description in the matrix VP is anaphoric on the preceding indefinite, which occurs in a subordinate VP. This dependency is signaled by co-indexation and shading in (1), and by semantic binding by a universal quantifier in (2).

(1) a. Every farmer who saw a donkey$_i$ fed it$_i$.
b. Every farmer who saw a donkey$_i$ fed the donkey$_i$.

(2) $\forall$y: $\forall$x: farmer x saw donkey y $\rightarrow$ farmer x fed donkey y

A similar dependency can obtain also between disjunction and a subsequent pronoun or definite description. This is exemplified by the sentences in (3), where *Donald* and *Eeyore* pick out two donkeys. The sentences convey that every farmer who saw Donald fed Donald, and that every farmer who saw Eeyore fed Eeyore, as represented in (4). On the assumption that Donald and Eeyore are the only pertinent donkeys, this meaning matches the one in (2) – that is, the sentences (1) and (3) differ merely in whether the donkeys are explicitly mentioned or not.

(3) a. Every farmer who saw Donald or$_i$ Eeyore fed it$_i$.
b. Every farmer who saw Donald or$_i$ Eeyore fed the donkey$_i$.

(4) $\forall$y: $\forall$x: farmer x saw y $\in$\{D, E\} $\rightarrow$ farmer x fed y $\in$\{D, E\}
($\Leftrightarrow$ ($\forall$x: farmer x saw D $\rightarrow$ farmer x fed D) $\wedge$ ($\forall$x: farmer x saw E $\rightarrow$ farmer x fed E))

Not all quantifiers and connectives can participate in such an anaphoric dependency. For example, if we substitute the indefinite and disjunction in the preceding examples with, respectively, a universal quantifier and conjunction, the dependency is broken. This is exemplified in (5)-(6), which cannot convey that every donkey is such that every farmer who saw the donkey fed the donkey.

(5) a. Every farmer who saw every donkey$_{*i}$ fed it$_{*i}$.
    b. Every farmer who saw every donkey$_{*i}$ fed the donkey$_{*i}$.

(6) a. Every farmer who saw Donald and$_{*i}$ Eeyore fed it$_{*i}$.
    b. Every farmer who saw Donald and$_{*i}$ Eeyore fed that donkey$_{*i}$.

Due to Geach's (1962) initial choice of examples, which we mimicked, sentences like (1) and (3) have been labelled 'donkey sentences' and the anaphoric elements in them 'donkey anaphora' (that is, donkey anaphora are the nominal expressions whose interpretation co-varies with that of a non-c-commanding indefinite/disjunctive antecedent, which smacks of a bound variable interpretation).

Donkey sentences present a challenge for the classical approach to quantification and binding. We proceed by first distilling the challenge into two modular parts – **the scope challenge** and **the strength challenge.** (What we say in the following applies to all types of donkey sentences mentioned above; we restrict ourselves to examples where an indefinite antecedes a pronoun for brevity.)

The scope challenge. The antecedent indefinite *a donkey* in (1) does not stand in a configuration with the subsequent pronoun that would allow for traditional binding: the former must c-command the latter at LF in order for binding to be possible (esp., Reinhart 1976, 1983, though see Barker 2012) – and this relation clearly does not obtain at surface form in (1). Moreover, it should not obtain at LF either as the relative clause is a constituent that in general prevents (covert) shifts of scope beyond its confines (e.g., Rodman 1976, May 1977).

(7) Every farmer [who saw a donkey$_i$] fed it$_i$.
scope island

Nonetheless, the representation of the meaning of the sentences in (1), provided in (2) and repeated below, contains a binding dependency between the antecedent indefinite and the subsequent pronoun that is established outside the DP hosting the antecedent indefinite. This is unexpected on the traditional assumptions about binding – and it constitutes the scope challenge.

(8) $\boxed{\forall y:}$ $\forall x$: farmer x saw $\boxed{\text{donkey y}}$ $\rightarrow$ farmer x fed $\boxed{\text{donkey y}}$

The strength challenge. The puzzlement does not stop at the scope challenge. Even if a binding dependency between the indefinite and the pronoun could be established by scoping the indefinite out of an island, we would remain perplexed: namely, the dependency is expressed by universal quantification, as repeated in (9a) (cf. Geach 1962). Instead, one would at most expect the dependency to be expressed by existential quantification, as the antecedent of the donkey pronoun is an indefinite, as provided in (9b). However, an attempt to paraphrase (1) with existential quantification fails to capture the reading under discussion (though it does correspond to an available reading of the sentence, as we discuss in Sect. 2). This is the strength challenge, where 'strength' refers to the quantificational force of the element that binds the anaphor in our representations.

(9) a. Target meaning: $\boxed{\forall y:}$ $\forall x$: farmer x saw donkey y $\rightarrow$ farmer x fed donkey y

b. Non-target meaning: $\boxed{\exists y:}$ $\forall x$: farmer x saw donkey y $\rightarrow$ farmer x fed donkey y

With the two challenges distilled, let's preview the account.

A three-step derivation, with two conscripts. Many approaches have been proposed for the data exemplified in (1) and (3) (e.g., Kamp 1981, Heim 1982, 1990, Groenendijk and Stokhof 1991), most of them comprising a slide away from what may be called the classical static semantics that we were tacitly presupposing above (e.g., Montague 1973, Heim and Kratzer 1998; but see Mandelkern 2022a,b for a recent exception). This note argues that such a slide may be avoidable. Capitalizing on the independent solutions to the two challenges described above, we do this in three steps:

Target meaning, to be derived: $\forall y$: $\forall x$: farmer x saw donkey y $\rightarrow$ farmer x fed donkey y

- **Step 1:** Indefinites and disjunction are subject to the scope challenge outside of donkey sentences – that is, they may take scope out of islands more generally, which constitutes their so-called 'exceptional scope' behavior (see Fodor and Sag 1982 and much subsequent literature). This behavior has been captured by recourse to **choice functions** and to quantification over them (e.g., von Heusinger 1996, Reinhart 1997, Winter 1997, 2002, Kratzer 1998, Matthewson 1999, von Fintel 1999, Chierchia 2001, Schlenker 2006; but see Schwarzschild 2002, Endriss

2009, Brasoveanu and Farkas 2011, Demirok 2019, Charlow 2020, 2023 for alternatives). We conscript choice functions to resolve the scope challenge in the domain of donkey anaphora.

Scope derived: ∃y: ∀x: farmer x saw donkey y → farmer x fed donkey y

- **Step 2:** Indefinites and disjunction instantiate the strength challenge in various configurations other than donkey sentences, perhaps most famously in their so-called 'free choice' uses. This behavior has been captured by recourse to **exhaustification in grammar** (cf., e.g., Fox 2007, Chierchia et al. 2011, Chierchia 2013, Singh et al. 2016, Bar-Lev 2018). We conscript exhaustification to resolve the strength challenge in the domain of donkey anaphora.

Scope and strength derived: ∀ y: ∀x: farmer x saw donkey y → farmer x fed donkey y

- **Step 3:** While our guiding examples have been universal donkey sentences, there is great variation in the quantificational force of donkey sentences, many instances of which resist universal quantification paraphrases of the kind employed above. Nonetheless, the behavior of these sentences can be captured by a generalization of the choice function construals, a generalization that was argued for independently (e.g., Winter 2002, 2004, Schlenker 2006).

The empirical landscape of donkey sentences is vast and daunting (see, e.g., Nouwen et al. 2016, Nouwen 2020, Brasoveanu and Dotlačil 2020, King and Lewis 2021 for recent reviews). And the theoretical advances that its study has spurred on have been impressive. Accordingly, the goals of this note can only be modest – we present an initial exploration of an approach to donkey sentences that (i) sticks to the basic tenets of classical static semantics, (ii) departs from the traditional treatment of indefinites and disjunction by turning to choice functions, and (iii) admits exhaustification into grammar. Accordingly, by necessity, the note is merely a prolegomenon to further study of the application of choice functions and exhaustification to donkey sentences. And due to this limited scope we only hint at the interactions of choice functions and exhaustification outside of donkey sentences (see, esp., Sects. 3.2, 4.4 and fn. 2, and Charlow 2019 for some pertinent observations).

2 The scope challenge

The scope challenge surfaces with indefinites and disjunction outside of donkey sentences, that is, indefinites and disjunction exhibit exceptional-scope-taking behavior more generally. Analyses of this behavior need not depart from the assumptions of classical static semantics, though they need to depart from either the classical analysis of indefinites or from the standard assumption about syntax. One analysis that departs from the classical analysis of indefinites, but not from the standard assumptions about syntax, takes indefinites to invoke quantification over choice functions. This analysis constitutes the first cornerstone of our treatment of donkey anaphora.

2.1 Exceptional scope of indefinites and disjunction

Consider the sentences in (10)-(11), which provide a true description of the prefixed contexts (Schlenker 2006 observes that the reading is easier to access in (11) if disjunction bears focal stress). This means that they have a reading on which there is a single donkey such that if anyone saw it, they were happy.

(10) *[Context: People who saw donkeys were sad, as they tend to be in captivity, except if they saw Donald, a free donkey, which made them happy:]*
Everyone who saw a donkey was happy.

(11) *[Context: People who saw donkeys were sad, as they tend to be in captivity, except if they saw Donald or Eeyore, exactly one of which is a free donkey (but we don't remember which one), which made them happy:]* Everyone who saw Donald or Eeyore was happy.

The formal representations of the readings that can be true in the described context are provided in the (a)-examples below, where existential quantification and disjunction take the widest scope in the sentence. In contrast, a low-scope construal of existential quantification and disjunction, provided in the (b)-examples below, yields meanings that are false in the described contexts.

(12) a. $\boxed{\exists\text{y: donkey y} \wedge}\ \big(\forall\text{x: person x saw donkey y} \rightarrow \text{person x was happy}\big)$
b. $\#\big(\forall\text{x: } \boxed{\exists\text{y: donkey y} \wedge}\ \text{person x saw donkey y} \rightarrow \text{person x was happy}\big)$

(13) a. $\big(\forall\text{x: pers x saw D} \rightarrow \text{pers x was happy}\big)\ \boxed{\vee}\ \big(\forall\text{x: pers x saw E} \rightarrow \text{pers x was happy}\big)$
b. $\#\big(\forall\text{x: person x saw D}\ \boxed{\vee}\ \text{person x saw E} \rightarrow \text{person x was happy}\big)$

The availability of the readings in (12a)-(13a) is puzzling due to existential quantification induced by the indefinite *a donkey* and the disjunction taking the widest scope in the sentence – namely, this scope construal violates the restrictions on scope shifting, which should in these case be restricted to the relative clause (see, e.g., Rodman 1976, May 1977, 1985, Hornstein 1984, among others). Accordingly, if we replace the indefinite and disjunction, respectively, with another quantifier and conjunction, the availability of the widest scope construal disappears. This is illustrated in (14)-(15), where the indefinite is replaced by a universal quantifier and disjunction is replaced by conjunction: neither of the sentences allows for a reading that would entail that someone who sees a single donkey is happy, which would be the case if the described wide scope construal were possible.

(14) a. Everyone who saw every donkey was happy.

b. #$\boxed{\forall \text{y: donkey y} \rightarrow}$ $\big(\forall$x: person x saw donkey y $\rightarrow$ person x was happy$\big)$

(15) a. Everyone who saw Donald and Eeyore was happy.

b. #$\big(\forall$x: pers x saw D $\rightarrow$ pers x was happy$\big)$ $\boxed{\wedge}$ $\big(\forall$x: pers x saw E $\rightarrow$ pers x was happy$\big)$

More to the point, the indicated exceptional scope construals of universal quantifier *every donkey* in (14b) and conjunction in (15b) would constitute stronger readings of the sentences than the low-scope construals of these expressions. That the stronger readings are indeed not available for these sentences is illustrated by the infelicity of a discourse like (16): B's correction targets the hypothesized strong reading that every donkey is such that everyone who saw it was happy, and is compatible with the natural, weak reading of the sentence; the infelicity of B's reply signals that only the natural, weak reading of A's sentence is possible (hence, their reply fails to correct anything).

(16) A: Everyone who saw every donkey was happy.

B: #No, everyone who saw only Eeyore was sad.

Choice functions. One way of obtaining the exceptional scope readings described in (12a)-(13a) is by switching to a choice function analysis of (exceptional) indefinites and disjunction (e.g., Reinhart 1997, Matthewson 1998, Winter 1997, 2002, 2004). A choice function is a function that applies to a non-empty predicate and returns an individual of which that predicate holds, as stated in (17) (the non-emptiness requirement can be treated as a presupposition, but see Winter 2002, Chierchia 2005 for alternatives; we set the presuppositions of choice functions aside in the following for brevity):

(17) Let E be a non-empty set of individuals. A function f: $\mathscr{P}(E) \rightarrow E$ is a (simple) choice function, $f \in CH$, iff for every $A \subseteq E$: if A is not empty then $f(A) \in A$.

An indefinite like *a donkey* can be analyzed as provided in (18): the indefinite determiner introduces a variables over choice functions (we represent the value assigned to the variable with the same symbol); this variable must be existentially closed, which can happen at the level of any clausal constituent dominating the indefinite (e.g., Reinhart 1997, Winter 1997, 2002, 2004, but see Matthewson 1999 for a different assumption) – this means that the existential closure of choice functions is not subject to locality conditions, which is similar to other binding operations. Similarly, disjunction introduces a choice function that applies to the predicate holding exhaustively of the disjoined elements: specifically, we assume that disjunction creates a predicate from the disjoined elements it combines with to which, then, the choice function introduced by disjunction applies.

(18) a. Gali saw a donkey.
b. [∃f [Gali saw a_f donkey]]

(19) a. Gali saw Donald or Eeyore.
b. [∃f [Gali saw [f [Donald or Eeyore]]]]

The meaning that we obtain for (18b) is provided in (20): there exists a function from a set of donkeys to a specific donkey and Gali likes that specific donkey. Unsurprisingly, the meaning is equivalent to the classical meaning assigned to the sentence, as stated in the parentheses in (20).

(20) $\exists f \in CH$: Gali saw f(donkey) $\big($= $\exists x$: donkey x $\wedge$ Gali saw x$\big)$

The meaning that we obtain for (19b) is provided in (21): there exists a function from a set consisting of Donald and Eeyore to one of the two donkeys and Gali likes that donkey. The meaning is again equivalent to the classical meaning assigned to the sentence, as stated in the parentheses in (22). Hence, a shift to choice functions is not detectable in simple sentences like (19) and (20).

(21) $\exists f \in CH$: Gali saw f({Donald, Eeyore}) $\big($= Gali saw Donald $\vee$ Gali saw Eeyore$\big)$

We turn now to our motivating examples. In (10), the existential closure over choice functions can apply at the matrix level even if its associated indefinite occurs in a relative clause deeper in the structure, as provided in (22b). This yields the appearance of the widest scope construal of the indefinite, as provided in (23) – the resulting meaning is equivalent to one on which the indefinite would take scope at the matrix level, as stated in the parentheses in (23).

(22) a. Everyone who saw a donkey is happy.

b. [$\exists$f [everyone [who saw a_f donkey] is happy]]

(23) $\exists f \in CH$: $\forall x$: person x saw f(donkey) $\rightarrow$ person x is happy

$\big($= $\exists y$: donkey y $\wedge$ $\forall x$: person x saw donkey y $\rightarrow$ person x is happy$\big)$

A parallel analysis is available also for the disjunctive sentence in (11), as provided in (24), yielding the widest scope interpretation of disjunction, as provided in (25):

(24) a. Everyone who saw Donald or Eeyore is happy.

b. [$\exists$f [everyone [who saw f [Donald or Eeyore]] is happy]]

(25) $\exists f \in CH$: $\forall x$: person x saw f({Donald, Eeyore}) $\rightarrow$ person x is happy

$\big($= ($\forall x$: person x saw Donald $\rightarrow$ person x is happy) $\vee$

($\forall x$: person x saw Eeyore $\rightarrow$ person x is happy)$\big)$

Choice functions have been used elsewhere as well – e.g., to interpret definites and pronouns.

2.2 Definites and pronouns

Definite descriptions can be analyzed by means of choice functions – in fact, they have been analyzed as such, and extensive arguments have been provided for such an analysis (e.g., Chierchia 1995, 2005, von Heusinger 1996, 2001, 2004, Schlenker 2004; see also Matthewson 2001). On this analysis, the definite article introduces a choice function variable, as provided in (26), the value of which must be furnished by the context. Chierchia (2005) argues that context can do this only if there is a unique salient individual in the predicate argument of the choice function, effectively deriving uniqueness and familiarity by pragmatic means (*mutatis mutandis* maximality and familiarity in the case of plural definite descriptions) (see also von Heusinger 1996, 2004 for discussion). We take these assumptions on board. (See Sect. 4.2 for further parallelism between choice functions in the indefinite and definite descriptions.)

(26) a. The donkey ate.

b. [[the$_f$ donkey] ate]

c. f(donkey) ate

If we treat pronouns as implicit definite descriptions, they may be analyzed in the same choice function way. In particular, the descriptive content of a pronoun may match that of an explicit definite description (e.g., Postal 1966, Cooper 1979, Davies 1981, Elbourne 2001, 2005). Such treatment of pronouns has been labeled the 'E-type analysis' of pronouns and fits naturally with a choice function approach to definite descriptions. For illustration, consider the sequence in (27). The pronouns in the second sentence can be analyzed as definite descriptions with elided NPs, as provided in (27b), where the NPs are retrieved from the first sentence (see, esp., Chierchia 2005 for details of the choice function analysis of pronouns, and Elbourne 2001, 2005 on the NP deletion in pronouns).

(27) a. The donkey ate the carrot. It liked it.

b. [[the$_f$ donkey] ate [the$_f$ carrot]]. [[it$_f$ ~~donkey~~] liked [it$_f$ ~~carrot~~]].

c. f(donkey) ate f(carrot) $\wedge$ f(donkey) liked f(carrot)

Indefinites, definites, and pronouns thus have a common semantic core – they all introduce choice functions. Given the above characterization, the difference between these expressions consist merely in whether the respective expression is accompanied by existential closure over choice functions or not: the indefinites are, the definites/pronouns are not necessarily. This characterization does not entail, however, that a choice function introduced by a definite/pronoun must be supplied by the context and cannot be bound by existential closure. It can be – and it is in donkey sentences.

2.3 Deriving donkey anaphora: Step 1 of 3

The scope challenge of donkey anaphora can be resolved by the same means as the more general scope challenge of indefinites and disjunction was – by recourse to choice functions and to existential closure over them. In particular, the two donkey sentences from the introduction may be assigned the structures in (28)-(29): the choice function variables introduced by the indefinite and disjunction are closed off at the matrix level by the existential closure accompanying them; the same existential closure binds also the choice function introduced by the donkey pronouns. The adoption of the choice function analysis of definites and pronouns thus pays immediate dividends in the domain of donkey sentences – such direct binding is unavailable on more classical analyses (see also Sect. 3.4).

(28) a. Every farmer who saw a donkey$_i$ fed it$_i$.

b. [∃f [every farmer who saw a$_f$ donkey fed it$_f$ ~~donkey~~]]

(29) a. Every farmer who saw Donald or$_i$ Eeyore fed it$_i$.

b. [∃f [every farmer who saw f [Donald or Eeyore] fed it$_f$ ~~donkey~~]]

The meanings of (28)-(29) are provided below: the sentence in (28) conveys that there is a donkey such that every farmer who saw it fed it; (29) conveys that every farmer who saw Donald fed Donald or every farmer who saw Eeyore fed Eeyore.

(30) $\exists f \in CH$: $\forall x$: farmer x saw f(donkey) $\rightarrow$ farmer x fed f(donkey)

$\big(\Leftrightarrow$ $\boxed{\exists y\text{: donkey y} \wedge}$ $\forall x$: farmer x saw donkey y $\rightarrow$ farmer x fed donkey y$\big)$

(31) $\exists f \in CH$: $\forall x$: farmer x saw f({Donald, Eeyore}) $\rightarrow$ farmer x fed f({Donald, Eeyore})

$\big(\Leftrightarrow$ ($\forall x$: frmr x saw D $\rightarrow$ frmr x fed D) $\boxed{\vee}$ ($\forall x$: frmr x saw E $\rightarrow$ frmr x fed E)$\big)$

Although these <u>are</u> possible readings of the sentences (again, stress on disjunction may be required to obtain it for the sentence with disjunction), they are obviously too weak to qualify as the target meanings of donkey sentences: the shaded existential closure in the above formulas should be universal, as provided in (32)-(33). In other words, the meanings of the sentences should be that <u>every donkey</u> is such that every farmer who saw it fed it, in the case of (1), and that every farmer who saw Donald fed Donald <u>and</u> every farmer who saw Eeyore fed Eeyore, in the case of (3).

(32) $\forall f \in CH$: $\forall x$: farmer x saw f(donkey) $\rightarrow$ farmer x fed f(donkey)

$\big(\Leftrightarrow$ $\boxed{\forall y\text{: donkey y} \rightarrow}$ $\forall x$: farmer x saw donkey y $\rightarrow$ farmer x fed donkey y$\big)$

(33) $\forall f \in CH$: $\forall x$: farmer x saw f({Donald, Eeyore}) $\rightarrow$ farmer x fed f({Donald, Eeyore})

$\big(\Leftrightarrow$ ($\forall x$: frmr x saw D $\rightarrow$ frmr x fed D) $\boxed{\wedge}$ ($\forall x$: frmr x saw E $\rightarrow$ frmr x fed E)$\big)$

How can this required universal quantification over choice functions be derived?

3 The strength challenge

Indefinites and disjunction can convey, respectively, universal quantification and conjunctive meanings in certain environments. The distribution of these strengthened readings is tightly constrained, and has been derived by exhaustification in grammar. The existential closure in donkey sentences satisfies the same tight constraints, and can be strengthened to universal closure analogously.

3.1 Universal strengthening and its limits

Consider the modal sentence in (34). The indefinite contained in it conveys a universal quantification meaning, as formalized in the second row of (34). Such occurrences of indefinites are sometimes called 'free choice indefinites'. A parallel behavior is observed with disjunction, as provided in (35).

(34) Gali is allowed to feed a(ny) donkey.

$\Rightarrow$ $\boxed{\forall \text{x: donkey x} \rightarrow}$ $\Diamond$(Gali fed donkey x)

(35) Gali is allowed to feed Donald or Eeyore.

$\Rightarrow$ $\Diamond$(Gali feeds Donald) $\boxed{\wedge}$ $\Diamond$(Gali feeds Eeyore)

Not every occurrence of an indefinite or disjunction allows for such a construal. For example, when these expressions occur in universal modal sentences, or when they are unembedded, they fail to give rise to universal quantification meanings. In fact, in these environments, they tend to give rise to a negation of these meanings (via scalar implicatures). We illustrate this with the sentences in (36)-(37), all of which can implicate the negation of the universal meaning.

(36) a. Gali is required to feed a donkey.

$\not\Rightarrow$ $\boxed{\forall \text{x: donkey x} \rightarrow}$ $\Box$(Gali feeds donkey x)

In fact: $\rightsquigarrow \neg\forall$x: donkey x $\rightarrow \Box$(Gali fed donkey x)

b. Gali is required to feed Donald or Eeyore.

$\not\Rightarrow$ $\Box$(Gali feeds Donald) $\boxed{\wedge}$ $\Box$(Gali feeds Eeyore)

In fact: $\rightsquigarrow \neg\big(\Box$(Gali feeds Donald) $\wedge\ \Box$(Gali feeds Eeyore)$\big)$

(37) a. Gali fed a donkey.

$\not\Rightarrow$ $\boxed{\forall \text{x: donkey x} \rightarrow}$ Gali fed donkey x

In fact: $\rightsquigarrow \neg\forall$x: donkey x $\rightarrow$ Gali fed donkey x

b. Gali fed Donald or Eeyore.

$\not\Rightarrow$ Gali fed Donald $\boxed{\wedge}$ Gali fed Eeyore

In fact: $\rightsquigarrow \neg\big($Gali fed Donald $\wedge$ Gali fed Eeyore$\big)$

In the following, we spell out a generalization about when the universal strengthening of existential meanings is possible, and provide a mechanism for deriving it. We focus on indefinites.

Condition on Strengthening. We have seen that the universal strengthening of indefinites is not always possible. Its distribution can be described by making reference to the alternatives to the sentence hosting an indefinite (e.g., Fox 2007, Singh et al. 2016). In particular, the alternatives that we must attend to are those in which either domain of the existential quantifier is replaced, or the existential quantifier itself is replaced by a universal one, or both, as provided in (38). (We represent alternatives as semantic objects for simplicity. See Katzir 2007, Fox and Katzir 2011 for discussion.)

(38) ALT([allowed [a$_D$ donkey$_x$ [Gali feed t$_x$]]]) =
$\{\Diamond$(Gali feed a$_{D'}$ donkey), $\Diamond$(Gali feed every$_{D'}$ donkey) $|$ D$' \subseteq$ E$\}$

A universal strengthening of a sentence with an indefinite is available only if no alternative to the sentence is equivalent to the universal quantification meaning to be derived by strengthening:

(39) **Condition on Strengthening (simplified):** Universal strengthening of a sentence with an indefinite is possible when the universally strengthened meaning of the sentence is not equivalent to one of the sentence's alternatives. (e.g., Singh et al. 2016)

Before turning to the mechanism responsible for strengthening, let us first show that the Condition on Strengthening correctly divides the examples discussed above. In the case of the existential modal sentence, the universal quantification meaning (where the universal quantification scopes above the modal) is not equivalent to any of the alternatives to the sentence, as stated in (40). Crucially, the universal quantification meaning is weaker than the universal quantifier alternative to the sentence (where the universal quantification applies below the modal). Universal strengthening is thus admitted by the condition in (39).

(40) a. Gali is allowed to feed a(ny) donkey.

b. $\forall$x: donkey x $\rightarrow$ $\Diamond$(Gali fed donkey x)

$\notin$ {$\Diamond$($\exists$x: Gali fed donkey x), $\Diamond$($\forall$x: donkey x $\rightarrow$ Gali fed donkey x), ...}

In contrast, the universal quantification meaning is equivalent to the universal quantifier alternative of the universal modal sentence in (36) and of the simple sentence in (37). This is stated in (41)-(42), where the alternatives equivalent to the universal quantification meanings are framed. In the universal modal case, the equivalence holds due to the commutativity of the two universal quantifiers, a nominal and a modal one; in the simple case, the equivalence holds trivially. Universal strengthening is thus blocked in both types of sentences by the condition in (39).

(41) a. Gali is required to feed a donkey.

b. $\forall$x: donkey x $\rightarrow$ $\Box$(Gali fed donkey x)

$\in$ {$\Box$($\exists$x: Gali fed donkey x), $\boxed{\Box(\forall x\text{: donkey x} \rightarrow \text{Gali fed donkey x}),}$ ...}

(42) a. Gali fed a donkey.

b. $\forall$x: donkey x $\rightarrow$ Gali fed donkey x

$\in$ {($\exists$x: Gali fed donkey x), $\boxed{(\forall x\text{: donkey x} \rightarrow \text{Gali fed donkey x}),}$ ...}

We now turn to the mechanism that derives the strengthened meanings and the condition in (39).

Strengthening. The strengthening of the existential meaning into a universal one can be achieved by exhaustification (e.g., Bowler 2014, Bar-Lev and Margulis 2014, Meyer 2015, Singh et al. 2016, Bar-Lev 2018, Staniszewski 2021). The exhaustification operator, *exh*, is defined in (43) (Bar-Lev and Fox 2020): it quantifies over the set of alternatives to the sentence it attaches to and returns (i) the meaning of its sister, (ii) the negation of (relevant) excludable alternatives, which are defined in (44), and (iii) the affirmation of includable alternatives, which are defined in (45).

(43) $[\![\text{exh}_C \text{ S}]\!] = [\![\text{S}]\!] \wedge \forall \text{p} \in \text{Excl(S)} \cap \text{C: } \neg \text{p} \wedge \forall \text{q} \in \text{Incl(S): q}$

(44) Excl(S) = $\bigcap${M | M is a maximal subset of ALT(S)

such that {$\neg$p | p$\in$M} $\cup$ {$[\![$S$]\!]$} is consistent}

(45) Incl(S) = $\bigcap${M | M is a maximal subset of ALT(S)

such that {p | p$\in$M} $\cup$ {$\neg$q | q$\in$Excl(S)} is consistent}

Derivation. We can now turn to the sentences under discussion. The existential modal sentence has the alternatives in (46). Among these, the includable alternatives consist of the existential quantifier alternatives, where the domain of the quantifier is a subset of the original domain; the excludable alternatives are the universal quantifier alternatives with non-singleton domains. This is provided in (47). (We are ignoring alternatives in which the domains of quantification contain elements outside of the original domain for brevity, see Crnič 2022 for discussion.)

(46) a. Incl([allowed [a_D donkey$_x$ [Gali feed t_x]]]) =

$\{\Diamond$(Gali feed $a_{D'}$ donkey) $\mid \emptyset \neq D' \subseteq D \cap [\![\text{donkey}]\!]\}$

b. Excl([allowed [a_D donkey$_x$ [Gali feed t_x]]]) =

$\{\Diamond$(Gali feed every$_{D'}$ donkey) $\mid D' \subseteq D \cap [\![\text{donkey}]\!] \wedge$ card(D')>1$\}$

The strengthened meaning of the sentence is computed in (47). The inclusion inferences in (47inc) correspond to the universal quantification meaning of the sentence. The strengthening of the existential meaning to a universal one is thus derived. (Note that the exclusion inferences in (47exc) are generated to the extent the excludable alternatives in (46b) are relevant.)

(47) $[\![$exh$_C$ [Gali is allowed to feed a_D donkey]$]\!]$ =

(bas) $\Diamond$(Gali feed a_D donkey) $\wedge$

(inc) $\forall D'$: $\emptyset \neq D' \subseteq D \cap [\![\text{donkey}]\!] \rightarrow \Diamond$(Gali feeds $a_{D'}$ donkey) $\wedge$

(exc) $\forall D'$: $D' \subseteq D \cap [\![\text{donkey}]\!] \wedge$ card(D')>1 $\rightarrow \neg\Diamond$(Gali feed every$_{D'}$ donkey)

In contrast, if the existential modal is replaced by a universal one, or if it is removed, the alternative that is equivalent to the universal quantification meaning becomes excludable. For illustration, in the case of the universal modal sentence, all the (non-trivial) alternatives to the sentence discussed above are excludable, and there are no (non-trivial) includable alternatives, as provided in (48) (see, e.g., Bar-Lev and Fox 2020, Crnič 2022 for details).

(48) a. Incl([required [a_D donkey$_x$ [Gali feed t_x]]]) =

$\{\Box$(Gali feeds a_D donkey$\}$

b. Excl([required [a_D donkey$_x$ [Gali feed t_x]]]) =

$\{\Diamond$(Gali feed $a_{D'}$ donkey), $\Diamond$(Gali feed every$_{D''}$ donkey) $\mid$

$\emptyset \neq D' \subseteq D \cap [\![\text{donkey}]\!]$, $D'' \subset D \cap [\![\text{donkey}]\!] \wedge$ card(D")>1$\}$

Accordingly, the strengthened meaning of the sentence is the one provided in (49) (where all excludable alternatives are taken to be relevant and are thus negated). The exclusion inferences entail the negation of the universal quantification meaning. The strengthening of the existential meaning of (36) to a universal one is thus correctly ruled out. (Parallel reasoning extends to the simple sentence in (37), which can also implicate the exclusion of the universal quantification meaning.)

(49) $[\![$exh$_C$ [Gali is required to feed a$_D$ donkey]$]\!]$ =

(bas) $\Diamond$(Gali feed a$_D$ donkey) $\wedge$

(exc) $\forall$D': $\emptyset \neq$ D' $\subset$ D$\cap[\![$donkey$]\!]$ $\rightarrow \neg\Diamond$(Gali feed a$_{D'}$ donkey) $\wedge$

$\forall$D': D' $\subset$ D$\cap[\![$donkey$]\!]$ $\wedge$ card(D")>1 $\rightarrow \neg\Diamond$(Gali feed every$_{D'}$ donkey)

What happens when we strengthen sentences with exceptional indefinites and disjunction?

3.2 Strengthening with choice functions

Let us begin by looking at a sentence with which we motivated the choice function analysis of indefinites and disjunction, in which an indefinite is assigned exceptional scope:

(10) *[Context: People who saw donkeys were sad, as they tend to be in captivity, except if they saw Donald, a free donkey, which made them happy:]*

Everyone who saw a donkey was happy.

The strengthened meaning of (49) depends (i) on the parse of the sentence, that is, what (if anything) is exhaustified, and (ii) on the alternatives to the sentence that are relevant. (See Charlow 2019 for a related discussion, though one that is based on assumptions about alternatives and exhaustification that are different from ours.)

Missing alternatives. The exceptional scope parse of the sentence is provided in (50). If exhaustification applies at the global level, it ranges over the alternatives provided in (51).

(50) a. Every farmer who sees a donkey is happy.

b. [$\exists$f [every farmer who sees a$_f$ donkey is happy]]

(51) ALT([$\exists$f [every farmer who sees a$_f$ donkey is happy]]) =

$\{\ \exists f{\in}CH{:}\ \forall x{:}$ farmer x saw f(donkey) $\to$ farmer x happy,

$\exists f{\in}CH'{:}\ \forall x{:}$ farmer x saw f(donkey) $\to$ farmer x happy,

$\forall x{:}\ (\exists f{\in}CH{:}$ farmer x saw f(donkey)) $\to$ farmer x is happy,

$\forall x{:}\ (\forall y{:}$ donkey y $\to$ farmer x saw donkey y) $\to$ farmer x is happy,

~~$\underline{\forall y{:}\ \text{donkey y} \to}$ $\forall x{:}$ farmer x saw donkey y $\to$ farmer x is happy~~, ... $\mid CH' \subseteq CH\}$

The alternatives include the sentence itself (the second row in the above example), the various domain alternatives in which the domain of existential closure varies (the third row above), the low-scope existential quantifier alternative (the fourth row above), and the low-scope universal quantifier alternative (the fifth row above) (see Sect. 4 for a discussion of additional alternatives). Importantly, there is no universal quantifier alternative in which the universal quantifier would take matrix scope (the struck-through sixth row above, where the non-existent exceptional scope universal quantifier is underlined) – namely, as we have seen in Sect. 2, only indefinites can take exceptional scope. This state of affairs is described in (52) and plays a pivotal role in our analysis of donkey anaphora. However, it plays no role in computing the inferences of sentence (10), as we will see shortly.

(52) **Missing universal quantifier alternative:** If exceptional scope construal is restricted to indefinites, and if closure over choice functions is existential, a sentence with an exceptional scope indefinite does not have a parallel exceptional scope universal quantifier alternative.

Some implicatures. The missing universal quantifier alternative notwithstanding, the sentence fails to satisfy the Condition on Strengthening, as stated in (53), since the universal quantification meaning is equivalent to the low-scope existential quantifier alternative (framed below). This means that the exceptional scope construal of the indefinite fails to lead to a universally strengthened meaning in (10). (Note that due to the equivalence with the low-scope existential quantifier construal of the sentence, the reading would be difficult to tease apart as a distinct reading in any case.)

(53) $\forall f{\in}CH{:}\ \forall x{:}$ farmer x saw f(donkey) $\to$ farmer x happy

$\in\ \{\ \exists f{\in}CH{:}\ \forall x{:}$ farmer x saw f(donkey) $\to$ farmer x happy,

$\exists f{\in}CH'{:}\ \forall x{:}$ farmer x saw f(donkey) $\to$ farmer x happy,

$\boxed{\forall x{:}\ (\exists f{\in}CH{:}\ \text{farmer x saw f(donkey)}) \to \text{farmer x is happy,}}$

$\forall x{:}\ (\forall y{:}$ donkey y $\to$ farmer x saw donkey y) $\to$ farmer x is happy,

~~$\forall y{:}$ donkey y $\to$ $\forall x{:}$ farmer x saw donkey y $\to$ farmer x is happy~~, ... $\}$

Now, the excludable alternative to the sentence in (10) is precisely the low-scope existential quantifier alternative, and there are no includable alternatives. Accordingly, the strengthening of the sentence yields the meaning in (54): there exists a donkey such that every farmer who saw that donkey fed that donkey, but not every donkey is such that every farmer who saw that donkey fed that donkey. This is indeed an inference that the sentence may have.

(54) [exh [∃f [every farmer who sees a_f donkey is happy]]]

(55) ⟦[exh [∃f [every farmer who sees a_f donkey is happy]]]⟧ =
$$\exists f \in CH: \forall x: \text{farmer x saw f(donkey)} \rightarrow \text{farmer x is happy} \wedge$$
$$\neg \forall x: (\exists f \in CH: \text{farmer x saw f(donkey)}) \rightarrow \text{farmer x is happy}$$

A stronger inference can be derived for the sentence if exhaustification applies below the existential closure over choice functions, as provided in (56), where the embedded *exh* associates with the choice function variable in its scope and ranges over the alternatives to its sister, including the alternatives that differ from its sister merely in the value of the choice function variable.

(56) [∃f [exh [every farmer who sees a_f donkey is happy]]]

The meaning of the structure in (56) is provided in (57): there exists a donkey such that only that donkey, and no other donkey, is such that every farmer who saw that donkey fed that donkey. This corresponds to the 'exactly-one' inference that exceptional indefinites give rise to (see Charlow 2019 for discussion). (Moreover, if the alternative in which the universal quantifier (*every farmer*) is replaced by an existential quantifier (*a farmer*) is relevant, we may obtain an even stronger inference that every other donkey (besides the seen and fed donkey) was not both seen and fed by a farmer.)

(57) ⟦[∃f [exh [every farmer who sees a_f donkey is happy]]]⟧ =
$$\exists f \in CH: \forall x: \text{farmer x saw f(donkey)} \rightarrow \text{farmer x is happy} \wedge$$
$$\forall f' \in CH: f(\text{donkey}) \neq f'(\text{donkey}) \rightarrow \neg \forall x: \text{farmer x saw f'(donkey)} \rightarrow \text{farmer x is happy}$$

As is often the case, the sentence in (10) is multiply ambiguous: multiple parses of the sentence are available, differing in the placement of *exh*, and in what alternatives are taken to be relevant; all of these may lead to potentially different readings of the sentence (see Crnič et al. 2015, Bar-Lev 2018, 2023 on some constraints on the distribution of *exh* and the pruning of its alternatives). The different scalar implicatures of exceptional scope indefinites, and the extent to which they can be derived on the different approaches to exceptional scope indefinites, will have to be explored in greater detail elsewhere (see Charlow 2019 for related discussion). Here, we return to donkey sentences.

3.3 Deriving donkey anaphora: Step 2 of 3

The parse that we ended up with in the preceding section, repeated below, allowed us to resolve the scope challenge of donkey anaphora, which was that no binding relation could obtain between the antecedent indefinite and the donkey pronoun due to the missing c-command relation between the two. The resolution consisted in the existential closure over choice functions binding both the choice function variable introduced by the indefinite, which triggered the presence of existential closure, and the choice function variable introduced by the subsequent donkey pronoun.

(58) a. Every farmer who saw a donkey$_i$ fed it$_i$.

b. [∃f [every farmer who saw a$_f$ donkey fed it$_f$ ~~donkey~~]]

What is awry in this representation is the strength of quantification over choice functions.

Yet further missing alternatives. The sentence in (58) has the alternatives partially represented in (59). In addition to the missing exceptional scope universal quantifier alternative, additional alternatives are inconsequential: all the low-scope quantifier alternatives – these alternatives, namely, contain a free choice function variable in the main predicate that has no potential binder (in the fourth and fifth row of the example below, where the donkey pronouns with free choice function variables are underlined). Their exclusion due to strengthening is innocuous and can well be ignored (it may well be that not everyone who saw a donkey fed Eeyore, say, but still hold that everyone who saw a donkey fed the donkey that they saw).

(59) ALT([∃f [every farmer who saw a$_f$ donkey fed it$_f$ ~~donkey~~]]) =

{ ∃f∈CH: ∀x: farmer x saw f(donkey) → farmer x feeds f(donkey),
∃f∈CH′: ∀x: farmer x saw f(donkey) → farmer x feeds f(donkey),
~~∀x: (∃f∈CH: farmer x saw f(donkey)) → farmer x feeds f(donkey),~~
~~∀x: (∀y: donkey y → farmer x saw donkey y) → farmer x feeds f(donkey),~~
~~∀y: donkey y → ∀x: farmer x saw donkey y → farmer x feeds donkey y~~,
... | CH′ ⊆ CH }

This absence of inhibitive low-scope existential quantifier alternatives allows for a satisfaction of the Condition on Strengthening: the universal quantification meaning is not equivalent to any of the alternatives, as stated in (60), and can accordingly be generated by an application of matrix *exh*.

(60) $\forall$f$\in$CH: $\forall$x: farmer x saw f(donkey) $\rightarrow$ farmer x feeds f(donkey)

$\notin$ { $\exists$f$\in$CH: $\forall$x: farmer x saw f(donkey) $\rightarrow$ farmer x feeds f(donkey),
$\exists$f$\in$CH$'$: $\forall$x: farmer x saw f(donkey) $\rightarrow$ farmer x feeds f(donkey),
~~$\forall$x: ($\exists$f$\in$CH: farmer x saw f(donkey)) $\rightarrow$ farmer x feeds f(donkey),~~
~~$\forall$x: ($\forall$y: donkey y $\rightarrow$ farmer x saw donkey y) $\rightarrow$ farmer x feeds f(donkey),~~
~~$\forall$y: donkey y $\rightarrow$ $\forall$x: farmer x saw donkey y $\rightarrow$ farmer x feeds donkey y~~,
... | CH$'$ $\subseteq$ CH }

The strengthening of the donkey sentence operates on the alternatives provided in (59), where the central role is played by the existential closure domain alternatives in which the existential closure over choice functions ranges over proper subsets of the set of choice functions. On the assumption that the existential closure is by default unrestricted, all these domain alternatives are includable. Accordingly, the strengthened meaning of the donkey sentence is the one provided in (61).

(61) $[\![$[exh$_C$ [$\exists$f [every farmer who saw a$_f$ donkey fed it$_f$ ~~donkey~~]]]$]\!]$ =

(bas) $\exists$f$\in$CH: $\forall$x: farmer x saw f(donkey) $\rightarrow$ farmer x feeds f(donkey) $\wedge$
(inc) $\forall$CH$'$:$\emptyset\neq$CH$'\subset$CH $\rightarrow$ $\exists$f$\in$CH$'$:$\forall$x: farmer x saw f(donkey) $\rightarrow$ farmer x feeds f(donkey)
($\Leftrightarrow$ $\forall$y: donkey y $\rightarrow$ $\forall$x: farmer x saw donkey y $\rightarrow$ farmer x fed donkey y)

The meaning derived in (61) is the target meaning of the donkey sentence that we are after: namely, if every domain of choice functions, incl. every singleton domain, is such that every farmer who saw a donkey picked out by a choice function in that domain fed the donkey picked out, then every donkey is such that every farmer who saw that donkey fed that donkey.

The recourse to choice functions and strengthening, two independently-motivated and -developed mechanisms, thus allows us to capture the meaning of the donkey sentence in (1). Moreover, we are able to do this without any departure from the standard assumptions about the two mechanisms.

3.4 Some immediate consequences

Before we turn to some other instances of donkey anaphora in the final two sections of the paper, we discuss five consequences of the proposed analysis of donkey sentences. All of them have been recognized as desirable in the literature. We conclude the section by indicating that our choice of how to deal with exceptional indefinites was not accidental.

Strong readings of donkey anaphora. The meaning that we derived for the sentence in (1), repeated below, is called the 'strong reading' of donkey anaphora: every farmer who saw a donkey fed every donkey that they saw. The strong reading is at the very least the preferred reading of the sentence (cf. Kanazawa 1994, Chierchia 1995, Champollion et al. 2019, Chierchia 2022, etc).

(61) $[\![$[exh$_C$ [∃f [every farmer who saw a$_f$ donkey fed it$_f$ ~~donkey~~]]]$]\!]$ =

(bas) $\exists f{\in}CH$: $\forall x$: farmer x saw f(donkey) $\rightarrow$ farmer x feeds f(donkey) $\wedge$

(inc) $\forall CH'{:}\emptyset{\neq}CH'{\subset}CH \rightarrow \exists f{\in}CH'{:}\forall x$: farmer x saw f(donkey) $\rightarrow$ farmer x feeds f(donkey)

$\big(\Leftrightarrow \forall y$: donkey y $\rightarrow \forall x$: farmer x saw donkey y $\rightarrow$ farmer x fed donkey y$\big)$

We return to other potential construals of sentence (1) in Sect. 4. There we discuss how a weaker, less accessible reading of the sentence could be derived – namely, that every farmer who saw a donkey fed some donkey that they saw – and what factors may play a role in its accessibility.

Formal link condition. A consequence of the proposed derivation of donkey sentences is that only expressions that can take exceptional scope can act as antecedents to donkey anaphora, as our derivation piggybacks on exceptional scope (though see Sect. 5.3 for a qualification). And since only indefinites have this property, as we observed in Sect. 2, only indefinites may antecede a donkey pronoun. The 'formal link condition', which requires a donkey pronoun to have a 'syntactic' antecedent (cf. Heim 1982, 1990, Kadmon 1987), thus falls out immediately from the proposal. Consider the two examples in (62). Although the two restrictors in (62) consist of the same individuals, of people who are donkey-owners/own donkeys, only the restrictor in (62b) introduces an indefinite whose choice function construal allows for the binding of a subsequent donkey pronoun. The analysis of (62b) is identical to that of (1) and is provided in (63) for good measure.

(62) a. Everyone donkey-owner feeds it. *no donkey anaphora reading*

b. Everyone who owns a donkey feeds it. *donkey anaphora reading possible*

(63) a. [exh [$\exists$f [everyone who owns a_f donkey feeds it_f ~~donkey~~]]

b. $\forall$f$\in$CH: $\forall$x: person x owns f(donkey) $\rightarrow$ person x feeds f(donkey)

($\Leftrightarrow$ $\forall$y: donkey y $\rightarrow$ $\forall$x: person x owns donkey y $\rightarrow$ person x feeds donkey y)

Indistinguishable participants. The next two consequences of the proposal pertain to the treatment of donkey pronouns as E-type pronouns, that is, as pronouns that have a richer descriptive content than what is pronounced. In particular, we rehearse how our proposal is not subject to the usual critiques of the standard E-type approaches to donkey anaphora. Consider first the donkey sentence in (64), in which two indefinites antecede two donkey pronouns (cf. Heim 1990).

(64) If a bishop meets another bishop, he blesses him.

Although such sentences present a challenge to the E-type approaches of donkey anaphora (but see Elbourne 2010), the proposal here is not susceptible to it. Consider the parse of sentence (64) provided in (65): each indefinite introduces its separate choice function variable that is closed off at the matrix level; these same variables are then picked up by the subsequent pronouns.

(65) [exh_C [$\exists$f [$\exists$f$'$ [if a_f bishop meets $another_{f'}$ bishop he_f ~~bishop~~ greets $him_{f'}$ ~~bishop~~]]]]

The interpretation of the structure, provided in (66), corresponds to the observed reading of the sentence: every pair of bishops is such that if the pair meets, the pair participates in mutual blessing.[1] (We discuss further examples of indistinguishable participants in Sect. 5.3.)

(66) $\forall$f$\in$CH: $\forall$f$'\in$CH: f(bishop) meets f$'$(bishop) $\rightarrow$ f(bishop) greets f$'$(bishop)

Non-uniqueness. Another challenge for the standard E-type approaches to donkey anaphora pertains to non-uniqueness: roughly, if the donkey pronoun is a definite description, picking out a

[1]Not every indefinite in a donkey sentence needs to undergo exceptional scope construal. Sentence (ia) has a parse on which only one of the indefinites has an exceptional scope construal, provided in (ib), conveying that every bishop is such that if he meets a bishop, he is happy, provided in (ic) (see, e.g., Kadmon 1987, Heim 1990 for related discussion).

(i) a. If a bishop meets a bishop, he is happy.

b. [exh [$\exists$f [if $\exists$f$'$ a_f bishop meets $a_{f'}$ bishop, he_f ~~bishop~~ is happy]]

c. $\forall$f$\in$CH: ($\exists$f$'\in$CH: f(bishop) meets f'(bishop)) $\rightarrow$ f(bishop) is happy unique element in a predicate, there should only be a unique element in the predicate. This is problematic in light of donkey sentences whose meaning contradicts such a uniqueness inference. An example, modeled after Heim (1990) sage plant examples, is provided in (67):

(67) Every farmer who saw a donkey introduced it to another donkey he saw.

Although the proposal does derive uniqueness inferences of unbound pronouns and definite descriptions, as sketched in Sect. 2.2 (following Chierchia 2005), these inferences do not obtain in donkey sentences, as they are filtered out under binding. This means that the meaning of (67) can be represented as in (68): for each of the donkeys seen by a farmer, there is another donkey such that the farmer introduced the donkey they saw (as chosen by the respective choice function) to it.

(68) $\forall$f$\in$CH: $\forall$x: farmer x saw f(donkey) $\rightarrow$
$\exists$y: farmer x introduced f(donkey) to donkey y $\wedge$ y $\neq$ f(donkey)
($\Leftrightarrow$ $\forall$y: donkey y $\rightarrow$ $\forall$x: farmer x saw donkey y $\rightarrow$
$\exists$z: farmer x introduced donkey y to donkey z $\wedge$ y $\neq$ z)

Disjunction. In line with indefinites, disjunctive antecedents also introduce a choice function that can be picked up by a subsequent pronoun or a definite. An explicit discussion of this was suppressed in the preceding for brevity. We fix this now. Consider the sentence from the introduction:

(69) Every farmer who saw Donald or$_i$ Eeyore fed it$_i$.

The LF of the sentence is provided in (70a), where existential closure over choice functions applies at the matrix level and is strengthened to a universal meaning in the same way as this happens with indefinites, and where the disjunctive phrase serves also as an antecedent for subsequent NP ellipsis (cf. Elbourne 2008). The meaning of this LF is provided in (70b), and corresponds to the target meaning of the sentence – the conjunction of every farmer who saw Donald fed Donald and every farmer who saw Eeyore fed Eeyore.

(70) a. [exh [$\exists$f [[every farmer who saw [f [Donald or Eeyore]]] [fed it$_f$ ~~Donald or Eeyore~~]]]]
b. $\forall$f$\in$CH: $\forall$x: farmer x saw f({Donald, Eeyore}) $\rightarrow$ farmer x fed f({Donald, Eeyore})
($\Leftrightarrow$ ($\forall$x: farmer x saw Donald $\rightarrow$ farmer x fed Donald) $\wedge$
($\forall$x: farmer x saw Eeyore $\rightarrow$ farmer x fed Eeyore))

The proposal extends to cases where the pronoun picks out an event antecedent, as in (71a), and to cases in which a VP in the matrix clause is elided, as in (71b) (Rooth and Partee 1982).

(71) a. Every farmer who saw Donald or$_i$ fed Eeyore liked it$_i$.

b. Every farmer who saw Donald or$_i$ fed Eeyore yesterday hopes to △ today as well.

For illustration, the sentence in (71) can be assigned the structure in (72): disjunction creates a predicate of event descriptions; this same disjunctive phrase is generated and subsequently left unpronounced in the matrix clause (ellipsis may trivially obtain as syntactic identity obtains between the antecedent and elided disjunctive VPs). The meaning of the structure corresponds to the target conjunctive meaning of the sentence: every farmer who saw Donald yesterday hopes to see Donald today and every farmer who fed Eeyore yesterday hopes to feed Eeyore today.

(72) [exh [∃f [[every farmer who -ed [f [see Donald or$_i$ fed Eeyore]] yesterday]

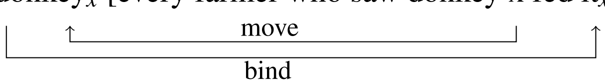
[[hopes to [f ~~[see Donald or$_i$ fed Eeyore]~~] today] as well]]]]

Other scope-shifting strategies. There is an abundance of analyses of exceptional scope indefinites that do not employ choice functions (e.g., Schwarzschild 2002, Brasoveanu and Farkas 2011, Demirok 2019, Charlow 2020, 2023). In the following, we contrast the choice function analysis with a representative of such analyses, the simple movement theory of exceptional scope indefinites, in relation to how the two analyses can be applied to donkey sentences (see Geurts 2000, Schwarz 2001, 2011 for a discussion of a simple movement theory).

Let us begin the comparison by looking at our initial example in (1). The two analyses of indefinites may assign the sentence the structures in (73): the first structure is familiar from above; the second one has the exceptionally moved indefinite bind the donkey pronoun.

(73) a. [exh$_C$ [∃f [every farmer who saw a$_f$ donkey fed it$_f$ ~~donkey~~]]]] *choice functions*

b. [exh$_C$ [a donkey$_x$ [every farmer who saw donkey x fed it$_x$]]] *simple movement*



In both cases, the Condition on Strengthening is satisfied – assuming that there are no wide scope universal quantifier alternatives for either existential closure over choice function or exceptionally moved indefinite – and thus exhaustification of both structures yields the same target meaning:

(74) ∀y: donkey y → ∀x: farmer x saw donkey y → farmer x fed donkey y

So far, so good. Is our choice of the choice function approach to exceptional indefinites thus accidental? There is a difference between the approaches when it comes to where the descriptive content of the indefinites is realized. While this does not matter much in a sentence like (1), it is of consequence in more involved examples. For illustration, consider the sentence in (75), where the indefinite contains a variable that is bound within the relative clause. The choice function analysis can assign the sentence the structure in (76a), which has the target interpretation in (76b). (Note that the parallelism required for the NP ellipsis in the pronoun is satisfied, as there is binding from parallel positions. We are ignoring Winter's matching condition for brevity; see Sect. 4.2 for discussion.)

(75) Every farmer who$_k$ saw a donkey$_i$ of their$_k$ uncle's fed it$_i$.

(76) a. [exh [∃f [[every farmer [who$_x$ saw a$_f$ d. of their$_x$ unc.]]$_z$ [fed it$_f$ ~~d. of their$_z$ unc.~~]]]]]

b. ∀f∈CH: ∀x: farmer x saw f(donkey of x's uncle) → farmer x fed f(donkey of x's uncle)

In contrast, the simple movement theory fails to derive the right reading of the sentence. The reason for this is that in order for the pronoun *their* in the antecedent indefinite to be bound, reconstruction for binding is needed. But this necessitates reconstruction for scope (cf. Fox 2000, Demirok 2019, Charlow 2020, among others). In turn, this should make the binding of the donkey pronoun by the indefinite unavailable. Accordingly, the feature of the choice function approach to exceptional scope indefinites to let the descriptive content of the indefinites stay *in situ* is vital. A different approach to exceptional scope indefinites could substitute the choice function approach in our proposal only to the extent it would allow for such a construal.

4 Variability

Not all donkey sentences are built on universal quantifiers, though all our examples have been so far – rather, quantified sentences of different quantificational forces can host donkey anaphora. A fully general analysis of donkey sentences that encompasses such sentences as well requires a minor (and independently motivated) addition to our current setup: the Skolemization of choice functions.

4.1 The initial puzzle

Consider the donkey sentence in (77), which is not built on a universal quantifier like our above examples, but rather on a numeral quantifier (*five farmers who* etc):

(77) Five farmers who saw a donkey$_i$ fed it$_i$.

Although an exceptional scope construal of the indefinite in (77), provided in (78), corresponds to a reading of the sentence, it is far from its target reading. The intuitive donkey anaphora reading, namely, leaves it open whether any donkey was seen and fed by five farmers – and this is decidedly not the case on the exceptional scope construal of the indefinite in (78). The meaning of sentence on such a construal entails that there is a donkey that was seen and fed by five farmers. Accordingly, an alternative derivation of (77) must be found.

(78) a. [∃f [five farmers who saw a$_f$ donkey fed it$_f$ ~~donkey~~]]

b. ∃f∈CH: |{x | farmer x saw f(donkey) ∧ farmer x fed f(donkey)}| ≥ 5

(⇔ ∃y: donkey y ∧ |{x | farmer x saw donkey y ∧ farmer x fed donkey y}| ≥ 5)

An alternative derivation is, fortunately, close at hand.

4.2 Skolemization

The choice function machinery introduced above does not suffice to capture all the exceptional readings of indefinites that have been observed – its expansion is required. We motivate it with examples due to Winter (2000, 2002), Schlenker (2006), and Elbourne (2005).

Functional (in)definites. Consider the sentence in (79). The sentence can be evaluated as true against the backdrop of the parenthesized context description (the example is from Schlenker 2006).

(79) [*Context: Every student in my syntax class has one weak point—John doesn't understand Case Theory, Mary has problems with Binding Theory, etc. Before the final, I say:*] If every student makes progress in some area, nobody will flunk the exam.

That the sentence can provide a true description of the context is unexpected both on the classical and the choice function construal of the indefinites discussed above. On the classical construal, provided in (80a), it is predicted that if every student makes progress even in an area distinct from the one that is their weak point, nobody will flunk the exam. This meaning is too weak. On the choice function construal, provided in (80b), it is predicted that there is a single area in which everyone must make progress in order for nobody to flunk the exam. This meaning is too strong. Accordingly, neither of the analyses is adequate for the example at hand.

(80) a. #($\forall$x: student x $\rightarrow$ $\exists$y: x makes progress in area y) $\rightarrow$ nobody flunks
b. #$\exists$f: (($\forall$x: student x $\rightarrow$ x makes progress in f(area)) $\rightarrow$ nobody flunks)

Another puzzling example is provided in (81) (Winter 2002). The example shows that even if the complement of the indefinite contains a bound variable, all analyses available to us fail.

(81) [*Context: Every child who hates his mother will develop a complex, and no one else will.*]
Every child who hates <u>a certain woman he knows</u> will develop a complex.

Take the context described in (81), and assume it contains two kids: Gal and Tal each love their own mothers but hate the other's mother (and don't know any other women, say). The sentence in (81) leaves it open whether Gal and Tal will develop a complex; in fact, we may get an implicature that they will not. But this is unexpected on the analyses of the sentence available to us. On the classical construal of the indefinite, we have the meaning in (82a) that is true as long as a child hates some woman he knows; this incorrectly predicts that Gal and Tal will develop a complex if (81) is true. On the choice function construal of the indefinite, we have the meaning in (82b), which incorrectly entails that one of Gal and Tal will develop a complex (depending on whose mother is picked out by a verifying choice function).

(82) a. #$\forall$x: ($\exists$y: child x knows woman y $\wedge$ child x hates woman y) $\rightarrow$ x has a complex
b. #$\exists$f$\in$CH: $\forall$x: child x hates f(woman that x knows) $\rightarrow$ x has a complex

We thus see that choice function machinery introduced above must be enriched to allow for adequate analyses of the sentences in (79) and (81). But this is not all. Similar patterns can be observed with definites as well. For example, in the sentences in (83), due to Winter (2000) and Elbourne (2005), the value of the definite descriptions varies with soldiers and men, respectively:

(83) a. [*Context: At a shooting range, each soldier was assigned a different target and had to*

shoot at it.] Every soldier hit the target.

b. [*Context: Every man was paired with a different woman for the training exercise.*] Every man liked the woman, and things went smoothly.

Although there is clearly no unique target or woman that the definites could pick out in the described contexts in (83), there is a unique target *per soldier*, and a unique woman *per man*. A way of capturing this relativization of uniqueness is needed.

Skolemization. Both families of issues are resolved by an expansion of the notion of choice function (Winter 2002, Schlenker 2006, among others). In particular, we want to allow the individuals picked out by a choice function to co-vary with the elements in the domain of a c-commanding quantifier. Although this can be achieved in a fully general manner (see Winter 2002, 2004, Schlenker 2006 for specifics), we restrict ourselves to cases like the above ones in which the variation is with a single c-commanding quantifier. An expanded notion of a choice function that suffices for our purposes is in (84), which complements the notion in (17) (again, for each individual, we take it for granted that a choice function applied to it and a predicate returns an individual).

(84) Let E be a non-empty set of individuals. A function f: $E \to (\mathscr{P}(E) \to E)$ is a (1-ary Skolem) choice function, $f \in CH^{+}$, iff for every $x \in E$ and for every $A \subseteq E$: if A is not empty then $f(x)(A) \in A$.

We can now assign the sentences in (79)-(83) structures like (85)-(86) (in fact, Winter 2002 argues that in specific cases such structures must be assigned to the sentences, see his 'matching condition'). The individual argument of the (expanded) choice function, the so-called Skolem index, is subscripted on the choice function, and is bound by a c-commanding element in the sentences under discussion (see Chierchia 2001 on the obligatoriness of a Skolem index).

(85) ∃f [if every student$_x$ makes progress in some$_{f_x}$ area, no student flunks]]

(86) [every soldier$_x$ hit the$_{f_x}$ target]]

The meanings that we obtain for these structures are provided in (87)-(88): the construal in (85) conveys that there is a (salient) assignment of study areas to students such that if every student advances in the area assigned to that student (that is, their weakest area), nobody will flunk the exam; the structure in (86) conveys that each soldier hit the target that they are mapped to by the salient assignment from soldiers to targets (that is, to targets the soldiers were assigned to by their commanding officer). These meanings correspond to the observed readings of the sentences.

(87) $\exists f \in CH^{+}$: ($\forall$x: student x $\rightarrow$ student x makes progress in f(x)(area)) $\rightarrow$ no student flunks

(88) $\forall$x: soldier x $\rightarrow$ soldier x hit f(x)(target)

This independently needed expansion can now be put to work in donkey sentences.

4.3 Deriving donkey anaphora: Step 3 of 3

The introduction of Skolemized choice functions into our toolbox allows us to provide new representations for the donkey sentence we started this section with, one in which the choice functions of the indefinite and pronoun apply to an additional variable bound by a c-commanding quantifier (for readability, we skip intermediate binding sites and assume direct binding by distributive *five*).

(89) a. Five farmers who saw a donkey fed it.

b. [$\exists$f [five$_x$ farmers who saw a$_{f_x}$ donkey fed it$_{f_x}$ ~~donkey~~]]

Skolemized choice functions allow us to avoid the inference that there is a donkey that was seen and fed by five people. This is due to the potential variation of donkeys selected by the Skolem choice function across farmers: each farmer may have seen and fed a different donkey. In other words, the binding of a Skolem index gives the impression of dragging the existential force of indefinites into the scope of the binder of the Skolem index (cf. Schwarz 2001, 2011).

(90) $\exists f \in CH^{+}$: $|\{$x | farmer x saw f(x)(donkey) $\wedge$ farmer x fed f(x)(donkey)$\}| \geq 5$

Weak readings of donkey anaphora. The interpretation derived in (90) corresponds to a weak reading of donkey anaphora: five farmers who saw one (or more) donkeys fed at least one of the donkeys they saw. This complies with the generalization about the readings of such sentences, stated in (91) (Kanazawa 1994, Sect. 2.1.3):

(91) An existential donkey sentence like (77) only has a weak reading.

In fact, this and at least some other related observations put forward by Kanazawa can be shown to follow from the proposal in this paper. In the case of (91), to substantiate this claim, we would have to show that a strong reading cannot be derived for such sentences. We return to the issue of strength of donkey anaphora in the following subsection.

Skolemization across the board? The representations that we employed in dealing with sentences like (77) can be transferred to our original examples, without affecting any of our conclusions. In short, the sentences in (1) could be parsed with a Skolemized choice function, as in (93a), yielding a strong interpretation of the donkey pronoun, in parallel to what we did in the preceding section.

(92) a. [exh [∃f [every$_x$ farmer who saw a$_{f_x}$ donkey fed it$_{f_x}$ ~~donkey~~]]]

b. $\forall f \in CH^+$: ∀x: farmer x saw f(x)(donkey) → farmer x fed f(x)(donkey)

(⇔ ∀y: donkey y → ∀x: farmer x saw donkey y → farmer x fed donkey y)

Although arguments for the Skolemization of choice functions across the board exist (esp., Chierchia 2001), we have not yet found independent support for this conclusion in the domain of donkey sentences. Hence, we opt for simpler representations wherever this is possible.

4.4 Additional readings and restrictions on choice functions

We discussed two construals for sentence (77), repeated below: a simple choice function construal in (94a) as well as a Skolemized choice function construal in (94b). Both of them give rise to the sentence's observable readings, the latter of which is the target donkey sentence reading.

(77) Five farmers who saw a donkey$_i$ fed it$_i$.

(93) a. [∃f [five farmers who saw a$_f$ donkey fed it$_f$ ~~donkey~~]]

b. [∃f [five$_x$ farmers who saw a$_{f_x}$ donkey fed it$_{f_x}$ ~~donkey~~]]

Can the meanings of these structures be strengthened? It is clear that a universal quantification paraphrase of the donkey dependency in (92), a conceivable output of strengthening (93b), does not correspond to an observable meaning of the sentence.

(94) $\forall y$: donkey y → $|\{x \mid$ farmer x saw donkey y ∧ farmer x fed donkey y$\}| \geq 5$

⇒ This is not an observable reading of (77)!

It turns out that this strengthening is correctly predicted to be unavailable in our setup, due to certain inhibitive alternatives to the sentence. We show that this differs from what is the case in the universal quantifier sentences. We also address a connected question of whether there are other non-universal quantification sentences that *do* allow for such an additional, strengthened reading. In answering this question, one needs to consider a full set of alternatives to a donkey sentence as well as any independent constraints that may affect the parse of the sentence, as summarized in (95). Accordingly, the question can only be answered on a case-by-case basis.

(95) As the derivation of donkey sentences builds on exhaustification and choice functions, their readings are conditioned by (i) the (relevant) alternatives to them, (ii) the independent constraints on exhaustification, and (iii) the independent constraints on choice functions.

In the following, we look at a buffet of examples that illustrate how different factors may influence the interpretation of donkey sentences: sentences like (77), under (a) below; universal quantifier sentences like (1), under (b) below; sentences with comparative quantifiers, under (c) below; and sentences with downward-entailing quantifiers, under (d) below. Although a discussion of each of these classes is instructive for a different reason, the full space of expectations is not covered by them. Further inquiry is hence necessary, but its pursuit is beyond the scope of this note.

(a) Additional, inhibitive alternatives. In the preceding sections, we zoomed in on the alternatives activated by the indefinites alone. As we will demonstrate below, looking at additional alternatives would not have affected our conclusions. The state of affairs is different, however, when it comes to examples like (77). A fuller set of alternatives to that sentence is provided in (96): in addition to the alternatives considered in the preceding sections, which are built on the low existential and universal quantifier alternatives to the indefinite and are provided in the first four rows of (96), the sentence also has the alternatives obtained by replacing the numeral with other numerals, and by replacing the definite DP with other (quantificational) DPs, two of which are shaded in (96) (the pertinent replacements are underlined).

(96) ALT([∃f [five$_x$ farmers who saw a$_{f_x}$ donkey fed it$_{f_x}$ ~~donkey~~]]) =

$$\{\ \exists f \in CH^{+}: |\{x \mid (\text{farmer x saw f(x)(donkey)}) \wedge (\text{farmer x fed f(x)(donkey)})\}| \geq 5,$$

$$\exists f \in CH^{+\prime}: |\{x \mid (\text{farmer x saw f(x)(donkey)}) \wedge (\text{farmer x fed f(x)(donkey)})\}| \geq 5,$$

$$|\{x \mid (\exists f: \text{farmer x saw f(x)(donkey)}) \wedge (\text{farmer x fed f(x)(donkey)})\}| \geq 5,$$

$$|\{x \mid (\forall y\text{: donkey y} \rightarrow \text{farmer x saw donkey y}) \wedge (\text{farmer x fed f(x)(donkey)})\}| \geq 5,$$
$$|\{x \mid (\exists f\text{: farmer x saw f(donkey)}) \wedge (\underline{\exists f\text{:}}\text{ farmer x fed f(x)(donkey)})\}| \, \underline{\geq 6},$$
$$|\{x \mid (\exists f\text{: frmr x saw f(x)(donkey)}) \wedge (\underline{\forall y\text{: donkey y}} \rightarrow \text{frmr x fed donkey y})\}| \geq 5,$$
$$\ldots \mid CH^{+\prime} \subseteq CH^{+}\}$$

Both shaded alternatives in (96) are excludable. Their joint exclusion is consistent and is part of all maximal sets of exclusions. And it contradicts the universal quantification strengthening of the sentence, as stated in (97): if it is false that six (or more) farmers saw and fed a donkey, and false that five farmers who saw a donkey fed every donkey, then it cannot hold that every donkey was seen and fed by one of five farmers. This means that the strengthening of the sentence cannot yield a universal quantification meaning. (This example illustrates the fact that the Condition on Strengthening in (39) is an approximation of a full condition, as in this case equivalence obtains between the sentence and a conjunction of two alternatives to it; see, e.g., Singh et al. 2016 for further details. Note also that the sentence need not entail the negation of all excludable alternatives, as some of these might not be relevant in the context. This is, however, irrelevant for determining inclusion, which is context-insensitive; see Bar-Lev and Fox 2020 for details.)

(97) $|\{x \mid (\exists f\text{: farmer x saw f(donkey)}) \wedge (\exists f\text{: farmer x fed f(x)(donkey)})\}| \leq 5 \wedge$
$|\{x \mid (\exists f\text{: farmer x saw f(x)(donkey)}) \wedge (\forall y\text{: donkey y} \rightarrow \text{farmer x fed donkey y})\}| < 5$
$\Rightarrow \neg\big(\forall y\text{: donkey y} \rightarrow |\{x \mid (\text{farmer x saw donkey y}) \wedge (\text{farmer x fed donkey y})\}| \geq 5\big)$

In conclusion, the sentence in (77) is two-way ambiguous (if we ignore the non-donkey-anaphora readings). First: it allows for a simple exceptional scope construal in (93a). Second: it allows for a weak donkey anaphora construal in (93b), where a Skolemized choice function is employed.

(93) a. [∃f [five farmers who saw a_f donkey fed it_f ~~donkey~~]]
b. [∃f [$five_x$ farmers who saw a_{f_x} donkey fed it_{f_x} ~~donkey~~]]

(b) Additional, non-inhibitive alternatives. Let us now turn to our original examples, and check whether our setting aside of alternatives that inhibited the strengthening of (77) was justified. The fuller set of alternatives of the sentence in (1) is provided in (98): in addition to the alternatives in (59), we include alternatives in which the pronoun is replaced by an existential and a universal quantifier, two representative instances of which are provided on the bottom of (98).

(98) ALT([∃f [every farmer who saw a_f donkey fed it_f ~~donkey~~]]) =

{ ∃f∈CH: ∀x: farmer x saw f(donkey) → farmer x feeds f(donkey),

∃f∈CH′: ∀x: farmer x saw f(donkey) → farmer x feeds f(donkey),

∀x: (∃f: farmer x saw f(donkey)) → farmer x feeds f(donkey),

∀x: (∀y: donkey y → farmer x saw donkey y) → farmer x feeds f(donkey),

∀x: (∃f: farmer x saw f(donkey)) → (∃f: farmer x feeds f(donkey)),

∀x: (∃f: farmer x saw f(donkey)) → (∀y: donkey y → farmer x feeds donkey y),

... | CH′ ⊆ CH}

While the newly considered universal quantifier alternative is excludable (the penultimate row above), the newly considered existential quantifier alternative is not (the row preceding the penultimate one). This can be appreciated by noticing that the negation of this latter alternative entails that at least one existential closure domain alternative must be false, as stated in (99). Thus, the existential quantifier alternative cannot be in all maximal exclusion sets of alternatives to the sentence.

(99) ¬(∀x: (∃f: farmer x saw f(donkey)) → (∃f: farmer x feeds f(donkey)))

⇒ ∃f: ¬(∀x: farmer x saw f(donkey) → farmer x feeds f(donkey))

As the negation of the excludable universal quantifier alternative is compatible with all the existential closure domain alternatives being true, the strengthening can apply and yield the target universal quantification meaning of the donkey sentence, as was the case previously. Hence, no important corners were cut by ignoring the additional alternatives in deriving the meaning of (1).

(iii) Some predictions. A broad new prediction arises from our preceding discussion: additional, strengthened readings should be accessible for existential donkey sentences that do not have inhibitive alternatives. A pair of examples instantiating this prediction is provided in (100), together with their strengthened reading: every class of mine is such that most students in it liked it (see Bar-Lev and Fox 2020, fn. 46, for a related discussion).[2]

[2]The examples discussed in the main text are part of a larger series of predictions of the proposal, many of which are independent of donkey sentences. In particular, the exceptional scope construal of disjunction and indefinites, coupled with the missing exceptional scope construal of universal quantifiers, opens up the possibility of strengthening disjunctive and existential meanings to conjunctive and universal ones at the level of the exceptional scope of disjunction and indefinites (which can of course obtain only if the target conjunctive or universal quantification meaning is not equivalent

(100) a. Most students in a class of mine liked it.

b. Most students who attended a class of mine liked the class.

$$\forall x\text{: class of mine x} \rightarrow \frac{|\{y \mid \text{student y in class x of mine likes class x of mine}\}|}{|\{y \mid \text{student y in class x of mine}\}|} \geq \frac{1}{2}$$

The judgments become perhaps even crisper when we replace the indefinite with disjunction, as in (101). The sentences in (101) can convey the strengthened meaning that most students in my pragmatics class liked it, and that most students in my semantics class liked it, as stated in (102).

(101) a. Most students in my pragmatics or my semantics class liked it.

b. Most students who attended my semantics or my pragmatics class liked the class.

$$\frac{|\{y \mid \text{student y in my semantics class liked my semantics class}\}|}{|\{y \mid \text{student y in my semantics class}\}|} \geq \frac{1}{2} \wedge$$
$$\frac{|\{y \mid \text{student y in my pragmatics class liked my pragmatics class}\}|}{|\{y \mid \text{student y in my pragmatics class}\}|} \geq \frac{1}{2}$$

These readings are derived in a straightforward manner. Importantly, unlike in the simple numeral example above, there is no confluence of alternatives that would block the strengthening of the sentence: it may well hold that, in addition to the strengthened meaning, not more than half of

to a conjunction of the alternatives to the sentence). In addition to the examples in the main text, one further prediction is illustrated on the ellipsis sequence in (i), where the disjunction in the antecedent VP gives rise to a free choice inference that may be derivable only locally (with embedded exhaustification), but no local free choice is generated at the ellipsis site (see Alxatib 2023 for the example and discussion). The target reading can be derived by matrix exhaustification, as in (ii), without any modification of the assumptions from the main text.

(i) Chris wants to allow Kim to eat salad or soup, but Mary doesn't. ($\Leftrightarrow$ Chris wants to allow Kim to eat salad $\wedge$ Chris wants to allow Kim to eat soup $\wedge$ $\neg$(Mary wants to allow Kim to eat soup or salad))

(ii) a. Antecedent: [exh [$\exists$f Chris [wants PRO_C to allow [Kim to eat [f salad or soup]]]]]

Ellipsis: [not_F [$\exists$f $Mary_F$ [wants PRO_C to allow [Kim to eat [f salad or soup]]]]]]

b. Antecedent: $\forall$f$\in$CH: Chris want ot allow Kim to eat f({salad, soup})

Ellipsis: $\neg$($\exists$f$\in$CH: Mary wants to allow Kim to eat f({salad, soup}))

Although the implementation of exceptional scope adopted in (ii) matches the one in the main text, the prediction holds independently of it. Due to the narrow goals of this note, and the limits on space and attention, various other predictions as well as the potential role of the analysis of exceptional scope will be explored elsewhere.

the students in my classes taken together like a (or every) class of mine.

A similar state of affairs seems to obtain with modified numeral examples as well, exemplified in (102), and with simple plural existential quantifiers, exemplified in (103). Both sets of sentences indeed seem to allow for a strengthened reading, which is provided below the examples.

(102) a. More than five students in a class of mine liked it.

b. More than five students who attended a class of mine liked the class.

$\forall$x: class of mine x $\rightarrow$ |{y | student y in class x of mine likes class x of mine}| $>$ 5

(103) a. Some students in a class of mine liked it.

b. Some students who attended a class of mine liked the class.

$\forall$x: class of mine x $\rightarrow$ |{y | student y in class x of mine likes class x of mine}| $>$ 1

The described readings are generated as in our previous examples, with no alternatives playing an inhibitive role. In the comparative quantifier examples, the notion that there should be fewer inhibitive alternatives is in line with the observation that the sentences do not admit a strengthening inference with respect to the precise numerosity expressed by the quantification (see, e.g., Krifka 1999, Fox and Hackl 2006, Mayr 2013 for discussion). In the plural existential quantifier examples, there are also no excludable alternatives that should block the strengthening (cf. Fox 2007 for related discussion). Before proceeding, it is worth reiterating that the non-strengthened readings are possible for the above sentences as well, and may even be preferred, especially when the strengthened readings clash with the shared assumptions of the conversational participants. We return to the issues of disambiguation and parsing preferences below.

(iv) Downward-entailment. Consider the donkey sentence built on a negative universal quantifier in (104): after strengthening, the sentence has the target donkey anaphora interpretation on which no feeding of donkeys by farmers who saw them took place, as provided in (105).

(104) No farmer who saw a donkey fed it.

(105) a. [exh [$\exists$f [no$_x$ farmer who saw a$_{f_x}$ donkey fed it$_{f_x}$ ~~donkey~~]]]

b. $\forall$f$\in$CH$^+$: $\neg\exists$x: farmer x saw f(x)(donkey) $\wedge$ farmer x fed f(x)(donkey)

($\Leftrightarrow$ $\forall$y: donkey y $\rightarrow$ $\neg\exists$x: farmer x saw donkey y $\wedge$ farmer x fed donkey y)

When we turn to non-universal quantifier sentences, however, we appear to fail to derive the target meanings. For example, consider the sentence in (106) with a downward-entailing comparative quantifier. It conveys that the number of farmers who saw and fed a donkey is lower than five.

(106) Fewer than five farmers who saw a donkey fed it.

If we apply existential closure over choice functions at the matrix level in (106), neither the simple nor the strengthened construal of the sentence entails the target meaning. On the simple construal, which yields the interpretation in (107), there may be many choice functions that would fail to verify the sentence. Thus, the sentence would be compatible with the number of farmers who saw and fed a donkey being greater than or equal to five.

(107) $\exists$f$\in$CH$^+$: $|\{$x $|$ farmer x saw f(x)(donkey) $\wedge$ farmer x fed f(x)(donkey)$\}| < 5$

Compatible with: Five (or more) farmers who saw a donkey fed the donkey they saw.

On the strengthened construal, the issue persists. Namely, the sentence entails that every donkey was such that fewer than five farmers who saw it fed it. This is compatible with every donkey being seen and fed by four (different) farmers, that is, it is again compatible with the number of farmers who saw a donkey and fed that donkey being greater than or equal to five. Thus, neither parse yields the target meaning. To boot, neither parse seems to yield an available reading of the sentence at all.

(108) $\forall$f$\in$CH$^+$: $|\{$x $|$ farmer x saw f(x)(donkey) $\wedge$ farmer x fed f(x)(donkey)$\}| < 5$

Compatible with: Five (or more) farmers who saw a donkey fed the donkey they saw.

The observed interpretation of the sentence in (106) can be derived, however. The derivation requires us to adopt a decomposition of downward-entailing quantifiers into a downward-entailing and a quantificational component (e.g., Hackl 2000, Takahashi 2006, Nouwen 2010, Buccola and Spector 2016). If we adopt such decomposition, as we should independently, the sentence in (106) may be assigned the structure in (109), where the existential closure over choice functions is sandwiched between the downward-entailing and the quantificational component of the comparative quantifier:

(109) [fewer than 5]$_n$ [$\exists$f [n-many$_x$ farmers who saw a$_{f_x}$ donkey fed it$_{f_x}$ donkey]]

The interpretation of (109), provided in (110), yields the target meaning of the sentence: five is greater than the maximal number of farmers such that there is an assignment of donkeys to them such that they each saw and fed a donkey assigned to them.

(110) $|\{x \mid \exists f \in CH^{+}$: farmer x saw f(x)(donkey) $\wedge$ farmer x fed f(x)(donkey)$\}| < 5$

But what warrants (109) being the only parse of the sentence in (106) and, hence, (110) its only meaning? Although a fully satisfactory answer to this question is outstanding, the restriction on the parse of the sentence is subsumed by an independent descriptive generalization observed for choice functions. Specifically, Chierchia (2001) and Schwarz (2001) observed that an empirically adequate choice function analysis of indefinites requires the choice functions to be existentially closed in the scope of a downward-entailing operator if their Skolem index is bound in its scope.

(111) **Constraint on choice functions:** When a downward-entailing operator c-commands a Skolem choice function, the existential closure over that choice function must occur in the scope of the downward-entailing operator if the binder of the Skolem index occurs in it.

As the behavior of choice functions in donkey sentences should be subject to the same restrictions as choice functions more generally, it holds that parses having the schematic form of (112a) are ruled out (where existential closure happens high and which have incorrectly weak meanings), and parses having the schematic form of (112b) are admitted (where existential closure happens in an intermediate position and which have the observed meaning).

(112) a. *[∃f [[fewer than 5] [... n-many$_x$ ... a$_{f_x}$ donkey ... it$_{f_x}$ ~~donkey~~ ...]]] *(due to (111))*
b. [fewer than 5] [∃f [... n-many$_x$ ... a$_{f_x}$ donkey ... it$_{f_x}$ ~~donkey~~ ...]]

Variation in strength. We have seen that both universal and non-universal donkey sentences can be adequately analyzed by recourse to choice functions. The interpretation of the sentences is modulated by the alternatives they induce and by the independent constraints on choice functions:

(95) As the derivation of donkey sentences builds on exhaustification and choice functions, their readings are conditioned by (i) the (relevant) alternatives to them, (ii) the independent constraints on exhaustification, and (iii) the independent constraints on choice functions.

With respect to the constraints on choice functions, it holds that if the quantifier hosting the antecedent indefinite and the donkey pronoun is downward-entailing, the closure must happen at an intermediate position due to the constraint in (111). Since in the scope of a downward-entailing operator, exhaustification is dispreferred (e.g., Fox and Spector 2018), this weak reading is preferred; in the case of (106), the reading is that fewer than five farmers who saw a donkey fed a donkey they saw. A strong reading may be obtained to the extent intermediate exhaustification can be forced.

(113) **Downward-entailing quantifiers:**
A weak reading of donkey anaphora is preferred over a strong reading

Turning to donkey sentences built on universal quantifiers, the donkey sentences tend to always be strengthened. But can we obtain a weak reading as well? One way of achieving this would be by restricting the domain of the existential closure over choice functions in an appropriate way, for example, to choice functions each of which picks out just a single seen donkey for a single farmer who saw it. Exhaustification would then give us the weaker reading that every farmer who saw a donkey, as picked out by a specific choice function, fed that donkey; and nothing is entailed about the other donkeys potentially seen by the farmer. It goes without saying that such an accommodation of the domain of existential closure would be non-trivial and would require rich contextual support, leaving the strong reading as the preferred one (see Pelletier and Schubert 1989 for some convincing examples of weak readings; Bar-Lev 2018 for a related discussion of non-maximal readings of definites; and Champollion et al. 2019 on the role of context in deriving the different readings).

(114) **Universal quantifiers:**
A strong reading of donkey anaphora is preferred over a weak reading.

In non-universal quantifier sentences, the availability of strengthening depends on the alternatives induced by the sentence. In some cases, we have seen it to be unavailable (for example, with *five*); in other cases, we have seen it to be possible, but perhaps dispreferred (for example, with *most*).

(115) **Existential quantifiers:**
To the extent that a strong reading can be generated at all (which varies across quantifiers), a weak reading of donkey anaphora is preferred over a strong reading.

Similarly to other instances of ambiguities in strengthening, various contextual factors may affect the accessibility of different readings, and the preferences for specific disambiguations. This calls for extensive further study (see, e.g., Denić and Sudo 2022 on non-monotonic donkey sentences).

5 Outlook

We captured the behavior of donkey sentences by conscripting (Skolemized) choice functions and exhaustification in grammar. The two mechanisms were put into service without departing from the standard assumptions about them. However, the empirical landscape we focused on was, of necessity, limited. Research into donkey anaphora uncovered a multitude of intricate data that we could not attend to, and that may prove to be challenging for the setup described above. We turn to three representative classes of such data in conclusion, advocating for perseverance.

5.1 Disjunction

Donkey anaphora are not only possible in quantificational sentences – two non-quantificational environments hosting them are discussed in this and the next subsection. We begin with disjunctive sentences. One famous example of donkey anaphora across disjunction is provided in (116) (attributed to Partee in Chierchia 1995, see also Evans 1977), where a negated indefinite seems to antecede a donkey pronoun in a subsequent disjunct.

(116) Either there isn't a bathroom$_i$ in Morrill Hall, or it$_i$ is in a funny place.

The analysis of examples like these led to various theoretical innovations in the donkey anaphora literature (e.g., Krahmer and Muskens 1995, Rothschild 2017, Elliott 2020, Mandelkern 2022a). Applying our proposal to them, we seem to obtain the desired interpretation from the outset. Specifically, the sentence in (116) can be parsed as provided in (117): existential closure over choice functions applies exceptionally high (above disjunction), it binds the subsequent choice function of the pronoun, and it is strengthened.

(117) [exh [∃f [not [there is a$_f$ bathroom in MH]] [or [it$_f$ ~~bathroom~~ is in a funny place in MH]]]]

The meaning of the sentence prior to strengthening is exceedingly weak: there exists a bathroom that is either not in Morrill Hall, or it is in a funny place of Morrill Hall – this is a contextual triviality, as great many bathrooms are are not in Morrill Hall. The triviality is avoided by exhaustification, which yields a meaning that matches the target meaning of the sentence.[3] Specifically, the sentence has as includable alternatives again all the existential closure domain alternatives; the excludable alternatives are the various universal quantifier alternatives to the second disjunct, some of which may well be relevant. Accordingly, the exhaustification yields the meaning in (118): every bathroom is such that it either is not in Morrill Hall or it is in a funny place in Morrill Hall (and some bathrooms are not in Morrill Hall).

(118) $\forall$f$\in$CH: $\neg$(f(bathroom) is in MH) $\vee$ f(bathroom) is in a funny place in MH
($\Leftrightarrow$ $\forall$x: bathroom x $\rightarrow$ ($\neg$bathroom x is in MH $\vee$ bathroom x is in a funny place in MH))
Optional exclusion: $\neg$($\forall$x: bathroom x $\rightarrow$ bathroom x is in a funny place in MH)

This analysis of donkey anaphora resolution builds exclusively and straightforwardly on the mechanisms developed in the preceding sections (choice function binding, strengthening). It does not invoke any new assumptions about the semantics of indefinites or special copying/accommodation mechanisms. The flipside is that the analysis makes the principles of anaphora resolution in such examples appear to be independent of those involving presupposition projection. Whether an important connection is thereby missed is left to future study.

5.2 Conjunction

Donkey anaphora appear also in conjunctive and juxtaposed sentences. In these cases, the dependency between the antecedent indefinite and the donkey pronoun can be expressed only with existential quantification. For illustration, consider the conjunctive sentences in (119). In (119a), the sentence conveys that there is a phonologist such that Gali met that phonologist and that phonologist was nice. This meaning is derived in (120), where the existential closure over choice functions scopes above conjunction.

(119) a. Gali met a phonologist$_i$ and she$_i$ was nice.
b. Gali met a phonologist$_i$ and if she$_i$ was nice, she was happy.

[3] In examples in which negative indefinites (*no bathroom*, say) replace the negated indefinites, exhaustification is arguably necessitated also by the indefinite component of the 'negative indefinite' being an NPI (e.g., Chierchia 2013). Hence, it must occur in an environment that is downward-entailing with respect to its domain, which exhaustification can deliver. The consequences of having this path to creating NPI-hospitable environments cannot be explored here.

(120) a. [∃f [[Gali met a_f phonologist] [and [she_f ~~phonologist~~ was nice]]]

b. ∃f∈CH: Gali met f(phonologist) ∧ f(phonologist) was nice

$\big($⇔ ∃x: phonologist x ∧ Gali met phonologist x ∧ phonologist x was nice$\big)$

The sentence in (119b), in which the donkey pronoun is embedded in the antecedent of a conditional, similarly conveys that there is a phonologist such that Gali met that phonologist and if that phonologist was nice, Gali was happy. This meaning is derived from the representation in (121).

(121) a. [∃f [[Gali met a_f phonologist] [and [if she_f ~~phonologist~~ was nice Gali was happy]]]

b. ∃f∈CH: Gali met f(phonologist) ∧ $\big($f(phonologist) was nice → Gali is happy$\big)$

$\big($⇔ ∃x: phonol.x ∧ Gali met phonol.x ∧ (phonol.x was nice → Gali was happy)$\big)$

Overgeneration and additional alternatives. No stronger readings can be derived for the sentences in (119), that is, we cannot obtain the reading that every phonologist was met by Gali and was nice, and that every phonologist was met by Gali and if she was nice, Gali was happy. This follows from the fact that the Condition on Strengthening is not met in these sentences. In particular, consider the alternatives to the sentences that are spotlighted in (122)-(123). They are derived from the original sentences by the recipe discussed above: the universal quantifier replaces the indefinite and the pronoun in the first example; the universal quantifier replaces the indefinite and a low existential quantifier replaces the pronoun in the second example. These alternatives are equivalent to the universal strengthening of the sentence (due to the commutativity of universal quantification and conjunction). This means that the strengthening to universal quantification is correctly blocked.

(122) $\big($∀x: phonologist x → G met phonologist x$\big)$ ∧ $\big($∀x: phonologist x → phonologist x nice$\big)$

(123) $\big($∀x: phonologist x → G met phonologist x$\big)$ ∧ $\big($(∃x: phonol. x was nice) → G is happy$\big)$

Text-level existential closure and exhaustification. It is not only across conjunction that donkey anaphora can find its antecedents. An example with juxtaposed sentences is provided in (124):

(124) Gali met a $phonologist_i$. She_i was nice.

In order to capture the interpretation of sequences like (124), we need to assume that existential closure over choice functions may apply at the level of text, as provided in (125) (cf. Heim 1982). The meaning of this structure is in (126), where juxtaposition is interpreted conjunctively.

(125) [∃f [[Gali met a_f phonologist]. [she_f ~~phonologist~~ was nice]]]

(126) ∃f∈CH: Gali met f(phonologist) ∧ f(phonologist) was nice

Simple E-type anaphora? Another possible derivation of sentences like (119) and (124) is lurking in the background. It treats the choice function introduced by the pronoun as free – its interpretation is fixed by the context – while the indefinite can be interpreted either as introducing a choice function or classically. The structure is provided in (127a), where we stick to the choice function construal of the indefinite for uniformity. The interpretation of the pronoun should pick out the salient phonologist in the context, namely, the one that Gali was described as meeting.

(127) [∃f_1 [Gali met a_{f_1} phonologist]]. [she_{f_2} ~~phonologist~~ was nice]]

This analysis of the sentence corresponds to the classical E-type analysis of the donkey anaphora. Nothing in our setup prevents it. Accordingly, at least in cases of cross-sentential (cross-conjunctive) donkey anaphora, the proposal in this paper subsumes the more classical E-type analysis of donkey anaphora. We suggest in the concluding subsection that this may be desirable.

Before we turn to this last subsection, it must be noted that a host of more involved examples involving cross-sentential and cross-conjunctive donkey anaphora have been discussed in the literature, about which intricate empirical generalization have been put forward (e.g., Roberts 1987, 1996, Chierchia 1995, Wang et al. 2006, among others). Whether an adequate analysis of them is possible in the current framework remains to be determined.

5.3 Complex indefinites

We conclude the note by discussing examples that appear to be irreconcilable with the logic behind our proposal. On the one hand, complex indefinites appear not to admit an exceptional scope construal. This is demonstrated by the contrast in (128): the (a)-sentence may convey that there is a donkey and the farmers who saw it are happy (and perhaps those that only saw other donkeys are unhappy); in contrast, the (b)-sentence cannot convey that there are more than two donkeys such that the farmers who saw them are happy (and perhaps other who only saw other donkeys are unhappy).

(128) a. Every farmer who saw a donkey was happy.

b. Every farmer who saw more than two donkeys was happy.

(129) a. $\exists$x: donkey x $\wedge$ $\forall$y: farmer y saw donkey x $\rightarrow$ farmer y is happy

b. #card({x | x$\sqsubseteq_{at}$X $\wedge$ donkeys X $\wedge$ ($\forall$y:farmer y saw donkeys X $\rightarrow$ farmer y is happy)})>2

On the other hand, complex indefinites may antecede donkey anaphora, as exemplified in (130). All else equal, this seems to be at odds with our proposal: complex indefinites do not admit an exceptional scope construal, which they should in order to allow the binding of donkey anaphora.

(130) Every farmer who saw more than two donkeys$_i$ feeds them$_i$.

We will not attempt to account for the absence of exceptional scope indefinites here, an issue that plagues all approaches to exceptional scope indefinites. Rather, we describe a way of deriving this pattern that employs a proper part of the machinery adopted above. This exercise is instructive also because it allows us to contrast the present proposal with the earlier E-type proposals.

E-type pronouns without choice function binding. Consider the sequence in (131). The plural donkey anaphor in the second sentence picks out the plurality of all the donkeys seen by Gali – and not just a plurality consisting of more than two of the donkeys seen by Gali, as stated in (132). In other words, the pronoun's reference is <u>maximal</u> relative to the donkeys seen by Gali.

(131) Gali saw more than two donkeys$_i$. She fed them$_i$.

(132) #card({x | Gali saw donkey x $\wedge$ Gali fed donkey x}) $>$ 2

How can the meaning of (131) be captured in our framework? One strategy available to us is the simple E-type resolution of the second sentence in (131), which is represented in (133): the choice function picks out the maximal plurality of donkeys made salient by the initial sentence – the more than two donkeys seen by Gali. Hence, although the strategy is compatible with a host of different readings of (133), if unconstrained, it <u>can</u> capture the target reading of (131).

(133) [she fed [them$_f$ ~~donkeys~~]]

In contrast, as is well documented, such a simple E-type strategy cannot fully capture the facts described in the preceding sections with singular indefinite antecedents (hence a slide into situation semantics at the very least). For example, an analysis of our initial sentence, repeated in (134a), yields only a weak meaning that is compatible with a weak reading of donkey anaphora – in particular, if we were to accommodate that there is only one salient donkey per farmer, and that it is a donkey they have seen, this would be the weak reading of the donkey anaphora. However, for the assumptions about unique salience of a donkey per farmer to be warranted, one would expect the conversational participants to be sufficiently clued in about this. This does not obviously hold in most contexts, and one ends up with the 'Achilles heel of the E-Type analysis' (Heim 1990, p.142).

(134) a. Every$_x$ farmer who saw a donkey fed it$_{f_x}$ ~~donkey~~.

b. ∀x: farmer x saw a donkey → farmer x fed f(x)(donkey)

Accommodation of the requisite choice function is more innocuous in the case of complex indefinites anteceding plural donkey anaphora. The sentence in (130) may be parsed as in (135a). The resulting meaning, provided in (135b), corresponds to the target meaning of the sentence (on the assumption that for each farmer the Skolem choice function returns the maximal plurality of donkeys seen by that farmer).

(135) a. Every$_x$ farmer [who$_z$ more than 2 donkeys$_y$ z saw y] fed them$_{f_x}$ ~~donkeys~~.

b. ∀x: card({y | y$\sqsubseteq_{at}$Y ∧ farmer x saw donkeys Y})>2 → farmer x fed f(x)(donkeys), where f(x)(donkeys) = max(λY. farmer x saw donkeys Y)

Indistinguishable participants again. As discussed in Sect. 3.4, the E-type approaches such as the one espoused for donkey sentences with complex indefinite antecedents above face the problem of indistinguishable participants. Does the problem rear its head here? At least two directions could be pursued on which it would not: one direction adopts a constant domain of the indefinites and pronouns, but different choice functions for the pronouns (cf. Lewis 1973, Schlenker 2004); the other direction adopts different domains, but a constant choice function. We zoom in on the latter.

Consider the complex indefinite variant of Heim's example in (64):

(136) If more than two bishops meet more than two (other) bishops, they blessed them.

In line with other bishop sentences, (136) conveys that when a meeting between more than two bishops with more than two (other) bishops took place, everyone in the former group blessed everyone in the latter group and *vice versa* (and there were no intra-group blessings). In order to see how this reading can be derived, we have to make some assumptions about the interpretation of plurality. In particular, we assume that the domain of individuals is partitioned in the context (e.g., Schwarzschild 1996). This partition enters into determining the meanings of sentences with plurals and may, for example, separate potential groups of bishops into separate cells of the partition.

Let us first turn to a donkey sequence like (137):

(137) More than two bishops met more than two (other) bishops. They blessed them.

The gist of our proposal is that the two groups of bishops that met each other, as described by the first sentence, are differentiated, and that this differentiation is picked up by the pronouns. The differentiation can be achieved by a (potentially covert) *other* expression, parenthesized in (137); it then plays a role in the second sentence by restricting who blesses whom (the members of the first group of bishops bless the members of the second group of bishops and *vice versa*). We spell this out in slightly greater detail in (138)-(139). In (138), which represents the first sentence of (137), the lower quantifier over bishops ranges over pluralities distinct from the one that verifies the higher one (this is represented by *other* in syntax, and the distinctness condition in semantics; such a configuration may be necessitated by Condition B).

(138) a. [more than 2 bishops$_X$ [more than 2 other$_X$ bishops$_Y$ [X met Y]]]

b. $\exists$X,Y$\in$C: bishops X $\wedge$ bishops Y $\wedge$ X$\neq$Y $\wedge$ X met Y $\wedge$ #(X)>2 $\wedge$ #(Y)>2

In (139), which represents the second sentence of (137), the two pronouns differ from each other merely in their covert descriptions, in parallel to the first sentence. The subject DP picks out the maximal plurality of bishops that met. The reference of the object DP varies with the subject as determined by the context-dependent distributivity operator: each bishop who participated in a meeting greeted only the individuals from a group of bishops distinct from his own, where groups are determined by the context and are conditioned by the first sentence.

(139) a. [they$_f$ ~~bishops~~] [Dist^C_X t$_X$ blessed [them$_f$ ~~other$_X$ bishops~~]]

b. $\forall$X: X $\sqsubseteq$ f(bishops) $\wedge$ X$\in$C $\rightarrow$ X *blessed f(bishops$-$X),

where f(bishops($-$X)) = max(λY. bishops Y($-$X) met)

The analysis just sketched can be straightforwardly extended to the quantificational bishop sentences, the only difference being that in these examples the choice functions denoted by the prononuns are indexed to the quantification in the sentence, as provided in (140) (in the case at hand, to the quantification over cases/situations compatible with the common ground, cf. von Fintel 1994). The interpretation of (139) yields the desired meaning that whenever two groups of bishops of specified sizes meet, the members of the first group bless the members of the second group and *vice versa.*

(140) ALWAYS$_s$ [[if more than 2 bishops$_X$ more than 2 other$_X$ bishops$_Y$ X meet Y]
[they$_{f_s}$ ~~bishops~~] [Dist^C_X t$_X$ blessed [them$_{f_s}$ ~~other$_X$ bishops~~]]]

This sketch of the analysis is, of course, only an initial step towards a full treatment of donkey anaphora with complex indefinite antecedents. We hope that the sketched direction is viable or else that the search for an alternative is sufficiently well motivated by the results of the preceding sections.

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