

Scalar implicature and exceptional scope

Simon Charlow
Rutgers University

Abstract There is lots of work on scalar implicature, lots of work on the exceptional scope properties of indefinites, and comparatively little work on the scalar implicatures of exceptionally scoping indefinites. This note points out that a phenomenon of ‘exceptional scalar distributivity’ suggests that the scalar alternatives of indefinites are more abstract than we might have figured: they don’t correspond to any actually expressible lexemes, and they aren’t, strictly speaking, alternatives of the indefinite determiner at all! I develop a preliminary account, pointing out various issues, predictions, and choice points along the way. I show that two different kinds of theories can explain the data: one uses choice functions for exceptional scope; the other uses alternatives directly.

1 Scalar implicature, exceptional scope

Indefinites give rise to scalar implicatures. In contexts where it matters whether I ate every cookie, example (1) carries the (primary) implicature that its speaker isn’t in a position to assert that I ate every cookie (generally strengthened to the secondary implicature that its speaker believes I didn’t eat every cookie).¹

- (1) Frank ate a cookie.

It is important to note at the outset that, though the literature commonly speaks of *a* implicating *not every*, (1) plausibly implicates that its speaker can’t assert, or even disbelieves that, Frank ate *two or more cookies* (e.g., Fox 2007). Call these *exactly-one* implicatures. In models with two or more cookies, *exactly-one* implicatures asymmetrically entail *not every* implicatures, and so the latter may not in fact exist independently. While I have no way to directly test the status of *not-every* implicatures, we will assume that they exist until Section 5. This allows us to develop some of the technical apparatus that ultimately underwrites an account of *exactly-one* implicatures in Section 5.6.

There’s a standard story about how *not-every* implicatures are generated (given here in vastly simplified form). First, suppose there’s a set of alternatives lexically or otherwise conventionally associated with the indefinite determiner (sometimes called a ‘Horn scale’), as in (2). Use these alternatives to calculate all the things (1)’s speaker might have said, as in (3). Finally, for any relevant alternative *A* which is logically stronger than the speaker’s actual utterance, conclude that the speaker fails to believe *A*, as in (4).

- (2) $\llbracket a \rrbracket_{At} := \{a, \text{every}\}$
(3) $\llbracket \text{Simon ate a cookie} \rrbracket_{At} = \{\text{Simon ate a cookie}, \text{Simon ate every cookie}\}$
(4) $\neg \text{Bel}_s : \text{Simon ate every cookie}$

¹ Primary/secondary terminology borrowed from Sauerland (2004).

Indefinites can take exceptional scope. We easily hear (5) as a claim about a particular student — that is, with the deeply embedded indefinite receiving apparent widest scope.² In contrast, “true” quantifiers like *every student of mine* resist wide-scope interpretations in such cases. Replacing *a* in (5) with *every* gives a sentence that can only be understood as a claim about John overhearing rumors of the form *every student so-and-so* — that is, with the quantified DP receiving narrowest scope.

- (5) John overheard the rumor that a student of mine was expelled.
(after Fodor & Sag 1982: 369, ex. 58)

There’s also something of a received view about exceptional scope, originally due to Reinhart (1997) (cf. also Engdahl 1980, Heim 1982). First, we assume that the indefinite determiner is a variable over functions of type $(e \rightarrow t) \rightarrow e$, and that a silent existential closure operator may bind this variable, as summarized in (6).³ Existential closure is restricted to *choice functions*, which take a (non-empty) set into one of its members, as in (7). Applied to (5), this yields the truth conditions in (8): for some way of choosing students of mine, John overheard the rumor that *that* student of mine was expelled.

- (6) $\llbracket a_i \rrbracket^g := g_i$ $\llbracket \exists_i \alpha \rrbracket^g := \exists f \in \text{CH} : \llbracket \alpha \rrbracket^{g[i \mapsto f]}$
(7) $\text{CH} := \{f_{(e \rightarrow t) \rightarrow e} \mid \forall P \ni \emptyset : P(fP)\}$
(8) $\exists f \in \text{CH} : \text{John overheard the rumor that } f(\text{student of mine}) \text{ was expelled}$

This does a decent job representing the wide-scope reading of (5), without any need to move the deeply embedded indefinite in a way that would over-generate wide-scoping readings for “true” quantifiers like *every student*.

2 Scalar implicature with exceptional scope

Exceptional scope of indefinites gives rise to scalar implicatures, just as much as simple constructions like (1). In contexts where the truth of a proposition like (9) is relevant (suppose, e.g., that there are rumors about all my students, and we are discussing which ones John overheard) an utterance of (5) with an intended wide-scope interpretation for the indefinite will tend to implicate that the speaker is not in a position to assert (9).

- (9) $\forall x \in \text{student of mine} : \text{John overheard the rumor that } x \text{ was expelled}$

Analogous facts hold of disjunctions. First, uses of *or* generally implicate that the speaker wasn’t in a position to use *and*, suggesting that $\text{and} \in \llbracket \text{or} \rrbracket_{\text{Alt}}$, analogously to (3). Second, disjunctions mirror indefinites in their ability to take exceptional scop, a point originally noted by Rooth & Partee (1982), while *and* functions like *every* in being a much

² We can be confident that this is a bona fide wide-scope reading of the indefinite (and not, for example, a pragmatic enrichment of a weaker narrow-scope reading), since in (5) the indefinite is embedded in a non-monotonic environment, the restrictor of the definite determiner *the*.

³ I follow Heim’s (2011) treatment of $\llbracket a_i \rrbracket^g$ and $\llbracket \exists_i \alpha \rrbracket^g$ ($g[i \mapsto f]$ is the assignment g' differing at most from g in that $g'_i = f$), and Reinhart’s (1997) characterization of CH. Throughout, I ignore the possibility of a choice function applying to the empty set.

less adventurous scope-taker. For example, (10) can be understood with widest-scope disjunction: either John repeated the rumor that Mary was expelled, or he repeated the rumor that Bill was (and a version with *Mary and Bill were* cannot be understood with widest-scope conjunction). This motivates a choice-functional analysis of disjunction along the lines mooted for indefinites (see Schlenker 2006 for such an account).

(10) John repeated the rumor that Mary or Bill was expelled.

Third, analogously to exceptionally scoping indefinites, exceptionally scoping disjunction yields scalar implicatures. The wide-scope disjunction construal of (10) tends to convey that its speaker isn't in a position to assert that John repeated the rumor that Mary was expelled, and the rumor that Mary was expelled.

3 A puzzle

As an empirical matter, none of this is too surprising. *Of course* exceptionally scoping indefinites and disjunctions generate scalar implicatures. The choice-functional theory is just a clever way to squeeze effectively wide-scope truth conditions out of LFs where an indefinite or disjunction has remained in situ.⁴ Verbose paraphrases of the exceptional wide-scope readings (e.g., *John repeated the rumor that Mary was expelled, or he repeated the rumor that Bill was expelled*) generate the relevant implicatures. It would be strange if the truth-conditionally equivalent in situ LFs worked differently.

Theoretically, however, there turns out to be a bit of a puzzle lurking: the received views of scalar implicature and exceptional scope are *incompatible*. First, notice that an alternative set containing both $\llbracket a_i \rrbracket^g$ and $\llbracket \text{every} \rrbracket^g$ — along the lines of (2) — isn't well-typed: the former is a variable over choice functions, type $(e \rightarrow t) \rightarrow e$, and the latter a relation between sets, type $(e \rightarrow t) \rightarrow (e \rightarrow t) \rightarrow t$. This is easy to fix; we're free to think of choice functions as functions from (non-empty) sets into the Montague-lifts of the individuals returned by some member of CH, as in (11) (see Winter 1997: 437, ex. 87 for a similar idea). This allows us to give the well-typed alternative-set characterization in (12), where g_i is now a variable ranging over members of CH^+ .⁵

(11) $\text{CH}^+ := \{\lambda P. \lambda Q. Q(fP) \mid f \in \text{CH}\}$

(12) $\llbracket a_i \rrbracket_{\text{Alt}}^g := \{g_i, \text{every}\}$

But of course this won't do either. For one, on the choice-functional theory, existential quantification doesn't arise with the indefinite determiner, which denotes a mere variable, but higher in the structure with the insertion of an existential closure operator. For that reason, it seems like a mistake to associate the universal scalar alternative

⁴ This is not *precisely* correct. Choice-functional truth conditions are subtly different from bona fide wide-scope truth conditions, though in ways that do not seem to affect the present points. See Reinhart 1997: 388–394 and Winter 1997: 433–445 for discussion, and in particular Reinhart's suggestions for making the choice-functional analysis exactly equivalent to wide-scoping.

⁵ A reviewer correctly points out that another way to resolve the type mismatch problem would be to adopt a syntactic theory of alternatives (Katzir 2007, Fox & Katzir 2011). See also footnote 6.

with the indefinite determiner. More importantly, though, the route to exceptional wide scope exploited by indefinites and disjunctions — binding by a higher existential closure operator — is unavailable to *every*. *Every* is not a variable over choice functions; as a standard generalized quantifier, it can only get scope by *taking scope*. So there's no way to use the alternative set in (12) to generate alternatives like (9), and thus no way (12) can undergird an account of the scalar implicatures that arise in the presence of exceptional scope. To put it in starker terms, the impossible wide-scope readings of deeply embedded distributive quantifiers (and conjunction) turn out to be possible, one way or another, in the realm of scalar alternatives!

4 Towards a theory

Back to the drawing board, where there's sort of an obvious possibility staring us in the face. What if, contra (11)–(12) (where we associate the universal scalar alternative with the indefinite determiner), we instead associate the universal scalar alternative with the existential closure operator, as in (13)–(14)?

$$(13) \quad \llbracket a_i \rrbracket_{A1t}^g := \{g_i\}$$

$$(14) \quad \llbracket \exists_i \alpha \rrbracket_{A1t}^g := \{\exists f \in CH : \llbracket \alpha \rrbracket^{g[i \mapsto f]}, \forall f \in CH : \llbracket \alpha \rrbracket^{g[i \mapsto f]}\}$$

This works for the present cases. But it can be improved. Notice that (14) incorrectly discards any scalar alternatives to α , which will cause us to under-generate implicatures when α contains another scalar item. That is, $\llbracket \exists_i \alpha \rrbracket_{A1t}^g$ contains only two members — an existential and a universal alternative — when it should contain more if $\llbracket \alpha \rrbracket^g$ itself generates non-trivial alternatives. The reason for this limitation is that binding and alternatives are *incompatible* given standard treatments of binding. (Note that the issue is not fixed by replacing both occurrences of $\llbracket \alpha \rrbracket^{g[i \mapsto f]}$ with $\llbracket \alpha \rrbracket_{A1t}^{g[i \mapsto f]}$. In fact, this makes things worse, since it is nonsensical for $\exists f$ and $\forall f$ to quantify into a set of alternatives!)

The incompatibility of standard treatments of binding and alternatives was originally noted in connection with alternatives-based theories of questions and indefinites (see especially Shan 2004). It's notable (if not too surprising) that it afflicts scalar alternatives, as well. Fortunately, the difficulty here can be remedied by replacing assignment-dependent alternative sets, as in (13)–(14), with alternative sets of assignment-dependent meanings, as in (15)–(16). See Rooth 1985, Poesio 1996, Romero & Novel 2013, Charlow 2014 for relevant discussion.⁶

$$(15) \quad \llbracket a_i \rrbracket_{A1t} := \{\lambda g. g_i\} \quad \text{(To be revised)}$$

$$(16) \quad \llbracket \exists_i \alpha \rrbracket_{A1t} := \{\lambda g. \exists f \in CH : h(g[i \mapsto f]), \\ \lambda g. \forall f \in CH : h(g[i \mapsto f]) \mid h \in \llbracket \alpha \rrbracket_{A1t}\}$$

Notice that the $h \in \llbracket \alpha \rrbracket_{A1t}$ portion of the definition guarantees that if $\llbracket \alpha \rrbracket_{A1t}$ generates alternatives, these alternatives will correctly be inherited by $\llbracket \exists_i \alpha \rrbracket_{A1t}$.

⁶ The structural theory of alternatives advocated, e.g., by Katzir (2007), Fox & Katzir (2011) avoids these issues, precisely because it gets the layering of alternatives and assignment-sensitivity right: sets of alternative structures are sets of assignment-dependent objects.

This picture has some interesting consequences. First off, the universal alternative associated with the existential closure operator evidently doesn't correspond to any overt or covert lexical item that ever shows up in actual sentences, at least in English. Exceptionally scoping 'scalar distributivity' is evident in the implicatures of exceptionally scoping indefinites because of the universal alternative in $\llbracket \exists_i \alpha \rrbracket_{Alt}$, even as our *actually* expressible distributive quantifiers remain resolutely unexceptional (i.e., tethered to scope islands). I return to this point in the conclusion.

Second, the implicatures associated with exceptionally scoping indefinites are modulated in nontrivial ways by independently reckoned properties of exceptional scope. Take (17). Its indefinite can be construed with widest scope: we can interpret it as 'about' three particular relatives of mine (perhaps there is a line of succession for possession of the family compound, and I am fourth in line).

- (17) If three relatives of mine die, I will inherit a house.
(Reinhart 1997: 380, ex. 62)

This reading clearly doesn't betray any doubt about the exceptional-scope reading of *if four relatives of mine die, I will inherit a house*. Consider what happens if the four deaths were first, second, third, and fifth in the aforementioned line of succession. I take it the house is still mine! This seems surprising on its face: *I have three kids* implicates I don't have four, and as we've seen in earlier examples, exceptionally scoping indefinites seem to generate the same implicatures as their unembedded counterparts.

On reflection, though, this turns out to be exactly what is predicted. As Ruys (1992) and Reinhart (1997) emphasize, the exceptional scope reading of (17) means that I have three relatives such that, if they *each* died, I'd inherit a house. It doesn't mean that three relatives are *each* such that, if they died, I'd inherit a house. In other words, the wide-scope-indefinite construal of the alternative utterance *if four relatives of mine die, I will inherit a house* is already entailed by what the speaker actually said: if you can find three relatives of mine such that, if they were to each die, I'd inherit a house, you can certainly locate four (just add any random relative to the initial three!).⁷

Instead, we expect the wide-scope reading of (17) to implicate that its speaker fails to believe *if two relatives of mine die, I will inherit a house* (with a wide-scope reading for the indefinite) — since this stronger alternative was eschewed. And, indeed, this seems to be the case: the speaker of (17) implicates that three is the *smallest* number of relatives such that, if they were to each die, the speaker would inherit a house. In sum, the plural indefinite's 'distributive scope' is trapped in a downward-entailing environment, even as its existential force projects upward unboundedly. This is why lower numbers yield stronger meanings.⁸

These remarks are fleshed out more formally in (18)–(20). In (18), *three relatives of mine* denotes a property characterizing three-relative pluralities, and invokes alternative properties characterizing relatives-pluralities of various sizes (* is Link's (1983) pluralization/distributivity operator; I omit assignment-sensitivity). The LF for the exceptional

⁷ This assumes, of course, that I actually have four relatives (cf. fn. 3).

⁸ I'm ignoring issues having to do with potential failures of monotonicity in conditionals (e.g., Sobel sequences).

scope reading of (17) is given in (19), where a silent indefinite determiner introduces a choice-function variable bound by a matrix-level existential closure operator. The characterization of alternatives in (16) means (20) is invoked as an alternative of (19) (again ignoring irrelevant assignment-sensitivity). This meaning, where the distributive scope of the plural indefinite is *die, asymmetrically entails $\llbracket (19) \rrbracket$. Since this stronger alternative wasn't said, the speaker must not believe it. That's the right result.

- (18) $\llbracket \text{three relatives of mine} \rrbracket = \lambda x. x \in \text{*relative} \cap \text{three}$
 $\llbracket \text{three relatives of mine} \rrbracket_{A1t} = \{\lambda x. x \in \text{*relative} \cap n \mid n \in \{\text{one}, \text{two}, \dots\}\}$
- (19) \exists_i [if $\llbracket \text{INDEF}_i$ [three relatives of mine] \rrbracket die, I will inherit a house]
- (20) $\exists f \in \text{CH} : \text{*die} (f(\lambda x. x \in \text{*relative} \cap \text{two})) \Rightarrow \text{I will inherit a house}$

It's worth mentioning that the universal alternative to \exists_i isn't doing any work in this case: if you fail to believe (20), you already fail to believe the corresponding universal claim.

5 Exactly-one implicatures

We're now in position return to *exactly-one* implicatures. Consider example (21). As we might expect, the exceptional scope reading of (21) has an anti-universal implicature. Actually, on closer inspection it seems to implicate something stronger: that I have *exactly one* relative whose death would be enough to get me a house (of course, as noted previously, a similar implicature is generated for simple cases like (1), as well, cf. Fox 2007). Longer-windedly, there's a relative of mine whose death nets me a house, and there aren't two relatives of mine who are *each* such that their death nets me a house! Notice that in the second conjunct of the implicature, the distributive part of the inference (corresponding to *each*) is scoping over the conditional. Once again, we find 'scalar distributivity' scoping exceptionally.

- (21) If a relative of mine dies, I'll inherit a house.

Clearly, this implicature isn't explained by the universal alternative to the existential closure operator alone. It also doesn't help to treat *a* as numeral-like, as in (22)–(24) below (as in (19), INDEF_i in (23) is a silent indefinite determiner). This approach certainly generates an alternative with *two* in it, in (24), but the fact that the distributive scope of the two-relatives-of-mine plurality occurs in a downward-entailing context means (24) is already entailed by the actual utterance $\llbracket (23) \rrbracket$.

- (22) $\llbracket \text{a relative of mine} \rrbracket = \lambda x. x \in \text{*relative} \cap \text{one}$
 $\llbracket \text{a relative of mine} \rrbracket_{A1t} = \{\lambda x. x \in \text{*relative} \cap n \mid n \in \{\text{one}, \text{two}, \dots\}\}$
- (23) \exists_i [if $\llbracket \text{INDEF}_i$ [a relative of mine] \rrbracket dies, I will inherit a house]
- (24) $\exists f \in \text{CH} : \text{*die} (f(\lambda x. x \in \text{*relative} \cap \text{two})) \Rightarrow \text{I will inherit a house}$

Nor can this be fixed by simply supposing that the alternatives to (23) include propositions like *there are two choice functions, such that so-and-so*. Choice functions are more

finely individuated than individuals. Even if there's exactly one relative of mine whose death gets me a house, there are potentially very many — and almost certainly at least two — choice functions that witness the truth of (23).⁹

This motivates a last revision. In addition to the alternatives associated with existential closure, we assume that the indefinite determiner triggers alternatives of its own, as in (25) below. These alternatives restrict P , the nominal argument of a_i , to different non-empty subsets of P . In the parlance of Chierchia 2013, a_i triggers *sub-domain* alternatives (I implement this with *Sel*, the subset selection functions of von Stechow (1999)).

$$(25) \quad \llbracket a_i \rrbracket_{A1t} := \{\lambda g. \lambda P. g_i(SP) \mid S \in \text{Sel}\}$$

$$(26) \quad \text{Sel} := \{S \mid \forall P \supsetneq \emptyset : S(P) \subseteq P \wedge S(P) \neq \emptyset\}$$

The upshot of this move is that (21) will be associated with the alternative propositions diagrammed in Figure 1; for illustration, I assume that my relatives are Al, Bob, and Carol, and use 'a' to abbreviate that if Al dies I inherit a house, etc. When two propositions are connected with a line, the higher one asymmetrically entails the lower one. The conjunctions in the diagram are contributed by the universal alternative to the existential closure operator, and the disjunctions by the existential alternative.

The key point is that we now have three conjunctive alternatives that directly concern two of my relatives: $a \wedge b$, $a \wedge c$, and $b \wedge c$. These alternatives were generated by combining the universal alternative to the existential closure operator with different sub-domains of $\llbracket \text{relative of mine} \rrbracket$. Crucially, these alternatives are all stronger than the actual utterance, $a \vee b \vee c$, and so we infer that the speaker must not have been in a position to assert them. If we have reason to believe the speaker disbelieves each of the two-relative alternatives (and that the speaker is reliable), we'll conclude that there aren't *any* pairs of relatives $\langle x, y \rangle$ such that, if x were to die, I'd inherit a house, and if y were to die, I'd inherit a house. As before, the three-relative conjunctive alternative $a \wedge b \wedge c$ is ruled out on similar grounds. Summing up, we come to disbelieve each of the alternatives on the top two rows of Figure 1. This is just a prolix way of stating the desired *exactly-one* implicature.^{10,11}

⁹ Sauerland (1998) argues that cardinal quantification over individuals can be simulated with quantification over *pointwise different* choice functions, where f and g are pointwise different iff $\forall P \in \text{Dom } f \cap \text{Dom } g : fP \neq gP$. Notice, though, that this predicts the *not-two* implicature of (21) to presuppose that I have at least two relatives (two pointwise different choice functions are never both defined on a property holding of fewer than two individuals)! This looks to be incorrect: the *not-two* implicature is consistent with us not knowing whether the speaker has two relatives or not. Abels & Martí (2010: 447–9) give another way to count choice functions, but it forces existential closure to form a constituent with the numeral and is for that reason not a good fit for exceptional scope.

¹⁰ To be precise, the algorithm that generates secondary implicatures (i.e., of the form *the speaker disbelieves that so-and-so*) needs to incorporate a notion of so-called innocent exclusion (e.g., Sauerland 2004, Fox 2007). I pass over these details here.

¹¹ A referee wonders whether *exactly-one* implicatures might be due to the singular number morphology on the indefinite in (21) competing with plural number. I believe this isn't a general solution. For example, (17), where the cardinal indefinite bears plural number, has an analogous *exactly* implicature: there is just one plurality of three relatives such that, if they all died, I'd inherit a house (in other words, there is just one path to house inheritance). This reading is generated along the lines of (25) if $\llbracket \text{three}_i \rrbracket_{A1t} := \{\lambda g. \lambda P. g_i(SP) \mid S \in \text{Sel3}\}$, where *Sel3* is a subset selection function which picks out subsets of a domain of plural individuals (here, *relative), each of which has three atomic parts. Formally, $\text{Sel3} := \{S \mid \forall P \supsetneq \emptyset : S(P) \subseteq \text{three} \cap P \wedge S(P) \neq \emptyset\}$.

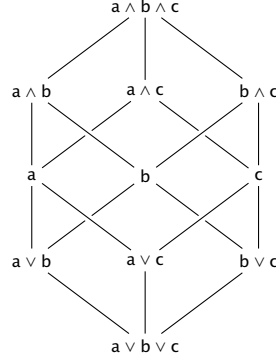


Figure 1: A lattice of alternative propositions, generated via the existential/universal alternatives of the existential closure operator, and the sub-domain alternatives of the indefinite. The top two rows host propositions that can be used to generate an *exactly-one* implicature for (21).

6 Alternative semantics

It turns out that choice functions are not the only way to derive exceptional scope behavior for indefinites and satisfactory implicatures for exceptionally scoping indefinites. Let's explore this point, briefly. Instead of using choice functions to secure exceptional scope taking, we'll assume (following Ramchand 1997, Kratzer & Shimoyama 2002) that the *core meaning* of an indefinite is identical to its alternatives, as in (27) below (ignoring assignments). Assuming core-meaning alternatives expand in the same way as scalar alternatives as we climb the tree, the core-meaning and scalar alternatives associated with (21) will both be given by (28): in both cases, the relative-of-mine alternatives 'expand', to yield a set of alternative conditional propositions at the sentence level.

$$(27) \quad \llbracket \text{a relative of mine} \rrbracket = \llbracket \text{a relative of mine} \rrbracket_{A1t} = \{x \mid x \in \text{relative}\}$$

$$(28) \quad \{x \text{ dies} \Rightarrow \text{I will inherit a house} \mid x \in \text{relative}\}$$

These two dimensions of alternatives march together in lockstep until an existential closure operator is encountered, as in (29). At that point, the core meaning becomes a singleton set containing a simple existentially quantified truth condition (gotten by taking the infinitary join/union of the prejacent α 's core meaning). For (28) this gives (30), a singleton set containing a proposition with a widest-scope existential quantifier.

$$(29) \quad \begin{aligned} \llbracket \exists \alpha \rrbracket &:= \{\bigvee \llbracket \alpha \rrbracket\} \\ \llbracket \exists \alpha \rrbracket_{A1t} &:= \{\bigwedge s \mid s \subseteq \llbracket \alpha \rrbracket_{A1t} \wedge s \neq \emptyset\} \cup \\ &\quad \{\bigvee s \mid s \subseteq \llbracket \alpha \rrbracket_{A1t} \wedge s \neq \emptyset\} \end{aligned}$$

$$(30) \quad \{\exists x \in \text{relative of mine} : x \text{ dies} \Rightarrow \text{I will inherit a house}\}$$

Simultaneously, a new set of scalar alternatives $\llbracket \exists \alpha \rrbracket_{A1t}$ is calculated, by individually conjoining and disjoining all non-empty subsets of the scalar alternatives associated

with the prejacent α .¹² The result of this manipulation is precisely the set of alternatives in Figure 1: conjoining the non-empty subsets of $[\exists \alpha]_{A1\tau}$ yields the alternatives on the upper half of lattice; and disjoining them yields the alternatives on the lower half.

From this point on, then, the implicature calculation is identical to that of the choice-functional theory. Thus, we have both exceptional scope for the indefinite (afforded by alternative expansion plus existential-closure-at-a-distance) and a robust, general account of exceptional scalar distributivity (afforded by the characterization of the alternatives to existential closure).

Taking stock, the alternatives-based account I have just sketched represents a competitive option, but it's important to note that (a) it takes us rather far afield of the received, choice-functional view of exceptional scope, and (b) it is still incomplete in two important ways.

First, alternative projection and existential closure as standardly conceived are fundamentally *unselective* (e.g., Rooth 1996, Wold 1996) — existential closure operators necessarily capture every source of alternatives in their scope. This turns out to be a poor fit for indefinites, as demonstrated by the fact that (31), with two indefinites in the antecedent of the conditional, allows either of its indefinites to take exceptional scope outside the conditional, even as the other takes in situ scope. In other words, (31) allows a specific-lawyer/any-relative reading, along with a any-lawyer/specific-relative reading. Given a definition like (29), such readings should be impossible: in situ scope for one indefinite (indicating the presence of an existential closure operator under *if*) should force in situ scope for the other.¹³

(31) If a persuasive lawyer visits a relative of mine, I will become rich.

Second, even though the unselectivity of the alternative-semantic existential closure operator (i.e., the fact that it doesn't bind any variables) allows us to forestall questions having to do with the interactions of alternatives and binding, these issues will need to be addressed sooner or later. As I've argued elsewhere (e.g., Charlow 2014: 152), the alternatives-over-assignments layering which, as we saw in (15) and (16), can be used to help reconcile alternatives and binding, turns out to be incompatible with using alternative semantics to theorize about exceptional scope-taking for indefinites (try to imagine what set of assignment-dependent individuals you would associate with, e.g., *a relative of his_i*; see Shan 2004: 295 for pertinent discussion).

As I point out in Charlow (2014), both of these problems can be overcome. There are alternative, conservative, ways of formulating alternative semantics which (a) entail full selectivity and (b) allow us to retain the assignments-over-alternatives layering that

¹² Alonso-Ovalle (2006, 2008) explores a similar idea for treating the exclusivity implicatures associated with disjunction — though he doesn't discuss indefinites or exceptional scope phenomena, associate scalar alternatives with the existential closure operator, or countenance disjunctive alternatives. I'll leave consideration of these matters to future work.

¹³ It may be possible to generate these readings with judicious applications of QR and \exists . More complicated examples like *each boy_i believes that he_i would become rich if a persuasive lawyer were to visit a relative of his_i* have readings that this putative approach cannot account for, however (i.e., with the two indefinites taking exceptional scope in different ways outside the conditional).

indefinites demand. There are thus no serious obstacles to using alternative semantics to explain exceptional scope. To the contrary, I argue that the alternative-semantic account of exceptional scope *improves on* choice-functional theories in various respects, which recommends an alternatives-based account of the implicatures associated with exceptional scope, like the one sketched here.

7 Conclusion

Our main conclusion is this: the alternatives that give rise to scalar implicatures in exceptional scope configurations are more abstract than we might have thought. Whether we pursue the choice-functional or alternative-semantic accounts of exceptional scope, the distributively quantified alternatives associated with the existential closure operator do not seem to correspond to any expressible lexical items. If they did, we would get a lot more distributive exceptional scope-taking than we actually do.¹⁴

Or would we? One possibility worth exploring is that the distributive alternatives associated with existential closure are expressible in principle, but that they bear (unvalued) features that render them incompatible with the featural specification on the indefinite determiner — which, recall, bears no quantificational force of its own (e.g., Kratzer & Shimoyama 2002, Kratzer 2005; see Szabolcsi 2015 for a more semantically oriented perspective). The conjecture, then, would be that English's indefinite determiner is ineluctably existential — meaning, more precisely, that it has no synonymous counterpart with distributive-closure-operator-compatible features. What differentiates languages like English from languages like Japanese (which is able to express distributive quantification at a distance using the additive particle *-mo*) is that the latter's indefinites bear (valued) features compatible with distributive closure operators. As such, distributive closure operators would be lexicalized in English after all, but it would turn out that no sentence-sized constituents with them could ever be grammatical.

I've also suggested that alternatives-based accounts of exceptional scope do a good job generating scalar implicatures for exceptionally scoping indefinites, while largely papering over issues having to do with selectivity and the interaction of alternatives and binding (though I think the way forward is promising). I have not, however, discussed whether we should prefer the choice-functional theory or the alternative-semantic theory. Indeed, in the cases considered here, their predictions seem basically identical. That said, the arguments hinted at above favoring an alternatives-based approach to exceptional scope may militate against the choice-functional theory in the long run. I'll leave a careful examination of these issues to future work.

There are a number of other issues I didn't consider. For example, I have assumed without argument that constructions with indefinites express existentially quantified propositions. This seemed like the easiest path to hew — in particular, the existential

¹⁴ A referee notes that Chemla (2007) makes an analogous point for French universal quantifiers. In English, *Salvador broke all his arms* is marked, presumably due to competition with *Salvador broke both his arms*. The French analog of the *all*-sentence is likewise marked, even though French lacks a correspondent of *both*. Chemla posits that alternative sets in a language may be generated from universally accessible 'key concepts', which may or may not be lexicalized within that language. This is a natural fit for the data discussed here, as well.

closure operator seemed like an obvious candidate for the thing that introduces scalar alternatives. But it is also crucial to consider referential theories of indefinites (e.g., Kratzer 1998, 2003), along with *discourse*-referential (i.e., dynamic) accounts (e.g., Karttunen 1976, Heim 1982, and many others). Geurts (2009) in particular emphasizes that dynamic treatments of indefiniteness offer natural solutions to various puzzles that arise in connection with scalar implicature. Of note in this respect is that dynamic semantics can be seen as a kind of alternative semantics (Charlow 2014: 159), which suggests that it would be worth considering the various ways in which the alternatives-based account sketched here might be scaled up.

References

- Abels, Klaus & Luisa Martí. 2010. A unified approach to split scope. *Natural Language Semantics* 18(4). 435–470. <https://doi.org/10.1007/s11050-010-9060-8>.
- Alonso-Ovalle, Luis. 2006. *Disjunction in alternative semantics*. University of Massachusetts, Amherst Ph.D. thesis. <http://semanticsarchive.net/Archive/TVkY2Z1M/>.
- Alonso-Ovalle, Luis. 2008. Innocent exclusion in an alternative semantics. *Natural Language Semantics* 16(2). 115–128. <https://doi.org/10.1007/s11050-008-9027-1>.
- Charlow, Simon. 2014. *On the semantics of exceptional scope*. New York University Ph.D. thesis. <http://semanticsarchive.net/Archive/2JmMWRjY/>.
- Chemla, Emmanuel. 2007. French *both*: a gap in the theory of antipresupposition. *Snippets* 15(1). 4–5.
- Chierchia, Gennaro. 2013. *Logic in grammar*. Oxford: Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199697977.001.0001>.
- Engdahl, Elisabet. 1980. *The syntax and semantics of questions in Swedish*. University of Massachusetts, Amherst Ph.D. thesis. https://scholarworks.umass.edu/dissertations_1/936/.
- von Fintel, Kai. 1999. Quantifier domain selection and pseudo-scope. Talk presented at the Cornell Context-Dependence Conference.
- Fodor, Janet Dean & Ivan A. Sag. 1982. Referential and quantificational indefinites. *Linguistics and Philosophy* 5(3). 355–398. <https://doi.org/10.1007/BF00351459>.
- Fox, Danny. 2007. Free choice and the theory of scalar implicatures. In Uli Sauerland & Penka Stateva (eds.), *Presupposition and implicature in compositional semantics*, 71–120. London: Palgrave Macmillan UK. https://doi.org/10.1057/9780230210752_4.
- Fox, Danny & Roni Katzir. 2011. On the characterization of alternatives. *Natural Language Semantics* 19(1). 87–107. <https://doi.org/10.1007/s11050-010-9065-3>.
- Geurts, Bart. 2009. Scalar implicature and local pragmatics. *Mind & Language* 24(1). 51–79. <https://doi.org/10.1111/j.1468-0017.2008.01353.x>.
- Heim, Irene. 1982. *The semantics of definite and indefinite noun phrases*. University of Massachusetts, Amherst Ph.D. thesis. <http://semanticsarchive.net/Archive/Tk0ZmYyY/>.
- Heim, Irene. 2011. Definiteness and indefiniteness. In Klaus von Heusinger, Claudia Maienborn & Paul Portner (eds.), *Semantics: An international handbook of natural language meaning*, vol. 2 (HSK 33), chap. 41, 996–1025. Berlin: de Gruyter. <https://doi.org/10.1515/9783110255072.996>.
- Karttunen, Lauri. 1976. Discourse referents. In James D. McCawley (ed.), *Syntax and Semantics, volume 7: Notes from the Linguistic Underground*, 363–385. New York: Academic Press.
- Katzir, Roni. 2007. Structurally-defined alternatives. *Linguistics and Philosophy* 30(6). 669–690. <https://doi.org/10.1007/s10988-008-9029-y>.

- Kratzer, Angelika. 1998. Scope or pseudoscope? Are there wide-scope indefinites? English. In Susan Rothstein (ed.), *Events and grammar*, vol. 70 (Studies in Linguistics and Philosophy), 163–196. Springer Netherlands. https://doi.org/10.1007/978-94-011-3969-4_8.
- Kratzer, Angelika. 2003. A note on choice functions in context. Unpublished ms. <http://semanticsarchive.net/Archive/zIyNTMxZ/>.
- Kratzer, Angelika. 2005. Indefinites and the operators they depend on: From Japanese to Salish. In Gregory N. Carlson & Francis Jeffry Pelletier (eds.), *Reference and Quantification: The Partee Effect*, 113–142. Stanford: CSLI Publications.
- Kratzer, Angelika & Junko Shimoyama. 2002. Indeterminate pronouns: The view from Japanese. In Yukio Otsu (ed.), *Proceedings of the Third Tokyo Conference on Psycholinguistics*, 1–25. Tokyo: Hituzi Syobo.
- Link, Godehard. 1983. The logical analysis of plurals and mass terms: A lattice-theoretical approach. In Rainer Bäuerle, Christoph Schwarze & Arnim von Stechow (eds.), *Meaning, use and interpretation of language*, 303–323. Berlin: Walter de Gruyter. <https://doi.org/10.1515/9783110852820.302>.
- Poesio, Massimo. 1996. Semantic ambiguity and perceived ambiguity. In Kees van Deemter & Stanley Peters (eds.), *Semantic Ambiguity and Underspecification* (CSLI Lecture Notes 55), 159–201. Stanford: CSLI Publications.
- Ramchand, Gillian. 1997. Questions, polarity and alternative semantics. In Kiyomi Kusumoto (ed.), *Proceedings of the North East Linguistic Society 27*, 383–396. Amherst, MA: GLSA.
- Reinhart, Tanya. 1997. Quantifier scope: How labor is divided between QR and choice functions. *Linguistics and Philosophy* 20(4). 335–397. <https://doi.org/10.1023/A:1005349801431>.
- Romero, Maribel & Marc Novel. 2013. Variable binding and sets of alternatives. In Anamaria Fălăuş (ed.), *Alternatives in Semantics*, chap. 7, 174–208. London: Palgrave Macmillan UK. https://doi.org/10.1057/9781137317247_7.
- Rooth, Mats. 1985. *Association with focus*. University of Massachusetts, Amherst Ph.D. thesis.
- Rooth, Mats. 1996. Focus. In Shalom Lappin (ed.), *The Handbook of Contemporary Semantic Theory*, 271–298. Oxford: Blackwell.
- Rooth, Mats & Barbara H. Partee. 1982. Conjunction, type ambiguity, and wide scope ‘or’. In Daniel P. Flickinger, Marlys Macken & Nancy Wiegand (eds.), *Proceedings of the First West Coast Conference on Formal Linguistics*, 353–362. Stanford: Stanford Linguistics Association.
- Ruys, Eddy. 1992. *The scope of indefinites*. OTS, University of Utrecht Ph.D. thesis.
- Sauerland, Uli. 1998. *On the making and meaning of chains*. Massachusetts Institute of Technology Ph.D. thesis. <http://hdl.handle.net/1721.1/9671>.
- Sauerland, Uli. 2004. Scalar implicatures in complex sentences. *Linguistics and Philosophy* 27(3). 367–391. <https://doi.org/10.1023/B:LING.0000023378.71748.db>.
- Schlenker, Philippe. 2006. Scopal independence: A note on branching and wide scope readings of indefinites and disjunctions. *Journal of Semantics* 23(3). 281–314. <https://doi.org/10.1093/jos/ff1005>.

- Shan, Chung-chieh. 2004. Binding alongside Hamblin alternatives calls for variable-free semantics. In Kazuha Watanabe & Robert B. Young (eds.), *Proceedings of Semantics and Linguistic Theory 14*, 289–304. Ithaca, NY: Cornell University. <https://doi.org/10.3765/salt.v14i0.2901>.
- Szabolcsi, Anna. 2015. What do quantifier particles do? *Linguistics and Philosophy* 38(2). 159–204. <https://doi.org/10.1007/s10988-015-9166-z>.
- Winter, Yoad. 1997. Choice functions and the scopal semantics of indefinites. *Linguistics and Philosophy* 20(4). 399–467. <https://doi.org/10.1023/A:1005354323136>.
- Wold, Dag E. 1996. Long distance selective binding: The case of focus. In Teresa Galloway & Justin Spence (eds.), *Proceedings of Semantics and Linguistic Theory 6*, 311–328. Ithaca, NY: Cornell University. <https://doi.org/10.3765/salt.v6i0.2766>.