Exceptional implicature

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Overview

Indefinites canonically trigger scalar inferences.

And indefinites canonically take scope in special ways.

Standard theories of these features are incompatible, in a way that's revealing about the alternatives we use as grist in the neo-Gricean mill.

Implicatures (of indefinites)

Implicatures

1. George chopped down the cherry tree **or** the apple tree.
   $\rightsquigarrow$ George **didn't** chop down the cherry tree **and** the apple tree.

2. Martha ate **a** cookie that George baked.
   $\rightsquigarrow$ Martha **didn't** eat **every** cookie that Mary baked.

Something like Grice

Hearers of $p \vee q$ reason as follows:

- The speaker S said $p \vee q$
- But S could have said something stronger, $p \wedge q$
- By the Maxim of Quantity, if $p \wedge q$ was assertable, S should've
- So S must not believe $p \wedge q$
- Most likely, then, S believes $\neg(p \wedge q)$ $\square$

This view is plausible, and makes some nice predictions. E.g.,

$$\begin{aligned} \neg(p \wedge q) &\rightsquigarrow \neg\neg(p \vee q) \\ &\rightsquigarrow p \vee q \end{aligned}$$

The symmetry problem (e.g., Kroch 1972, Hirschberg 1985)

The exclusive disjunction $\triangledown$ is logically stronger than $\vee$:

$$p \triangledown q \overset{\Longrightarrow}{\underset{\not\Longleftarrow}{}} p \vee q$$

But $p \vee q$ doesn't, of course, implicate the negation of $p \triangledown q$:

$$\neg(p \triangledown q) \Longleftrightarrow \neg(p \vee q) \vee (p \wedge q)$$

Old intuition: $\wedge$ is a "legitimate" alternative to $\vee$, but $\triangledown$ isn't.

neo-Grice in 3 steps

1. Scalar expressions are conventionally associated with **alternatives**:

$$[\![\text{or}]\!] := \vee_{t \to t \to t} \qquad [\![\text{a}]\!] := \exists_{(e \to t) \to (e \to t) \to t}$$

$$\{\!\{\text{or}\}\!\} := \{[\![\text{or}]\!], [\![\text{and}]\!]\} \qquad \{\!\{\text{a}\}\!\} := \{[\![\text{a}]\!], [\![\text{every}]\!]\}$$

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2. Scalar alternatives **grow** up into utterance-sized alternatives:

$$\{\!\{\text{G chopped C or A}\}\!\} = \left\{ \textbf{chopped}(\textbf{g},\textbf{c}) \vee \textbf{chopped}(\textbf{g},\textbf{a}), \; \textbf{chopped}(\textbf{g},\textbf{c}) \wedge \textbf{chopped}(\textbf{g},\textbf{a}) \right\}$$

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3. Alternatives stronger than the actual utterance are **negated**:

$$\neg(\textbf{chopped}(\textbf{g},\textbf{c}) \wedge \textbf{chopped}(\textbf{g},\textbf{a}))$$

[Glossing over some important stuff. See, e.g., Sauerland 2004, Fox 2007.]

A theory of alternatives

Katzir (2007), Fox & Katzir (2011):

1. $S' \sim S \iff S'$ can be derived from S by successive replacements of sub- constituents of S with elements of $SS(X, C)$.
2. $SS(X, C)$ is the union of the following sets:
   (a) The lexicon
   (b) The sub-constituents of X
   (c) The set of salient constituents in C

The basic picture

The neo-Gricean picture is notably *linguistic*:

- Scalar alts are conventional, in a way that looks pretty lexical.
- Theories of alternatives refer to things like syntax and the lexicon.
- $\{\!\{\cdot\}\!\}$ looks a lot like an alternative-semantic interpretation function.

Exceptional indefinites (and their implicatures)

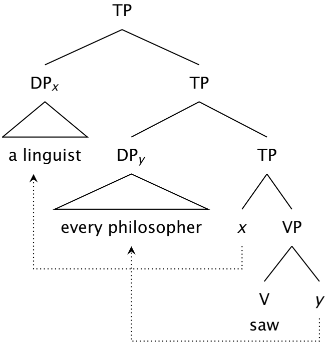
Quantifier scope

Sentences with two quantifiers tend to be ambiguous (in English):

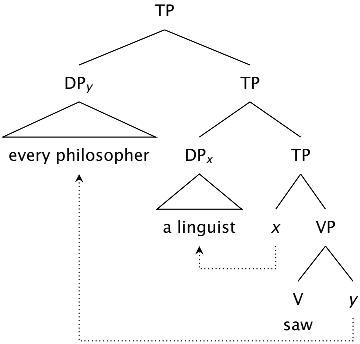
1. A member of every committee voted for the bill.
2. A guard is standing in front of every embassy.

The standard account (May 1985)

Scope ambiguity is due to unpronounced movement at **LF**:



$\exists \gg \forall$



$\forall \gg \exists$

Scope islands

1. One senator on every committee voted for the ACA. $\forall \gg \exists$
2. One senator who's on every committee voted for the ACA. $*\forall \gg \exists$

Conclusion: movement that's possible out of the PP *on every cmte* is (for some reason) impossible out of the relative clause *who's on every cmte*.

Structures out of which quantifiers can't scope are called **scope islands**.

Exceptional scope in (e.g.) English

Indefinites aren't as nicely behaved as other quantifiers:

1. Every theory that's been posited by a famous expert on syntax has ended up being discussed rather extensively. $\exists \gg \forall$

The pattern is quite general:

2. If a rich relative of mine dies, I'll inherit a house. $\exists \gg$ *if*
3. If every rich relative of mine dies, I'll inherit a house. $*\forall \gg$ *if*

[E.g., Farkas 1981, Fodor & Sag 1982, Ludlow & Neale 1991, Reinhart 1997]

Quantification at a distance (Reinhart 1997, Winter 1997)

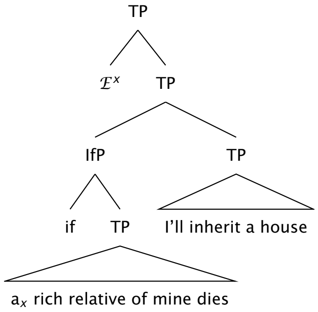
Conclusion: indefinites don't have to move to get scope.

$$\exists f \in \mathbf{CH} : \mathbf{dies}\,(f\,\mathbf{rel}) \Longrightarrow \mathbf{house} \;\approx\; \exists x \in \mathbf{rel} : \mathbf{dies}\,x \Longrightarrow \mathbf{house}$$

CF is a domain of *choice functions*:

$$\mathbf{CF} := \{f \mid \forall P \supsetneq \emptyset : f(P) \in P\}$$

An exceptional scope LF: no movement



Technical implementation (after Heim 2011):

$$[\![a_x]\!]^g := g(x) \qquad [\![\mathcal{E}^x \; \Delta]\!] := \exists f \in \textbf{CH} : [\![\Delta]\!]^{g[x \rightarrow f]}$$

Exceptional implicatures

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Does the exceptional-scope reading of (1) have an implicature? Try to imagine that I have, say, 30 rich relatives.

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It sure does (in fact, it implicates something stronger; stay tuned).

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Disjunctions work similarly. They take exceptional scope and when they do, give rise to the customary *not-both* implicature:

2. Not a single student who picked Greek or Latin (I don't remember which) passed the exam. (Schlenker 2006: 306)

Exceptional implicatures? (cont.)

1. If a rich relative of mine dies, I'll get a house.
   $\rightsquigarrow$ Not every rich relative of mine is s.t. if they die, I'll get a house.

Should this surprise us? Pre-theoretically, nah. The *every* alternative is stronger than what was actually said, so it gets negated.

But remember that the alternatives powering the neo-Gricean theory are supposed to arise in a *convention-mediated* way:

$$[\![\text{every}]\!]^g \in \{\!\{\text{a}_i\}\!\}^g$$

The puzzle, informally

We'd like our Gricean platitudes to help us out like before. Do they?

- The speaker *S* said *...a rich relative...*
- But *S* could have said something stronger, *...every rich relative...*
- By the MoQ, if *...every rich relative...* was assertable, *S* should've
- So *S* must not believe *...every rich relative...*
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- Most likely, then, *S* believes $\neg$(*...every rich relative...*) $\square$?

This does not work! *If every rich relative of mine dies, I'll inherit a house* simply **lacks** the widest-scope-$\forall$ reading.

$$\forall x \in \mathbf{rel} : \mathbf{dies}(x) \Longrightarrow \mathbf{house}$$

The puzzle, more formally

Old, busted (quantificational indefinites):

$$\{\!\{\text{a}\}\!\} := \{[\![\text{a}]\!], [\![\text{every}]\!]\}$$

New hotness? (indefinites aren't quantifiers at all):

$$\{\!\{\text{a}_i\}\!\}^g := \{[\![\text{a}_i]\!]^g, [\![\text{every}]\!]^g\}$$

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This isn't even well-typed! $g(i)$ is a choice function, and $[\![\text{every}]\!]$ is a 2-place quantifier. So treat a_i as if it had the type of a 2-place quantifier?

$$[\![\text{a}_i]\!]^g := \lambda n.\lambda f.f\,(g(i)(n))$$

Unexceptional alternatives

There is a basic problem with this proposal.

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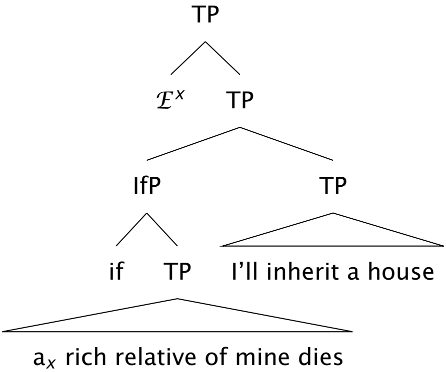
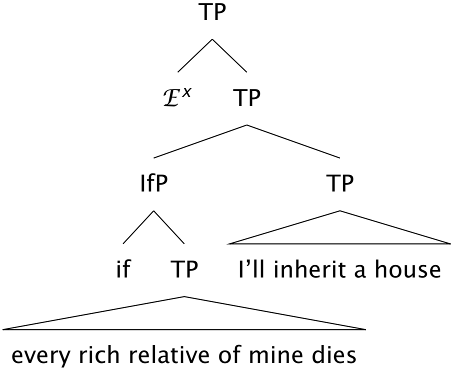
The relevant alternative to a_i doesn't (and in principle can't) precipitate exceptional scope readings in the same way that a_i does.


TP
$\mathcal{E}^x$
TP
IfP
TP
if
TP
I'll inherit a house
a_x rich relative of mine dies


TP
$\mathcal{E}^x$
TP
IfP
TP
if
TP
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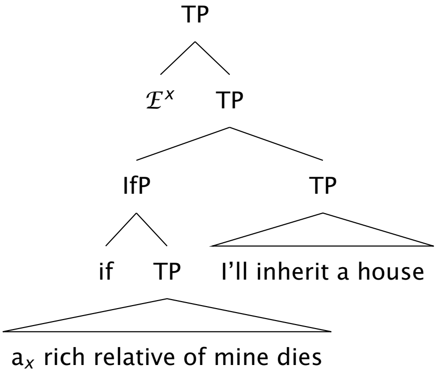
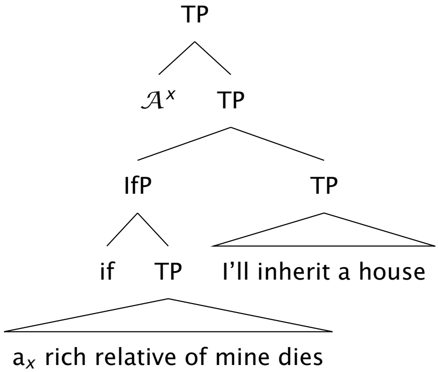
Towards a theory

We make some progress if we assume instead that the relevant scalar alternative isn't triggered by the indefinite at all, but by the silent $\mathcal{E}$.

$$\{\!\{\mathsf{a}_i\}\!\}^g := \{[\![\mathsf{a}_i]\!]\} = \{g(i)\} \qquad \{\!\{\mathcal{E}^x\ \Delta\}\!\}^g := \{[\![\mathcal{E}^x\ \Delta]\!]^g, [\![\mathcal{A}^x\ \Delta]\!]^g\}$$

With $\{\!\{\mathcal{A}^x\ \Delta\}\!\}^g := \forall f \in \mathbf{CH} : [\![\Delta]\!]^{g[x \to f]}$


TP
ℰ^x TP
IfP TP
if TP I'll inherit a house
a_x rich relative of mine dies


TP
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TP
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TP
if
TP
I'll inherit a house
a_x rich relative of mine dies

A technical note

The characterization of $\{\!\{\mathcal{E}^x\ \Delta\}\!\}^g$ fails to retain the alternatives of Δ.

$$\begin{aligned}\{\!\{\mathcal{E}^x\ \Delta\}\!\}^g &:= \left\{[\![\mathcal{E}^x\ \Delta]\!]^g, [\![\mathcal{A}^x\ \Delta]\!]^g\right\}\\ &:\not= \left\{\ldots\delta\ldots \mid \delta \in \{\!\{\Delta\}\!\}^g\right\}\end{aligned}$$

That's problematic. For example, $\exists x. P(x) \vee Q(x) \rightsquigarrow \neg\exists x. P(x) \wedge Q(x)$:

1. **Somebody** got sick **or** had trouble breathing.
   $\rightsquigarrow$ **Nobody** got sick **and** had trouble breathing.

Turns out this dumb feature is necessitated by treating alternative sets as assignment-relative things (Shan 2004, Romero & Novel 2013). Fix:

$$\{\!\{\Delta\}\!\} := \{\lambda g.\ldots \mid \ldots\}$$

Using alternatives directly

Another view of exceptional scope phenomena is alternative semantics:

$$[\![\text{a relative of mine}]\!] = \{\!\{\text{a relative of mine}\}\!\} = \{x \mid \mathbf{rel}(x)\}$$

Individual alternatives expand into proposition-sized alternatives:

$$[\![\text{if a rel dies...}]\!] = \{\!\{\text{if a rel dies...}\}\!\} = \{\mathbf{dies}(x) \Longrightarrow \mathbf{house} \mid \mathbf{rel}(x)\}$$

Existential closure operators tame alternatives:

$$\begin{aligned} [\![\mathbb{E}\ \Delta]\!] &:= \{\exists p \in [\![\Delta]\!] : p\} \\ \{\!\{\mathbb{E}\ \Delta\}\!\} &:= \bigcup\{[\![\mathbb{E}\ \Delta]\!], [\![\mathbb{A}\ \Delta]\!]\} \end{aligned}$$

A theory of alternatives redux

Katzir (2007), Fox & Katzir (2011):

1. $S' \sim S \iff S'$ can be derived from S by successive replacements of sub- constituents of S with elements of $SS(X, C)$.
2. $SS(X, C)$ is the union of the following sets:
   (a) The lexicon
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So *where* does $\mathcal{A}$ (or $\mathbb{A}$) come from? The lexicon?

Exceptional scope in (e.g.) Japanese

In Japanese (and many other languages), "indeterminate pronouns" yield island-disrespecting existential *and universal* quantification:

1. [[**Dono gakusei**-ga katta] hon]-**ka**-o karita.
   which student-Nom bought book-KA-Acc borrowed
   'For some student *x*, I borrowed the book *x* bought.'
2. [[**Dono gakusei**-ga katta] hon]-**mo**-o karita.
   which student-Nom bought book-MO-Acc borrowed
   'For every student *x*, I borrowed the book *x* bought.'

Moral: Japanese *ka* and *mo* look a lot like overt cousins of $\mathcal{E}$ and $\mathcal{A}$.

[See, e.g., Nishigauchi 1990, Kratzer & Shimoyama 2002, Shimoyama 2006]

Quantificational variability in English

Of course, English indefinites are sometimes read universally:

1. Somebody who respects others is punctual.
   $\approx$ Everybody who respects others is punctual.

But exceptional scope (and exceptional implicature) happen in episodic sentences lacking GEN, so it'd be a mistake to identity $\mathcal{A}$ with GEN.

2. Every theory that was posited by a famous expert on syntax yesterday was discussed rather extensively in the Q&A.

Summed up

When we do (neo-)Gricean reasoning, *we reason like Japanese speakers*.
We use $\mathcal{A}$ (or $\mathbb{A}$), which is otherwise ineffable in English.

Plurality and cardinals

Basic patterns

Indefinites tend to implicate an upper bound:

1. I ate **a** cookie.

   $\rightsquigarrow$ I **didn't** eat **two** cookies.

2. I ate **two** cookies.

   $\rightsquigarrow$ I **didn't** eat **three** cookies.

Exceptional

Back to our running example:

1. If a rich relative of mine dies, I'll inherit a house.

Does this implicate the negation of the wide-scope reading of *if two rich relatives of mine die, I'll get a house*?

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- On the one hand, if you can find a rich relative of mine whose death would guarantee me a house, certainly you can find two relatives whose deaths would get me a house.
- On the other hand, you do seem to be implicating that you don't have two relatives *each of whom* could die and get you a house.

More formally

Sentence (1) implicates (2), but not (3):

1. If a rich relative of mine dies, I'll inherit a house.
2. $\neg\exists X \in \textbf{2.rels} : \forall x \leqslant_{\textbf{at}} X : (\textbf{dies}(x)) \Longrightarrow \textbf{house}$
3. $\neg\exists X \in \textbf{2.rels} : (\forall x \leqslant_{\textbf{at}} X : \textbf{dies}(x)) \Longrightarrow \textbf{house}$

Question: how is the (2) implicature to be calculated? Remember that we're quantifying over *choice functions*.

A non-starter

Do we just need more alternatives to $\mathcal{E}^x$?

$$\{\!\{\mathcal{E}^x\ \Delta\}\!\}^g := \{[\![\mathcal{E}^x\ \Delta]\!]^g, [\![\mathcal{A}^x\ \Delta]\!]^g, [\![2^x\ \Delta]\!]^g, \ldots\}$$

Nah: choice functions are way more finely individuated than individuals. Even in cases where just one individual witnesses the truth of a sentence, there will potentially be very many choice functions that do so.

One way to go

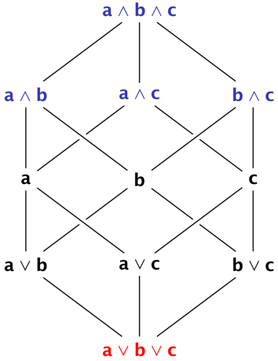
Suppose that the indefinite actually creates relevant alternatives too:

$$\{\!\{\mathrm{a}_i\}\!\}^g := \{\lambda n.[\![\mathrm{a}_i]\!](S(n)) \mid S \in \mathbf{SEL}\}$$

SEL are *subset selection functions* (Chierchia 2013, von Fintel 1999):

$$\mathbf{SEL} := \{S \mid \forall P \supsetneq \emptyset : S(P) \subseteq P \wedge S(P) \neq \emptyset\}$$

Together with the alternatives to $\mathcal{E}$, the alternatives to a_i end up inducing a full lattice of alternative propositions:



The conjunctive ones can all be sensibly negated, and we're home free.

The alternative semantics perspective

$$[\![\mathbb{E}\ \Delta]\!] := \{\exists p \in [\![\Delta]\!] : p\}$$
$$\{\!\{\mathbb{E}\ \Delta\}\!\} := \bigcup\{[\![\mathbb{E}\ \Delta]\!], [\![\mathbb{A}\ \Delta]\!]\}$$

(cf. Alonso-Ovalle 2008)

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$$[\![\mathbb{E}\ \Delta]\!] := \{\exists p \in [\![\Delta]\!] : p\}$$
$$\{\!\{\mathbb{E}\ \Delta\}\!\} := \bigcup_{s \subseteq \{\!\{\Delta\}\!\} \wedge s \neq \emptyset} \{\bigwedge s, \bigvee s\}$$

(cf. Alonso-Ovalle 2008)

One revised widget in lieu of the choice-functionalists' two.

Wrapping up

Exceptional implicatures require us to contemplate alternatives that don't correspond to any actually expressible lexemes in English.

When we do scalar reasoning, we behave like we're Japanese speakers, considering a universal alternative that only appears in counterfactual utterances contemplated by the neo-Gricean machine.

Upper-bounded exceptional implicatures suggest that the alternatives induced by exceptional indefinites are numerous, finely structured, and rather occult. We seem a long way from *Logic and Conversation*.

TK

I took it for granted that sentences with indefinites have existentially quantified interpretations. Kratzer (1998, 2003) thinks this is wrong.

1. If Uncle Buck dies, I'll inherit a house.

But while this seems reasonable for *a certain* indefinites, simple *a* indefinites have readings a referential approach can't explain.

The choice-functional and alternative-semantic theories of indefinites seem on an empirical par so far. I think alternatives give a better account of exceptional indefinites (Charlow 2014, 2017), so it's worth considering how the alternative-semantic account might be scaled up.

Tak ^_^

Alonso-Ovalle, Luis. 2008. Innocent exclusion in an alternative semantics. *Natural Language Semantics* 16(2). 115–128. http://dx.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/.

Charlow, Simon. 2017. The scope of alternatives: Indefiniteness and islands. Unpublished ms. http://ling.auf.net/lingbuzz/003302.

Chierchia, Gennaro. 2013. *Logic in grammar*. Oxford: Oxford University Press. http://dx.doi.org/10.1093/acprof:oso/9780199697977.001.0001.

Farkas, Donka F. 1981. Quantifier scope and syntactic islands. In Roberta Hendrick, Carrie Masek & Mary Frances Miller (eds.), *Papers from the Seventh Regional Meeting, Chicago Linguistic Society*, 59–66. Chicago: CLS.

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. http://dx.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. http://dx.doi.org/10.1057/9780230210752_4.

Fox, Danny & Roni Katzir. 2011. On the characterization of alternatives. *Natural Language Semantics* 19(1). 87–107. http://dx.doi.org/10.1007/s11050-010-9065-3.

Heim, Irene. 2011. Definiteness and indefiniteness. In Klaus von Heusinger, Claudia Maienborn & Paul Portner (eds.), *Semantics: An International Handbook of Natural Language Meaning*, vol. 33 (HSK 2), chap. 41, 996–1025. Berlin: de Gruyter. http://dx.doi.org/10.1515/9783110255072.996.

Hirschberg, Julia. 1985. *A theory of scalar implicature*. University of Pennsylvania Ph.D. thesis.

Katzir, Roni. 2007. Structurally-defined alternatives. *Linguistics and Philosophy* 30(6). 669–690. http://dx.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. http://dx.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 & 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.

Kroch, Anthony. 1972. Lexical and inferred meanings for some time adverbials. In *Quarterly progress reports of the research laboratory of electronics 104*. MIT, Cambridge, Mass.

Ludlow, Peter & Stephen Neale. 1991. Indefinite descriptions: In defense of Russell. *Linguistics and Philosophy* 14(2). 171–202. http://dx.doi.org/10.1007/bf00627402.

May, Robert. 1985. *Logical form: Its structure and derivation*. Cambridge, MA: MIT Press.

Nishigauchi, Taisuke. 1990. *Quantification in the theory of grammar*. Dordrecht: Kluwer Academic Publishers. http://dx.doi.org/10.1007/978-94-009-1972-3.

Reinhart, Tanya. 1997. Quantifier scope: How labor is divided between QR and choice functions. *Linguistics and Philosophy* 20(4). 335–397. http://dx.doi.org/10.1023/A:1005349801431.

Romero, Maribel & Marc Novel. 2013. Variable binding and sets of alternatives. In Anamaria Fălăuș (ed.), *Alternatives in Semantics*, chap. 7, 174–208. London: Palgrave Macmillan UK. http://dx.doi.org/10.1057/9781137317247_7.

Sauerland, Uli. 2004. Scalar implicatures in complex sentences. *Linguistics and Philosophy* 27(3). 367–391. http://dx.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. http://dx.doi.org/10.1093/jos/ffl005.

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. http://dx.doi.org/10.3765/salt.v14i0.2901.

Shimoyama, Junko. 2006. Indeterminate phrase quantification in Japanese. *Natural Language Semantics* 14(2). 139–173. http://dx.doi.org/10.1007/s11050-006-0001-5.

Winter, Yoad. 1997. Choice functions and the scopal semantics of indefinites. *Linguistics and Philosophy* 20(4). 399–467. http://dx.doi.org/10.1023/A:1005354323136.