A note on substitution sources

Tue Trinh
University of Wisconsin–Milwaukee

Zentrum für Allgemeine Sprachwissenschaft, 3/2/2016

Abstract

I address some of Breheny et al.'s (2015) arguments against the structural approach to alternatives as explicated in Fox and Katzir (2011) and amended in Trinh and Haida (2015), thereby proposing a slight revision of Trinh & Haida's Atomicity Constraint and a condition on substitution sources which together turn out to account for a number of hitherto puzzling observations.

1 The structural approach to alternatives

1.1 The symmetry problem

Implicatures of a sentence φ used in a context c arise from reasoning about alternatives of φ which could have been used in c, i.e. elements of $\mathrm{ALT}(\varphi, c)$. From a purely Gricean perspective,

(1) Gricean alternatives
$\mathrm{ALT}(\varphi, c) =_{\mathrm{def}} \{\varphi' \mid \varphi' \text{ is relevant in c}\}$

Symmetric alternatives which do not follow from φ give rise to ignorance inferences (cf. Kroch 1972, Fintel and Heim 1997, Sauerland 2004).

(2) Symmetric alternatives
φ' and φ'' are symmetric alternatives of φ iff $\varphi \wedge \neg\varphi'$ entails φ'' and $\varphi \wedge \neg\varphi''$ entails φ'

(3) John talked to Mary or Sue
$\rightsquigarrow \neg\mathrm{K}(\textbf{mary}) \wedge \neg\mathrm{K}(\textbf{sue}) \wedge \neg\mathrm{K}\neg(\textbf{mary}) \wedge \neg\mathrm{K}\neg(\textbf{sue})$

We expect ignorance inferences with respect to **mary** $\wedge$ **sue** and **mary** $\overline{\vee}$ **sue**. However, (3) clearly conveys the speaker's belief that **mary** $\wedge$ **sue** is false and **mary** $\overline{\vee}$ **sue** is true.

One solution has been to say that alternatives not only have to meet the criterion of contextual relevance but also that of contextual simplicity. This is the "Neo-Gricean" perspective.

(4) Neo-Gricean alternatives
$\mathrm{ALT}(\varphi, c) =_{\mathrm{def}} \{\varphi' \mid \varphi' \text{ is relevant in c}\} \cap \{\varphi' \mid \varphi' \text{ is no more complex than } \varphi \text{ in c}\}$

Elements of $\{\varphi' \mid \varphi' \text{ is no more complex than } \varphi \text{ in c}\}$ are usually called the "formal alternatives" of φ. The idea is to define this notion in such a way that (5a), but not (5b), is a formal alternative of (3).

(5) a. John talked to Mary and Sue
b. John talked to Mary or Sue but not both

1.1.1 Katzir's theory

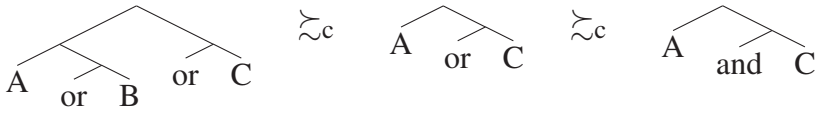
Katzir (2007) and Fox and Katzir (2011) work out the following definition of the relation "φ' is no more complex than φ in context c," notated $\varphi' \preceq_c \varphi$.

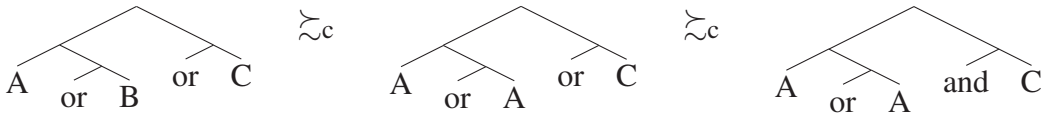
(6) Definition of $\precsim_c$
(i) $\varphi' \precsim_c \varphi$ iff φ' can be derived from φ by replacement of at most one constituent of φ with an element of the substitution source of φ in c
(ii) if $\varphi' \precsim_c \varphi$ and $\varphi'' \precsim_c \varphi'$ than $\varphi'' \precsim_c \varphi$

(7) Definition of "substitution source of φ in c"
$\text{SUB}(\varphi, c) =_{\text{def}} \{x \mid x \text{ is a lexical item}\} \cup \{x \mid x \text{ is a constituent of an expression uttered in c}\}$

(8) Neo-Gricean alternatives
$\text{ALT}(\varphi, c) =_{\text{def}} \{\varphi' \mid \varphi' \text{ is relevant in c}\} \cap \{\varphi' \mid \varphi' \precsim_c \varphi\}$

Note that we need the transitivity clause in (6) to derive, say, $(A \wedge C)$ from $((A \vee B) \vee C)$.

(9) a. 

b. 

Katzir's theory explains the following data, among others.

(10) Everyone talked to Mary or Sue
$\rightsquigarrow$ ¬Everyone talked to Mary

(11) Everyone who loves John but not Mary is an idiot
$\rightsquigarrow$ ¬Everyone who loves John is an idiot

(12) Yesterday it was warm. Today it is warm and sunny with gusts of wind.
$\rightsquigarrow$ ¬Yesterday it was warm and sunny with gusts of wind

1.2 The Atomicity Constraint

Relevance is closed under negation and conjunction (cf. Groenendijk and Stokhof 1984, Lewis 1988, Fintel and Heim 1997, Fox and Katzir 2011).

(13) Closure conditions on relevance
a. if p is relevant, ¬p is relevant
b. if p is relevant and q is relevant, $p \wedge q$ is relevant

This means that a proposition is relevant if it is in the Boolean closure of other propositions which are relevant. Given this assumption, Katzir's theory under-generates.

Problem 1 (Trinh and Haida 2015)

(14) Yesterday John went for a run. Today he went for a run and didn't smoke.
$\rightsquigarrow$ Yesterday John smoked.

(15) **run** $\succsim_c$ **run** $\wedge$ ¬**smoke** $\succsim_c$ **run** $\wedge$ **smoke**

Problem 2 (Romoli 2012)

(16) John did not do all of the homework.
$\rightsquigarrow$ John did some of the homework.

(17) ¬**all** $\succsim_c$ ¬**some** $\succsim_c$ **some**

Trinh & Haida's solution

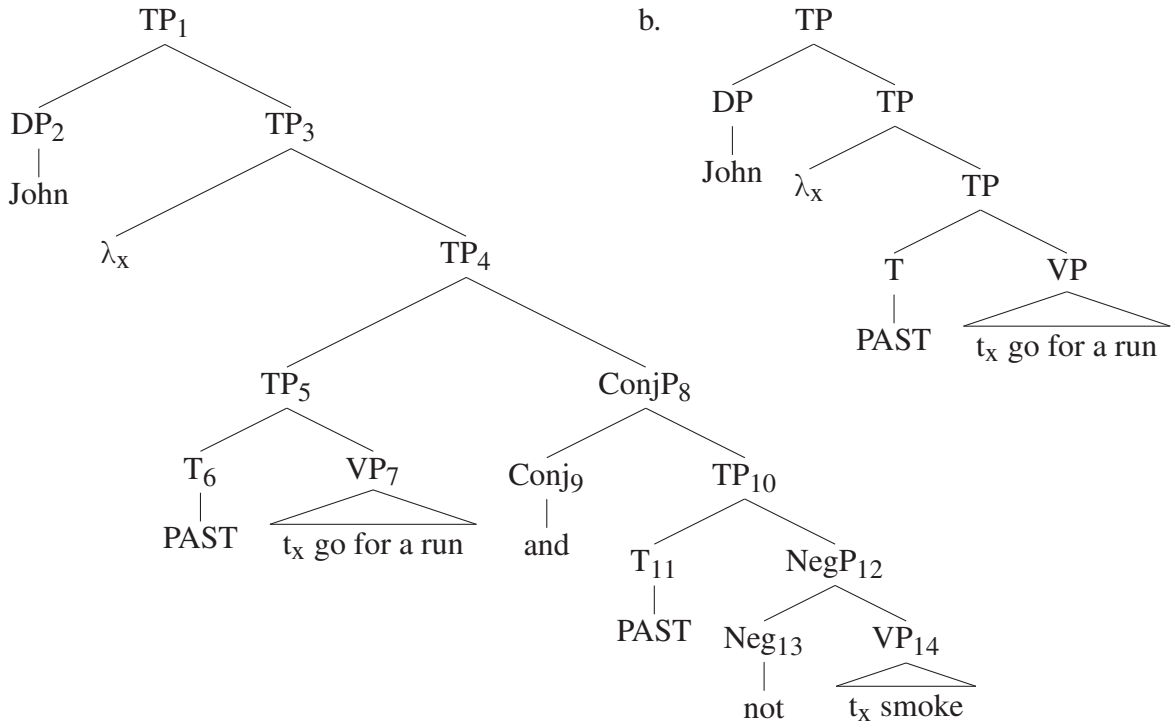
Trinh and Haida (2015) amends Katzir's theory with a constraint on the derivation of alternatives.

(18) Atomicity (first version, to be revised below)
Elements of SUB(φ, c) are syntactically atomic

The idea is that salient constituents are "pronominalized," and $\varphi' \precsim_c \varphi$ if φ' can be derived from φ by replacing a constituent of φ with one of these "pronouns." (Another way of describing this is to say that salient constituents are treated as "temporary" lexical items.)

The contextually salient constituents are those numbered in (19a), the prejacent is (19b).

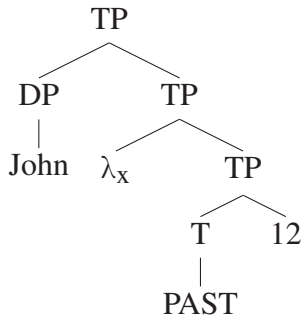
(19) a.



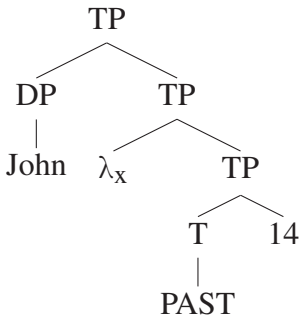
b.

The formal alternatives are thus (20a-c), in addition to the prejacent itself, which is derived by replacing no constituent with an element in the substitution source.

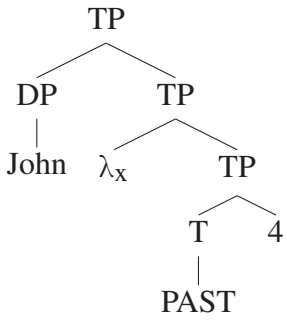
(20) a.



b.



c.



Importantly, there is no way to derive **run** $\wedge$ **smoke** from **run**.

We can then have

(21) a. $\{\varphi' \mid \varphi' \precsim_c \textbf{run}\} = \{\textbf{run}, \textbf{smoke}, \neg\textbf{smoke}, \textbf{run} \wedge \neg\textbf{smoke}\}$
b. $\{\textbf{smoke}, \neg\textbf{smoke}\} \not\subseteq \{\varphi' \mid \varphi' \text{ is relevant in c}\}$
c. $\{\textbf{run}, \textbf{run} \wedge \neg\textbf{smoke}\} \subseteq \{\varphi' \mid \varphi' \text{ is relevant in c}\}$

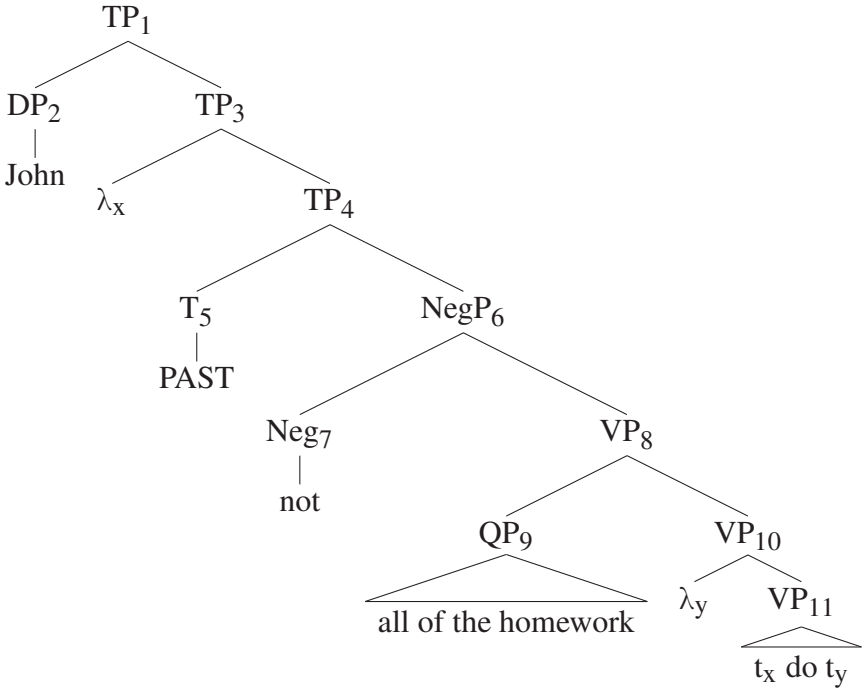
which means

(22) ALT(**run**, c) = $\{\textbf{run}, \textbf{run} \wedge \neg\textbf{smoke}\}$

which gives the right result.[1]

Similar reasoning applies in the indirect implicature case.

(23)



Given Atomicity, there is no way to derive **some** from **not all**.

1.3 Criticisms against Trinh & Haida (2015)

1.3.1 Undergeneration problem with non-conjunctive sentences

Breheny et al. (2015) present the following simple variant of the example which motivates Trinh & Haida's postulation of the Atomicity constraint.

(24) A: Bill went for a run. He didn't smoke.
B: What about John?
A: John went for a run.
⇝ John smoked

Trinh & Haida predict that

(25) $\{\varphi' \mid \varphi' \precsim_c \textbf{run}\} = \{\textbf{run}, \textbf{smoke}, \neg\textbf{smoke}, \sout{\textbf{run} \wedge \neg\textbf{smoke}}\}$

which means ALT(**run**, c) is either {**run**} or {**run**, **smoke**, ¬**smoke**}, neither of which licenses the attested inference that John smoked.

"[S]ince the conjunction is not present, we can only create formal alternatives [**smoke** and ¬**smoke**] [...] The desired scalar implicature would obtain if the alternative ¬**smoke** is negated, but this cannot be done due to its symmetric counterpart **smoke**. And **smoke** cannot be excluded [...] due to the closure condition [on relevance]." (Breheny et al. 2015)

What if we say A's first utterance is a conjunctive sentence with a covert **and**?

(26) $[_{S_1}\ [_{S_2}$ Bill went for a run] and $[_{S_3}$ he did not smoke]]

"While having multiple sentences as one alternative is a logical possibility, it would remain the problem that substituting into them is exactly what the atomicity constraint prohibits." (Breheny et al. 2015)

---

[1] Note that neither **smoke** nor ¬**smoke** is in the Boolean closure of {**run**, **run** ∧ ¬**smoke**}. Also, note that if **run** ∧ **smoke** were a formal alternative, it would have to be considered relevant, since it is equivalent to **run** ∧ ¬(**run** ∧ ¬**smoke**).

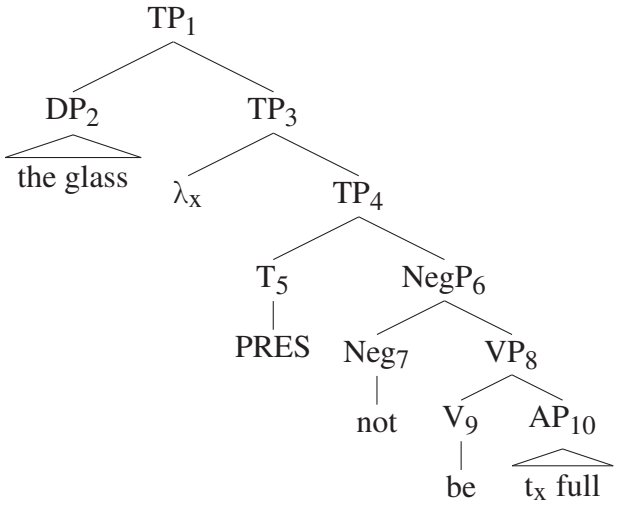
1.3.2 Over- and under-generation problem with adjectives

Breheny et al. (2015) provide the following example which they take to be an instance of the indirect implicature phenomenon.

(27) The glass is not full
⇝ The glass is not empty

Assuming the structure of (27) to be

(28)



Trinh & Haida predict that

(29) $\{\varphi' \mid \varphi' \precsim_c \neg\textbf{full}\} = \{\neg\textbf{empty}, \sout{\textbf{empty}}\}$

which means they predict ¬**full** to have the non-attested inference **empty** (over-generation) and not to have the attested inference ¬**empty** (under-generation).

"Trinh & Haida (2015) [...] over-generates for cases like [(28)]. That is, it predicts the inference [that the glass is empty] because of the alternative ¬**empty** obtained by simple lexical substitution of **full** and **empty**. Of course, this inference would be correctly blocked if the alternative **empty** was available, but [...] there is no way to create **empty** out of ¬**empty** without violating the atomicity constraint." (Breheny et al. 2015)

1.4 Addressing the criticisms

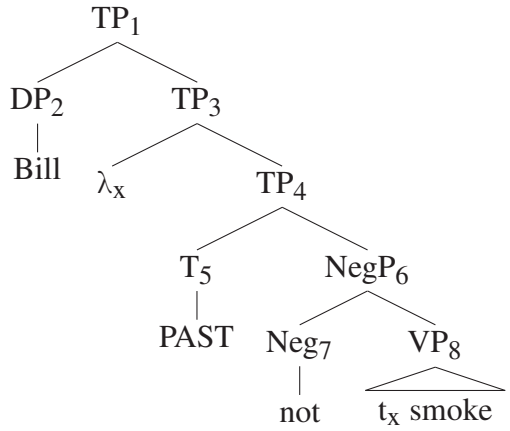
1.4.1 Accounting for scalar implicatures of non-conjunctive sentences

Suppose the context sets the standard for simplicity in a very simple way: it determines which constituents are to be regarded as "atoms," i.e. as having no subparts which are themselves atoms. I propose to revise the Atomicity constraint as follows.

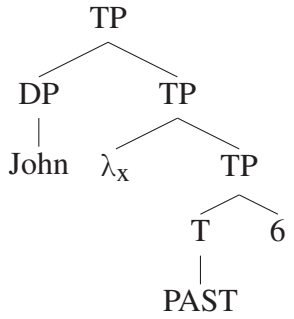
(30) Atomicity (final version)
If α and β are elements of SUB(φ, c), α is not a subconstituent of β

Thus, Atomicity becomes a condition on the elements of the substitution source. The condition entails, assuming (31) has been uttered in the context, that the substitution source may contain either 6 or 8, but not both. This means ALT(31) may contain (32a) or (32b), but not both.

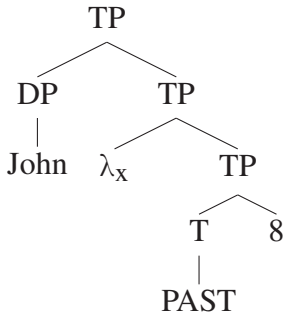
(31)



(32) a.



b.



Note that the new version of Atomicity, unlike the old one, can account for the following.

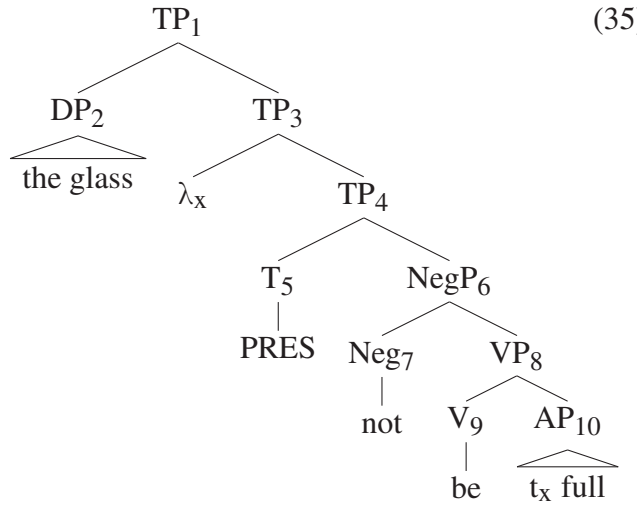
(33) A: Bill went for a run and didn't smoke.
B: What about John? Did he smoke.
A: John only went for a run. He didn't smoke either.

1.4.2 The case of adjectives

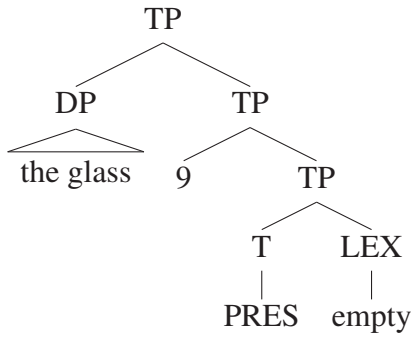
Solving the under-generation problem

Suppose subcategorization is not an LF condition and alternatives are LF's. Furthermore, suppose that **be** denote the identity function [$\lambda P_{<e,t>}.P$] (Heim and Kratzer 1998). Then (35) can be derived from (34) by successively replacing (i) λ_x with 9 and (ii) NegP with **empty**.

(34)



(35)



Solving the over-generation problem

We now need to prevent ¬**empty** from being an alternative of ¬**full**. I propose that alternatives whose negation is logically stronger than the prejacent are disregarded.

(36) Definition of "alternatives of φ in c" (final version)
ALT(φ, c) = {φ′ | φ′ is relevant} ∩ {φ′ | φ′ ≾c φ} ∩ {φ′ | ¬φ′ ⇏ φ}

We predict that **empty**, but not ¬**empty**, is in ALT(¬**full**, c), which gives the right result.

1.5 Consequences of the proposal

1.5.1 Distribution of ignorance inferences

Jacopo Romoli (p.c.) provides the following example.

(37) Last year, some of my students passed the exam. This year, in the same way, not all of them passed it.
⇝ ¬Last year, all of my students passed the exam

Fox and Katzir's theory, in its original version or in the version amended by Trinh and Haida, predicts that (37) gives rise to ignorance inferences concerning whether all of my students passed the exam last year. Romoli points out, correctly, that this prediction is wrong: (37) actually licenses the scalar implicature that not all of my students passed the exam last year.

Given the new definition of alternatives and Atomicity, this is exactly what we would expect, because

(38) a. |{¬**all**, **all**} ∩ {φ′ | φ′ ≾c **some**}| = 1
b. ¬¬**all** ⇒ **some**

From (38a) it follows that there is no ignorance inference, and from (38b) it follows that

(39) ALT(**some**, c) = {**all**}

which yields the attested scalar implicature.

Similarly,

(40) A: I hope you didn't eat all of the cookies.
B: I ate some of them.
⇝ K(¬**all**)
↛ ¬K(**all**) ∧ ¬K¬(**all**)

(41) A: I hope you didn't have four drinks.
B: I had three drinks.
⇝ K(¬**four**)
↛ ¬K(**four**) ∧ ¬K¬(**four**)

(42) A: I hope John did not talk to both Mary and Sue.
B: He talked to Mary or Sue.
⇝ K¬(**mary** ∧ **sue**)
↛ ¬K(**mary** ∧ **sue**) ∧ ¬K¬(**mary** ∧ **sue**)

Importantly, we do not predict the absence of ignorance inferences with respect to the individual disjuncts, because neither disjunct contains the other as a subconstituent.

(43) John talked to Mary or Sue
⇝ ¬K(**mary**) ∧ ¬K(**sue**) ∧ ¬K¬(**mary**) ∧ ¬K¬(**sue**)

1.5.2 Distribution of scalar implicatures

We predict that symmetry can be broken in the following cases. Note that these must be spoken with the right intonation, accompanied by vivid facial expression.

(44) A: I hope you ate some but didn't eat all of the cookies.
B: I ate some of the cookies, yes.
⇝ B ate all of the cookies

(45) A: I hope you had three drinks but did not have four drinks?
B: I had three drinks, yes.
$\rightsquigarrow$ B had more than three drinks

(46) A: I hope you talked to Mary or Sue and did not talk to both?
B: I talked to Mary or Sue, yes.
$\rightsquigarrow$ B talked to Mary and Sue

The following examples might bring out the relevant implicatures better.

(47) A: I hope you ate just some of the cookies.[2]
B: Well I ate some of the cookies.

(48) A: I hope you had exactly three drinks?[3]
B: Well I had three drinks.

(49) A: I hope you talked to just Mary or Sue
B: Well I talked to Mary or Sue

There is some "playing with language" involved, in some sense which is not well understood. However, the inferences seem to be (marginally) possible. The two speakers I consulted found a contrast between these and the examples in the previous subsection. If the contrast turns out to be unreal, it may just mean that the under- and over-generation problem with adjectives must find another solution. One is actually sketched in Breheny et al. (2015).

References

Breheny, Richard, Romoli Jacopo Klinedinst, Nathan, and Yasutada Sudo. 2015. Does the structural approach to alternatives give us enough alternatives to solve the symmetry problem?

Fintel, Kai von, and Irene Heim. 1997. Pragmatics in Linguistic Theory. MIT classnotes.

Fox, Danny, and Roni Katzir. 2011. On the characterization of alternatives. Natural Language Semantics 19:87–107.

Groenendijk, Jeroen, and Martin Stokhof. 1984. Studies on the Semantics of Questions and the Pragmatics of Answers. Doctoral Dissertation, University of Amsterdam.

Heim, Irene, and Angelika Kratzer. 1998. Semantics in Generative Grammar. Blackwell.

Katzir, Roni. 2007. Structurally-defined alternatives. Linguistics and Philosophy 30:669–690.

Kroch, Anthony. 1972. Lexical and inferred meanings for some time adverbials. Quarterly Progress Reports of the Research Laboratory of Electronics 104:260–267.

Lewis, David. 1988. Relevant implication. Theoria 54:161–174.

Matsumoto, Yo. 1995. The conversational condition on Horn scales. Linguistics and Philosophy 18:21–60.

Romoli, Jacopo. 2012. A problem for the structural characterization of alternatives. Unpublished manuscript.

Sauerland, Uli. 2004. Scalar implicatures in complex sentences. Linguistics and Philosophy 27:367–391.

Trinh, Tue, and Andreas Haida. 2015. Constraining the derivation of alternatives. Natural Language Semantics 23:249–270.

[2] Assuming **just some** is not a constituent.

[3] I also assume that **exactly three** is not a constituent. A variant of this example, with the same conclusion, is discussed in Matsumoto (1995), footnote 17.