A note on the substitution source

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Abstract

Breheny et al. (2015) argue against the structural approach to alternatives. The empirical force of their argument comes mostly from challenges raised against Trinh and Haida (2015). The present paper responds to these challenges, showing how they can be met by a revision of Trinh and Haida's (2015) theory which appeals to even more details of syntactic analysis than the original proposal. The revision turns out to be independently justified in two respects: (i) it captures the distribution of ignorance inferences more adequately than previous accounts; (ii) it makes unexpected predictions about particularized implicatures which cannot be dismissed as false, thus providing a stimulus for future experimental work.

1 Introduction

1.1 Scalar implicatures, ignorance inferences, symmetry

1.1.1 Scalar implicatures

A sentence φ, uttered in context c, licenses the "scalar implicature" $\neg\psi$ for every ψ which is "innocently excludable" given φ and SA(φ, c), the set of scalar alternatives of φ in c, where

(1) ψ is innocently excludable given φ and A iff $\psi \in \bigcap \{A' \mid A'$ is a maximal subset of A such that $\{\varphi\} \bigcup \{\neg\varphi' \mid \varphi' \in A'\}$ is consistent$\}$.[1]

The conjunction of φ and all of its scalar implicatures is the "strengthened meaning" of φ. Elements of SA(φ, c) answer the same question as φ, which means SA(φ, c) is a subset of RA(φ, c), the set of relevant sentences, where

(2) a. if $\psi \in \mathrm{RA}(\varphi, c)$ then $\neg\psi \in \mathrm{RA}(\varphi, c)$, and
b. if $\psi, \chi \in \mathrm{RA}(\varphi, c)$ then $\psi \wedge \chi \in \mathrm{RA}(\varphi, c)$.

1.1.2 Ignorance inferences

A sentence φ, in context c, gives rise to the inference $\neg K(\psi) \wedge \neg K(\neg\psi)$ for every ψ in RA(φ,c) which is not settled by the strengthened meaning of φ, where

(3) $P(\psi) =_{def} \neg K(\psi) \wedge \neg K(\neg\psi)$.

1.1.3 Symmetry

It follows from (1) that ψ and χ cannot both be innocently excludable given φ and A if $\varphi \wedge \chi$ is contradictory.

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[1] More informally, ψ is innocently excludable given φ and A iff every way of negating as many sentences in A as possible without contradicting φ includes the negation of ψ. Another way to formulate the definition in (1) is that ψ is innocently excludable given φ and A iff ψ is an element of A and $\varphi \wedge \neg\psi$ does not entail any disjunction of elements of A which is not entailed by φ. I thank Andreas Haida for suggesting this formulation.

(4) ψ and χ are symmetric alternatives of φ iff $\psi \wedge \chi \equiv \bot$

Given (2), no scalar alternative is innocently excludable if SA(φ, c) = RA(φ, c). This means for every φ which licences $\neg\psi$ as an implicature,

(5) SA(φ, c) = RA(φ, c) $\cap$ F,

where F is a property which "breaks symmetry," being true of ψ but not any of its symmetric counterparts in RA(φ, c).

1.2 Katzir's theory of F

Katzir (2007), and later Fox and Katzir (2011), propose that alternatives must meet not only the criterion of contextual relevance, but also that of contextual simplicity. Thus, F is to be the set of sentences which are contextually "no more complex than" the prejacent.

(6) $\text{SA}(\varphi, c) = \text{RA}(\varphi, c) \cap \{\psi \mid \psi \precsim_c \varphi\}$, where
  a. $\psi \precsim_c \varphi$ iff ψ can be derived from φ by replacement of at most one syntactic constituent of φ with an element of SUB(φ, c) of the same semantic type, and
  b. if $\psi \precsim_c \varphi$ and $\psi' \precsim_c \psi$, than $\psi' \precsim_c \varphi$

I will say that ψ is "K-derivable" from φ iff $\psi \precsim_c \varphi$. The substitution source of φ in c, SUB(φ, c), is

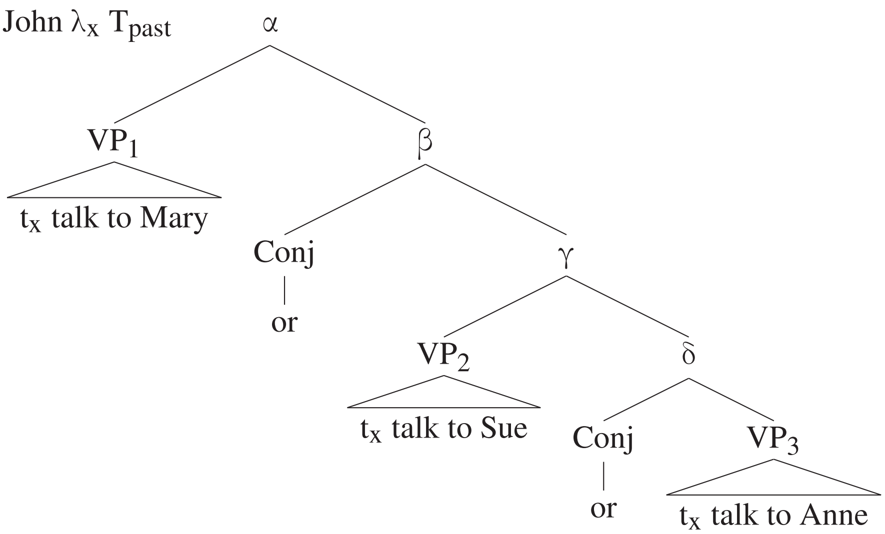
(7) $\text{SUB}(\varphi, c) =_{def} \{x \mid x \text{ is a lexical item}\} \cup \{x \mid x \text{ is a constituent of an expression uttered in c}\}$.

Illustration: (8) has the strengthened meaning (8a) and the ignorance inference (8b).

(8) John talked to Mary, or Sue, or Anne
  a. (**mary** $\vee$ (**sue** $\vee$ **anne**)) $\wedge$ $\neg$(**mary** $\wedge$ **sue**) $\wedge$ $\neg$(**mary** $\wedge$ **anne**) $\wedge$ $\neg$(**sue** $\wedge$ **anne**)
  b. P(**mary** $\vee$ **sue**) $\wedge$ P(**mary** $\vee$ **anne**) $\wedge$ P(**sue** $\vee$ **anne**)

This means **mary** $\wedge$ **sue**, **mary** $\wedge$ **anne**, and **sue** $\wedge$ **anne** need to be innocently excludable scalar alternatives of (8): they must be K-derivable from (9) and their symmetric counterparts must not be.

(9) John λ_x T_{past}



  a. John talked to Mary and Sue — γ/VP_2 + or/and
  b. John talked to Mary and Anne — γ/VP_3 + or/and
  c. John talked to Sue and Anne — α/γ + or/and

No symmetric counterpart of any of these conjunctions, e.g. $\neg$(**mary** $\wedge$ **sue**), is K-derivable from (9): such a symmetric counterpart would have to contain the negation **not**, and no constituent of (10) is of the same semantic type as **not**.

2 Problems for Katzir and a solution

Allowing the substitution source to contain contextually salient syntactic objects in addition to lexical items accounts for many cases of particularized implicature.

(10) Yesterday it was warm. Today it is warm and sunny with gusts of wind.
SI: ¬Yesterday it was warm and sunny with gusts of wind.

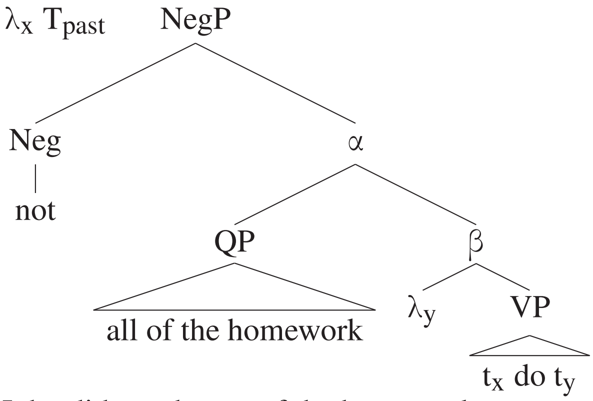
However, it is this component of the theory which turns out to be problematic. Specifically, it makes it quite easy to derive symmetric alternatives, thus leads to an overgeneration of ignorance inferences.

2.1 Romoli (2012)

(11) John did not do all of the homework
SI: John did some of the homework

The correct SI would only be predicted if (12a), but not (12b), is a scalar alternative of (12). However, both (12a) and (12b) are K-derivable from (12).

(12) John λ_x T_{past}



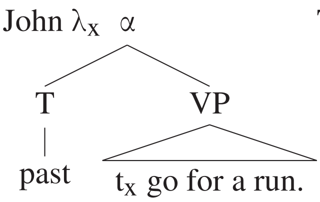
a. John did not do any of the homework — all/any
b. John did some of the homework — NegP/α + all/some

2.2 Trinh and Haida (2015)

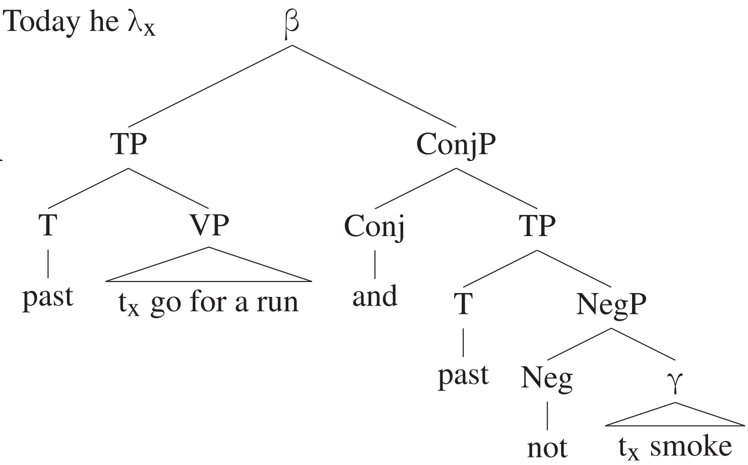
(13) Yesterday John went for a run. Today he went for a run and didn't smoke.
SI: Yesterday John smoked

As shown in Trinh and Haida (2015), the attested scalar implicature is only licensed if (14a) is a scalar alternative of **yesterday John went for a run** but not its symmetric counterpart (14b). However, both (14a) and (14b) are K-derivable from **yesterday John went for a run**.

(14) Yesterday John λ_x



Today he λ_x



a. Yesterday John went for and run and did not smoke — α/β
b. Yesterday John went for a run and smoked — α/β + NegP/γ

2.3 Atomicity (first version)

Katzir's novel idea is to treat contextually salient constituents as lexical items.Trinh and Haida (2015) propose the following constraint, which further specifies this idea.

(15) Atomicity (first version, to be revised)
Once an element of SUB(φ, c) has been inserted into a tree, its internal structure is inaccessible to further manipulation

This would prevent the second derivational step in (12b) and (14b), breaking the unwanted symmetry.

3 Problems for Trinh and Haida (2015) and a partial solution

3.1 Romoli's example

(16) #Last year, not all of my students passed the exam. This year, some of them did.
SI: This year, not all of my students passed the exam

The SI makes the sequence a bit strange. It can only be derived if (17a) but not (17b), is a scalar alternative of (17). However, both are K-derivable from (17), even given T&H's Atomicity constraint.

(17) This year, some of them passed the exam
a. This year, all of my students passed the exam.
b. This year, not all of my students passed the exam.

3.2 Breheny et al.'s examples

3.2.1 Non-conjunctive sequences

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

The attested SI is derived only if (19a) but not (19b) is a scalar alternative of (19). However, T&H's theory allows both (19a) and (19b) to be derived from (19).

(19) John went for a run
a. John smoked
b. John didn't smoke

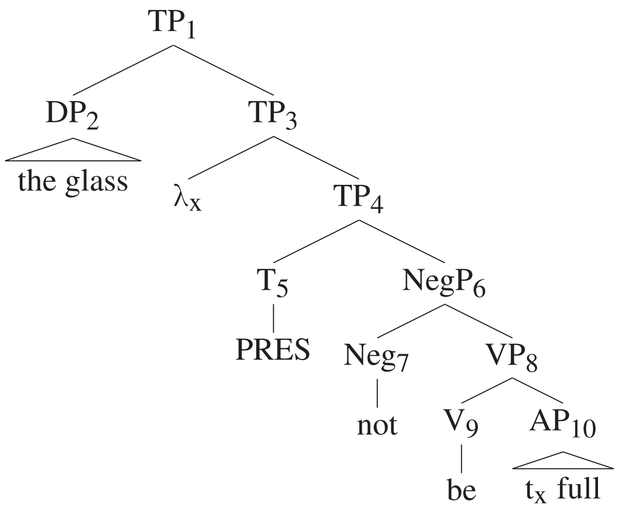
Another example which illustrates the same problem.

(20) John didn't drink wine, and Bill didn't drink beer.
SI: John drank beer and Bill drank wine

3.2.2 Gradable adjectives

(21) The glass is not full
SI: The glass is not empty

(22)



Trinh & Haida predict that (23a) can, but (23b) cannot, be a scalar alternative of (22), because the adjective **full**, presumably, is the only constituent of (22) which is of the same semantic type as **empty**.

(23) a. the glass is not empty
b. the glass is empty

"Trinh & Haida (2015) [...] over-generates for cases like [(22)]. 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)

3.3 Atomicity (second version)

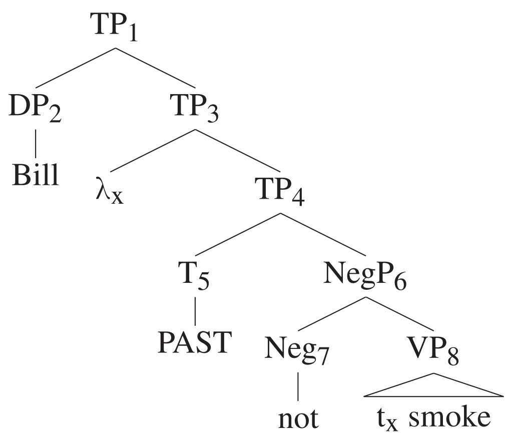
(24) Atomicity (final version)
If α and β are elements of SUB(φ, c), α is not a subconstituent of β

Thus, Atomicity becomes a condition on the elements of the substitution source.

3.3.1 Accounting for scalar implicatures of non-conjunctive sentences

The second version of the Atomicity condition entails, assuming (25) has been uttered in the context, that the substitution source may contain either 6 or 8, but not both. This means either (26a) or (26b), but not both, can be a scalar alternative of (26).

(25)



(26) John λ_x T_{past} [$_{VP}$ go for a run]
a. John λ_x T_{past} 6 (= John did not smoke) VP/6
b. John λ_x T_{past} 8 (= John smoked) VP/8

The tendency to opt for (26a) in the described context is caused by the need to establish a difference between John and Bill. However, (26b) can also be appropriate given the right context.

(27) 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.

3.3.2 The case of adjectives

To prevent **not empty** from being an alternative of **not full**, I propose that alternatives whose negation is logically stronger than the prejacent are disregarded.

(28) $\text{SA}(\varphi, c) = \text{RA}(\varphi, c) \cap \{\psi \mid \psi \precsim_c \varphi\} \cap \{\psi \mid \neg\psi \not\Rightarrow \varphi\}$

This means (29b) cannot be a scalar alternative of (29a), and vice versa, even though one is K-derivable from the other.

(29) a. The glass is not full
b. The glass is not emty

Thus, **not full** will never license **empty** as a scalar implicature. The condition in (28) has other consequences which we will examine later.

In order to derive **not empty** as a scalar implicature, we either need **empty** as an alternative to **not full**, or some other way. I leave this problem for future research.

4 Predictions

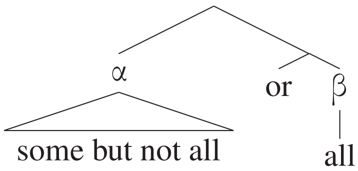
4.1 Predicting scalar implicatures

(30)	A:	I hope you didn't eat all of the cookies.	SA(some, c) = {all}
	B:	I ate some of them.	*SA(some, c) = {not all}
		SI: $\neg$I ate all of them	*SA(some, c) = {all, not all}
(31)	A:	I hope you didn't have four drinks.	SA(three, c) = {four}
	B:	I had three drinks.	*SA(three, c) = {not four}
		SI: $\neg$I had four drinks	*SA(three, c) = {four, not four}
(32)	A:	I hope John did not talk to both Mary and Sue.	SA($m \vee s$, c) = {$m \wedge s$}
	B:	He talked to Mary or Sue.	*SA($m \vee s$, c) = {not($m \wedge s$)}
		SI: $\neg$(mary $\wedge$ sue)	*SA($m \vee s$, c) = {$m \wedge s$, not($m \wedge s$)}
(33)	A:	I hope you ate some but didn't eat all of the cookies.	SA(some, c) = {all} SA(some, c) = {some $\wedge$ not all}
	B:	I ate some of the cookies, yes.	*SA(some, c) = {all, some $\wedge$ not all}
		SI: B ate all of the cookies	
(34)	A:	I hope you had three drinks but did not have four drinks?	SA(three $\wedge$ not four, c) = {four} SA(three $\wedge$ not four, c) = {three $\wedge$ not four}
	B:	I had three drinks, yes.	
		SI: B had four drinks	*SA(three $\wedge$ not four, c) = {four, three $\wedge$ not four}
(35)	A:	I hope John talked to Mary or Sue but did not talk to both?	SA($m \vee s$, c) = {$m \wedge s$} SA($m \vee s$, c) = {$m \overline{\vee} s$}
	B:	He talked to Mary or Sue, yes.	*SA($m \vee s$, c) = {$m \wedge s$, $m \overline{\vee} s$}

4.2 Predicting ignorance inferences

(36) John either did some but not all of the homework, or he did all of them
$\rightsquigarrow$ P(all)

(37)



The current theory allows both of the following two possibilities.

(38) a. SA((37), c) = {α}
b. SA((37), c) = {β}

However, none of them would be viable if we assume the following axiom.

(39) Axiom on disjunctions
A disjunction may not convey the meaning of one of its disjuncts

Then, the attested ignorance inference would follow from the fact that (36) does not settle whether John did all of the homework.

A similar example is (40), assuming HC driven local exhaustification.

(40) John talked to Mary or Sue or both

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