Quality assurance *

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Abstract

Utterance of a sentence ϕ, by default, gives rise to the inference that the speaker believes that ϕ. This inference can be derived "pragmatically" by way of the Gricean Maxim of Quality. It can also be derived semantically by assuming that ϕ, by default, is parsed as [K ϕ], where K means something like 'the speaker believes that.' The goal of this talk is to provide an argument, starting from a novel observation about modified numerals, in favor of the pragmatic derivation, thereby making a step towards the assurance of Quality as a non-trivially operative principle of language use.

1 Quality inferences

Utterance of a sentence ϕ, in a normal, non-defective conversation, gives rise to the inference that the speaker believes that ϕ.

(1) it's raining $\rightsquigarrow$ the speaker believes it's raining

The pragmatic derivation

Conversations follow a set of mutually accepted rules, one of which is the Maxim of Quality (Grice 1967).

(2) The Maxim of Quality
Say only what you believe!

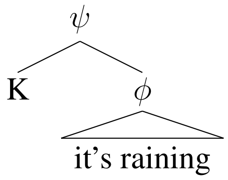
Given Quality, it follows from the fact that the speaker has said ϕ that he believes that ϕ.

The semantic derivation

The lexicon contains a silent operator, **K**, which means something like 'the speaker believes that.' The grammar of natural language dictates the following (Meyer 2013, 2014, Buccola and Haida 2017).

(3) Every assertive sentence ϕ must be c-commanded by an occurance of **K**

(4)



The inference that the speaker believes that ϕ will then be a semantic inference which logically follows from the *literal* meaning of the sentence uttered. There is no need for the Maxim of Quality.

Goal of this talk

In this talk, I will argue that the pragmatic derivation is correct, and hence, that the Maxim of Quality is an operative principle of language use.

* This talk results from a discussion with Andreas Haida and is currently being developed into a joint paper.

2 Exhaustification and ignorance inferences

2.1 Exhaustification

Sentences are parsed with an exhaustifying operator **exh**$_C$ whose meaning is akin to that of the word **only**.

(5) $[\![\text{exh}_C\ \phi]\!] = 1$ iff $[\![\phi]\!] = 1 \wedge \forall\phi'\ [\phi' \in E^C_\phi \rightarrow [\![\phi']\!] = 0]$
i.e. $[\text{exh}_C\ \phi]$ is true iff ϕ is true and every excludable alternatives of ϕ in C is false[1]

(6) $[_\psi$ exh$_C$ $[_\phi$ John talked to Mary or Sue$]]$

a. $C = \{\underbrace{\text{John talked to Mary}}_{\text{non-excludable}}, \underbrace{\text{John talked to Sue}}_{\text{non-excludable}}, \underbrace{\text{John talked to Mary and Sue}}_{\text{excludable}}\}$[2]

b. $[\![\psi]\!] = 1$ iff John talked to Mary or Sue but not both

(7) $[_\psi$ exh$_C$ $[_\phi$ there are at least 2 students$]]$

a. $C = \{\underbrace{\text{there are more than 2 students}}_{\text{non-excludable}}, \underbrace{\text{there are exactly 2 students}}_{\text{non-excludable}}\}$[3]

b. $[\![\psi]\!] = [\![\phi]\!] = 1$ iff there are at least 2 students

2.2 Ignorance inferences

The sentence in (8) licenses the "ignorance inference" that the speaker does not know whether there are three students (Geurts and Nouwen 2007, Buring 2008, Schwarz 2016).

(8) there are at least 2 students
$\rightsquigarrow \neg\text{know}_S(3) \wedge \neg\text{know}_S(\neg 3)$

Pragmatic derivation

The ignorance inference in question can be derived from the following generalization, itself a consequence of Grice's Maxim of Quantity (Kroch 1972, Fox 2007a,b, Chierchia et al. 2012, Fox 2016, Buccola and Haida 2017).[4]

(9) Consequence of Quantity (CQ)
$[\text{exh}_C\ \phi]$ gives rise to the inference that the speaker does not know whether ϕ' is true, for every non-excludable ϕ' in C

(10) $[_\psi$ exh$_C$ $[_\phi$ there are at least 2 students$]]$

a. $C = \{\underbrace{\text{there are more than 2 students}}_{\text{non-excludable}}, \underbrace{\text{there are exactly 2 students}}_{\text{non-excludable}}\}$

b. $\psi \rightsquigarrow \underbrace{\neg\text{know}_S(\text{more than 2}) \wedge \neg\text{know}_S(\neg\text{more than 2}) \wedge \neg\text{know}_S(\text{exactly 2}) \wedge \neg\text{know}_S(\neg\text{exactly 2})}_{\neg\text{know}_S(3)\ \wedge\ \neg\text{know}_S(\neg 3)}$

Semantic derivation

It has, however, been claimed that ignorance inferences are to be derived semantically by way of the K operator (Meyer 2013, 2014, Buccola and Haida 2017). The logical form of (11) is assumed to be (12), in which exh$_C$ scopes over K, and the members of C contain K in their analysis.

(11) there are at least 2 students

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1 Here is the formal definition: $E^A_\psi =_{\text{def}} \bigcap \{A' \mid A'$ is a maximal subset of A such that $\{\psi\} \bigcup \{\neg\psi' \mid \psi' \in A'\}$ is consistent$\}$. In this talk, we will not show how this definition derives the claims made in the text.

2 For arguments that the alternatives of a disjunction are the individual disjuncts and the corresponding conjunction, see Sauerland (2004), Fox (2007a), Fox and Katzir (2011), Trinh and Haida (2015), Trinh (2018).

3 For arguments that **at least** alternates with **more than** and **exactly**, see Kennedy (2015), Buccola and Haida (2017).

4 For lack of space, we will not present a derivation of CQ from the Maxim of Quantity.

(12) $[_\chi \text{ exh}_C \ [_\psi \text{ K } [_\phi \text{ there are at least 2 students}]]]$

a. $C = \{\underbrace{[\text{K [there are more than 2 students]}]}_{\text{excludable}}, \underbrace{[\text{K [there are exactly 2 students]}]}_{\text{excludable}}\}$

b. $[\![\chi]\!] = 1 \text{ iff } \underbrace{\text{K(at least 2)} \wedge \neg\text{K(exactly 2)} \wedge \neg\text{K(more than 2)}}_{\neg\text{K}(3) \wedge \neg\text{K}(\neg 3)}$

3 L-analyticity

Deviance may result from the sentence being "L-analytical," i.e. tautological or contradictory purely by virtue of the configuration of logical constants contained in it (Barwise and Cooper 1981, Fintel 1993, Gajewski 2003, Chierchia 2006, Abrusán 2007, Gajewski 2009, Abrusán 2011).

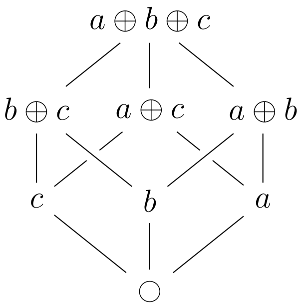
(13) a. there is a student $\equiv \exists x[x \in S \wedge \ x \in E]$
b. *there is every student $\equiv \forall x[x \in S \rightarrow x \in E] \equiv \top_L$

Note that the sentences in (14) are not L-analytical, even though they are analytical. That is why they are not deviant.

(14) a. every bachelor is unmarried $\equiv \top \not\equiv \top_L$
b. there are students and there are no students $\equiv \bot \not\equiv \bot_L$

4 Zero semantics

We adopt the theory proposed in Bylinina and Nouwen (2017), according to which every plural noun has in its the denotation a special element, $\bigcirc$, whose cardinality is 0. Thus, suppose a, b and c are all and only the students in the world, then $[\![\text{students}]\!]$ would be the set containing all elements of the complete latice below.



(15) a. $[\![\text{n students}]\!] = [\lambda x \ [x \in [\![\text{students}]\!] \wedge |x| = n]]$
b. there are n students $\equiv \exists x[x \in [\![\text{students}]\!] \wedge |x| = n]$

(16) a. $[\![\text{2 students}]\!] = [\lambda x \ [x \in [\![\text{students}]\!] \wedge |x| = 2]] = \{a \oplus b, b \oplus c, a \oplus c\}$
b. $[\![\text{0 students}]\!] = [\lambda x \ [x \in [\![\text{students}]\!] \wedge |x| = 0]] = \{\bigcirc\}$

(17) a. there are 2 students $\equiv \exists x[x \in [\![\text{students}]\!] \wedge |x| = 2]$
b. there are 0 students $\equiv \exists x[x \in [\![\text{students}]\!] \wedge |x| = 0] \equiv \top_L$

Because every plural noun, by assumption, has $\bigcirc$ in its denotation, (17b) is L-analytical, although (17a) is not. However, L-analyticity can be circumvented by exhaustification: none of the sentences in (18) is L-analytical, assuming that every numeral alternates with every other numerals.

(18) a. $[_\psi \text{ exh}_C \ [_\phi \text{ there are 2 students}]]$
$\equiv \exists x[x \in [\![\text{students}]\!] \wedge |x| = 2] \wedge \neg\exists x[x \in [\![\text{students}]\!] \wedge |x| > 2]$
b. $[_\psi \text{ exh}_C \ [_\phi \text{ there are 0 students}]]$
$\equiv \exists x[x \in [\![\text{students}]\!] \wedge |x| = 0] \wedge \neg\exists x[x \in [\![\text{students}]\!] \wedge |x| > 0]$

Thus, sentences with **0** are always parsed with $\textbf{exh}_C$. This means that **0** must always mean 'exactly 0', while every other numeral **n** can mean either 'at least n' or 'exactly n.'

(19) a. there are 2 students in the classroom, possibly more
b. #there are exactly 2 students in the classroom, possibly more

(20) a. #there are 0 students in the classroom, possibly more
b. #there are exactly 0 students in the classroom, possibly more

5 A novel observation

(21) a. #there are at least 0 students
b. there are 0 or more students

Scenario 1: there is no K in the lexicon

Suppose there is no K in the lexicon, the parses in (22a) and (23a) are available for (22) and (23), respectively (Hurford 1974, Chierchia et al. 2012, Fox and Spector 2018). While both (22a) and (23a) are analytical, only (22a) is L-analytical. Thus, the correct prediction is made that (22) is deviant, but not (23).

(22) #there are at least 0 students

a. $[_\psi$ exh$_C$ $[_\phi$ there are at least 0 students$]]$

b. C = $\{\underbrace{\text{there are more than 0 students}}_{\text{non-excludable}}, \underbrace{\text{there are exactly 0 students}}_{\text{non-excludable}}\}$

c. $\psi \equiv \phi \equiv \exists x[x \in [\![\text{students}]\!] \wedge |x| = 0] \equiv \top_L$

(23) there are 0 or more students

a. $[_\chi$ $[_\psi$ exh$_C$ $[_\phi$ there are at least 0 students$]]$ or $[_\omega$ there are more than 0 students$]]$

b. $\chi \equiv \psi \equiv \phi \equiv \top \not\equiv \top_L$

Scenario 2: there is K in the lexicon

Suppose there is K in the lexicon, then in addition to (22a), the parse in (24a) is also available for (24).

(24) #there are at least 0 students

a. $[_\chi$ exh$_C$ $[_\psi$ K $[_\phi$ there are at least 0 students$]]]$

b. C = $\{\underbrace{\text{[K [there are more than 0 students]]}}_{\text{excludable}}, \underbrace{\text{[K [there are exactly 0 students]]}}_{\text{excludable}}\}$

c. $\chi \equiv$ K(at least 0) $\wedge \neg$K(more than 0) $\wedge \neg$K(exactly 0) $\not\equiv \top$

Thus, assuming K in the lexicon will lead to the wrong prediction, namely that there is a grammatical parse for (24), i.e. that (24) is not deviant.

6 Conclusion

There is no K in the lexicon. We need Quality.

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