Presupposition Projection out of Quantified Sentences: Strengthening, Local Accommodation and Inter-speaker Variation

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Summary: The empirical status of presupposition projection under quantificational NPs is controversial. We report on a survey revealing inter-speaker variation regarding which quantificational NPs yield universal inferences. We observe an implication that if *some* yields a universal inference for a speaker, *no* and *any* in a polar question do as well. We propose an account of this implication based on a trivalent theory together with auxiliary assumptions suggested by [4].

Debate

$Q(B)(\lambda x.C(x)_{p(x)})$

- **Universal Projection** ([6,9]): $\forall x \in B : p(x)$
- **Existential Projection** ([1]): $\exists x \in B : p(x)$
- **Nuanced Projection** ([3,5]): Depends on Q

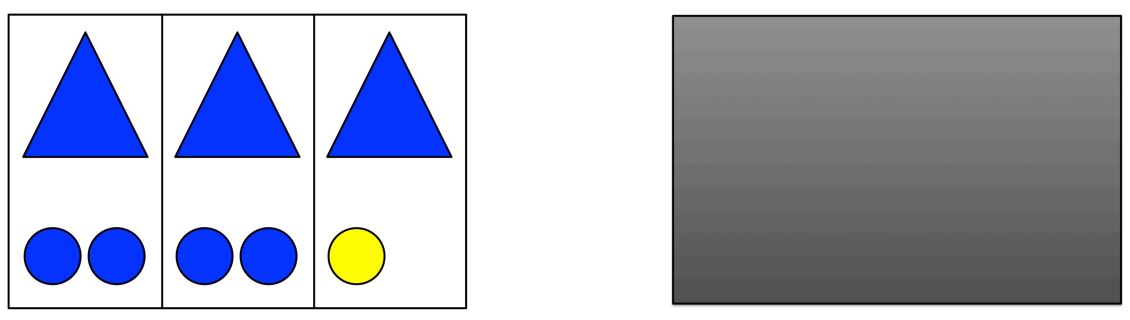
[3]'s experimental results show that *no* tends to have a universal inference while existentials less robustly do, but are not informative on possible variations among speakers.

Survey

Design

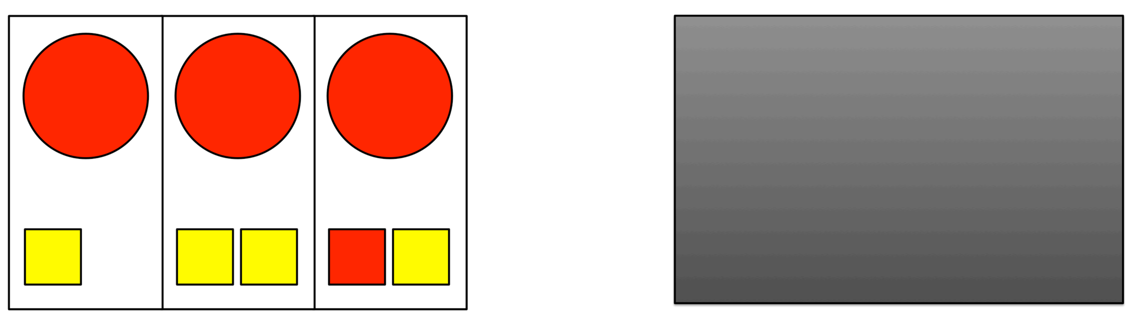
- Task: "Guess which picture the sentence is talking about"
- 'Covered box' task ([7]):
  - Two pictures, one is covered
  - Choose the covered pictureif the visible picture does not match the sentence
- Universal inference ⇔ Covered Picture
- 3 target trials + 3 control trials + 18 filler trials

Some



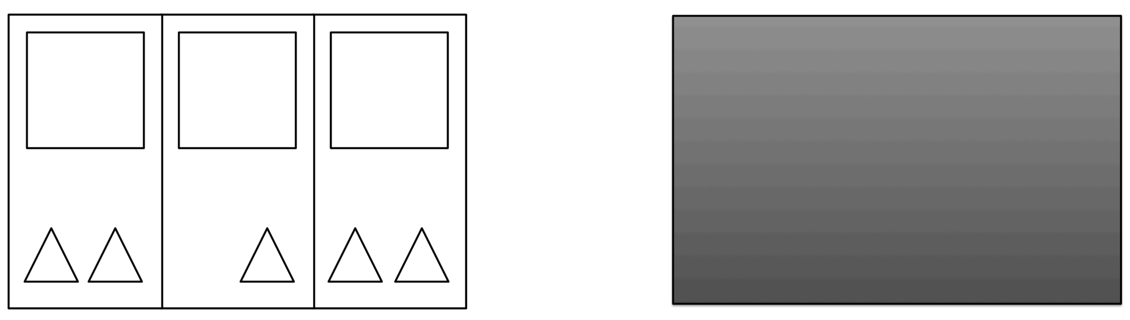
Some of these three triangles have the same color as both of the circles in their own cell

None



None of these three circles have the same color as both of the squares in their own cell

?any



Do any of these three squares have the same color as both of the triangles in their own cell?

Results

- 193 participants on MTurk (10 non-native and 78 whose accuracy <80% for the filler items are excluded from the analysis)

- If *some* is universal, then *none* and *?any* are too
- If *some* is not universal, then *none* and *?any* can be but do not have to be

Some	None	?any	# of Subjs
Overt	Overt	Overt	33
Overt	CP	Overt	10
Overt	Overt	CP	31
Overt	CP	CP	27
CP	Overt	Overt	2
CP	CP	Overt	0
CP	Overt	CP	1
CP	CP	CP	11

References:
[1] Beaver, D. (1994) When variables don't vary enough. *SALT 4*.
[2] Beaver, D. and Krahmer, E (2001) A partial account of presupposition projection. *JLLI*.
[3] Chemla, E. (2009) Presuppositions of quantified sentences: experimental data. *NALS*, 17.
[4] Fox, D. (2010) Presupposition Projection, Trivalence and Relevance. Talk given at UConn.
[5] George, B. (2008) A new predictive theory of presupposition projection. *SALT 18*.
[6] Heim, I. (1983) On the projection problem for presuppositions. *WCCFL 2*.
[7] Huang, Y., E. Spelke, & J. Snedeker (ms.) What exactly do numbers mean?
[8] Peters, S. (1979) A truth-conditional formulation of Karttunen's account of presupposition. *Synthese*.
[9] Schlenker, P. (2009) Local contexts. *Semantics and Pragmatics*.

Trivalent Theory

Assumptions

- $D_t = \{1, 0, \#\}$
- $[\![\text{John likes his sister}]\!] = \lambda w. \begin{cases} 1 & \text{if John has a sister and likes her in } w \\ 0 & \text{if John has a sister and doesn't like her in } w \\ \# & \text{otherwise} \end{cases}$
- **Bridging Principle for Declarative Sentences:**
  A declarative sentence S can be felicitously uttered given a context set C only if for all $w \in C$, $[\![S]\!](w) \neq \#$

Extension to Questions

- Questions denote sets of propositions
- **Bridging Principle for Questions:**
  A question Q is can be felicitously uttered given a context set C only if for all $w \in C$, there is $q \in [\![Q]\!]$ such that $q(w) \neq \#$

Disjunctive presupposition

$$[\exists x \in B : p(x) \wedge C(x)] \vee [\forall x \in B : p(x) \wedge \neg\exists x \in B : p(x) \wedge C(x)]$$

$$[\![\text{some}]\!](B)(\lambda x.C(x)_{p(x)}) = \lambda w. \begin{cases} 1 & \text{if } \exists x \in B : p(x) \wedge C(x) \text{ in } w \\ 0 & \text{if } [\forall x \in B : p(x)] \wedge [\neg\exists x \in B : p(x) \wedge C(x)] \text{ in } w \\ \# & \text{otherwise} \end{cases}$$

$$[\![\text{none}]\!](B)(\lambda x.C(x)_{p(x)}) = \lambda w. \begin{cases} 1 & \text{if } [\forall x \in B : p(x)] \wedge [\neg\exists x \in B : p(x) \wedge C(x)] \text{ in } w \\ 0 & \text{if } \exists x \in B : p(x) \wedge C(x) \text{ in } w \\ \# & \text{otherwise} \end{cases}$$

$$[\![?]\!][\![\text{any}]\!](B)(\lambda x.C(x)_{p(x)}) = \left\{ \begin{array}{l} [\![\text{some}]\!](B)(\lambda x.C(x)_{p(x)}), \\ [\![\text{none}]\!](B)(\lambda x.C(x)_{p(x)}) \end{array} \right\}$$

We assume that the disjunctive presupposition is pragmatically marked and triggers one of two repair strategies ([4])

Two repair strategies

1. Pragmatic strengthening: yields a universal inference
2. A-operator

$$[\![\text{A}]\!](p) = \lambda w. \begin{cases} 1 & \text{if } p(w) = 1 \\ 0 & \text{if } p(w) = 0 \text{ or } p(w) = \# \end{cases}$$

- *Some* + A never has a universal inference

$$[\![\text{A}]\!]([\![\text{some}]\!](B)(\lambda x.C(x)_{p(x)})) = \lambda w. \begin{cases} 1 & \text{if } \exists x \in B : p(x) \wedge C(x) \text{ in } w \\ 0 & \text{otherwise} \end{cases}$$
$$= [\![\text{some}]\!](B)(\lambda x.[\![\text{A}]\!](C(x)_{p(x)}))$$

- *None* + A can have a universal inference

$$[\![\text{A}]\!]([\![\text{none}]\!](B)(\lambda x.C(x)_{p(x)}))$$
$$= \lambda w. \begin{cases} 1 & \text{if } [\forall x \in B : p(x)] \wedge [\neg\exists x \in B : p(x) \wedge C(x)] \text{ in } w \\ 0 & \text{otherwise} \end{cases}$$

$$[\![\text{none}]\!](B)(\lambda x.[\![\text{A}]\!](C(x)_{p(x)})) = \lambda w. \begin{cases} 1 & \text{if } [\neg\exists x \in B : p(x) \wedge C(x)] \text{ in } w \\ 0 & \text{otherwise} \end{cases}$$

- *?any* + A can have a universal inference

$$\{[\![\text{A}]\!]([\![\text{any}]\!](B)(\lambda x.C(x)_{p(x)})), [\![\text{A}]\!](\neg[\![\text{any}]\!](B)(\lambda x.C(x)_{p(x)}))\}$$
$$= \{[\![\text{A}]\!]([\![\text{some}]\!](B)(\lambda x.C(x)_{p(x)})), [\![\text{A}]\!]([\![\text{none}]\!](B)(\lambda x.C(x)_{p(x)}))\}$$
$$\rightsquigarrow \forall x \in B : p(x)$$

$$\{[\![\text{A}]\!]([\![\text{any}]\!](B)(\lambda x.C(x)_{p(x)})), \neg[\![\text{A}]\!]([\![\text{any}]\!](B)(\lambda x.C(x)_{p(x)}))\}$$
$$= \{[\![\text{any}]\!](B)(\lambda x.[\![\text{A}]\!](C(x)_{p(x)})), \neg[\![\text{any}]\!](B)(\lambda x.[\![\text{A}]\!](C(x)_{p(x)}))\}$$
$$= \{\exists x \in B : p(x) \wedge C(x), \neg\exists x \in B : p(x) \wedge C(x)\}$$

Proposal

Two populations:
1. Those who do not use the A operator → ∀ for all
2. Those who use the A operator → ∃ for *some*

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