Scalar competition across environments

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Scalar implicatures

(1) Donald Duck likes some of his nephews.
$\rightsquigarrow$ He does not like all of his nephews.

(2) Donald Duck likes all of his nephews.

Well-established idea: the inference in (1) is due to competition with (2).

This competition involves the scale $\langle \text{some}, \text{all} \rangle$ (a scale being a set of logically ordered elements).

The standard picture

Following more or less Sauerland (2004):

- The competition between (1) and (2) is driven by Grice's conversational maxims of Quality (*be truthful*) and Quantity (*be informative*) (Grice 1975).
  - The speaker should prefer to say "all" because it is more informative (Quantity)...
  - ... unless it is not true (Quality).
- We need an *epistemic step*:
  - The speaker does not know the strong alternative to be true: $\neg K\varphi$.
  - The speaker knows the strong alternative to be false: $K\neg\varphi$.

The epistemic step

Sometimes the epistemic step would lead to a contradiction: then, we do not perfom it.

(3) Donald is talking to Huey or Dewey. ($H \vee D$)
$\rightsquigarrow$ The speaker does not know who Donald is talking to.

(4) a. Donald is talking to Huey. (H)
b. Donald is talking to Dewey. (D)

- We cannot accept $K\neg H$ and $K\neg D$ without contradicting the original utterance.
- We correctly predict that the speaker is understood to be ignorant.

Alternative to the epistemic step: non(-obviously)-principled exhaustification algorithms (van Rooij and Schulz 2004; Spector 2006; Fox 2007).

Magri cases (1)

Magri (2009) identifies some cases of infelicity for weak scalar terms:

(5) **Context:** *Donald Duck has three nephews, who are triplets.*
#Some of Donald Duck's nephews are orphans.

Explanation: the "not all" inference is obligatory, but it contradicts world knowledge.

Magri cases (2)

Aren't implicatures cancellable in general?

- Implicature derivation is *always* obligatory...
- ... but it is possible to ignore *irrelevant* alternatives...
- ... except alternatives contextually equivalent to the utterance have to be relevant.

So the crucial fact here is that the "some" and "all" sentences are equivalent given world knowledge.

Generalization (taking the contrapositive): use of the weak item sets the condition that it is not contextually equivalent to the strong item.

Embedded Magri cases

The phenomenon extends to embedded uses, positive or negative:

(6) #If some/any of Donald Duck's nephews are orphans, I hope he takes good care of them.

(7) #I doubt that some/any of Donald Duck's nephews are orphans.

(8) #Do you think that some/any of Donald Duck's nephews are orphans?

Per Magri:

- Obligatory *local* derivation of implicatures at the level of embedded clauses.
- Again, the only way to avoid strengthening is if certain alternatives are deemed irrelevant, but contextually equivalent alternatives are obligatory relevant.

Some issues with the obligatory implicature theory

Embedded implicatures are very marked in some environments, even when the alternatives in question are very much relevant:

(9) If ??some/#any of my students fail, it's no big deal, I only will get in trouble if all of them do.

(10) #I doubt that some/any of my students will fail, because all of them will.

- Established answer: constraints on the choice between potential interpretations (Fox and Spector 2018; Enguehard and Chemla 2021).
- If selection of alternatives is not really about relevance, the condition on equivalent alternatives is *ad hoc*.

The case of strong items

(11) #All of Donald Duck's nephews are orphans.

(12) #If all of Donald Duck's nephews are orphans, I hope he takes good care of them.

(13) #I doubt that all of Donald Duck's nephews are orphans.

(14) #Do you think that all of Donald Duck's nephews are orphans?

Embedded implicatures are impossible here: the embedded clauses are already as strong as they can be.

Global implicatures are only possible when the strong item is in a decreasing environment, so not for (11) in particular.

Scalar non-triviality as basic

Generalization: use of ~~the weak item~~ a scalar item sets the condition that it is not equivalent to ~~the strong item~~ its scalemates.

Proposal: see this generalization as a basic pragmatic principle, and derive implicatures from it.

(Precedent in Anvari and Chatain 2020)

Weak implicatures

The direct prediction of the principle is a weak possibility presupposition.

(15) a. Donald likes some of his nephews.
b. Donald likes all of his nephews.
c. Donald does not like ??some/any of his nephews.
d. Donald does not like all of his nephews.
$\rightsquigarrow$ Donald might (in principle) like some but not all of his nephews.

(16) $\varphi \rightsquigarrow \Diamond_{CG}(p \wedge \neg p^{+})$

- This is good enough for Magri cases, but it is too weak for (15a) and (15d).
- Note: it is even weaker than a primary implicature ("the speaker does not know that φ").

Strengthening implicatures

Some analytical options:

- Stipulate that inferences of the form $\Diamond_{CG}\varphi$ are strengthened if possible into φ (similar to Sauerland 2004).
- Try to derive it from general principles:
  - The speaker is intending to settle the propositions in question (intentionality assumption).
  - The speaker has the authority to presuppose their beliefs (related idea in Chemla 2008).

Strengthening implicatures: formalization

- Intentionality assumption: the speaker's proposed update settles p and p^+.
  Where a set of worlds C settles φ whenever $C \vDash \varphi$ or $C \vDash \neg\varphi$.
- Speaker authority: the speaker is presupposing some restriction R of the CG that is entailed by their beliefs.

Define $\mathcal{C}$ the set of contexts where p and p^+ are settled.

Plausible restrictions: $\mathcal{R} = \{R \subseteq CG : R[\varphi] \in \mathcal{C}\}$.

The adressee is licensed to infer that the speaker beliefs entail C^+ where:

$$C^+ = \bigcup_{R \in \mathcal{R}} R[\varphi]$$

How it works

Assertion: p

- For $R[p]$ to settle p^+, it has to be the case that $R \vDash \neg p^+$ or $R \vDash \neg p \vee p^+$.
- If $R \vDash \neg p \vee p^+$, then the scalar non-diversity constraint makes it so that $R[p]$ is undefined.
- Therefore $R \vDash \neg p^+$.

Assertion: $\neg p$

- $R[\neg p]$ settles p and p^+ even if $R = CG$.
- Nothing to conclude.

The p^+ and $\neg p^+$ cases work exactly the same (no symmetry problem!).

Disjunction

(17) #Huey or Dewey is an orphan.

(18) Donald is talking to Huey or Dewey.
$\rightsquigarrow$ Donald is not talking to both.
$\rightsquigarrow$ Donald might be talking to either (as far as the speaker knows).

It seems natural to apply the non-triviality constraint to $\langle H \vee D, H \rangle$ and $\langle H \vee D, D \rangle$, from which we get:

(19) $\Diamond_{CG}(H \wedge \neg D) \wedge \Diamond_{CG}(\neg H \wedge D)$

Problem: H and D are not settled by the speaker of (19).

Solution: the speaker is trying to settle the alternatives *as much as possible*.

(Unsolved problem: “some or all” is clearly ruled out by the scalar non-triviality principle.)

Disjunction: details

For a set of propositions Φ, C' settles Φ at least as well as C, which we write $C \preceq_\Phi C'$, whenever:

$$\{c \in \mathcal{P}(\Phi) : c \subseteq C'\} \subseteq \{c \in \mathcal{P}(\Phi) : c \subseteq C\}$$

where $\mathcal{P}(\Phi)$ is the partition induced by Φ (the set of maximal contexts that settle all Φ; cf. Spector 2007b).

New intentionality: the speaker's proposed update settles the alternatives as much as any strengthening of the assertion can.

New suitable restrictions: $\mathcal{R} = \{R \subseteq CG : \neg\exists R' \subseteq CG.\, R[\varphi] \prec_\Phi R'[\varphi]\}$

If R is not compatible with $H \wedge \neg D$ and $\neg H \wedge D$, $R[H \vee D]$ is undefined.
If R is compatible with $H \wedge D$, considering the above, R settles fewer alternatives than it could.
It follows that $R \vDash \neg(H \wedge D)$.

More complex sentences

(20) Some Duckburg residents like some of Donald's nephews.
(Abbreviation: **some some**)

Following Schlenker (2009), it is natural to assume that the non-triviality constraint due to the lower quantifier holds in the local context created by the higher quantifier:

$$LC = \{(w; x) : w \in CG, P^w(x)\}$$

where P is the restrictor.

We predict a weak existential presupposition:

$\Diamond_{CG}$(**some sbna**)

On top of that, from the higher quantifier:

$\Diamond_{CG}$(**sbna some**)

Intentionality in complex sentences

To simplify, we assume the restrictors are constant.

Suppose the set of relevant alternatives is:

$\Phi = \{x \text{ likes } y : x, y\}$

A minimal restriction R is such that (after accepting the assertion) the transitive predicate is fully specified, in such a way that **some sbna** and **sbna some** are true.

An inference to the union of these restrictions is licensed:

some some $\rightsquigarrow$ **some sbna** $\wedge \neg$(**all some**)

This is a weaker reading that the most straightforward one we derive from traditional approaches (it is compatible with **some all**), and it has been argued to exist (Bassi et al. 2021).

Complex sentences: second approach

(21) Some Duckburg residents like some of Donald's nephews.

We can also apply the non-triviality constraint in the global context, considering the entire sentence.

New presupposition:

$\Diamond_{CG}(\textbf{sbna some}) \wedge \Diamond_{CG}(\textbf{some some} \wedge \textbf{none all})$

Whence: **some some** $\rightsquigarrow \neg$**all some** $\wedge \neg$**some all**

This is the usual, strong reading.

Some extra quantified sentences

In (a), the local approach, in (b), the global approach:

(22) Some Duckburg residents like all of Donald's nephews.

a. **some all** $\rightsquigarrow$ ¬**all all** ∧ **some sbna**
b. *(identical)*

(23) All Duckburg residents like some of Donald's nephews.

a. **all some** $\rightsquigarrow$ ¬**all all**
b. *(identical)*

(24) Many Duckburg residents like some of Donald's nephews.

a. **many some** $\rightsquigarrow$ ¬**all some** ∧ **some sbna**
b. **many some** $\rightsquigarrow$ ¬**all some** ∧ **few all**

(25) Few Duckburg residents like all of Donald's nephews.

a. **few all** $\rightsquigarrow$ **some all** ∧ **some sbna**
b. **few all** $\rightsquigarrow$ **some all** ∧ **many some**

(note: assuming that "few" is "not many")

Distributivity inferences

(26) Some Duckburg residents like Huey or Dewey.

(27) Many Duckburg residents like Huey or Dewey.

(28) All Duckburg residents like Huey or Dewey.

In all these cases, the predicted inference under the local approach is that some residents like only Huey, and some like only Dewey:

(29) DET P [H or D]
$\rightsquigarrow$ Some P [H and not D]
$\rightsquigarrow$ Some P [D and not H]

This is different from traditional approaches or the global approach for (27), arguably in a good way:

(27) $\not\rightsquigarrow$ Not many residents like Huey.

It is still stronger than some readings defended by Crnič et al. (2015).

(Anvari and Chatain (2020) discuss these same predictions, which motivate the approach.)

Distributivity inferences: global approach

(30) Some Duckburg residents like Huey or Dewey.

Predicted inference from global comparisons:

$\Diamond_{CG}$(some like H or D but none likes H)

Equivalently: $\Diamond_{CG}$(some like D but none likes H)

We can strengthen this inference and its counterpart; the reading is indistiguishable from a wide-scope disjunction.

Modal distributivity inferences

(31) **Free Choice (FC):**
Donald can ask Huey or Dewey for help.
$\rightsquigarrow$ He can ask Huey and he can ask Dewey.

(32) **Simplifcation of disjunctive antecedents (SDA)**:
If Donald gets help from Huey or Dewey, he will make it.
$\rightsquigarrow$ If Donald gets help from Huey, he will make it.
$\rightsquigarrow$ If Donald gets help from Dewey, he will make it.

Naïve approach to local contexts here: treat the domain of quantification as a contextual parameter W:

$\Diamond_W(H \vee D) \qquad \Box_W((H \vee D) \rightarrow M)$

We predict that some worlds in the domain are Huey-not-Dewey or Dewey-not-Huey worlds: the desired inferences follow (without even strengthening).
This seems wrong: on that approach the informative character of the utterances is not really modelled.

Presuppositional implicatures

When a scalar term is used in a factive or anti-factive context, the usual implicature can be perceived as presupposed:

(33) Donald regrets he wasn't nice to some of his nephews.
$\rightsquigarrow$ He was not nice to all of his nephews.
(Spector and Sudo 2017, a.o.)

(34) Donald wishes he had been nice to all of his nephews.
$\rightsquigarrow$ He was nice to some of his nephews.

This follows from our weak presupposition without any strengthening, as long as it is assumed that the question is settled by the CG (which is the case in antural contexts).

Number marking on indefinites

(35) a. There are blue circles on the card.
$\rightsquigarrow |\{x : x \text{ is a blue circle on the card}\}| \geq 2$
b. There is a blue circle on the card.
$\rightsquigarrow |\{x : x \text{ is a blue circle on the card}\}| = 1$

(36) a. There are no blue circles on the card.
b. There is no blue circle on the card.
$\rightsquigarrow |\{x : x \text{ is a blue circle on the card}\}| = 0$

The inferences in (35) have been analyzed as scalar implicatures:

- Recursive implicatures (Spector 2007a)
- Subclausal competition (Zweig 2009; Ivlieva 2013)
- Anaphoric competition (Sudo 2023)

The conceivability presupposition

(37) a. This book has no table of contents.
b. #This book has no tables of contents.

(38) a. #This book has no chapter.
b. This book has no chapters.

Conceivability presupposition of number marking (Enguehard 2025): expected if it is an implicature under our approach (but mysterious for Magri (2009)).

Number marking pragmatics "in the middle"

What governs the choice of number feature when both possibilities are conceivable?

A generalization due to Farkas and de Swart (2010): singular is used when *prototypical* witnesses are atomic.

(39) a. Do you have children?
b. Do you have a child on our baseball team?

(Farkas and de Swart 2010)

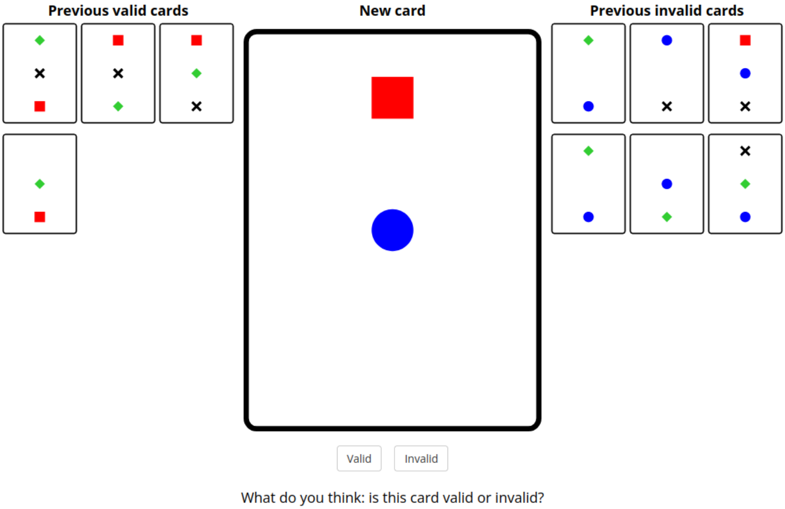
A production experiment: the task

- Participants see a series of cards with symbols and have to learn a certain condition through trial and error.
- The rule is always that the card has no blue circles.
- Participants can always see all earlier cards.
- After 20 trials, they are asked to provide a description of the rule.

The number of each symbol on each card is random, and the distribution depends on the conditions; each condition determines the chance of having several symbols of a kind, conditional on the kind being present:

- Conditions are Sg (0% chance), SgPl (10%), Mix (50%), PlSg (90%), Pl (100%).

A production experiment: example trial

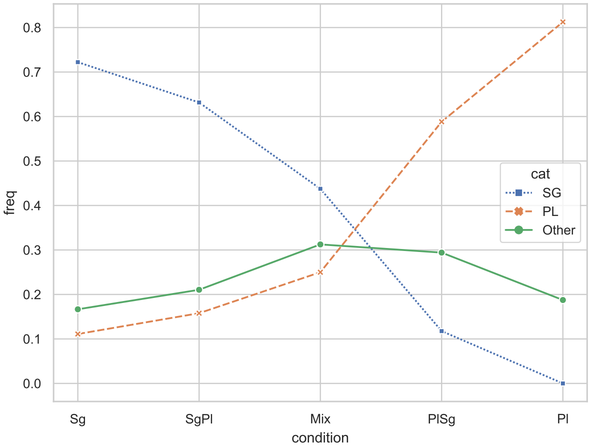


Technical details

- 100 English-speaking participants recruited on Prolific and assigned randomly to one of the 5 conditions
- 88 of them guessed the rule and are included in analysis
- Productions manually sorted into three categories:
  - SG: negated or negative singular indefinite
  - PL: negated or negative plural indefinite
  - Other: most commonly, referring to the color blue (e.g. "there is no blue")

A production experiment: results

Share of participants using a negated singular indefinite (SG), a negated plural indefinite (PL), or another strategy (Other), as a function of condition:



A production experiment: qualitative results

- Both numbers are used in all mixed situations (hence no strong presupposition in either case).
- Plural can be used even when it was never observed, unlike singular: supports the established view (though perhaps participants have the domain of symbols of all kind in mind).
- Clear gradient effect: *participants are sensitive to the stimuli distribution*.

Back to scalar items

(40) At an international conference:

a. #Some of the talks are in English.
b. Not all of the talks are in English.
c. Some of the talks are in French.
d. #Not all of the talks are in French.

(41) Same context:

a. #Are some/any of the talks in English?
b. Are all of the talks in English?
c. Are some/any of the talks in French?
d. #Are all of the talks in French?

Again: sensitivity to probabilistic features of the context.

(cf. Enguehard and Spector 2021)

Sensitivity to probabilities

- Some models of pragmatics (e.g. RSA (Bergen et al. 2016, a.o.), IBR (Franke 2011)) predict ubiquitous sensitivity of production and comprehension to prior probabilities.
- Argued by Fox and Katzir (2020) to be excessive.
- In Enguehard and Spector 2021 we provide a clear example of sensitivity with scalar items, and in Enguehard 2025 a gradient effect on number marking.

Ultimately, we want our models of competition to make probabilistic predictions that can be interpreted in probabilistic ways.

A first step: we should perhaps read $\Diamond_{CG}\varphi$ as "a decent amount of worlds verify φ"?

(See also Denić 2023 and Bar-Lev and Fox 2023 for interesting complications.)

Conclusion

- Strong implicatures alternate with weak presuppositions: it seems that both should be derived in the same way.
- The Gricean maxims do not obviously help here, so it seems that we should innovate. Picking up an idea of Anvari and Chatain (2020), local non-triviality constraints seem promising.
- There are potentially other routes (e.g., extending competition beyond truth conditions; cf Sudo 2023, Enguehard 2025).
- Ultimately, we want to understand how scalar implicatures interact with probabilities.

Thank you!

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