# Exhaustivity implicatures and attentive content

I provide a solution to a long-standing problem in pragmatics: *exhaustivity implicatures*, as exemplified in (1) by the part in italics:

(1)  Which colours does John like?
     He likes green.                 ⤳ *He doesn't like red, blue, yellow, etc.*

Exhaustivity has been considered a prime example of a *conversational implicature*, i.e., a supposition necessary to maintain the assumption that the speaker is cooperative (Grice, 1975). However, no theory exists that wholly explains it as such. The key difficulty has been to show how the Quantity implicature ('the speaker lacks the belief that John likes red') can be strengthened to obtain exhaustivity ('the speaker believes John doesn't like red'), a strengthening known as the *epistemic step* (Sauerland, 2004). It has been claimed that the epistemic step does not follow from the assumption of cooperativity (e.g. Chierchia, Fox, & Spector, 2008). I show that it does.

The source of the problem, I argue, is that existing pragmatic theories are built on top of a classical semantics, which models only the *informative content* of utterances. Such a semantics provides insufficient semantic foothold for a theory of exhaustivity, because while the response in (1) is just as informative as the response in (2), only the former is interpreted exhaustively, as far as the colour 'red' is concerned:

(2)  Which colours does John like?
     He likes green, or red and green       ⤴̸ *He doesn't like red.*

The difference between the responses in (2) and (1) doesn't lie in their informative content, but in the possibilities they *draw attention to*. The response in (2) draws attention to the possibility that John also likes red, while the response in (1) doesn't; it leaves the possibility *unattended*.

To capture this, we need a semantic backbone for our pragmatics that models attentive content. Roelofsen's (2011) *attentive semantics* was designed for this purpose. Meanings are sets of sets of worlds, i.e., sets of classical propositions. Under the simplifying assumption that there are only two colours, red and green, the meanings of our examples can be depicted below, with (i) the question, (ii) the response in (1), (iii) the response in (2). Circles represent worlds, regions sets of worlds, and '*gr̸*' means that in that world, John likes green but not red:
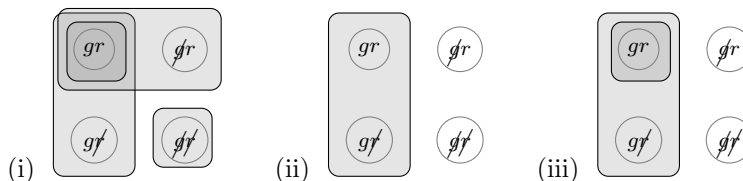


On top of these meanings, I adopt a very standard maxim of Relation:

**Definition 1 (Maxim of Relation)**  *A speaker with information state s should utter A in response to B, only if A, plus the information in s, entails B.*

Crucially, how strict our maxim of Relation is depends on the sparseness of entailment, and *the richer the semantics, the sparser entailment.* If we would use the same semantic backbone as Roberts (2012), my maxim of Relation would logically follow from her *relevance* (contextual entailment). But with attentive semantics, we get the following notion of entailment:

**Definition 2 (Entailment)** *For all meanings $A, B$, $A \vDash B$ iff (i) $\bigcup A \subseteq \bigcup B$ (informatively stronger) and (ii) for all $b \in B$, $b \cap \bigcup A \in A$ (attentively stronger).*

Now the question is entailed by the response in (2), but not in (1), because although both responses are more informative than the question, the one in (1) is *less attentive.* For the latter to entail the question relative to the speaker's information, she must be able to exclude either world '$g\!\!\!/r$' or world '$gr$', i.e., she must know $g \to r$ or $g \to \neg r$. This enables the epistemic step:

| | |
|---|---|
| 1. The speaker believes $g$. | (Quality) |
| 2. The speaker lacks the belief that $r$. | (Quantity) |
| 3. The speaker believes $g \to r$ or $g \to \neg r$. | (Relation) |
| 4. The speaker believes $\neg r$. | Exhaustivity! |

In contrast, (2) yields no Relation implicature, hence no exhaustivity (though if we would drop the simplifying assumption that there exist only two colours, we would get exhaustivity with respect to all colours except red and green).

In sum, with a richer semantic backbone, the maxim of Relation automatically becomes strict enough to enable the epistemic step. The maxim effectively requires that a speaker knows, for each possibility left unattended, how it depends on the information given. This suggests that pragmatic reasoning is sensitive to attentive content, and that exhaustivity implicatures are genuine *conversational* implicatures. I will discuss attentive semantics and its entailment relation in more detail, show how the above result generalizes to certain cases of 'embedded' implicature, and contrast my theory with the mainstream approach that relies on a *competence assumption* for taking the epistemic step.

# References

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