1. The phenomenon: exhaustivity

I. Examples

(1) a. [John or Mary] was at the party.  
   b. [John] was.  \rightarrow Mary wasn't.
(2) a. Who was at the party?  
   b. Some of the linguists.  \rightarrow Not many of them.
(3) a. How many marbles are in the vase?  
   b. Five.  \rightarrow Not more than five.

I will focus on (1).

II. The problem for the Gricean approach  
('Gricean' = 'as a conversational implicature').

Conversational implicature: what follows from what is said plus the assumption that speaker is cooperative (Grice, 1975)

Typical 'Gricean' derivation of exhaustivity for (1):

1. She didn't say “John and Mary were both there”.
2. She should have said so, had she believed it. (Quantity)
3. She lacks the belief that Mary was there.
   \rightarrow The epistemic step (Sauerland, 2005)
4. She believes that Mary was not there.
   \rightarrow The richer the semantics, the stronger this maxim.

III. Toward a solution

An insightful minimal pair with (1):

(4) a. [John or Mary] was at the party.  
   b. At least John was. / John and maybe Mary too.

Intuition: (1b) is not related enough to (1a), because, unlike (4b), it leaves Mary unattended.

2. Four ingredients

I. The following minimal translations:

(1') a. p \lor q  
   b. p
(4') b. p \lor (p \land q)  (Ciardelli, et al., 2009; Coppock and Brochhagen, 2013)

II. A standard definition of entailment:

Entailment: \Phi entails \psi iff \exists \chi s.t. \psi \land \chi \equiv \Phi

III. A pretty standard Maxim of Relation:

Maxim of Relation: Let your utterance, relative to your knowledge state, entail the question under discussion.  
(cf. Roberts, 2012; Groenendijk & Stokhof, 1984)

(5) a. Was John at the party?  
   b. It was raining.  \rightarrow John likes/hates rainy parties.

IV. Attentive semantics (Roelofsen, 2011)

Meanings are sets of sets of worlds (in the spirit of Inquisitive Semantics): the possibilities that a sentence draws attention to.

![Diagram of possibilities]

(1a)  
(1b)  
(4b)  

(For a definition of the semantics, see back of right column.)

Proposition 1: (1b) does not entail (1a); (4b) does.

Proof: one cannot add possibilities to (1a) or remove worlds from it to obtain (1b). For (4b), this is possible.

3. Results

I. Exhaustivity of (1)

Proposition 2: For (1b) to comply with the Maxim of Relation, the speaker must know p \rightarrow q or p \rightarrow \neg q.

Proof: (1a) is entailed by p \land q and by p \land \neg q. There is no other way for (1b) to comply with Relation.

This gives us the following derivation:

1. the speaker believes p \rightarrow q or p \rightarrow \neg q (Relation)
2. the speaker believes that p (Quality)
3. the speaker lacks the belief that q (Quantity)
4. the speaker believes that \neg q

II. General result

Unattended possibilities: For meanings \{a\}, B, a speaker who responds \{a\} to B, leaves unattended all b \in B that properly overlap with a.

Proposition 3: The Relation implicature is that each unattended possibility or its complement must be made to coincide with attended possibilities, or be excluded altogether.

Proposition 4: A speaker implicates for each unattended possibility that she lacks the belief that it is true.

Proposition 5: A speaker implicates for each unattended possibility that it is false.

Proof: Maxim of Quality plus propositions 3 and 4.
A. Definition of attentive semantics (Roelofsen, 2011)

1. \[ p = \{ w : w(p) = 1 \} \]
2. \[ \neg \phi = \bigcup \{ \phi \} \]
3. \[ \phi \lor \psi = \bigcup \{ \phi \} \cup \bigcup \{ \psi \} \]
4. \[ \phi \land \psi = \bigcup \{ \phi \} \cup \bigcup \{ \psi \} \cup \{ \phi \} \]

where \[ \{ \phi \} = \{ \alpha \land \beta : \beta \in \{ \phi \} \} \]

B. Other semantics with similar results

Minimally, the semantics must lack the absorption laws.

Absorption laws: \[ p \lor (p \land q) \equiv p \equiv p \land (p \lor q) \]

Proposition 6: (1b) and (4b) are semantically distinct only if the absorption laws do not hold.

Proof: Easy to see. □

Proposition 7: Exhaustivity can be derived via Relation only if the absorption laws do not hold.

Proof: If the absorption laws hold, \[ (p \lor q) \land p \equiv p \lor q \] and hence \[ p \lor q \] entails \[ p \land q \] . That means (1b) would comply with the Maxim of Relation as it is. □

In particular, the following are also suitable:

- Unrestricted inquisitive semantics (Ciardelli, et al., 2009)
- Truth-maker semantics (Fine, 2013)

C. First-order cases

For (2) and (3), the following translations would work, where:

- \( x \) ranges over sets of individuals, \( n \) over numbers.
- \( \text{some} \) denotes a context-dependent quantity.

(2') a. \[ \exists x \text{ AtParty}(x) \lor \neg \exists x \text{ AtParty}(x) \]
   b. \[ \exists x . \text{ Ling}(x) \land \text{ AtParty}(x) \land x \models \text{some} \]

(3') a. \[ \exists n \exists x . \text{ Marbles}(x) \land \text{ InVase}(x) \land x \models n \]
   b. \[ \exists x . \text{ Marbles}(x) \land \text{ InVase}(x) \land x \models 5 \]

→ i.e., a one-sided account of numerals/quantifiers.

D. The final rise contour

(Presented at UCSC S-Circle, April 2013)


(6) a. [John or Mary] was at the party.
   b. [John]: was... (final rise) \[ \rightarrow \text{not sure about Mary.} \]

'Non-dispelled' \[ \equiv \] 'unattended', hence similar results obtain if rise-fall-rise conveys uncertain compliance with Relation.

But the final rise has many readings (e.g., Gunlogson, 2008).

New proposal: final rise conveys uncertain cooperativity.

\[ \rightarrow \text{This can pertain to Quality, Quantity, Relation or Manner.} \]

Focus in (6b) makes uncertain Relation/Quantity more salient.

E. 'Embedded' implicatures (work in progress)

Chierchia, et al., (2008) consider (7) a challenge for Grice:

(7) a. Every student read [Othello or King Lear].
   b. Every student read [Othello]. \[ \rightarrow \text{no one read King Lear} \]

But this is already predicted by the present setup...

F. References


Summary

- I present a Gricean account of exhaustivity implicatures.
- The main challenge for existing 'Gricean' accounts, the epistemic step, is overcome via the Maxim of Relation, by adopting a richer notion of meaning.
- Pragmatic reasoning is sensitive to the possibilities that a speaker draws attention to (cf. Ciardelli, et al., 2009).

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