Embedded Implicatures

1. The Symmetry problem - Summary

The Gricean system (simple version):

(1) s(peaker) John has 3 children (=: φ)

H(earer) reasons…

Basic Inf: There is something else that s could have uttered, namely *John has 4 children*, φ' . Moreover, if s believed that φ' is true, s should have uttered φ' (Maxim of Quantity). Assuming that s does what she should, we conclude that s does not believe that φ' is true (with no neg-raising).

Basic Conclusion: $\neg B_s(\varphi')$ (i.e. "$B_s(\neg\varphi')$ or [$\neg B_s(\varphi')$ and $\neg B_s(\neg\varphi')$]")

Sym. Inf: There is something else that s could have uttered, namely *John has exactly 3 children*, φ''. Moreover, if s believed that φ'' is true, s should have uttered φ'' (Maxim of Quantity). Assuming that s does what she should, we conclude that s does not believe that φ'' is true (with no neg-raising).

Symmetric Conclusion: $\neg B_s(\varphi'')$

$\varphi'' = \varphi \wedge (\neg\varphi')$

Hence: s doesn't know how many children John has. (Ignorance Inference)

$\neg B_s(\varphi') \wedge \neg B_s(\varphi \wedge (\neg\varphi'))$
Which, given $B_s(\varphi)$
$\neg B_s(\varphi') \wedge \neg B_s(\neg\varphi')$ (Ignorance)

2. Horn Sets and the Neo-Gricean Maxim of Quantity

To address the symmetry problem, the neo-Griceans propose a modification of the Maxim of Quantity.

(2) **Maxim of Quantity (basic version)**: If φ and φ^* are both relevant to the topic of conversation and φ^* is more informative than φ, if the speaker believes that both are true, the speaker should utter φ^* rather than φ.

(3) **Maxim of Quantity (Neo-Gricean version)**: If φ and φ^* are both relevant to the topic of conversation and φ^* is more informative than φ, **and $\varphi^* \in$ Alt(φ)**, then, if the speaker believes that both are true, the speaker should utter φ^* rather than φ.

In (1), φ' is a member of Alt(φ), but φ'' isn't. Hence H makes the Basic Inference $\neg B_s(\varphi')$ but not the Symmetric Inference $\neg B_s(\varphi'')$.

H can now postulate (when appropriate) that the speaker is opinionated (the epistemic step), thus concluding $B_s(\neg\varphi')$, the Scalar Implicature.

(4) Alt(φ) = {φ': φ' is derivable from φ by replacement of scalar items with members of their Horn-Set}

(5) Examples of Horn-Sets
- a. {*or*, *and*}
- b. {*some*, *all*}
- c. {*one*, *two*, *three*,…}
- d. {*can*, *must*}
- e. {*warm*, *hot*}

(6) When φ is uttered by s

a. Inference based on the Basic Maxim of Quantity (B-MQ):

$\forall\varphi' \in \text{Rel}$
  (φ' is more informative than $\varphi \rightarrow \neg B_s(\varphi')$)

If *Rel* is closed under negation and conjunction

$\forall\varphi' \in \text{Rel}$
  (φ' is more informative than $\varphi \rightarrow \neg B_s(\varphi') \wedge \neg B_s(\neg\varphi')$)

b. Inference based on the Neo Gricean Maxim of Quantity (NG-MQ):

$\forall\varphi' \in (\text{Rel} \cap \text{Alt}(\varphi))$
  (φ' is more informative than $\varphi \rightarrow \neg B_s(\varphi')$)

B-MQ "comes for free", whereas NG-MQ seems quite stipulative.

Two possibilities:

a. NG-MQ is nevertheless correct. We might try to derive it in a non-stipulative manner.

For example:
1. Try to show that despite initial appearance NG-MQ is equivalent to B-MQ, i.e., that $\forall\varphi$ (Rel$\cap$Alt(φ) = Rel) or $\forall\varphi$ (Rel $\subseteq$ Alt(φ)). Not very plausible, Rel seems to be closed under conjunction and negation.
2. Try to justify Alt(φ) on other grounds. (Maxim of Manner (Katzir), syntax/semantics of questions (Spector)).

b. Find an alternative derivation for Scalar Implicatures. If B-MQ is correct, and different from NG-MQ, SIs would have to be derived within grammar. Otherwise B-MQ would derive the negation of SIs.

3. Putative Cracks in the Neo-Gricean Picture

- **Embedded implicatures:** arguments for embedded/intrusive implicatures (some references in section 4)

- **Intervention Effects:** interactions between implicature and NPI licensing, intervention effects (Chierchia 2004, 2005)
- **Free Choice effects** and their distribution (Kratzer and Shimoyama, Alonso-Ovalle 2004, Chierchia 2005, Fox 2006, Klindinst 2006)
- **Modularity:** Evidence for an "informationally encapsulated" mechanism of implicature computation: that the relevant notion of "informativity" is computed based on formal considerations alone (ignoring extra-linguistic knowledge; Fox and Hackl in press, Fox 2004 Class 4, Magri 2005)
- **Cumulative interpretations** (Krifka 1998, Landman 1998)

4. Embedded Implicatures

Many people have argued that implicatures can be introduced in embedded positions (Levinson 2000, Chierchia 2001, Cohen 1971, Kempson 1986, Recanati 2003, see also Horn 1989, Hurford 1974).

For obvious reasons, it is a little harder to argue for the existence of embedded implicatures in environments that are upward monotone, since the non-embedded global implicature is weaker, and it's hard to argue for the existence of strong meanings of (multiply) ambiguous representations.

So, the easy arguments would be based on non-UM environments:

(7) a. The man whose reading one book is my brother. The man whose reading two books is my brother in law.
b. The students who only did the reading OR the homework are in worse shape than the students who did both.

4.1. Negation

(8) a. John didn't read three books. He read four.
b. John didn't talk to Bill OR Mary. He talked to Bill AND Mary.
a. John didn't talk to SOME girls. He talked to ALL girls.

4.1.1. Horn's account[1]

Negation in the sentences in (8) is meta-linguistic negation:

(9) $[[\text{not}_{\text{standard}}]] = \lambda p_t.\ p = 0$
$[[\text{not}_{\text{meta-linguistic}}]] = \lambda S_{\text{linguistic-expression}}$. It is inappropriate to utter S.

(10) a. I didn't manage to trap two monGEESE. I managed to trap two monGOOSES.
b. John didn't talk to XOMsky. he talked to CHOMsky.

(10) argues that meta-linguistic negation exists. How do we tell whether the sentences in (8) involve standard or meta-linguistic negation.

4.1.2. Horn's arguments:

1. Meta-Linguistic negation requires focus on the culprit.

2. *but* as a test for meta-linguistic negation

(11) a. John didn't read 3 books, but 4.
b. John didn't read 3 books, #but he read 4.
(cf. John didn't read 3 books, but he read 2.)

(12) a. John didn't talk to Bill OR Mary, but to Bill AND Mary.
b. John didn't talk to Bill OR Mary, #but he talked to Bill AND Mary.

(13) a. John didn't talk to XOMsky, but to CHOMsky.
b. John didn't talk to XOMsky, #but he talked to CHOMsky.

Horn's conclusion: There are two types of *but*. *But$_{NP}$* can go with meta-linguistic negation. *But$_{IP}$* ("concessive *but*") is restricted to regular negation. In different languages the two lexical items are associated with different sounds (Romance, Hebrew…).

But I'm not sure how good this argument is:

(14) a. John didn't read exactly 3 books, but exactly 4.
b. John didn't read exactly 3 books, #but he read exactly 4.

4.1.3. Possible challenges for a "meta-linguistic" account

Cases where "meta-linguistic" paraphrases seem inappropriate (embedded negation):

(15) a. Fred convinced me that you read not TWO books, but THREE.

[1] Horn, L. (1989). A Natural History of Negation. Chicago, University of Chicago Press.

b. Fred convinced me that you talked not to Bill OR Mary, but to Bill AND Mary.

(16) a. You can come to the movies with us because we didn't buy 2 tickets, but 3.
b. John was electrocuted because he didn't touch the red wire OR the blue wire, but both. (Kai von Fintel, pc)

(17) a. John was upset because I didn't eat SOME of the candy but ALL of the candy.
b. John was upset because I didn't bring TWO friends to the party as I had promised, but THREE .

c. John was upset because his kid didn't eat the Ice-cream OR the lollipop but BOTH of them.

Cases where the appropriate meaning could result from "meta-linguistic" negation only if implicatures were embedded.

(18) a. John didn't say that Sue, Jane and Mary each did SOME of the homework. He said that Jane and Mary both did some of the homework and that Sue did ALL of it.
b. It's not true that Each of my students handed in the squib OR the homework assignments. Fred handed in BOTH.

This argues for Chierchia's claim that implicature-embedding is possible under universal quantifiers.

4.2. Various Examples based on Levinson[2]

(19) a. Anyone who has seven children is less miserable than anyone who has eight.
b. #Anyone who lives in IRAQ is in less misery than anyone who lives in BAGHDAD.

(20) a. Every student who has three papers to write is better off than every student who has four papers to write.
b. The man with two children near him is my brother; the man with three children near him is my brother in law.
c. #The man standing next to A BOY is my brother; the man standing next to BILLY is my brother in law.

(21) a. Every student who has to solve problem 1 OR problem 2 is better off than every student who has to solve problem 1 AND problem 2 .
b. The person you will see talking to a boy OR a girl will be my brother; the person you will see talking to a boy AND a girl will be my brother in law.

(22) a. Every student who has to solve SOME of the problems is better off than every student who has to solve ALL of the problems.

[2]See, Levinson, S. (2000). Presumptive Meanings, MIT Press, and various references.

b. The person who can solve SOME of the problems is my brother; the person who can solve ALL of the problems is my brother in law.

4.3. Chierchia and non-monotonic contexts.

(23) a. Exactly one boy talked to Mary or Sue.
b. Exactly one boy did some of the homework.
c. Exactly one boy read 3 books.

(24) a. Three boys talked to Mary and Sue, and exactly one boy talked to Mary or Sue.
b. Three boys did all of the homework, and exactly one boy did some of the homework.
c. Every boy read 3 books, and exactly one boy read 2 books.

4.4. A constraint on disjunction (Hurford 1974)

Hurford's Generalization: *A or B* is infelicitous when B entails A[3]

(25) a. ??John is an American or a Californian.
b. ??I was born in France or Paris.

Hurford used this generalization to argue for a strong meaning for disjunction (ExOR):

(26) I will apply to Cornell or UMASS or to both.

But we can extend this to other scalar items (Gazdar 1979):

(27) a. I will read two books or three.
b. I will do some of the homework or all of it.

If Hurford constraint is correct, implicatures need to be computed within the first disjunct.

4.5. Hurford's constraint and Chierchia claim about embedding under universal Qs

S or S′ can appear in embedded positions where Hurford's constraint would be violated, unless the implicatures of S were computed below disjunction and henceforth below other material:[4]

[3] See also Simons, M. (2000). Issues in the Semantics and Pragmatics of Disjunction. New York and London, Garland Pub.

[4] See Larson 1985 for an account of the correlation between the position of *either* and the scope of *or*. See also Schwarz 2000.

(28) a. John and Bill both either [did some or all of the homework].
b. Every boy either [did some or all of the homework].
c. Fred said that you either [did some or all of the homework]

We can also use Hurford's condition to argue that *S* in *S or S′*, has an implicature in a position that is embedded within *S*. In the cases below, *S′* entails S, unless there is an implicature computed below an UM operator within *S′*.

(29) a. It's either the case that John and Bill both did some of the homework or that John did some of it and Bill did all of it.
b. It's either the case that each of the kids did some of the homework or that John did all of it and every other kid did just some of it

Important: It is easy to see that the first disjunct in (29b has an embedded implicature even independently of Hurford's constraint. This sentence would be false/odd if there was a kid other than John who did all of the homework. The sentences in (29 thus provide independent evidence for Hurford's constraint.

5. Interim Summary

Two clear problems for the (neo-)Gricean picture:

1. Doesn't allow for embedded implicatures, which are, nevertheless, attested.
2. Involves a stipulative statement of the Maxim of Quantity

An alternative perspective: Keep to MQ, and derive scalar implicatures within grammar (Chierchia 2004, Fox 2006).

Possible Motivation: scales and alternative are real, but they are objects of grammar and should not be misplaced.