Grice and Implicatures

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Discourse and Cooperation I

_Cooperative Principle_: Make your contribution such as it is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged.
Discourse and Cooperation II

► *Maxim of Quality*: Try to make your contribution one that is true.
  ► Do not say what you believe is false.
  ► Do not say that for which you lack adequate evidence.

► *Maxim of Quantity*:
  ► Make your contribution as informative as is required for the current purposes of the exchange.
  ► Do not make your contribution more informative than is required.
Discourse and Cooperation III

- *Maxim of Relation:*
  - Be relevant.

- *Maxim of Manner:*
  - Be perspicuous.
  - Avoid obscurity of expression.
  - Avoid ambiguity.
  - Be brief (avoid unnecessary prolixity).
  - Be orderly.

(1)  
  a. A: Where’s Bill?  
  b. B: There’s a yellow VW outside of Sue’s house.
Discourse and Cooperation IV

Observing the maxims

(2)  
A(to passer by): I’ve just run out of petrol.  
B: Oh; there’s a garage just around the corner.

Flouting the maxims

(3)  
A: Let’s get the kids something.  
B: Okay, but I veto I-C-E C-R-E-A-M-S.
Discourse and Cooperation V

Observing the maxim of Quality

(4) John has two PhDs.
   → I believe he has, and have adequate evidence that he has.

(5) Does your farm contain 400 acres?
   → I don’t know that it does, and I want to know if it does.
Discourse and Cooperation VI

Observing the maxim of Quantity

(6) Nigel has fourteen children.
    ⟷ Nigel has only fourteen children.

Observing the maxim of Relevance

(7) Pass the salt.
    ⟷ pass the salt now.

(8) A: Can you tell me the time?
    B: Well, the milkman has come.
Observing the maxim of Manner

(9) a. Open the door.
b. Walk up to the door, turn the door handle clockwise as far as it will go, and then pull gently towards you.

(10) ??The lone ranger rode into the sunset and jumped on his horse.
Flouting the maxim of Quality

(11) A: What if the USSR blockades the Gulf and all the oil?  
B: Oh come now, Britain rules the seas!

(12) A: Konsalik ist ein großartiger Schriftsteller.  
B: Ja genau, und Goethe so ziemlich der mieseste, den ich kenne.

(13) A: Teheran’s in Turkey isn’t it teacher?  
B: And London’s in Armenia I suppose.
Discourse and Cooperation IX

Flouting the maxim of Quantity

(14) a. War is war.
    b. Either John will come or he won’t.
    c. If he does it, he does it.

(15) a. $W(x) \rightarrow W(x)$
    b. $p \lor \neg p$
    c. $p \rightarrow p$
Discourse and Cooperation X

Flouting the maxim of Relevance

(16) A: I do think Mrs. Jenkins is an old windbag, don’t you?
B: Huh, lovely weather for March, isn’t it?

Flouting the maxim of Manner

(17) Miss Singer produced a series of sounds corresponding closely to
the sore of an aria from *Rigoletto*.

(18) Miss Singer sang an aria from *Rigoletto*.
Properties of Implicatures I

Definition (Implicature)

S’s saying $p$ conversationally implicates $q$ iff:

1. S is presumed to be observing the maxims, or at least (in the case of floutings) the co-operative principle
2. in order to maintain this assumption it must be supposed that S thinks that $q$.
3. S thinks that both S and the addressee H mutually know that H can work out that to preserve the assumption in (1), $q$ is in fact required.
Properties of Implicatures II

1. the conventional content of the sentence \( P \) uttered
2. the co-operative principle and its maxims
3. the context of \( P \) (e.g. its relevance)
4. certain bits of background information (e.g. \( P \) is blatantly false)
5. that (1) - (4) are mutual knowledge shared by speaker and addressee.
Properties of Implicatures III

1. S has said that $p$

2. there’s no reason to think S is not observing the maxims, or at least the co-operative principle

3. in order for S to say that $p$ and be indeed observing the maxims or the co-operative principle, S must think that $q$

4. S must know that it is mutual knowledge that $q$ must be supposed if S is to be taken to be co-operating

5. S has done nothing to stop me, the addressee, thinking that $q$

6. therefore S intends me to think $q$, and in saying that $p$ has implicated $q$. 
Properties ofImplicatures IV

Properties of implicatures: 1. defeasibility

If Socrates is a man, he is mortal.
   Socrates is a man.
   Therefore, Socrates is mortal.

I have dug up 1001 carrots.
   Every one of the 1001 carrots is orange.
   Therefore, all carrots are orange.
Properties of Implicatures V

(19) a. I have dug up 1001 carrots.
b. Every one of the 1001 carrots is orange.
c. The 1002nd carrot is green.
d. Invalid: Therefore, all carrots are orange.
Properties of Implicatures VI

(20)  a. John has three cows.
b. John has only three cows and no more.

(21)  ⇒ John has two cows.

(22)  John has three cows, if not more.

(23)  ?John has three cows, if not two.
Properties of Implicatures VII

(24) a. John has three cows, in fact ten.
b. John has three cows and maybe more.

(25) a. *John has three cows, in fact none.
b. *John has three cows and maybe none.
Properties of Implicatures VIII

(26)  a.  I: Has John really got the requisite number of cows.
    b.  N: Oh sure, he’s got three cows all right.

(27)  ↔ John has only three cows and no more.
Properties of Implicatures IX

Conventional Implicatures

(28)  a. There is a garage round the corner, but it’s closed.
     b. X is meeting a woman this evening – his sister, in fact.

(29) *There is a garage round the corner, but it’s not round the corner.

(30)  Harry is rich but dull.

(31)  ?Harry is rich but dull, though I wouldn’t want to suggest that there is a contrast between these two properties.
Properties of Implicatures X

Presuppositions

(32)  a. Socrates is ill.
b. Socrates isn’t ill.

(33)  The present king of France is bald.

(34)  a. Harry doesn’t realise October 2 was a Friday.
b. Harry doesn’t realise October 2 was a Friday, because it wasn’t: it was a Saturday.
Properties of Implicatures XI

Properties of implicatures: 3. non-detachability

(35) John’s a genius.

(36) a. John’s a mental prodigy.
b. John’s an exceptionally clever human being.
c. John’s an enormous intellect.
d. John’s a big brain.
Ein Kapitän und sein Maat verstehen sich nicht gut. Der Maat ist ein schwerer Sünder und der Kaptän versucht, ihn so rasch wie möglich loszuwerden. Als der Maat wieder einmal sternhagelvoll ist, schreibt der Kaptän ins Logbuch.

*Heute, 23 März, der Maat ist betrunken.*

Während seiner nächsten Wache liest der Maat diese Eintragung. Er überlegt, was er dagegen tun kann, ohne sich selbst in Schwierigkeiten zu bringen. Er macht folgende Eintragung in das Logbuch:

*Heute, 26 März, der Kapitän ist nicht betrunken.*
Properties of Implicatures XIII

1. Cancellability (or defeasability)
2. non-detachability (or inference based on meaning rather than form)
3. calculability
4. non-conventionality
Adversative discourse

(37) C: On many occasions?
W. Not many
C: Some?
W: Yes, a few
Kinds of Implicatures I

Generalized Implicatures

(38) a. I walked into a house.
    b. The house is not my house

Particularized Implicatures

(39) a. The dog is looking very happy.
    b. Perhaps the dog has eaten the roast beef.

(40) A: What on earth has happened to the roast beef?
    B: The dog is looking very happy.
Generalized Quantity implicatures I

(41) Bonnie stole some of the pears.

1. Rather than saying (41), Clyde could have made a stronger statement:

(42) Bonnie stole all the pears.

Why didn’t he do so?

2. The most likely explanation is that Clyde doesn’t believe that (42) is true: $\neg Bel_C((42))$.

3. Clyde is likely to have an opinion as to whether (42) is true: $Bel_C((42)) \lor Bel_C(\neg(42))$:

4. Between them, (2) and (3) entail $Bel(\neg(42))$: Clyde believes that Bonnie didn’t steal all the pears.
Generalized Quantity implicatures II

Standard recipe for deriving Q-Implicatures (Bart Geurts)

S said that $\phi$

1. S could have made a stronger claim by saying $\psi$. Why didn’t he do so?

2. Presumably, it’s because S doesn’t believe that $\psi$ is true: $\neg Bel_S(\psi)$.

3. S has an opinion to whether $\psi$ is true: $Bel_S(\psi) \lor Bel_S(\neg \psi)$

4. (2) and (3) entail $Bel_S(\neg \psi)$: S believes $\psi$ is false.
### Generalized Quantity implicatures III

<table>
<thead>
<tr>
<th>Reasoning step</th>
<th>Logical form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fred is not in Antwerp</td>
<td>¬ψ</td>
</tr>
<tr>
<td>Fred is in Antwerp or Brussels</td>
<td>ψ ∨ χ</td>
</tr>
<tr>
<td>Fred is in Brussels</td>
<td>χ</td>
</tr>
<tr>
<td>Since S didn’t say φ, ¬KS(φ)</td>
<td>¬ψ</td>
</tr>
<tr>
<td>KS(φ) ∨ KS(¬φ)</td>
<td>ψ ∨ χ</td>
</tr>
<tr>
<td>KS(¬φ)</td>
<td>χ</td>
</tr>
</tbody>
</table>
Given $\psi$ and

$$\phi_1, \ldots, \phi_n$$

from which $\psi$ follows, seek the best $\phi_i$
Abductive reasoning: Bayes

**Bayes’ Rule:** Let $A_1, A_2, \ldots, A_n$ be disjoint events that form a partition of the sample space, and assume that $P(A_i) > 0$ for all $i$. Then, for any event $B$ such that $P(B) > 0$, we have

\[
P(A_i|B) = \frac{P(A_i)P(B|A_i)}{P(B)} = \]

\[
\frac{P(A_i)P(B|A_i)}{P(A_1)P(B|A_1) + \ldots + P(A_n)P(B|A_n)}
\]
A = an aircraft is present
B = the radar registers an aircraft presence

We are given that

\[ P(A) = 0.05 \quad P(B|A) = 0.99 \quad P(B|A^c) = 0.1 \]

Compute \( P(\text{aircraft present}|\text{radar registers}) = P(A|B) \)

\[
P(A|B) = \frac{P(A)P(B|A)}{P(B)} = \frac{P(A)P(B|A)}{P(A)P(B|A) + P(A^c)P(B|A^c)}
\]

\[
= \frac{0.05 \cdot 0.99}{0.05 \cdot 0.99 + 0.95 \cdot 0.1} \approx 0.3426
\]
We observe a shade in a person’s X-ray (this is event $B$, the effect) and we want to estimate the likelihood of three mutually exclusive and collectively exhaustive potential causes: cause 1 (event $A_1$) is that there is a malignant tumor, cause 2 (event $A_2$) is that there is a nonmalignant tumor, and cause 3 (event $A_3$) corresponds to reasons other than a tumor. We assume that we know the probabilities $\mathbf{P}(A_i)$ and $\mathbf{P}(B|A_i)$, $i = 1, 2, 3$. Given that we see a shade Bayes’ rule gives the conditional probabilities of the various causes as

$$
\mathbf{P}(A_i|B) = \frac{\mathbf{P}(A_i)\mathbf{P}(B|A_i)}{\mathbf{P}(A_1)\mathbf{P}(B|A_1) + \mathbf{P}(A_2)\mathbf{P}(B|A_2) + \mathbf{P}(A_3)\mathbf{P}(B|A_3)}
$$
(43)   A: Has Clyde’s book come out yet?
     B: He has corrected the proofs.

1. Rather that giving the answer in (43), B could have made a stronger statement

(44)   Yes, it has.

   Why didn’t she do so.

2. the most likely explanation is that B doesn’t believe that (44) is true:
   \(\neg Bel_B((44))\).

3. B is likely to have an opinion as to whether (44) is true:
   \(Bel_B((44)) \lor Bel_B(\neg(44))\).

4. Between them (2) and (3) entail \(Bel_B(\neg(44))\): B believes that Clyde’s book hasn’t yet come out yet.
Generalized Quantity implicatures IX

S has said $\phi$.

1. S could have made a stronger claim by saying $\psi$. Why didn’t he do so?
2. Presumably, it’s because S doesn’t believe that $\psi$ is true: $\neg Bel_S(\psi)$.
3. S has an opinion as to whether $\psi$ is true: $Bel_S(\psi) \vee \neg Bel_S(\psi)$.
4. Between them, (2) and (3) entail $Bel_S(\neg \psi)$: S believes that $\psi$ is false.
Generalized Quantity implicatures

Non-epistemic implicatures

(45) What’s this thing doing on the mantlepiece?
(46) I see that somebody hasn’t eaten his porridge yet.
(47) A mutual acquaintance of ours will not be able to keep his appointment.
Generalized Quantity implicatures XI
“or” and competence

(48) Bonnie stole an apple or a pear.

(49) a. Bonnie stole an apple.
     b. Bonnie stole a pear.

1. \( \text{Bel}_C(((49-a)) \lor ((49-b))) \)
2. \( \neg \text{Bel}_C((49-a)) \)
3. \( \neg \text{Bel}_C((49-b)) \)

1. \( \text{Bel}_C((49-a)) \lor \text{Bel}_C(\neg(49-a)) \)
2. \( \text{Bel}_C(\neg(49-a)) \)
3. \( \text{Bel}_C((49-b)) \) Contradiction
Generalized Quantity implicatures XII

Relevance

(50) Clyde is a dope.
(51) Clyde is a dope and Jupiter is larger than Saturn.

 دقائق
Bonnie doesn’t believe that Jupiter is larger than Saturn.

(52) The price is either in the garden or in the attic.
Generalized Quantity implicatures XIII

(53) A: Has your article been published yet?  
    B: I corrected the proofs.

(54) A: What was your contribution to that article?  
    B: I corrected the proofs.
Scalar implicatures I

(55) Wilma read some of the papers.
(56) a. Wilma read many of the papers.
    b. Wilma read most of the papers.
    c. Wilma read all of the papers.
Scalar implicatures II

(57)  a.  <some, many, most, all>
b.  <warm, hot, scalding>
c.  <clever, brilliant>
d.  <or, and>

(58)  *Using Horn scales to generate alternatives.*  
$\phi[\beta]$ is an alternative to $\phi[\alpha]$ iff $\beta$ is a stronger scalemate of $\alpha$. 

Scalar implicatures III

(59)  

a.  \neg Bel_S(Wilma read many of the papers).
b.  \neg Bel_S(Wilma read most of the papers).
c.  \neg Bel_S(Wilma read all of the papers).

(60)  

a.  Barney has bought a Manet or a Monet.
b.  Barney has bought a Mante and a Monet.
Scalar implicatures IV

- a set of Horn scales
- a procedure for generating alternatives
- the Standard Recipe

(61) a. <animal, dog>
    b. <animal, dog, schnauzer>

(62) I saw an animal on the lawn this morning.
(63) I saw a dog on the lawn this morning.
Scalar implicatures V

(64) Fred didn’t read many of the books Wilma gave him.

(65) Fred didn’t read all the books Wilma gave him.

Standard Recipe

\[ \downarrow \]

\[ \neg Bel((65)) \text{ or } Bel(\neg(65)) \]

(66) Fred didn’t read any of the books Wilma gave him.

\[ \downarrow \]

\[ Bel_S(\neg(66)) \]
Scalar implicatures VI

(67) **Upward entailing environments**
Φ[... ] is an upward entailing environment iff, for any two expressions α and β: if α entails β, then Φ[α] entails Φ[β].

(68) **Downward entailing environments**
Φ[... ] is an upward entailing environment iff, for any two expressions α and β: if α entails β, then Φ[β] entails Φ[α].

(69)

a. Fred is wearing scarlet socks ⇒ Fred is wearing red socks.
b. Fred isn’t wearing red socks ⇒ Fred isn’t wearing scarlet socks.

scarlet ⇒ red
Scalar implicatures VII

(70) Some of [ the students with scarlet socks ] [ passed ] \Rightarrow 
Some of [ the students with red socks ] [ passed ]

(71) Some of [ the students who passed ] [ wore scarlet socks ] \Rightarrow 
Some of [ the students who passed ] [ wore red socks ]

(72) At most five of [ the students with red socks ] [ passed ] \Rightarrow 
At most five of [ the students with scarlet socks ] [ passed ]

(73) At most five of [ the students who passed ] [ wore red socks ]
\Rightarrow 
At most five of [ the students who passed ] [ wore scarlet socks ]
Scalar implicatures VIII

(74) All [ the students with red socks ] [ passed ] \Rightarrow
    All [ the students with scarlet socks ] [ passed ]

(75) All [ the students who passed ] [ wore scarlet socks ] \Rightarrow
    All [ the students who passed ] [ wore red socks ]

<table>
<thead>
<tr>
<th>Quantifier</th>
<th>Restrictor</th>
<th>Nuclear scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>some</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>at most five</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>all</td>
<td>↓</td>
<td>↑</td>
</tr>
</tbody>
</table>
Scalar implicatures IX

(76) Fred didn’t read all of the books Wilma gave him.

(77) Fred didn’t read any of the books Wilma gave him.

\[ \downarrow \]

\[ \neg Bel_S((77)) \text{ or } Bel_S(\neg(77)) \]
Scalar implicatures X

(78) Everyman who read all these books passed the exam.

(79) Everyone who read any of these books passed the exam.

\[ \neg Bel_S((79)) \text{ or } Bel_S(\neg(79)) \]
Scalar implicatures XI

(80) Using Horn sets to generate alternatives
\( \phi[\beta] \) is an alternative to \( \phi[\alpha] \) iff \( \alpha \) and \( \beta \) share a Horn set and \( \phi[\beta] \) is stronger than \( \phi[\alpha] \).

<table>
<thead>
<tr>
<th>Sentence</th>
<th>Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Wilma read some of the papers</td>
<td>ii, iii, iv</td>
</tr>
<tr>
<td>ii. Wilma read many of the papers</td>
<td>iii, iv</td>
</tr>
<tr>
<td>iii. Wilma read most of the papers</td>
<td>iv</td>
</tr>
<tr>
<td>iv. Wilma read all of the papers</td>
<td>–</td>
</tr>
<tr>
<td>v. Wilma didn’t read any of the papers</td>
<td>–</td>
</tr>
<tr>
<td>vi. Wilma didn’t read many of the papers</td>
<td>v</td>
</tr>
<tr>
<td>vii. Wilma didn’t read most of the papers</td>
<td>v, vi</td>
</tr>
<tr>
<td>viii. Wilma didn’t read all of the papers</td>
<td>v, vi, vii</td>
</tr>
</tbody>
</table>

Grice and Implicatures
Scalar implicatures XII

Disjunction

(81) Wilma is dating Albinoni or Boccherini \(\approx A \lor B\)

Ignorance inferences

(82) \(\neg \text{Bel}_S(A)\) and \(\neg \text{Bel}_S(\neg A)\)
    \(\neg \text{Bel}_S(B)\) and \(\neg \text{Bel}_S(\neg B)\)

Exclusivity inferences

(83) \(\neg \text{Bel}_S(A \land B)\) [weak]
    \(\text{Bel}_S(\neg (A \land B))\) [strong]
Scalar implicatures XIII

(84) Wilma is dating Albinoni, Boccherini, or Corelli $\approx A \lor B \lor C$.

(85) Wilma is dating Albinoni, Boccherini, and Corelli $\approx A \land B \land C$.

\[ Bel_S(\neg (A \land B \land C)) \]
Scalar implicatures XIV

(86)  a. Wilma is dating Albinoni.
     b. Wilma is dating Boccherini.
     c. Wilma is dating Corelli.

(87)  a. Wilma is dating Albinoni and Boccherini.
     b. Wilma is dating Albinoni and Corelli.
     c. Wilma is dating Boccherini and Corelli.
     d. Wilma is dating Albinoni, Boccherini, and Corelli.

If $\phi$ and $\psi$ are alternatives, then $\phi \wedge \psi$ is an alternative.