Quantity implicatures

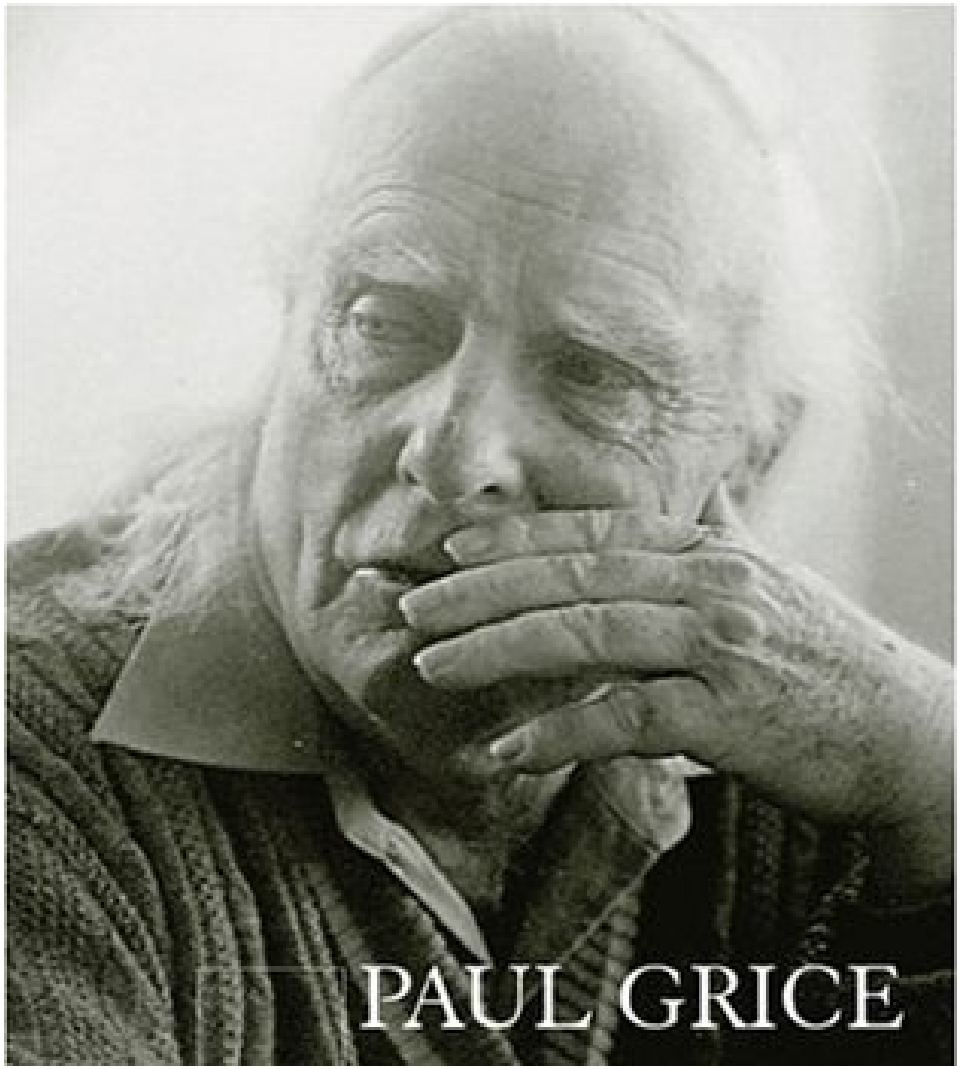
Overview of the course

1. Quantity implicatures
2. Nonce inferences or defaults?
3. "Embedded" implicatures
4. Free choice permission
5. Non-pragmatic alternatives

Overview of the course

1. Quantity implicatures
   - Grice
   - Quantity implicatures
   - Scalar implicatures
   - Disjunction
2. Nonce inferences or defaults?
3. "Embedded" implicatures
4. Free choice permission
5. Non-pragmatic alternatives

Grice


PAUL GRICE

Grice on conversational implicatures

- Philosophical background.
- Not everything that is conveyed by way of a linguistic utterance ϕ is part of ϕ's meaning.
- An important part of the information conveyed is *inferred* on the assumption that the speaker seeks to be *cooperative*.
- Example:

  A: I am out of petrol.
  B: There is a garage round the corner.
  $\rightsquigarrow$ For all B knows, the garage is open and has petrol to sell.
- Such inferences Grice calls "conversational implicatures".
- This is not a psychological theory. Rather, Grice is concerned primarily with speakers' commitments.

Inference to the best explanation

- Conversational implicatures are not deductive inferences.
- Rather, they are inferences to the best explanation (aka abductive inferences). Cf. diagnostic reasoning.
- Even if much of the literature suggests otherwise, there couldn't be a mechanical procedure for computing conversational implicatures.

Conversational implicatures are:

- derived from:

  an utterance made by a speaker S ("what S has said")
  \+ the assumption that S is trying to be cooperative.
- cancellable:

  B: There is a garage around the corner, but I'm not sure it is open.
- non-linguistic: they are licensed by general principles of rational cooperative behaviour.

Methodological corollary:

☞ All else being equal, an explanation in terms of conversational implicature is better than any alternative explanation in linguistic terms.

Cancellability

- Cancellability is a useful heuristic for testing if a given inference *might be* a conversational implicature.
- But #1: Conversational implicatures aren't the only kind of cancellable inferences:

  (1) Harry doesn't know he got promoted.

  (2) Harry doesn't know he got promoted, because he didn't: it was just a rumour.

- But #2: "Cancellability" is a bit of a misnomer.

Implicatures aren't *really* cancellable

Explicit cancellation:

(3) There is a garage round the corner, but it's closed.

It's not at all clear that an implicature is cancelled in this case (certainly not from the speaker's point of view).

Implicit cancellation:

(4) [During a treasure hunt:] The prize is either in the garden or in the attic.

Here it's probably better to say that the implicature never arose in the first place.

Summing up

Conversational implicatures are:

- pragmatic inferences that aren't encoded, but rather flow from universal principles of cooperative behaviour
- inferences to the best explanation, i.e. abductive rather than deductive
- "cancellable"

Quantity implicatures

Quantity implicatures

- Q-implicatures are a kind of conversational implicature.
- Q-implicatures are inferred on the basis of the assumption that the speaker is trying to make his utterance sufficiently informative "for the current purposes of the exchange."

tricky bit

Varieties of Q-implicature

- *Exhaustivity effects in question answering*

  A: Who did you see?
  B: Fred.
  $\rightsquigarrow$ The speaker saw only Fred.

- *Scalar implicatures*

  Fred ate some of the figs.
  $\rightsquigarrow$ Fred didn't eat all the figs.

- *Conditional perfection*

  If you scratch my back, I'll give you a kiss.
  $\rightsquigarrow$ Only if you scratch my back will I give you a kiss.

- *Free choice permission*

  You can have an apple or a pear.
  $\rightsquigarrow$ You can have an apple.
  $\rightsquigarrow$ You can have a pear.

The Standard Recipe for deriving Q-implicatures

(1) A: Who did you see?

(2) B: Fred.

1. Rather than saying (2), B could have said:
   (2*) Fred and ...
   Why didn't she do so?
2. The most likely explanation is that B doesn't believe that (2*) is true: $\neg \text{Bel}_{\text{B}}(2^*)$.
3. B is likely to have an opinion as to whether (2*) is true: $\text{Bel}_{\text{B}}(2^*) \vee \text{Bel}_{\text{B}}\neg(2^*)$.
4. Thus, it follows that $\text{Bel}_{\text{B}}\neg(2^*)$: B believes that she saw only Fred.

The Standard Recipe for deriving Q-implicatures

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1. Rather than saying (2), B could have said:
   (2*) Fred and ...
   Why didn't she do so?
2. The most likely explanation is that B doesn't believe that (2*) is true: $\neg \text{Bel}_\text{B}(2^*)$. ← *primary/weak implicature*
3. B is likely to have an opinion as to whether (2*) is true: $\text{Bel}_\text{B}(2^*) \vee \text{Bel}_\text{B}\neg(2^*)$. ← *Bivalence Assumption*
4. Thus, it follows that $\text{Bel}_\text{B}\neg(2^*)$: B believes that she saw only Fred. ← *secondary/strong implicature*

The Standard Recipe for deriving Q-implicatures

(3) Fred ate some of the figs.

1. Rather than saying (3), S could have said:
   (3*) Fred ate all the figs.
   Why didn't he do so?
2. The most likely explanation is that S doesn't believe that (3*) is true: $\neg \text{Bel}_S(3^*)$. ← *primary/weak implicature*
3. S is likely to have an opinion as to whether (3*) is true: $\text{Bel}_S(3^*) \vee \text{Bel}_S\neg(3^*)$. ← *Bivalence Assumption*
4. Thus, it follows that $\text{Bel}_S\neg(3^*)$: S believes that Fred didn't eat all the figs. ← *secondary/strong implicature*

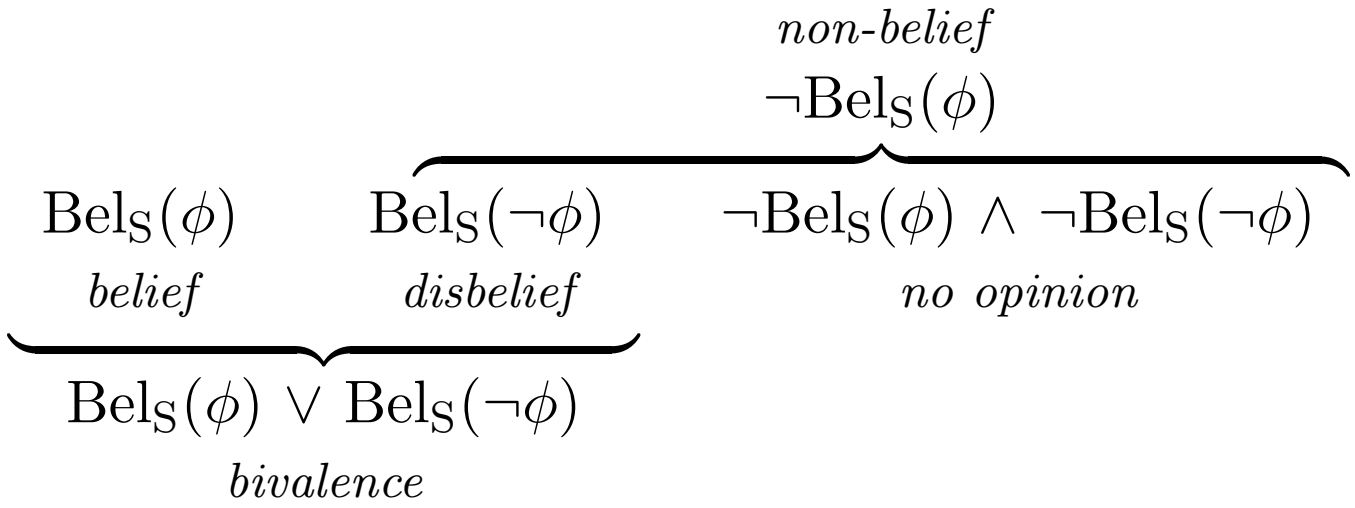
☞ Ergo: "some" doesn't entail "not all".

Bivalence, Competence, and No Opinion

- Weak Q-implicatures are always of the form $\neg \text{Bel}_S(\phi)$.
- Strong Q-implicatures are always of the form $\text{Bel}_S(\neg\phi)$.
- The Bivalence Assumption is always of the form
$$\text{Bel}_S(\phi) \vee \text{Bel}_S(\neg\phi).$$
- S is *competent* about ϕ iff the following hold:
  - if ϕ then $\text{Bel}_S(\phi)$
  - if $\neg\phi$ then $\text{Bel}_S(\neg\phi)$

  Competence entails Bivalence but not v.v.
- If S has *No Opinion* about ϕ, then $\neg \text{Bel}_S(\phi) \wedge \neg \text{Bel}_S(\neg\phi)$.
- Weak implicatures express less than No Opinion.
- No Opinion is the negation of Bivalence.

Bivalence, Competence, and No Opinion



Weak implicatures aren't always strenghtened

(4) Bonnie had an apple or a pear.

Implicatures:

(5) a. $\neg \text{Bel}_S(\text{Bonnie had an apple})$
b. $\neg \text{Bel}_S(\text{Bonnie had an pear})$

But since the Bivalence Assumption doesn't hold in this case (why not?), we don't get:

(6) a. $\text{Bel}_S \neg(\text{Bonnie had an apple})$
b. $\text{Bel}_S \neg(\text{Bonnie had an pear})$

Reminder: Q-implicatures are abductive inferences

- A realises that the figs were injected with strychnine and suspects that somebody may have eaten some:

  (7) A: Did anyone eat of the figs?
  B: Fred ate some.

- Speaker is contemplating a priceless antique clock:

  (8) What's this thing doing on the mantlepiece?

- Parent at the breakfast table:

  (9) I see that somebody hasn't eaten his porridge, yet.

☞ In these cases, Q-implicatures are (at the very least) less likely to arise: *the Standard Recipe doesn't apply here.*

Relevance

Simplistic notion of Q-implicature:

☹ If S says ϕ and ψ is stronger than ϕ, then it is implicated that $\neg \text{Bel}_S(\psi)$.

This entails, e.g., that (10a) implicates $\neg \text{Bel}_S$(10b):

(10) a. Clyde is a dope.
b. Clyde is a dope and Jupiter is larger than Saturn.

We need some notion of relevance:

☺ If S says ϕ and ψ is relevant and stronger than ϕ, then it is implicated that $\neg \text{Bel}_S(\psi)$.

But what is relevance?

This is (ahem) a difficult question, but here's a first stab at an answer:

> Anything that is of potential interest *to the hearer* is relevant.

How does the speaker decide what is of interest to the hearer?

There are at least 3 different ways:

- S can assume that all discourse goals are of interest to H.
- H may have personal interests that S knows about.
- S can assume that everything of general interest is of interest to H.

Relevance I: discourse goals

In the context of a treasure hunt: Grice (1975)

(11) The prize is either in the garden or in the attic.

Or compare: Matsumoto (1995)

(12) A: What have you done with that mail?
B: I've typed it.

(13) A: Did you handwrite that letter?
B: No. I typed it.

Relevance II: hearers' personal interests

(14) A: I tried to call you yesterday. Where were you?
B: I was playing golf with a friend of mine.

- B's utterance is likely to implicate that his golf partner is not among A and B's mutual friends,
- even if this information is not relevant to the immediate purpose of the discourse.

Relevance III: general interest

(15) A: Where is Wilma?
B: She went out to buy a piece of furniture.

- B's answer is likely to implicate that he doesn't know (or care) what kind of furniture Wilma went out to buy.
- This information does not seem relevant to the immediate purpose of the discourse, and it need not be relevant to A's personal interests.

  (Though maybe it is assumed by fiat that anything of general interest is of interest to the hearer).

Relevance III: general interest (cont.)

It is possible that *conventions* (of some kind) decide what is the minimum level of specificity that may be expected.

Cf.

(16) a. She went out to buy a piece of furniture.
b. She went out to buy a sofa.

(17) a. I saw an animal on the lawn this morning.
b. I saw a dog on the lawn this morning.

Relevance III: general interest (cont.) Matsumoto (1995)

(18) Michio is Takashi's brother.
$\not\rightsquigarrow$ S doesn't know whether M. is older or younger than T.

(19) Kochira wa Takashi-kun no kyoodai no Michio-kun desu.
this TOP Takashi-Mr. GEN brother GEN Michio-Mr. COP
$\rightsquigarrow$ S doesn't know whether M. is older or younger than T.

Background: Unlike English, Japanese also has a system of sibling terms that encode sex as well as seniority:

ani	"older brother"	*otooto*	"younger brother"
ane	"older sister"	*imooto*	"younger sister"

Apparently, there is a general expectation that, by default, sibling terms are at least as specific as this.

So, what's relevance now?

- Uuuuh ...
- Whatever relevance is, it is likely to be a multi-faceted thing.
- Perhaps, as I have suggested, relevance is hearer-centred.
- With few exceptions, the R-issue is avoided in the literature on Q-implicature.

Scalar implicatures

Varieties of Q-implicature

- *Exhaustivity effects in question answering*

  A: Who did you see?

  B: Fred.

  $\rightsquigarrow$ The speaker saw only Fred.

- *Scalar implicatures*

  Fred ate some of the figs.

  $\rightsquigarrow$ Fred didn't eat all the figs.

- *Conditional perfection*

  If you scratch my back, I'll give you a kiss.

  $\rightsquigarrow$ Only if you scratch my back will I give you a kiss.

- *Free choice permission*

  You can have an apple or a pear.

  $\rightsquigarrow$ You can have an apple.

  $\rightsquigarrow$ You can have a pear.

Synopsis

- Scalar implicatures have received more attention than any other type of Q-implicature.
- Theories of scalar implicature have been deeply influenced by Horn's (1972) dissertation work.
- This has led to a somewhat distorted perception of Q-implicatures.

Horn scales

- A Horn scale is a sequence of expressions ordered according to strength:
  - ⟨some, many, most, all⟩
  - ⟨clever, brilliant⟩
  - ⟨warm, hot, scalding⟩

    ...
- Scales are used to *generate*, by means of simple substitution, alternative sentences the speaker could have uttered:
  - Let $\phi(\alpha)$ be a sentence, where α is an expression in ϕ.
  - Then $\phi(\beta)$ is the same sentence, except that α is replaced with β.
  - $\phi(\beta)$ is an *alternative* to $\phi(\alpha)$ iff β occurs to the right of α on some Horn scale.

Horn scales: examples

1. Sentence: **Wilma had many of the pears**
   - Horn scale: ⟨**some, many, most, all**⟩
   - Alternatives:
     Wilma had most of the pears
     Wilma had all of the pears
   - Scalar implicatures:
     $\text{Bel}_S \neg$(Wilma had most of the pears)
     $\text{Bel}_S \neg$(Wilma had all of the pears)
2. Sentence: **Barney's essay is okay**
   - Horn scale: ⟨**okay, brilliant**⟩
   - Alternative: **Barney's essay is brilliant**
   - Scalar implicature: $\text{Bel}_S \neg$(Barney's essay is brilliant)
3. Sentence: **Betty had an apple or a pear**
   - Horn scale: ⟨**or, and**⟩
   - Alternative: **Betty had an apple and a pear**
   - Scalar implicature: $\text{Bel}_S \neg$(Betty had an apple and a pear)

The generative method

- One might call this the "generative" method for dealing with scalar implicatures.
- This method is much more problematic than it may seem:
  - It gives rise to pseudo-issues.
  - It doesn't generalise to other Q-implicatures.
  - It may give a false impression of what Q-implicatures are.

Downward entailment

In a downward entailing (DE) environment, entailment relations are reversed:

(1) a. Fred's car is navy blue $\Rightarrow$ Fred's car is blue
b. Fred's car isn't navy blue $\not\Rightarrow$ Fred's car is blue
c. Fred's car isn't blue $\Rightarrow$ Fred's car isn't navy blue

$\rightsquigarrow$ Negation creates a DE environment.

(2) a. All [cars] [are navy blue] $\Rightarrow$ All [cars] [are blue]
b. All [blue cars] [are cheap] $\Rightarrow$ All [navy blue cars] [are cheap]

$\rightsquigarrow$ In a sentence of the form "All ϕ are ψ", ϕ is a DE environment, but ψ isn't.

Downward entailment and scalar implicatures

Since scalar implicatures are based on the relative strength of scalar expressions, and downward entailment affects relative strength, downward entailment and scalar implicature are bound to interact.

(3) Fred read many of these novels
entailment: Fred read some of these novels
implicature: ¬(Fred read all of these novels)

(4) Fred didn't read many of these novels
entailment: Fred didn't read all of these novels
implicature: ¬(Fred didn't read some of these novels)
= Fred read some of these novels

“Scale reversal”

- It is often said that Horn scales are reversed under negation and in other DE environments.
- This is wrong: it is entailment relations that reverse.
- The assumption that scales are ordered in terms of strength is redundant: alternatives are ordered in terms of entailment anyway:

  Wilma had all of the pears.
  ⇒ Wilma had most of the pears.
  ⇒ Wilma had some of the pears.

☞ The idea that scalar implicatures are generated from Horn scales yields a distorted view of implicatures.

Scalar implicatures with Horn *sets*

- Replace Horn scales with Horn sets, like {all, some, most, many}, {brilliant, clever}, etc.
- Let $\phi(\alpha)$ be a sentence, where α is an expression in ϕ.
- $\phi(\beta)$ is an *alternative* to $\phi(\alpha)$ iff
  - $\alpha, \beta \in$ H, where H is a Horn set, and
  - $\phi(\beta)$ is stronger than $\phi(\alpha)$ (i.e. $\phi(\beta)$ entails $\phi(\alpha)$ but not vice versa).
- Examples:
  - Sentence: Betty ate many of the tarts
    Alternatives: Betty ate most of the tarts
    Betty ate all of the tarts
  - Sentence: Betty didn't eat many of the tarts
    Alternatives: Betty didn't eat some of the tarts

Scalar implicatures with Horn *sets*

- Lesson #1:
  For the purpose of calculating Q-implicatures, strength is measured at sentence level, not below.
- Lesson #2:
  We don't need scales: The best way of implementing the generative method uses sets rather than scales.

Assorted worries about Horn scales/sets

- Horn scales/sets may be viewed as way of dodging the problem of *relevance*. Basically, this problem is stipulated out of existence.
- What are Horn scales/sets, and where do they come from?
- The Horn-style analysis of scalar implicatures suggests that a generative theory of Q-implicatures is possible. However, such a theory will not work for other Q-implicatures:

  E.g.: Bonnie stole the apples or the pears.
  $\rightsquigarrow \neg \mathrm{Bel}_S(\text{Bonnie stole the apples})$
  $\rightsquigarrow \neg \mathrm{Bel}_S(\text{Bonnie stole the pears})$

- Finally:
  What does this have to do with conversational implicature?

Disjunction

Disjunction

- Disjunctions belong to the stock-in-trade examples of sentences that have (scalar) Q-implicatures associated with them.
- But things aren't as straightforward as is often thought.
- Working hypothesis: the lexical meaning of "or" is inclusive: "φ or ψ" means that at least one of φ and ψ is true.

Two types of inference associated with "or"

(1) Wilma is dating Albinoni or Boccherini. ("A or B")

1. Exclusivity inferences:
   - $\rightsquigarrow \neg \text{Bel}_S(\text{A and B})$ (weak exclusivity)
   - $\rightsquigarrow \text{Bel}_S \neg(\text{A and B})$ (strong exclusivity)
2. Ignorance inferences:
   - $\rightsquigarrow \neg \text{Bel}_S(\text{A})$ and $\neg \text{Bel}_S(\neg \text{A})$
   - $\rightsquigarrow \neg \text{Bel}_S(\text{B})$ and $\neg \text{Bel}_S(\neg \text{B})$

Two problems with exclusive "or"

1. It is not clear that strong exclusivity is derivable as a Q-implicature.
2. The scalar analysis of exclusive "or" doesn't scale up to sentences with more than two disjuncts.

A problem with strong exclusivity

This is how it should go:

(1) Wilma is dating Albinoni or Boccherini.

1. Rather than saying (1), S could have said:
   (1*) Wilma is dating Albinoni and Boccherini.
   Why didn't S do so?
2. The most likely explanation is that S doesn't believe that (1*) is true: $\neg \mathrm{Bel}_S(1^*)$.
3. Bivalence: $\mathrm{Bel}_S(1^*) \vee \mathrm{Bel}_S\neg(1^*)$.
4. Ergo: $\mathrm{Bel}_S\neg(1^*)$.

But: How plausible is the Bivalence Assumption in this case?

A problem with n-ary disjunctions ($n \geq 1$)

(2) Wilma is dating Albinoni, Boccherini, or Corelli.

- The exclusive reading of (2) should be:
  "Only one of A, B, and C is true."
- It's not clear how this can be derived as a Q-implicature.

A problem with n-ary disjunctions ($n \geq 1$)

Idea #1:

- Generalise "or" to an n-ary connective:
  $\textsc{or}(\phi_1, \ldots, \phi_n)$ means that at least one of $\phi_1, \ldots, \phi_n$ is true.
- Ditto for "and":
  $\textsc{and}(\phi_1, \ldots, \phi_n)$ means that all of $\phi_1, \ldots, \phi_n$ are true.
- But this yields inferences that are too weak:
  "A, B, or C" implicates merely that $\mathrm{Bel}_{\mathrm{S}}(\neg\textsc{and}(\mathrm{A}, \mathrm{B}, \mathrm{C}))$,
  i.e., S believes that not all of A, B, and C are true.

A problem with n-ary disjunctions ($n \geq 1$)

Idea #2:

- Stick to the binary analysis of the connectives:

  The underlying form of "A, B, or C"
  is either "A or (B or C)" or "(A or B) or C".

- Hence, the stronger alternatives to "A, B, or C" are

either:

A and (B and C)
A and (B or C)
A or (B and C)

or:

(A and B) and C
(A and B) or C
(A or B) and C

- Note: This requires multiple substitutions.

A problem with n-ary disjunctions ($n \geq 1$)

Take the first set of alternatives:

A and (B and C)
A and (B or C)
A or (B and C)

	A	B	C	*ruled out by:*
	1	1	1	¬(A and (B and C))
	1	1	0	¬(A and (B or C))
	1	0	1	¬(A and (B or C))
☞	1	0	0	¬(A or (B and C))
	0	1	1	¬(A or (B and C))
☞	0	1	0	—
☞	0	0	1	—
	0	0	0	"A, B, or C"

A problem with n-ary disjunctions ($n \geq 1$)

Conclusion:

- The generative method doesn't seem to work: in the general case, exclusivity inferences don't seem to be scalar implicatures.
- How bad is this?

Ignorance inferences

(3) Wilma is dating Albinoni or Boccherini. ("A or B")

Ignorance inferences:

- $\rightsquigarrow$ $\neg\text{Bel}_S(\text{A})$ and $\neg\text{Bel}_S(\neg\text{A})$
- $\rightsquigarrow$ $\neg\text{Bel}_S(\text{B})$ and $\neg\text{Bel}_S(\neg\text{B})$

These are not derivable as scalar implicatures, because the relevant alternatives are *shorter* than (3):

- Wilma is dating Albinoni.
- Wilma is dating Boccherini.

A pseudo-dichotomy

- The generative view on (scalar) implicatures has led to the widespread opinion that exclusivity inferences are very different from ignorance inferences.
- Apart from the fact that it is doubtful that exclusivity inferences can be analysed as scalar implicatures, this dichotomy is not very appealing.

A deflationist view on scalar implicatures

- Lengthwise, there are three ways a sentence can relate to any of its alternatives: it can be (i) longer, (ii) shorter, or (iii) the same length.
- In the case of (iii), we can speak of "scalar implicatures".
- That's all.

The key concept in a theory of Q-implicatures is that of alternatives, not scales.

Where are we now?

1. Quantity implicatures
   - Grice
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   - Disjunction
2. Nonce inferences or defaults?
3. "Embedded" implicatures
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5. Non-pragmatic alternatives