Exhaustivity is a conversational implicature

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1.1. The challenge: the epistemic step

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   Wrong, it does!

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but how?!

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All we can do is show that Grice *can* do it.

Part I: Exhaustivity à la Grice.
Yes we can!

Part II: Generativity à la Grice.
On cancellability, focus, and the final rise.

Part I: Exhaustivity à la Grice

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3. Theory

3.1. Translation into logic

(4) a. Of John, Bill and Mary, who came to the party?
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(4) a. John came, or Mary, or John and Mary. $\quad p \vee q \vee (p \wedge q)$
   b. John came. $\qquad\qquad\qquad\qquad\qquad\qquad\qquad p$
   c. John came, or Mary and John. $\qquad\qquad p \vee (p \wedge q)$

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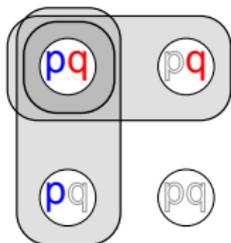- ▸ *Informative content*: $|\varphi| := \bigcup[\varphi]$

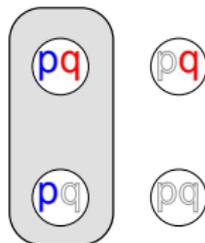(4a) $[p \vee q \vee (p \wedge q)]$ (4b) $[p]$ (4c) $[p \vee (p \wedge q)]$

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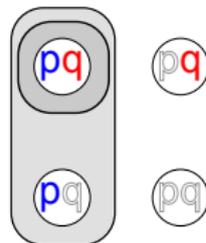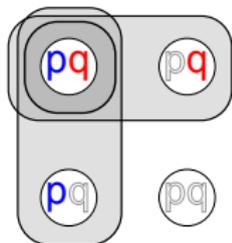# 3.2. Semantics (Roelofsen, 2011)

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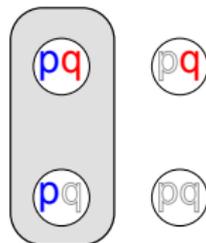(4a) $[p \vee q \vee (p \wedge q)]$ (4b) $[p]$ (4c) $[p \vee (p \wedge q)]$

Entailment
A entails B, $A \vDash B$, iff
(i) $\bigcup A \subseteq \bigcup B$; and
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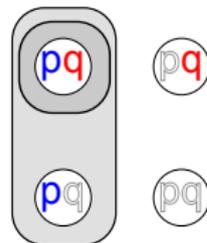# 3.2. Semantics (Roelofsen, 2011)

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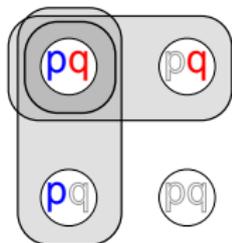(4a) $[p \vee q \vee (p \wedge q)]$ (4b) $[p]$ (4c) $[p \vee (p \wedge q)]$

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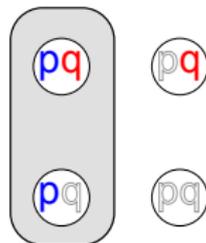A entails B, $A \vDash B$, iff
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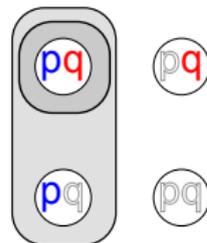
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Now, (4c) $\vDash$ (4a), but (4b) $\nvDash$ (4a).

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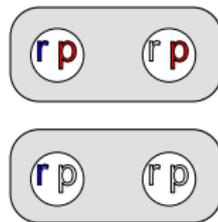
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It was raining. $\leadsto$ If it rained, John {went / didn't go}.
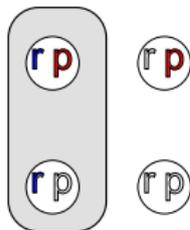
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4. Results

4.1. Examples

(4) a. John came, Mary came, or both came $(p \lor q \lor (p \land q))$

   b. John came. (p)

   c. John came, or Mary and John. $(p \lor (p \land q))$

4.1. Examples

(4) a. John came, Mary came, or both came $(p \vee q \vee (p \wedge q))$

b. John came. (p)

c. John came, or Mary and John. $(p \vee (p \wedge q))$
   1. $s \subseteq |p \vee (p \wedge q)|$ (Quality)

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$$p \vee (p \wedge q) \vDash p \vee q \vee (p \wedge q)$$

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(4) a. John came, Mary came, or both came $(p \lor q \lor (p \land q))$

b. John came. (p)

c. John came, or Mary and John. $(p \lor (p \land q))$
  1. $s \subseteq |p \lor (p \land q)| = |p|$ (Quality)
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  3. - $p \lor (p \land q) \models p \lor q \lor (p \land q)$ (Relation)

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4. $\boxed{s \subseteq \overline{|q|}}$ **exhaustivity!**

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4.2. Formal results

Recall: *A entails Q*, $A \vDash Q$, iff
(i) $\bigcup A \subseteq \bigcup Q$; and
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given s, $q \cap \bigcup A$ and a coincide.

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Main conclusion:

- ▸ If pragmatic reasoning is sensitive to *attentive content* (which it must be, to distinguish between (3b) and (3c));
- ▸ then *exhaustivity is a conversational implicature*.

5. Reflection

5.1. 'Alternatives'

Existing approaches (since forever):

- 'Why did the speaker not say "$p \wedge q$"?'

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- ▸ Hence something stronger is implied: exhaustivity.

Beware:

- ▸ These 'alternatives' are fully determined by the maxims.
- ▸ Speakers need not reason in terms of alternatives.

5.2. Semantics

Restriction
A restricted to *b*, $A_b := \{a \cap b \mid a \in A, a \cap b \neq \varnothing\}$

Semantics (Roelofsen, 2011)

1. $[p]$ $= \{\{w \in \textbf{Worlds} \mid w(p) = \text{true}\}\}$
2. $[\neg\varphi]$ $= \{\overline{\bigcup[\varphi]}\}$ if $\overline{\bigcup[\varphi]}$ is nonempty; $\varnothing$ otherwise.
3. $[\varphi \vee \psi] = ([\varphi] \cup [\psi])_{|\varphi|\cup|\psi|} = [\varphi] \cup [\psi]$
4. $[\varphi \wedge \psi] = ([\varphi] \cup [\psi])_{|\varphi|\cap|\psi|}$

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Attentive semantics is not the only suitable semantics:

- *Unrestricted Inquisitive Sem.* (Ciardelli, 2009; Westera, 2012)

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2. $[\neg\varphi] = \{\overline{\bigcup[\varphi]}\}$ if $\overline{\bigcup[\varphi]}$ is nonempty; $\varnothing$ otherwise.
3. $[\varphi \vee \psi] = ([\varphi] \cup [\psi])_{|\varphi|\cup|\psi|} = [\varphi] \cup [\psi]$
4. $[\varphi \wedge \psi] = ([\varphi] \cup [\psi])_{|\varphi|\cap|\psi|}$

Attentive semantics is not the only suitable semantics:

▸ *Unrestricted Inquisitive Sem.* (Ciardelli, 2009; Westera, 2012)

Minimally, the semantics must lack the *absorption laws*:

▸ Absorption: $p \vee (p \wedge q) \equiv p \equiv p \wedge (p \vee q)$

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  (cf. Groenendijk and Stokhof, 1984; cf. 'mention-some').
- ▸ Wh-words are existential quantifiers over sets.
- ▸ 'Some', 'most' are *fuzzy numerals*:
  $\exists x.\textsc{some}_P(x) \wedge P(x) \wedge Q(x)$

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Besides: this is the only way.

6. 'Embedded' implicatures

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Many 'embedded' implicatures are in fact predicted.

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(6) John, Mary or Bob came.
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(Of course more needs to be said regarding empirical data.)

End of Part I

Part II: Generativity à la Grice

7. Cancellability

7.1. Grice on cancellability

> *A putative conversational implicature that p is explicitly*
> *cancellable if [...] it is admissible to add "but not p", or*
> *"I do not mean to imply that p" [...].*
>
> *(Grice, 1975, p. 44.)*

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> *A putative conversational implicature that p is explicitly cancellable if [...] it is admissible to add "but not p", or "I do not mean to imply that p" [...].*
> *(Grice, 1975, p. 44.)*

> *[...] since it is possible to opt out of the observation of [the Cooperative Principle], it follows that a conversational implicature can be cancelled in a particular case.* *(p.57)*

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4. The speaker would be either uncooperative, or inconsistent.

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This makes the Gricean story much more *generative*...

8. Exhaustivity and focus

8.1. The focus principle

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The Gricean story is *as generative as the grammatical approach*.

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(15) If [John]$_F$ was there, Mary was there.   (c.f., Horn, 1972)
    ≢ If only John was there, Mary was there.

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(15) If [John]$_F$ was there, Mary was there.   (c.f., Horn, 1972)
    $\not\equiv$ If only John was there, Mary was there.

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However, for 'simple' sentences:

- '$[\text{Subject}]_F$ predicate' $\rightsquigarrow$ 'only $[\text{Subject}]_F$ predicate'.

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Zondervan (2010) experimentally compares two focus structures:

(17) Q: What did Harry bring?
   A: Harry brought [bread or chips]$_F$.

(18) Q: Who brought bread or chips?
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(19) Q: What did Harry bring?
     A: Harry brought [bread]$_F$ or [chips]$_F$.

8.3. But... Zondervan!

Zondervan (2010) experimentally compares two focus structures:

(17) Q: What did Harry bring (bread/chips; booze; or party hats)?
   A: Harry brought [bread or chips]$_F$.

(18) Q: Who brought bread or chips?
   A: [Harry]$_F$ brought bread or chips.

His findings in a nutshell: *no effect on exhaustivity*.

However:

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(19) Q: What did Harry bring?
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(20) Q: Did Harry bring bread and chips?
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His findings in a nutshell: *no effect on exhaustivity*.

However:

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   A: Harry brought [bread]$_F$ or [chips]$_F$.

(20) Q: Did Harry bring bread and chips?
   A: Harry brought bread [or]$_F$ chips.

- ▸ All theories predict exh. not for (17), but for (19) and (20).

8.4. But... other experiments!

In general, experimental results are mixed because:

- ‣ QUD and/or focus are left implicit;

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In general, experimental results are mixed because:

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In general, experimental results are mixed because:

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- ▸ Level of granularity is left implicit;

- ▸ Intonation is not controlled for.

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In general, experimental results are mixed because:

- ‣ QUD and/or focus are left implicit;
- ‣ Domain restriction is left implicit (cf. *mention some*);
- ‣ Level of granularity is left implicit;
- ‣ The experimental task may disable maxims;
- ‣ Intonation is not controlled for.

9. Preventing exhaustivity: the final rise

9.1. Puzzle & proposal

(21) Of John, Bill and Mary, who came to the party?
John came↘. ↝ Mary and Bill didn't.

9.1. Puzzle & proposal

(21) Of John, Bill and Mary, who came to the party?
John came ↗.   ↛ Mary and Bill didn't.

9.1. Puzzle & proposal

(21) Of John, Bill and Mary, who came to the party?
John came ↗.   ↛ Mary and Bill didn't.
       ⤳ ...wait, there's more.

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        ⤳ ...wait, there's more.
        ⤳ ...perhaps that implies sth. about M&B?

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    ↝ ...but I'm not sure.

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(21) Of John, Bill and Mary, who came to the party?
    John came ↗.   ↛ Mary and Bill didn't.
            ⤳ ...wait, there's more.
            ⤳ ...perhaps that implies sth. about M&B?
            ⤳ ...but I'm not sure.
            ⤳ ...did I make myself clear?

9.1. Puzzle & proposal

(21) Of John, Bill and Mary, who came to the party?
John came $\nearrow^L$. $\not\hookrightarrow$ Mary and Bill didn't.
   $\leadsto$ ...wait, there's more.
   $\leadsto$ ...perhaps that implies sth. about M&B?
c. John came $\nearrow^H$.
   $\leadsto$ ...but I'm not sure.
   $\leadsto$ ...did I make myself clear?

9.1. Puzzle & proposal

(21) Of John, Bill and Mary, who came to the party?
    John came $\nearrow^L$. $\not\rightsquigarrow$ Mary and Bill didn't.
        $\rightsquigarrow$ ...wait, there's more.   (Quantity)
        $\rightsquigarrow$ ...perhaps that implies sth. about M&B?
    c. John came $\nearrow^H$.
        $\rightsquigarrow$ ...but I'm not sure.
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  $\leadsto$ ...did I make myself clear?

Proposal

1. The final rise marks the violation of a maxim.

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(21) Of John, Bill and Mary, who came to the party?
John came ↗ ^{L}.   ⇸ Mary and Bill didn't.
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     ⤳ ...perhaps that implies sth. about M&B?   (Relation)
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     ⤳ ...but I'm not sure.   (Quality)
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       $\rightsquigarrow$ ...did I make myself clear?   (Manner)

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     $\rightsquigarrow$ ...but I'm not sure.   (Quality)

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Proposal

1. The final rise marks the violation of a maxim.

2. Its pitch conveys the severity of the violation:
   $\nearrow^H$: Quality/Manner;   (cf. Ward & Hirschberg, 1992;
   $\nearrow^L$: Quantity/Relation.   Banziger & Scherer, 2005)

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   $\nearrow^H$: Quality/Manner;   (cf. Ward & Hirschberg, 1992;
   $\nearrow^L$: Quantity/Relation.   Banziger & Scherer, 2005)

This proposal is new in its generality, not in spirit.

9.2. Deriving the readings

 (21) Of J and M, who came to the party? $(p \lor q \lor (p \land q))$
    John came↗. (p)

9.2. Deriving the readings

(21) Of J and M, who came to the party?　　　$(p \vee q \vee (p \wedge q))$
　　　John came↗.　　　　　　　　　　　　　　　　　(p)

Readings

　　　...wait, there's more.　　　　　　　　　(Quantity)
　　　...perhaps that implies sth. about Mary?　　(Relation)
　　　...but I'm not sure.　　　　　　　　　　(Quality)
　　　...did I make myself clear?　　　　　　(Manner)

9.2. Deriving the readings

(21) Of J and M, who came to the party? $(p \lor q \lor (p \land q))$
John came ↗. (p)

1. $s \subseteq |p|$ (Quality)
2. $s \notin |q|$ (Quantity)
3. $s \subseteq \overline{|p|} \cup |q|$ or $s \subseteq \overline{|p|} \cup \overline{|q|}$ (Relation)

Readings

...wait, there's more.   (Quantity)
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3. $s \subseteq \overline{|p|} \cup |q|$ or $s \subseteq \overline{|p|} \cup \overline{|q|}$ (Relation)
4. The speaker thinks she is clear, concise, etc. (Manner)

Readings

...wait, there's more. (Quantity)
...perhaps that implies sth. about Mary? (Relation)
...but I'm not sure. (Quality)
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9.2. Deriving the readings

(21) Of J and M, who came to the party? $(p \vee q \vee (p \wedge q))$
     John came ↗. (p)

   1. $s \notin |p|$ $(↗)$
   2. $s \notin |q|$ (Quantity)
   3. $s \subseteq \overline{|p|} \cup |q|$ or $s \subseteq \overline{|p|} \cup \overline{|q|}$ (Relation)
   4. The speaker thinks she is clear, concise, etc.   (Manner)

Readings

   ...wait, there's more.   (Quantity)
   ...perhaps that implies sth. about Mary?   (Relation)
   ...but I'm not sure.   (Quality)
   ...did I make myself clear?   (Manner)

9.2. Deriving the readings

(21) Of J and M, who came to the party? $\quad (p \lor q \lor (p \land q))$

John came $\nearrow$. $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad (p)$

1. $s \notin |p|$ $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad (\nearrow)$
2. $s \notin |q|$ $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad$ (Quantity)
3. $s \subseteq \overline{|p|} \cup |q|$ or $s \subseteq \overline{|p|} \cup \overline{|q|}$ $\quad\quad\quad\quad$ (Relation)
4. The speaker thinks she is clear, concise, etc. $\quad$ (Manner)

Readings

...wait, there's more. $\quad\quad\quad\quad\quad\quad\quad\quad$ (Quantity)

...perhaps that implies sth. about Mary? $\quad\quad$ (Relation)

$\checkmark$ ...but I'm not sure. $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad$ (Quality)

...did I make myself clear? $\quad\quad\quad\quad\quad\quad$ (Manner)

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Readings

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    2. $s \subseteq |q|$ $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad$ (↗)
    3. $s \subseteq \overline{|p|} \cup |q|$ or $s \subseteq \overline{|p|} \cup \overline{|q|}$ $\quad\quad$ (Relation)
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     1. $s \subseteq |p|$ (Quality)
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     3. $s \nsubseteq \overline{|p|} \cup |q|$ and $s \nsubseteq \overline{|p|} \cup \overline{|q|}$ (↗)
     4. The speaker thinks she is clear, concise, etc.   (Manner)

Readings

     ✓ ...wait, there's more.   (Quantity)
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1. $s \subseteq |p|$ $\qquad\qquad\qquad\qquad\qquad\qquad$ (Quality)
2. $s \nsubseteq |q|$ $\qquad\qquad\qquad\qquad\qquad\qquad$ (Quantity)
3. $s \nsubseteq \overline{|p|} \cup |q|$ and $s \nsubseteq \overline{|p|} \cup \overline{|q|}$ $\qquad\qquad (\nearrow)$
4. The speaker thinks she is clear, concise, etc. $\qquad$ (Manner)

Readings

✓ ...wait, there's more. $\qquad\qquad\qquad\qquad$ (Quantity)

✓ ...perhaps that implies sth. about Mary? $\qquad$ (Relation)

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Readings

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   4. The speaker doesn't think she's clear, concise, etc. $(\nearrow)$

Readings

   ✓ ...wait, there's more.   (Quantity)
   ✓ ...perhaps that implies sth. about Mary?   (Relation)
   ✓ ...but I'm not sure.   (Quality)
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3. $s \subseteq \overline{|p|} \cup |q|$ or $s \subseteq \overline{|p|} \cup \overline{|q|}$ $\quad$ (Relation)
4. The speaker doesn't think she's clear, concise, etc. $\quad (\nearrow)$

Readings

✓ ...wait, there's more. $\quad$ (Quantity)
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9.3. General results

My approach unifies existing approaches:

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Over-all:

- ▸ The reproductive precision is *uncanny*.

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Over-all:

- ▸ The reproductive precision is *uncanny*.

- ▸ Attentive content is crucial for the Relation readings.

9.4. Outlook

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Contrastive topic (Büring, 2003):

(9) [John]$_{CT}$ had the [beans]$_F$.

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(10) a. Was John there ↗?
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Future work!

End of Part II

10. The bigger picture

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Part I: Exhaustivity à la Grice

‣ If pragmatic reasoning is sensitive to *attentive content*

10. The bigger picture

Part I: Exhaustivity à la Grice

- ▸ If pragmatic reasoning is sensitive to *attentive content*
- ▸ then *exhaustivity is a conversational implicature*.

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Part I: Exhaustivity à la Grice

- ‣ If pragmatic reasoning is sensitive to *attentive content*
- ‣ then *exhaustivity is a conversational implicature*.
- ‣ 'Embedded' implicatures are no problem.

10. The bigger picture

Part I: Exhaustivity à la Grice

- ‣ If pragmatic reasoning is sensitive to *attentive content*
- ‣ then *exhaustivity is a conversational implicature*.
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Part II: Generativity à la Grice

- ‣ Conversational implicatures are not really cancellable.

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Part I: Exhaustivity à la Grice

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10. The bigger picture

Part I: Exhaustivity à la Grice

- ▸ If pragmatic reasoning is sensitive to *attentive content*
- ▸ then *exhaustivity is a conversational implicature*.
- ▸ 'Embedded' implicatures are no problem.

Part II: Generativity à la Grice

- ▸ Conversational implicatures are not really cancellable.
- ▸ Focus makes it even more generative.
- ▸ The final rise is *awesome*.

The End

Articles

- *Exhaustivity through the maxim of Relation*
  (*LENLS* proceedings, see staff.science.uva.nl/~westera/)
- *'Attention, I'm violating a maxim!'*
  (submitted, available through me)

Appendix A. Other maxims of Relation

    i. $R_s \vDash Q$ (mine)

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  iii. $R_h \vDash Q$ ($\approx$ GS's (1984) *pragmatic answer*)

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ii. and iii. are too strong:

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ii. and iii. are too strong:

    ▸ The participants need not *already know* how R is relevant.

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ii. and iii. are too strong:

- ‣ The participants need not *already know* how R is relevant.
- ‣ They need only be able to *figure it out*.

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- ‣ The participants need not *already know* how R is relevant.
- ‣ They need only be able to *figure it out*.
  (left implicit here)

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    i. $R_s \vDash Q$ (mine)

   ii. $R_{CG} \vDash Q$ (Roberts's (1996) *contextual entailment*)

  iii. $R_h \vDash Q$ ($\approx$ GS's (1984) *pragmatic answer*)

ii. and iii. are too strong:

- The participants need not *already know* how R is relevant.
- They need only be able to *figure it out*.
  (left implicit here)

(5) Did John go to the party?
    It was raining. ⤳ If it rained, John {went / didn't go}.

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Within a world, everything is related.

Appendix C. Logical relatedness

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Connecting this to the literature is a work in progress.

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- ‣ Final rise: 'For some maxim, I'm not sure whether or how I comply with it'.

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Example given by Fox (forthcoming):

(25) There's money in box A or in box B! $(p \lor q)$
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References (i)

- Banziger, T., & Scherer, K. R. (2005). The role of intonation in emotional expressions.

- Bartels, C. (1999). The intonation of English statements and questions: a compositional interpretation.

- Beaver and Clark (2008). Sense and sensitivity: How focus determines meaning.

- Büring, D. (2003). On D-Trees, Beans and B-Accents.

- Chierchia, G., Fox, D., & Spector, B. (2008). The grammatical view of scalar impl. and the relationship between sem. and pragmatics.

- Ciardelli, I. (2009). Inquisitive semantics and intermediate logics.

- Constant, N. (2012). English Rise-Fall-Rise: A study in the Semantics and Pragmatics of Intonation.

- De Morgan, A. (1847). Formal Logic.

- Geurts (2010). Quantity implicatures.

- Grice, H. (1975). Logic and conversation.

References (ii)

- Groenendijk, J., & Stokhof, M. (1984). Studies on the semantics of questions and the pragmatics of answers.

- Gunlogson, C. (2008). A question of commitment.

- Mill, J.S. (1867). An Examination of Sir William Hamilton's Philosophy.

- Roberts, C. (1996). Information structure in discourse.

- Roelofsen, F. (2011). Information and attention.

- Sauerland, U. (2004). Scalar implicatures in complex sentences.

- Truckenbrodt, H. (2006). On the semantic motivation of syntactic verb movement to C in German.

- Ward, G., & Hirschberg, J. (1985). Implicating uncertainty: the pragmatics of fall-rise intonation.

- Ward, G., & Hirschberg, J. (1992). The influence of pitch range, duration, amplitude and spectral features on the interpretation of the rise-fall-rise intonation contour in english.

- Westera, M. (2012). Meanings as proposals: a new semantic foundation for Gricean pragmatics.