Exhaustivity is a conversational implicature

Matthijs Westera

Institute for Logic, Language and Computation
University of Amsterdam

Semantics Research Group, Tokyo, October 25th 2013

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As a speaker, how can you:

- *Ensure* that your answer is interpreted exhaustively?
- *Prevent* that your answer is interpreted exhaustively?

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An implicature, the supposition of which is necessary for maintaining the assumption that the speaker is cooperative.

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Wrong, it does!

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but how?!

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- Replacing 'relevance' by lexical scales (since Horn, 1972).
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I will show that none of this is necessary.

Part I: Exhaustivity is a conversational implicature.

Part II: Intonation and exhaustivity

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Part II: Intonation and exhaustivity

- Focus further reduces contextual uncertainty.
- How the final rise prevents exhaustivity.

Part I: Exhaustivity is a conversational implicature.

2. Diagnosis
3. Theory
4. Results

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(3) a. Of John, Bill and Mary, who came to the party?
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maxim of Relation

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

b. John came. p

c. John came, or Mary and John. $p \vee (p \wedge q)$

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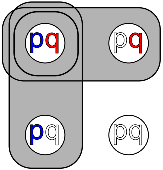

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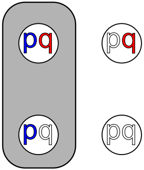
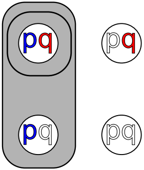


(4b) $[p]$



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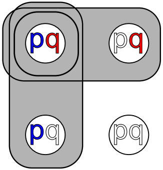

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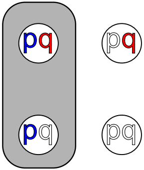

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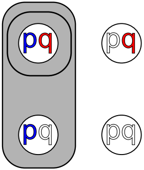

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Entailment

A entails B, $A \vDash B$, iff
(i) $\bigcup A \subseteq \bigcup B$; and
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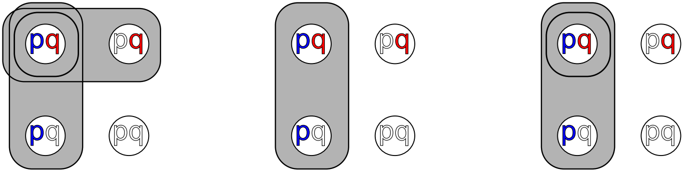

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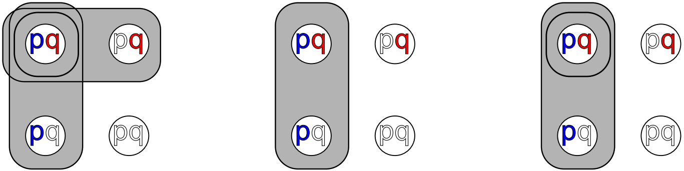

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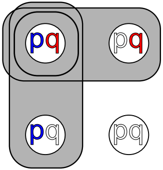

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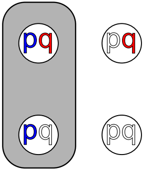
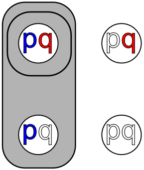


(4b) $[p]$



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Now, (4c) $\vDash$ (4a), but (4b) $\nvDash$ (4a).

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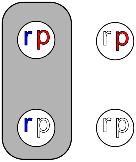

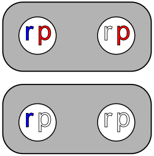

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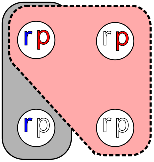

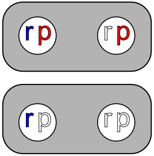

The relevant maxims

For a cooperative speaker with information s, responding R to Q:

1. **Quality**: $s \subseteq \bigcup R$.
2. **Quantity**: For all $Q' \subseteq Q$, if $s \subseteq \bigcup Q'$ then $\bigcup R \subseteq \bigcup Q'$.
3. **Relation**: $\{r \cap s \mid r \in R\} \vDash Q$.

(5) Did John go to the party?
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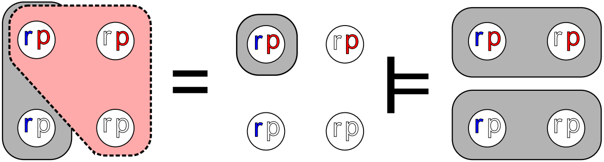

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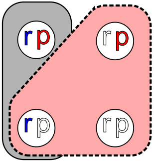

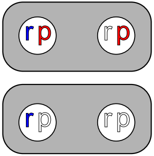

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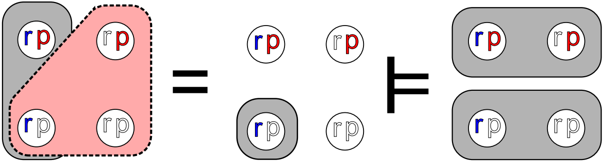

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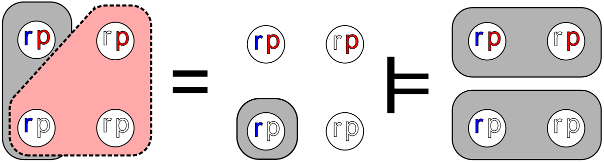

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(cf. Grice, 1975; Groenendijk and Stokhof, 1984; Roberts, 1996; Spector, 2007)

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4. Results

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

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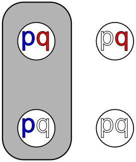

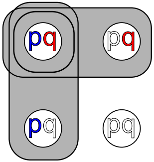

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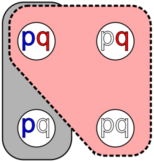

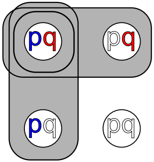

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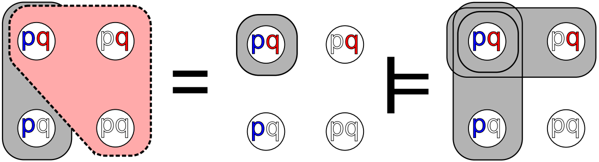

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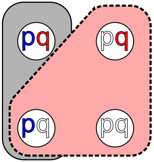

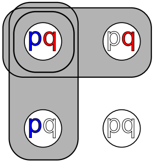

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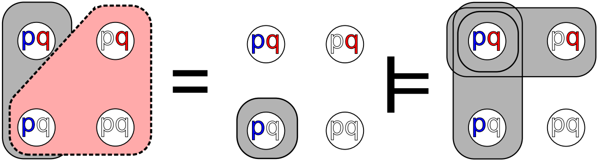

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4. $s \subseteq \overline{|q|}$ exhaustivity!

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More generally:

- The maxim of Relation requires that:
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Minimally, the semantics must lack the *absorption laws*:

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

4.3. 'Alternatives'

Existing approaches (since forever):

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

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Beware:

- Speakers need not reason in terms of alternatives.

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

End of Part I

Part II: Intonation and exhaustivity

5. Focus
6. The final rise

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5.1. Focus is necessary for exhaustivity

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- Focus is *necessary* for exhaustivity (as a C.I.).
- However, it is not yet *sufficient*...

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- Unless if we know the QUD's *domain restriction*,
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But this too can be fixed:

(8) *Of John, Bob and Mary*, who ate the tofu?
[John]$_F$ ate the tofu. $\leadsto$ Bob and Mary didn't.

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How can a speaker enforce exhaustivity?

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- What about *cancellability* (appendix).

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- Part I: no need for an opinionatedness assumption.
- Focus is *necessary* for exhaustivity.
- With an explicit domain, it is also *sufficient*.

This predicts that exhaustivity in (8) is *mandatory*:

(8) *Of John, Bob and Mary*, who ate the tofu?
[John]$_F$ ate the tofu. # Indeed, John and Bob did.

This raises several issues:

- What about *cancellability* (appendix).
- What about Hungarian focus? (5.4)

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- What about *cancellability* (appendix).
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- What about experiments? (5.5)

5.4. Hungarian vs. English focus

Hungarian focus is *more* obligatory (Szabolcsi, 1981):

(9) [Amy and Ben]$_F$ saw Cleo. $\vDash$ [Amy]$_F$ saw Cleo.

(10) [Amy és Ben]$_F$ látta Cleot. $\nvDash$ [Amy]$_F$ látta Cleot.

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(12) Of Amy, Ben, and John, [Amy and Ben]$_F$ saw Cleo.
$\nvDash$ Of Amy, Ben, and John, [Amy]$_F$ saw Cleo.

5.5. Experiments

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- Intonation is not controlled for. (*coming up next*)

6. The final rise

6.1. The sentence-final rise

6.2. Deriving the readings

6.3. General results

6.4. Contrastive topic (work in progress)

6.5. The bigger picture

6.1. The sentence-final rise

(13) Of John, Bill and Mary, who came to the party?
John came↘. $\rightsquigarrow$ Mary and Bill didn't.

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$\rightsquigarrow$ ...but I'm not sure.

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(13) Of John, Bill and Mary, who came to the party?
John came$\nearrow$. $\not\leadsto$ Mary and Bill didn't.

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$\leadsto$ ...but I'm not sure.
$\leadsto$ ...did I make myself clear?

6.1. The sentence-final rise

(13) 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.
$\rightsquigarrow$ ...perhaps that implies sth. about M&B?
c. John came $\nearrow^{H}$.
$\rightsquigarrow$ ...but I'm not sure.
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(13) Of John, Bill and Mary, who came to the party?
John came$\nearrow^{L}$. $\not\rightsquigarrow$ Mary and Bill didn't. (Quantity)
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Proposal

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

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1. The final rise marks the violation of a maxim.
2. Its pitch conveys *emotivity*. (Banziger & Scherer, 2005)
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   $\nearrow^{H}$: Quality/Manner; (cf. Ward & Hirschberg, 1992)
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This proposal is new in its generality, not in spirit.

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

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(14) Of J and M, who came to the party? $(p \vee q \vee (p \wedge q))$
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1. $s \subseteq |p|$ (Quality)
2. $s \nsubseteq |q|$ (Quantity)
3. $s \subseteq \overline{|p|} \cup |q|$ or $s \subseteq \overline{|p|} \cup \overline{|q|}$ (Relation)

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4. The speaker thinks she is clear, concise, etc. (Manner)

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1. $s \notin |p|$ $(\nearrow)$
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	...perhaps that implies sth. about Mary?	(Relation)
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4. The speaker doesn't think she's clear, concise, etc. ($\nearrow$)

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Noteworthy:

- For the Relation readings, *attentive content* is crucial.
- In all but the last reading, exhaustivity is absent.
- Conjunctive lists: Quantity (I will say more!);
  Disjunctive lists: Relation (I will attend more!)

6.4. Contrastive topic

Work in progress

- *Focus*: the function of nuclear stress in a *falling* phrase.

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(14) Who had what for lunch?
a. $[\text{John}]_{CT}$ had the $[\text{beans}]_F$. $\leadsto$ John had only beans;
$\not\leadsto$ only John had something.

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b. $[\text{John}]_F$ had the $[\text{beans}]_{CT}$. $\not\rightsquigarrow$ John had only beans; $\rightsquigarrow$ only John had the beans.

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This would be a major advance in our understanding of intonation and information structure.

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- Facial expressions, gestures, ...

End of Part II

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- Beware of implicit domain restrictions.
- The final rise conveys a maxim violation.

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)

Thanks to the *Netherlands Organisation for Scientific Research* (NWO) for financial support; to F. Roelofsen, J. Groenendijk, C. Cummins, K. Von Fintel, A. Ettinger, J. Tyler, M. Križ, the audiences of *SemDial*, *S-Circle* (UCSC), *SPE6*, *ICL*, *CISI*, *ESSLLI StuS*, *LIRA*, *Göttingen*, *INSEMP*, and many anonymous reviewers for valuable comments.

Grice on cancellability

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(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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Many 'embedded' implicatures are in fact predicted.

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(Alternatively, use a *final rise*...)

Semantics

Restriction

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

Semantics (Roelofsen, 2011)

1. $[p] \quad = \{\{w \in \textbf{Worlds} \mid w(p) = \text{true}\}\}$
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- *Unrestricted Inquisitive Sem.* (Ciardelli, 2009; Westera, 2012)

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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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- Wh-words are existential quantifiers over sets.

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Besides: this is the only way.

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The foregoing is not to say that focus 'means' 'only':

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But at least for 'simple' sentences:

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

Formal results

Recall: A *entails* Q, $A \vDash Q$, iff
(i) $\bigcup A \subseteq \bigcup Q$; and
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(5) Did John go to the party?
It was raining. $\rightsquigarrow$ If it rained, John {went / didn't go}.

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Within a world, everything is related.

Logical relatedness

> *Just as [logical consequence] rules the validity of argumentation, [logical relatedness] rules the coherence of information exchange.*
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Logical consequence is logical relatedness.

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But an account based on *objective* maxims would also work:

- 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! $(p \vee q)$

$\rightsquigarrow$ *Not in both.*

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4. $s \subseteq (|p| \cap |q|)$ or $s \subseteq \overline{|p| \cap |q|}$ (from 1 and 2)

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3. $s \subseteq \overline{|p| \cup |q|} \cup (|p| \cap |q|)$ or $s \subseteq \overline{|p| \cup |q|} \cup \overline{|p| \cap |q|}$ (Relation)

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4. $s \subseteq (|p| \cap |q|)$ or $s \subseteq \overline{|p| \cap |q|}$ (from 1 and 2)
5. Comply with the maxims transparently. (Manner)

Exhaustivity without Quantity

Example given by Fox (forthcoming):

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

$\rightsquigarrow$ *Not in both.*

But a quizmaster is not expected to comply with Quantity!

However, she *does* comply with Relation, Quality, Manner:

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

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4. $s \subseteq (|p| \cap |q|)$ or $s \subseteq \overline{|p| \cap |q|}$ (from 1 and 2)
5. Comply with the maxims transparently. (Manner)
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7. $s \subseteq \overline{|p| \cap |q|}$ (from 4, 5 and 6)

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