Theme with Variations:
Focus, Congruence and Exhaustivity

Floris Roelofsen

www.illc.uva.nl/inquisitive-semantics

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Source

- Chapters 2, 3, and 4 of Kata Balogh’s dissertation
  
  *Theme with variations: a context-based analysis of focus*
  
  defended September 2009 at the University of Amsterdam.

- Chapter 2 of the dissertation draws on earlier work by Jeroen Groenendijk, presented, among other places, in his 2008 lectures at Rutgers.

- Kata’s dissertation and Jeroen’s lecture notes are available through [www.illc.uva.nl/inquisitive-semantics](http://www.illc.uva.nl/inquisitive-semantics)

- I largely follow Kata’s plot, but slightly adapt the terminology and notation at some points, and also bring up some issues that seem to require further consideration.
Common ground and pending proposals
At any point in a conversation there is:
• A common ground $\sigma$
• A stack of pending proposals $\langle \pi_1, \ldots, \pi_n \rangle$

Stages and transitions
• We refer to $\langle \sigma, \pi_1, \ldots, \pi_n \rangle$ as a stage of the conversation
• Utterances induce transitions from one stage to another
Uptake and absorption

- Primary uptake: semantic content
- Secondary uptake: pragmatic inferences
- Absorption: the effect of a response
Uptake and absorption

- Primary uptake: semantic content
  - Add the theme of $\phi \approx$ the questions behind $\phi$
  - Add the rheme of $\phi \approx$ the proposition expressed by $\phi$ itself
- Secondary uptake: pragmatic inferences
- Absorption: the effect of a response

$\langle \sigma, \text{Theme} \rangle$

$\langle \sigma, \text{Theme, Rheme} \rangle$
Uptake and absorption

- Primary uptake: semantic content
  - Add the theme of $\phi \approx$ the questions behind $\phi$
  - Add the rheme of $\phi \approx$ the proposition expressed by $\phi$ itself

- Secondary uptake: pragmatic inferences
  - alternative exclusion

- Absorption: the effect of a response

\[ \langle \sigma, \text{Theme} \rangle \]
\[ \langle \sigma, \text{Theme}, \text{Rheme} \rangle \]
\[ \langle \sigma, \text{Theme}, \text{Rheme}, \text{Excl} \rangle \]
Uptake and absorption

• Primary uptake: semantic content
  • Add the theme of $\phi \approx$ the questions behind $\phi$
  • Add the rheme of $\phi \approx$ the proposition expressed by $\phi$ itself

• Secondary uptake: pragmatic inferences
  • alternative exclusion

• Absorption: the effect of a response
  • accept: proposed information percolates down
  • cancel: cancels informative steps and returns to latest issue

$\langle \sigma, \text{Theme} \rangle$
$\langle \sigma, \text{Theme, Rheme} \rangle$
$\langle \sigma, \text{Theme, Rheme, Excl} \rangle$
$\langle \sigma, \text{Theme, Rheme, Excl}\rangle[absorption]$
Questions, focus, and thematization

Representation of wh-questions and focus

- ‘Who did Amy call?’ $\leadsto ?\exists x. C(a, x)$
- ‘Amy called BEN.’ $\leadsto C(a, b_F)$
Questions, focus, and thematization

Representation of wh-questions and focus

- ‘Who did Amy call?’  $\leadsto ?\exists x. C(a, x)$
- ‘Amy called BEN.’  $\leadsto C(a, b_F)$

Thematization without focus

- $TH(\varphi) = ?\varphi$
- $RH(\varphi) = \varphi$
Questions, focus, and thematization

Representation of wh-questions and focus

- ‘Who did Amy call?’ \( \leadsto ?\exists x. C(a, x) \)
- ‘Amy called BEN.’ \( \leadsto C(a, b_F) \)

Thematization without focus

- \( TH(\varphi) =?\varphi \)
- \( RH(\varphi) = \varphi \)

Thematization with focus

- \( TH(\varphi(a_1,F, ..., a_n,F)) =?\exists x_1...x_n. \varphi [a_1,F...a_n,F/x_1...x_n] \)
- \( RH(\varphi(a_1,F, ..., a_n,F)) = \varphi(a_1, ..., a_n) \)
Focus and thematization exemplified

Thematization without focus

- \( TH(\varphi) = ?\varphi \)
- \( RH(\varphi) = \varphi \)

Thematization with focus

- \( TH(\varphi(a_1,F, ..., a_n,F)) = ?\exists x_1...x_n. \varphi[a_1,F...a_n,F/x_1...x_n] \)
- \( RH(\varphi(a_1,F, ..., a_n,F)) = \varphi(a_1, ..., a_n) \)

Examples

- Ben called Amy. \( \leadsto C(b, a) \Rightarrow \) Theme: \( ?C(b, a) \)
- BEN called Amy. \( \leadsto C(b_F, a) \Rightarrow \) Theme: \( ?\exists x.C(x, a) \)
- BEN called AMY. \( \leadsto C(b_F, a_F) \Rightarrow \) Theme: \( ?\exists x\exists y.C(x, y) \)
Application: question–answer congruence

Pattern
Who called Ben? AMY called Ben. (ok)
Who called Ben? #Amy called BEN. (misplaced focus)
Who called Ben? #AMY called BEN. (overfocused)
Who called whom? #AMY called Ben. (underfocused)

Generalization (KB)
The theme of an answer must be compliant with the given question.
Application: question–answer congruence

Pattern
Who called Ben? AMY called Ben. (ok)
Who called Ben? #Amy called BEN. (misplaced focus)
Who called Ben? #AMY called BEN. (overfocused)
Who called whom? #AMY called Ben. (underfocused)

Generalization (KB)
The theme of an answer must be compliant with the given question.

Or perhaps simpler? (FR)
The theme of an answer must be identical to the given question.
Example: congruence

- ‘Who called Ben?’ $\leadsto ?\exists x. C(x, b)$
- ‘AMY called Ben.’ $\leadsto C(a_F, b)$
- Theme: $\exists x. C(x, b)$
- Identical to the given question (and also compliant)
Example: misplaced focus

- ‘Who called Ben?’  \(\sim \ ?\exists x. C(x, b)\)
- ‘Amy called BEN.’  \(\sim \ C(a, b_F)\)
- Theme:  \(?\exists x. C(a, x)\)
- Not identical to the given question (and also not compliant)
Example: overfocused answer

- ‘Who called Ben?’ \(\leadsto ?\exists x. C(x, b)\)
- ‘AMY called BEN.’ \(\leadsto C(a_F, b_F)\)
- Theme: \(?\exists x \exists y. C(x, y)\)
- Not identical to the given question (and also not compliant)
Example: underfocused answer

- ‘Who called whom?’ $\sim$ $?\exists x.\exists y. C(x, y)$
- ‘AMY called Ben.’ $\sim$ $C(a_F, b)$
- Theme: $?\exists x. C(x, b)$
- Not identical to the given question
- Also not compliant, BUT
Example: underfocused answer

- ‘Who called whom?’ $\sim ?\exists x.\exists y. C(x, y)$
- ‘AMY called Ben.’ $\sim C(a_F, b)$
- Theme: $?\exists x. C(x, b)$
- Not identical to the given question
- Also not compliant, BUT
- This indicates that there is a problem with the definitition of compliance, or with the logical representation of wh-questions.
- After all, ‘Who called Ben?’ should come out as compliant with ‘Who called whom?’
- So I don’t think that congruence should be characterized in terms of compliance
Exhaustivity

Observation
Focused answers are interpreted exhaustively

For example
Q: Who called yesterday?

A1: AMY did. → and nobody else
A2: AMY and BEN did. → and nobody else
A3: AMY or BEN did. → not both, and nobody else

Account in terms of alternative exclusion

• Automatic mechanism, but separate from primary uptake
• Can therefore also be canceled separately
• Intended effect: disclaim stronger possible answers to the given question
The possible answers to a proposition $\pi$ are characterized by:

- The possibilities in $\pi$, corresponding to answers that establish exactly one of the proposed updates.
- But also intersections of the possibilities in $\pi$, which correspond to answers that establish more than one of the proposed updates.
Possible answers

The possible answers to a proposition $\pi$ are characterized by:

- The *possibilities* in $\pi$, corresponding to answers that establish exactly one of the proposed updates
- But also *intersections* of the possibilities in $\pi$, which correspond to answers that establish more than one of the proposed updates

**Alternative exclusion**

$\langle \sigma, s, t \rangle[\text{excl}] = \langle \sigma, s, t, u \rangle$

where $u$ is obtained from $t$ by ‘substracting’ from every possibility $\alpha$ in $t$ any possible answer to $s$ that is strictly stronger than $\alpha$
Illustration

Examples
Q: Who called yesterday?
A1: AMY did. → and nobody else
A2: AMY and BEN did. → and nobody else
A3: AMY or BEN did. → not both, and nobody else

Representation of the question
\[
C = \{a, b, c\} \{a, b\} \{a\} \{a, c\} \{c\} \{b, c\} \{b\} \{
\]

\[
\rho_1 \leadsto C(a)
\]
\[
\rho_2 \leadsto C(b)
\]
\[
\rho_3 \leadsto C(c)
\]
\[
\rho_4 \leadsto \neg \exists x. C(x)
\]
Q: Who called yesterday?

A1: AMY did. → and nobody else

Question: Answer: Exhaustification:

\[
\begin{array}{c}
  \bullet_k \\
  \bullet_j \\
  \bullet_i \\
  \bullet_m \bullet_l \bullet_n \bullet_o \\
  \bullet_p
\end{array}
\]
Q: Who called yesterday?

A2: AMY and BEN did. → and nobody else

Question:  

Answer:  

Exhaustification:
Illustration: disjunctive answers

Q: Who called yesterday?
A3: AMY or BEN did. → not both, and nobody else

Question: Answer: Exhaustification:
Q: Did Amy or Ben or Chris call yesterday?
A3: AMY did. → Ben and Chris did not

Question: Answer: Exhaustification:

Illustration: disjunctive questions
Some problems

A or B or both
Who called yesterday?
AMY or BEN or both. ⇒ not both

Prediction: not both
(because ‘A or B or both’ behaves just like ‘A or B’)
Some problems

A or B or both
Who called yesterday?
AMY or BEN or both.  ⇒ not both

Prediction: not both
(because ‘A or B or both’ behaves just like ‘A or B’)

Conditional questions
If Ben called, did Amy then call as well?
Yes, if Ben called then Amy called as well.  ⇒ both called

Prediction: both called
(by alternative exclusion)
Summary

- Basic architecture of a **dialogue modeling** system
- **Focus** analyzed as having a special effect on **thematization**
- **Congruent answers** in terms of compliance
- **Exhaustivity** as automatic, but cancelable inference
- The dissertation also contains chapters on the interpretation of **only** and of **structural focus** in Hungarian
Some open problems (to work on)

Question–answer congruence

- Characterization in terms of compliance does not seem to be on the right track;
- Is identity general enough?

Alternative exclusion

- A or B or both
- Conditional questions