Modeling questions and responses

Lecture 5: The dynamics of responses part 2

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Outline

Course structure

- *Lecture 1*: Introducing questions and responses.
- *Lecture 2*: Representing question meanings.
- *Lecture 3*: The architecture of a QA system.

⇒ *Lecture 4-5*: The dynamics of responses.

- *Lecture 5*: Integration.

Review of lecture 4 stopping point

The current project

Build up to a flexible, general pragmatic account of responses.

- Tool: a ‘Stalnakerian’ update semantics.
- Endpoint: update semantics with tables.

Current version: context sets as equivalence relations to represent inquisitivity (Groenendijk 1999).

A post-formalization example 1

Initial context

$$c_0 = \langle \{A, B\}, \left\{ \begin{array}{llll} \langle w_1, w_1 \rangle, & \langle w_1, w_2 \rangle, & \langle w_1, w_3 \rangle, & \langle w_1, w_4 \rangle, \\ \langle w_2, w_1 \rangle, & \langle w_2, w_2 \rangle, & \langle w_2, w_3 \rangle, & \langle w_2, w_4 \rangle, \\ \langle w_3, w_1 \rangle, & \langle w_3, w_2 \rangle, & \langle w_3, w_3 \rangle, & \langle w_3, w_4 \rangle, \\ \langle w_4, w_1 \rangle, & \langle w_4, w_2 \rangle, & \langle w_4, w_3 \rangle, & \langle w_4, w_4 \rangle \end{array} \right\} \rangle$$

Facts: it's raining (only) in w_1, w_2 and snowing (only) in w_4.

A post-formalization example 2

Is it raining?

$$c_1 = \langle \{A, B\}, \left\{ \begin{array}{llll} \langle w_1, w_1 \rangle, & \langle w_1, w_2 \rangle, & \langle w_1, w_3 \rangle, & \langle w_1, w_4 \rangle, \\ \langle w_2, w_1 \rangle, & \langle w_2, w_2 \rangle, & \langle w_2, w_3 \rangle, & \langle w_2, w_4 \rangle, \\ \langle w_3, w_1 \rangle, & \langle w_3, w_2 \rangle, & \langle w_3, w_3 \rangle, & \langle w_3, w_4 \rangle, \\ \langle w_4, w_1 \rangle, & \langle w_4, w_2 \rangle, & \langle w_4, w_3 \rangle, & \langle w_4, w_4 \rangle \end{array} \right\} \oslash \{w_1, w_2\} \rangle$$

$$c_1 = c_0 + \ulcorner \text{is it raining?} \urcorner = \langle H_c, cs_c \oslash [\![\text{it is raining}]\!] \rangle$$

A post-formalization example 3

A: Is it raining?

$$c_1 = \langle \{A, B\}, \left\{ \begin{array}{llll} \langle w_1, w_1 \rangle, & \langle w_1, w_2 \rangle, & & \\ \langle w_2, w_1 \rangle, & \langle w_2, w_2 \rangle, & & \\ & & \langle w_3, w_3 \rangle, & \langle w_3, w_4 \rangle, \\ & & \langle w_4, w_3 \rangle, & \langle w_4, w_4 \rangle \end{array} \right\} \rangle$$

$$c_1 = c_0 + \ulcorner \text{is it raining?} \urcorner = \langle H_c, cs_c \oslash [\![\text{it is raining}]\!] \rangle$$

A post-formalization example 4

B: Yes, it's raining.

$$c_1 = \langle \{A, B\}, \left\{ \begin{array}{ll} \langle w_1, w_1 \rangle, & \langle w_1, w_2 \rangle, \\ \langle w_2, w_1 \rangle, & \langle w_2, w_2 \rangle \\ & \\ & \end{array} \right\} \rangle$$

$$c_2 = c_1 + \ulcorner\text{It's raining}\urcorner = \langle H_{c_1}, cs_{c_1} \oplus [\![\text{it is raining}]\!] \rangle$$

A post-formalization example 4

B: Yes, it's raining.

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$c_2 = c_1 + \ulcorner$It's raining$\urcorner = \langle H_{c_1}, cs_{c_1} \oplus [\![$it is raining$]\!] \rangle$

- The context is now uninquisitive.

A post-formalization example 4

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$$c_2 = c_1 + \ulcorner \text{It's raining} \urcorner = \langle H_{c_1}, cs_{c_1} \oplus [\![\textbf{it is raining}]\!] \rangle$$

- The context is now uninquisitive.
- Relevance constraint after Roberts:

(1) A question-response α is relevant in a G-context c just in case there is some $p \in \text{Alts}(cs_c)$ such that $[\![\alpha]\!]$ decides p or $[\![\alpha]\!]$ decides $\neg p$.

How to get from polar to constituent questions? (Here I diverge quite a bit from Groenendijk.)

- Intuition: can get the effect of a constituent question with a set of polar questions of this type.

Moving to non-polar questions

How to get from polar to constituent questions? (Here I diverge quite a bit from Groenendijk.)

- Intuition: can get the effect of a constituent question with a set of polar questions of this type.
- ‘What is the weather like?’ $\sim$ ‘is it raining?’ + ‘is it sunny?’ + ‘is it snowing’?
- Suppose that a question denotation in general is a Hamblin alternative set (assume mutual exclusivity and exhaustivity).

Foreshadowing the details of polar questions

This generalizes the starting analysis of polar questions as long as polar questions denote singleton sets.

Inquiry in a Stalnakerian context with Hamblin alternatives

Restrict to alternative sets that partition some subset of $\mathscr{W}$ (no overlap).

(2) G-context definition for comparison: Where Q is an alternative set and c a context,
$c \oslash p = c \cap \{\langle w, v\rangle \mid \forall p \in Q : w \in p \leftrightarrow v \in p\}$

(3) Questions v. 2.1
$c' = c + \text{Question}_a \phi = \langle H_c, \bigcap\{cs_c \oslash p \mid p \in [\![\phi]\!]\}\rangle$
Felicity conditions in w: It is not the case that $Dox_a(w) \cap \text{Dom}(cs_{c'})$ resolves $cs_{c'}$.

Suppose it's raining in w_1, w_2, sunny in w_3 and snowing in w_4.

$[\![\text{What's the weather like?}]\!] = \{\{w_1, w_2\}, \{w_3\}, \{w_4\}\}$.

$\bigcap\{cs_c \oslash p \mid p \in [\![\text{what's the weather like}]\!]\} =$

$$
\left\{\begin{array}{llll}
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\end{array}\right\}
\cap
\left\{\begin{array}{llll}
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Questions and the table

Integrating tables, first pass

Can simply add an assertion stack to the G-context structure.
Is this enough?

(4) Tabular contexts v. 1.1
A context is a tuple $\langle H, A, cs \rangle$, where H is a non-empty set of agents, A is a stack, and cs a G-context set.

Integrating tables

How to incorporate tables into this picture?

- assertions: coordinating on evolution of the common ground.
    - Interaction with content: acceptance.
    - Common ground management (Repp 2013): rejection, postponement (others).

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- questions: coordinating on goals of an inquiry.
    - Interaction with content: (partially) resolve.
    - Common ground management?

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    - Interaction with content: acceptance.
    - Common ground management (Repp 2013): rejection, postponement (others).
- questions: coordinating on goals of an inquiry.
    - Interaction with content: (partially) resolve.
    - Common ground management? reject question, start subinquiry, clarify, …

Like assertions, we need a direct representation of a question under discussion in order to target common ground management appropriately.

Contexts with tables

(5) Contexts v. 3

A context is a tuple $\langle H, Q, A, cs \rangle$, where H is a non-empty set of agents, Q and A are stacks of sentences, and and cs is a (regular) context set.

(6) Tabular assertion v. 2 (additional felicity conditions to be filled in)

$c + \mathrm{Assert}_a(\phi) = \langle H_c, \mathrm{push}(A_c, \phi), Q_c, cs_c \rangle$

Felicity condition in w: $\forall w' \in Dox_w(a) : w' \in [\![\phi]\!]$

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(7) Acceptance v. 2

$c + \text{Accept}_a = \langle H_c, \text{pop}(A_c), Q_c, cs_c \oplus [\![\textbf{pop}(A)]\!] \rangle$

Felicity condition in w: $\forall w' \in Dox_w(a) : w' \in [\![\textbf{pop}(A)]\!]$

Contexts with tables (2)

(8) Where p is a proposition, $inq(p) = \{\langle w, v\rangle \mid w, v \in p\}$

(9) Hybrid QUDs: where c is a context,

$$QUD(c) = \begin{cases} \bigcap\{inq(cs_c) \oslash p \mid p \in [\![\mathbf{top}(Q_c)]\!]\} & \text{if } |Q_c| \geq 1 \\ inq(cs_c) & \textit{otherwise} \end{cases}$$

- The idea: use Groenendijk-style technology to model the dynamics of answering. (Many other possible choices here.)

(10) Dispelling a question: where c is a context,
$c + \mathrm{Dispel} = \langle H_c, A_c, \mathrm{pop}(Q_c), cs_C \rangle$ Felicitous only if $|Q_c| \geq 1$

Contexts with tables (3)

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(11) The full QUD in a context: where c is a context,

$$FQUD(c) = \begin{cases} inq(cs_c) & \text{if } |Q_c| = 0 \\ QUD(c) \cap FQUD(c + \text{Dispel}) & \text{otherwise} \end{cases}$$

(This is the QUD summed over every question in the stack.)

Contexts with tables (4)

(12) Questions with the table
$c' = c + \text{Question}_a(\phi) = \langle H_c, \text{push}(Q_c, \phi), A_c, cs_c \rangle$
Felicity conditions: appropriate in c at w only if
(i) If $|Q_c| \geq 1$ then $FQUD(c) \subseteq QUD(c')$, and
(ii) It is not the case that $Dox_a(w) \cap cs_{c'}$ resolves $QUD(c')$.

(13) Automatic dispelling
At any point c_n in a conversation, if $QUD(c_n) = inq(cs_{c_n})$,
adjust c_n to $c'_n = c_n + \text{Dispel}$.

Contexts with tables (3)

Relevance again: (two versions)

(14) An assertion α is relevant in a table context c just in case $\exists p \in \text{Alts}(QUD(c)) : \neg\exists p' \in \text{Alts}(QUD(c+\alpha)) : p' \subseteq p$

(15) A response α is relevant in a table context c just in case $\text{Alts}(QUD(c+\alpha)) \subseteq \text{Alts}(QUD(c))$

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(15) A response α is relevant in a table context c just in case $\mathrm{Alts}(QUD(c+\alpha)) \subseteq \mathrm{Alts}(QUD(c))$

Relevance in discourse (preliminary)

If the QUD in c is inquisitive, agents in c should make moves that are relevant to that QUD.

- Independent ban on uninformative updates (cf. Crone talk yesterday).

Polar questions as the tip of the iceberg

Polar questions again

Current analysis of the semantics of polar questions is a departure from Hamblin:

(16) $[\![$**Is it raining?**$]\!] = \{\lambda w_s\,.\,\text{it's raining in } w\}$

How to think about question-question sequences?

(17) What's the weather like? Is it raining?

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These are already licensed in the current system.

Polar questions again (2)

Licensing question-question sequences. Where c is the initial context:

$$QUD(c + \ulcorner\text{What's the weather like?}\urcorner) =$$

$$\left\{\begin{array}{llll} \langle w_1, w_1\rangle, & \langle w_1, w_2\rangle, & & \\ \langle w_2, w_1\rangle, & \langle w_2, w_2\rangle, & & \\ & & \langle w_3, w_3\rangle, & \\ & & & \langle w_4, w_4\rangle \end{array}\right\}$$

is a subset of

$$QUD(c + \ulcorner\text{What's the weather like?}\urcorner + \ulcorner\text{Is it raining?}\urcorner) =$$

$$\left\{\begin{array}{llll} \langle w_1, w_1\rangle, & \langle w_1, w_2\rangle, & & \\ \langle w_2, w_1\rangle, & \langle w_2, w_2\rangle, & & \\ & & \langle w_3, w_3\rangle, & \langle w_3, w_4\rangle, \\ & & \langle w_4, w_3\rangle, & \langle w_4, w_4\rangle \end{array}\right\}$$

Polar questions again (3)

(18) Where should we go for lunch? Should we go to Mamoun's?

Biezma & Rawlins (2012): the function of a polar question relative to a bigger QUD is to characterize an alternative by 'name' – identify constraint on the domain.

- The felicity condition acts as an informative presupposition (Prince 1978, Stalnaker 1973, 1974, a.o.)

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- The felicity condition acts as an informative presupposition (Prince 1978, Stalnaker 1973, 1974, a.o.)
- Biezma & Rawlins (2012) suggest that polar questions can never establish a big question. Stronger than the present constraint: could implement by adding a polar-specific presupposition (content alternative is part of the input QUD).

Alternative questions

Similar puzzle arises for alternative questions. On a naive implementation in a G-context system, they would involve redundant updates:

(19) Where should we go for lunch? Should we go to Mamoun's or to Tacoria? (falling pitch)

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Biezma & Rawlins (2012) proposal – alternative questions list by 'name' all of the propositions in the current QUD. Implicate falling pitch in this (though this is controversial; see **?**). Sketch:

(20) Where α is a disjunction structure, $[\![\alpha + \textbf{falling pitch}]\!]^c = [\![\alpha]\!]^c$

Presupposes: $QUD(c) = QUD(c + [\![\alpha]\!]^c)$

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Presupposes: $QUD(c) = QUD(c + [\![\alpha]\!]^c)$

- This may force accommodation that eliminates alternatives that are in principle viable in c.

Intermediate summary

What have we accomplished?

- Core answers. (Fairly standard machinery in an update semantics context.)
- Basics of rejections / dismissals for assertions and questions. (For a bit more, see Asher & Gillies (2003), Maier & van der Sandt (2003), van Leusen (2004), Spenader & Maier (2009))
    - Subcoordination – structurally similar to subinquiry.
- Room for resistance, strategies for acceptance – but not the full story.
- Question-question sequences and subquestions.

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  - Subcoordination – structurally similar to subinquiry.
- Room for resistance, strategies for acceptance – but not the full story.
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What's still missing?

- Weak answers (possibility claims, ignorance claims).
- Presupposition denials.
- A fuller story for resistance. (Not this class.)

Weak answers and ignorance

(21) Q: Will you come to the party? (Büring 2003 fn. 6)
A: Presumably.

(22) Q: Did Jane win the contest? (Simons 2001 fn. 15)
A: Either she won, or she didn't win and now she's weeping in the bathroom.

(23) A: Who did we invite to give a talk this semester?
B: All I know is that we might have invited Alfonso.

(24) (Ginzburg (2012) ex. 18b, modified from BNC)
Anon: Are you voting for Tory?
Denise: I might.

Strategies for weak answers

Possibility 1: they aren't answers at all (contra intuition).

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- Standard: also a feature of our current update semantics.

Possibility 2: weaken the notion of answerhood.

- Developed (briefly) by Büring (2003).
- This is probably much, much too weak.

(25) **Probabilistic answerhood** (Büring)
A is an answer to Q if A shifts the probabilistic weights among the propositions denoted by Q.

Strategies for weak answers

Possibility 3: Drop excluded middle (Ginzburg 2012).

- That is, use an underlying logic where $p \vee \neg p$ is not a tautology.

  (26) (Ginzburg's aboutness) p is about q iff p entails a (finite) disjunction of simple answers.

- I find this strategy very worrying. (As well as counterintuitive for this data.)
- Still, worth emphasizing that Ginzburg provides the only real treatment of this data I've found.

Ignorant responses

(27) A: Are you going to the party?
B: I don't know.
B': I don't know whether I'm going to the party.

(28) Who is coming for dinner tonight? (Ciardelli et al. 2013 ex. 7d)
a. I don't know.

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(28) Who is coming for dinner tonight? (Ciardelli et al. 2013 ex. 7d)
a. I don't know.

(29) (example from Colin Wilson, p.c.)
A: Who is coming for dinner tonight?
B: I don't know.
… later, A describes B's response to C …
A: #B didn't answer the question.

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Possibility 3: They are some special type of response that is not an answer. (Hamblin 1971, Asher & Lascarides 2003)

- Asher & Lascarides: 'Not Enough Information' / NEI responses.

Collapsing weak and ignorant responses

Generalization: both types of response serve to indicate the limits of the responders ability to address the question.

This function collapses in certain future-oriented questions:

(30) A: Are you going to the party?

a. [B: I don't know.

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  b. [B′] I might.

Intuition about B′: B is unable at the moment to reject the possibility that they won't go.

Two senses of answerhood

Public answering: a question is sufficiently addressed when it is fully resolved or dispelled in context.

vs.

Agent-oriented answering: a question is sufficiently addressed when the agent(s) it is targeted at have done their best.

Agent-oriented answerhood sketch

(31) $QUD(c)$ has been sufficiently addressed by an agent $a \in H_c$ if either (a) a asked the question in c, or (ii) $\forall w \in cs_c : Dox_a(w)$ is not relevant in $QUD(c)$

(32) Automatic dispelling part 2: At any point c_n in a conversation, if $QUD(c_n)$ has been sufficiently addressed by all $a \in H_{c_n}$, adjust c_n to $c'_n = c_n + \text{Dispel}$.

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Paraphrase: an agent has sufficiently addressed a QUD just in case it is common ground that their doxastic state can't contribute (further) to the QUD.

- NEI responses follow straightforwardly!

A test semantics for 'might' (Veltman 1996), cf. Yalcin (2011):

(33) $cs \oplus \diamond p = \begin{cases} \emptyset \text{ if } cs \oplus p = \emptyset \\ cs \text{ otherwise} \end{cases}$

Felicity condition for speaker a: a's doxastic state is compatible with $\neg p$.

Weak answers

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Felicity condition for speaker a: a's doxastic state is compatible with $\neg p$.

Paraphrase: crash if p is not possible, do nothing otherwise.

- Speaker is unable to reject the possibility that p is false.
- Implicates ignorance about p.
- With appropriate (expressivist) felicity condition and implicature, triggers dispelling.

Discourse futures

A more elaborate analysis (not formalized here):

- Responses are licensed if they decide for or against some licensed discourse future. (Generalization of Roberts-relevance)
- NEI/weak answers decide against discourse futures where the agent contributes to resolving the question.

Summary

Summary of the response model

Responses come in two kinds:

1. Address an element on the table (relevance).
   (What is the common ground like?)
    - Accept or dispute an assertion.
    - Contribute to resolving a question.

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1. Address an element on the table (relevance).
   (What is the common ground like?)
   - Accept or dispute an assertion.
   - Contribute to resolving a question.
2. Manipulate the table. (What is the discourse like?)
   - Enter/exit the discourse.
   - Reject a move (question/assertion) altogether.
   - Contribute to dispelling a QUD (deny presupposition, express ignorance, ...)

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