Modeling questions and responses

Lecture 4: the dynamics of responses

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Outline

Some empirical desiderata

Stalnakerian context

- Responding to assertions

A Stalnakerian account for questioning

Questions and the table

- Polar questions as the tip of the iceberg

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*: wrap-up.

Some empirical desiderata

Responses

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Goal of Thursday/Friday: give a thorough linguistic account of the pragmatics of responding that derives some of this larger picture.

- Update semantics with tables. (Partly based on joint work with Justin Bledin, though he hasn't seen this version.)
- We won't include everything there is, but the account will be flexible, and could be added to.

Responses to assertions

(1) A: It's raining.
B: I agree.
B′: No it's not, that's snow.
B″: Are you sure?
B‴: I think there's a water leak on the top floor.

Responses to questions

(2) A: Is it raining?
B: Yes, it is. / No, it isn't.
B′: It might be.
B″: I don't know.
B‴: I refuse to answer. / fuck you! / (shushing motion)

Responses to questions

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B: Yes, it is. / No, it isn't.
B′: It might be.
B″: I don't know.
B‴: I refuse to answer. / fuck you! / (shushing motion)

(3) A: When's the poster session today?
B: It's at 8.
B′/A: Is it in the evening?
B″: There's no poster session today.
B‴: It might be at 8.
B⁗: I don't know.

Stalnakerian context

Stalnakerian context and assertion

(4) A context set is a set of worlds. (Stalnaker 1978)

(5) Contexts v. 1: A context is a tuple $\langle H, cs \rangle$, where H is a non-empty set of agents and cs a context set.

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(6) Where p is a proposition and cs a context set, $cs \oplus p = cs \cap p$

(7) Assertion v. 1: $c + \text{Assert}_a(\phi) = \langle H_c, cs_c \oplus [\![\phi]\!] \rangle$
Felicity condition in w: $\forall w' \in Dox_w(a) : w' \in [\![\phi]\!]$
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(8) Accommodating felicity inferences: by default, if a move comes with a felicity condition f relative to w, as a precondition for interpreting that move in c, we take it that cs_c entails f.

Participation requirements

A general felicity condition:

(9) A move α_a where a is some agent is felicitous in a context c only if $a \in H_c$.

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Some basic entrances and exits:

(10) $c + \text{Enter}(a) = \langle H_c \cup \{a\}, cs_c \rangle$ (can be accommodated)

(11) $c + \text{Exit}(a) = \langle H_c - \{a\}, cs_c \rangle$

Linguistic correlates? Leave this a question for now. (Cf. discussion in situated dialogue course.)

An example

The usual kind of thing: it's raining in w_1, w_2 and not in w_3, w_4.

$[\![$it's raining$]\!] = \{w_1, w_2\}$

(12) The scenario: a windowless room. A comes in from the outside. $c = \langle \{A, B\}, \{w_1, w_2, w_3, w_4\} \rangle$

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B′: (But) Joanna might be there. (Resistance move; Bledin & Rawlins 2016a,b)
B′: What if Joanna is there?

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B′: What if Joanna is there?
B′: are you sure?
B′: why not?

Tables

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- An assertion is a proposal to update the common ground with its content.
- In proposing, that assertion is put on the 'table'.

Intuition: if an assertion is on the table, interlocutors are coordinating on whether to incorporate it into the common ground.

Tables for assertions

(14) Tabular contexts v. 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 context set.

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

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(16) Acceptance

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

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

(17) Rejection

$c + \text{Reject}_a = \langle H_c, \text{pop}(A_c), cs_c\rangle$

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

Example: acceptance of assertions

it's raining in w_1, w_2 and not in w_3, w_4. $[\![\text{it's raining}]\!] = \{w_1, w_2\}$

(18) The scenario: a windowless room. A comes in from the outside. $c_0 = \langle \{a, b\}, \langle\rangle, \{w_1, w_2, w_3, w_4\} \rangle$

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For assertions, acceptance is the default! $c + \text{Assert}(\phi) + Accept$ amounts to assertion in v. 1.

Non-acceptance moves

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- Resistance is more complicated. Bledin & Rawlins (2016): involves drawing attention to possibilities that are previously ignored. (Need a model of attention; de Jager 2009, Fritz & Lederman 2015)
  - Resistance involves, at some level, a strategy of inquiry for deciding whether to accept an assertion.
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  - Resistance involves, at some level, a strategy of inquiry for deciding whether to accept an assertion.
  - Initial assertion remains on table while resistance move is dealt with.
- Assertion sequences (without acceptance) are mostly unconstrained so far. One more interesting case: sequences of contradictory assertions.

A Stalnakerian account for questioning

Inquiry

So far, we have only a single kind of inquiry: coordinating on a specific assertion.

- How can this be generalized?
- Starting point: modify the original Stalnakerian approach, and then return to a tabular approach.

Inquiry in a Stalnakerian context

We need a representation that can handle both information and issues.

- Information: what worlds are present at all.
- Issues: how do the worlds that are present relate to each other?

Groenendijk's 1999 idea: an equivalence relation on a subset of $\mathscr{W}$ accomplishes this. (This leads to the notion of a hybrid in later work.)

A pre-formalizing example

Our usual four worlds. It's raining (only) in w_1, w_2 and snowing (only) in w_4.

(19) $c + \ulcorner$is it raining?$\urcorner =$

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

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Intuition: cells correspond to ways the (informative) context set could evolve.

Another pre-formalizing example

(20) $c + \ulcorner$It's not snowing, but is it raining?$\urcorner =$

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

Full update has eliminated one world altogether (w_4) and divided up w_1, w_2 from w_4.

After Groenendijk (1999) (see Isaacs & Rawlins 2008, Ciardelli et al. 2013 etc. for descendents):

(21) A G-context set is a set of pairs of worlds in some $cs \subseteq \mathscr{W}$ that is reflexive, symmetric, and transitive. (An equivalence relation.)

(22) Contexts v. 2: A context is a tuple $\langle H, cs \rangle$, where H is a non-empty set of agents and cs a G-context set.

Inquiry in a Stalnakerian context: setup

Some convenience functions:

(23) Where Q is an equivalence relation:

a. $\text{Dom}(Q) = \{w \mid \langle w, w \rangle \in Q\}$

b. $\text{Alts}(Q) = \{p_{\langle st \rangle} \mid p \neq \emptyset \wedge \exists u_s : \forall v_s : \langle u, v \rangle \in Q \leftrightarrow p(v)\}$

c. A proposition p resolves an equivalence relation Q iff $\exists p' \in \text{Alts}(Q) : p \subseteq p'$.[1]

[1] This is different that a Roberts-style complete answer.

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Example: $\{w_1\}$ resolves $\left\{ \begin{array}{lll} \langle w_1, w_1 \rangle, & \langle w_1, w_2 \rangle, & \\ \langle w_2, w_1 \rangle, & \langle w_2, w_2 \rangle, & \\ & & \langle w_3, w_3 \rangle \end{array} \right\}$

[1] This is different that a Roberts-style complete answer.

Inquiry in a Stalnakerian context: moves

On to defining the moves. First, redefine $\oplus$, $\oslash$ (here cf. Isaacs & Rawlins 2008).

(24) Where p is a proposition and c a context,
$c \oplus p = c \cap \{\langle w, v\rangle \mid w, v \in p\}$

(25) Where p is a proposition and c a context,
$c \oslash p = c \cap \{\langle w, v\rangle \mid w \in p \leftrightarrow v \in p\}$

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(26) Assertion v. 2: $c + \text{Assert}_a\phi = \langle H_c, cs_c \oplus [\![\phi]\!]\rangle$
Felicity conditions: the same (a is committed to ϕ)

(27) Polar questions v. 1: $c' = c + \text{PolarQ}_a\phi = \langle H_c, cs_c \oslash [\![\phi]\!]\rangle$
Felicity conditions in w: It is not the case that $Dox_a(w) \cap \text{Dom}(cs_{c'})$ resolves $cs_{c'}$.

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

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

$c_2 = c_1 + \ulcorner$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

B: Yes, it's raining.

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

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

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

(28) 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 $\neg p$.

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.

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- Intuition: can get the effect of a constituent question with a set of polar questions of this type.
- 'What is the weather like?' ~ '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).

(29) Where Q is an alternative set and c a context,
$c \oplus p = c \cap \{\langle w, v\rangle \mid \forall p \in Q : w \in p \leftrightarrow v \in p\}$

(30) 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.

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

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

$$\left\{\begin{array}{llll} \langle w_1, w_1\rangle, & \langle w_1, w_2\rangle, & & \\ \langle w_2, w_1\rangle, & \langle w_2, w_2\rangle, & & \\ & & \langle w_3, w_3\rangle, & \langle w_3, w_4\rangle, \\ & & \langle w_4, w_3\rangle, & \langle w_4, w_4\rangle \end{array}\right\}$$
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Suppose it's raining in w_1, w_2, sunny in w_3 and snowing in w_4.
$[\![$What's the weather like?$]\!] = \{\{w_1, w_2\}, \{w_3\}, \{w_4\}\}$.

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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?

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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    - Interaction with content: (partially) resolve.
    - Common ground management?

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- assertions: coordinating on evolution of the common ground.
    - 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, …

(31) 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.

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

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

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

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(33) 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)

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

(35) The i: where c is a context,

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

(36) Dispelling a question: where c is a context,

$c + \text{Dispel} = \langle H_c, A_c, \text{pop}(Q_c), cs_C\rangle$ Felicitous only if $|Q_c| \geq 1$

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

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

Contexts with tables (2)

(38) 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 $QUD(c')$.

(39) 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:

(40) A question-response α is relevant in a table context c just in case $\text{Alts}(QUD(c + [\![\alpha]\!])) \subset \text{Alts}(QUD(c))$[2]

[2] This is still different from Roberts-style relevance.

Polar questions again

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

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

How to think about question-question sequences?

(42) 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:

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

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

is a subset of

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

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

Polar questions again (3)

(43) 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:

(44) 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:

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

Summary

What have we accomplished?

- Core answers. (Fairly standard machinery in an update semantics context.)
- Basics of rejections / dismissals for assertions and questions.
- Room for resistance, strategies for acceptance – but not the full story.
- Question-question sequences and subquestions.

What's still missing?

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

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