Questions in a Dynamic Perspective

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Outline and Program

- formal semantics
- dynamic semantics

≫ questions and answerhood

≫ information exchange

- conclusions

≫ please interrupt!

Classical Semantics

- meaning equals truth- or satisfaction-conditions
- knowing the meaning of an indicative sentence equals knowing the conditions under which it is true

- logico-philosophical tradition
- Frege, Russell, Wittgenstein, Tarski, Montague
- knowledge, truth, and inference
- distinguish between various possibilities

Satisfaction Semantics

- $M, g, \vec{e} \models \phi$

- models or situations
- variables or indices
- indefinites or pronouns

Grice's Program

- combine logical semantics with pragmatic reasoning

(1) John switched off the light. He entered the room.

(2) John entered the room. He switched off the light.

(3) If everybody had a beer, everybody had one.

(4) If *someone* had a beer, everybody had one.

(5) You may have an apple or a pear.

(6) You may have an apple and you may have a pear.

Dynamic Semantics

- the interpretation of utterances depends on the context of utterance
- and they are intended to change the context of utterance

(7) I lost a marble. It is probably under the sofa.

(8) It is probably under the sofa. I lost a marble.

(9) Mary's head was chopped off but even so it kept smiling.

(10) ?Mary was decapitated but even so it kept smiling.

Dynamic Issues

- anaphora
- presupposition
- epistemic modalities
- discourse relations
- questions and answers

Motivating Examples

(11) John has children, and all of his children are bald.

(12) All of John's children are bald and ?he has children.

(13) John married Jane and he regrets that he married her.

(14) John regrets that he married Jane and ?he married her.

(15) Your wife is now cheating on you, while you don't know it.
?And your wife is now cheating on you, while you don't know it.

(16) John left. Mary started to cry. (weak-hearted Mary ;-)

(17) Mary started to cry. John left. (hard-hearted John ;-)

Update Semantics

- the meaning of an indicative *utterance* resides in its update potential

- of what interlocutors believe to be the common ground

$\gg$ of what interlocutors believe they commonly assume to be true

$\gg$ of what interlocutors believe they commonly assume to be at issue

Interrogative Semantics

- meaning equals answerhood-conditions
- knowing the meaning of an interrogative sentence equals knowing the conditions under which it is (fully) answered

- logico-philosophical tradition
- Hamblin, Karttunen, Groenendijk and Stokhof
- answerhood and question entailment
- distinguish between various *sets* of possibilities

Indifference and Answerhood

- intensional models $\mathcal{M}$ so that $\mathcal{M}_w$ is an extensional model
- $[\![\phi]\!]_{\mathcal{M},g} = \{\vec{\alpha}w \mid \mathcal{M}_w, g, \vec{\alpha} \models \phi\}$ (content of ϕ)

  $D(S) = \{w \mid \exists\vec{\alpha}\colon\ \vec{\alpha}w \in S\}$ (data of S)

  $A(S) = \{\ \{w \mid \vec{\alpha}w \in S\}\ \mid \vec{\alpha}v \in S\}$ (p'ble answers)

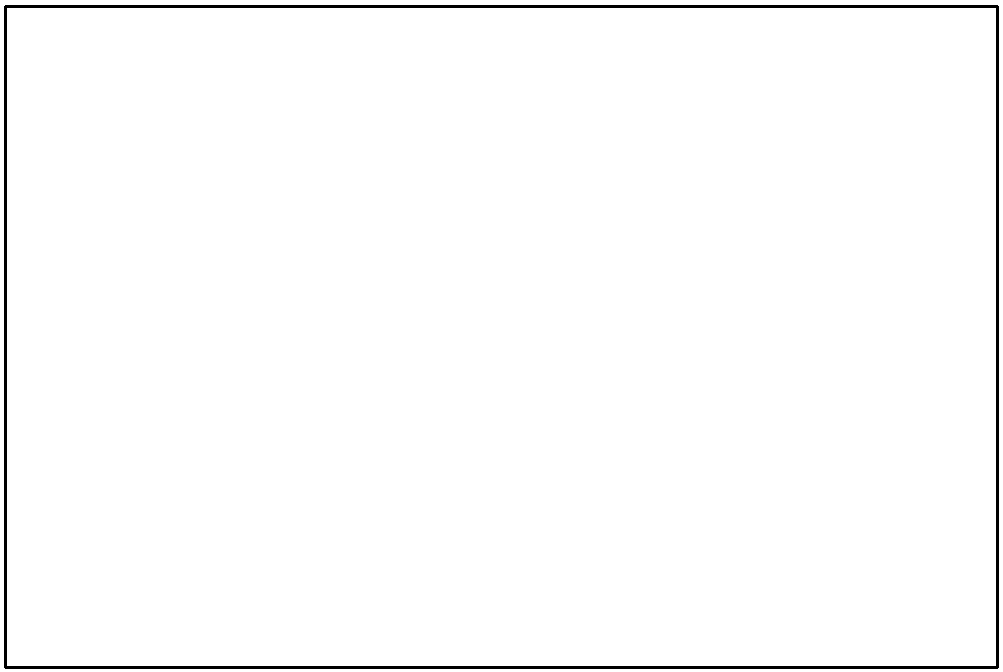
  $I(S) = \{\langle v, w\rangle \mid \exists\vec{\alpha}\colon\ \vec{\alpha}v \in S\ \&\ \vec{\alpha}w \in S\}$ (indifference)

  $\phi \models_{\mathcal{M},g} \psi$ iff $I([\![\phi]\!]_{\mathcal{M},g}) \subseteq I([\![\psi]\!]_{\mathcal{M},g})$ (support)

$\gg$ (pseudo-)partitions model the uncertainty (lack of data) and the worries (lack of indifference) of an agent

- the partition theory links logic with decision theory

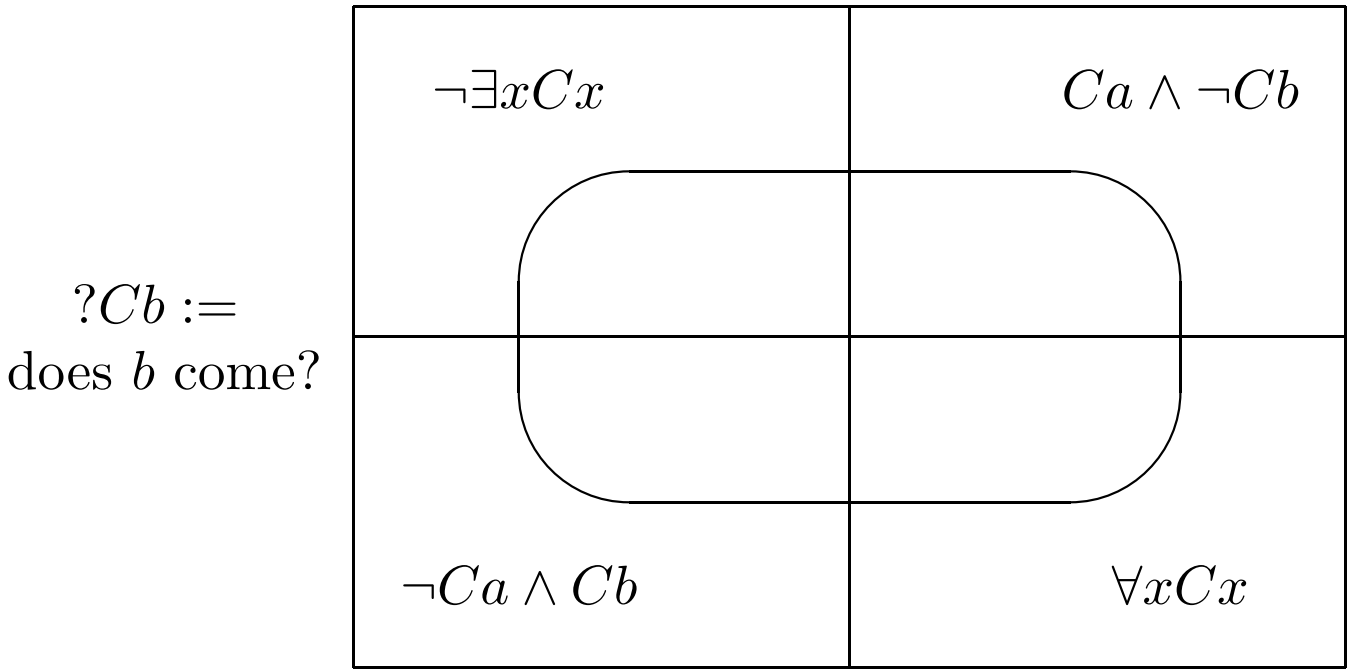
Logical Space



Nirvana: no assumptions, no needs

Pragmatic Space

- Will I go to the party? $?xCx$:= who come?



Answerhood and Entailment

- $p \wedge q \models p$

  $\forall x Cx \models Ca$

- $p \wedge q \models ?p$

  $\forall x Cx \models ?xCx$

- $?p \wedge ?q \models ?p$

  $?xCx \models ?Ca$

- $?p \models \top$

Update Semantics

- the meaning of an interrogative *utterance* resides in its update potential

- $S[\![\phi]\!]_{\mathcal{M},g} = \{\vec{\alpha}\epsilon w \mid \vec{\epsilon}w \in S \;\&\; \mathcal{M}_w, g, \vec{\alpha} \models_{\vec{\epsilon}} \phi\}^*$
  $[T^* = \{\vec{\epsilon}w \mid \vec{\alpha}\epsilon w \in T\}$ for the longest $\vec{\alpha}$: $D(T) = D(T^*)]$

- relevance taken from a global, not local, perspective

Relevance and the Logic of Conversation

- Grice maxims for a rational and cooperative conversation
- quality, quantity, relation, manner

- a *general*, but not a *specific* assumption of rationality and cooperativity (it is based upon them, but not limited to them)

- a game of information exchange consists in trying to get one's own questions answered in a reliable and preferrably pleasant way

Optimal Inquiry

- given a set of interlocutors A with states $(\sigma)_{i \in A}$ a discourse $\Phi = \phi_1, \ldots, \phi_n$ is optimal iff:
  - $\forall i \in A$: $D([\![\Phi]\!]) \cap D(\sigma_i) \models \sigma_i$ (relation)
    $\bigcap_{i \in A} D(\sigma_i) \models D([\![\Phi]\!])$ (quality)
    Φ is minimal (quantity)
    Φ is well-behaved (manner)
- with epistemic logical and decision-theoretic freedom
- we get informativity, non-redundancy, consistency, and congruence implicatures

An Optimal Exchange

- $\sigma = \{ \llbracket s \rrbracket \cap \llbracket \neg t \rrbracket \, , \, \llbracket \neg s \rrbracket \cap \llbracket \neg t \rrbracket \, \}$
  $\tau = \{ \llbracket s \rrbracket \cap \llbracket \ \ t \rrbracket \, , \, \llbracket \ \ s \rrbracket \cap \llbracket \neg t \rrbracket \, \}$
  $CG_0 = W$

(18) *A:* Does Sue come? $CG_1 = \{iw \mid i = w(s)\}$

B: Yes. $CG_2 = \{iw \mid i = w(s) = \mathbf{1}\}^*$
$= \llbracket s \rrbracket$

Does Tim come? $CG_3 = \{iw \mid w \in \llbracket s \rrbracket \ \& \ i = w(t)\}$

A: No. $CG_4 = \{iw \mid w \in \llbracket s \rrbracket \ \& \ i = w(t) = \mathbf{0}\}^*$
$= \llbracket s \rrbracket \cap \llbracket \neg t \rrbracket = \sigma' = \tau'$

Global Perspective

- relatively standard picture
  - pose questions you have
  - answer them to the best of your knowledge
  - question – answerhood relations
  - congruence
- our picture is much more general

Extensions (1): Subquestions

(19) *A:* Who were at the awards?
Who of the Bee Gees?
B: Robin and Barry but not Maurice. (*POP*)
A: Who of the Jackson Five?
C: Jackie, Jermain and Mike, but not Marlon and Tito. (*POP*)
A: Who of Kylie Minogue?
D: Kylie Minogue. (*POP*)
⋮
(*POP*)

- subquestions used to answer superquestions
- but they are invisible in partitions

Extensions (2): Counterquestions

- 'side sequences' (Jefferson 1972, Clark 1996)

(20) *Waitress:* What'll ya have girls?
Customer: What's the soup of the day?
Waitress: Clam chowder.
Customer: I'll have a bowl of clam chowder and a salad with Russian dressing.

- discourse local versus epistemic global view

Almost, but not Anything, Goes

(21) *A:* Will Arnold come?
B: Will you come?
A: Yes.
B: Then I don't know.
A: Oh, sorry, I am confused, I cannot come.
B: Then I still don't know about Arnold.

- that sounds pretty confused
- a nephew of Moore's paradox?

Extensions (3): Conditional Questions

(22) *A:* If we throw a party tonight will you come?
B: Yes! (If you throw a party tonight I will come.)
B: No! (If you throw a party tonight I will not come.)
B: There will be no party.

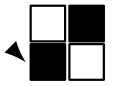
(23) *A:* If it rains, who will come?
B: John and Mary but not Dick and Trix.
B: It won't rain.

Conditional Questions (cont'd)

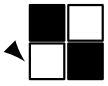
(24) *A:* Do you go to the party?
B: If I go to the party, will prof. Schmull be there?

- indeed B may not be interested in the question whether prof. Schmull comes if she doesn't come herself.

Extensions (4): Superquestions

- actual world:  (agent A is at $a1$)

. A and B's information and indifference is characterized as:

- $\sigma = \{\ \{$  ,  $\}$, $\{$  ,  $\}$ $\}$
  $\tau = \{\ \{$  ,  $\}$ $\}$

(25) *A:* Am I on a black square? *B:* I don't know. *A:* On which square am I? *B:* You're on $a1$. *POP A:* Then I am on a black square. *POP*

- result: $\sigma' = \tau' = \{\ \{$  $\}$ $\}$

Superquestions (Cont'd)

- scenario: the party may be visited by me, and the professors Aims, Baker, Charms, Dipple, and Edmundson: $2^5 = 32$ possibilities
- since my decision depends on that of the others that reduces for me to $2^4 = 16$

- I prefer to speak to A and otherwise C, but I know that
  if B is there she will absorb A if B doesn't absorb C, that is, if C is not absorbed by D
  if neither B and C are present, D will absorb A
- if this ain't human, it is academic at least

Will I Go to the Party?

-

	$C\&D$	$C\&\neg D$	$\neg C\&D$	$\neg C\&\neg D$
$A\&\ B$	-	+	-	-
$A\&\neg B$	+	+	-	+
$\neg A\&\ B$	-	-	-	-
$\neg A\&\neg B$	-	+	-	-

(26) $(A\ AND\ [(\neg B\ AND\ (D \rightarrow C))\ OR\ (B\ AND\ C\ AND\ \neg D)])\ OR\ (C\ AND\ \neg B\ AND\ \neg D)$?

(27) Will I like the party?

(28) Who come?

Conclusions

- the Gricean program is still actual
- it extends beyond mere indicative utterances
- local compositional semantics for questions and answers
- in Gricean combination with a global, epistemic pragmatics

- we have presented only a program here
- understanding actual interpretation and choice of strategies requires much more work