Assertions and Questions in Commitment Space Semantics

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1 Dynamic Semantics and Speech Acts

Szabolcsi, Anna. 1982. "Model theoretic semantics of performatives."

- Against performative utterances as propositions (Generative Semantics)
- Against separating semantics (truth-conditionals) from pragmatics (language games)
- Difference between constatives (descriptives) and performatives:
  – describing some state of affairs leaves the state of affairs untouched
  – performatives change the state of affairs: dynamic **transition** from one to another.
- Example: i + *I congratulate you* = i′,
  where i′ like i except that in i′, sp(i) has congratulated addr(i)
- Performatives (and speech acts in general) have a semantic type: ⟨s, s⟩
- Speech Acts a part of semantics, allowing semantic operators to scope over them.

Worked-out proposal: Krifka, Manfred. 2014. "Embedding illocutionary acts."

- Transition operator: i′⇀i [φ[i]] $\Leftrightarrow_{def}$ i′ precedes i immediately ∧ ¬φ[i′] ∧ φ[i]
  for all ψ logically independent from φ: ψ[i′] ↔ ψ[i]
- Here: A particular implementation of this proposal, cf. Krifka 2015,
  concentrating on assertions and questions.

2 A Framework for Illocutionary Acts

2.1 Commitment States (CSt)

Basic assumptions:

- Illocutionary acts change commitments of interlocutors
- **Commitments** are represented as **propositions**
- Commitments accrue during conversation in **Commitment States** (CSt) modeled as **sets of propositions**

Update of commitment state c with speech act $\mathfrak{A}_\varphi$:

(1) $c + \mathfrak{A}_\varphi = c \cup \{\varphi\}$,
where φ: the commitment introduced by speech act $\mathfrak{A}_\varphi$.

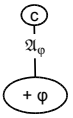


Figure 1: Update of commitment state

Requirements for update of commitment states:

- The proposition φ should not be entailed by c (redundancy; but: increase of saliency, not modeled here)
- The proposition φ should be consistent with c, no blatant inconsistencies with salient propositions in c.

2.2 Commitment Spaces (CSp)

Common Ground development (Krifka 2008):

- CG content
- CG management: Intended continuations of CG

Notion of **Commitment Space (CSp):**

(2) C is a CSp iff C is a set of commitment states, with $\cap C \neq \varnothing$ and $\cap C \in C$

- We call ∩C the **root** of C, and write √C.
- √C is the set of propositions that participants have positively committed to.

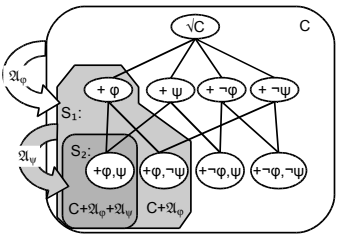


Figure 2: Update of CSp: C $+^{S_1}\mathfrak{A}_\varphi +^{S_2}\mathfrak{A}_\psi$

Update of C with speech act $\mathfrak{A}_\varphi$:

(3) $C + \mathfrak{A} = \{c \in C \mid \sqrt{C} + \mathfrak{A}_\varphi \subseteq c\}$

We also use this level to mark the **actor** or **performer** of a speech act:

(4) $C + \mathfrak{A}^S = C +^S \mathfrak{A} = \langle C + \mathfrak{A}, S\rangle = [C + \mathfrak{A}]^S$,
where S: the person that performs the speech act.

If actor is of no concern: Use of wild card.

(5) $C +^* \mathfrak{A} = [C + \mathfrak{A}]^*$

2.3 Boolean Operations: Denegation

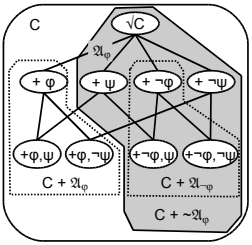


Figure 3: Update with $\mathfrak{A}_\varphi$, with $\mathfrak{A}_{\neg\varphi}$, and with denegation ~$\mathfrak{A}_\varphi$

Why Commitment Spaces? Boolean Operations:

- Negation
- Conjunction
- Disjunction

Modeling of **denegation** by **complementation**:

(6) *I don't promise to come*. (≠ *I promise not to come*.)

Update of a commitment space with denegation of $\mathfrak{A}$:

(7) $C +^S {\sim}\mathfrak{A} = [C — [C + \mathfrak{A}]]^S$

Notice:

- Denegation is dynamic negation on Commitment Spaces
- Denegation does not change the root,
  no effect on the propositions that the interlocutors are committed to.
- But denegation has an effect about the possible future development of conversation:
  in (monotonic) updates, update with C + $\mathfrak{A}$ is excluded
- Cohen & Krifka 2014 call such updates **meta speech act**.

2.4 Boolean Operations: Conjunction

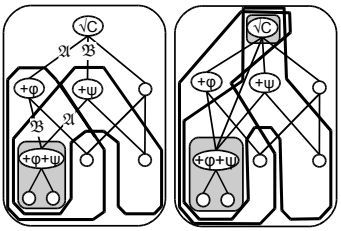


Figure 4:
Conjunction of regular and meta speech acts

Modeling of **conjunction** by **intersection**:

(8) $C +^S [\mathfrak{A} \,\&\, \mathfrak{B}]$
$= [[C + \mathfrak{A}] \cap [C + \mathfrak{B}]]^S$

Always results in a rooted set
of commitment states (a Commitment Space)

Speech acts generally can be conjoined
(cf. Krifka 2001 for quantification
and conjunction of questions).

Conjunction of Commitment Spaces
has a similar impact as **sequential update**:

(9) $C +^S [\mathfrak{A} \,\&\, \mathfrak{B}] \approx [C + \mathfrak{A} + \mathfrak{B}]^S$

- See below for sequential update.
- Anaphoric bindings from first to second conjunct possible with sequential update
- Sequential update might be a cognitively simpler operation,
  and hence preferred over intersection of commitment spaces.

2.5 Boolean Operations: Disjunction

Modeling of **disjunction** by **union**.

(10) $C +^S [\mathfrak{A} \vee \mathfrak{B}]$
$= [[C + \mathfrak{A}] \cup [C + \mathfrak{B}]]^S$

Notice:

- Results in a proper CSp only for meta speech acts.
- Speech acts cannot in general be disjoined.
- Intuitive reason: It is unclear what the speaker has committed to.

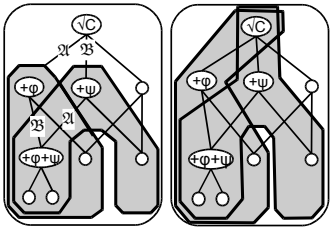


Figure 5:
Disjunction of regular and meta speech acts

Cf. discussion of disjunction of assertions: Gärtner & Michaelis 20

Fixing non-rooted commitment spaces:

- If a speech-act operation results in a non-rooted set of commitment spaces C, add a commitment state c such that C ∪ {c} is a (rooted) commitment space, such that a proposition p follows from C iff p follows from C∪c
- Here: c = √C ∪ {φ∨ψ}

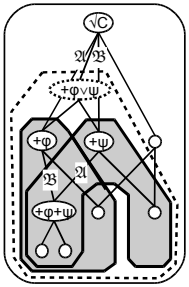


Figure 6: Fixing disjunction

2.6 Commitment Space Developments (CSD)

Record of the history of the update by a sequence:

(11) $\langle C^*_0, C^*_1, \ldots C^*_n\rangle$, where C^*_n: the current CSp

Update of a commitment space development:

(12) $\langle \ldots, C^*\rangle +^S \mathfrak{A} = \langle \ldots, C^*, [C+\mathfrak{A}]^S\rangle$

- Complete record of the conversation
- Corresponds to Szabolcsi's idea of speech acts as world changers
- And speakers can refer back to order in conversation (*As I said at the beginning...*)

Rejection of last update by rejection operation $\mathfrak{R}$
(cf. negotiable "table" in Farkas & Bruce 2010):

(13) $\langle \ldots, C^*, C'^*\rangle +^S \mathfrak{R} = \langle \ldots, C^*, C'^*, C^S\rangle$, return to next to last CSp, actor: S
$\llcorner\!\!\_\!\!\lrcorner = \llcorner\!\!\_\!\!\lrcorner$

Updates as functional applications for CSt, CSp and CSDs:

(14) a. $\mathfrak{A}_\varphi = \lambda c\,[c\cup\varphi]$
b. $\mathfrak{A}^S = \lambda C\,[\{c\in C \mid \surd C + \mathfrak{A} \subseteq c\}]^S$
c. $\mathfrak{A}^S = \lambda\langle \ldots, C^*\rangle\,\langle \ldots, C^*, \mathfrak{A}^S(C)\rangle$
d. $\mathfrak{R}^S = \lambda\langle \ldots, C^*, C'^*\rangle\,\langle \ldots, C^*, C'^*, C^S\rangle$

3 Assertions

3.1 Assertions as commitments

Proposal: By asserting a proposition,
speaker makes a **public commitment for the truth of that proposition**
(cf. e.g. Brandom 1983).

(15) $S \vdash \varphi$
'S is publicly committed to / vouches for the truth of φ'

Alternative proposal: S wants that addressee believes φ (Bach & Harnish 1979).
Problem:

(16) *Believe it or not, I won the race*.

But then how does A come to believe φ in typical cases?

- By committing to a proposition φ, S gives addressee a reason to believe φ.
- Reason: Committing to false propositions: Social sanctions,which S tries to avoid.

As the intention that addressee believes the proposition is cancellable, cf. (16)
this is a **conversational implicature**.

General effect of assertion:

(17) $C^* +^{S_1} S_1 \vdash \varphi = [C + S_1 \vdash \varphi]^{S_1}$
$= [\{c \subseteq C \mid \sqrt{C} + S_1 \vdash \varphi \subseteq c\}]^{S_1}$

3.2 Syntactic structure of assertions

Assertions involve the following projections:

- Asserted proposition: **TP, Tense Phrase**
- Proposition expressing commitment: **CmP, Commitment Phrase**
- Application to CSD (speech act): **ActP, Illocutionary Act Phrase**

Following principles of X-bar-syntax
(possible rasing of finite verb / subject to CmP, ActP?)

(18) $[_{ActP}\,[[_{Act^\circ}\ .\ ]\,[_{CmP}\,[[_{Cm^\circ}\ \vdash\ ]\,[_{TP}$ *I won the race*$]]]]]$

Compositional interpretation by function $[\![\ ]\!]^{S_1S_2}$, where S_1: Speaker, S_2: Addressee

(19) $[\![[_{ActP}\,[[_{Act^\circ}\ .\ ]\,[_{CmP}\,[[_{Cm^\circ}\ \vdash\ ]\,[_{TP}$ *I won the race*$]]]]]]\!]^{S_1S_2}$
$= [\![[_{Act^\circ}\ .\ ]]\!]^{S_1S_2}([\![[[_{Cm^\circ}\ \vdash]\,[_{TP}$ *I won the race*$]]]\!]^{S_1S_2})$
$= [\![[_{Act^\circ}\ .\ ]]\!]^{S_1S_2}([\![[_{Cm^\circ}\ \vdash]]\!]^{S_1S_2}([\![[_{TP}$ *I won the race*$]]\!]^{S_1S_2}))$

with
$[\![[_{TP}$ *I won the race*$]]\!]^{S_1S_2}$ = 'S_1 won the race' — proposition, TP
$[\![[_{Cm^\circ}\ \vdash]]\!]^{S_1S_2} = \lambda p \lambda S[S \vdash p]$ — head of CmP
$[\![[_{Act^\circ}\ .\ ]]\!]^{S_1S_2} = \lambda R \lambda C^*[C + R(S_1)]^{S_1}$ — head of ActP

$= \lambda C^*\,[C + S_1 \vdash$'$S_1$ won the race'$]^{S_1}$
A function that updates the last CSp of a CSD, and adds it to the last element.

3.3 Reactions to assertion

Assertions have two effects:

- Conventional: Adding speaker's commitment to proposition
- Conversational implicature: Adding proposition itself

(20) $\langle ..., C^* \rangle +^{S_1} S_1 \vdash \varphi \; +^{S_1} \varphi$
$= \langle ..., C^*, [C + S_1 \vdash \varphi]^{S_1}, [C + S_1 \vdash \varphi + \varphi]^{S_1} \rangle$

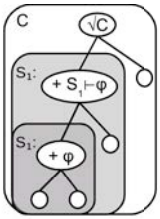


Figure 7:
Assertion of φ, followed by conventional implicature φ

Reactions to assertions:

(21) S_1: $[_{ActP}$ [[.] $[_{CmP}$ [[⊢] $[_{TP}$ *I won the race*]]]]] introduction of propositional discourse referent φ, cf. Krifka 2013
↪ φ
S_2: (*Okay.*) $+_{S_2}$ φ acknowledgement of φ
S_2: *Yes.* $+_{S_2}$ $S_2 \vdash \varphi$ assert φ
S_2: *No.* $+_{S_2}$ $S_2 \vdash \neg\varphi$ assert negation of φ, requires retraction

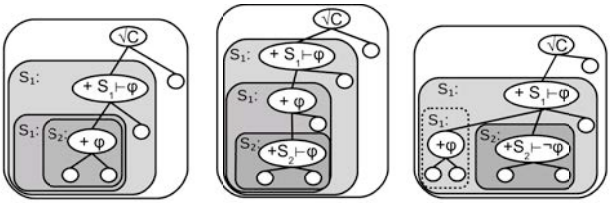


Figure 8: Acknowledgement (*okay*), Confirmation (*yes*) and Contradiction (*no*) of an assertion

Interlude: Other Speech Act Types

Speech acts have effects on the world, modeled by proposition that describes it.

Veritatives: Public expression of guaranteeing truth; assertions, representatives

- S adds public commitment to truth of proposition: $+^S S \vdash \varphi$, 'S vouches for φ'
- The proposition φ itself is added by conversational implicature

Mutatives: Public expression of change in the world (cf. Barker 2012 on imperatives)

- Directives, commissives; definitions; declarations; magic spells, prayers; inflectives
- S restricts the future histories to those in which φ is/becomes true,
  e.g. S, to A: *Get well!* restricts histories to those in which A gets well.
- Prohibitives as denegations of mutatives, e.g. *Don't get well!* exludes those histories
- Disjunctions as speech act disjunction,
  e.g. *Eat an apple or eat a pear* union of histories in which A eats apple, A eats pear,
  Get out or I call the police union of histories in which A gets out, S calls the police
- In directives, commissives, hortatives: such histories changes result in obligations,
  perhaps as an indirect speech act, e.g. for directives: $+^S A \; !\!- \varphi$
- May also count as expressions of wishes (indirect speech act)

Exhibitives: Public display of an attitude or preference: Exclamatives, Optatives (?)

- S adds a display of an attitude to an entity, a proposition etc. CS: $+^S S :\!- \varphi$
- S, to A: *How beautiful this picture is!* $+^S S :\!-$ 'This picture is beautiful'

4 Questions

4.1 Questions as meta speech acts

Questions as Common Ground Management:

- They determine how the common ground should develop
- Preferred development: Addressee answers the question

(22) C* + S_1 to S_2: *Did I win the race?*
= $[\{\sqrt{C}\} \cup C + S_2 \vdash \varphi \cup C + S_2 \vdash \neg\varphi]^{S_1}$

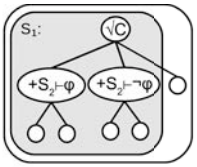


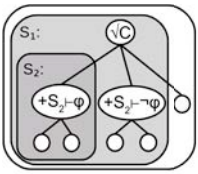
Figure 9: Bipolar question

Possible reactions to polar question:

(23) a. (22) + S_2: *Yes*. = (22) $+^{S_2}$ $S_2 \vdash \varphi$

b. (22) + S_2: *No*. = (22) $+^{S_2}$ $S_2 \vdash \neg\varphi$

(24) (22) $+^{S_2}$ $\Re$ $+^{S_2}$ S_2: *I don't know.* =
$\langle$..., C*, $[\{\sqrt{C}\} \cup C + S_2 \vdash \varphi \cup C \cup S_2 \vdash \neg\varphi]_{S_1}$, C^{S_2}, $[C + S_2 \vdash$ '¬S_2 knows whether φ']$^{S_2}\rangle$



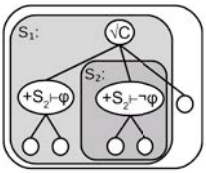


Figure 11: Answers *yes* and *no* to bipolar question

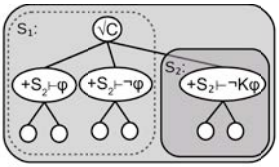


Figure 10: Rejection of bipolar question

4.2 Monopolar questions

- Polar question as illustrated so far: Offer two assertions, of φ and ¬φ
  ⇒ **bipolar** question
- The framework also allows for questions that offer just one assertion, of φ
  ⇒ **monopolar** questions

Candidates for monopolar questions:

(25) a. Declarative questions: *I won the race?*
b. Questions with negated propositions: *Did I not win the race?*
c. Option for regular questions: *Did I win the race?*
(Different from: *Did I win the race, or not?*)

(26) C* + S_1, to S_2: *I won the race?*
= $[\{\sqrt{C}\} \cup C + S_2 \vdash \varphi]^{S_1}$

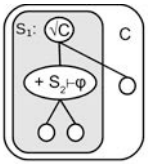


Figure 12: Monopolar (biased) question

Notice that response *yes* is straightforward,
whereas *no* requires prior rejection

- Natural way of expressing question bias
- This option is not available for theories for which questions always denote a non-singleton set of propositions, or a disjunction, as in Inquisitive Semantics (Roelofson & Farkas 2015).

4.3 Derivation of monopolar questions

Monopolar questions:
ActP head ? creates a meta speech act (requests to commit to proposition).

(27) $[\![[_{ActP}\ [[_{Act^o}\ ?\ \textit{Did}\ ]\ [_{CmP}\ [[_{Cm^o}\ \vdash\ t_{\textit{did}}\ ]\ [_{TP}\ \textit{I}\ t_{\textit{did}}\ \textit{win the race}]]]]]]^{S_1S_2}$
= $[\![[_{Act^o}\ ?\ ]]^{S_1S_2}([\![[_{Cm^o}\ \vdash]\ [_{TP}\ \textit{I did win the race}]]]^{S_1S_2})$
= $[\![[_{Act^o}\ ?\ ]]^{S_1S_2}([\![[_{Cm^o}\ \vdash]]^{S_1S_2}([\![[_{TP}\ \textit{I did win the race}]]^{S_1S_2}))$

with	$[\![[_{TP}\ \textit{I won the race}]]^{S_1S_2}$ = 'S_1 won the race'	proposition
	$[\![[_{Cm^o}\ \vdash]]^{S_1S_2}$ = λpλS[S⊢p]	head of CmP, same as assertion
	$[\![[_{Act^o}\ ?\ ]]^{S_1S_2}$ = λRλC*[{√C} ∪ C + R(**S_2**)]^{S_1}	head of ActP, applies CmP to **addressee**
= λC*[{√C} ∪ C + S_2⊢'S_1 won the race']^{S_1}		monopolar question

4.4 Commitment Phrases in Conjunct/Disjunct systems (egophoricity)

Example: Kathmandu Newari (Hargreaves 2005; cf. Wechsler 2015).

(28) Assertions

a. *jĩ:* *a:pwa* *twan−**ā**.*
1.SG.ERG much drink-PST.**CJ**
'I drank a lot.'

b. *chā* *a:pwa* *twan−**a**.*
2. SG.ERG much drink-PST.**DJ**
'You drank a lot'

c. *wā:* *a:pwa* *twan−**a**.*
3. SG.ERG much drink-PST.**DJ**
'he/she drank a lot'

Questions

d. *jĩ:* *a:pwa* *twan−**a**-la.*
'1.SG.ERG much drink-PST.**DJ**-Q
'Did I drink a lot?'

e. *chā* *a:pwa* *twan−**ā**-la.*
2.SG.ERG much drink-PST.**CJ**-Q
'Did you drink a lot?'

f. *wā:* *a:pwa* *twan−**a**-la.*
'3. SG.ERG much drink-PST.**DJ**-Q
'Did he/she drink a lot?'

Proposal: CJ presupposes Committer = Subject, DJ presupposes Committer ≠ Subject

(29) $[\![\text{CJ}]\!]^{S_1S_2}$ = λPλxλS.**S=x**[S⊢P(x)] $[\![\text{DJ}]\!]^{S_1,S_2}$ = λPλxλS.**S≠x**[S⊢P(x)]

For 3rd pers. subjects in commitment reports; embedded assertions (cf. Krifka 2014):

(30) *Syām-ā* *a:pwa* *twan-ā* *hã.*
Syam-ERG much drink-PST.**CJ** EVD
'Syam said that he drank too much.'

Syām-ā *a:pwa* *twan-a* *hã.*
Syam-ERG much drink-PFV.**DJ** EVD
'It is said that Sam drank too much.'

4.5 Disjunctive questions

(31) *Did Ed meet Ánn, or did Ed meet Béth?* raising accent (question)

Proposal: Question disjunction

(32) $[\![[_{ActP}$ *Did Ed meet Ann*$]$ *or* $[_{ActP}$ *Did Ed meet Beth*$]]\!]^{S_1S_2}$

with $[\![[_{ActP}$ *Did Ed meet Ann*$]]\!]^{S_1S_2}$ = $\lambda C^*[\{\sqrt{C}\} \cup C + S_2 \vdash$'Ed met Ann'$]^{S_1}$

and $[\![[_{ActP}$ *Did Ed meet Beth*$]]\!]^{S_1S_2}$ = $\lambda C^*[\{\sqrt{C}\} \cup C + S_2 \vdash$'Ed met Beth'$]^{S_1}$

and $[\![or]\!]^{S_1S_2}$ = $\lambda A \lambda A' \lambda C^*[A(C) \cup A'(C)]^{S_1}$, where A, A′: variables over speech acts

= $\lambda C^*[[\{\sqrt{C}\} \cup C + S_2 \vdash$'Ed met Ann'$] \cup [\{\sqrt{C}\} \cup C + S_2 \vdash$'Ed met Beth'$]]^{S_1}$

= $\lambda C^*[\{\sqrt{C}\} \cup C + S_2 \vdash$'Ed met Ann' $\cup$ C + $S_2 \vdash$'Ed met Beth'$]]^{S_1}$

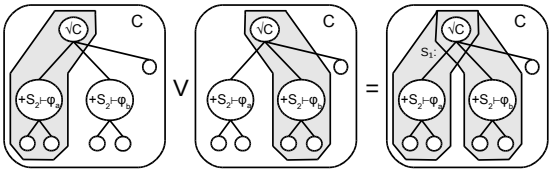


Figure 13: Disjunctive question as disjunction of two monopolar questions

4.6 Alternative (disjunctive) questions

Disjunctive questions come about
as disjunctions of monopolar questions;
recall that disjunctions are defined for meta speech acts.

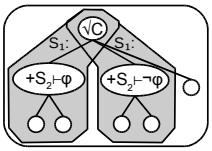


Figure 14:
Disjunction of monopolar questions

(33) S_1 to S_2: *Did I win the race, or not?*

= $[\![[_{ActP}$ *Did I win the race*$]]\!]^{S_1S_2}$
V $[\![[_{ActP}$ *did I not win the race*$]]\!]^{S_1S_2}$

= $\lambda C^*[\{\sqrt{C}\} \cup C + S_2 \vdash$'$S_1$ won the race'$]$
$\cup [\{\sqrt{C}\} \cup C + S_2 \vdash \neg$'$S_1$ won the race'$]]^{S_1}$

Simple answer *yes / no* avoided,
as there are two propositional discourse referents:

(34) $[_{ActP}\ [_{ActP}$? *Did* $[_{CmP} \vdash [_{IP}$ *I win the race*$]]]$ *or* $[_{ActP}$? ~~*did*~~ $[_{CmP} \vdash [_{IP}$ ~~*I not win the race*~~$]]]]$
$\hookrightarrow \varphi$ $\hookrightarrow \neg\varphi$

Cf. disjunctive formation of bipolar questions in Mandarin:

(35) a. monopolar question:

Nǐ chī píngguǒ ma?
you eat apple QUEST
'Do you eat apples?', 'You eat apples?'

b. bipolar question:

Nǐ chī bù chī píngguǒ?
you eat not eat apple
'Do you eat apples (or not)?'

4.7 Constituent Questions as disjunctive questions

(36) a. *Which woman did Ed meet?* (*Ann, Beth, or Carla?*)
b. *Did Ed meet Ann, or did Ed meet Beth, or did Ed meet Carla?*

In English, wh-phrases in root questions are moved to SpecActP:

(37) $[\![[_{ActP}\ [_{DP}\ \textit{which woman}]_i\ [_{Act'}\ [_{Act^o}\ ?\text{-}\textit{did}]\ [_{CmP}\ [[_{Cm^o}\ \vdash]\ [_{TP}\ \textit{Ed}\ t_{\textit{did}}\ \textit{meet}\ t_i]]]]]]]\!]^{S_1S_2}$

$= [\![[_{DP}\ \textit{which woman}]]\!]^{S_1S_2}(\lambda x_i\ [\![[_{Act'}\ [_{Act^o}\ ?\text{-}\textit{did}]\ [_{CmP}\ [[_{Cm^o}\ \vdash]\ [_{TP}\ \textit{Ed}\ t_{\textit{did}}\ \textit{meet}\ t_i]]]]]\!]^{S_1S_2,t_i/x_i})$

with $\lambda x_i\ [\![[_{Act'}\ [_{Act^o}\ ?\text{-}\textit{did}]\ [_{CmP}\ [[_{Cm^o}\ \vdash]\ [_{TP}\ \textit{Ed}\ t_{\textit{did}}\ \textit{meet}\ t_i]]]]]\!]^{S_1S_2,t_i/x_i}$
$= \lambda x_i\ \lambda C^*[\{\sqrt{C}\} \cup C + S_2 \vdash \text{'Ed met } x_i\text{'}]^{S_1}$

and $[\![[_{DP}\ \textit{which woman}]]\!]^{S_1S_2} = \lambda R\ \lambda C^*[\bigcup_{x \in [\![\textit{woman}]\!]} [R(x)(C)]^{S_1}$

$= \lambda C^*[\{\sqrt{C}\} \cup \bigcup\{C + S_2 \vdash \text{'Ed met } x_i\text{'} \mid x_i \in \text{woman}\}]^{S_1}$

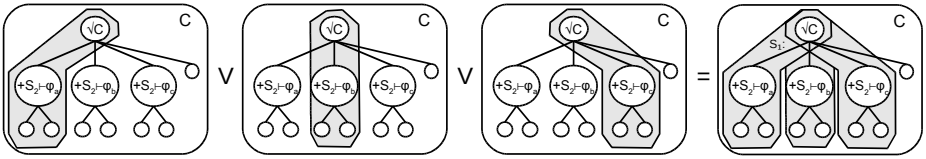


Figure 15: Constituent question *Which woman did Ed meet?* as disjunction of monopolar questions.

5 Focus in Answers and Questions

5.1 Focus in Answers

(38) a. S_1: *Who met Ann?* S_2: [*ED*]$_F$ *met Ann.*
b. S_1: *Who did Ed meet?* S_2: *Ed met* [*ANN*]$_F$

Focus in answer leads to a set of alternatives that matches the question (Rooth 1992); here: alternative **assertions**.

(39) $[\![[_{ActP}\ \textit{Ed met}\ [\textit{ANN}]_{F.}]]\!]^{S_2S_1}$ (with alternatives Ann, Beth, Carla):
meaning: $\lambda C^*[C + S_2 \vdash \text{'Ed met Ann'}]^{S_1}$
alternatives: $\{\lambda C^*[C + S_2 \vdash \text{'Ed met Ann'}]^{S_2}$,
$\lambda C^*[C + S_2 \vdash \text{'Ed met Beth'}]^{S_2}$,
$\lambda C^*[C + S_2 \vdash \text{'Ed met Carla'}]^{S_2}\}$

Condition for Q/A focus congruence: Alternatives of Answer ⊆ Meaning of Question

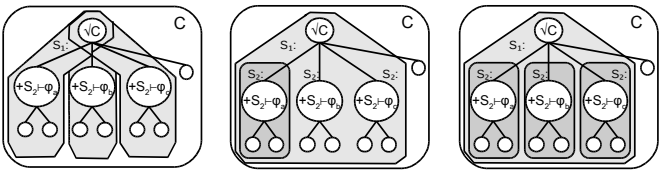


Figure 16: (a) Meaning of question, (b) meaning of answer, (c) alternatives of answer

5.2 Focus in questions

Here: Focus in monopolar questions.

(40) S_1: *Did Ed meet* [*ÁNN*]$_F$*?* S_2: *Yes.* rising accent
S_2: *#No. / No, he met* [*BETH*]$_F$.

Focus indicates alternative monopolar question:

(41) $[\![[_{ActP}$ *Did Ed meet* [*ÁNN*]$_F$?$]]\!]^{S_1S_2}$ (with alternatives Ann, Beth, Carla)
meaning: λC^* [{√C} ∪ C + $S_2 \vdash$'Ed met Ann']^{S_1}
alternatives: { λC^*[{√C} ∪ C + $S_2 \vdash$'Ed met Ann']^{S_1},
λC^*[{√C} ∪ C + $S_2 \vdash$'Ed met Beth']^{S_1},
λC^*[C*, [{√C} ∪ C + $S_2 \vdash$'Ed met Carla']^{S_1}}

The union of the question alternatives form the background, which is accommodated; in case question is answered negatively, this background question remains.

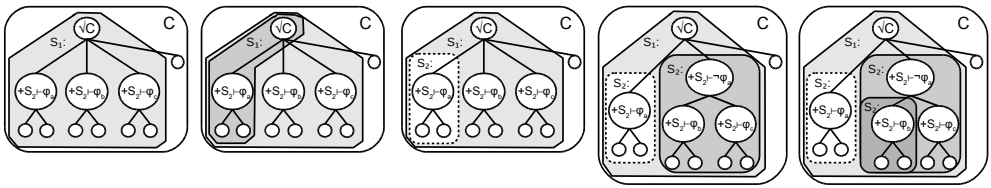


Figure 17: (a) Background, (b) question, (c) rejection, (d) assertion of negated proposition, (e) assertion of other proposition

6 Questions with Polarity Phrases

6.1 Polarity Phrase

(42) A: *I don't believe that you won the race.*
B: *I DID win the race.* (**Verum focus**)

Proposed syntactic structure, with **Polarity Phrase** PolP

(43) $[_{PolP}$ *I* $[\,[_{Pol^0}$ pol - *did*$]$ $[_{IP}$ t_I t_{did} *win the race*$]]]]$

Semantic contribution of pol:

(44) a. Meaning: λp[p] (identity function)

Redundant, hence always with alternative:

b. Alternatives: {λp[p], λp[¬p]}

(45) $[\![[_{PolP}\,[\,[_{Pol^0}$ pol - *did*$]$ $[_{IP}$ *I* t_{did} *win the race*$]]]]\!]^{S_1S_2}$
= $[\![[_{Pol^0}$ pol$]]\!]^{S_1S_2}([\![[_{IP}$ *I* t_{did} *win the race*$]]\!]^{S_1S_2})$

Meaning: 'S_1 won the race'
Alternatives: {'S_1 won the race', ¬'S_1 won the race'}

Q/A congruence to bipolar question:

(46) S_2: *Did you win the race, or not?*
S_1: *I DID win the race.*

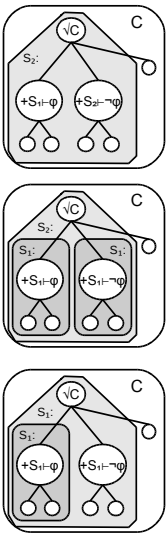


Figure 18:
(a) Bipolar question
(b) Q/A congruence: Alternatives of answer fit question
(c) Answer

6.2 Bipolar interpretations of yes/no questions

We have analyzed simple yes/no questions as **monopolar,**
but they arguably also have a **bipolar** reading, e.g. when auxiliary is accented:

(47) S_1: *DID I win the race?*

We assume: Alternatives of the polarity phrase project to ActP; raising accent on *did*

(48) $[\![[_{ActP}\ [[_{Act^o}\ ?\text{-}DID]\ [_{CmPh}\ [[_{Cm^o}\ \vdash\ t_{did}]\ [_{PolP}\ [[_{Pol^o}\ pol\text{-}\ t_{did}]\ [\ I\ t_{did}\ win\ the\ race]]]]]]]]]\!]^{S_1S_2}$
Meaning: $\lambda C^*[\{\sqrt{C}\} \cup C + S_2 \vdash$'I won the race'$]^{S_1}$
Alternatives: { $\lambda C^*[\{\sqrt{C}\} \cup C + S_2 \vdash$'I won the race'$]^{S_1}$,
$\lambda C^*[\{\sqrt{C}\} \cup C + S_2 \vdash \neg$'I won the race'$]^{S_1}$}

(49) S_2: *Yes, you did.* $\lambda C^*[C + S_2 \vdash$'$S_1$ won the race'$]^{S_2}$

(50) S_2: *No, you didn't.* $\lambda C^*[C + S_2 \vdash \neg$'$S_1$ won the race'$]^{S_2}$
Requires prior retraction, then assertion of the only alternative left.

Question is not quite symmetric, but signals interest in positive and negative answer.

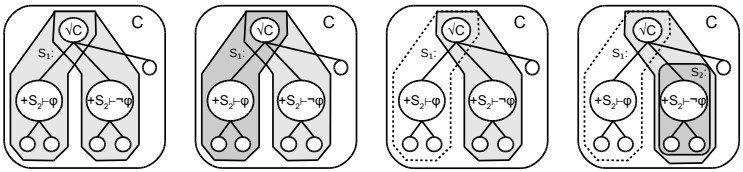


Figure 19: (a) Alternatives of question, (b) Question, (c) Rejection, (d) Assertion of remaining alternative

7 Negated Questions

7.1 Monopolar question with propositional negation

Negation part of the proposition, modifier or per NegP:

(51) $[\![[_{ActP}\ [[_{Act^o}\ ?\ Did\ ]\ [_{CmP}\ [[_{Cm^o}\ \vdash\ t_{did}\ ]\ [_{TP/NegP}\ I\ [_{T'/Neg'}\ not\ [_{TP}\ t_I\ t_{did}\ win\ the\ race]]]]]]]\!]^{S_1S_2}$
$= \lambda C^*[\{\sqrt{C}\} \cup C + S_2 \vdash \neg$'$S_1$ won the race'$]^{S_1}$

Notice:

- This is different from non-negated monopolar question, bias towards negative answer
- In standard accounts (Hamblin, Groenendijk & Stokhof, Roelofsen) non-negated and negated yes/no questions have the same meaning: {p, ¬p} = {¬p, ¬¬p}
- Interpretation of responses *yes / no* is not straightforward, as **two** propositional discourse referents, φ and ¬φ, are introduced (cf. Krifka 2013, Meijer e.a. 2015).

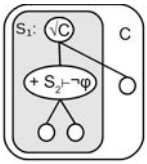


Figure 20: Monopolar (biased) question

7.2 Monopolar question with high negation

High negation is interpreted at the level of the commitment phrase,

(52) $[\![[_{ActP}[[_{Act^\circ}$? *Did*] $[_{CmP/NegP}\,[_{Cm'/Neg'}$ *n't* $[_{CmP}\,[[_{Cm^\circ}\vdash]\,[_{TP}$ *I* t_{did} *win the race*]]]]]]$]\!]^{S_1S_2}$

= $[\![[_{Act^\circ}?]]\!]^{S_1S_2}([\![\textit{not}]\!]^{S_1S_2}([\![\vdash]\!]^{S_1S_2}([\![[_{TP}$ *I did win the race*$]]\!]^{S_1S_2})))$

= $\lambda C^*[\{\surd C\} \cup C + \neg S_2 \vdash \varphi]^{S_1}$

- With this move, S_1 asks S_2 to express non-commitment towards the proposition φ.
- Notice that adding $\neg S_2 \vdash \varphi$ to the CSp precludes commitment to φ, i.e., $S_2 \vdash \varphi$, but is compatible with commitment to ¬φ, i.e., $S_2 \vdash \neg\varphi$.
- Hence, $\neg S_2 \vdash \varphi$ is pragmatically weaker than $S_2 \vdash \neg\varphi$: The former proposition does not force S_2 to also commit to ¬φ, whereas the latter proposition forces S_2 not to commit to φ, as it would be incompatible with $S_2 \vdash \varphi$.

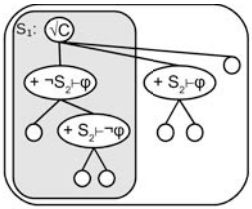


Figure 21: High negation question

Reactions to high negation questions:

- The TP introduces a discourse referent φ, can be picked up by *no,* asserts ¬φ.
- The answer *yes* requires a rejection of the last move in.
- The reaction *I don't know* does not require a rejection, as it is compatible with S_2 being not committed to φ.

7.3 Questions of bias

A variety of expressing yes/no questions:

(53) a.	$\{\surd C\} \cup C + [S_2 \vdash \varphi]^{S_1}$	monopolar question
	$\{\surd C\} \cup C + [S_2 \vdash \neg\varphi]^{S_1}$	monopolar question, negated proposition
b.	$\{\surd C\} \cup C + S_2 \vdash \varphi \cup C + [S_2 \vdash \neg\varphi]^{S_1}$	bipolar question
c.	$\{\surd C\} \cup C + [\neg S_2 \vdash \varphi]^{S_1}$	high negation question
	$\{\surd C\} \cup C + [\neg S_2 \vdash \neg\varphi]^{S_1}$	high negation question, negated proposition

Discussion of biases:
Büring & Gunlogson 2000, Sudo 2013, Gärtner & Gyuris 2016

Sudo discusses two different kinds of bias:

- Evidential bias
- Epistemic bias

Evidential bias:

(54) [S_2 enters the windowless computer room, raincoat dripping.]
a. *Is it raining?*
b. *# Is it not raining?*
c. *# Is it sunny?*
d. *# Is it raining, or not?*
e. *# Isn't it raining?*
f. *# IS it raining?*

(55) a. Asking the monopolar question $S_2 \vdash \varphi$, if φ is likely, results in a smooth conversation (simple affirmation).
b. Asking the monopolar question $S_2 \vdash \neg\varphi$ would result in a likely rejection, which should be avoided in smooth communication.
c. Would also result in a likely rejection, as sunny → ¬ raining
d. Bipolar questions suggest that φ and $\neg\varphi$ are equally likely, if φ is more likely, (a) is to be preferred.
e. Checking whether S_2 would refrain from asserting φ is a rather complex move, appropriate only if φ is controversial.
f. Also a bipolar question, focus on auxiliary indicates alternatives $\lambda p[p]$, $\lambda p[\neg p]$

Epistemic bias:

(56) S_2: *You must be starving. You want something to eat?*
S_1: *Yeah. I remember this place from my last visit.*
a. *Isn't there a vegetarian restaurant around here?*
b. (#) *Is there a vegetarian restaurant around here?*

Explanation of preference of high negation question (a):

- S_1 checks whether S_2 refrains from committing to the proposition φ, that is, whether S_2 is willing to add $\neg S_2 \vdash \varphi$ to the common ground.
- Rationale: S_1 has an epistemic tendency favoring φ and is interested whether the strength of this belief can be increased; S_1 considers S_2 as a possible independent source.
- But S_1 does not want to impose the epistemic tendency for φ on S_2 by making asserting $\neg\varphi$ an easy option, as with the biased question based on $S_2 \vdash \varphi$ (b).
- (a) does not force S_2 to commit to φ or $\neg\varphi$ directly, but rather officially invites S_2 to refrain from a commitment for φ. Explains politeness of high negation questions.
- (a) makes it easier to answer negatively, by $S_2 \vdash \neg\varphi$; strategy of S_1: maximize the chances for S_2 to actually commit to $\neg\varphi$. If S_2 against these odds commits to φ, then S_1 can assume that this commitment was not obtained by force.

8 Question tags

Matching and reverse question tags (Cattell 1973):

(57) *You are tired, are you?*

(58) a. *I have won the race, haven't I?*
b. *I haven't won the race, have I?*

8.1 Matching question tags

Speech act **conjunction** of an assertion and a question

(59) *I have won the race, have I?*

$$C +_{S_1} [\![[_{ActP} [\ .\ ] [_{CmP} [\vdash] [_{TP} \textit{I have won the race}]]]]\!]^{S_1S_2} \,\&\, [\![[_{ActP} [\ ?\ ] [_{CmP} [\vdash] [_{TP} \textit{I have won the race}]]]]\!]^{S_1S_2}]$$

$$= [[C + S_1 \vdash \varphi] \cap [\{\sqrt{C}\} \cup C + S_2 \vdash \varphi]]^{S_1}$$

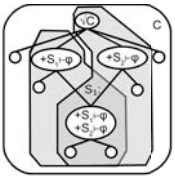


Figure 22: Matching question tag

- The overall effect is that S_1 proposes to S_2 that both S_1 and S_2 are committed to the proposition φ.
- That is, S_1 proposes dark central area as new commitment space.
- S_1 can propose $S_2 \vdash \varphi$ because φ is understood as a commitment that S_2 has already anyway – Cattell: "Voicing a likely opinion by the addressee".
- Hence: Evidential bias towards φ

8.2 Reverse question tags

Speech act **disjunction** of an assertion and a question

(60) *I have won the race, haven't I?*

$$C +_{S_1} [\![[_{ActP} [\ .\ ] [_{CmP} [\vdash] [_{TP} \textit{I have won the race}]]]]\!]^{S_1S_2} \vee [\![[_{ActP} [\ ?\ \textit{have'nt}\ ] [_{CmP} [\vdash\ ] [_{TP} [[t_{n't}] [_{TP} \textit{I } t_{\textit{have}} \textit{ won the race}]]]]]]\!]^{S_1S_2}]$$

$$= |[C + S_1 \vdash \varphi] \cup [\{\sqrt{C}\} \cup C + S_2 \vdash \neg\varphi]]^{S_1}$$

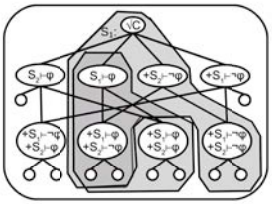


Figure 23: Reverse question tag

- The resulting commitment space is the whole gray area.
- This excludes that S_2 is committed to φ but S_1 is committed to ¬φ.
- This means that if S_2 commits to φ, then S_1 is committed to φ as well.
- That is, S_1 puts forward a commitment to φ, asking S_2 for support.
- If S_2 does not provide this support by committing to ¬φ, S_1 is free to either stick with the commitment to φ, or to retract it and even assert ¬φ, without contradicting an earlier commitment.
- Epistemic bias towards φ, seeking confirmation

9 Embedded Questions

9.1 Nature and kind of embedded questions

Questions also occur as embedded syntactic objects:

(61) a. *Who won the race?*
b. *Bill knows who won the race.*

But there are important differences between root and embedded questions:

(62) a. *Who did Ed meet?* **Who Ed met?*
b. *Bill knows who Ed met.* **Bill knows who did Ed meet.*

(63) a. *Did Ed meet Beth?* **Whether / if Ed met Beth?*
b. *Bill knows whether / if Ed met Beth.* **Bill knows did Ed meet Beth?*

(64) a. *Did Ed meet Ann or Beth?* **Whether Ed met Ann or Beth?*
b. *Bill knows whether Ed met Ann or Beth.* **Bill knows did Ed meet Ann or Beth?*

Discourse particles in German:

(65) a. *Wen hat Ed denn getroffen?*
b. *Bill weiß, wen Ed *denn getroffen hat.*

This is evidence that embedded questions do not involve ActP and CmP, but they involve structure beyond a TP.

9.2 Whether

Embedded questions and declaratives form a CP, not a CmP or ActP:

(66) a. $[_{CP}\ [[_{C^\circ}\ \textit{whether}]\ [_{TP}\ \textit{Ed met Ann}]]]$

b. $[_{CP}\ [[_{C^\circ}\ \textit{that}]\ [_{TP}\ \textit{Ed met Ann}]]]$

Whether / Q turns TP proposition into a set of propositions, with two options:

- Bipolar: λp {p, ¬p} (cf. etymology: wh + either)
- Monopolar: λp [p]

Evidence for monopolar operator:

(67) *I doubt whether the Benefits of opposition to the Constitution...* (G. Washington)

(68) a. $[_{CP}\ [_{CP}\ [[_{C^\circ}\ \textit{whether}]\ |_{TP}\ \textit{Ed met Ann}]]]$ *or* $[_{CP}\ [[_{C^\circ}\ \textit{whether}]\ [_{TP}\ \textit{he met Beth}]]]]$
b. $[_{CP}\ [[_{C^\circ}\ \textit{whether or not}]\ [_{TP}\ \textit{Ed met Ann}]]]$
c. $[_{CP}\ [[_{C^\circ}\ \textit{whether}]\ [_{TP}$ Ed met ANN, BETH or CARla$]]]$

(69) $[\![[[_{CP}\ [[_{C^\circ}\ \textit{whether}]\ |_{TP}\ \textit{Ed met Ann}]]]$ *or* $[_{CP}\ [[_{C^\circ}\ \textit{whether}]\ [_{TP}\ \textit{he met Beth}]]]]]\!]^{S_1S_2}$
= λp{p}[‘Ed met Ann’] ∨ λp{p}[‘Ed met Beth’]
= {‘Ed met Ann’} ∪ {‘Ed met Beth’}, = {‘Ed met Ann’, ‘Ed met Beth’}

Bipolar operator:

(70) $[\![[_{CP}\ [[_{C^\circ}$ whether$]\ [_{TP}\ \textit{Ed met Ann}]]]]\!]^{S_1S_2}$
= λp{p, ¬p}(‘Ed met Ann’), = {‘Ed met Ann’, ¬‘Ed met Ann’}

9.3 Embedded Constituent Questions

Assumption for syntactic structure: Qu head

(71) a. $[_{CP}$ *who*$_i$ $[[_{C^o}$ Qu] $[_{TP}$ *Ed met* $t_i]]]$

b. $[_{CP}$ *wen* $[[_{C^o}$ *(dass)*$]]$ $[_{TP}$ *Ed* t_{wen} *getroffen hat*$]]]$ (Southern German)

Qu is interpreted like *whether*, i.e. introduces singleton sets.

(72) $[\![[_{CP}$ [*which woman*]$_i$ $[[_{C^o}$ Qu] $[_{TP}$ *Ed met* $t_i]]]]\!]^{S_1S_2}$

$= [\![$*which woman*$]\!]^{S_1S_2}(\lambda x_i\ [[\![\text{Qu}]\!]^{S_1S_2}([\![[_{TP}$ *Ed met* $t_i]]\!]^{S_1S_2,t/x_i})])$

with $[\![[_{TP}$ *Ed met* $t_i]]\!]^{S_1S_2,t/x_i}$ = 'Ed met x_i'

and $[\![\text{Qu}]\!]^{S_1S_2} = \lambda p\{p\}$

and $[\![$*which woman*$]\!]^{S_1S_2} = \lambda R \bigcup_{x \in [\![woman]\!]^{S_1S_2}} R(x)$

we have: $\bigcup_{x \in [\![woman]\!]^{S_1S_2}} \{\text{'Ed met x'}\}$, = $\{\text{'Ed met x' | } x \in [\![\textit{woman}]\!]^{S_1S_2}\}$

Question-embedding *know* reduces to proposition-embedding *know*:

(73) $[\![$*know*$]\!](Q)([\![$*Ed*$]\!]) \Leftrightarrow \forall p \in Q[p \text{ is true} \rightarrow [\![$*know*$]\!](p)([\![$*Ed*$]\!])]$

'for every true proposition in the set of propositions, Ed knows that it is true.'

Notice: strong exhaustive interpretation when Qu is interpreted as $\lambda p\{p, \neg p\}$

9.4 Comparison: Wh in Root vs. embedded questions

Wh in embedded questions: Disjunctions of sets of propositions.

(74) a. $\{p\} \vee \{q\}$ $= \{p\} \cup \{q\}$, $= \{p, q\}$

b. $\lambda R\ [\bigcup_{x \in WH} R(x)]\ (\lambda y\ \{p(y)\})$ $= \bigcup_{x \in WH} \{p(x)\}$

Wh in root questions Disjunctions of functions from CSp to CSp

(75) a. $\lambda C[\mathfrak{A}(C)]\ V\ \lambda C[\mathfrak{B}(C)]$ $= \lambda C[\mathfrak{A}(C) \cup \mathfrak{B}(C)]$

b. $\lambda R\ [\bigcup_{x \in WH} R(x)]\ (\lambda y \lambda C[\mathfrak{A}(y)(C)])$ $= \lambda C\ [\bigcup_{x \in WH} \mathfrak{A}(x)]$

Basic meaning in either case: set union (corresponding to disjunction); difference just a matter of type (where e: entities, st: propositions)

- Root questions: *who* is of type [[e → {st}] → {st}]
- Embedded questions: *who* is of type [[e → [CSp → CSp]] → [CSp → CSp]]

Cf. also: Wh with indefinite interpretation, as in German, or engl. *somewhere*

(76) *Ed hat wen getroffen.* 'Ed met someone'

(77) a. $p \vee q$ b. $\lambda P \bigcup_{x \in WH} P(x)\ (\lambda y[p(y)])$ *who* is of type [[e → st] → st]

9.5 Embedded root questions

Predicates like *wonder, ask, be interested in* are different:

- Root syntax possible:

(78) a. *Ed wondered who he met.*
b. % *Ed wondered who did he meet.* (Irish English, cf. McCloskey 2005)

- Discourse particles that occur in root questions:

(79) a. *Wen hat Ed denn getroffen?*
b. *Ed weiß, wen er *denn getroffen hat.*
c. *Ed fragte sich, wen er denn getroffen hat / habe.*

Krifka (2014) argues that such questions are different:

- They may denote illocutionary acts
- This is possible, as ActPs are semantic objects, with a proper semantic type (CSD → CSD)

(80) *Ed* [*wondered* [$_{ActP}$ *who did he meet*]]

(81) x wonders Q, where Q: a question speech act
'in the situation s referred to,
x is interested in the answer to the speech act Q performed in that situation'

10 Conclusion

Goals of the talk:

- Argue for dynamic semantics for speech acts (cf. Szabolcsi)
- Introduce a framework of conversation as development of common ground (cf. Stalnaker, Lewis, ...)
- Common grounds contain the commitments of interlocutors (Commitment States)
- New: Common grounds have a projective component (Commitment Spaces) that models common ground management
- Questions have an effect on the projective component: they restrict the legal development of the common ground.
- There are "monopolar" questions that project just one legal development; this can be used to model biased questions
- Proposals for focus in answers to questions and focus in questions, in particular, focus in polarity questions
- Proposals for polarity (yes/no) questions, alternative questions, constituent (wh-) questions, question tags.
- Explanation of biases of such questions
- Relation between root and embedded questions

This talk is partly based on Krifka 2015.

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