How to do things with words 2: speech acts and mutual joint belief

Regine Eckardt & Magdalena Schwager, (University of Göttingen)

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1. Role and interpretation of 'agreement'
2. Logic of mutual joint belief (Stalnaker 2002, Fagin & al. 1995)
3. Truckenbrodt 2008: self-verification for social act propositions
4. Reconsidering social facts
5. Conclusion

Outline

Starting point

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- take serious: connection $[\![\textit{sentence}]\!] \leftrightarrow$ SPEECH ACT
- add: contextual factor of mutual joint belief

Truth-conditions and ASSERTIONS

(1) *Regine is in Norway.* ASSERTION

(2) *I promise you to call Regine tonight.* PROMISE

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- truth conditional semantics has a natural link to ASSERTIONS
- ASSERTIONS (minimally): S provides information to reduce epistemic uncertainty
  S does so by enriching joint information (vs. anonymous note)

A model of joint information: Stalnaker

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Common belief $CB_{A,w}$: A proposition ϕ is common belief of a group of believers A in w (short: $CB_{A,w}(\phi)$) iff all in the group believe that ϕ, all believe that all believe it, all believe that all believe that all believe it, ...

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  $CS_{new} := \{w \mid w \in CS_{old} \wedge [\![decl.sentence]\!](w) = 1\}$
- side-remark: a speech act that amounts to adding a proposition to the Common Ground need not be an Assertion

Non-assertive acts and propositions: Truckenbrodt 2008

Truckenbrodt assumes that some propositions are inherently self-verifying (under contextual conditions) thanks to their lexical semantics:

(3) For performative p and contextual conditions C:
$\forall w, x, y[\text{say}(w)(x, y, p) \wedge C(w)(x, y, p)] \rightarrow p(w)]$

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Starting point is Searle's (1995) distinction of:

- brute facts ordinary facts about the world
- institutional facts constituted by agreement (10$-bill)

Searle extends this to language:

(4) *The meeting is adjourned.*

➽ How to model 'agreement'?

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- predicates that build up performative propositions: predicates that say something about context set

Claim 1: The content of a performative sentence S can be paraphrased as a fact about mutually joint agreement:
there is a proposition p s.t. $[\![S]\!] \Leftrightarrow CB(p)$.
Claim 2: such sentences are self-verifying if they are used to update the Common Ground.

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Individual Belief

Individual belief: For each participant a: a's beliefs are modelled by a relation $R_a \subseteq W \times W$ which is serial, transitive and euclidian.

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- a's doxastic alternatives in w: $\{w' \mid wR_aw' \}$
- 'a believes ϕ in w': $B_{a,w}(\phi)$ iff $\forall w'[wR_aw' \rightarrow w' \in \phi]$

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2. If a believes ϕ, she believes that she believes ϕ (positive introspection: $B_{a,w}(\phi)$ entails $B_{a,w}(B_a(\phi))$.
   ... transitive: $\forall w \forall w' \forall w''[wRw' \wedge w'Rw'' \rightarrow wRw'']$.

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3. If a does not believe ϕ, then she believes that she does not believe ϕ(negative introspection: $\neg B_{a,w}(\phi)$ entails$B_{a,w}(\neg B_a(\phi))$.
   ... euclidian: $\forall w \forall w' \forall w''[wRw' \wedge wRw'' \rightarrow w'Rw'']$.

Positive introspection

$B_{a,w}(\phi)$ entails $B_{a,w}(B_a(\phi)$.

Follows from transitivity: $\forall w \forall w' \forall w''[wRw' \wedge w'Rw'' \rightarrow wRw'']$.

Proof (indirect):
$B_{a,w}(\phi)$. By definition, $\forall w'[wR_aw' \rightarrow w' \in \phi]$.
Assume not $B_{a,w}(B_a(\phi))$. Then not
$\forall w'[wR_aw' \rightarrow \forall w''[w'B_aw' \rightarrow w'' \in \phi]$. Hence,
$\exists w' \exists w''[wR_aw' \wedge wR_aw'' \wedge w'' \notin \phi]$. By transitivity, wR_aw''. So, we derive $B_{a,w}(\phi)$ which contradicts the given statement.
Therefore, it must be that $B_{a,w}(B_a(\phi))$. *q.e.d.*

Negative introspection

$\neg B_{a,w}(\phi)$ entails $B_{a,w}(\neg B_a(\phi))$.

Follows from euclidicity: $\forall w \forall w' \forall w''[wRw' \wedge wRw'' \rightarrow w'Rw'']$.

Proof of negative introspection: (indirect)
$\neg B_{a,w}(\phi)$. Hence, there is a world w_1, such that wR_aw_1 and $w_1 \notin \phi$.
Assume not $B_{a,w}(\neg B_a(\phi))$. That is, $\neg\forall w_2[wR_aw_2 \rightarrow [\neg\forall w_3[w_2R_aw_3 \rightarrow w_3 \in \phi]]]$. Hence, there is a w_2 s.t. wR_aw_2 and $\forall w_3[w_2R_aw_3 \rightarrow w_3 \in \phi]]$; by euclidicity, for any world w_1 s.t. wR_aw_1 also $w_2R_aw_1$. So, there cannot be a world w_1, such that wR_aw_1 and $w_1 \notin \phi$. Thus we obtain $B_{a,w}(\phi)$ which contradicts the given statement.
Therefore, it must be that $B_{a,w}(\neg B_a(\phi))$. *q.e.d.*

Belief relations are pseudo-reflexive

reflexive: $\forall w[wRw]$.

Belief relations need not be reflexive, as subjects can have wrong beliefs (can exclude their own world).

Belief relations are pseudo-reflexive: $\forall w \forall w'[wRw' \rightarrow w'Rw']$

Proof: R is euclidian, hence for any wRw', $w'Rw'$. *q.e.d.*

Common belief CB

Common Belief in w of a group A:
$CB_{A,w}(\phi)$ iff $\forall w'[wR_Aw' \rightarrow w' \in \phi]$, where $R_A = (\bigcup_{a \in A} R_a)^+$
(transitive closure of the union of all participant's belief relations).

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wR_Aw' iff there is a sequence $wR_{a_1}w_1R_{a_2}w_2 \ldots w_{n-1}R_{a_{x_n}}w''$.

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- $CB_{A,w}(\phi)$ entails $CB_{A,w}(CB_A\phi)$. Positive Introspection.
  Proof: by transitivity, see proof for individual belief above.

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  Proof: by transitivity, see proof for individual belief above.
- Pseudo-reflexivity holds (to show).
- Negative Introspection does not hold. (The relation need not be euclidian.)
  - There are cases of unawarely unshared belief:
    $\neg CB_{A,w}(\phi)$ but not $CB_{A,w}(\neg CB_A\phi)$.

Example: unawarely unshared belief

Group: $A = \{a, b\}$. $p = \lambda w$.there is time pressure in w.
Assume: $\neg CB_{A,w}(p)$.
Hence, $\exists w'[wR_A w' \wedge \neg p(w')]$, so there is some sequence $wR_{i_1} w_1 \ldots R_{i_{n-1}} w'$ with $i_j \in \{a, b\}$ for $1 \leq j \leq n$ and $\neg p(w')$.

E.g. for all w_1 where $wR_a w_1$:

- $\neg p(w_1)$. (a believes there is no time pressure)
- $\forall w'[w_1 R_b w' \rightarrow p(w')]$
  (a believes that b believes that there is time pressure).
- $\forall w''\forall w_2[w_1 R_b w_2 \wedge w_2 R_a w'' \rightarrow p(w'')]$
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- And so on for all ab-series.

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R_A is not euclidian - worlds w_1 (accessible to a) and w_3 (accessible to b) need not see each other. Fits our intuitions about common belief.

Cancellability of multiple CB

Theorem on Common Belief in w of a group A:
$CB_{A,w}(\phi) \Leftrightarrow CB_{A,w}(CB_A\phi)$.

Stalnaker 2002 sans proof; Truckenbrodt 2008 for a proof by structural induction

$\Rightarrow$: by Positive Introspection, ✓; $\Leftarrow$: ➽ show.

Lemma: Mutual joint belief is quasi-reflexive.

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Lemma: Mutual joint belief is quasi-reflexive.

- Proof: Assume wR_Av. Then, either (i) there is a single step s.t. for some $a \in A$, wR_av. Since R_a is quasi-reflexive, vR_Av. Or (ii), there are $z_1, \ldots z_n$ for $n \geq 1$ s.t. $wR_{i_1}z_1 \ldots z_nR_{i_{n+1}}v$ where $i_r \in A$ for $1 \leq r \leq n+1$. So, $R_{i_{n+1}} = R_a$ for some $a \in A$. As R_a is quasi-reflexive, $vR_{i_{n+1}}v$, hence vR_Av. *q.e.d.*

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Lemma: Mutual joint belief is quasi-reflexive.

Proof $\Leftarrow$: If $CB_{A,w}(CB_A\phi))$, then $\forall v[wR_Av \rightarrow [\forall u[uR_Av \rightarrow u \in \phi]]$. From wR_Av, by quasi-reflexivity, it follows that vR_Av. Therefore, $\forall v[wR_Av \rightarrow v\phi]$. So, $CB_{A,w}(\phi)$. *q.e.d.*

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Social facts in terms of lexical paraphrases: Truckenbrodt 2008

The content of any performative sentence S can be paraphrased as a fact about mutually joint agreement: $[\![S]\!] \Leftrightarrow CB(p)$.

Agreement is equivalent to fact: $CB([\![S]\!])$

$\Leftrightarrow CB(CB(p))$ lexical equivalence

$\Leftrightarrow CB(p)$ theorem about CB, Stalnaker 2002, fn. 7

$\Leftrightarrow$ [[S]] is true. lexical equivalence, backward.

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Example: $[\![own]\!](x)(y) \Leftrightarrow$

$CB_{A,w}(\lambda w'.\forall z \in A : \text{use}(z,y)(w') \rightarrow$

$[\text{authorize}(x, \lambda w''.use(z,y)(w''))(w') \vee \text{sth-wrong}(w')])$

$CB_{A,w}(\lambda w'.\text{own}(x,y)(w'))$ iff $\text{own}(x,y)(w')$.

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1. cancellability of CB (✓)

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2. properties of the particular account ➠ check!

Update

Truckenbrodt (2008):

(5) Stalnaker 1978: In an ASSERTION, p is added to the common ground of S and A, unless A objects. [his 17]

(6) By using a declarative clause ([-wh,-imp]), indicative verbal mood, falling intonation) with proposition p, a speaker adds p to the Common Ground if the addressee does not object. (Formally: the context set is intersected with p.) [his 19]

Define update of CB_A with p: Eckardt (draft, p.8)

(7) $R_a \oplus p := \{\langle w, w' \rangle \mid \langle w, w' \rangle \in R_a \wedge p(w')\}$

two possibilities:

(8) a. $R_A \oplus p := (\bigcup_{a \in A}(R_a \oplus p))^+$ local

b. $R_A \oplus p := \{\langle w, w' \rangle \mid \langle w, w' \rangle \in R_A \wedge p(w')\}$ global

Worries about lexical equivalence: biconditional

- equivalence between agreement and fact:

$[\![own]\!](x)(y) \Leftrightarrow$
$CB_{A,w}(\lambda w'.\forall z \in A : \text{use}(z,y)(w') \rightarrow$
$\quad [\text{authorize}(x, \lambda w''.use(z,y)(w''))(w') \vee \text{sth-wrong}(w')])$
$\Rightarrow$ no uncertainty among the relevant people.

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  $\quad [\text{authorize}(x, \lambda w''.use(z,y)(w''))(w') \vee \text{sth-wrong}(w')])$
  $\Rightarrow$ no uncertainty among the relevant people.

- but:

  (9) A: *Is this pencil mine or yours?*
  B: *I think it's yours.*

Worries about lexical equivalence: biconditional

- equivalence between agreement and fact:

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- complex interactions, e.g. buying a car (cf. Eckardt, draft)

Worries about lexical equivalence: expers, Effect

- can we always find a suitable lexical paraphrase known to the relevant group?

  (10) *I hereby declare you dean of the philosophical faculty.*

  compare Putnam's *elms* and *beeches*...

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  compare Putnam's *elms* and *beeches*...
- Truckenbrodt aims to explain why update amounts to truth, but does not explain why update takes place (invariably)

Truckenbrodt: a technical problem after all -? (*pace Eckardt*)

Updating $CB_{A,w}$ with a proposition of the form $CB_A(\phi)$ seems worrisome...

- CB_A does not warrant negative introspection (the corresponding relation need not be euclidian).
  In other words, $\neg CB_{A,w}(\phi)$ is compatible with $\neg CB_{A,w}(\neg CB_A(\phi))$.

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- This is crucial, because Truckenbrodt's approach relies on an update of the context set with a proposition of the form $CB_{A,w}(\phi)$.
- Homework: Can we show that a non-trivial update with $CB_{A,w}(\phi)$ requires belief revision for at least one individual?

Outline

Social facts

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For all worlds, social facts ϕ and relevant groups A for ϕ: $CB_A(\phi) \rightarrow \phi$.

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What about $\phi \rightarrow CB_A(\phi)$?
We don't think so (contra Truckenbrodt 2008).

(11) a. *Is this my pencil or yours?*
b. *Does the car already belong to us or do we have to sign more papers?*

Special status of social facts w.r.t. mutual agreement is crucial for the automatic update effect observed with explicit performatives.
Compare brute facts: *The Eiffeltower is in Berlin.*.

Outline

Conclusion

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to do:

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2. reconsider the lexical meaning of social fact-description