Non-de dicto construals as a uniform phenomenon

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Point of departure: *de dicto* vs. *de re* construal

- Bill's doxastic state in (1a) entails that Eve loves Ann.
- The analysis of *believe* in (3) relativizing evaluation of the embedded clause to the subject's belief state correctly predicts the truth of (1b) in (1a).

(1) a. SCENARIO 1: Joe and Bill went to a party. Ann and Eve were among the guests. Bill knows both Ann and Eve well. He didn't see them together at the party. Still, he is convinced Eve and Ann are a couple. Joe recognizes Eve, but does not recognize Ann (and does not think Eve knows Ann). He saw them dancing with each other and thinks Eve and the person he saw her dancing with are lovers. There was discussion about Eve's relationship status. No other guest has an opinion about it.

b. *Bill thinks that Eve loves Ann.* ✓(de dicto)

(2) $\text{DOX}_{\text{Bill},w} \subseteq \{w' : \text{Eve loves Ann in } w'\}$ (true in (1a))

(3) $[\![\text{believe}]\!]^w = \lambda p_{\langle st\rangle}.\lambda x_e.\text{DOX}_{x,w} \subseteq p$ (Hintikka 1969 a.m.o.)

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- Sentence (4) true in (2a) despite of Joe's doxastic state not entailing that Eve loves Ann.[1]

(4) *Joe thinks that Eve loves Ann.* ✓(de re)

(5) $\text{DOX}_{\text{Joe},w} \not\subseteq \{w' : \text{Eve loves Ann in } w'\}$ (false in (1a))

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(7) $\lambda w.$Ann replaced by e.g. $f = \lambda w.$the person Joe saw dancing with Eve in w

(8) $[\![(6b)]\!]^{w} = 1$ iff $\forall w' \in \text{DOX}_{\text{Joe},w}$(Eve loves $f(w')$ in w')

(9) $\text{DOX}_{\text{Joe},w} \subseteq \{w :$ Eve loves in w the person Joe saw dancing with Eve in $w\}$ (true in (6a))

Main Points of this talk: generalized NDD construals

- Replacement for expressions of arbitrary semantic type: generalized non *de dicto* (NDD)[2]
- Replacement is QUD dependent
- There is no ambiguity (structural or otherwise) between *de dicto* (DD) and NDD.

[2] also cf. Percus 2021, Benbaji t.a.

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- Quantification over alternatives contributed by attitude.
- Quantification restricted in terms of QUD.
- Analysis forms natural class with phenomena of underspecification and QUD-dependent specification (e.g., imprecision[3]).

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Outline

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A contrast in the availability of *de re*

(10) a. SCENARIO 1: Joe and Bill went to a party. Ann and Eve were among the guests. Joe recognizes Eve, but does not recognize Ann (...) He saw them dancing with each other and thinks Eve and the person he saw her dancing with are lovers...

b. *Joe thinks that Eve loves Ann.* ✓(de re)

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- What explains this contrast?
- Replacing [λw.Ann] with f, both (10b) and (10c) are true.

(11) $f = \lambda w$.the person Joe saw dancing with Eve in w

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- Answer options to QUD must be relativized to what is available in the context (≈ common ground or intensional state introduced by higher operator)
- Answers must be informative (i.e., add new information)

Application of QUD constraint to examples

(12) SCENARIO 1: Joe and Bill went to a party. Ann and Eve were among the guests. Joe recognizes Eve, but does not recognize Ann (...) He saw them dancing with each other and thinks Eve and the person he saw her dancing with are lovers. . . .

(13) a. *Joe thinks that Eve loves Ann.* ✓
b. Salient QUD in (12) addressed by (13a): *Does Joe think that Eve is in love?*

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d. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}$(the person dancing with Eve in w' was at the party in w') unresolved

A dedicated structure for *de re*?

- Standard assumption: replacement via a dedicated grammatical device, e.g., G, denoting a function that maps individuals to individual concepts (replacement concepts)[4]

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⇒ both construals must always be available at the same time – supported by (20)

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(19) *Only Joe thinks that Eve loves Ann.* ✗in (18a)

⇒ both construals must always be available at the same time – supported by (20)

(20) a. *Exactly one guest thinks that Eve loves Ann.* ✗in (18a)

b. *Two guests think that Eve loves Ann.* ✓in (18a)

Attaching G in both *de re* and *de dicto* construal?

- Problem: sentences say that Joe/Bill is the only individual of who (21) holds, which is false.

(21) $[\![\textit{thinks Eve loves Ann}]\!]^w = \lambda x.\exists f_{\langle s,e\rangle} \forall w' \in \text{DOX}_{x,w}(\text{Eve loves } f(w') \text{ in } w')$

[5] Percus and Sauerland 2003 (see also Lewis (1979)), but cf. Heim 1994, Deal 2018 for non-quantificational treatments.

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- A minimal fix: always attach G to *Ann* and existentally over it[5] – roughly as in (23b), with variable (eventually) bound existentially by attitude

(22) a. [1 [that Eve loves [G_1 Ann]]]
b. $[\![(22a)]\!]^{w,c} = \lambda f_{\langle s,e\rangle}.\text{Eve loves } f(w) \text{ in } w$

(23) witnesses: $f_1 = [\lambda w.\text{Ann}]$, $f_2 = [\lambda w.\text{the person dancing with Eve in } w]$

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(21) $[\![\textit{thinks Eve loves Ann}]\!]^w = \lambda x.\exists f_{\langle s,e\rangle} \forall w' \in \textsc{dox}_{x,w}(\text{Eve loves } f(w') \text{ in } w')$

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(23) witnesses: $f_1 = [\lambda w.\text{Ann}]$, $f_2 = [\lambda w.\text{the person dancing with Eve in } w]$

- Parallelism generalizes to arbitrary number of (N)DD-construed expressions. (appendix)
- The *de dicto*-construal contains any *de re*-construal and vice versa.
- Individual denoting expressions are always interpreted *de re*.

[5] Percus and Sauerland 2003 (see also Lewis (1979)), but cf. Heim 1994, Deal 2018 for non-quantificational treatments.

Outline

1. If phenomenon *X* is intuitively characterized as NDD and observes QUD dependence and parallelism *X* is an NDD phenomenon.
2. This means *X* should involve replacement.

The phenomenon: transparent construals

- Second classic NDD-phenomenon[6]: its analyses are typically unrelated to those of *de re*[7]
- The narrow scope opaque, i.e., the DD construal of (24b) is expected to be true in (24a): $\text{DOX}_{\text{Bill},w} \subseteq \{w : \text{Eve loves in } w \text{ a linguist in } w\}$

(24) a. SCENARIO 2: Joe and Bill went to a party. Bill has no idea if there were any linguists at the party, but Bill is convinced that Eve is in a relationship with a linguist. Joe thought all guests were biologists. Except for three linguists called Ann, Bea, and Cate, this was the case. Joe doesn't know them or their names. He saw each of them dancing with Eve, who he knows. So he thinks Eve and one of them are lovers but is not sure which of them it is. There was discussion about Eve's relationship status. No other guest has an opinion about it.

b. *Bill thinks Eve loves a linguist.* ✓(NO)

[6] Fodor 1970, Bäuerle 1983 a.o.

[7] Cresswell 1990, Percus 2000, Keshet 2011, Schwarz 2012 a.o., but cf. Tancredi and Sharvit 2022

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b. *Bill thinks Eve loves a linguist.* ✓(NO)

c. *Joe thinks Eve loves a linguist.* ✓(NT)

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b. *Bill thinks Eve loves a linguist.* ✓(NO)

c. *Joe thinks Eve loves a linguist.* ✓(NT)

- (24c) is true on a narrow scope transparent, i.e., NDD construal, with a property replaced.

(25) $f = [\lambda w.\lambda x.\ \text{linguist}(x) \text{ in } w]$ replaced by $f = [\lambda w.\lambda x.\text{person dancing with Eve } (x) \text{ in } w]$

(26) $\text{DOX}_{\text{Joe},w} \subseteq \{w : \text{Eve loves in } w \text{ a person dancing with Eve in } w\}$

[6] Fodor 1970, Bäuerle 1983 a.o.

[7] Cresswell 1990, Percus 2000, Keshet 2011, Schwarz 2012 a.o., but cf. Tancredi and Sharvit 2022

Property 1: QUD-dependence of NT

- QUD dependence observed for NT suggesting replacement.
- QUD dependence explains the parallelism of the pattern and the one observed with *de re*.

(27) a. SCENARIO 2: …Joe thought all guests were biologists. Except for three linguists called Ann, Bea, and Cate, this was the case. Joe doesn't know them or their names. He saw each of them dancing with Eve, who he knows. So he thinks Eve and one of them are lovers but is not sure which of them it is …

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b. *Joe thinks that Eve loves a linguist.* ✓(NT)

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b. *Joe thinks that Eve loves a linguist.* ✓(NT)

c. *Joe thinks/knows a linguist was at the party.* ✗(NT)

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c. *Joe thinks/knows a linguist was at the party.* ✗(NT)

(28) *Does Joe think that Eve is in love?*

(29) a. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}$(Eve loves in w' a linguist in w') YES

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b. *Joe thinks that Eve loves a linguist.* ✓(NT)

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b. *Joe thinks that Eve loves a linguist.* ✓(NT)

c. *Joe thinks/knows a linguist was at the party.* ✗(NT)

(28) *Does Joe think that Eve is in love?*

(29) a. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}$(Eve loves in w' a linguist in w') YES

b. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}$(Eve loves in w' a person dancing with Eve in w') YES

(30) *Does Joe think that a linguist was at the party?*

(31) a. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}$(a linguist in w' is at the party in w') YES

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b. *Joe thinks that Eve loves a linguist.* ✓(NT)

c. *Joe thinks/knows a linguist was at the party.* ✗(NT)

(28) *Does Joe think that Eve is in love?*

(29) a. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}$(Eve loves in w' a linguist in w') YES

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(30) *Does Joe think that a linguist was at the party?*

(31) a. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}$(a linguist in w' is at the party in w') YES

b. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}$(a person dancing with Eve in w' is at the party in w') unresolved

Property 2: No ambiguity between NT and NO

- In analogy to observations for *de re*: NT/NO do not use dedicated structures.
- Joe's NT belief is parallel to Bill's NO one and vice versa.

(32) a. SCENARIO 2: ...Bill has no idea if there were any linguists at the party, but Bill is convinced that Eve is in a relationship with a linguist. Joe thought all guests were biologists. Except for three linguists called Ann, Bea, and Cate, this was the case. Joe doesn't know them or their names. He saw each of them dancing with Eve, who he knows. So Joe thinks Eve and one of them are lovers but is not sure which of them it is. ...

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b. *Only Bill thinks that Eve loves a linguist.* ✗

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(32) a. SCENARIO 2: . . . Bill has no idea if there were any linguists at the party, but Bill is convinced that Eve is in a relationship with a linguist. Joe thought all guests were biologists. Except for three linguists called Ann, Bea, and Cate, this was the case. Joe doesn't know them or their names. He saw each of them dancing with Eve, who he knows. So Joe thinks Eve and one of them are lovers but is not sure which of them it is. . . .

b. *Only Bill thinks that Eve loves a linguist.* ✗

c. *Only Joe thinks that Eve loves a linguist.* ✗

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b. *Only Bill thinks that Eve loves a linguist.* ✗

c. *Only Joe thinks that Eve loves a linguist.* ✗

d. *Two guests think that Eve loves a linguist.* ✓

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b. *Only Bill thinks that Eve loves a linguist.* ✗

c. *Only Joe thinks that Eve loves a linguist.* ✗

d. *Two guests think that Eve loves a linguist.* ✓

- Generalizes to arbitrary NT/NO expressions. (appendix)
- The NO-construal contains any NT-construal and vice versa.

Consequences for an account of NT

- Account of NT must involve replacement of property.

[8] von Fintel and Heim 2011
[9] Kamp 1971, Cresswell 1990
[10] Keshet 2011, but cf also Groenendijk and Stokhof 1984
[11] Percus 2000, Schwarz 2012

Consequences for an account of NT

- Account of NT must involve replacement of property.
- Virtually all accounts of NT assume dedicated structures for NT over NO.
- They must be abandoned given parallelism.

(33) a. **Ambiguity in movement plus reconstruction approaches**[8]
[[a linguist] [λ_2 [Joe thinks that [a linguist]$_2$ loves Eve]]]
b. **Ambiguity in *ACTUAL*-operator approaches**[9]
[Joe thinks [a [(ACTUAL) linguist]] loves Eve]]]
c. **Ambiguity in world-parameter binding approaches**[10]
[Joe thinks [[a linguist] [λ_2 [$\wedge$ [[a linguist]$_2$ loves Eve]]]]]
d. **Ambiguity in extensional approaches**[11]
[Joe thinks w* that [a [linguist w/w*]] loves Eve]]]

Extensional frameworks permit NT via replacement of world pronouns. Must be blocked independently, or the semantic system is intensional.

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[8] von Fintel and Heim 2011
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Outline

Transparent interpretations of verbal properties

- Transparent construals claimed to be unavailable for verbal properties.[12]

(34) a. SCENARIO 3: Ann mistakenly believes that Bert is Joe's brother. She moreover mistakenly believes that Bert is American, while in fact he is Canadian.

b. *Ann thinks that Joe's brother is Canadian.* ✗ (cf. Percus 2000)

[12] Percus 2000, Schwarz 2012

[13] also cf. Fodor 1970, Schwager 2011, Sudo 2014

Transparent interpretations of verbal properties

- Transparent construals claimed to be unavailable for verbal properties.[12]

(34) a. SCENARIO 3: Ann mistakenly believes that Bert is Joe's brother. She moreover mistakenly believes that Bert is American, while in fact he is Canadian.
b. *Ann thinks that Joe's brother is Canadian.* ✗ (cf. Percus 2000)

- But with the right context this seems possible.[13]

(35) a. SCENARIO 4: Joe is American. He gives a party. Ann and Bea are among the guests. (. . .) Ann talks to three men at the party. She does not know their nationality, but all three are from Canada and are the only ones at the party from there. Ann is wrongly convinced one of them is Joe's brother but is not sure who. Joe has told Ann repeatedly that his whole family was born in the USA. He complains to his wife about how Ann doesn't seem to know anything about him. She later says: . . .
b. *Ann thinks that Joe's brother is Canadian.* ✓

[12] Percus 2000, Schwarz 2012
[13] also cf. Fodor 1970, Schwager 2011, Sudo 2014

Property 1: QUD dependence of transparent verbal properties

- A salient QUD in scenario 4 would be whether Ann knows Joe's nationality.
- In the context it would be resolved negatively with the utterance and its replacement.

(36) *Does Ann know Joe's nationality? (possible QUD in scenario 4)*

(37) a. $c + \lambda w.\forall w' \in \text{DOX}_{\text{Ann},w}$(Joe's brother in w' is Canadian in w') NO

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- A salient QUD in scenario 4 would be whether Ann knows Joe's nationality.
- In the context it would be resolved negatively with the utterance and its replacement.

(36) *Does Ann know Joe's nationality? (possible QUD in scenario 4)*

(37) a. $c + \lambda w.\forall w' \in \text{DOX}_{\text{Ann},w}$(Joe's brother in w' is Canadian in w') NO
b. $c + \lambda w.\forall w' \in \text{DOX}_{\text{Ann},w}$(Joe's brother in w' is one of the people Ann talked to at Joe's party in w') NO

Property 1: QUD dependence of transparent verbal properties

- A salient QUD in scenario 4 would be whether Ann knows Joe's nationality.
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(36) *Does Ann know Joe's nationality? (possible QUD in scenario 4)*

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b. $c + \lambda w.\forall w' \in \text{DOX}_{\text{Ann},w}$(Joe's brother in w' is one of the people Ann talked to at Joe's party in w') NO

- For scenario 3 it is not even clear what the QUD could be.
- Accommodating one will improve the sentence.
- This treatment subsumes the cases discussed under the header contextual equivalence, which arguably amount to equivalence wrt. the QUD (cf. Schwager 2011, Sudo 2014).

Property 2: No ambiguity between transparent and opaque construals

- $\text{DOX}_{\text{Bea},w} \subseteq \{w : \text{Joe's brother in } w \text{ is Canadian in } w\}$ (opaque)
- $\text{DOX}_{\text{Ann},w} \not\subseteq \{w : \text{Joe's brother in } w \text{ is Canadian in } w\}$ (transparent)

(38) a. SCENARIO 4: Joe is American. He gives a party. Ann and Bea are among the guests. Bea has been convinced for a long time that Joe and his family including his brother Bill are Canadian. She suspects Joe of claiming to be American because he has ambitions to run for president. Everyone knows about Bea's crazy beliefs. Ann talks to three men at the party. She does not know their nationality, but all three are from Canada and are the only ones at the party from there. Ann is wrongly convinced one of them is Joe's brother but is not sure who. Joe has told Ann repeatedly that his whole family was born in the USA. He complains to his wife about how Ann doesn't seem to know anything about him. She later says: . . .

b. *Only Bea thinks that Joe's brother is Canadian.* ✗

c. *Only Ann thinks that Joe's brother is Canadian.* ✗

d. *Two guests think that Joe's brother is Canadian.* ✓

Property 2: No ambiguity between transparent and opaque construals

- $\text{DOX}_{\text{Bea},w} \subseteq \{w : \text{Joe's brother in } w \text{ is Canadian in } w\}$ (opaque)
- $\text{DOX}_{\text{Ann},w} \not\subseteq \{w : \text{Joe's brother in } w \text{ is Canadian in } w\}$ (transparent)

(38) a. SCENARIO 4: Joe is American. He gives a party. Ann and Bea are among the guests. Bea has been convinced for a long time that Joe and his family including his brother Bill are Canadian. She suspects Joe of claiming to be American because he has ambitions to run for president. Everyone knows about Bea's crazy beliefs. Ann talks to three men at the party. She does not know their nationality, but all three are from Canada and are the only ones at the party from there. Ann is wrongly convinced one of them is Joe's brother but is not sure who. Joe has told Ann repeatedly that his whole family was born in the USA. He complains to his wife about how Ann doesn't seem to know anything about him. She later says: . . .

b. *Only Bea thinks that Joe's brother is Canadian.* ✗

c. *Only Ann thinks that Joe's brother is Canadian.* ✗

d. *Two guests think that Joe's brother is Canadian.* ✓

- Opaque and transparent properties are generally parallel to each other.

- In wide-scope, opaque construals (WO) descriptive material relativized to intensional operator, but quantificational material isn't.[14]
- $\text{DOX}_{\text{Abe},w} \not\subseteq \{w : \text{most terrorists } D \text{ in } w \text{ live on Abe's street in } w\}$

(39) a. SCENARIO 5: Abe and Bert live in the same neighborhood. They both falsely think it is full of terrorists. Both go to the police. Officer Bea shows them photos of people. For each photo, she asks them if the person on it is a terrorist and if they live on their respective street. When they are done, they are asked if there are terrorists in the neighborhood who are not on any of the photos, if they know how many people they identified as terrorists and how many of those as living on their streets. (...) Abe says no, he only knows he identified several as terrorists living on his street. Bea knows that Abe has identified 11 as terrorists in total and 7 of these as living on his street. Bea tells her colleague, who, like Bea, is worried about Abe and Bert going crazy. Bea:

b. *Abe believes that most terrorists live on his street.* ✓

c. $\lambda w.$most terrorists D in w live on Abe's street in w
$\lambda w.$several terrorists D in w live on Abe's street in w

((39a,b) adapted from Szabó 2010)

[14] Szabó 2010 but cf. Benbaji 2021 a.o.

(40) a. SCENARIO 6: . . . they are asked if there are terrorists in the neighborhood who are not on any of the photos, if they know how many people they identified as terrorists and how many of those as living on their streets. (. . .) Abe says no, he only knows he identified several as terrorists living on his street. Bea knows that Abe has identified 11 as terrorists in total and 7 of these as living on his street. Bea and her colleagues know that Abe does not mind the presence of terrorists in his neighborhood as long as the majority of them does not live on his street, which would make him move. A colleague asks Bea: So will Abe have to move? Bea:

b. *Abe believes that most terrorists live on his street.* ✗

Property 1: QUD-dependence of WO

(40) a. SCENARIO 6: . . . they are asked if there are terrorists in the neighborhood who are not on any of the photos, if they know how many people they identified as terrorists and how many of those as living on their streets. (. . .) Abe says no, he only knows he identified several as terrorists living on his street. Bea knows that Abe has identified 11 as terrorists in total and 7 of these as living on his street. Bea and her colleagues know that Abe does not mind the presence of terrorists in his neighborhood as long as the majority of them does not live on his street, which would make him move. A colleague asks Bea: So will Abe have to move? Bea:

b. *Abe believes that most terrorists live on his street.* ✗

(41) *Does Abe think that terrorists live on his street?* (Scenario 5)

Property 1: QUD-dependence of WO

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b. *Abe believes that most terrorists live on his street.* ✗

(41) *Does Abe think that terrorists live on his street?* (Scenario 5)

(42) a. $\lambda w.\forall w' \in \text{DOX}_{\text{Abe},w}$(most terrorists D in w' live on Abe's street in w') YES

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(40) a. SCENARIO 6: ...they are asked if there are terrorists in the neighborhood who are not on any of the photos, if they know how many people they identified as terrorists and how many of those as living on their streets. (...) Abe says no, he only knows he identified several as terrorists living on his street. Bea knows that Abe has identified 11 as terrorists in total and 7 of these as living on his street. Bea and her colleagues know that Abe does not mind the presence of terrorists in his neighborhood as long as the majority of them does not live on his street, which would make him move. A colleague asks Bea: So will Abe have to move? Bea:

b. *Abe believes that most terrorists live on his street.* ✗

(41) *Does Abe think that terrorists live on his street?* (Scenario 5)

(42) a. $\lambda w.\forall w' \in \text{DOX}_{\text{Abe},w}$(most terrorists D in w' live on Abe's street in w') YES

b. $\lambda w.\forall w' \in \text{DOX}_{\text{Abe},w}$(several terrorists D in w' live on Abe's street in w') YES

Property 1: QUD-dependence of WO

(40) a. SCENARIO 6: ...they are asked if there are terrorists in the neighborhood who are not on any of the photos, if they know how many people they identified as terrorists and how many of those as living on their streets. (...) Abe says no, he only knows he identified several as terrorists living on his street. Bea knows that Abe has identified 11 as terrorists in total and 7 of these as living on his street. Bea and her colleagues know that Abe does not mind the presence of terrorists in his neighborhood as long as the majority of them does not live on his street, which would make him move. A colleague asks Bea: So will Abe have to move? Bea:

b. *Abe believes that most terrorists live on his street.* ✗

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unresolved

Property 2: No ambiguity between WO and NO

- $\text{DOX}_{\text{Bert},w} \subseteq \{w : \text{most terrorists } D \text{ in } w \text{ live on Bert's street in } w\}$
- Bea knows Bert identified less than half of the alleged terrorists as living on his street

(45) a. SCENARIO 5: . . . they are asked if there are terrorists in the neighborhood who are not on any of the photos, if they know how many people they identified as terrorists and how many of those as living on their streets. Bert claims he identified 7 terrorists and of these 5 as living on his street. Bea knows that Bert identified 7 photos as showing terrorists and 3 of them as living on his street. Abe says no, he only knows he identified several as terrorists living on his street. Bea knows that Abe has identified 11 as terrorists in total and 7 of these as living on his street. Bea tells her colleague, who, like Bea, is worried about Abe and Bert going crazy. Bea:

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b. *Only Bert believes that most terrorists live on his street.* ✗

c. *Only Abe believes that most terrorists live on his street.* ✗

d. *Abe and Bert believe that most terrorists live on their streets.* ✓

- $\text{DOX}_{\text{Abe},w} \not\subseteq \{w : \text{most terrorists } D \text{ in } w \text{ live on Abe's street in } w\}$
- WO and NO beliefs are parallel to each other.

Generators everywhere because of generalized NDD?

- Given parallelism every meaningful lexical expression embedded under an attitude predicate would need to have concept generator G attached to it.

(46) *Abe thinks that most terrorists live on Bea's street.*

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Generalized NDD account

- NDD construals are a by-product of compositional interpretation.
- Special grammatical devices are not implicated in their generation.

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  $\mathcal{F}$ relativized to an assignment g, a context c, and the salient question under discussion Q.
- t-value for terminals determined relative to o-value by a context-sensitive 'salient-replacement-for' relation $\sim_c$.

(48) $\mathcal{F}^{g,c,Q} = \langle [\![\text{Ann}]\!]^o, [\![\text{Ann}]\!]^t \rangle \quad = \langle \lambda w.\text{Ann}, \{f : f \sim_c \lambda w.\text{Ann}\} \rangle$

(49) a. $[\![\text{Ann}]\!]^o = \lambda w.\text{Ann}$
b. $[\![\text{Ann}]\!]^t = \{\lambda w.\text{Ann}, \lambda w.\text{the person Eve danced with in } w, \ldots\}$

Composition without sensitivity to transparency value

- *o*- and $t-$ values for complex nodes computed in parallel, eventually derive pairs of propositions and sets of propositions (analogous to other uses of alternative semantics)[15]

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- Composition of the *o*-value employs FA, composition of the *t*-value pointwise FA.

(50) $\langle a, \{a, b\}\rangle_{\langle s,e\rangle}$ $\langle f, \{f, g\}\rangle_{\langle s,\langle e,t\rangle\rangle}$ $\langle f(a), \{f(a), f(b), g(a), g(b)\}_{\langle s,t\rangle}\rangle$

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Composition with sensitivity to transparency value

- *Believe* quantifies existentially over the elements of its complement's *t*-value
  (and also stops further projection of *t*-value)

(52) **a believes S** $\rightsquigarrow$ a believes at least one element of $[\![S]\!]^t$ (to be revised)

$\mathcal{F}^{g,c,Q}(believe\ S) = \langle \lambda w.\lambda x.\exists p \in [\![S]\!]^t(\forall w' \in \text{DOX}_{x,w}(p(w'))), \{\lambda w.\lambda x.\exists p \in [\![S]\!]^t(\forall w' \in \text{DOX}_{x,w}(p(w'))\}\rangle$

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b. $[\![\text{(54a)}]\!]^o = \lambda w.\exists p \in \{\lambda w'.\text{Eve loves Ann in } w',$
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- Existential quantification over alternative propositions by *believe* captures parallelism.
- *Only* negates both the *de dicto* and the *de re* 'construal'.

(55) a. *believes that Eve loves Ann*
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Capturing QUD-sensitivity

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- This differentiates between our examples as discussed.

Outline

This is too permissive

- The proposal overgenerates NDD-construals (Mitya Privoznov, Nina Haslinger, pc).
- The QUD-constraint is satisfied by both (57b) and (57c).

(57) a. SCENARIO 7: Joe went to a party. Ann and Eve were among the guests. Joe recognizes Eve, but does not recognize Ann (...) He saw them dancing with each other and thinks Eve and the person he saw her dancing with are lovers. Bea was also there. Joe does not know her. He saw her briefly talking with the host. There was discussion about Eve's relationship status. No other guest has an opinion about it.

b. *Joe thinks Eve loves Ann.* ✓

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b. *Joe thinks Eve loves Ann.* ✓

c. *Joe thinks Eve loves Bea.* ✗

(58) a. Does Joe think Eve is in love?

b. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}$(Eve loves Ann in w') YES

c. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}$(Eve loves Bea in w') YES

d. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}$(Eve loves in w' the person dancing with Eve in w') YES

Restricting replacement by overlap in world of evaluation

- Following standard assumptions about *de re* the replaced meaning and its alternative must be co-extensional in w_c in the case of individual denoting expressions.
- Otherwise the intersection between the values of the concepts in w_c must be non-empty.

Overlap requirement on 'salient-replacement-for' relation $\sim_c$ (to be modified)

For any context c, $f \sim_c g$ iff $f(w_c)$ and $g(w_c)$ overlap.

- If $f, g \in D_{\langle s,e \rangle}$, $f(w_c)$ and $g(w_c)$ overlap iff $f(w_c) = g(w_c)$.
- If $f, g \in D_{\langle s, \ldots \langle \tau, t \rangle \rangle}$, f and g overlap iff $f(w_c) \cap g(w_c) \neq \varnothing$.

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(59)
a. $[\lambda w.\text{Ann}](w_c) = [\lambda w.\text{the person Eve danced with in } w](w_c)$
b. $\lambda w.\text{the person Eve danced with in } w \sim_c \lambda w.\text{Ann}$
c. $\lambda w.\text{the person Eve danced with in } w \in [\![\text{Ann}]\!]^t$

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b. $\lambda w.\text{the person Eve danced with in } w \sim_c \lambda w.\text{Ann}$
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(60) a. $[\lambda w.\text{Bea}](w_c) \neq [\lambda w.\text{the person Eve danced with in } w](w_c)$
b. $\lambda w.\text{the person Eve danced with in } w \not\sim_c \lambda w.\text{Bea}$
c. $\lambda w.\text{the person Eve danced with in } w \notin [\![\text{Bea}]\!]^t$

NDD with empty/undefined extension[16]

- There is no building with 192 floors in this world.
- $[\lambda w.\lambda x.x$ is a building with 192 floors in $w](w_c) \cap [\lambda w.\lambda x.x$ is a building one floor taller than Burj Khalifa in $w](w_c) = \varnothing$
- Still replacement for NT seems possible.

(61) a. SCENARIO 9: Abe is looking at the Burj Khalifa. Not knowing that it has 191 floors and is the world's tallest building, he thinks: 'I want to buy a building that's one floor taller'.

b. *Abe wants to buy a building with 192 floors.* ✓

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b. *Abe wants to buy a building with 192 floors.* ✓

- This extends to *de re*.
- There are no superheroes in our world.
- $[\lambda w.\text{Superman}](w_c) \neq [\lambda w.\text{the superhero called Clark Kent } w](w_c)$

(62) a. SCENARIO 10: Ann is quite confused. She saw a Superman movie. Afterwards she cannot tell fact from fiction. She decides she will marry the superhero called Clark Kent. Moreover she is not sure anymore if superhero Clark Kent is Superman, Batman, or Spiderman. Carol knows all this and says:
b. *Ann wants to marry Superman.* ✓

[16] Schwager 2011, also for example (61), a.o.

- Maybe overlap is checked for revised contexts.[17]
- In case both the expression to be replaced and its replacement denote in w_c, the null revision is used for checking.

Overlap requirement on ‘salient-replacement-for’ relation $\sim_c$ (final)

- For any context c, and functions f and g, the revision of c for f and g is defined as:
  - $Rev_{f,g}(c) = c$ if all $w \in c$, $f(w), g(w) \neq \#$ and $f(w), g(w) \neq \varnothing$, or else
  - $Rev_{f,g}(c) = X$ where $c \subseteq X$ and $\exists w \in X.f(w), g(w) \neq \#$ and $f(w), g(w) \neq \varnothing$.

  (cf. Heim 1992)
- For any context c, $f \sim_c g$ iff there is an X such that $X \subseteq Rev_{f,g}(c)$ and for all $w \in X$, $f(w)$ and $g(w)$ overlap.

[17] also cf. Benbaji t.a., based on van Fraassen 1979

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- Assume a superset X of c for scenario 10 with $w \in X$ such that there is a building one floor taller than Burj Khalifa in w.
- This guarantees that there is a $Y \subseteq X$ such that for all $w \in Y$, $\lambda x.x$ is a building with 192 floors in $w \cap \lambda x.x$ is a building one floor taller than Burj Khalifa in $w \neq \varnothing$.

[17] also cf. Benbaji t.a., based on van Fraassen 1979

Revision of context set

- Maybe overlap is checked for revised contexts.[17]
- In case both the expression to be replaced and its replacement denote in w_c, the null revision is used for checking.

Overlap requirement on 'salient-replacement-for' relation $\sim_c$ (final)

- For any context c, and functions f and g, the revision of c for f and g is defined as:
  - $Rev_{f,g}(c) = c$ if all $w \in c$, $f(w), g(w) \neq \#$ and $f(w), g(w) \neq \varnothing$, or else
  - $Rev_{f,g}(c) = X$ where $c \subseteq X$ and $\exists w \in X.f(w), g(w) \neq \#$ and $f(w), g(w) \neq \varnothing$.

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- This immediately extends to the superhero *de re* case.
- In all other cases considered the null revision is used and nothing changes.

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- quantification is restricted, *qua* the lexical meaning of the intensional operator, by the QUD-constraint

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- co-dependency/ binding[19],

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Open questions

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- why NDD-construals are usually hard to access – are there general constraints?,

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Outline

Replacement constrained by acquaintance?

- Replacement on *de re* is traditionally also constrained by acquaintance.
- Kaplan's 1968 shortest spy problem: λw.Mia cannot be replaced with the shortest-spy concept because Ann is not acquainted with Mia.[22]

(63) a. SCENARIO 11: Ann believes there is a shortest spy. Mia, who Ann is not acquainted with, is in fact the shortest spy.
b. *Ann knows/believes that Mia is a spy.* ✗

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- But the QUD constraint is also not satisfied in (63), even with contextual information.

(64) a. $c \subseteq \{w$: Ann believes there is a shortest spy in $w \wedge$ Mia is the shortest spy in $w \wedge$ Ann does not know and has never heard of Mia in $w\}$

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- Possibly [λw.Ann] gets replaced by [λw.the passengers on flight AF62 in w]
- Co-extentensionality should then be relativized to parthood, a subcase of overlap.

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We thank ...

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(Appendix) QUD-constraint: specification

- there is more than one type of question which an attitude report can address (see Benbaji t.a. for the same point wrt similar phenomena)[25]
  - subject's internal state **a thinks that p** relativized to *c* addresses a question about *a*, i.e., **whether a Ps?** we saw an application of this
  - embedded content: **a thinks that p** relativized to *c* addresses a general question not about *a*, i.e., **whether p?**

In our context, QUD *Was Ann at the party?* won't arise: answer already entailed by the context

(69) a. SCENARIO 1: Joe and Bill went to a party. Ann and Eve were among the guests.Joe recognizes Eve, but does not recognize Ann (...) He saw them dancing with each other and thinks Eve and the person he saw her dancing with are lovers. . .

b. *Joe believes Ann was at the party.* ✗

- *c* can contain information about subject's belief state that is considered relevant[26]
- In scenario 1 no information about Joe's belief state permitting us to add that Joe believes that Ann is the person Eve danced with.
- Reason why we obtain different answers for *Does Joe believe Ann was at the party?*

[25] Simons et al 2010, 2016, Beaver et al 2017 a.o. cf. also Lyons 1977

[26] Heim 1992 a.o.

(Appendix) Parallelism for *de re*/*de dicto* generalized

In (70a) Joe has a *de re* belief about Ann and Eve, and Bill a *de dicto* belief about both.

(70) a. SCENARIO: Joe and Bill went to a party. Ann and Eve were among the guests. Joe did not recognize either (...). So he thinks the two people he saw dancing with each other are lovers. Bill knows both Ann and Eve well. He didn't see them together at the party. Still, he is convinced Eve and Ann are a couple. There was discussion about Eve's and Ann's relationship statuses. No other guest has an opinion about either.

b. *Only Joe thinks that Eve loves Ann.* ✗

c. *Only Bill thinks that Eve loves Ann.* ✗

d. *Two guests think that Eve loves Ann.* ✓

(Appendix) Parallelism for NT/NO generalized

For Joe both linguist and biologist construed transparently, for Bill both construed opaquely.

(71) a. SCENARIO: Joe and Bill went to a party. Joe thought the guests were all linguists. There were six linguists there. The rest were biologists (Ann, Bea, Cate) and psychologists (Daria, Eve, Fran). Joe doesn't know their names. He saw Ann dancing with Daria, Bea with Eve, and Cate with Fran. He comes to think that one these pairs must be a couple but is not sure which of them. Bill wrongly thinks that the six linguists are actually three biologists and three psychologists. For some reason he comes to think that one of the former is involved with one of the latter.

b. *Only Joe thinks that a psychologist is involved with a biologist.* ✗

c. *Only Bill thinks that a psychologist is involved with a biologist.* ✗

d. *Two guests think that a psychologist is involved with a biologist.* ✓

(Appendix) No ambiguity and double vision

- Apparent support for ambiguity: version of double vision[27]
- (72b) given as non-contradictory in scenario (72a).
- Assume different replacement alternatives for the conjuncts, i.e., (72a) and not (72b)
- Not implausible to assume that there are different QUDs for each conjunct, which would make asymmetric *t*-sets as quantificational domain for $[\![\textit{believe}]\!]$ feasible.

(72) a. SCEN: Roy saw a man at the beach; he thinks he is a spy. He saw a man in the town hall; he thinks he is not a spy. He fails to recognize they are the same man, Ortcutt.
b. *Roy believes Ortcutt is a spy and doesn't believe that Ortcutt is a spy.* ?/% ✓

(73) a. $[\![O_1]\!]^t = \{\lambda w.O, \lambda w.\text{ the man on the beach in } w\}$
$[\![O_2]\!]^t = \{\lambda w.O, \lambda w.\text{ the man in the town hall in } w\}$
b. $[\![O_1]\!]^t = [\![O_2]\!]^t$
$= \{\lambda w.O, \lambda w.\text{ the man in the town hall in } w, \lambda w.\text{ the man on the beach in } w\}$

- Analogous mechanism arguably also needed for other context-dependent cases (also similar behavior wrt judgments, modifiers...)

(74) *Joe is both tall and not tall.* ?/% true[28]

[27] Quine 1956
[28] Alxatib and Pelletier 2011 a.o.

(Appendix) No need for wide scope existential quantification over replacements

- If the first sentence in (75b) says that there is no concept for Ann such that in all of Joe's doxastic alternatives w' Eve loves the value for this concept in w', why is the sequence acceptable?
- $[\![\text{Ann}]\!]^t$ is restricted to not contain λw.the person Joe saw Eve dancing with in w].
- Possibly a similar reading is available with *only*.
- The prosodic contour is similar to the one referred to as metalinguistic negation.

(75) a. SCENARIO 1: Joe and Bill went to a party. Ann and Eve were among the guests. Bill knows both Ann and Eve well. He didn't see them together at the party. Still, he is convinced Eve and Ann are a couple. Joe recognizes Eve, but does not recognize Ann (...) He saw them dancing with each other and thinks Eve and the person he saw her dancing with are lovers. . . .

b. *Joe doesn't think Eve loves Ann. He thinks she loves the person he saw her dancing with.* ✓

c. *Only Bill thinks that Eve loves Ann. Joe thinks that Eve loves the person he saw her dancing with.* ✓

(Appendix) Overlap requirement too permissive?

- Replacement in (76b) is allowed in scenario (76a).
- $[\lambda x.x \text{ is a butcher in } w_c] \cap [\lambda x.x \text{ is a student in } w_c] \neq \varnothing$.
- $\text{DOX}_{\text{Joe},w} \subseteq \{w : \forall x[x \text{ is a student in } w \rightarrow x \text{ is at the party in } w]\}$.
- Why is (76b) unacceptable in (76a)?

(76) a. SCENARIO 8: There are three butchers (Ann, Bea, Cate), of who Joe does not know that they are butchers. He believes that there are three linguists (Ann, Bea, Dan) and that they are all at the party.

b. *Joe thinks that every butcher is at the party.* ✗

- The salient QUD is not resolved in the same way, however.

(77) a. Does Joe think every butcher is at the party?

b. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}(\forall x[x \text{ is a butcher in } w' \rightarrow x \text{ is at the party in } w'])$ YES

c. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}(\forall x[x \text{ is a student in } w' \rightarrow x \text{ is at the party in } w'])$ unaddressed

(Appendix) No replacement with uncertainty in context

- In (78a), either Ann or Bea is the person Joe saw Eve dancing with.
- [λw.Ann], [λw.Bea], and [λw.the person Joe saw Eve dancing with in w] are all defined for any world in c. I.e., c is used for checking overlap.
- There is $X \subseteq c$ such that [λw.Ann] is co-extensional with [λw.the person Joe saw Eve dancing with in w] in all worlds in X and similarly for and [λw.Bea].

(78) a. SCENARIO: Joe went to a party. Ann, Bea, and Eve were among the guests. Joe recognizes Eve, but does not recognize Ann or Bea (and does not think Eve knows Ann or Bea). He saw Eve dancing with someone and thinks Eve and the person he saw her dancing with are lovers. We know that this person was either Ann or Bea.
b. *Joe thinks that Eve loves Ann.* ✗
c. *Joe thinks that Eve loves Bea.* ✗

- $Rev_{f,g}(c)$ when not null is arrived at by mapping the worlds w in c to the set of worlds w' in which f and g are defined and non-empty and that are otherwise like w.
- The 'salient-replacement-for' relation can always look at all the worlds in $Rev_{f,g}(c)$.

(79) For any context c, and functions f and g, the revision of c for f and g is defined as:
a. $Rev_{f,g}(c) = c$ if all $w \in c$, $f(w), g(w) \neq \#$ and $f(w), g(w) \neq \varnothing$, or else
b. $\{h(w) \mid w \in c$ and $h(w)$ is like w except that $f(h(w)), g(h(w)) \neq \#$ and $f(h(w)), g(h(w)) \neq \varnothing\}$

(80) For any context c, $f \sim_c g$ iff for all $w \in Rev_{f,g}(c)$, $f(w)$ and $g(w)$ overlap.

(Appendix) Variant of shortest-spy

- Examples like (81) are sometimes acceptable without simply answering the question 'Is Ann crazy?' – which is all we seem to predict based on (82).

(81) *Ann doesn't know/believe that the shortest spy is a spy.*

(82) Ann doesn't believe any element of {**the shortest spy is a spy**, . . . }

(83) *C* : *So, Ann has no idea that Mia is a spy. She thinks she is a gymnast.*
D: *I see. So **she doesn't know/believe the shortest spy is a spy**.* ✓

- Relevant information about the belief state could be added to the alternatives (contra Blumberg and Lederman 2021, where revision would involve material outside the belief state)

⇒ Would predict that sentence is acceptable in (83).

(84) Ann doesn't believe any element of {**Mia a spy & is the shortest spy is a spy**, . . . }

Given the relevance of the QUD assumed, subtle variations of acceptability of NDD-construals are expected – not investigated, to our knowledge

(Appendix) Modifying the QUD condition

- The definedness condition of *believe* incorporating the QUD-condition must be modified.
- It needs to allow for questions that are not directly about the subject's beliefs.

(85) A sentence α *believes* ϕ is only defined in *c* if
$c +$ **that for some** $p \in [\![\phi]\!]^t$**,** α **believes** *p*
resolves the QUD in the same way as
$c +$ **that** α **believes** $[\![\phi]\!]^o$
would.

$\mathcal{F}^{g,c,Q}(\textit{believe}\ S)(\langle a, \{a\}\rangle)$ (final)
defined if $\exists q \in Q(c \cap \lambda w''.\exists p \in [\![S]\!]^t(\forall w' \in \text{DOX}_{a,w''}(p(w'))) \subseteq q \wedge c \cap \lambda w''.\forall w' \in \text{DOX}_{a,w''}([\![S]\!]^o(w')) \subseteq q))$
if defined,
$\mathcal{F}^{g,c,Q}(\textit{believe}\ S)(a) =$
$\langle \lambda w.\exists p \in [\![S]\!]^t(\forall w' \in \text{DOX}_{a,w}(p(w')), \{\lambda w.\exists p \in [\![S]\!]^t(\forall w' \in \text{DOX}_{a,w}(p(w'))\}\rangle$

(Appendix) Contradictory complements and the QUD-constraint

- Our proposal derives non-contradictory alternatives for (86).

(86) a. SCENARIO 13: Ann, Bea and Carl won their competitions. Joe falsely thinks that at least one of them lost.
b. *Joe thinks one of the winners lost.* ✓
c. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}(\exists x(x \in \text{winner in } w' \;\&\; x \text{ is lost in } w'))$
d. $\lambda w.\forall w' \in \text{DOX}_{\text{Joe},w}(\exists x(x \in \text{one of Ann, Bea and Carl in } w' \;\&\; x \text{ is lost in } w'))$

- The QUD-constraint predicts that (86c) (Joe's believing the contradiction) answers the QUD in the same way as (86d).
- QUD in (87)– specification of (86a) something along the lines of
'Does Joe believe something implausible/absurd?'

(87) SCENARIO 13': Ann, Bea and Carl are top athletes. As was completely expected, they each won their competitions. Joe saw them beforehand and thought they were weak competitors; he didn't follow the competition but is sure at least one of them lost.

- More generally, 'Does Joe know that Ann, Bea and Carl won?' is answered negatively by both the utterance (given Joe's empty belief state) and the replacement version.