

Belief Report Basics

Uli Sauerland, ZAS — EGG Brno August 2007

General info

Instructor: Uli Sauerland (uli@alum.mit.edu)

homepage: <http://www.zas.gwz-berlin.de/mitarb/homepage/sauerland/>

Rough schedule for the week:

Monday: Possible worlds, de re vs. de dicto, Percus's constraint

Tuesday: de re vs. de se, LF of de re, LF of de se, constraints on dreams

Wednesday: shiftability

Thursday: non-finite complements, dependent tense

Friday: embeddability, modal subordination, parenthetical, embedded speech acts

Questions throughout are very welcome!

1 Basic Analysis of Belief Reports

Truth alone is not enough to describe the semantics of embedded clauses.

- (1)
 - a. John believes that it is raining.
 - b. John believes that Brno is in the Czech Republic.

Possible worlds

Possible worlds are a concept to describe knowledge:

- (2) A possible world is any imaginable complete state of knowledge.

(Philosophical views of possible worlds may differ).

Sentences can be characterized as sets of possible worlds (or equivalently, one place functions): *Propositions*

- (3) a. $\{w \mid \text{It is raining in } w\}$
 b. $\{w \mid \text{Brno is in the Czech Republic in } w\}$

Intensional vs. Extensional Treatment of Worlds:

- (4) a. intensional, as a parameter of the evaluation procedure:
 $\llbracket \text{---} \rrbracket^{w,g}$ evaluation procedure with world parameter
 $\llbracket \text{raining} \rrbracket^{w,g} = 1$ iff. it is raining in w
 $\llbracket \wedge \text{XP} \rrbracket^{w,g} = [\lambda w' . \llbracket \text{XP} \rrbracket^{w',g}]$
 b. extensional, syntactically represented:
 $\lambda w \text{ it is raining}(w)$

Believe

The knowledge of an individual can also be characterized as a set of possible worlds.

- (5) $\text{Dox}(\text{John}, w) = \{w' \mid \text{for all John knows in } w, w' \text{ could be the actual world}\}$

Possible worlds quantification analysis (Hintikka, 1962):

- (6) intensional entry:
 $\llbracket \text{believe} \rrbracket^w(x)(p) = 1$ iff. $\forall w' \in \text{Dox}(x, w): p(w') = 1$
 (7) extensional entry:
 $\llbracket \text{believe} \rrbracket(x)(p)(w) = 1$ iff. $\forall w' \in \text{Dox}(x, w): p(w') = 1$

Hyperintensionality

The possible worlds analysis predicts closure of beliefs under entailment.

- (8) a. Kai believes that it's raining and cold.
 b. Hence, Kai believes that it's raining.

However, logical closure doesn't hold for more complex inferences:

- (9) a. Kai believes that the basic laws of arithmetic hold.
 b. #Hence, Kai believes that there are infinitely many prime numbers.

I put this aside since I don't know how mathematical statements are conceptualized.

Individuals and Worlds

Kripke:

(10) an individual can be parts of multiple possible worlds

Lewis:

(11) an individual can only ever be part of one possible world; it may have counterparts in other worlds though

For concreteness, we follow Kripke for the time being.

2 *de re*-Interpretation

(12a) and (12b) would incorrectly entail that Ralph has contradictory beliefs:

(12) Quine (1956)

- a. Ralph believes that Ortcutt is a spy.
- b. Ralph believes that Ortcutt is not a spy.

Kaplan (1968) analysis (with a “res-extraction”-syntax):

- (13)
- a. intuition: Ralph believes of Ortcutt that he is (not) a spy.
 - b. intensional: Ralph believes (Ortcutt) ($\lambda x \wedge$ that x is (not) a spy)
 - c. extensional: λw Ralph believe(w) (Ortcutt) ($\lambda x \lambda w'$ that x is (not) a spy(w'))
- (14) $\llbracket \text{believe}_{\text{res}} \rrbracket^w(y)(P)(x) = 1$ (intensional) or $\llbracket \text{believe}_{\text{res}} \rrbracket(y)(P)(x)(w) = 1$ (extensional) iff.
- a. there's an acquaintance relation R such that $R(x,y,w)$
 - b. and $\forall w' \in \text{Dox}(x, w): \exists !y' R(x,y',w') P(w')(y) = 1$

The need for vivid acquaintance: (15a) and (15b) are not actually felt to entail (15c), but that is predicted by (14).

- (15)
- a. James is the shortest spy.
 - b. Ralph believes that the shortest spy is a spy.
 - c. #Hence, Ralph believes that James is a spy.

Kaplan's fix:

- (14) c. the acquaintance relation R must be *vivid*

3 *de dicto*-Interpretation

The *de dicto*-interpretation doesn't require any reference in the actual world:

- (16) a. Ralph believes that his guardian angel has a cold.
b. #Ralph believes of his guardian angel that he has a cold.

Indefinites also allow both a *de re*- and a *de dicto*-Interpretation:

- (17) a. Lina believes that a spy is the best man in her unit.
b. #Lina believes of a spy that he is the best man in her unit.
- (18) a. Ralph believes that a unicorn ate his flowers.
b. #Ralph believes of a unicorn that it ate his flowers.

The *de dicto*-interpretation is represented intensionally as in (19a) and extensionally as in (19b).

- (19) a. Ralph believes \wedge (a unicorn ate his flowers)
b. λw Ralph believes(w) ($\lambda w'$ a unicorn(w') ate(w') his flowers(w'))

Terminological remark

I have seen the following terms used:

- (20) a. instead of *de re*: transparent, wide scope
b. instead of *de dicto*: opaque, narrow scope

The transparent/opaque distinction is also used for cases like (21):

- (21) John seeks a unicorn.

4 Syntactic representation

4.1 Locality?

On the intensional analysis, the *de re* interpretation must be captured by movement.

- (22) intensional: Ralph believes (Ortcutt) ($\lambda x \wedge$ that x is (not) a spy)

De re interpretations, however, seem unrestricted by locality:

- (23) Ralph believes that he would have died if Orcutt had seen him.
(24) The policewoman thinks Ralph believes a spy killed a philosopher.

4.2 Percus's Constraint

The extensional approach unconstrained predicts unavailable readings (Percus, 2000):

Scenario: Participant A is the sky-high favorite in the race, while participant B is expected to come second. But, participant A injures himself just before the race and cannot participate. B wins the race. The next morning, John briefly skims the paper and sees the names of A and B, but doesn't read on. He assumes that A won as expected, and B came second.

- (25) a. #John believes that the second-placed won.
b. John believes that the winner came second.

Unavailable extensional analyses:

- (26) λw John believes(w) $\lambda w'$ the second-placed(w') won(w)

Generalization:

- (27) The world variable that a verb selects for must be coindexed with the nearest λ above it.

Similar constraint with conditionals:

- (28) If every semanticist owned a villa in Tuscany, what a joy this world would be.
(29) a. available: If all actual semanticists were villa-owners, ...
b. unavailable: If the actual villa-owners were all the semanticists, ...

4.3 Further Constraints

Percus's Generalization Y

Scenario: Participant A is the sky-high favorite in the race, while participant B is expected to come second. But, participant A injures himself during the race and limps through the goal supported by B. The referee council is still deliberating who should be considered the winner. The next morning, Mary briefly skims the paper and sees the names of A and B, but doesn't read on. She assumes that A won as expected, and B came second.

- (30) #Mary believes that the second-placed possibly won.

Unavailable extensional analyses:

- (31) λw Mary believes(w) $\lambda w'$ the second-placed(w') possibly(w) $\lambda w''$ won(w'')

Generalization

- (32) The world variable that an adverbial quantifier selects for must be coindexed with the nearest λ above it.

Adjectives

- (33) a. #John believes that an unsuccessful winner triumphed.
b. #John believes that a successful loser triumphed.

Unavailable extensional analyses:

- (34) a. λw John believes(w) $\lambda w'$ an unsuccessful(w) winner(w') triumphed(w')
b. λw John believes(w) $\lambda w'$ a successful(w') loser(w) triumphed(w')

Generalization (Sauerland?):

- (35) The world variable that an attributive adjective selects for must be coindexed with that of the noun it modifies.

Number-Marking

Scenario: Kai hears noises from the basement and assumes that there are two monsters in the basement. Actually, his mother is down there making the noises.

- (36) a. Kai believes the monsters are dangerous.
b. Kai believes his mother is dangerous.
c. #Kai believes the monster is dangerous.
d. #Kai believes his mothers are dangerous.

Generalization (Sauerland, 2003):

- (37) The world variable that a number morpheme selects for must be coindexed with that of the noun it is attached to.

References

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