HS: Idioms, SoSe 2013

Tutorial "Semantics"

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based on material created by Marthe, Elisabeth, Isabelle, Lisa, WiSe 2012/13

Nov 19-11:45

Content

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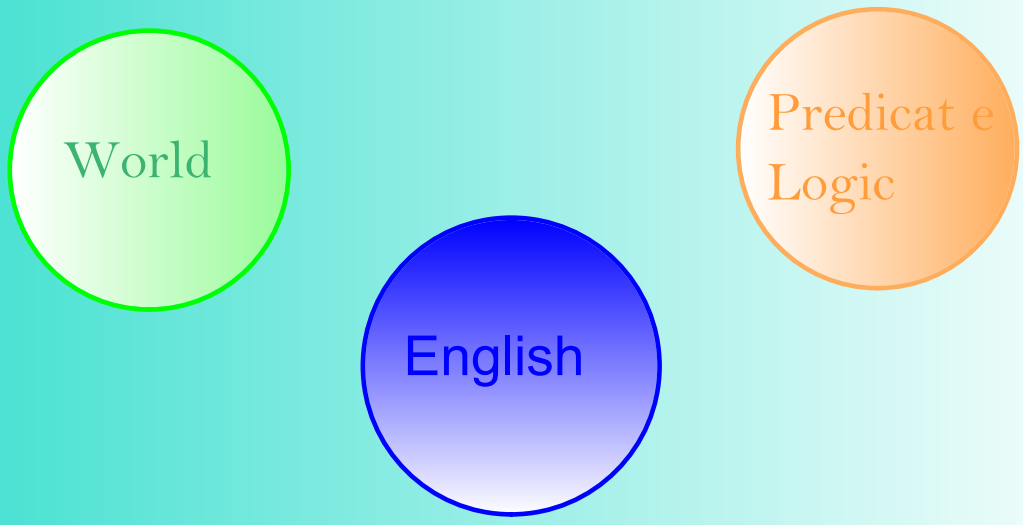
1. Predicate Logic

Defintion: The purpose of Predicate Logic is to avoid ambiguity by forming formulae out of natural language.



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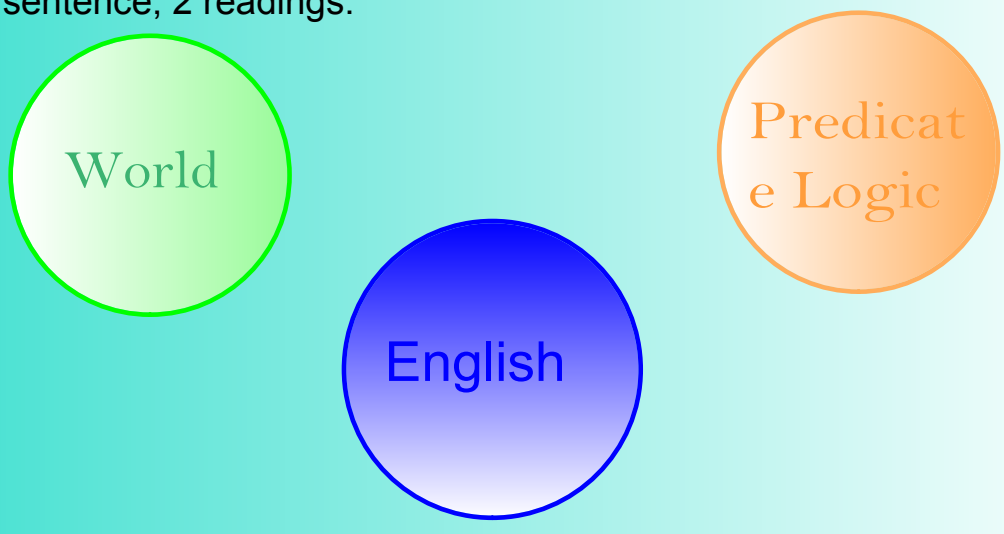
1. Predicate Logic

Defintion: The purpose of Predicate Logic is to avoid ambiguity by forming formulae out of natural language.

2 sentences, 1 reading:

1 sentence, 2 readings:



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Truth conditional semantics

We represent the conditions under which a statement is true.

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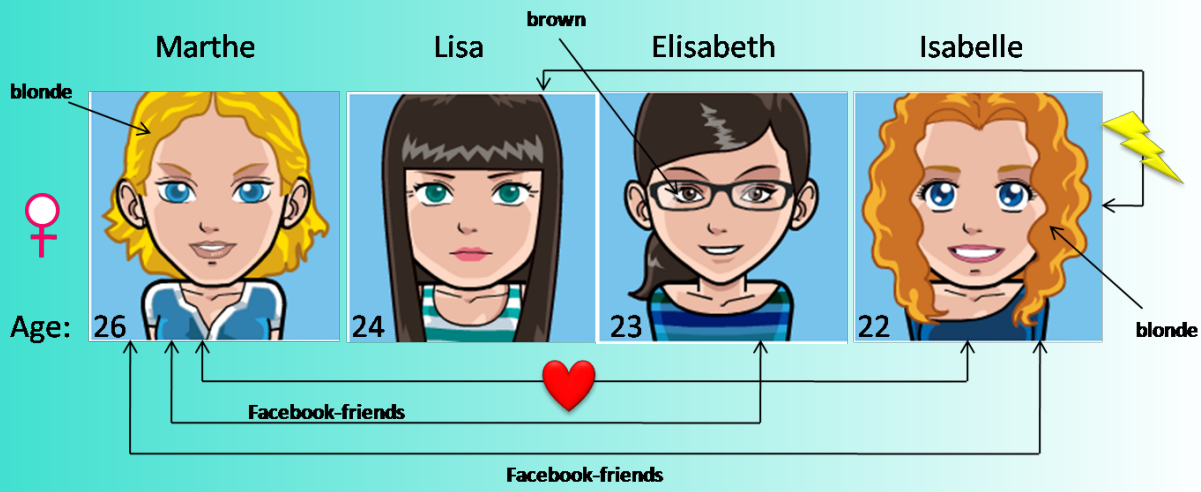
2. Definition of "Our World"



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Universe U = { LRRH , GM , BW}

Properties { < LRRH >, < GM > }

{ < LRRH > } { < BW > }

Relations { < LRRH, BW > } { < LRRH, GM > }

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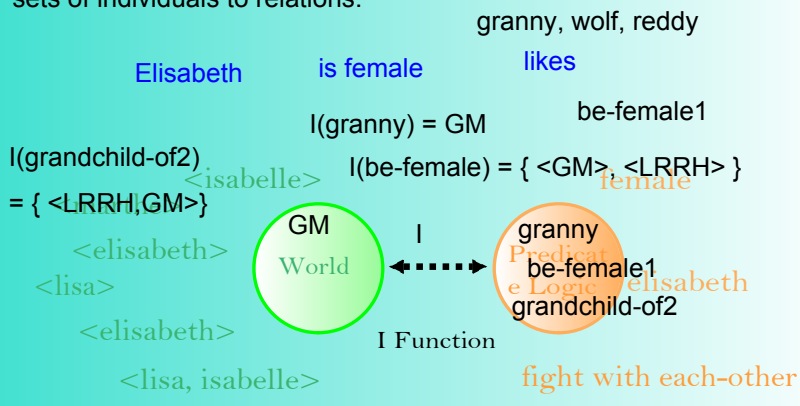
3. The Interpretation Function (I Function)

Definiton: The I Function maps each name of the logical language to one individual from the universe. It maps individuals to properties and sets of individuals to relations.



Names:

Properties:

Relations:

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4. Formulae

Definition: Formulae are expressions of logical language /predicate logic that can be interpreted as true or false according to the definition of the "World". They can be used to state the truth conditions of sentences.

Sentence: Elisabeth and Lisa are facebook friends.

Formula: facebook-friends(elisabeth,lisa)

Interpretation: [[facebook-friends(elisabeth,lisa)]] =

be-female1(wolf)

grandchild-of2(reddy,granny)

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[[grandchild-of2(reddy,granny)]] = true

iff the pair consisting of the interpretation of "reddy" and the interpretation of "granny" is an element of the interpretation of "grandchild-of2".

Since this is the case, the formula is true.

[[be-female1(wolf)]] = true

iff (the list containing) the interpretation of "wolf" is an element of the interpretation of "be-female1".

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Task 1

Which of the following expressions are formulae? Put them in the right box.

formulae

no formulae

blonde(lisa, elisabeth)

brown-eyes (marthe)

love-each-other (marthe)

isabelle

female

fight-with-each-other (lisa,isabelle)

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5. Interpretation of formulae - Illustration

facebook-friends (elisabeth,lisa)

$[\![$ facebook-friends (elisabeth,lisa) $]\!]$ = false

because

I (elisabeth) = elisabeth,

I (lisa) = lisa

and <elisabeth,lisa> is NOT in the set I(facebook-friends).

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Task 2

Read the story and try to create two formulae out of it. Then interpret them according to our World as true or false.

- These are Lisa, Marthe, Isabelle and Elisabeth with the brown eyes.

  Isabelle bought some ugly shoes at Zalando. Therefore, Lisa and Isabelle are fighting. Elisabeth and Lisa are facebook friends.

  They gossip about Isabelle´s ugly shoes with facebook messenger.

  Marthe visits Isabelle and comforts her.

  She loves her despite her ugly shoes.

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Examples:

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6. The G Function

Definition: The G Function maps variables to individuals.

Elisabeth and Lisa are facebook friends.

facebook-friends (elisabeth,lisa) use of the I Function

She is a facebook facebook friend of her.

facebook-friends (x,y) we need the G Function

g(x) = elisabeth g(y) = lisa

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variables:

Little Redriding Hood is the wolf's afternoon snack.

afternoon-snack-of2(reddy,wolf)

Littel RrHood is his afternoon snack.

afternoon-snack-of2(reddy,x)

[[afternoon-snack-of2(reddy,x)]]g

g(x) = BW

g'(x) = GM

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7. Logical Connectives

Definiton: Logical connectives are necessary to interpret sentences with "and", "or", "if...then" and "not".

AND Symbol:

Sentence: Lisa is blonde and Elisabeth is female.

[[blonde (lisa) female (elisabeth)]] = true/false

Truthtable "AND"

Sentence I p	Sentence II q	Sentence I ∧ Sentence II p ∧ q	
1	1		1
1	0		0
0	1		0
0	0		0

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OR Symbol: V

Sentence: Lisa is blonde or Elisabeth is female.

[[blonde (lisa) V female (elisabeth)]] = true/false

Truthtable "OR"

Sentence I p	Sentence II q	Sentence I V Sentence II p V q	
1	1		1
1	0		1
0	1		1
0	0		0

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IF...THEN Symbol: ⊃ →

Sentence: If Lisa is blonde then Elisabeth is female.

[[blonde (lisa) ⊃ female (elisabeth)]] = true/false

Truthtable "IF....THEN"

Sentence I p	Sentence II q	Sentence I --> Sentence II p --> q	
1	1		1
1	0		0
0	1		1
0	0		1

ex falso quod libet

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NOT Symbol: ¬

Sentence: Lisa is not blonde.

[[¬ blonde (lisa)]] = true/false

The original formula has to be FALSE so that the overall statement is true.

If [[blonde(lisa)]]= false, [[¬ blonde (lisa)]]= true.

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8. Interpretation of formulae with connectives - Illustration

Formula: [[blonde(lisa) V female(elisabeth)]] = ?

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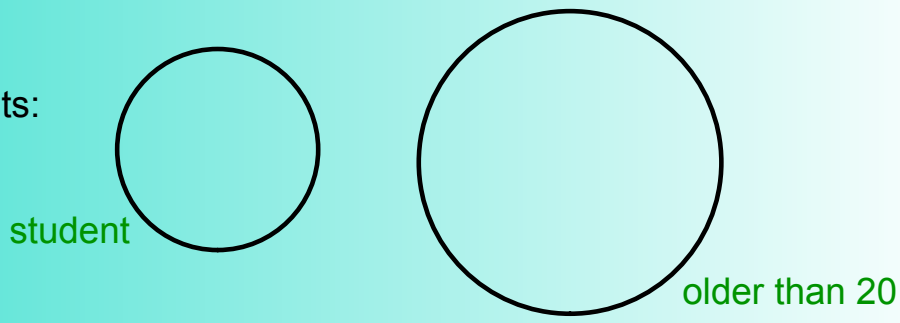
9. Quantifiers

Natural language items: some, a, every, most, many, ...

Examples: Every student is older than 20.

Compare 2 sets:



Formula: ∀ x (student(x) ⊃ older-than-20(x))

ALL x (student(x))(older-than-20(x))

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Formula: ∀ x (student(x) ⊃ older-than-20(x))

ALL x (student(x))(older-than-20(x))

Truth conditions: _____ elements of the restictor set are in the scope set.

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Some students are older than 24.

∃ x (student(x) ∧ older-than-24(x))

EXIST x (student(x))(older-than-24(x))

Truth conditions:

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Most students are older than 24.

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Literal and non-literal readings

Cinderella spilled the beans on the prince.

literal/compositional reading

idiomatic reading

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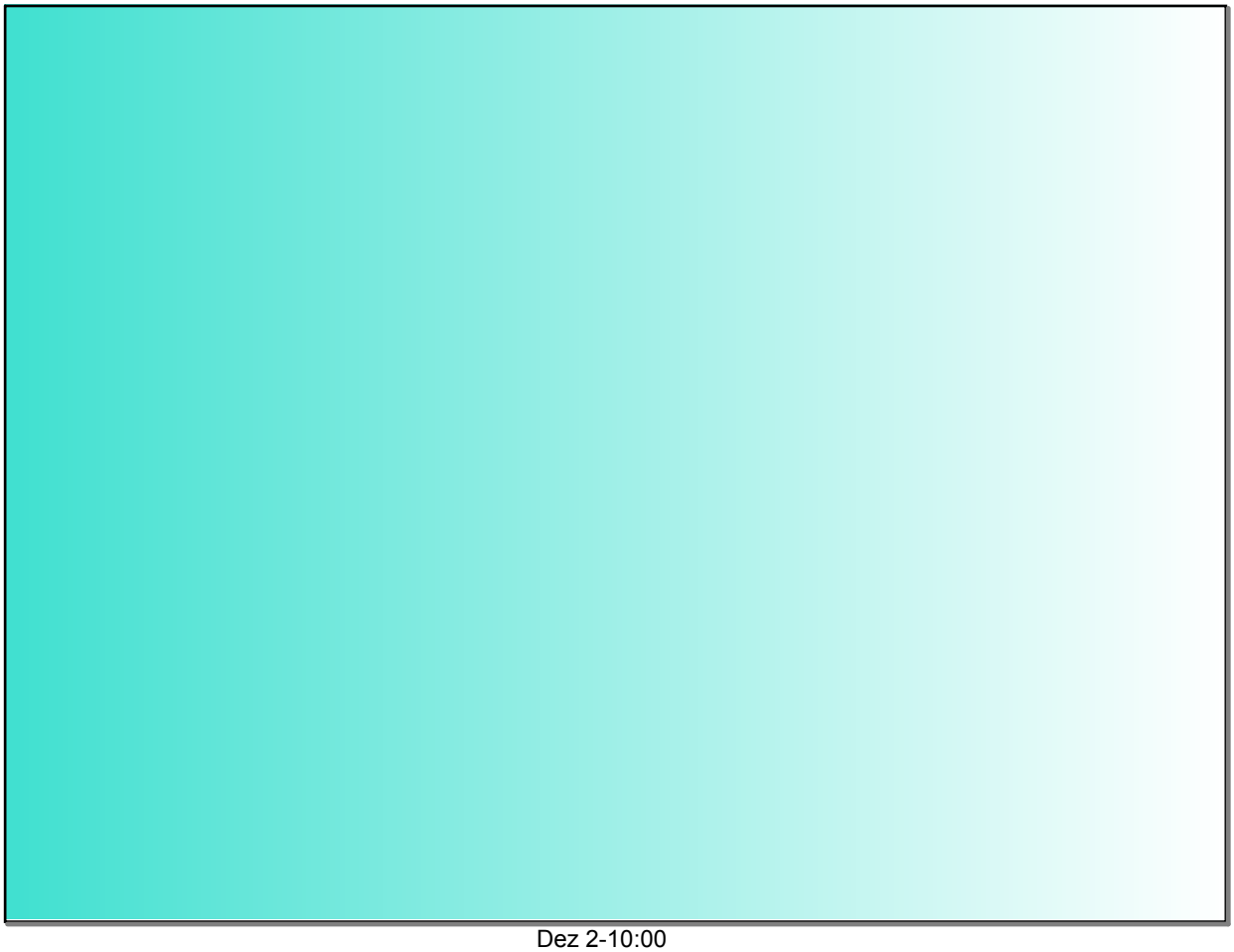

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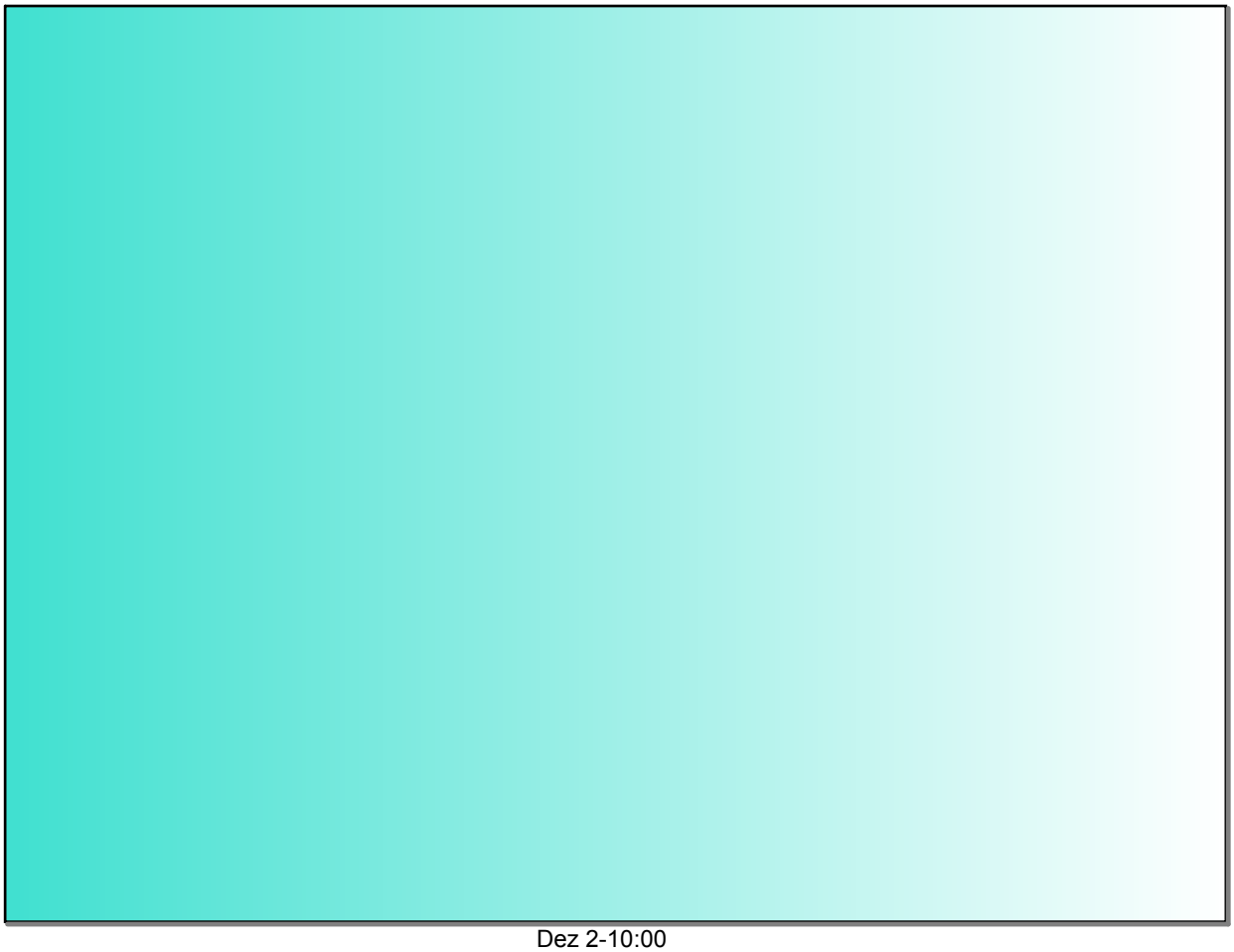

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Thank you for your attention

Links: www.lexical-resource-semantics.de/wiki/index.php/FSEGA

material for chapters 1 and 2.

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Apr 22-7:00 vorm.