Meaning relations
What are meanings?

- What do linguistic expressions “stand for” or “denote”?

Declarative sentences:
- To know the meaning of a declarative sentence is to know the situations it is describing
  - Terminology: situations = “possible worlds” = “models”
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• What do linguistic expressions “stand for” or “denote”?

Declarative sentences:
• To know the meaning of a declarative sentence is to know the situations it is describing
  • Terminology: situations = possible worlds = models

• In other words, it is to know the conditions under which the sentence is true.
  • Terminology: truth-conditions
Knowing meanings

- The number of situations in which a particular sentence is true (or false) is potentially infinite.
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- So, we can’t be remembering, by association, the situation(s) in which a sentence is true
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• So, we can’t be remembering, by association, the situation(s) in which a sentence is true

• So, we must have some **algorithm = recipe** for truth-conditions
  • that would tell us how to distinguish situations in which the sentence is true from those in which it’s false

• **Terminology:**
  
  *truth-conditional semantics* = *model-theoretic semantics*
Example

- *Sophia rode a bicycle on September 5, 2013.*
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- Scenario (= partial model):
  - $w_1, w_2, w_3, w_4, \ldots w_{10}$:
    - worlds where Sophia rode a bicycle on September 5.
  - $w_{11}, w_{12}, w_{13}, w_{14}, \ldots w_{20}$:
    - worlds where Sophia did not ride a bicycle that day.
Example

• Sophia rode a bicycle on September 5, 2013.

• Scenario (= partial model):
  • \( w_1, w_2, w_3, w_4, \ldots w_{10} \):
    worlds where Sophia rode a bicycle on September 5.
  • \( w_{11}, w_{12}, w_{13}, w_{14}, \ldots w_{20} \):
    worlds where Sophia did not ride a bicycle that day.

• The sentence above denotes the following set of worlds:
  \[
  w_1 \ w_2 \ w_3 \ w_4 \\
  w_5 \ w_6 \ w_7 \ w_8 \\
  w_9 \ w_{10}
  \]
Some special meanings

A rose is a rose
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A rose is a rose

• A statement that is always true
• (describes every situation):  
  • Tautology
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- (describes every situation):
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*Fido is a poodle but Fido is not a poodle*
Some special meanings

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Fido is a poodle but Fido is not a poodle
• A statement that is always false
• (describes no situation):
  • Contradiction
Some special meanings

A *rose* *is* *a* *rose*
• A statement that is always true
• (describes every situation):
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*Fido* *is* *a* *poodle* *but* *Fido* *is* *not* *a* *poodle*
• A statement that is always false
• (describes no situation):
  • *Contradiction*

• Most statements depend on a situation
  • *Contingency*
Meanings relations: sentences

• Entailment:

A: *Fido is a poodle*  
B: *Fido is a dog*

• Whenever A is true, B is true
• Every situation describable by A is also describable by B
• The information B conveys is contained in the information A contains (but A may or may not be more specific)
• ‘A and not B’ is a contradiction
• ‘If A then B’ is a tautology
Meanings relations: sentences

• Entailment:
  A: *Fido is a poodle*  
  B: *Fido is a dog*

• Paraphrase:
  A: *Fido is a poodle*  
  B: *The kind of dog Fido is is a poodle*

  • Whenever A is true, B is true and vice versa
  • A and B entail each other
  • A and B describe all the same situations
  • The information B conveys is the same as the information A contains
Meanings relations: sentences

• Entailment:
  A: *Fido is a poodle*    B: *Fido is a dog*

• Paraphrase:
  A: *Fido is a poodle*    B: *The kind of dog Fido is is a poodle*

• Ambiguity:

  *Enraged cow injures farmer with ax*

  • same form, multiple meanings
  • It is useful to create unambiguous paraphrases for each meaning
    • Note: these are not paraphrases for each other!
Meanings relations in general

• One meaning is included in the other
  • (like entailment)
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  *Fido is a poodle - Fido is a dog*  
  *blue pen - pen*  
  *poodle - dog*  
  *run - move*  
  *dance tango – dance*

- hyponym – hypernym
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• Two equivalent meanings
  • (like paraphrase)
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- Two equivalent meanings
  - (like paraphrase)

*John loves Mary – Mary is loved by John*

*car – automobile*

*quick – fast*

*salt – sodium chloride*

- synonyms
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• Two equivalent meanings
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  • synonyms
• One form, multiple meanings
  • (ambiguity)
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- One form, multiple meanings
  - (ambiguity and polysemy)

*High-school dropouts were cut in half*

*bank duck book door run*
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*High-school dropouts were cut in half*

*bank*  *duck*  *book*  *door*  *run*

- homonymy (typically contrastive)
- inherent or selectional polysemy (typically complementary)