Semantics

The Basics

- Definition: the study of linguistic meaning

- Semantics is part of the *grammar.*

The Basics

- The meaning of a complex expression is determined by:
  - the meanings of its parts, and
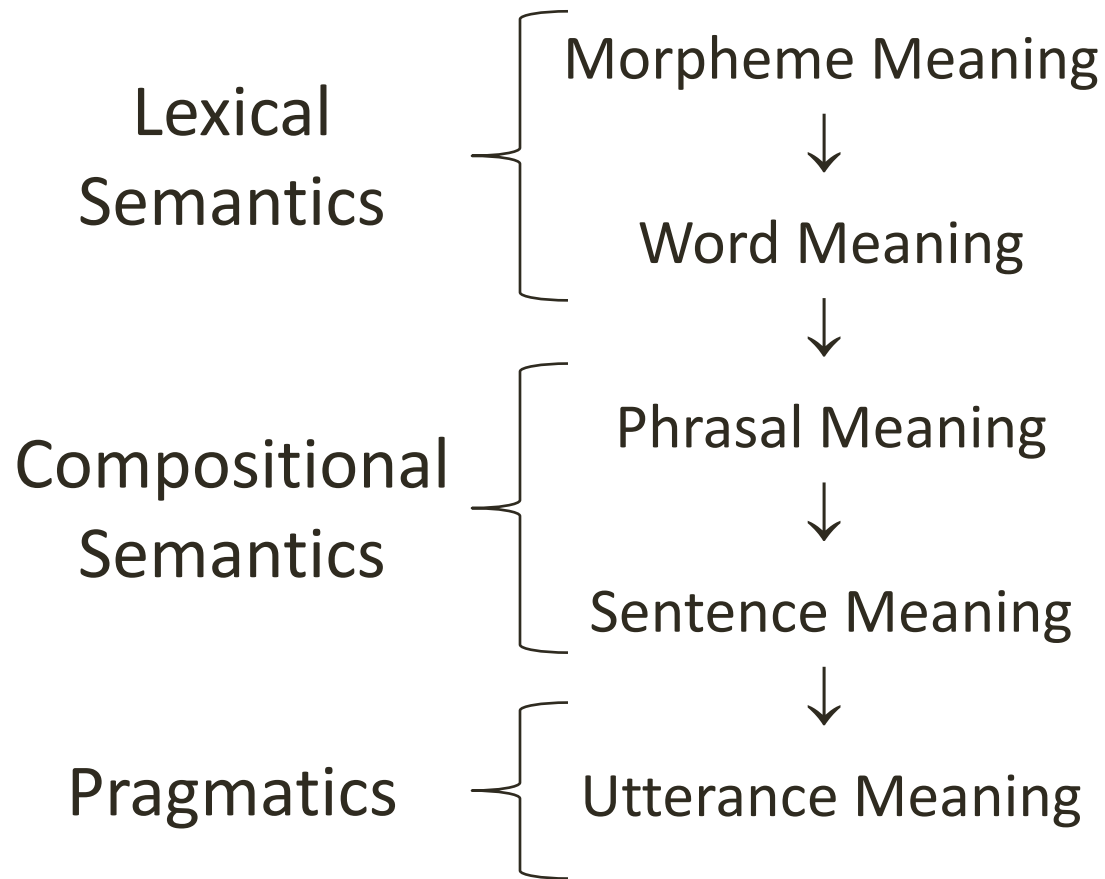 - the way in which those parts are combined

A cat chased a small rat.

A small rat chased a cat.

The Basics:
The Architecture of Meaning

Lexical Semantics

    Morpheme Meaning

    ↓

    Word Meaning

    ↓

Compositional Semantics

    Phrasal Meaning

    ↓

    Sentence Meaning

    ↓

Pragmatics

    Utterance Meaning

Lexical Semantics

- Recall:
  - Words are composed of morphemes
  - Each morpheme has a meaning and/or function

- What do lexical items mean?
  - Dictionary definitions?
  - Images? Other sensory information?
  - Referential?

Lexical Semantics: Sensory information

- Mental images or other sensory information
    - words often conjure up mental images
        - e.g. 'moon', 'green', 'kitten'
    - words may conjure up other sensory information
        - e.g. 'crispy', 'soft', 'salty', 'sweet', 'musty', 'humid'
    - default image/sense is prototypical
- Sensory information is part of a word's abstract meaning, but not all.
    - e.g. 'frog'

Lexical Semantics: Semantic Properties

- To some extent, we can break down words into various semantic properties.

- Semantic properties are convenient ways to notate abstract categories which the mind uses to classify words.
  - man   [+human, +adult, +male]
  - woman   [+human, +adult, -male]
  - girl   [+human, -adult, -male]
  - dog   [+canine, +adult, +male]

- Semantic properties alone cannot define words
  - e.g. why should we have prototypes for words?

Lexical Semantics: Hyponyms & Hypernyms

- Hyponym: word *x* is a hyponym of word *y* if the sets of referents of *x* is always in the set of referents of *y*
  - e.g. the set of *poodles* is always in the set of *dogs*

- Hypernym: the converse of hyponym
  - above, 'dogs' = hypernym, 'poodles' = hyponym

- Semantic properties: relation between hypernym and hyponym
  - human   [+human]
  - > adult   [+human, +adult]
  - > man   [+human, +adult, +male]
  - > husband   [+human, +adult, +male, +married]
  - > house husband   [+human, +adult, +male, +married, -employed]

Lexical Semantics: Hyponyms & Hypernyms

- Note that a hyponym entails a hypernym, but not the opposite.

(1) A Texan tried to assassinate the President.

(2) A Texan tried to murder the President.

(3) A Texan tried to kill the President.

(4) # A Texan tried to assassinate my brother.

(5) A Texan tried to murder my brother.

(6) A Texan tried to kill my brother.

(7) #A Texan tied to assassinate my hamster.

(8) #? A Texan tried to murder my hamster.

(9) A Texan tried to kill my hamster.

- assassinate **entails** murder, murder **entails** kill
- kill **does not entail** murder, murder **does not entail** assassinate

Lexical Semantics: [-male] or [+female]?

- In instances of binary opposition, one term tends to be less 'marked' than another (i.e. the default). This is language specific.

    How old are you?   vs. How young are you?

    How long is the river?   vs. How short is the river?

    How fast is the car?   vs. How slow is the car?

- Use of the marked form makes a presupposition.

    How shallow is it?

    How young is he?

    #How young is your grandpa?

Lexical Semantics: Synonyms

- Synonyms: words that seem to have the same meaning
  - 'couch' vs. 'sofa'

- Unlikely that there are perfect synonyms
  - couch potato, *sofa potato
  - deep vs. profound
    - deep thoughts, profound thoughts
    - deep holes, *profound holes
  - mother vs. mom, father vs. dad
    - different levels of formality

Lexical Semantics: Antonyms

- Antonyms: words that seem to have opposite meanings

- Three types of antonyms:
  - Complementary   single - married, dead - alive
    - mutually exclusive
  - Gradable   cold - cool - warm - hot, wet - dry
    - can modify with 'very', 'a little', etc.
  - Converse   above / below, give / receive, buy - sell
    - reciprocal relationship between words
    - relationship *x* entails existence of relationship *y*

Lexical Semantics: Reference

- Words also refer to (concrete or abstract) things
  - reference to specific entity (a referent)
    - Bill, the White House, Paris
  - reference to set of entities
    - person, house, city
  - cf. definite, indefinite articles
    - a person, the person
- Not all words contain a referent in the real world
  - unicorn

Compositional Semantics

- Deals with phrasal and sentence meaning.

- Non-idiomatic meanings are compositional in that they combine the meanings of smaller units.

m&ms

blue m&ms

Compositional Semantics

- What does understanding a sentence involve?
  - Knowing what circumstances a sentences can be true in (i.e. its *truth conditions*)
  - It is not necessary to know whether a sentence is true or not
    - "A bird is the hallway right now."

Compositional Semantics: Entailment

- Whenever A is true, B is necessarily true.

Regine ate apples and grapes.
entails Regine ate apples.

Most linguists are vegetarians.
entails At least one linguist is a vegetarians.

A cat chased a rat.
entails A rat was chased.

Compositional Semantics: Presupposition

- A presupposes B when, to determine whether A is true or false, one must assume B is true.

Peter has quit smoking.
presupposes Peter smoked before.

Emily never went to Philadelphia again.
presupposes Emily has been to Philadelphia before.

The king of France died yesterday.
presupposes Until yesterday, France had a king.

A cat chased a small rat.
presupposes There exists a cat and there exists a rat that is small.

Compositional Semantics: Thematic Roles

- Phrases play various roles (called 'thematic roles') in sentences.

- Some thematic roles are given below:
  - Agent   (initiator of action)
  - Theme   (undergoes action)
  - Recipient   (endpoint of change in possession)
  - Goal   (endpoint of change in location)
  - Source   (point of origination)
  - Instrument   (means to accomplish action)
  - Experiencer   (receiver of sensory input)

Compositional Semantics: Thematic Roles

"John gave the book to Sarah."
  Agent   Theme   Recipient

"Jeff   saw   the moon with a telescope."
  Experiencer   Theme   Instrument

"I walked from Newark to Wilmington."
  Agent   Source   Goal

Compositional Semantics: Thematic Roles

- Part of a verb's meaning is the thematic roles is requires.

  - John ran   cf. *John ran the car.

    RUN <agent>

  - John shot the bear.   cf. *John shot.

    SHOOT <agent, theme>

  - John handed Bill the money. cf. *John handed Bill.

    HAND <agent, recipient, theme>

Compositional Semantics: Thematic Roles

- A verb can have an <agent> subject:
  - <u>John</u> ran.

- A verb can take a <theme> subject:
  - <u>The ship</u> sank.

- A verb can take an <agent> subject + <theme> object.
  - <u>The navy</u> sank <u>the ship</u>.

- A verb cannot take a <theme> subject + <agent> object.

Compositional Semantics: Thematic Roles

- Do not confuse *thematic role* with *grammatical relation*
- Grammatical relations (simplified):
  - subject
  - object
  - indirect object
  - oblique (object of a preposition)
- Consider the following:
  - <u>Michele</u> opened the door with this key. (agent)
  - <u>The door</u> opens easily. (theme)
  - <u>This key</u> will open the door. (instrument)
- Grammatical relations are syntactic, not semantic.

Compositional Semantics: Thematic Roles

- Syntactic processes may alter which thematic roles appear in which argument relations.

- Passivization: an object become a subject, a subject may occur in a *by*-phrase
  - John shot the bear → The bear was shot by John

- *Sink*-type verbs
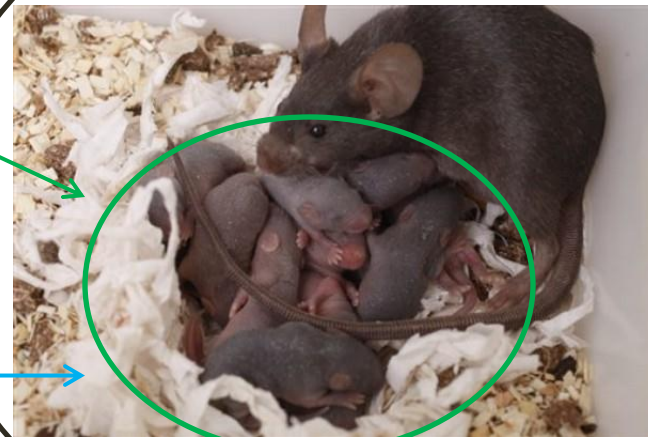 - The navy sank the ship (i.e. the navy *caused* the ship to sink)
  - The ship sank.

Summary:
'A cat chased a small rat'

- Meaning of noun phrases:
  - 'rat' picks out the set of rats

  - 'small rat' chooses a subset

  - 'a small rat' picks out an undefined individual from the set of small rats

one of these

Summary:
'A cat chased a small rat'

- Meaning of verb phrase:
  - CHASE requires two thematic roles be filled: <agent, theme>
  - Recall that when we have both <agent> and <theme>, subject = <agent>, object = <theme>

Event: CHASE
<agent>
<theme>