Next lectures

- Word sense disambiguation
  - Background from linguistics
    - Lexical semantics
  - On-line resources
  - Computational approaches
Semantic analysis

- Assigning meanings to utterances/sentences
- **Compositional semantics**: we can derive the meaning of the whole sentence from the meanings of its parts.
  - Marseille ate a green apple.
- Relies on knowing:
  - the meaning of individual words
  - how the meanings of individual words combine to form the meaning of groups of words
  - how it all fits in with syntactic analysis
Caveats

- Problems with a compositional approach
  - a former congressman
  - a toy elephant
  - kicked the bucket
Introduction to lexical semantics

- Lexical semantics is the study of
  - the systematic meaning-related connections among words and
  - the internal meaning-related structure of each word

- Lexeme
  - an individual entry in the lexicon
  - a pairing of a particular orthographic and phonological form with some form of symbolic meaning representation

- Sense: the lexeme’s meaning component

- Lexicon: a finite list of lexemes
Dictionary entries

- **right** *adj.* located nearer the right hand esp. being on the right when facing the same direction as the observer.
- **left** *adj.* located nearer to this side of the body than the right.

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- **red** *n.* the color of blood or a ruby.
- **blood** *n.* the red liquid that circulates in the heart, arteries and veins of animals.
Lexical semantic relations

- **Homonyms**: *words that have the same orthographic and phonological form and unrelated meanings*
  - Instead, a *bank*\(^1\) can hold the investments in a custodial account in the client’s name.
  - But as agriculture burgeons on the east *bank*\(^2\), the river will shrink even more.

- **Homophones**: distinct lexemes with a shared pronunciation
  - E.g. *would* and *wood*, *see* and *sea*.

- **Homographs**: identical orthographic forms, different pronunciations, and unrelated meanings
  - The expert angler from Dora, Mo., was fly-casting for *bass* rather than the traditional trout.
  - The curtain rises to the sound of angry dogs baying and ominous *bass* chords sounding.
Why do these distinctions matter?

- One type or another is more likely to affect specific NLP applications.
  - Spelling correction?
  - Speech recognition?
  - Text-to-speech?
Lexical semantic relations: polysemy

- Polysemy: the phenomenon of multiple related meanings within a single lexeme
  - Example: While some banks furnish blood only to hospitals, others are much less restrictive.
  - New sense, e.g. bank$^3$?
  - Polysemy allows us to associate a lexeme with a set of related senses.

- Distinguishing homonymy from polysemy is not always easy. Decision is based on:
  - Etymology: history of the lexemes in question
  - Intuition of native speakers
Word sense disambiguation

- Given a *fixed* set of senses associated with a lexical item, determine which of them applies to a particular instance of the lexical item in running text

- Two fundamental approaches
  - WSD occurs during semantic analysis as a side-effect of the elimination of ill-formed semantic representations
  - Stand-alone approach
    » WSD is performed independent of, and prior to, compositional semantic analysis
    » Makes minimal assumptions about what information will be available from other NLP processes
    » Applicable in large-scale practical applications
Synonymy

- Lexemes with the same meaning
- Invoke the notion of **substitutability**
  - Two lexemes will be considered synonyms if they can be substituted for one another in a sentence without changing the meaning or acceptability of the sentence
    - How *big* is that plane?
    - Would I be flying on a *large* or small plane?
    - Miss Nelson, for instance, became a kind of *big* sister to Mrs. Van Tassel’s son, Benjamin.
    - We frustrate ‘em and frustrate ‘em, and pretty soon they make a *big* mistake.
    - Also issues of **register**
      - Social factors that surround the use of possible synonyms, e.g. politeness, group status.
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