Week 7 Lecture: Semantics

Linguistics 201 – Fall 2025

Meaning in language

- So far this semester, we've focused on the **form** or **structure** of language.
  - **Morphology**: study of the structure of words
    - Morphemes, morphological processes, morphological trees
  - **Syntax**: study of the structure of sentences
    - Parts of speech, constituents, phrase structure rules, syntax trees

Meaning in language

- Of course, language isn't just structure – **language has meaning** – and we've mentioned meaning on several occasions:
  - **Morphology**
    - Morphemes are the smallest linguistic unit with *meaning*
    - Derivation changes a word's core *meaning*
    - Order of affixation reflects a word's *meaning*
  - **Syntax**
    - Parts of speech can be defined based on their *meaning*
    - Ambiguous sentences like *The girl saw the bear with the telescope* show us that syntactic structures contribute to the *meaning* of sentences

Meaning in language

- In this and the next unit, we're going to focus on **meaning** more specifically.
- We can differentiate three types of linguistic meaning:
  - **Literal meaning** (Semantics)
  - **Implied meaning** (Pragmatics)
  - **Social meaning** (Sociolinguistics, Linguistic Anthropology)

Literal and implied meaning

- As a system for **communicating ideas**, language must have meaning.
- But meaning in language goes **beyond the literal**.
    - Imagine the following conversation:
        - Person A: *Do you want to go out tonight?*
        - Person B: *I have an exam in the morning*.
    - What has B literally said?
    - What has B implied that they have not said explicitly?
- As in this example, much of what we say has different levels of **literal** and **implied** meaning.

Social meaning

- Language also has **social meaning**, since it's a tool for social interaction:
  - We use small talk to establish and reinforce social bonds with others.
  - The way we speak can indicate our attitude toward others (friendliness, solidarity, irritation…)
  - We can actively choose to speak a particular way to convey a particular social identity:
    - You can say *good morning* to a professor and *'sup* to a friend, but the other way around?
  - We often unconsciously accommodate to the speech of people we like, adopting phrases and speech patterns from them without even noticing it.
    - Have you noticed your speech changing since you came to college?

Social meaning

- Language varies by region, community, and other social factors.
- So the way we speak often conveys information like where we're from, our age, gender, etc.
- We often strongly identify with the language and dialect we grew up speaking.
- And we can actively use language to signal our membership in certain communities.
- Consider these signs. Would it make sense if the Brooklyn sign said *Y'all come back now?*

Sign on road leaving Brooklyn

Florence, Kentucky water tower – visible from highway at Ohio border

Meaning in language

- So language has meaning on several different levels.
- And each of these levels is studied in a different branch of linguistics.
    - **Semantics** studies **literal meaning** in language (which we'll study this unit)
    - **Pragmatics** studies **implied meaning** in language (which we'll study next unit)
    - **Social meaning** is studied in **Sociolinguistics** and **Linguistic Anthropology** (which unfortunately we won't have time to cover this semester, but consider taking a class!)

Semantics

- In this unit, we'll focus on **Semantics** – the literal meaning of language
- We can identify two levels of semantics: **lexical semantics** and **compositional semantics**
  - **Lexical semantics** – the meaning of words
    - **Lexicon** refers to a speaker's mental vocabulary; words are known as **lexical items**, but lexical items can also include common multi-word expressions
  - **Compositional semantics** – the meaning of sentences
    - Recall that *A girl saw a bear with a telescope* has two different meanings, and these meanings depend on syntax.
    - Meaning of a sentence = Meaning of words + Meaning of structure

Lexical meaning

- **Lexical semantics** studies the **meaning of words**. Lexical meaning is **conventional** and **arbitrary**.
- Lexical meaning is **conventional**
  - Words mean what they mean because we agree as a speech community that's what they mean – that is, words are defined by social convention
  - Consider words with slang meanings like *fire* 'amazing, excellent'
    - How did *fire* come to mean 'great'? Someone starting using it with that meaning, and it caught on – the rest of the community agreed it can be used that way, too.
  - Same thing with technological terms like *mouse, screen, tablet*, even *computer*:
    - All of these words originally had other meanings, but when we invented new technology and needed a name for it, we agreed these words can have new meanings.

Lexical meaning

- Lexical meaning is **arbitrary**
  - There is no inherent connection between the sound of a word and its meaning
- We know this because:
  - Same sounds can have different meanings in different languages:
    Spanish *taco* 'taco' vs. Japanese *tako* 'octopus'
  - Same meaning can be conveyed with different sounds in different languages:
    English *dog* vs. Spanish *perro*
  - Meaning and sound of words can change over time: *nice* 'foolish' > 'kind', *knight* [knixt] > [najt]
- Main exception: **onomatopoeia** – words that mimic sounds
  - Even onomatopoeia can be a bit arbitrary: *cockadoodledoo, cocorico, quiquiriquí, kokekokko*

Sense and reference

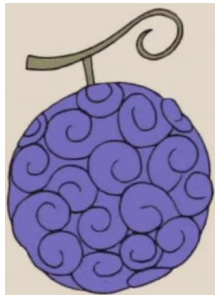
- So we know that words have meaning: **lexical semantics**
- And we know that lexical meaning is **conventional** and **arbitrary**
- But how do we specify what a word means?
- Think of the words *fruit* and *animal*:
    - What image comes to mind when you think of a fruit or an animal?
    - How might you try to define these words?

Sense and reference

- Now, a test: do these animals represent animals or fruit? How do you know?

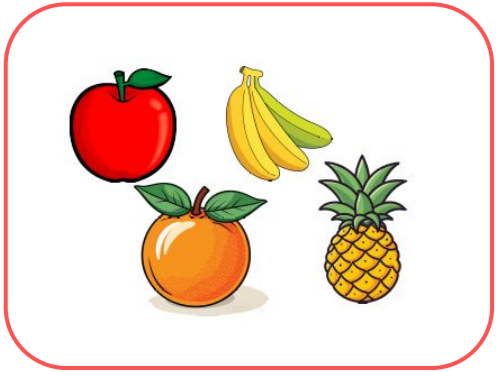
Sense and reference

- How about these new images? Animals or fruit? How do you know?



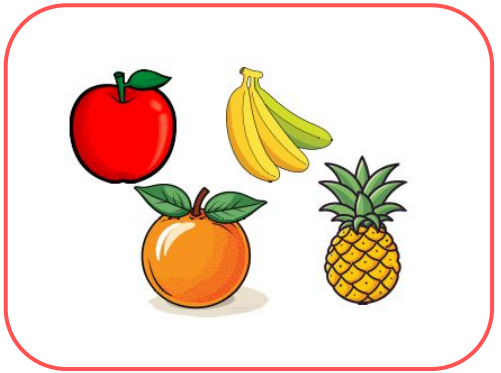
Sense and reference

- There are two ways of thinking about a word's meaning: **sense** and **reference**
- The **sense** of a word is:
  - The mental concept of a word's meaning
  - A description of this mental concept: dictionary definition
- For example, the sense of *fruit* might be:
  - A seed-bearing structure in flowering plants



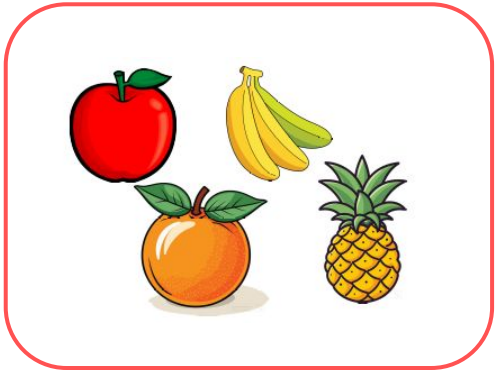
Referential meaning

- The **reference** of a word is:
  - The set of things in the world that the word refers to
  - Each thing the word refers to is a **referent** of the word
- The reference of the word *fruit* would include:
  - The apple I had for breakfast
  - The bananas they have at Cafe West
  - The oranges they sell at Aldi…



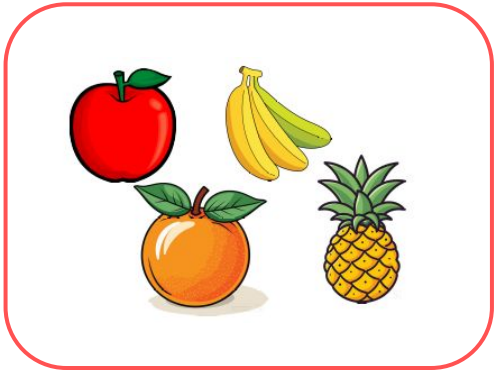
Sense and reference

- Defining words by **reference** helps us understand how we can categorize new items we come across:
    - By comparing them to the referents we already know
- It's also more in line with how we learn words:
    - We don't learn what an animal is by learning that it's a "multicellular eukaryotic organism [in] Animalia" (Wikipedia)
    - We learn what an animal is by learning that a puppy is an animal and a kitty is an animal and a froggy is an animal…
    - We learn what a fruit is by observing what our caregivers call fruit



Referential meaning

- In this class, we'll define words by **reference**
  - The **set** of things in the world (referents) that the word refers to
- Once we define a word as a **set** or **collection** of things, we can also compare the sets of things that different words refer to.
- Some words refer to entirely different sets of things.
- For other words, there is overlap between their set of referents.
- Consider these words. Does their reference overlap in any way:
  - *animal* vs. *dog*
  - *dog* vs. *canine*
  - *dog* vs. *poodle*



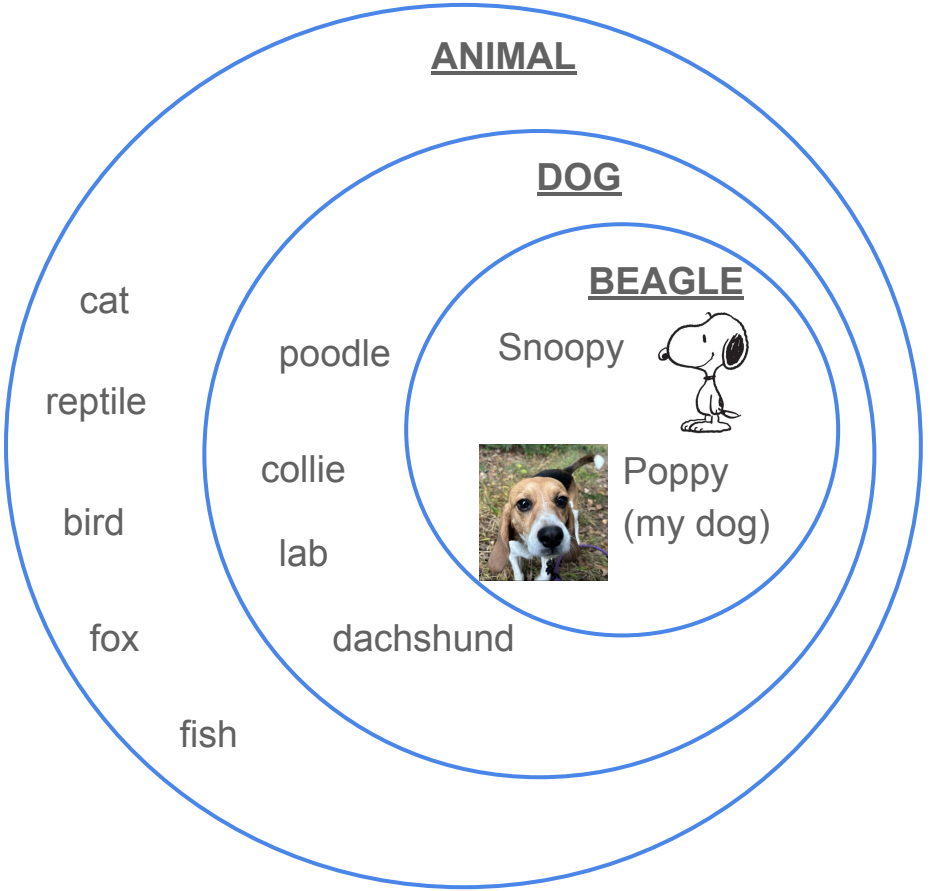
Synonyms

- **Synonyms** are words that have the same reference.
  That is, they refer to the same set of things in the world.

[[drinks]] =  = [[beverages]]

Hyponyms and hypernyms

- A **hyponym** is a word whose reference is a **subset** of another word's reference
    - *dog* is a **hyponym** of *animal*
- A **hypernym** is a word whose reference is a superset of another word's reference
    - *animal* is a **hypernym** of *dog*
- Can you think of any other word pairs with a **hypernym/hyponym** relationship?



Antonyms

- **Antonyms** are words that have opposite meanings: *cold* vs. *hot*, *alive* vs. *dead*, *old* vs. *young*
- Antonyms turn out to be difficult to define in terms of reference.
- In fact, there are several ways words' meanings can be "opposite":
  - **Complementary pairs** (item can't be in both categories): *alive* vs. *dead, single* vs. *married*
  - **Gradable pairs** (opposite ends of some scale): *young* vs. *old*, *small* vs. *large*
  - **Reverses** (opposite direction): *up* vs. *down*, *left* vs. *right*, *inside* vs. *outside*
  - **Converses** (same action, different perspective): *buy* vs. *sell*, *take* vs. *give*, *teach* vs. *learn*
- We'll come back to synonyms, hypernyms, and hyponyms, but we'll leave aside antonyms for now.

Compositional semantics

- So we've seen some ideas about **lexical semantics** – the meaning of words (or lexical items)
  - Lexical meaning is **conventional** and **arbitrary**
  - Lexical meaning can be defined by **sense** or by **reference**
  - Referential meaning helps us define relationships between words: synonyms, hypernyms, hyponyms
- Beyond words, **phrases** and **sentence** can also have meaning:
  - **Compositional semantics**
  - Let's see some basic ideas in compositional semantics

Truth values

- Part of a sentence's meaning is its **truth value**: is it **true** or **false**
- What is the truth value of the following sentences:?
  - *Earth is a planet.*
  - *Fish are birds.*
  - *Mars is in the Solar System.*
  - *Cats are animals.*

Complex truth values

- Some sentences make multiple propositions, each of which has its own truth value:
  - *Earth is a rocky planet*.
    - Proposition 1: *Earth is a planet*. TRUE
    - Proposition 2: *Earth is rocky.* TRUE
  - *I have a dog and a cat.*
    - Proposition 1: I have a dog. TRUE
    - Proposition 2: I have a cat. FALSE

My dog Poppy

Complex truth values

- The truth value of a sentence depends on the truth value of its propositions.
  All of the propositions in a sentence must be true for the entire sentence to be true.
  - *Earth is a rocky planet*.
    - Proposition 1: *Earth is a planet*. TRUE
    - Proposition 2: *Earth is rocky.* TRUE
    - Sentence truth value TRUE
  - *I have a dog and a cat.*
    - Proposition 1: I have a dog. TRUE
    - Proposition 2: I have a cat. FALSE
    - Sentence truth value FALSE

My dog Poppy

Complex truth values

- A sentence might also give rise to other, unspoken propositions – often related through synonyms, hypernyms, and hyponyms.
- The sentence *I have a dog* gives rise to other propositions:
  - *I have a pet.*
  - *My pet is a canine.*
  - *My pet is an animal.*
- All of these propositions **must also be true** for the sentence to be true:
  - If *my pet is an animal* is false, *I have a dog* cannot be true.

My dog Poppy

Entailment

- This relationship between the propositions in a sentence is called **entailment**
  - A proposition *p* **entails** another proposition *q* if, whenever *p* is true, *q* must also be true.
  - More formally: *p* entails *q* iff whenever *p* is true, *q* is true
- For example:
  - The sentence *Earth is a rocky planet* **entails** the sentence *Earth is a planet*
    - For *Earth is a rocky planet* to be true, *Earth is a planet* must also be true
  - The sentence *Poppy is a beagle* **entails** the sentence *Poppy is a dog*
    - For *Poppy is a beagle* to be true, *Poppy is a dog* must also be true

Possible worlds

- One way to think about entailment is to imagine the **possible worlds** (alternative realities) in which a sentence would be true.
- Consider the sentence ***John has a dog***.
    - There are many possible worlds in which ***John has a dog*** would be **true**.

Possible worlds

- There are also many possible worlds in which ***John has a dog*** would be **false**.

Possible worlds

- Knowing the **meaning** of a sentence involves knowing in which possible worlds the sentence would be **true**.

Possible worlds where *John has a dog* is true.

Possible worlds

- Now consider the following sentences.
  Can you think of a possible world in which only one of these sentences is true?
  Can you think of a possible world in which two or more of these sentences are true?

  a. John has a fluffy dog.

  b. John has a dog.

  c. John has a fluffy dog and a cat.

Entailment and possible worlds

- Recall our definition of entailment.
- (a) entails (b) because (a) cannot be true while (b) is false:
    - There is no possible world in which John has a fluffy dog but not a dog.
- (b) does not entail (a) because (b) *can* be true while (a) is false:
    - There is a possible world: John could have a short-haired dog.
- (c) entails **both** (a) and (b) because (c) cannot be true while (a) or (b) is false.

Entailment: Proposition *p* entails proposition *q* if, whenever *p* is true, *q* must also be true.

In other words: *p* entails *q* when there is no possible world in which *p* is true and *q* is false

a. John has a fluffy dog.

b. John has a dog.

c. John has a fluffy dog and a cat.

Entailment

- Consider the following sentences:
    a. Alicia drank coffee at midnight.
    b. Alicia drank coffee.
    c. Alicia drank coffee at midnight in the living room.
- Does (a) entail (b)?
- Does (a) entail (c)?
- Does (b) entail (c)?
- Does (c) entail (a)?

Entailment: Proposition *p* entails proposition *q* if, whenever *p* is true, *q* must also be true.

In other words: *p* entails *q* when there is no possible world in which *p* is true and *q* is false

Entailment

Entailment: Proposition *p* entails proposition *q* if, whenever *p* is true, *q* must also be true.

In other words: *p* entails *q* when there is no possible world in which *p* is true and *q* is false

- Consider the following sentences:
  a. Alicia drank coffee at midnight.
  b. Alicia drank coffee.
  c. Alicia drank coffee at midnight in the living room.
- Does (a) entail (b)? yes: If *Alicia drank coffee at midnight* is true, it must be true that *Alicia drank coffee*
- Does (a) entail (c)? no: Suppose Alicia drank coffee at midnight in the kitchen. (a) will be true while (b) is false
- Does (b) entail (c)? no: Suppose Alicia drank coffee in the morning. (b) will be true while (c) is false.
- Does (c) entail (a)? yes: If *Alicia drank coffee at midnight in the living room* is true, it must be true that *Alicia drank coffee at midnight*

Entailment

- What about these two sentences? Does one entail the other?
  - Alicia drank coffee in the living room at midnight.
  - Alicia drank coffee at midnight in the living room.
- When two sentences entail each other (have **mutual entailment**), we say that they are **synonymous**.

World-specific entailment

- Sometimes *p* entails *q* due to **world knowledge** or **lexical meaning**:
  - ***James is a bachelor*** entails ***James is not married***.
    (because we know bachelors aren't married)
  - ***Poppy is a beagle*** entails ***Poppy is a dog***.
    (because we know beagles are a type of dog)
- We need to rely on our knowledge of *lexical meaning* or *how the world works* to understand this entailment. If you replaced the words nonsense words, the entailment wouldn't hold up.

Logical entailment

- Sometimes *p* entails *q* for logical reasons, **regardless** of world knowledge or lexical meaning:
  - ***James plays the piano and the bass*** entails ***James plays the bass***.
  - ***Poppy went for a walk in the forest*** entails ***Poppy went for a walk***.
- These sentences depend on **sentence structure**, not **lexical meaning**, for the entailment to occur.
- If you replaced these words with nonsense words, the entailment would still hold:
  - ***James plays the blarg and the whatsit*** entails ***James plays the whatsit***.

Key takeaways

- **Semantics** is the study of **literal meaning** in language
- Semantics includes **lexical semantics** (words) and **compositional semantics** (sentences)
- Lexical meaning is **conventional** and **arbitrary**
- Lexical meaning can be defined by **sense** and **reference**
- Compositional meaning includes **truth values**
- Sentences can have multiple propositions with different truth values
- **Entailment** describes a particular relationship between the truth values of a sentence's propositions:
    - Proposition *p* entails proposition *q* if, whenever *p* is true, *q* must also be true
    - It can help us understand the relationship between the meaning of sentences