• Semantics:
  Sentence meaning relations

Background reading:
• CL Ch 6, §1.2, “Semantic relations involving sentences”
1. Review: Sentence meaning and entailment

- When we know the **meaning** of a (declarative) sentence, we know the **circumstances** under which the sentence would be **true** or **false** — known as the **truth conditions** of the sentence
  - **Intension** of a sentence =
  - **Extension** of a sentence in a given situation =
1. Review: Sentence meaning and entailment

- When we know the **meaning** of a (declarative) sentence, we know the **circumstances** under which the sentence would be **true** or **false** — known as the **truth conditions** of the sentence
  - **Intension** of a sentence = its **truth conditions**
  - **Extension** of a sentence in a given situation = its **truth value** (**true** or **false**) in that situation
1. Review: Sentence meaning and entailment

- Once we have a way to think about sentence meaning, we can examine ways in which the meaning of one sentence relates to that of another
  - entailment
  - paraphrase
  - contradiction
1. Review: Sentence meaning and entailment

• From CL, p 222: “When the truth of one sentence guarantees the truth of another sentence, we say that there is a relation of entailment.”
  - What does “guarantees the truth” mean here?
  → Consider: This is about truth conditions

• A more explicit definition of entailment: Sentence A entails sentence B if in all situations where sentence A is true, sentence B is also true
  (examples in Monday’s outline slides)
Paraphrase is another meaning relation between sentences

- From CL, p 221: “Two sentences that have essentially the same meaning are said to be paraphrases of each other.”

- Can we develop a more explicit definition of paraphrase, in terms of entailment?
2. Paraphrase

- A more explicit definition of **paraphrase**: Sentences A and B are paraphrases of one another if A entails B and B entails A.
  - What kind of evidence do we have to provide to show that two sentences are *not* paraphrases of each other?
2. Paraphrase

- A more explicit definition of **paraphrase**: Sentences A and B are paraphrases of one another if A entails B and B entails A.
  - What kind of evidence do we have to provide to show that two sentences are *not* paraphrases of each other?

→ Think of a situation in which one of A or B is true and the other is not
2. Paraphrase

- A more explicit definition of **paraphrase**: Sentences A and B are paraphrases of one another if A entails B and B entails A.

- Try it: Are sentences (3) and (4) paraphrases?
  - (3) *Lucy ate the last piece of pizza.*
  - (4) *The last piece of pizza was eaten by Lucy.*
2. Paraphrase

• A more explicit definition of **paraphrase**: Sentences A and B are paraphrases of one another if A entails B and B entails A.

• Try it: Are sentences (3) and (4) paraphrases? | Yes

(3) Lucy ate the last piece of pizza.

(4) The last piece of pizza was eaten by Lucy.
- In all situations where (3) is true, (4) is also true
- In all situations where (4) is true, (3) is also true
2. Paraphrase

• A more explicit definition of **paraphrase**: Sentences A and B are paraphrases of one another if A entails B and B entails A.

• Try it: Are (1) and (2) (from Monday) paraphrases?

  (1) Linus ate a sugar-covered doughnut.
  (2) Linus ate something sweet.
2. Paraphrase

- A more explicit definition of **paraphrase**: Sentences A and B are paraphrases of one another if A entails B and B entails A.

- Try it: Are (1) and (2) (from Monday) **paraphrases**? | No

(1) Linus ate a sugar-covered doughnut.

(2) Linus ate something sweet.

- We showed on Monday that (2) does not entail (1), so these sentences are not paraphrases of each other
Contradiction is another meaning relation between sentences

- From *CL*, pp 222–3: “Sometimes, it turns out that if one sentence is true, then another sentence must be false. [...] When two sentences cannot both be true, we say that there is a contradiction.”

- Can we develop a more explicit definition for contradiction, inspired by the way we have defined entailment?
3. Contradiction

• A more explicit definition of **contradiction**: Sentence A and B are contradictory if **there is no situation** in which both A and B can be true.
  
  - What kind of evidence do we have to provide to show that two sentences are **not** contradictory?
3. Contradiction

- A more explicit definition of **contradiction**: Sentence A and B are contradictory if **there is no situation** in which both A and B can be true.
  - What kind of evidence do we have to provide to show that two sentences are *not* contradictory?
  → Think of a situation in which A and B are both true
3. Contradiction

• A more explicit definition of *contradiction*: Sentence A and B are contradictory if there is no situation in which both A and B can be true.

• Are sentences (5) and (6) contradictory?
  
  (5) *The present king of France is bald.*
  
  (6) *France is a republic.*
3. Contradiction

• A more explicit definition of **contradiction**: Sentence A and B are contradictory if there is no situation in which both A and B can be true.

• Are sentences (5) and (6) contradictory? | Yes

(5) *The present king of France is bald.*

(6) *France is a republic.*

- Since a republic is a nation with no king, (5) and (6) can never be true in the same situation
4. Some real-world applications

• What is all this stuff good for? When might we care whether one sentence entails another, or one sentence contradicts another?
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• What is all this stuff good for? When might we care whether one sentence entails another, or one sentence contradicts another?

• How about situations such as...
  - legislation, contracts
  - testimony in court
  - claims of false advertising
  - ...

4. Some real-world applications

• One popular advertising technique is the use of language that tries to sound like it’s making a stronger claim than it actually is.

• It can be interesting to look carefully at the language of an advertisement and try to determine what claims are actually entailed.
4. Some real-world applications

• Example:

   *No other chewing gum keeps your breath fresh longer!*

- What might the ad like you to **conclude**?
- Is this conclusion **entailed** by the language in the ad? Can you **prove** whether it is?
4. Some real-world applications

- Example:

  *Everything in the store is up to 75% off!*

  - What might the ad like you to **conclude**?
  
  - Is this conclusion **entailed** by the language in the ad? Can you **prove** whether it is?
4. Some real-world applications

• How is it possible for people to use language in ways that communicate *more* than what is *said*?

• This is part of the linguistic subfield of **pragmatics**, the study of **language meaning in context**

  → Our next topic