

# LING/C SC 581:

## Advanced Computational Linguistics

Lecture 19

# Today's Topic

- Homework 8 Review
- Continuing from last time (*we didn't get to cover all the slides*)
  - one last mention about word2vec models
  - Semantic Opposition and WordNet

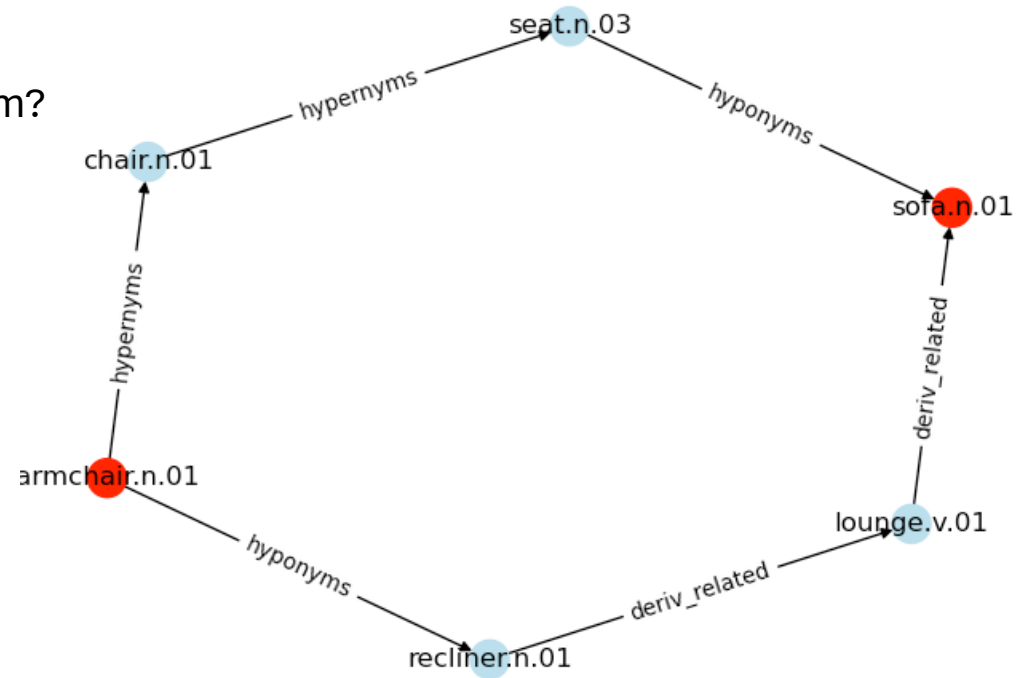
# Homework 8 Review

- Using the online Princeton browser or wnb:
  1. Find the connection between *recliner* (noun, sense 1) and *sofa* (noun, sense 1).
    - Show the links (relations).
    - What is the common hypernym?

```
python hypernoms.py recliner.n.1 sofa.n.1  
Synset('recliner.n.01') Synset('sofa.n.01') have lowest common hypernym  
Synset('seat.n.03')
```

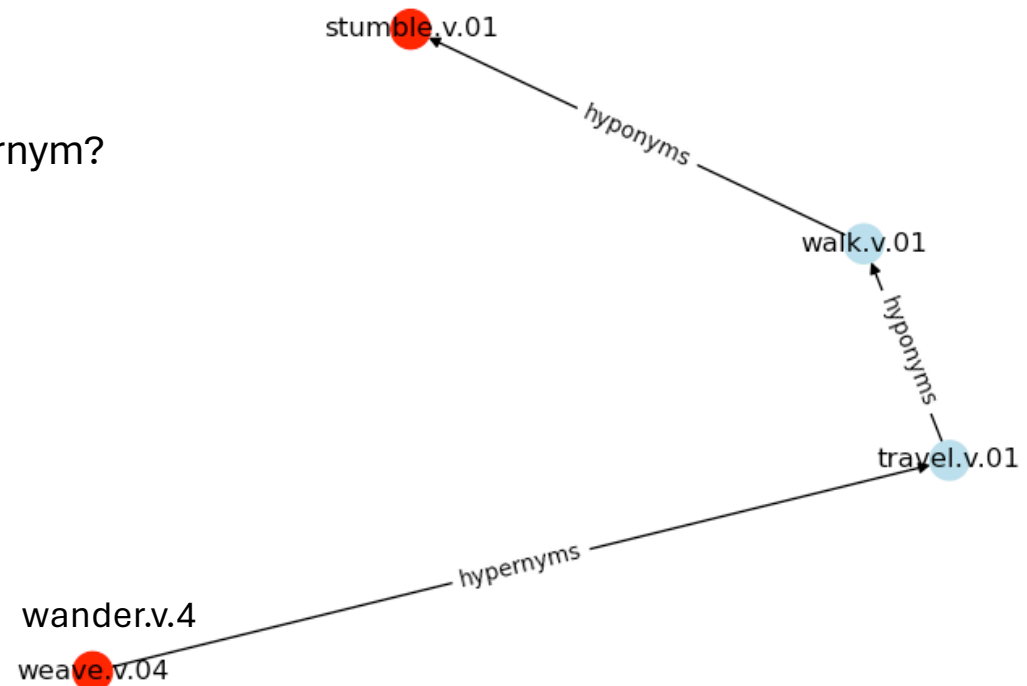
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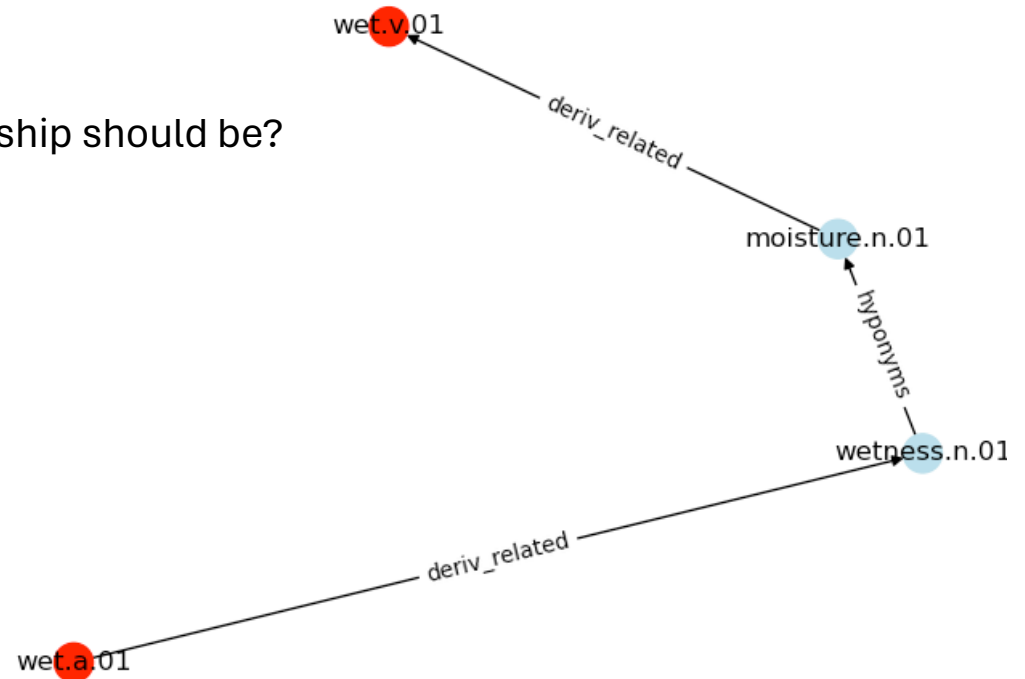
# Homework 8 Review

- Using the online Princeton browser or wnb:
  2. Find the connection between *wander* (verb, sense 4) and *stumble* (verb, sense 1).
    - Show the links (relations).
    - What is the common hypernym?

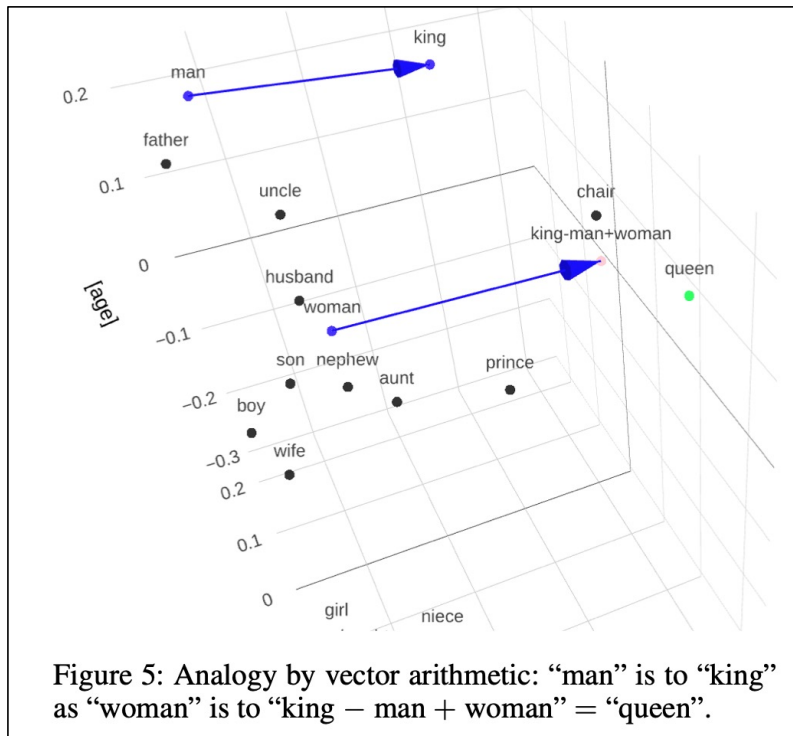


# Homework 8 Review

- Using the online Princeton browser or wnb:
  3. Find a connection between *wet* (as a verb) and *wet* (as an adjective).
    - Which senses of each word?
    - Show the links (relations).
    - What do you think the relationship should be?



# word2vec



- Semantic dimensions:

- <https://www.cs.cmu.edu/~dst/WordEmbeddingDemo/EAAI-2022-Word-Embedding.pdf>
- given the word “king”, we measure its position along the gender axis by taking the dot product of its embedding vector with a “gender” unit vector.

Gender Dimension		Age Dimension		Royalty Dimension	
man	woman	man	boy	man	king
king	queen	woman	girl	woman	queen
prince	princess	king	prince	boy	prince
husband	wife	queen	princess	girl	princess
father	mother	father	son	woman	duchess
son	daughter	mother	daughter	woman	countess
uncle	aunt	uncle	nephew	woman	baroness
nephew	niece	aunt	niece		
boy	girl				
male	female				

# Using WordNet: Example

## Event Template Representation

Change of State Verbs:

John mended the *torn/red* dress

*mend*: x CAUS y BECOME <STATE (*mended*)>

John CAUS the *torn/red* dress BECOME <STATE (*mended*)>

- Antonym relation between adjective and end state



# Semantic Opposition: *mend* vs. *tear/torn*

The verb mend has 2 senses (first 2 from tagged texts)

1. (5) repair#1, **mend**#1, fix#1, bushel#1, doctor#3, furbish up#1, restore#4, touch on#3 -- (restore by replacing a part or putting together what is torn or broken; "She repaired her TV set"; "Repair my shoes please")
2. (1) **mend**#2, heal#1 -- (heal or recover; "My broken leg is mending")

The verb tear has 5 senses (first 4 from tagged texts)

1. (19) **tear**#1, rupture#1, snap#2, bust#3 -- (separate or cause to separate abruptly; "The rope snapped"; "tear the paper")
2. (7) **tear**#2 -- (to separate or be separated by force; "planks were in danger of being torn from the crossbars")
3. (2) **tear**#3, shoot#7, shoot down#1, charge#4, buck#3 -- (move quickly and violently; "The car tore down the street"; "He came charging into my office")
4. (1) pluck#5, pull#14, **tear**#4, deplume#2, deplumate#1, displume#2 -- (strip of feathers; "pull a chicken"; "pluck the capon")
5. **tear**#5 -- (fill with tears or shed tears; "Her eyes were tearing")

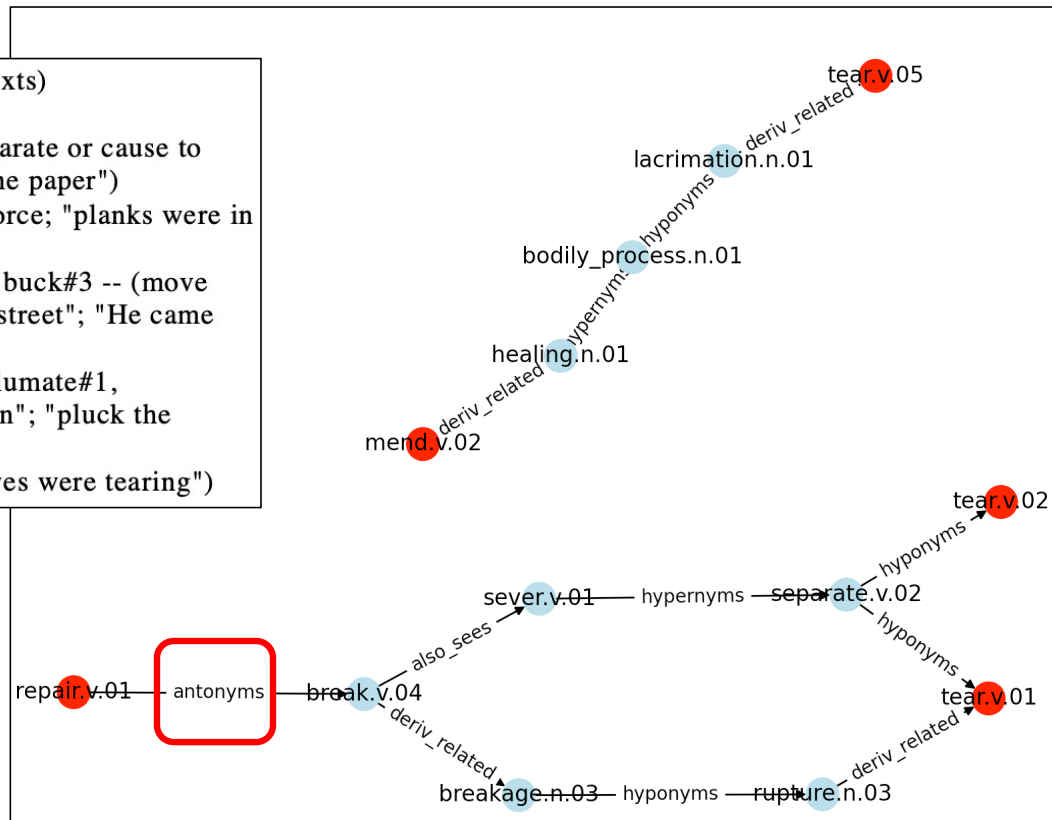
The adj torn has 2 senses (first 2 from tagged texts)

1. (5) lacerate#2, lacerated#2, mangled#1, **torn**#1 -- (having edges that are jagged from injury)
2. (2) **torn**#2 -- (disrupted by the pull of contrary forces; "torn between love and hate"; "torn by conflicting loyalties"; "torn by religious dissensions")

# Semantic Opposition: *mend* vs. *tear/torn*





The verb *tear* has 5 senses (first 4 from tagged texts)

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# Semantic Opposition and ChatGPT

SA John mended the torn dress. Is the dress torn?

 Based on the given sentence "John mended the torn dress," it can be inferred that the dress was torn at some point in time, but it has been mended by John. Therefore, as of now, the dress is not torn anymore.   

SA John mended the red dress. Is the dress red?

 Yes, the dress is red. The sentence "John mended the red dress" implies that the dress in question is red.   

# Semantic Opposition and ChatGPT

- Synset: {*repair, fix, restore, mend, ...* }

John restored the torn dress. Is the dress torn?



It is implied that the dress was torn before John restored it. So, yes, the dress was torn before John restored it.

Presupposition  
only



# Semantic Opposition and ChatGPT

- Synset: {*repair*, *fix*, *restore*, *mend*, ... }

The image shows a screenshot of the ChatGPT interface with two separate chat sessions. The first session shows a user prompt: "John fixed the torn dress. Is the dress torn?" and a response: "It can be inferred that the dress was torn before John fixed it." A blue callout box with the text "Presupposition only" and an arrow points to the response. The second session shows a user prompt: "John repaired the torn dress. Is the dress torn?" and a response: "The given sentence, 'John repaired the torn dress,' implies that the dress was torn before John repaired it. Therefore, the dress was torn, but it is not torn anymore after John repaired it." The response in the second session includes icons for copy, like, and comment.

SA John fixed the torn dress. Is the dress torn?

It can be inferred that the dress was torn before John fixed it.

Presupposition only

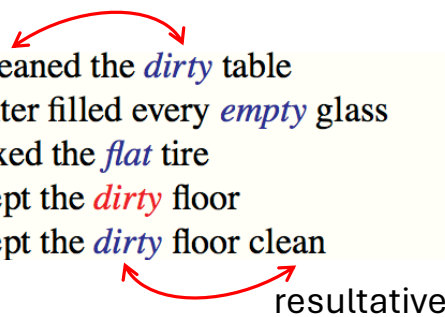
SA John repaired the torn dress. Is the dress torn?

The given sentence, "John repaired the torn dress," implies that the dress was torn before John repaired it. Therefore, the dress was torn, but it is not torn anymore after John repaired it.

# Semantic Opposition: *clean* vs. *dirty*

Mary cleaned the *dirty* table                      Change of State  
The waiter filled every *empty* glass  
Mary fixed the *flat* tire  
Bill swept the *dirty* floor                              Activity  
Bill swept the *dirty* floor clean                      Accomplishment

resultative



The verb clean has 10 senses (first 4 from tagged texts)

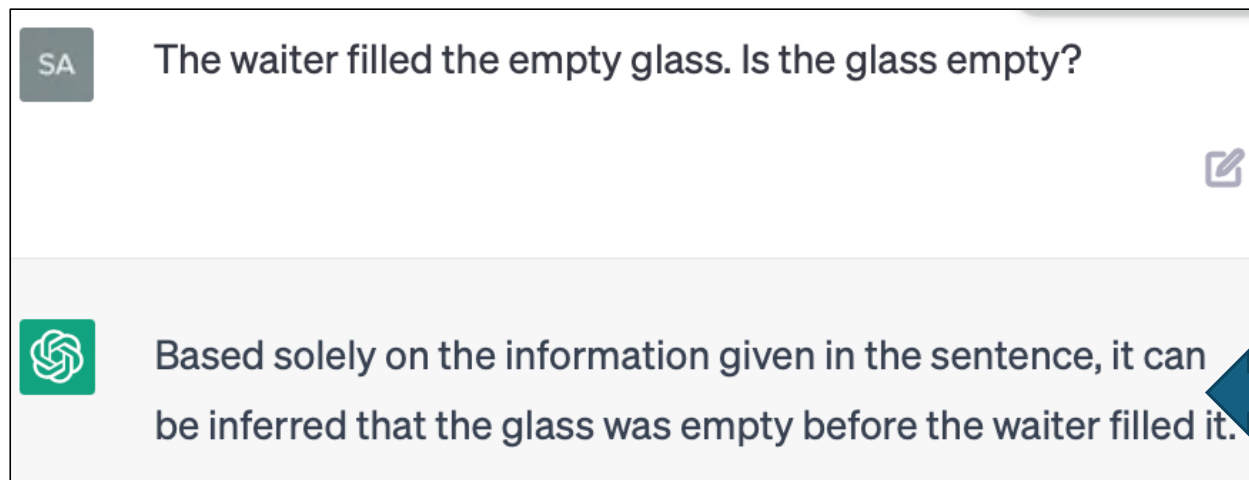
1. (16) **clean**#1, make clean#1 -- (make clean by removing dirt, filth, or unwanted substances from; "Clean the stove!"; "The dentist cleaned my teeth")
2. (3) **clean**#2, pick#6 -- (remove unwanted substances from, such as feathers or pits; "Clean the turkey")
3. (2) houseclean#1, clean house#1, **clean**#3 -- (clean and tidy up the house; "She housecleans every week")
4. (1) cleanse#1, **clean**#4 -- (clean one's body or parts thereof, as by washing; "clean up before you see your grandparents"; "clean your fingernails before dinner")
5. **clean**#5 -- (be cleanable; "This stove cleans easily")
6. **clean**#6 -- (deprive wholly of money in a gambling game, robbery, etc.; "The other players cleaned him completely")
7. **clean**#7, strip#7 -- (remove all contents or possession from, or empty completely; "The boys cleaned the sandwich platters"; "The trees were cleaned of apples by the storm")
8. **clean**#8 -- (remove while making clean; "Clean the spots off the rug")
9. scavenge#4, **clean**#9 -- (remove unwanted substances from)
10. **clean**#10 -- (remove shells or husks from; "clean grain before milling it")

# More examples

- *Event-based Models of Change and Persistence in Language* (Pustejovsky, 2000).
- Adapted examples:
  1. The waiter filled every empty glass
  2. Mary fixed the flat tire
  3. Mary fixed the leaky tire
  4. John comforted the crying child
  5. John rescued the drowning man
  6. The nurse mixed the powdered milk
- Which ones work?
- Can you think of others?

# Semantic Opposition

- Other accomplishment verbs:
  - The waiter filled the *empty* glass
  - Mary fixed the *flat* tire



SA The waiter filled the empty glass. Is the glass empty?

Based solely on the information given in the sentence, it can be inferred that the glass was empty before the waiter filled it.

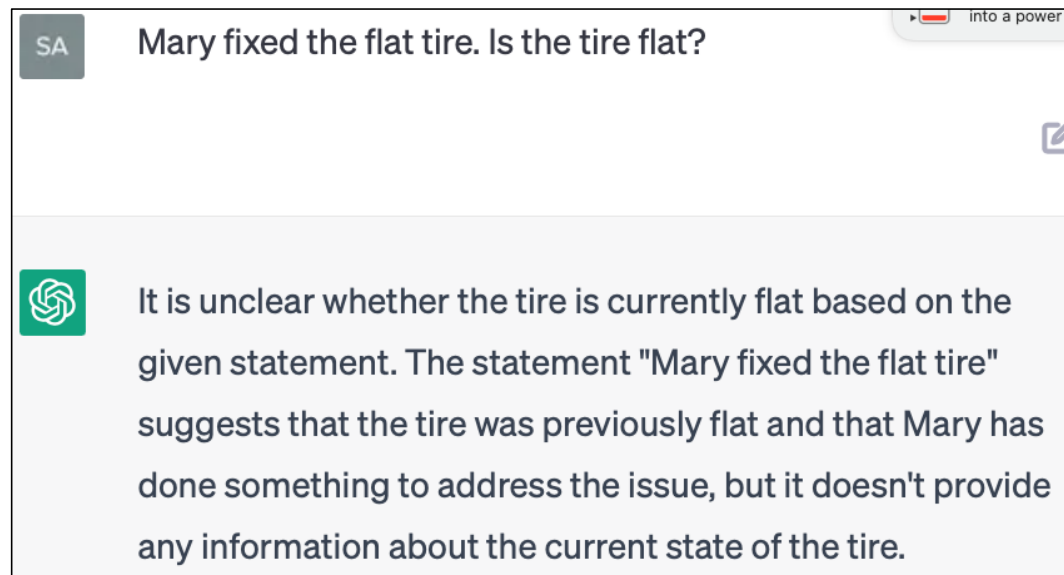
The screenshot shows a chat interface with a question and an answer. The question is "The waiter filled the empty glass. Is the glass empty?" and the answer is "Based solely on the information given in the sentence, it can be inferred that the glass was empty before the waiter filled it." The answer is highlighted with a blue arrow pointing to it from the right.

Presupposition  
only



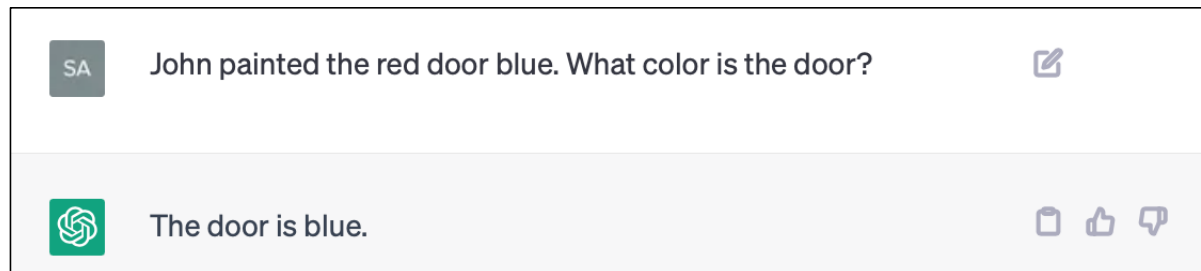
# Semantic Opposition and ChatGPT

- Other accomplishment verbs:
  - The waiter filled the *empty* glass
  - Mary fixed the *flat* tire








# Semantic Opposition and ChatGPT

- Activity verbs and resultatives:
  - John painted the *red* door *blue*
  - John swept the *dirty* floor
  - John swept the *dirty* floor *clean*



# Semantic Opposition and ChatGPT

- Activity verbs and resultatives:
  - John swept the *dirty* floor
  - John swept the *dirty* floor *clean*

<p>SA John swept the dirty floor. Is the floor dirty?</p>	<p>SA John swept the dirty floor clean. Is the floor dirty?</p>
<p> Yes, based on the given statement, the floor is dirty. The statement "John swept the dirty floor" suggests that the floor was dirty and John took action to clean it.</p>	<p> Yes, according to the sentence "John swept the dirty floor clean", it is implied that the floor was dirty before John swept it clean.</p>
<p>  </p>	