Discourse & Inference

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COGS 4780

Pragmatics

- Understanding language isn't as simple as just adding syntax + semantics

- Sometimes people say one thing to mean another – actually, more often than we may realize
  - Implicature
  - Metaphor
  - Irony
  - etc.

- There's also a real world that language is used to refer to, and the language:real world interface is not always so neat

Mental Models

- **Proposition** – the "literal" meaning of a sentence, comprised of its linguistic content only
  - Truth-conditional semantics: the knowledge of the meaning of a sentences is the knowledge of the real world situations under which the sentence is true

- Propositional meaning comes from semantics + syntax

- Propositional content is *one* source that helps us build a **mental model** – our internal representation of something in the world
  - What is the relationship between propositional content and mental models?

Mental Models

(a) Elizabeth bakes some cookies and bread

(b) Elizabeth bakes some cookies but no bread

- Both sentences mention *bread*
- And the propositional content for both will also contain bread
- But the real world situation for (a) will have bread and the real world situation for (b) will not have bread
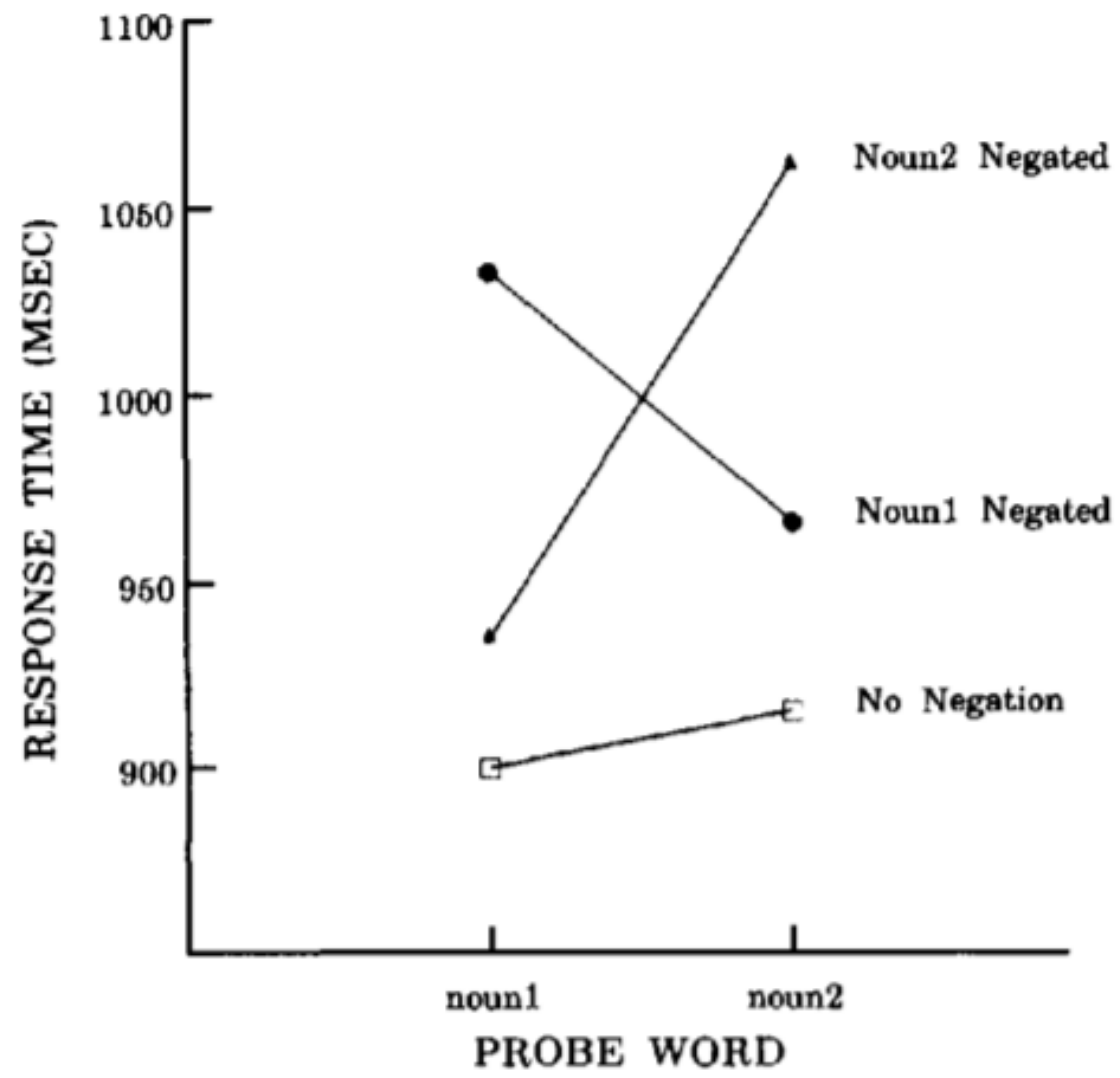
Mental Models

- MacDonald & Just (1989) tried to figure out how people build mental models in real time

- Participants read a sentence with self-paced reading, then saw a probe word – the task was to answer, as quickly as possible, if this word appeared in the sentence they just read

Mental Models

(a) Almost every weekend, Elizabeth bakes no bread but only cookies for the children

(b) Almost every weekend, Elizabeth bakes some bread but no cookies for the children

(c) Almost every weekend, Elizabeth bakes some bread and some cookies for the children

Probe 1: bread

Probe 2: cookies

Mental Models

- Mental model can account for negation in real time!
- Mental models are more complex than just the propositional content of the sentence
  - Stronger activation for *bread* when it was actually present in the situation described

- From other research, mental models keep track of temporal information, spatial information, individuals' goals, cross-modal perception, etc.
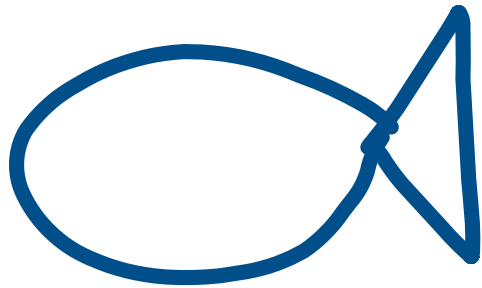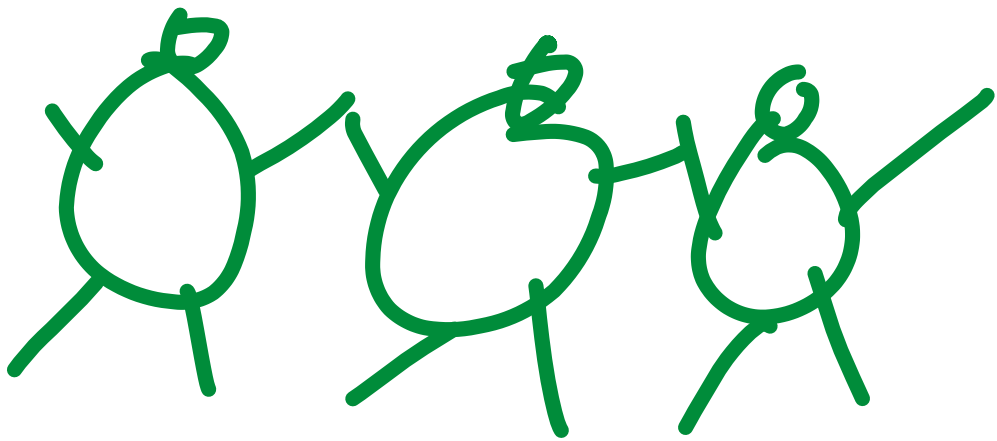 - All in real time

Mental Models

- Bransford et al (1972) had people listen to a list of sentences
- Later presented with another list of sentences – for each, had to indicate if the sentence was exactly the same as one they heard earlier

- (a) Three turtles rested beside a floating log, and a fish swam beneath them
- (b) Three turtles rested beside a floating log, and a fish swam beneath it
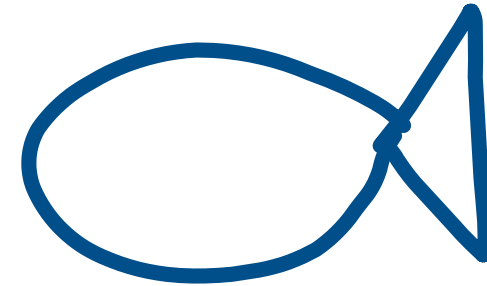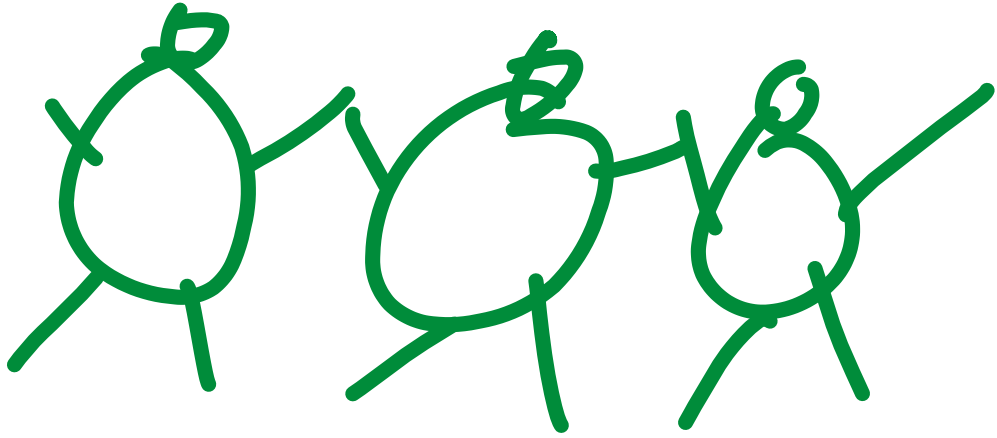
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- (c) Three turtles rested on a floating log, and a fish swam beneath them
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Mental Models

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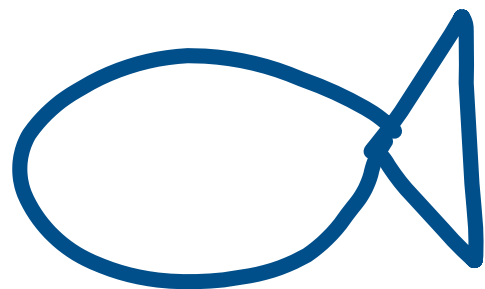- (d) Three turtles rested on a floating log, and a fish swam beneath it

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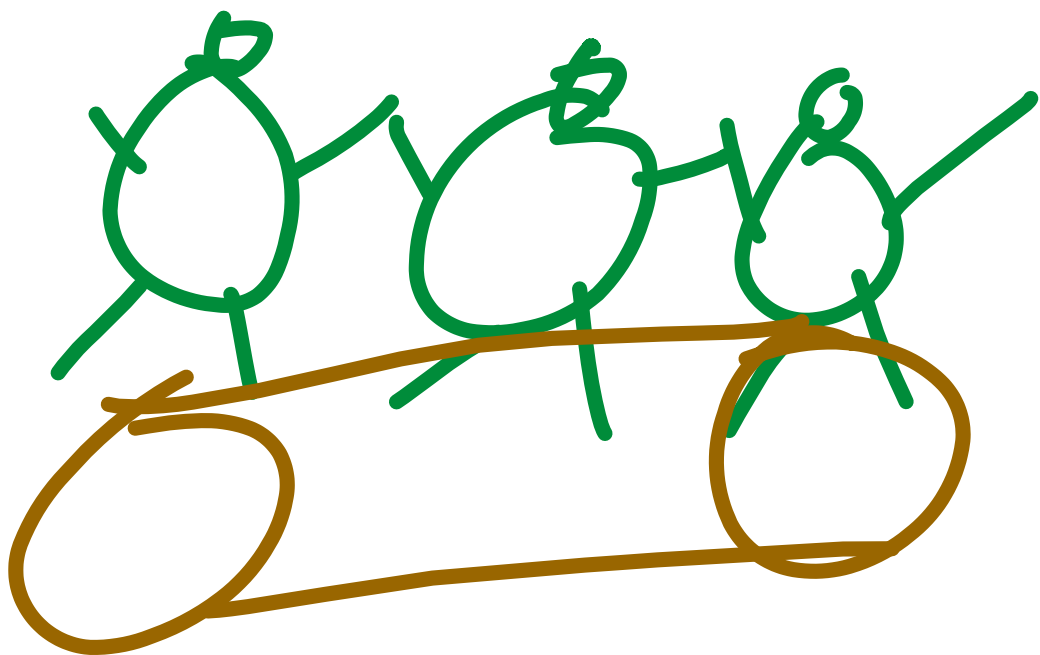
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Mental Models

better recall

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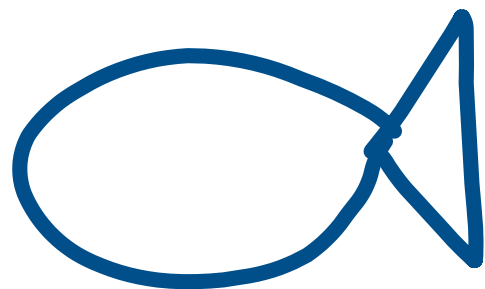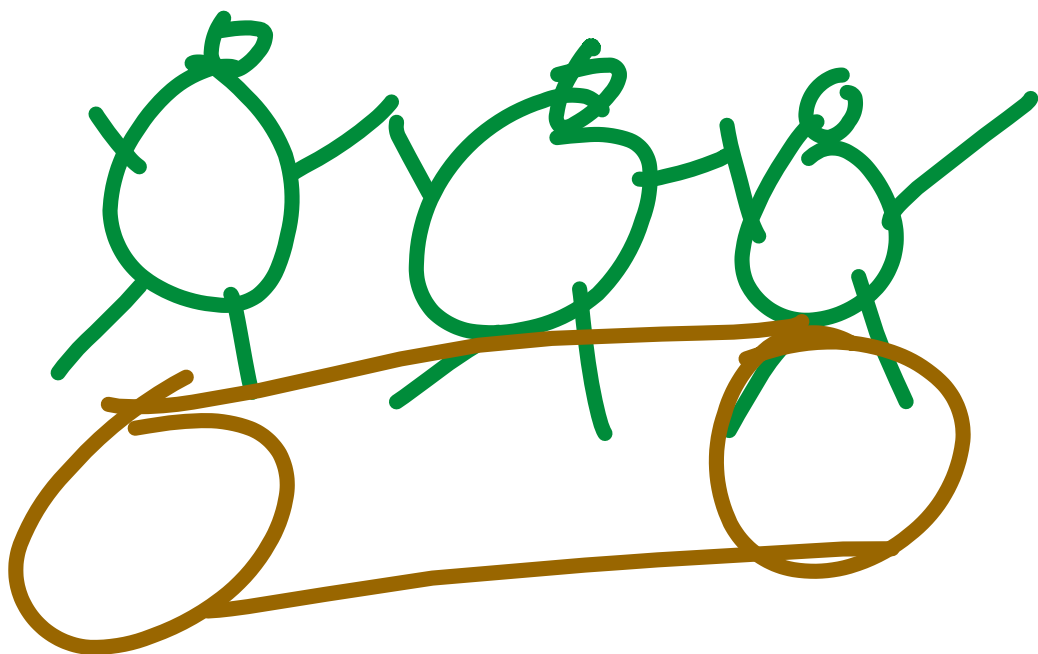- (d) Three turtles rested on a floating log, and a fish swam beneath it

Worse recall

Mental Models

- Conscious memory, at least, seems to recall the gist of sentences, not every single word and detail
    - Our implicit memory might, though
        - (remember all our priming effects)

Mental Models

"The procedure is actually quite simple. First you arrange things into different groups depending on their makeup. Of course, one pile may be sufficient depending on how much there is to do. If you have to go somewhere else due to lack of facilities that is the next step, otherwise you are pretty well set. It is important not to overdo any particular endeavor. That is, it is better to do too few things at once than too many. In the short run this may not seem important, but complications from doing too many can easily arise. A mistake can be expensive as well. The manipulation of the appropriate mechanisms should be self-explanatory, and we need not dwell on it here. At first the whole procedure will seem complicated. Soon, however, it will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but then one never can tell."

Instructions for Washing Clothes

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Background Information

- Non-linguistic information is vital to our processing of linguistic information

- This can include:
  - Things that have been said previously
  - Things that have happened previously
  - Physical context
  - Familiarity with speaker & their intentions

- This can affect our understanding of language in real time

Discourse-Specific Inferences

When Peanuts Fall in Love: N400 Evidence for the Power of Discourse

Mante S. Nieuwland and Jos J. A. Van Berkum

Discourse-Specific Inferences

- Once upon a time, a psychotherapist was consulted in her home office by a **yacht** with emotional problems.

Discourse-Specific Inferences

- Once upon a time, a psychotherapist was consulted in her home office by a yacht with emotional problems.

- The yacht confided in her that everything in life had gone wrong and started crying.

- The psychotherapist consoled the yacht by stating that everybody experiences these kinds of trouble every now and then.

- But the yacht doubted whether to continue outlining his problems to her.

- The psychotherapist advised the **yacht** to be honest not only with her, but especially with himself.

- At that moment the yacht cried out that he was absolutely terrified of water

Discourse-Specific Inferences

- A woman saw a dancing peanut who had a big smile on his face. The peanut was singing about a girl he had just met. And judging from the song, the peanut was totally crazy about her. The woman thought it was really cute to see the peanut singing and dancing like that. The peanut was **in love**, and by the sound of it, this was definitely mutual.

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Metaphor

- My lawyer is a shark
- The hurricane devoured the coastline
- Universities are petri dishes for ideas

- The hammerhead is a shark
- The hurricane destroyed the coastline
- Universities are productive spaces for ideas

Metaphor

- Conventional (or unconventional) nonliteral uses of language
  - A strictly literal interpretation of metaphor will be incorrect
    - The lawyer is not literally a shark

- The relevant question (for us) is how do we process metaphor?
  - Can you think of two possible explanations for how we process metaphor?

Metaphor

- Conventional (or unconventional) nonliteral uses of language
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- The relevant question (for us) is how do we process metaphor?
  - Can you think of two possible explanations for how we process metaphor?
    - (a) we first compute the literal meaning, recognize that something isn't quite right, and use that information to compute the nonliteral (correct) meaning
    - (b) we can easily compute the nonliteral meaning from the use of that utterance in context
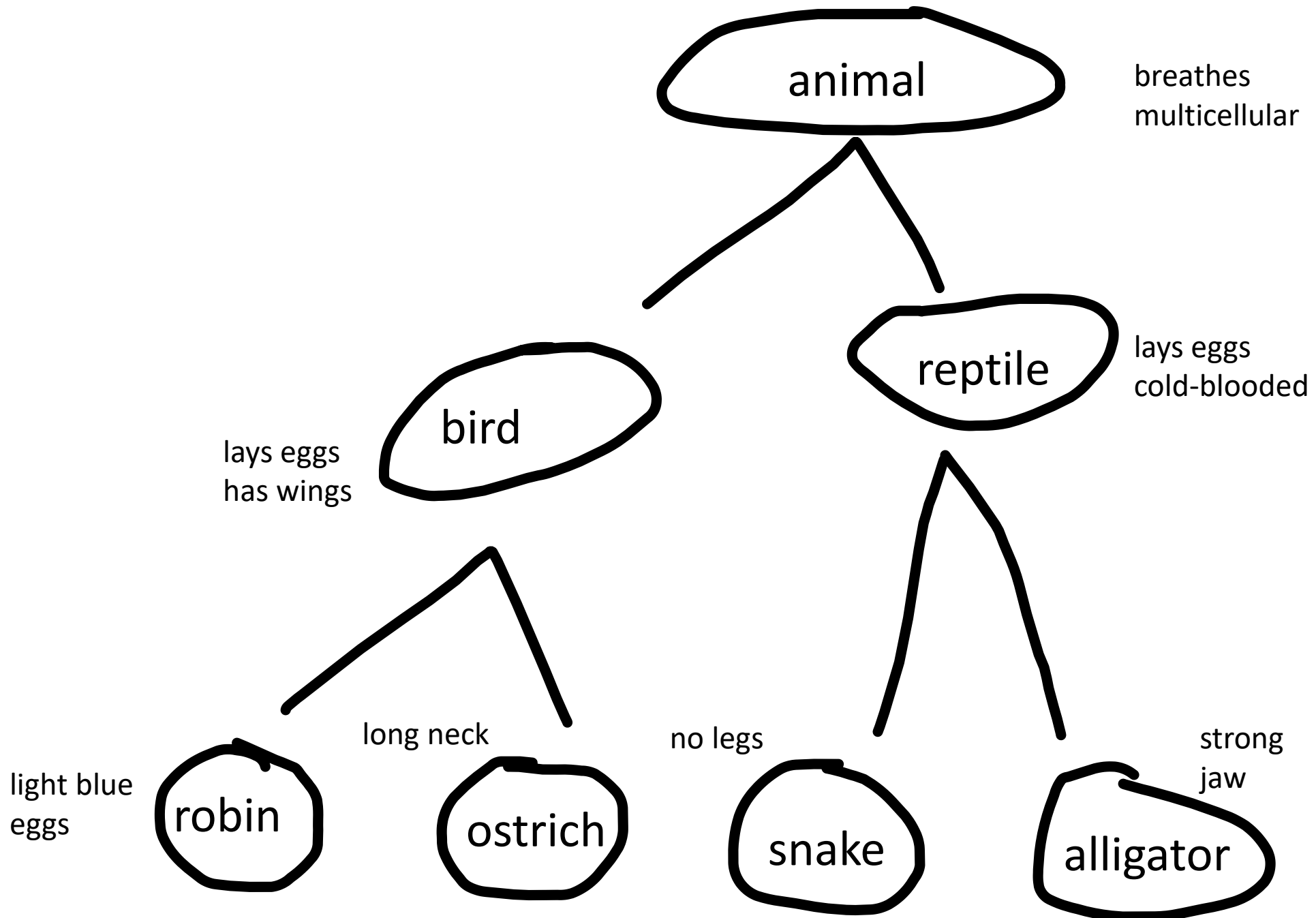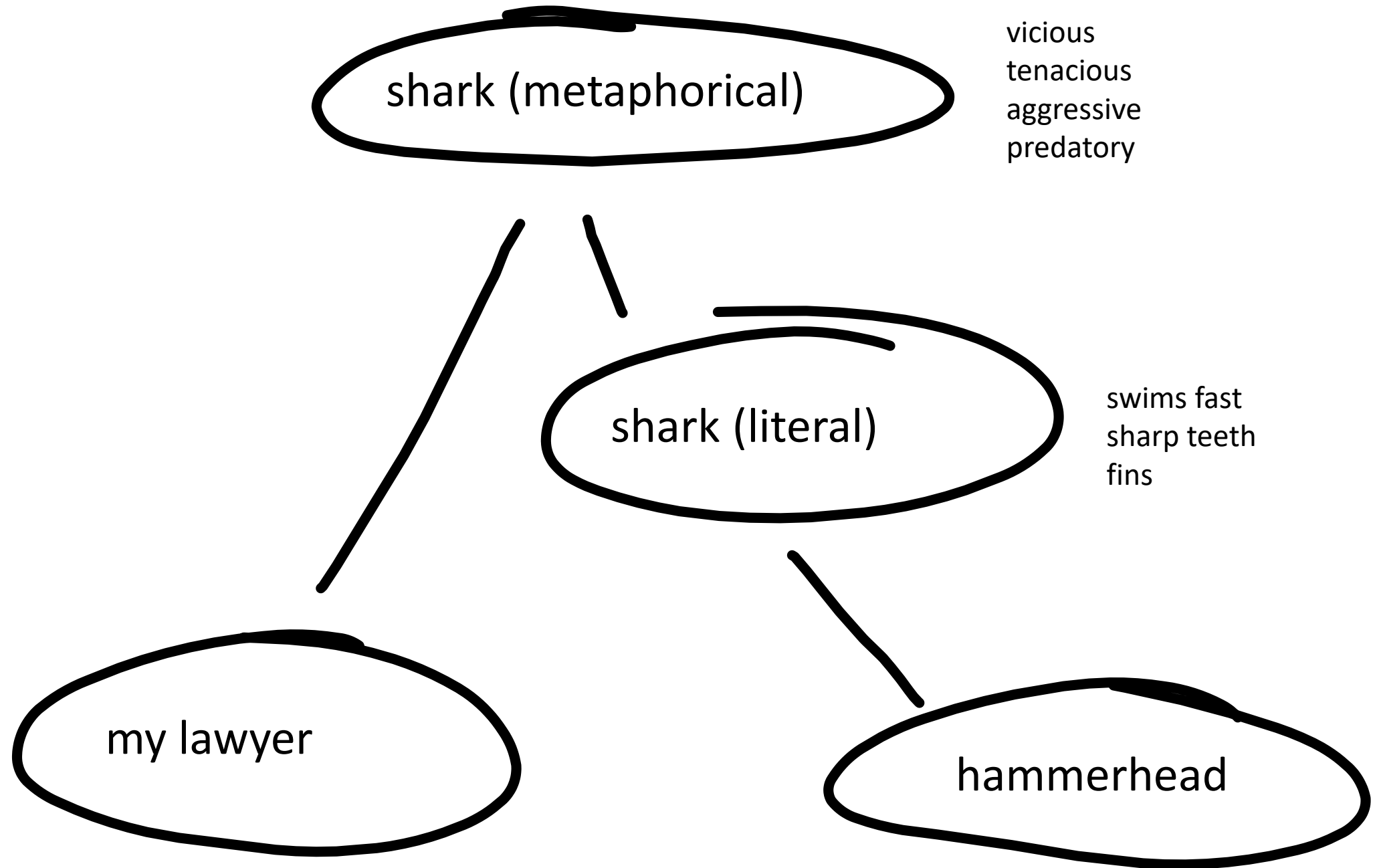
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      - When the metaphorical meaning is relevant and salient from the context, we don't really stop to consider the literal meaning

Metaphor

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Metaphor

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- Another approach depends on analogical reasoning
  - Our ability to compare things and focus on similarities

Tree trunks are drinking straws

- In order to understand this, we don't just have an abstract "drinking straw" category – we need to understand relations
  - drinking straw:drink::tree trunk:water

Metaphor

- One approach to metaphor goes back to category structure

- Another approach depends on analogical reasoning
  - Our ability to compare things and focus on similarities

- Note that both of these approaches are *domain-general*
  - Categorization and analogy aren't processes specific to language

Metaphor

- Another approach is more language-focused
  - When we activate a word, we activate related words (remember lexical access)
    - And we also inhibit irrelevant connections based on context
  - So when we activate words from two seemingly different realms (e.g., my lawyer is a shark), we inhibit the "typical" activations of *lawyer* and *shark* and instead activate whatever connects those two
- This process uses the exact same mechanisms as processing a literal sentence, just with a different outcome

Metaphor

- In order for any of these theories to work, we need some way to suppress literal content in order to understand metaphor
- Gernsbacher et al (2001): participants read a sentence then answer a prompt
  a. That hammerhead is a shark
  b. That defense lawyer is a shark

  c. Sharks are good swimmers
  d. Sharks are tenacious

Metaphor

- In order for any of these theories to work, we need some way to suppress literal content in order to understand metaphor

- Individual differences:

- Those with better cognitive control and working memory abilities seem to be faster and better at understanding metaphor
  - Better at inhibiting irrelevant content, storing more content in working memory

- More general knowledge will lead to better metaphor processing too

Irony

- Irony is another example of nonliteral language
  - The actual meaning is the opposite of the literal meaning
  - Usually heavily dependent on context – knowledge about the speaker and/or the situation are typically necessary to understand irony
    - Prosodic cues help in verbal interactions

- Pragmatically, can be thought of as a violation of Grice's Quality maxim
  - *Say what you believe to be true*
  - Irony is a violation – you're saying what you don't believe to be true in order to imply what you do believe to be true

Irony

- Again, same question: how do we process irony?
  - (a) we first compute the literal meaning, recognize that something isn't quite right (with the help of context), and use that information to compute the nonliteral (intended) meaning
  - (b) we can easily compute the nonliteral meaning from the use of that utterance in context

Irony

- "Standard pragmatic" approach: we compute the literal meaning, then recognize that this meaning is incompatible with the context, then suppress the literal meaning and activate the ironic one
- "Direct access" approach: context and lexical information interact early on such that we can directly access the right meaning immediately in context
- "Graded salience" approach: fundamental differences between processing familiar and unfamiliar irony
  - Literal meaning and familiar irony will both be activated in parallel, which means direct access is possible
  - But unfamiliar irony will require additional processing
  - Applied to metaphor as well

Irony

- Experimental results (eventually) seem to support the graded salience approach
- Eye-tracking studies repeatedly find longer reading times and more regressions for ironic sentences compared to literal ones
  - Only for unfamiliar irony
- ERP studies repeatedly find P600 effects for ironic sentences compared to literal ones
  - Taken as evidence of revision, reanalysis

Next time