The Lexicon (1)

LIGN 170, Lecture 4
The Lexicon

- Connecting words and concepts: 
  Linked but separate
The Lexicon

• Connecting words and concepts: *Linked but separate*

• One word can have many concepts
  - bank: money *vs.* river

• One concept can have many words
The Lexicon

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  • pail vs. bucket
The Lexicon

• Connecting words and concepts:  
  *Linked but separate*

• One word can have many concepts
  • bank: money *vs.* river

• One concept can have many words
  • pail *vs.* bucket
  • sofa *vs.* couch
• Pseudowords have no meaning

• Lewis Carrol’s Jabberwocky:
  • Twas brillig, and the slithy toves...

• Unfamiliar words have no / vague meaning

• quadrille  french square dance

• ostracod  subclass of small crustaceans
• One concept may require multiple words to express

• at the house of French: chez

• Words change in meaning depending on context

• Tall tale vs. tall man

• Light reading vs. light suitcase

• Large poodle vs. large bear
• Do words and concepts interact?

• Sapir-Whorf Hypothesis:
  • Cognition is constrained by language
  • But, concepts are not strictly constrained:
    • Dani has only two color terms: mola (light) and mili (dark)
    • But speakers can distinguish other colors in non-linguistic tasks
Roadmap for Today and Tuesday

- How is conceptual space organized?
  - Individual concepts
  - Categories/Relations between concepts
- How does the lexicon link to concepts?
  - How is the lexicon organized?
  - What information does it contain?
  - How do we access it?
Concepts

• How are concepts organized internally
  • Two kinds of theories:
    • Features
    • Real-world knowledge about concepts
Feature-based theories

- Features can be:
  - perceptual
  - functional
  - microstructurual (composed of)
  - conventional
  - intrinsic
  - contextually-based
Classical view

- Set of necessary features to define an object

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<tr>
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- All items which have these feature are equally good

- Categories have clear, precise boundaries
Birds
Birds
Family Resemblance

- Categories have characteristic features
  - common to many exemplars
  - most frequent features most important

- Birds:
  - feathers, beak, lays eggs
  - flies, eats bugs
Family Resemblance

- Categories have fuzzy boundaries
- Core of commonly identified exemplars
- Best example of a category is the *prototype*
  - Prototype may not actually exist
- Birds:
  - Core: robin, pigeon, seagull
bird?
Family Resemblance

- Categories have fuzzy boundaries
  - Core of commonly identified exemplars
  - Best example of a category is the prototype
    - Prototype may not actually exist
  - Fuzzy because items at periphery are likely to share features with other categories
- Tomatoes:
  - Many same functional properties as vegetables
  - Eaten in lettuce salads
  - Not made into pies or sweets
  - But, has physical properties of fruits
• How could otherwise intelligent well-educated people argue that a chicken is a mammal?

• Physical features
  • Lays eggs
  • Has beak, wings, feathers

• Functional features
  • Is often cooked and eaten (like cows and pigs)
Typicality effects

- Semantic Verification Task:
  - How long does it take people to judge that an X is a Y?
  - A robin is a bird.
  - An ostrich is a bird.

- Supports idea of core and peripheral exemplars
What about classical examples?

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• Even for these categories, people will rate “13” as a better odd number than “57”
Problems...

- What counts as a feature?
- Features appear to be differently available
  - Depending on task
Is “floats” a feature of basketball?
Problems...

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- Situational (ad hoc) categories
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- Situational (ad hoc) categories
Knowledge-based theories

- Focus on how and why items get grouped together into categories
- Features are cues to more complex understanding of categories
grey hair
grey hair

must be old enough to have children who can have children
Knowledge-based theories

- Focus on how and why items get grouped together into categories
- Features are cues to more complex understanding of categories
Psychological Essentialism

• People behave as if things have underlying natures that give them identity

• We know the underlying reason for features (or know that someone does)

• White vs grey
  • clouds // hair
• Essentially a version of feature theory
  • Features have underlying quantifiable causes
  • Must have certain DNA structure to be a raccoon,
    • But in absence of portable DNA kit (now available at Toys’R’Us), we use obvious features
      • Knowing they are derived from the more fundemantal features
Psychological contextualism

- Certain contexts can provide bond between features in a concept(s)
Cup and bowl continuum

When mixed features:
“cup” with tea
“bowl” with soup
Psychological contextualism

- Certain contexts can provide bond between features in a concept(s)
- Distinction between intrinsic features and temporary context-dependent features
Concepts

• How are concepts organized internally
  • Features
  • Knowledge about concepts
• How are concepts related to each other and organized into a larger pattern?
• Supporting evidence
  • Semantic distance effects
    • A canary is a bird
    • A canary is an animal
  • Category-size effects
    • Larger categories take longer to verify

animal
bird
canary
• Problems for strict hierarchical models
  • Abstract concepts
  • Strength of association
    • *A canary sings.* vs. *A canary has skin.*
    • Singing more frequently associated with canaries
  • Equal members problem
• Typicality Effects:

(1) A penguin is a bird.

(2) A robin is a bird.

• (2) verified faster than (1)

But, equal members of “bird”
• Problems for strict hierarchical models
  • Abstract concepts
  • Strength of association
    • *A canary sings.* vs. *A canary has skin.*
    • Singing more frequently associated with canaries
  • Equal members problem
  • Subset problem
• Standard subset effect

• A robin is a bird vs. A robin is an animal.

• But, for certain categories, people are faster to verify superordinate relations that are further away

• A dog is an animal. vs. A dog is a mammal.

• “Relatedness” measure
Feature comparison

- Two kinds of features
  - Defining: critical for category
  - Characteristic: common but not necessary for category
- Stage 1: Compare all features
  - Enough overlap to say yes?
- Stage 2: If no: Compare defining features only
• Problems with this approach
  • Early problems about features
    • How to define them
    • How to make them work with context
  • Notion of “semantic similarity” still important
Another view

- Spreading activation model
- Features are treated as concepts in their own right
- Concepts are nodes
- Associated concepts are connected
- Activation spreads from node to node
Salmon
Fish
Edible
Cherries
Fruit
Green
Apples
Flowers
Violets
Pink
Cherries
Red
Roses
Fruit
Yellow
Green
Orange
Red
Fire engine
Vehicle
Bus
Ambulance
Truck
Car
Street
Spreading activation

- More highly associated concepts are closer together in the network
- Proximity means activation
  - Typicality Effects
    - Robin is closer to bird than robin
  - Subset Effects
    - Dog is closer to animal than mammal
A note about knowledge

- The problem with spiders
- A spider is a kind of ________
  arachnid, arthropod
- Not actually an insect
- But that is most frequent response
- Knowledge of “correct” conceptual organization
Creepy Crawly Thing
Centipede
Spider
Wasp
Ant
Fly
Beetle
Bee
Millipede
Grubs
Insect
Butterfly
Arachnid
Summary of concepts

• Concepts have substructure

• Features (Context)

• Concept organization appears to have some hierarchical structure

• Based on internal representations not direct real world

• Not strictly taxonomic

• Similarity plays an important role
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