Cognitive Linguistics: Categories, Frames, Image Schemas, and Beyond

Section notes for Friday 2/29 (Will Chang) & Monday 3/3 (Nathan Schneider, cs182-ra@imail.eecs.berkeley.edu)

Administrivia

- Assignment 4 is due Thursday in class. It will ask you to do lots of fun CogLing stuff.
- Midterm is Tuesday 3/11 in class.
- Grades for A2 & A3 on the way—you’ll have them in advance of the midterm.
- Students were asked to read “Cognitive Semantics” by Lakoff (1988), which should be a helpful introduction to CogLing. It’s on bSpace!

Categorization

- Classical notion of categories (Aristotle): a category is a set of elements satisfying necessary and sufficient conditions (à la Set Theory). Everything is either completely in or out of the category, and categories have no internal structure.
- Review what constitutes a basic-level category
  - Characteristics typical of basic-level categories: concept learned early, highest level with a single representative mental image or shape, highest level with representative motor routines, most knowledge organized at this level, named with a short & common word, fastest membership identification at this level. The basic level of living things is typically the genus level.
    - Some examples—basic, superordinate, or subordinate?

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<table>
<thead>
<tr>
<th>Desk lamp</th>
<th>Doorknob</th>
<th>Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tevas</td>
<td>Water</td>
<td>Tool</td>
</tr>
<tr>
<td>Emperor penguin</td>
<td>Computer</td>
<td>Clothing</td>
</tr>
<tr>
<td>Flathead screwdriver</td>
<td>Happy</td>
<td>Animal</td>
</tr>
<tr>
<td>GBC sandwich</td>
<td>Light</td>
<td>Liquid</td>
</tr>
<tr>
<td>Hoodie</td>
<td>Strawberry</td>
<td>Food</td>
</tr>
</tbody>
</table>
```

- Review what characterizes a prototype (central case)
  - Quickly identifiable as a category member
  - In a radial category, other members are variations on the central case
  - May be culturally dependent
  - What are some prototypical members of the superordinate categories mentioned previously?
    - Leader: politician, president, chairperson, coach; Tool: screwdriver, hammer, screws, nails; Clothing: shirt, pants, shoes; Animal: dog, cat, lion, bear, bird (probably not platypus or ostrich); Liquid: water, milk; Food: bread, meat, eggs
• The following may be used in making judgments about category members:
  o **Typical case:** A typical computer is a desktop
  o **Stereotype:** A stereotypical Berkeley resident is a bleeding-heart liberal
  o **Salient exemplar:** A salient example of an evangelist is Yoshua (or: Happy, Happy, Happy)
  o **Ideal case:** An ideal university has great resources, courses, students, instructors, research, etc.
  o **Paragon** (member exhibiting the ideal): Berkeley, of course! 😊
  o **Nightmare case:** A nightmare corporation is one that screws over its investors, workers, and customers
  o **Anti-paragon** (member exhibiting the nightmare): Enron

• Radial category/polysemy networks show the structure of a category by encoding links between related senses of a word
  o Remember mother was one example of a radial category
  o Consider game:

- **language game; charades**
  - + for fun
  - - involves props
  - +/− requires skill
  - - chance
  - - requires luck
  - +/- competition
  - - risk

- **prototype (e.g. poker game)**
  - + for fun
  - + involves props
  - + requires skill
  - + chance
  - + competition
  - + risk

- **a game that I got for Christmas**
  - Metonymy*: activity for props

- **the game of marriage**
  - Metaphor*: a relationship is a game

- **war games**
  - - for fun
  - ? involves props
  - ? requires skill
  - ? chance
  - ? competition
  - - risk

- **lottery**
  - + for fun
  - + involves props
  - - requires skill
  - + chance
  - + competition
  - + risk

* There will be more on metaphor and metonymy later in the course.
Frame Semantics

- Thursday’s lecture was on FrameNet (from Michael Ellsworth).
- Ask a student to draw a hypotenuse on the board. The hypotenuse is just a line segment—why did they draw a triangle? That’s right, folks: It’s because of FRAMES! The meaning of “hypotenuse” depends on the right triangle frame, just like “shortstop” is meaningless without a baseball frame.
- What frame does “Tuesday” evoke?
- What is a frame, precisely?
  - An online publication by several of the architects of the FrameNet project (Ruppenhofer et al 2005:1) describes a semantic frame as “a script-like conceptual structure that describes a particular type of situation, object, or event and the participants and props involved in it”. Frames, as used in FrameNet, consist of sets of roles and relations that form part of the meaning of a lexical item. (Karen Sullivan, 2008)
  - OOP Metaphor: Think of a frame as a class definition.
    - Roles are like properties, events are like methods
    - Understanding a scenario in terms of frames is like instantiating them, and filling roles with entities from context/simulating events
    - Frames can be expressed in an inheritance hierarchy, with more specific/elaborate frames inheriting from more general ones
    - Frames are, in fact, formalized in an object-oriented language for FrameNet and Embodied Construction Grammar (ECG)
- What sorts of entities and events are encapsulated in the following frames?:
  - transfer: TRANSFERER, RECIPIENT, GOODS; TRANSFERER gives GOODS to RECIPIENT
  - commercial transaction: BUYER, SELLER, MONEY, GOODS; BUYER pays MONEY to SELLER, SELLER furnishes BUYER with GOODS (this is a two-way transfer)
  - hospital: DOCTORS, NURSES, PATIENTS, ADMINISTRATORS, VISITORS, pharmacy, operating room, medical equipment, etc.; caring/healing (DOCTORS, NURSES care for PATIENTS), visiting (VISITORS visit PATIENTS), etc.
  - exercise: exerciser, body part(s), a goal of improving health/fitness; exercise activities undertaken by exerciser in order to achieve goal

Image Schemas

- These are a subtype of frames that seem to be fundamental and universal, playing a role across languages
- They deal largely with physical relations, motion, and perception
- Argued to be important in the brain for understanding more complex ideas
  - The frames and constructions (words, syntax, etc.) of a language combine universal schemas in specific ways
• NOTE: In some of the literature, "schema" (also "script") is just a synonym for “frame”. In Embodied Construction Grammar, the schema keyword will be used for frames as well as image schemas.

• Review the image schemas presented in lecture:
  o Trajector-Landmark: An asymmetric relationship between two entities, in which one (the trajector) is being described relative to another one (the landmark).
  o Container: All sorts of things are often construed as (literal or metaphorical) containers: a box, a room, a geometric shape, a cell, a body, a geographic region (in Berkeley). The Container has a boundary demarcating an interior and an exterior, and possibly a portal allowing movement from the exterior to the interior and vice versa.
  o Source-Path-Goal (SPG): This schema represents a prototypical motion event, where some mover starts at a source and moves via a path to arrive at a goal. It is also used metaphorically all the time (e.g. I’m going to/gonna graduate — this does not refer to literal motion).

• Other image schemas include overlap, surrounding, near-far, vertical orientation, etc.

• Review the English spatial schemas Into, OutOf, and Through:
The marble rolled into/out of/through the room.
  o These all evoke Trajector-Landmark, Container, and SPG.
  o The motion of the marble is being described relative to the room:
    ▪ The trajector is bound to (associated with) the mover role of SPG, which is filled in our scenario with the marble.
    ▪ The landmark is bound to the container role, i.e. the room. (Note: Because of how the sentence is expressed, the landmark here is the entire container. If the sentence were The marble rolled through the door, then the landmark and path would be just the door (portal). Because the role bindings would be different relative to the sentence—X in through X referring to the portal rather than the container—this would be a different, related sense of “through.”)
  o Because there is motion along a path, we use SPG:
    ▪ The source is where the motion starts.
      • For Into and Through, the exterior of the room (container).
      • For OutOf, the interior of the room.
    ▪ The goal is where the motion ends.
      • For Into, the interior of the room.
      • For OutOf and Through, the exterior of the room.
    ▪ The path is where the mover is during the motion.
      • For Into and OutOf, the portal (door) of the room.
      • For Through, the entire interior of the room.
• Unlike the notions of SPG, Container, etc.—thought to be universal—categories like “in”, “out of”, etc. are language-specific. Part of your homework assignment will be to see how another language categorizes spatial relationships.

**Finally**

• Next in the class you’ll learn about a computational model for learning how a language categorizes spatial relationships. Later you’ll learn about how the meanings of linguistic expressions will be represented in a formal way (Embodied Construction Grammar) so they can be used for computational simulation, inference, and models of language learning.

• Any questions about the homework? Linguistics? Life?