HG2002 Semantics and Pragmatics

Word Meaning

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Lecture 3

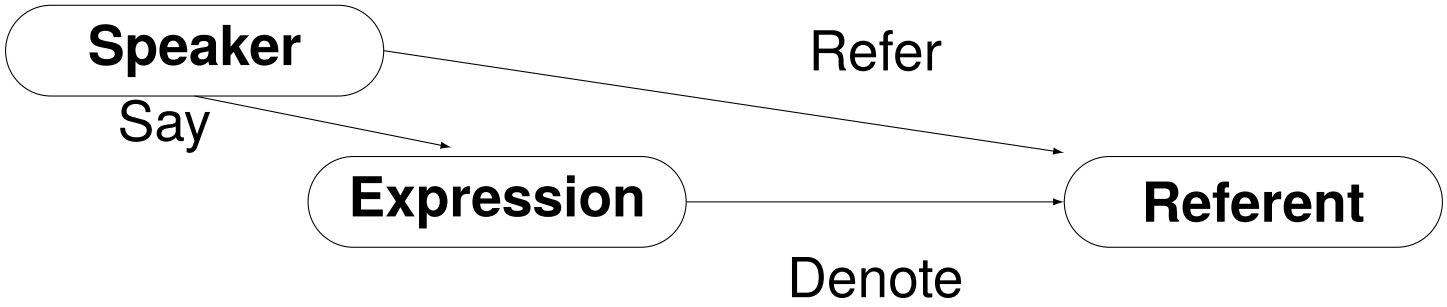
https://bond-lab.github.io/Semantics-and-Pragmatics/

Overview

- Revision: Meaning, Thought and Reality
  - Reference as a Theory of Meaning
  - Deixis
  - Mental Representations
  - Words, Concepts and Thinking
- Defining ***word***
- Problems with defining word meaning
- Lexical Relations
  - Wordnet
- Derivational Relations
- Lexical Universals
- Next week: Chapter 4: Sentence Relations and Truth

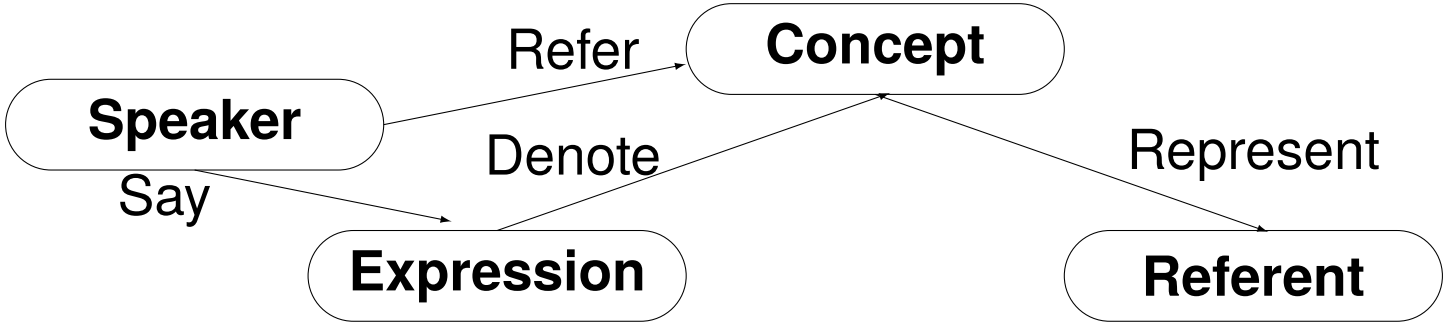
Revision: Meaning, Thought and Reality

Referential View



Referential view is focused on direct relationships between expressions (words, sentences) and things in the world (realist view). (More in Chapter 10)

Representational View



Representational view is focused on how relationships between expressions (words, sentences) and things in the world are mediated by the mind (cognitive linguistics). (More in Chapters 9 and 11)

Two types of naming

- **The description theory**: Names are like short hands for descriptions:

  William Shakespeare = “the playwright who wrote Hamlet”

- **The causal theory**: Names begin with some event of naming (e.g. a christening) before becoming commonly accepted.

  William Shakespeare = “the guy other people call William Shakespeare”

Mental Representations

- Divide meaning into
  - **reference**: the relation to the world
  - **sense**: the rest of the meaning
- Introduce **concepts**
  - Represented by Necessary and Sufficient Conditions
  - Prototypes
    - Concepts are organized in groups around a **prototype**
    - These have typical members (remembered as **exemplars**)
    - prototypes have **characteristic feature**s
    - Some categories (concepts) seem to be more psychologically basic than others: **basic level categories**

What is Deixis

- any linguistic element whose interpretation necessarily makes reference to properties of the extra-linguistic context in which they occur is **deictic**

  Person relative to the speaker and addressee
  Spatial Location demonstratives; …
  Temporal Location tense; *yesterday, today, tomorrow*
  Social relative to the social status: *professor, you, uncle, boy*

- Discourse deixis: referring to a linguistic expression or chunk of discourse

More than 90% of the declarative sentences people utter are indexical in that they involve implicit references to the speaker, addressee, time and/or place of utterance in expressions like first and second person pronouns, demonstratives, tenses, and adverbs like here, now, yesterday (Bar-Hillel 1954: 366).

Spatial Deixis

- Two (three) way systems (English, …)

proximal	***this***	***here***	close to the speaker
distal	***that***	***there***	far to the speaker
interrogative	***what***	***where***	

- Three (four) way systems (Japanese, …)

proximal	***kore*** “this”	***koko*** “here”	close to speaker
medial	***sore*** “that”	***soko*** “there”	close to addressee
distal	***are*** “that”	***asoko*** “over there”	far from both
interrogative	***dore*** “which”	***doko*** “where”	

- Can decompose: ***this*** “this thing”, ***here*** “this place”

Person Deixis

- Commonly a three way division

First Person	Speaker	***I***
Second Person	Addressee	***you***
Third Person	Other	***he/she/it***

- Often combined with
  - **gender**: ***he/she/it***
  - **number**: ***I/we***, ***'anta*** "you:m", ***'antumaa*** "you:dual", ***'antum*** "you:m:pl" (Arabic)
  - **inclusion**: ***núy*** "we including you", ***níi*** "we excluding you" (Zayse)
  - **honorification**: ***kimi*** "you:inferior", ***anata*** "you:equal", don't use pronouns for superiors: ***sensei*** "teacher", …(Japanese)

Social Deixis

In European languages, a two-way choice in 2nd person pronominal reference is known as the T/V distinction, based on the French forms for “you”.

➢ T/V distinctions in European languages

	Familiar 2sg	Polite 2sg
French	tu	vous
German	du	Sie
Spanish	tú	usted

➢ Shift from asymmetric use showing **power** (superior uses ***du***; inferior uses ***vous***) to symmetric use showing **solidarity** (strangers use ***vous***; intimates use ***du***): typically the socially superior person must invite the socially inferior person to use the familiar form

Linguistic Relativity

- The language we think in makes some concepts easy to express, and some concepts hard
- The idea behind **linguistic relativity** is that this will effect how you think
- Do we really think in language?
  - We can think of things we don't have words for
  - Language under-specifies meaning
- Maybe we store a more abstract representation
  the language of thought or **Mentalese**

Word Meaning

Defining *word*

- How many words are there in the following?

  (1) *He who laughs last laughs longest.*
  (2) *If he is right and I am wrong, are we both in trouble?*
  (3) *I'm gonna go.*
  (4) 他们结婚了 *ta1men jie2hun1 le* "they got married" (他们结了婚)

- **Tokens**: Individual instances of a class

- **Types**: The class as a whole

- Why do we need a definition for ***word***?
  - Psychological reality: People can divide language into words
  - Phonological contours: People pronounce words as unit
  - Orthographic practice: Many languages put spaces between words (although this practice only began around 600 CE for Latin, and did not spread to all European languages 'til as late as the 1600s)
    - Some put them between phrases (Korean)
    - Some words include spaces *New York*, *ad hoc*

Bloomfield's grammatical definition

> A word, then, is a free form, which does not consist entirely of (two or more) lesser free forms; in brief, a word is a *minimum free form*.
>
> (Bloomfield 1984: p178)

In practice, the definition is somewhat task specific: it may make more sense to talk of **orthographic words**, **semantic words** or **predicates**, ….

Problems with defining word meaning

Definitional Semantics

- Standard lexicographic approach to lexical semantics:

  semantics = *the study of language meaning*
  tailor = *a person whose occupation is making and altering garments*

- Definitions are conventionally made up of;
  - genus: what class the lexical item belongs to
  - differentiae: what attributes distinguish it from other members of that class

- Often hard to understand if you don't already know the meaning!

Definitional Semantics: pros and cons

- Pros:
  - familiarity (we are taught to use dictionaries)
- Cons:
  - subjectivity in sense granularity (splitters vs. lumpers) and definition specificity
  - circularity in definitions
  - consistency, reproducibility, …
  - often focus on diachronic (historical) rather than synchronic (current) semantics

Starting at the Beginning ...

- Lexical semantics is concerned with the identification and representation of the semantics of lexical items

- If we are to identify the semantics of lexical items, we have to be prepared for the eventuality of a given word having multiple interpretations
  - **Polysemy**: having multiple meanings
  - **Monosemy**: having only one meaning

- **Homonyms** are words with two unrelated meanings:
  - **homographs**: same spelling
    bow vs *bow*; *keep* vs *keep*
  - **homophones**: same pronunciation
    right vs *write*; *keep* vs *keep*

Distinguishing Polysemes

- The polysemy of a word can be tested by a variety of means, including:
  - **Antagonism**: can the word be used in a sentence with multiple competing interpretations that are incompatible?

    Kim can't bear children
    - Cannot have children
    - Doesn't like children
  - **Zeugma**: can the word be used in a context where multiple competing interpretations are simultaneously evoked?

    Kim and her visa expired
    - died
    - ran out
  - **Paraphrase/Translation**: Is there more than one (clearly different) way to paraphrase/translate the word.

Lexical Relations

Words/Concepts are related in many ways

- **Hyponymy/Hypernemy**
- **Synonymy**
- **Antonymy** (Opposites)
- **Meronymy**
  - **Member-Collection**
  - **Portion-Mass**
  - **Element-Substance**
- **Domain** (lexical field)

Hypernymy and Hyponymy

- **Hyponymy**: X is a hyponym of Y iff $f(X)$ entails $f(Y)$ but $f(Y)$ does not entail $f(X)$ (for all or most f):

  Kim has a pet dog $\rightarrow$ *Kim has a pet animal*
  Kim has a pet animal $\not\rightarrow$ *Kim has a pet dog*

  N.B. complications with universal quantifiers and negation:

  Kim likes all animals $\rightarrow$ *Kim likes all dogs*
  Kim likes all dogs $\not\rightarrow$ *Kim likes all animals*

- **Hypernymy**: Y is a hypernym of X iff X is a hyponym of Y

- Can a word have multiple hypernyms?

  (5) ***tank***$_1$ $\subset$ ***military_vehicle***$_1$; $\subset$ ***tracked_vehicle***$_1$; $\subset$ ***armored_vehicle***$_1$; ? $\subset$ ***weapon***$_1$

Properties of hypernymy/hyponymy

- Asymmetric
- applies only to lexical items of the same word class
- applies at the sense level
- Transitive: ***dog***$_1$ $\subset$ ***mammal***$_1$ $\subset$ ***animal***$_1$
- Not all nodes are lexicalized

neutral (Hyper)	male	−balls	female	child
sheep	***ram***	***wether***	***ewe***	***lamb***
cow	***bull***	***steer***	***cow***	***calf***
goose	***gander***		***goose***	***gosling***
snake				
horse	***stallion***	***gelding***	***mare***	***foal***: ***colt/filly***

- Can you do this for ***pig***, ***cat*** or ***chicken***? **?**
- Can you give an example of this in another language? **?**

Synonymy

- **Propositional synonymy**: X is a propositional synonym of Y if
  - (i) X and Y are syntactically identical,
  - (ii) substitution of Y for X in a declarative sentence doesn't change its truth conditions

  e.g., ***violin*** and ***fiddle***

- Why propositional synonymy is over-restrictive:
  - syntactic identity (cf. ***eat*** and ***devour***)
  - collocations (cf. ***cemetery*** and ***graveyard***)
  - gradability (cf. ***sofa***/***settee*** vs. ***boundary/frontier***)

Near Synonymy

- Synonyms are substitutable in **some/most** rather than **all** contexts

- Synonymy via semantics: synonyms share "common traits" or attributional overlap, walking the fine line between "necessary resemblances" and "permissible differences":

  grain vs. ***granule***; ***green*** vs. ***purple***; ***alsation*** vs. ***spaniel***

➢ Permissible differentiation via **clarification**:

Here is a grain, or granule, of the substance.
** The cover is green, {or,that is to say} purple.*

and **contrast**:

Here is a grain or, more exactly, granule
** He likes alsations, or more exactly, spaniels*

Properties of synonymy

- Symmetric
- traditionally applies only to lexical items of the same word class but what about
  - ***can*** vs ***be able to***
  - ***immediately*** vs ***at once***
- applied at the sense or lexical item-level?
- $\approx$ converse of polysemy

Antonymy (opposites)

- Give me some new examples of each **?**

- **Simple antonyms**: the negative of one implies the positive of the other.

  (6) *dead/alive*
  (7) *pass/fail*

- **Gradable Antonyms**: points along a scale

  (8) *boiling/hot/warm/tepid/cool/cold/freezing*
  (9) *like HG2002/fascinating/interesting/dull/boring/*

- **Reverses**: reverse the direction of a motion

  (10) *ascend/descend*

(11) *up/down; right/left*

➢ **Converses**: the same act from different points of view

(12) *above/below; right/left*
(13) *employer/employee*

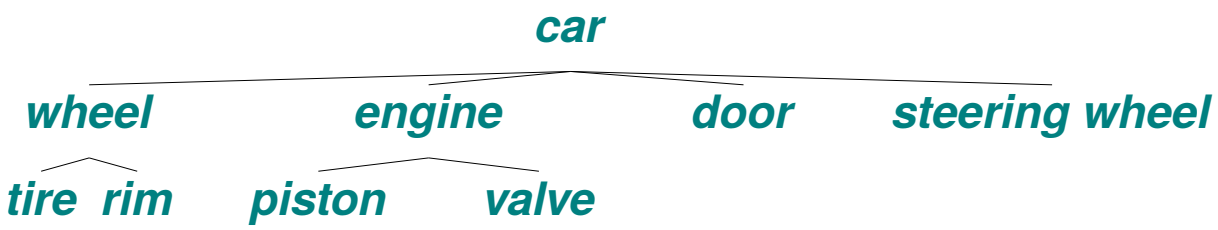
(Slightly non-standard usage)

➢ **Taxonomic Sisters**: children of the same (grand)parent

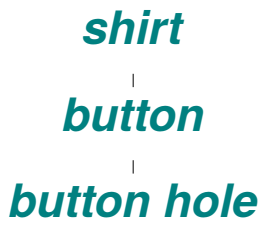
(14) *Monday/Tuesday/…/Sunday*
in WordNet: ***day of the week*** $\supset$ ***weekday***, ***weekend***
(15) *LMS/English/Chinese/…*
Context dependent

Meronymy

- **Meronomy** refers to the part-whole relation
  - **meronym** is the part
  - **holonym** is the whole



- It is not always transitive



But we don't normally say that a ***button hole*** is part of a ***shirt***.

Member-Collection

- The relation between a collection and one of the units that makes it up

(16) *tree–forest*
(17) *sheep–flock*
(18) *fish–school*
(19) *book–library*
(20) *member–band*
(21) *musician–orchestra*
(22) *student–class*

Portion-Mass

- The relation between a mass noun and a typical unit of measurement

  (23) *drop–liquid*
  (24) *grain–sand/salt/truth*
  (25) *sheet/ream–paper*
  (26) *lump–coal (or just about anything)*
  (27) *strand–hair*
  (28) *rasher–bacon*

- Similar to classifiers in many ways, e.g. in Malay

  (29) *ekor* “tail”–*animal*
  (30) *orang* “human”–*person*

Domain (lexical field)

The domain in which a word is typically used with this meaning.

(31) ***driver***$_1$ — the operator of a motor vehicle

(32) ***driver***$_2$ — someone who drives animals that pull a vehicle

(33) ***driver***$_3$ — a golfer who hits the golf ball with a driver [GOLF]

(34) ***driver***$_4$ — ($\simeq$ device driver) a program that determines how a computer will communicate with a peripheral device [COMPUTER SCIENCE]

(35) ***driver***$_5$ — ($\simeq$ number one wood) a golf club (a wood) with a near vertical face that is used for hitting long shots from the tee [GOLF]

Some GOLF terms: approach$_9$, approach shot$_1$, golf course$_1$, links course$_1$, wedge$_5$, tee$_1$, scratch$_9$, putt$_1$, slice$_1$, hook$_1$

And More

- There are many, many more lexical relations advocated by various theories including:
  - Troponymy/hypernymy (cf. *walk* vs. *lollop*) “way of doing something”
  - Entailment (cf. *snore* vs. *sleep*) “if you do one thing, you must be doing the other”
  - Operator (cf. *question* vs. *ask*) “the thing you do by doing something”
  - Magnifier (cf. *wound* vs. *badly*) “intensifier, diminisher”
  - Usage (cf. *strong-willed* vs. *pig-headed* “stubborn”)
    strong-willed is *pejorative*

Wordnet

WordNet

- WordNet is an open-source electronic lexical database of English, developed at Princeton University

  `http://wordnet.princeton.edu/`

- Made up of four separate semantic nets, for each of nouns, verbs, adjectives and adverbs

- WordNets exist for many languages, at LMS we work on:
  - Japanese
  - Bahasa Malay/Indonesian
  - Chinese
  - Myanmar
  - Kristang
  - The shared open multi-lingual wordnet (34+ languages)
    `http://compling.hss.ntu.edu.sg/omw/`

Wordnet Structure

- Lexical items are categorised into $\sim$115K (and counting) glossed **synsets** (= synonym sets)

```
1. enrichment -- (act of making fuller or more
   meaningful or rewarding)
2. enrichment -- (a gift that significantly increases
   the recipient's wealth)
```

- Lexical relations at either the synset level or sense (= combination of lexical item and synset) level

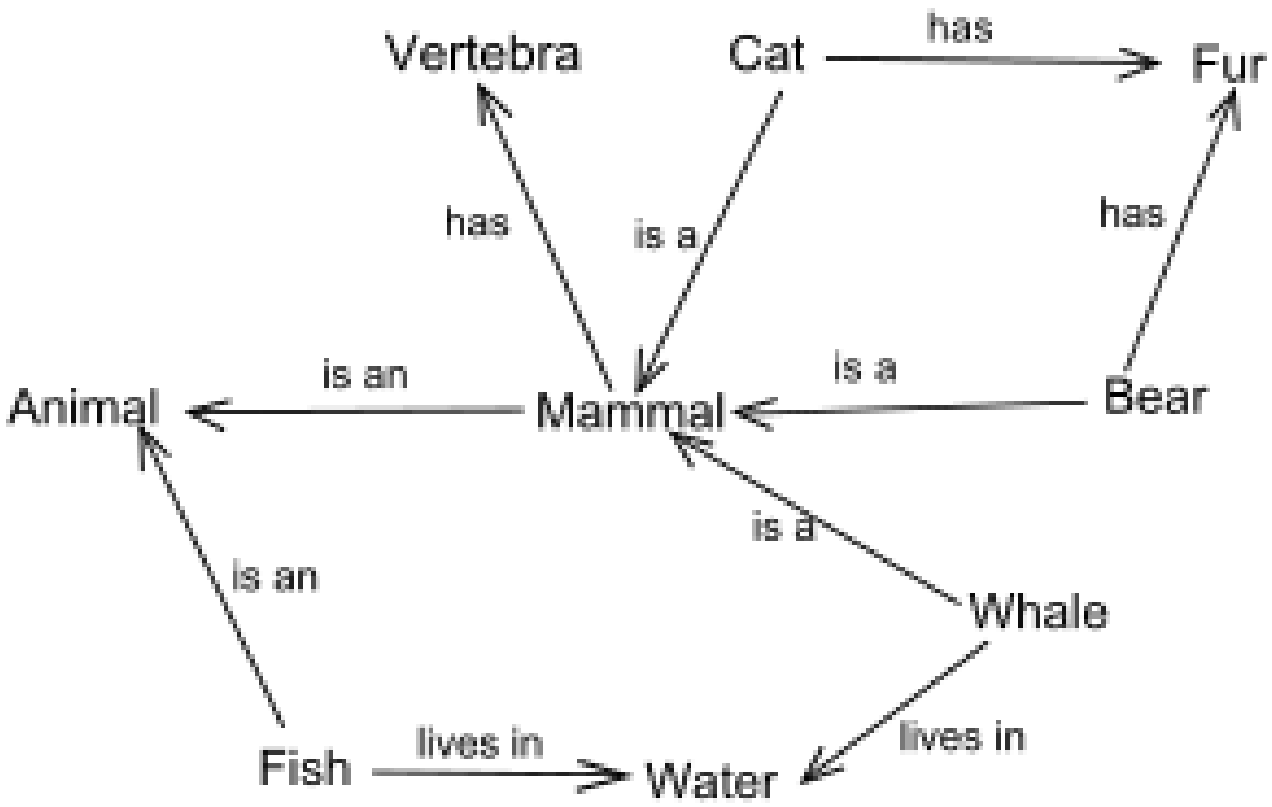
- Strongly lexicalist (orginally):
  - synsets only where words exist
  - but many multiword expressions ($\approx 50\%$)

Psycholinguistic Foundations of WordNet

- Strong foundation on hypo/hypernymy (lexical inheritance) based on
  - response times to sentences such as:
    a canary {can sing/fly,has skin}
    a bird {can sing/fly,has skin}
    an animal {can sing/fly,has skin}
  - analysis of anaphora:
    I gave Kim a novel but the {book,?product,...} bored her
    Kim got a new car. It has shiny {wheels,?wheel nuts,...}
  - selectional restrictions

- Is now often used to calculate **semantic similarity**
  - The shorter the path between two synsets the more similar they are
  - Or the shorter the path to the nearest shared hypernym, …

Word Meaning as a Graph



➢ You need a very big graph to capture all meanings

Wordnet in this course

- We will use wordnet to test our skills in determining word meaning
  - tag a short text from this year's story or stories
  - discuss differences with other annotators
- As well as a source of examples and inspiration

Synonyms for a *dead* Parrot

be dead, be demised, be deceased, pass on, be no more, cease to be, expire, go to meet one's maker, be a stiff, be bereft of life, rest in peace, push up the daisies, one's metabolic processes are now history, be off the twig, kicked the bucket, shuffle off this mortal coil, ring down the curtain, join the choir invisible, be an ex-parrot

From the "Dead Parrot Sketch", also known as the "Pet Shop Sketch" or "Parrot Sketch", originally in *Monty Python's Flying Circus*, first performed in the eighth episode of the show's first series, "Full Frontal Nudity" (7 December 1969).

Derivational Relations

Diathesis Alternations

- **Causative/inchoative alternation**:

  Kim broke the window $\leftrightarrow$ *The window broke*
  also *the window is broken* (state)

- **Middle construction alternation**:

  Kim cut the bread $\leftrightarrow$ *The bread cut easily*

- **Conative alternation**:

  Kim hit the door $\leftrightarrow$ *Kim hit at the door*

- **Body-part possessor ascension alternation**:

  Kim cut Sandy's arm $\leftrightarrow$ *Kim cut Sandy on the arm*

Diathesis Alternations and Verb Classes

- A verb's (in)compatibility with different alternations is a strong predictor of its lexical semantics:

	break	***cut***	***hit***	***touch***
Causative	YES	NO	NO	NO
Middle	YES	YES	NO	NO
Conative	NO	YES	YES	NO
Body-part	NO	YES	YES	YES

break = {*break, chip, crack, crash, crush, ...*}
cut = {*chip, clip, cut, hack, hew, saw, ...*}
hit = {*bang, bash, batter, beat, bump, ...*}
touch = {*caress, graze, kiss, lick, nudge, ...*}

- **Corollary**: we can predict the syntax of novel words we are given the semantic class for

- The principal weakness of syntax-based verb classification is that there are often subtle divergences in semantics between synonyms (cf. ***eat*** vs. ***devour*** vs. ***gobble***)

Agentive Nouns

- An **agentive noun** is a word that is typically derived from another word denoting an action, and that identifies an entity that does that action.
  verb + ***-er, -or, -ant***

  (36) ***murderer, commentator, whaler, director, computer***

  (37) ?? ***undertaker, cooker, footballer*** (Saeed also includes these)

- Should ***murderer*** be listed separately from ***murder*** in the dictionary? Why or why not?

- Also the undergoer: **verb** + ***-ee***: ***employee***

Agentive Nouns in Other Languages

- Japanese (suffix distinguishes person/machine)
  - 運転する → 運転者 *unten-sha* “driver”
  - 計算する → 計算者 計算機 *keisan-sha/ki* “computer”
  - 研究する → 研究者 研究員 *kenkyuu-sha/in* “researcher”
  - 読む → 読み手 読者 *yomite/dokusha* “reader”

- Malay (prefix can convert any part of speech)
  - *bantu (v)* “help” → *pembantu* “assistant/helper”
  - *potong (v)* “cut” → *pemotong* “cutter (human/machine)”
  - *terbang (v)* “fly” → *penerbang* “pilot (not passenger)”
  - *gunting (n)* “scissors” → *penyunting* “(editor – human)”

Agentive Nouns in Other Languages

- Tamil, can convert verb or noun
  - வேலை *vēlai* “work” → வேலைக்காரர் *vēlaikkārar* “worker”
  - சமையல் *samaiyal* “cook” → சமையல்காரர் *samaiyalkārar* “chef”
  - பாடல் *pāl* “song” → பாடகர் *pālkārar* “singer”
- Endings can mark gender, similar to pronouns
  - Singer
    - பாடகன் *pāṭagan* (male)
    - பாடகி *pāṭaki* (female ≈ male + இ *i*)
    - பாடகர் *pāṭaka* (formal)
  - Pronouns
    - அவன் *avaṉ* “he”
    - அவள் *avaḷ* “she”
    - அவர் eng[they]Avar (Formal/Gender-neutral)

Lexical Universals

Color Terms

- **Basic Color Terms**
  - Monolexemic
  - Not a hyponym of any other color
  - Can be widely applied
  - Not derived from a noun

- **Focal Colors** are related to the neurophysiology of our visual system

- Seem to come in an order

$$\left\{\begin{array}{l}\text{WHITE/DARK}\\ \text{BLACK/LIGHT}\end{array}\right\} < \text{RED} < \left\{\begin{array}{l}\text{GREEN}\\ \text{YELLOW}\end{array}\right\} < \text{BLUE} < \text{BROWN} < \left\{\begin{array}{l}\text{PURPLE}\\ \text{PINK}\\ \text{ORANGE}\\ \text{GREY}\end{array}\right\}$$

Core Vocabulary

- Some universal terms can be used to compare languages
  - lexicostatistics (quantitative language relatedness assessment)
  - glottochronology (language divergence dating)

- The **Swadesh list**, developed by Morris Swadesh from 1940 onward

I, You, we, this, that, who, what, not, all, many, one, two, big, long, small, woman, man, person, fish, bird, dog, louse, tree, seed, leaf, root, bark, skin, flesh, blood, bone, grease, egg, horn, tail, feather, hair, head, ear, eye, nose, mouth, tooth, tongue, claw, foot, knee, hand, belly, neck, breasts, heart, liver, drink, eat, bite, see, hear, know, sleep, die, kill, swim, fly, walk, come, lie, sit, stand, give, say, sun, moon, star, water, rain, stone, sand, earth,

cloud, smoke, fire, ash(es), burn, path, mountain, red, green, yellow, white, black, night, hot, cold, full, new, good, round, dry, name

- Available in many languages (hundreds); Now linked to wordnet

Natural Semantic Meta Language

- Try to define everything in terms of semantic primitives and reductive paraphrase
  - simple, indefinable, and universally lexicalized concepts
  - breaking complex concepts down into simpler concepts

```
X feels unhappy=
sometimes a person thinks something like this:
    something bad happened to me
    I don't want this
    if I could, I would do something
because of this, this person feels something bad
X feels like this
```

- Very hard to do consistently and reproducibly

The Semantic Primitives

- **substantives**: I, YOU, SOMEONE, PEOPLE, SOMETHING/THING, BODY
- **relational substantive**: KIND, PART
- **determiners**: THIS, THE SAME, OTHER/ELSE
- **quantifiers**: ONE, TWO, MUCH/MANY, SOME, ALL
- **evaluators**: GOOD, BAD
- **descriptors**: BIG, SMALL
- **mental predicates**: THINK, KNOW, WANT, FEEL, SEE, HEAR
- **speech**: SAY, WORDS, TRUE
- **actions, events, movement, contact**: DO, HAPPEN, MOVE, TOUCH
- **location, existence, possession, specification**: BE (SOMEWHERE), THERE IS, HAVE, BE (SOMEONE/THING)
- **life and death**: LIVE, DIE
- **time**: WHEN/TIME, NOW, BEFORE, AFTER, A LONG TIME, A SHORT TIME, FOR SOME TIME, MOMENT
- **space**: WHERE/PLACE, HERE, ABOVE, BELOW, FAR, NEAR, SIDE, INSIDE
- **logical concepts**: NOT, MAYBE, CAN, BECAUSE, IF
- **intensifier, augmentor**: VERY, MORE
- **similarity**: LIKE/WAY

Acknowledgments and References

- Definitions from WordNet: `http://wordnet.princeton.edu/`
- Images from
  - the Open Clip Art Library: `http://openclipart.org/`
  - Steven Bird, Ewan Klein, and Edward Loper (2009) *Natural Language Processing with Python*, O'Reilly Media
    `www.nltk.org/book`
- Video: Dead parrot sketch Monty Python

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