

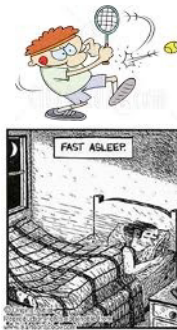
Presentation 15: Word meaning

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Sentence meaning = word meanings + compositional rules

1. The man hit the ball
man(x) + hit(x,y) + ball(y)
2. The boy went to the kitchen
boy(x) + went(x,y) + kitchen(z) + to(y,z)
3. But idioms:
The man **hit the sack**
The kid **went to the bathroom** (in the kitchen)



Conventions reflect community expertise

Every convention ...

1. is **specific to a community**
(e.g., middle class North Americans)
2. **requires shared expertise** to apply
(e.g., how to shake hands)
3. solves a **community-wide coordination problem**
(e.g., how to greet strangers)

7

What are signals?

Signal: An action by which you mean something for someone

1. Indicating (locating things)
2. Depicting (imagining physical appearances)
3. Describing-as (categorizing)

Using *symbols* to get people to categorize things

Symbols are a type of sign that is associated with its object by rule

Words are symbols

2

What is a convention? (Lewis, 1969)

A **convention** is ...

1. a regularity **r** in behavior
2. partly arbitrary
3. that is common ground in a given community **C**
4. as a coordination device
5. for a recurrent coordination problem **s**

5

Signal meaning vs. speaker meaning

1. Speaker's meaning

In uttering "I am hot", the speaker meant she was lucky.



2. Signal meaning

a. sentence meaning

"I am hot" can be used to mean that the speaker, whoever that is, is lucky at the time it is produced

b. word meaning

"hot" can mean "(i) heated up, (ii) sweaty, (iii) spicy, (iv) attractive, (v) stolen, ... (x) **unusually lucky**"



c. utterance meaning

On this occasion, "I am hot" was used to mean that Clark was lucky



Shaking hands is ...

1. a regularity in behavior clasp hands, 2-3 pumps
2. partly arbitrary *not* high fives, low fives
3. common ground in **C** in middle class N. America
4. as a coordination device
5. for a recurrent problem greeting strangers



6

Word = form + content (de Saussure)

Lexical entry for "give"

Form

- morphology: none
- phonology: /giv/

Lemma

- conceptual specification:
x causes y to change possession from x to z
- conceptual arguments: *x, y, z*
- syntactic category: *verb*
- grammatical functions:
subject, direct object, indirect object

8

Word meanings are conventions

Saying "hello" is ...

1. a regularity in behavior pronounce /hel-ow/
2. partly arbitrary *not* 'goodbye,' 'hi,' 'hey,' 'hiya'
3. common ground in **C** in middle class N. America
4. as a coordination device
5. for a recurrent problem greeting others

9

What concepts should we have words for?

1. *Habitual concepts*
Concepts that are habitually thought by people in a community
2. *Socially shared concepts*:
Concepts that are shared by people in a community
3. *Jointly useful concepts*:
Concepts that are useful by people in a community in their characteristic joint activities

10

Habitual, socially shared, jointly useful concepts

For people in general
objects, causality, location, etc.

For physicians
diseases, body parts, treatments, etc.

For lawyers
legal offenses, legal procedures

For car aficionados
car types, engine parts, etc.

For desert societies
camels, sand phenomena, absolute directions, etc.

11

Lexical entries in *communal lexicons*?

Each community *C* has its specialized lexicon

- *fruit* (botanists): ripened ovary or ovaries of a seed-bearing plant
- *fruit* (general English): An edible, usually sweet and fleshy form of such a structure
- *raise* (North Americans): "increase in salary"
- *raise* (miners): "vertical mine shaft"
- *stope* (miners): "mining cavity"

Each lexical entry is indexed to a community

- [miners: stope, "mining cavity"]
- [botanists: *fruit*, "ripened ovary or ovaries of a seed-bearing plant"]



12

What is a cultural community?

1. the set of people *C*
2. in which a conventional practice *r*
3. is common ground (taken for granted)
4. for a situation *s*.

Also
"community of practice"
"community of expertise"

13

Expertise	Examples of Cultural Communities
Nationality	Americans, Canadians, New Zealanders
Residence	Westerners, Californians, Glaswegians
Education	university students, law students, high school graduates
Occupation	ophthalmologists, plumbers, used car dealers
Employment	Ford auto workers, Stanford faculty, Newsweek reporters
Hobbies	pianists, baseball fans, philatelists
Language	English speakers, Japanese speakers, Gaelic speakers
Religion	Baptists, Protestants, Muslims, Hindus
Politics	Democrats, libertarians, Tories
Ethnicity	Blacks, Hispanics, Cajuns, Polish Americans
Clubs	Elks Lodge members, Masons, Girl Scouts, Ku Klux Klan
Subculture	rock musicians, cocaine users, teenage gangs
Cohort	teenagers, senior citizens, thirty-year-olds
Gender	men, women

14

Proper names (in community of Americans)

Category	Examples (for Americans)
1. Public figures	Hillary Clinton, Jimmy Carter
2. Historical figures	George Washington, Robert E. Lee
3. Writers, authors	Mark Twain, Ernest Hemmingway
4. Fictional characters	Huckleberry Finn, Uncle Tom
5. Regions, cities, streets	New England, Boston, Broadway
6. Buildings, rooms, businesses	White House, Oval Office, Disneyland
7. Print media	New York Times, Time Magazine, Playboy
8. Electronic media	CBS, Nightline, Jeopardy
9. Brands	Ivory soap, Safeway, Caterpillar
10. Institutions	Congress, New York Stock Exchange, EPA

15

Common words (for different communities)

Community	Examples	Main topics of words
Nationality	Canada, Australia, U.S.	politics
Residence	Seattle, Boston, Denver	foods, regional phenomena
Education	high school, college, Ph.D.	literate vocabulary
Occupation	lawyer, miner, physician	technical notions, practices
Employment	Stanford, Yale, UCLA	employer's procedures
Hobby	birder, bicyclist, baseball fan	technical notions, practices
Language	English, French, Polish	all word-forms, many lemmas
Religion	Baptist, Jew, Mormon	religious notions, artifacts
Politics	Democrat, Republican, Tory	political perspectives
Ethnicity	Chicano, Japanese American, Polish American	ethnic items, traditions
Club	Elk, Mason, girl scout	club rules and activities
Subculture	drug user, teenage gang member, Hell's angel	community practices and paraphernalia (slang)
Cohort	teenager, 30-year-old, senior	age-related goods and services
Gender	male, female	gender-related goods, services

17

Words that don't exist, but should?!

1. AQUADEXTROUS (ak wa deks' trus) adj. Possessing the ability to turn the bathtub faucet on and off with your toes.
2. CARPERPETUATION (kar' pur pet u a shun) n. The act, when vacuuming, of running over a string or a piece of lint at least a dozen times, reaching over and picking it up, examining it, then putting it back down to give the vacuum one more chance.
3. DISCONFECT (dis kon fekt') v. To sterilize the piece of candy you dropped on the floor by blowing on it, assuming this will somehow 'remove' all the germs.
4. ELBONICS (el bon' iks) n. The actions of two people maneuvering for one armrest in a movie theater.
5. FRUST (frust) n. The small line of debris that refuses to be swept onto the dust pan and keeps backing a person across the room until he finally decides to give up and sweep it under the rug.

Words that don't exist, but should?!

6. LACTOMANGULATION (lak' to man gyu lay' shun) n. Manhandling the "open here" spout on a milk container so badly that one has to resort to the 'illegal' side.
7. PEPPIER (pehp ee ay') n. The waiter at a fancy restaurant whose sole purpose seems to be walking around asking diners if they want ground pepper.
8. PHONESIA (fo nee' zhuh) n. The affliction of dialing a phone number and forgetting whom you were calling just as they answer.
9. PUPKUS (pup' kus) n. The moist residue left on a window after a dog presses its nose to it.
10. TELECRASTINATION (tel e kras tin ay' shun) n. The act of always letting the phone ring at least twice before you pick it up, even when you're only six inches away.

18

How are lexical entries organized?

Homophones: two lexical entries that are unrelated

- bank*:
- of river
 - financial institution



Polysemy: two or more entries that are related

- line*:
- physical mark
 - imaginary line
 - line of soldiers
 - line of work



newspaper:

- the physical object we read
- the edition of the thing we read
- the company that publishes the object
- the building that houses the company, etc.



19

Everyday innovations

Novel compositional words:

- chartreuseusness
- spankable

Novel contextual expressions:

- to porch the newspaper
- the apple juice chair
- to do the fence
- I got on his bus

Story about Max

- Max teapotted the dean of students



"NICE TRY, BILLY, BUT DOGMA IS NOT A PUPPY'S MOTHER!"

20

Literary innovations

Erma Bombeck (essay on roommates)

- Our **electric typewriter** got married.
- **Stereos** are a dime a dozen.

Other sources

- You misunderstand, Hayne—when I said what we need now is a **Churchill**, I was speaking of a cigar. (William Hamilton cartoon)
- A small boy and a girl came past close to me **doing an Indianapolis** on their tricycles. (Dick Francis's *Blood Sport*)
- You haven't **Reno'd** until you've **Ramada'd**. (newspaper ad for Reno Ramada Hotel and Casino)
- One woman to another at cocktail party: He seems very **California**, but actually he's **bi-coastal**. (Lorenz cartoon in the New Yorker)

21

Semantic decomposition

Bachelor(x): Human(x)
Adult(x)
Not(Marry(x,y))

Father(x,y): Human(x)
Male(x)
Parent(x,y)

22

Why “factor” word meanings?

Relate word meanings to sentence meanings

“I saw a bachelor” = “I saw the unmarried male adult human”

Relate word meanings to each other

“bachelor” related to “man” via male(x)

“husband” via male(x), marry(x,y), etc.

Goal: relate understanding of words to component processes

to understand “bachelor” one must:

understand “not, married, male, man, human”

be able to combine them in right way

not(x) also found in “bad, absent, forget, deny”, etc.

Ultimate goal: universal set of primitives

not, marry, male, etc.

23

Common components in suffixes, small words

Cause(x,y)
Come-about(x)
Not(x)
Do(x,y):
Extent(x)
Male(x), Female(x)
Similar-to(x,y)
Have(x)
Plural(x)
Past(x)
Person(x)
Case role
Number
Mutually-identifiable
Relative location
Spatial directions
Container vs. support
Possibility
Necessity
Intent

to warm, blacken, enrage, benumb
to warm, blacken
unable, inability, debug, nonperson
digger, bicyclist, librarian
length, width, happiness, goodness
actor, actress
childish, childlike, athletic
bloody, messy
boys, tables
worked, had, was
I, you, he, am
he vs. him vs. his
two, many, several, all
the man, a man
this vs. that, here vs. there
up, down, above, below
in vs. on
can, may
must, have to
will

Lesson: Factoring of experience

Factors reflect how people factor the world they experience

- “cause” can be factored out of causal sequences
- “more than one” factored out of sets of like objects
- “not” factored out of related events, states

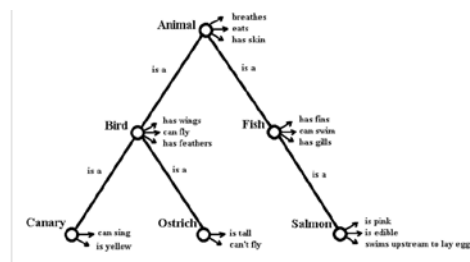
Factors may or may not represent same processes

- “not” may be same process wherever found
- “number” dealt with same way wherever found

25

Semantic networks

Do categories belong to hierarchies like this?



based on Collins & Quillian (1969)

26

Apparent word hierarchies may be intransitive

If a = b, and if b = c, then a = c.

A chair is a piece of furniture

- a car seat is a chair
- a car seat is not a piece of furniture
- a chair lift for skiers is a chair
- a sedan chair is a chair
- a hammock is a bed
- a torch on a miner's helmet is a lamp
- a car headlight is a lamp
- a luggage rack in a railway carriage is a shelf
- a windowsill inside a room is a shelf

27

Vehicles are machines

- a canoe is a vehicle
- a raft is a vehicle

Archery is a sport

- Being a bowmen at the battle of Agincourt is archery
- Robin Hood shooting a message is archery

28

Problems with network theories

1. Distance in network doesn't predict RTs
a dog is an animal < a dog is a mammal
2. Members of categories are graded in typicality
Birds:
robin, crow, goose, penguin
Furniture:
chair, footstool, cupboard, ashtray
Containers:
bottle, jar, tub, tank
3. But so are *ad hoc* categories (Barsalou)

29

Fruit is graded in typicality

- | | |
|-----------------|-----------------|
| 1. Apple | 11. Tangerine |
| 2. Orange | 12. Grapes |
| 3. Strawberries | 13. Cherry |
| 4. Banana | 14. Watermelon |
| 5. Pear | 15. Berries |
| 6. Peach | 16. Lemon |
| 7. Pineapple | 17. Blueberries |
| 8. Plum | 18. Raisins |
| 9. Apricot | 19. Tomato |
| 10. Nectarine | |

30

Tools are graded in typicality

- | | |
|------------------------|---------------------|
| 1. Hammer | 8. Shovel |
| 2. Screwdriver | 9. Chisel |
| 3. Pliers | 10. Socket wrenches |
| 4. Wrench | 11. Nails |
| 5. Saw | 12. Crowbar |
| 6. Drill | 13. Knife |
| 7. Philips screwdriver | |

31

Vehicles are graded in typicality

- | | |
|---------------|----------------|
| 1. Car | 10. Plane |
| 2. Truck | 11. Jeep |
| 3. Bus | 12. Bike |
| 4. Sports car | 13. Train |
| 5. Porsche | 14. Moped |
| 6. VW | 15. Boat |
| 7. Camaro | 16. Tractor |
| 8. Motorcycle | 17. Skateboard |
| 9. Mustang | |

32

Ad hoc: Transportation from SF to NYC

1. Airplane
2. Car
3. Train
4. Bus
5. Motorcycle
6. Bike
7. Hitch hike
8. Boat
9. Walking

33

Ad hoc: Foods not to eat on a diet

- | | |
|----------------------|----------------|
| 1. Ice cream sundaes | 12. Spaghetti |
| 2. Candy | 13. Pizza |
| 3. Pie | 14. Butter |
| 4. Sugar | 15. Starches |
| 5. Cookies | 16. Bread |
| 6. Cake | 17. Hamburgers |
| 7. Pastry | 18. Potatoes |
| 8. Ice cream | 19. Salt |
| 9. French fries | 20. Cheese |
| 10. Pasta | 21. Meat |
| 11. Potato chips | |

34

Ad hoc: Things to take from home during a fire

- | | |
|--------------------------------|--------------------|
| 1. Children | 9. Dogs |
| 2. Other people | 10. Cats |
| 3. Family | 11. Family records |
| 4. Important documents | 12. Jewelry |
| 5. Pets | 13. Pictures |
| 6. Prized personal possessions | 14. Camera |
| 7. Money | 15. Memorabilia |
| 8. Valuables | 16. Clothes |

35

Features and prototypes

Basic premise: Concepts defined by cluster of features

- bird: feathered, flies, has wings, two feet
- features are highly but not perfectly correlated with one another

Members of category: family resemblance

- they have features in common
- but not necessarily all or any features across all members

Grading: the more features, the more typical

- robin: sings, medium sized, flies,
- penguin: doesn't sing, doesn't fly

Prototype: more features that all members have

- robins close to prototype
- penguins far from prototype



36

Caution! Possible concepts are *not* limited by language

We can think of **nonlinguistic ideas**

- how things look, how music sounds
- dynamic concepts, how things change
- knife-makers knowledge of knives

Nonlinguistic ideas reflected in **indicating and depicting**

- pointing at objects
- depicting with quotations and iconic gestures

Many words reflect **infinitely many possible concepts**

- **apple-juice chair**
- Max **teapotted** the dean of students
- Angela is very **San Francisco**
- The photographer asked me to **do a Napoleon** for the camera

37

Do words in use reflect fixed concepts?

"He **sort of** slid down the hill."

"It is **muddy**," where it is:

shoes, puddle, floor, pants, hands, ...

"There is something **on the sofa**," where "something" is:

label, cat, hair, dirt, oak legs, two lovers



38

Two views of word meaning

Dictionary theories
Process theories

39

Dictionary theories

1. Every word has a lexical entry in memory that pairs ...
a **phonological shape**, like /dog/, with
a **conventional meaning**, like "canine animal."
2. Conventional meaning is really a **brief, partial description** of some aspect of the world.
3. All words taken together form a list called the **mental lexicon**.
4. When we need a word, we **search this list** for a word with the right conventional meaning.
5. And when we hear the phonological sequence /dog/, we **search this list** for that shape and retrieve its conventional meaning.

Sense selection: When we use a word, we **select** the intended sense from a **finite list** of conventional senses of that word-form.

40

Process theories

Principle of possibilities: We understand what an entity is with reference to what it could have been.

Every word is located in two domains:

1. **lexical possibilities** (all English words), and
2. **conceptual possibilities** (all conceivable denotations).

So we understand **each word** with reference to ...

1. the domain of all English words
2. the domain of concepts

Sense creation: When we use a word, we **create** the intended sense in relation to other words we could have used.

The story of



42

Dictionary theories

Red denotes ...

the color of *blood* when predicated of many objects;

tawny when predicated of a skin type;

pinkish red when predicated of potatoes;

orange when predicated of hair;

purply red when predicated of wine;

pinkish red when predicated of wood;

etc.

Theory predicts an unlimited number of lexical entries

43

Process theories

"Red" is determined by **mapping** between lexical and conceptual fields

Lexical field for colors in general:

- primary brightness terms: <black, white>
- primary hue terms: <red, yellow, green, blue>
- secondary color terms: <grey, pink, orange, brown, purple>
- exotic color terms: <maroon, ecru, chartreuse, etc.>
- modifiers: <light, dark>, etc.

Hence:

- **red** contrasts with *yellow, green, blue*
- **red** can be modified by *light, dark*, etc.

44

Conceptual field for skin colors:

- Skin color in humans comes in a limited number of types;
- Skin color is genetically determined;
- Skin color is highly correlated with race;
- Skin color can change with emotion and illness;
- Skin color can change with exposure to the sun; and
- Skin colors determined by these factors have **such and such appearances**.

Lexical field specialized for skin colors:

- primary skin color terms: <black, white, red, yellow, brown>
- skin color (for Euro skin) from sun exposure: <tan, brown, red>
- skin color (for Euro skin) from emotions: <red, white, pale, green, purple>
- exotic skin color terms: <sallow, ashen, livid, olive, etc.>

45

Process theories

Constraints on mapping from lexical domain to conceptual domain:

1. **Similarity constraint:** For each salient possibility in the specialized conceptual field, apply the term for the most similar possibility in the general conceptual field.
2. **Preference constraint:** For terms in the specialized lexical field, prefer common over uncommon terms from the general lexical field.
3. **Exhaustiveness constraint:** Partition the possibilities in the specialized conceptual field in such a way that, for most practical purposes, they are exhaustively covered by the chosen terms with the maximum amount of information value.

46

How do these constraints apply in the supermarket?

- *Potatoes:* red, brown, white, russet
- *Cabbages:* red, green
- *Bell peppers:* red, yellow, green
- *Onions:* red, yellow, white
- *Grapes:* red, white
- *Grapefruit:* white, pink
- *Beans:* red, white, black, green, yellow
- *Wine:* red, white, rose, rosé, green
- *Hair:* black, brown, red, blond (*not* yellow), gray, white

These nomenclatures **make no sense** by standard Munsell color chips

47

Process theory prediction 1: Contrast

Contrasts in meaning

<u>informal register</u>	<u>formal register</u>
--------------------------	------------------------

try	attempt
Often	frequently
Cop	policeman
Yet	nevertheless
Enough	sufficient

...

To choose an informal term in a formal setting means something.

To choose the reverse means something different

48

Process theory prediction 2: Innovations

Innovations vs. idioms

noun	denominal verb
Vehicles	segway My sister segwayed down the street
	unicycle My sister unicycled down the street
	bicycle My sister bicycled down the street
Places	litterbin I litterbinned all of our newspapers
	box I boxed all the books
	land Re Pilot Sullenberger, one passenger said "I can't believe he managed to land that plane" (on the Hudson)

Bicycle is in the dictionary, but *unicycle* and *Segway* aren't.
Shelf means "to put on a shelf"; *land* doesn't mean "to put on land"

49

Process theory prediction 3: Pre-emption

Pre-emption of innovations by entrenched terms

<u>entrenched term</u>	<u>pre-empted term</u>
today	this day
tomorrow	day after today
hospitalize	hospital (cf. house)
imprison	prison (cf. jail)
slap	palm (cf. elbow, knee)
kick	foot
...	

50

Process theory prediction 4: Eponymy

Eponymous expressions

<u>Eponym</u>	<u>eponymous expression</u>
Houdini	My sister Houdinied her way out of the closet
Napoleon	The photographer asked me to do a Napoleon for the camera
California	He seems very California , but actually he's bi-coastal .
Indianapolis	A small boy and a girl came past close to me doing an Indianapolis on their tricycles.
Houdini	My friend Ray Hyman did a thorough Houdini on Madame Charlotte's séance.
Napoleon	Hitler did a Napoleon when he tried to defeat the Russians at Stalingrad.

In classical semantic theory, **proper nouns** refer, but do not have senses (like common nouns). So where do eponymous expressions get their senses?

Process theory prediction 5: Ad hoc meanings

Ad hoc, momentary meanings

Scene *Clark in check-out line at grocery store*

Clerk Do you have one or two radishes there?

Clark Two

[Clark No, about thirty]

Conventional meaning of *radish*: "plant of the genus *Raphanus*"

Momentary meaning of *radish*: "bunch of plants of the genus *Raphanus*"

Clark created this sense against possibilities in current common ground

52

Conclusions

Problems in traditional theories of word meaning

- Semantic decomposition
- Semantic networks
- Dictionary theories in general

Better approaches

1. Words belong to a mapping between
 - a. lexical field and
 - b. conceptual field
2. Lexical fields differ by communal lexicon (e.g., by language)
3. Conceptual fields reflect expertise of these communities
4. Using and understanding words is a process:
 - Not merely sense selection
 - But sense creation

53