

Language

Intro Psychology
Georgia Tech
Instructor: Dr. Bruce Walker

Today

- Speech
- Language
- Language and thought

Some basic principles

- Language is rule based
 - We recognize that some things are correct and some things aren't
 - “Tlop” could not be a English word, “flirp” could be
 - “Colorless green ideas sleep furiously”
 - Rules govern how language parts can be combined - “phonotactics” and “syntax”

What are these rules?

- Rarely consciously aware of them
- but still rules because all native speakers of a dialect will obey them very very closely.
- Prescriptive versus descriptive

Prescriptive versus Descriptive

- Descriptive rules are the rules that all speakers of a dialect seem to agree with (in that they don't violate them)
- Prescriptive rules are often highly arbitrary social constructions that have more in common with rules of etiquette than language.

Dialects and Prescriptives

- Dialects are variants of a language
 - Scottish English / American English / Canadian English
 - Swedish/Norwegian/Danish
 - Variations in pronunciation, syntactic rules, often reflecting different linguistic influences

Dialects and Prescriptives

- Prescriptive rules generally derive from dialects that have most prominent social standing in a language community
 - “He and I” versus “Me and him”
 - “He and I” reflects Norman French preference to put first person just prior to verb.
 - “Me and him” is Anglo Saxon preferred construction
 - Why prefer first rather than second? Normans invaded Britain, had higher social standing

Differences and similarities across languages

- Parts change (e.g., phonemes, words, etc)
- Rules change (word order, how to make words plural, etc)
- All languages appear equally capable to expressing same complexity of thoughts and meaning.
- Surface content is different, deeper meaning is not.
- Language complexity is in different places across languages (vocabulary, syntactic rules, morphology, etc)

Dialect example

- Canadian English
- ### Canadian Tire store breaks sales records

“Not only did the Lower Sackville **Canadian Tire** receive a facelift in 2003, it was totally rebuilt in a nearby location. The Canadian Tire in Downsview Mall has long been a staple for shoppers in the area... They also added 10,400 sq. ft. to the side of the building. ‘Our **Garden Centre** is as big as we could possibly make it,’ says Mr. Burley.”



Productivity

- Rules provide the structure for creating novel but understandable forms.
- What happens when rules aren't all followed?
- Misinterpretation

“Girl, 13, Turns in Parents for Marijuana, Cocaine”

“Toronto Law to Protect Squirrels Hit by Mayor”

“Beirut Uprising by Ousted Leader
Crushed by Militia”

“Rumors about NBA Referees
Growing Ugly”

“Deer Kill 130,000”

Why the misinterpretation?

- Missing words that help label syntax, and syntax is central to understanding.

Toronto law to protect squirrels hit by mayor

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Rumors about NBA referees growing ugly

Temporary ambiguity

- Poorly written newspaper headlines provide a kind of permanent ambiguity
- In speech and reading, temporary ambiguity is extremely common.

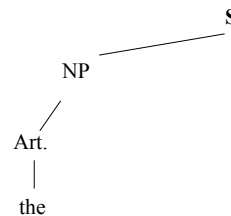
Since Jay always jogs a mile seems like a short distance.

Temporary ambiguity

- What does the difficulty of these sentences tell us?
 - When we hear or read, we try to do the interpretation moment by moment rather than wait until the end of the sentence.
 - How? We know the syntactic rules and we know something about common sentence constructions.

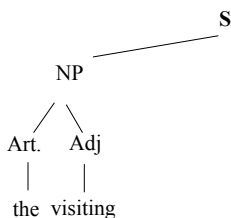
Syntactic Parsing

The



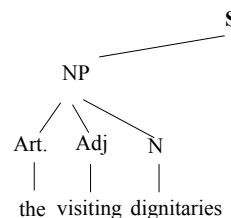
Syntactic Parsing

The visiting



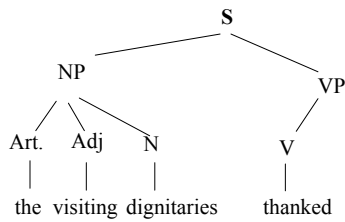
Syntactic Parsing

The visiting dignitaries



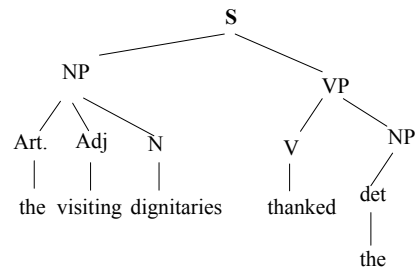
Syntactic Parsing

The visiting dignitaries thanked



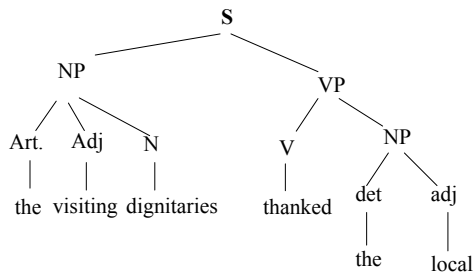
Syntactic Parsing

The visiting dignitaries thanked the



Syntactic Parsing

The visiting dignitaries thanked the local...



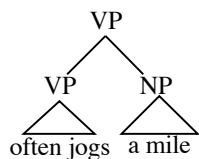
Garden Path Sentences

Since Jay often jogs a mile seems like a very short distance to him.

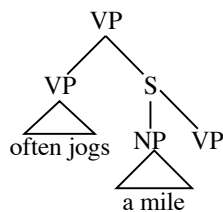
These sentences reveal something about the heuristics that our language processor use to interpret incoming information.

Garden Path Sentences

Since Jay often jogs a mile seems like a very short distance to him.



Simple but incorrect



Correct but much more complex

But the interpreter is smarter than we thought...

- We seem to not always expect the simplest interpretation (most of the time but not always)

The defendant examined **the evidence**.

The defendant examined **by the lawyer...**

↑
Readers typically slow down and/or look back to the beginning of the sentence

But the interpreter is smarter than we thought...

- We seem to not always expect the simplest interpretation (most of the time but not always)

But... if the subject is something that can't "examine"

The evidence examined **by the lawyer...**

↑
Readers continue on their merry way.

Context, Context, Context

- Psycholinguists have often thought very limited ways about language.
- But... broader context also has a big influence.

"Put the doll on the napkin in the box"

Psycholinguists would say that there is an initial error in interpretation.

Context, Context, Context

- Psycholinguists have often thought very limited ways about language.
- But... broader context also has a big influence.

"Put the doll on the napkin in the box"

But what if there are two dolls? Which doll? The one on the napkin!

Trueswell clips

Producing Language

Speaking seems easy because it is

- Fast
 - average speech rate of 150 words/minute & 5.6 syllables per second
- Accurate
 - errors in word selection about 1/1000 words
 - errors in sound ordering about 1/2000 sounds
- Normally effortless & automatic
 - Perhaps too easy, some people won't shut up!

But should be tough:

- Start with abstract thought that needs to be expressed
- Select the syntactic structure
- Filling this structure, you select from over 10,000 words in vocabulary.
- Need to produce sentences never used before
- Little time or memory to prepare far in advance
- Rapid sequence of precise movements for articulation

Speech Errors

- How often?
 - 1 or 2 errors per thousand words.
 - Really difficult to study because they are so rare!
 - Avoid making speech errors around psycholinguists.

Freudian account

- Speech errors reflect thoughts not intended to be expressed.

Freudian account

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 - At a recent conference, “The next pervert..., excuse me... person speaking....”

Problems with Freudian account

- Always post-hoc explanations - it doesn't predict when slips will occur, type of slip, or what slip will be.
- Many slips cannot be explained as with reference to repressed thoughts.

Some speech errors

“Have you ever seen the money, ‘The Movie Pit’?”

“A my offered him some celery”

“How many dedollars deductible?”

“A forecast for flow snurries”

Sources of speech error data

Corpora

- Listen for errors & document those that occur or record everything
- But can't control factors influencing errors
- Might be biased to miss classes of errors

Experiments

- Researcher tries to make errors happen more frequently than usual
 - via time pressure, tongue twisters, priming errors
- But may make task too artificial

Inducing Errors

- Can one try to increase the number of errors and see what types of errors are easier to create than others?

ball - doze
bash - door
bean - deck
bell - dark
darn - bore

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bash - door
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Consonants exchange with consonants, vowels with vowels
Sound exchanges are usually between phonemes in same position
Speech errors more likely if error creates words

keen- tip
core - tick
cup - tin
kill - tuck
tool - kits

keen- tip
core - tick
cup - tin
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People would stop speaking in this case
Baars & Motley (1979)

Some things that errors tell us

- At least two stages in creating what we say:

Intend:
Sally gave him the present

Said:
He gave Sally the present.

Some things that errors tell us

- At least two stages in creating what we say:

Intend:

Sally gave him the present

Sally = giver, Some guy = receiver

slips to:

Some guy = giver, Sally = receiver

BUT - notice that the surface form was NOT:

Him gave Sally the present.

Some things that errors tell us

- At least two stages in creating what we say

1. Select some abstract word (e.g., 3rd person pronoun for a male)

2. Adjust the surface form depending on how its used (e.g., him, he, his, etc)

Conversation

- Multiple simultaneous goals served
 - Social
 - Emotional
 - Informational
- I'll mention just a few now but we'll return when we talk about social interaction.

Conversation

- Syntax and rules seem to go out the window

Literary conversation

(Samuel Beckett, *Waiting for Godot*)

Vladimir I'm glad to see you back. I thought you were gone forever.

Estragon Me too.

Vladimir Together again at last! We'll have to celebrate this. But how? (*He reflects.*) Get up till I embrace you.

Estragon (*irritably*). Not now, not now.

Vladimir (*hurt, coldly*). May one enquire where His Highness spent the night?

Estragon In a ditch.

Spontaneous conversation

(London-Lund corpus)

Alan u:h no, . but at the same time, . u:m I uh I did .
accuse them, of of uh having misled us, . on April
the twenty-third,

Ben this year,

Alan uh yes, . this year,

Ben this is over thiy re-*newal . for two years,*

Alan *over yes,* the renewal . for two years, -

Two types of actions in conversation

Primary actions: official business

- Alan asserts that "at the same time I did accuse them of having misled us"
- Alan refers to "them," "us," "the renewal for two years"

Collateral actions: managing the conversation

- Alan signals delays: "u:h" "u:m" "uh"
- Ben queries Alan's meaning: "this year?"
- Alan looks to see whether Ben is attending

General conversational rules

If possible, speak with an ideal delivery

- Try to produce **what** is expected **when** it is expected
- Try to produce **speech** fluently

If possible, signal anticipated departures from the ideal delivery

- Signal anticipated **suspensions** and **delays**
- If delayed, signal something about what is coming up

Disfluencies in speech

- Pauses (e.g., silent or "uh" or "um") come when we are trying to formulate what to say next.
- More choices, more disfluencies
 - Schacter (1980) - had undergraduates count disfluencies in course lectures.

Disfluencies in speech

- Pauses (e.g., silent or "uh" or "um") come when we are trying to formulate what to say next.
- More choices, more disfluencies
 - Schacter (1980) - had undergraduates count disfluencies in course lectures.
 - Disfluencies were greatest in Literature, moderate in psychology, and least in physics.

Responses to questions of fact

(Smith & Clark, 1993)

Exp: In which sport is the Stanley cup awarded?

Subj: {(1.4 sec) **um**
(1.0 sec)}
hockey

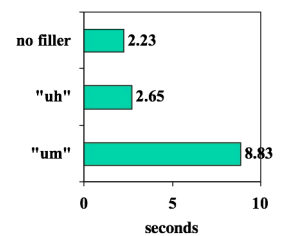
Responses to questions of fact

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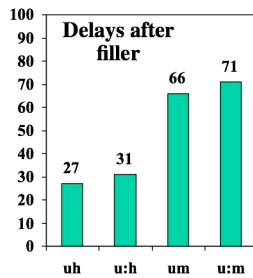
Subj: {(1.4 sec) **um**
(1.0 sec)}
hockey

Delay to answer



Delays before and after fillers (%)

(Clark & Fox Tree, 2000)



Other things we do in conversations

- “Back channel” behaviors - “uh huh” “yeah”, “I see...”
- Eye contact
 - Don’t make eye contact during your turn, at end, make eye contact.
 - Amount of eye contact negatively correlated with relative social status, positively with interest.

Relationship between receiving and producing language

- Alignment
 - Speakers shift pronunciation, vocabulary, and syntax toward positively viewed groups and individuals
- Syntactic priming
 - How you produce language is related to the language you are exposed to.
 - Syntax in production can be shifted depending on recent reading

Language Development

- Surely the most impressive intellectual achievement of our lives and we do it early, and seemingly effortlessly.

Language Development

- Surely the most impressive intellectual achievement of our lives and we do it early, and seemingly effortlessly.
- How? Is it just learning? or is there some innate abilities that bootstrap our learning?

Poverty of the stimulus

- The evidence (language) that children are exposed to is insufficient to permit children to correctly infer all of the rules that they **do** learn.
- Chomsky - All languages are variants such that language learning is akin to setting parameters

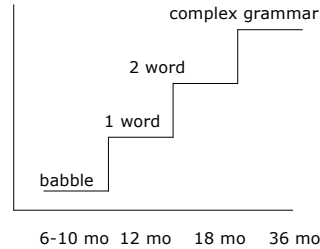
Again, *rules* are central, allow speakers to generalize to entirely novel situations



We can think of the problem of acquisition as one of rule discovery.

Children don't entertain all possible rules, just a few that seem common to all languages.

Universal pattern of language development

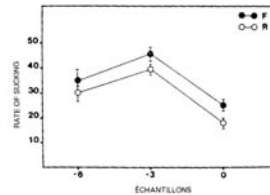


Same pattern observed in every culture... suggesting that the unfolding of language is acquired as a result of highly specialized biologically programmed mechanisms operating on the linguistic input

Speech perception

- Learning starts before born
 - preference for mother's voice
 - know language rhythm, prosody
- Sounds languages use are easy to distinguish
 - infants (& chinchillas) discriminate between phones not used in language environment
- Child-directed speech is clearer
 - but probably is not necessary for learning

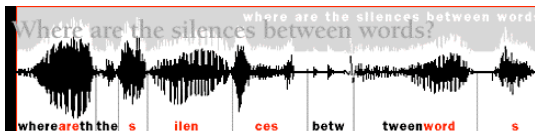
Early perceptual biases



Infants prefer to listen to speech in their own language. This graph shows that French babies show more interest (higher sucking rates) to a bilingual speaker reading in French than to the same reader reading in Russian.

But some purely data driven learning must happen...

- Hard part is getting learning started
 - Learning anything requires that you can accurately separate words.
 - This has been a bit mysterious.



Statistical learning/ learning from distributed information

GATILAPIKIBUHUNOLEKAME

HUNOLEGATILAKAMEPIKIBU

KAMEGATILAHUNOLEPIKIBU

Statistical learning/ learning from distributed information

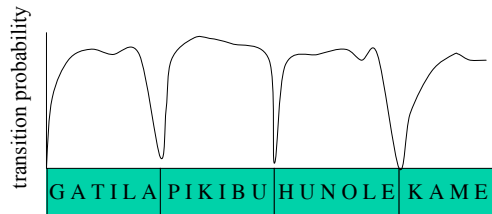
GATILA PIKIBU HUNOLE KAME

HUNOLE GATILA KAME PIKIBU

KAME GATILAHUNOLE PIKIBU

Statistical learning/ learning from distributed information

- Things (phonemes) that occur together consistently belong together for some reason, maybe they are words



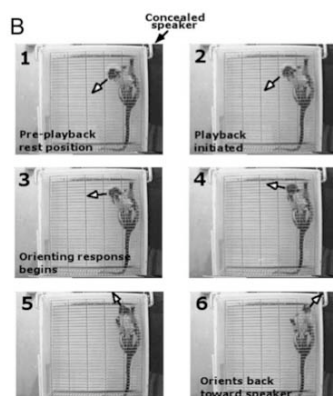
Statistical learning in infants

- Saffran, Aslin & Newport (1996)
 - 8 month old infants hear a stream of syllables (sequence demo)
 - Within stream were sequences that always occurred together (words) or that occurred together only sometimes (like the end of one word and the start of the next)
 - “tudaro” is consistent (word), pabiku is not (nonword)

Statistical learning in infants

- Statistical learning seems to be a simple automatic way to get learning started.

- Interestingly, tamarins (small monkeys) also do this (look at speaker with nonwords > old words)



Sensitive periods for language

- Some language learning seems to be best only a certain ages - “critical period”.
- Miss critical period, you may miss opportunity for optimal proficiency.

Sensitive periods for language: isolated children

Genie was an isolated child... she was locked away in a back room as an infant and not spoken to. She was discovered by the authorities when aged 13. Though she acquired words, she never acquired correct syntax and function morphology:

Mike paint.
 Applesauce buy store.
 Neal come happy; Neal not come sad.
 Genie have Momma have baby grow up.
 I like elephant eat peanut.

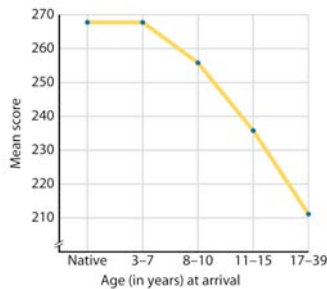
Sensitive periods for language: isolated children (cont.)

By contrast, Isabelle and her mute, brain-damaged mother escaped from the imprisonment of her grandfather when she was aged 6½. Within eighteen months, her language was not significantly behind the level expected at her age:

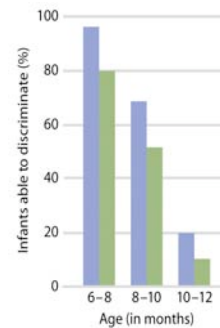
Why does the paste come out if one upsets the jar?
 What did Miss Mason say when you told her I cleaned my classroom?
 Do you go to Miss Mason's school at the university?

Sensitive periods... learning a second language

The eventual grammatical level to which Chinese immigrants arriving in the USA arrived depended on their AGE at arrival rather than how long they'd been in the country.



Selective Loss of Speech Contrasts



Infants initially have the capacity to discriminate speech sounds in all languages, not just their own.

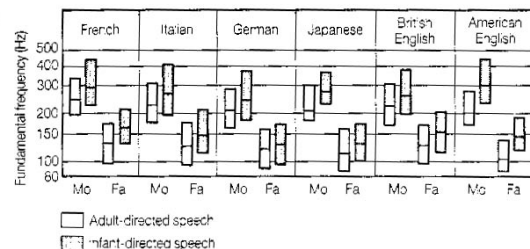
Over the first year of life, the ability to discriminate non-native sounds declines.

The graph shows the declining percentage of (American) infants at three ages capable of telling apart two non native speech sounds.

Adult Contributions: Infant Directed Speech (“baby talk”)

- shorter utterances
- restricted vocabulary
- pauses at end of sentences
- slower
- more repetitions
- emphasis
- verbs in present tense

Properties of Infant Directed Speech



First words

- first words at about 12-13 months.
- initially very slow... one word at a time.
- remarkable similarity in first 50 or so words produced across all languages.
- mostly object names (small objects, familiar people) and some actions

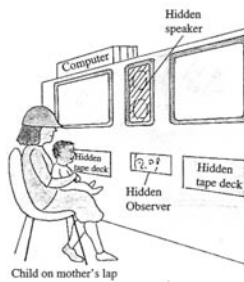
Over-extensions of first words

TABLE 6.1

Examples of Young Children's Overextensions of Word Meaning

Word	Referents
<i>ball</i>	ball, balloon, marble, apple, egg, spherical water tank (Rescorla, 1980)
<i>cat</i>	cat, cat's usual location on top of TV when absent (Rescorla, 1980)
<i>moon</i>	moon, half-moon-shaped lemon slice, circular chrome dial on dishwasher, half a Cheerio, hangnail (Bowerman, 1978)
<i>snow</i>	snow, white flannel bed pad, white puddle of milk on floor (Bowerman, 1978)
<i>baby</i>	own reflection in mirror, framed photograph of self, framed photographs of others (Hoff, 2001)

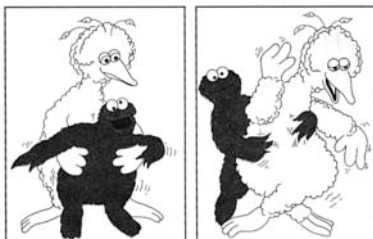
Producing only one word... but do they understand more than they can produce?



16 week old children that only are speaking one word.



Understanding before production?



"look! big bird's borking cookie monster"

"look! cookie monster's borking big bird"

Two-word stage (telegraphic speech)

- At about 18-24 months, infants begin to combine their words into simple sentences.
- This stage is called telegraphic speech because the sentences are abbreviated... containing almost no function words. The effect is somewhat like telegrams, where unnecessary words are omitted.

Vocabulary Spurt

- Early word learning is slow and deliberate
- Spurt around 18 months
 - 5 - 10 words per day !
 - Not better memory
 - Probably other skills
 - People look at things they are talking about
 - Objects can have multiple names that have different extensions

Two-word stage (telegraphic speech)

Children's two word utterances offer some evidence that infants arrange words into the correct word order for their language

Agent	+ Action	John kick
Action	+ Object	Kick ball
Agent	+ Object	John ball
Action	+ Location	Kick there
Entity	+ Location	John there
Possessor	+ Possessed	Adam ball
Entity	+ Attribute	Ball fast
Demonstrative	+ Entity	That ball

From telegraphic speech to complex grammar

Age		
28 months (telegraphic speech)	35 months	38 months
Somebody pencil	No—I don't know	I like a racing car
Floor	What dat feeled like?	I broke my racing car
Where birdie go?	Lemme do again	It's broked
Read dat	Don't—don't hold with me	You got some beads
Hit hammer, Mommy	I'm going to drop it—inne dump truck	Who put dust on my hair?
Yep, it fit	Why—cracker can't talk?	Mommy don't let me buy some
Have screw	Those are mines	Why it's not working?

Upcoming

- Cognitive Development
- Intelligence
- Social Development