

Introduction to Language & Language Comprehension

- The Nature of Language
 - Background
 - Phrase structure grammars
 - Transformational grammars
 - Factors affecting comprehension
 - Neurolinguistics
- Speech Perception
 - Characteristics of speech perception
 - Theories of speech perception

1

1

Introduction to Language & Language Comprehension

- Basic Reading Processes
 - Perceptual processes in reading
 - Discovering the meaning of an unfamiliar word
 - Reading and working memory
 - Theories about the role of sound in word recognition

2

2

Language

- 75,000 - 100,000 words
- Productive or generative nature of language
- Psycholinguistics

3

3

Nature of Language

- Phoneme
- Morpheme
- Semantics
- Syntax
- Pragmatics

4

4

Noam Chomsky



5

5

Linguistics

- Rejection of behaviorist notions of language
- Emphasis on mental processes underlying language learning
- Novelty of utterances
- 2 Major Claims
 - Language knowledge innate
 - Grammatical rules/system

6

6

Evidence

- Same age of acquisition
- Similar stages and length of time to acquire
- Limited # of Grammars
- Novel utterances
- Evidence for rule use: Irregular past tense verbs

7

7

Evidence for Rule Use: Irregular past tense formation

- Initially
 - 'go' --> 'went'
 - 'eat' --> 'ate'
- Later (after acquiring regular past tense rule)
 - 'go' --> 'goed'
 - 'eat' --> 'eated'

8

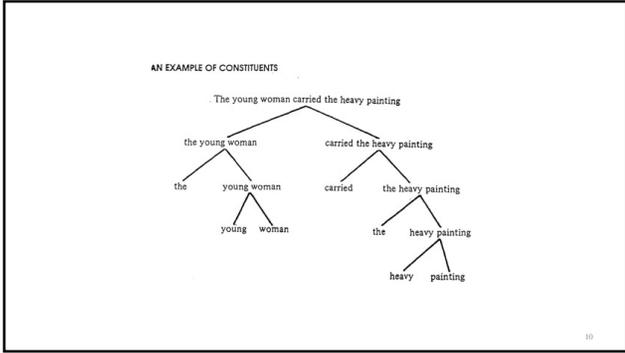
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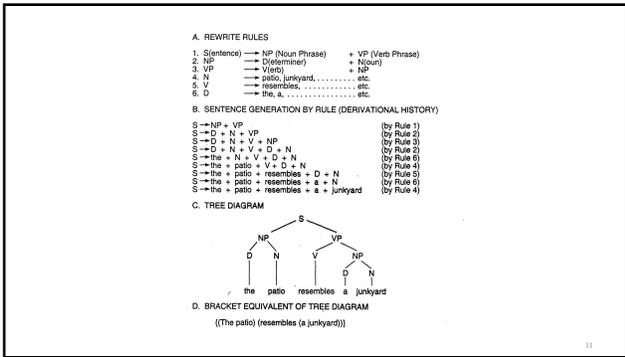
Phrase Structure Grammars

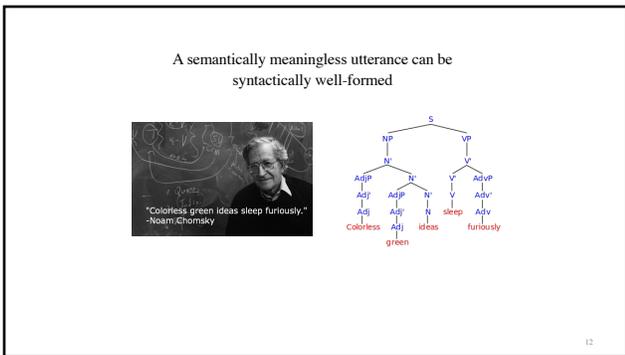
- Sentence decomposed into constituents by rewrite rules
- "The young woman carried the heavy painting."
- Phrase structure rules
- Why is this important?

9

9







Transformational Grammar

- Chomsky
- Surface Structure vs. Deep Structure
- Rules / Grammar that converts Deep Structure to Surface Structure
- Deep Structure = more abstract meaning (structure) of sentence

13

13

Different surface structures but same deep structure:

Sue corrected the homework.
 The homework was corrected by Sue.
 or:
 The boy kissed the girl.
 The girl was kissed by the boy.
 Was the girl kissed by the boy?

14

14

Same surface structure but different deep structures:

Visiting relatives can be a nuisance.
 or
 The shooting of the hunters was terrible.

15

15

Factors Affecting Comprehension

- Negatives – e.g., Clark & Chase (1972)
- Passive vs. Active Voice
- Ambiguous Sentences

16

16

Clark & Chase (1972)

*

+

1. 'Star' is above 'plus'. Y/N ?
2. 'Plus' isn't above 'star'. Y/N ?

<u>Positive</u>	vs.	<u>Negative</u>
-faster		-slower
-fewer errors		-more errors

17

17

Passive vs. Active

- Chomsky
- Active sentences 7 times more frequent
- Implications for writing:
 - “The study was run by three researchers”
 - “Three researchers ran the study”

18

18

Neurolinguistics

- Brain & Language
- Aphasia
 - Broca's Aphasia
 - Wernicke's Aphasia
- Recent Neuroscience Research
 - PET scans
 - ERPs

19

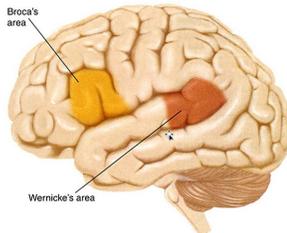
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Hemisphere Specialization

- Language localized in Left Hemisphere?
- Yes / No
- Left-Handers (50%) -----> process in RH or Right-Handers (5%) both hemispheres
- LH dominance:
 - speech perception
 - complex words – morphemic analysis
 - Syntax
 - Reading
- RH participates in language production
 - Interprets emotional tone
 - Metaphor
 - Subtle word meanings
- Deaf individuals

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Two areas of the brain commonly associated with speech and aphasias

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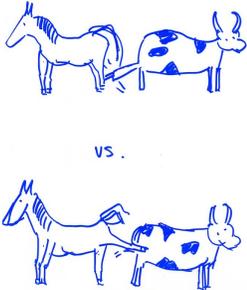
- **Broca's Aphasia**
 - “Yes . . . Monday . . . Dad and Dick . . . Wednesday nine o' clock . . . ten o' clock doctors . . . and . . . teeth.” (Geschwind, 1980)
- **Wernicke's Aphasia**
 - “Mother is away here working her work to get her better, but when she's looking the two boys looking in the other part. She's working another time.” (Geschwind, 1980)

22

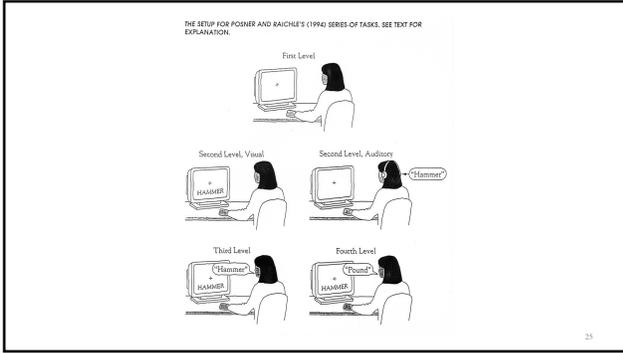
Broca's Patient Video



23



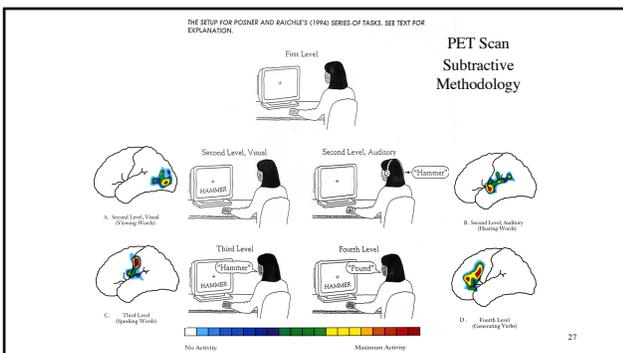
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25

- ### Tasks
- 1st Level - subject looks at '+'
 - 2nd Level
 - a. Visual Task - subject looks at a word ('hammer') (e.g., 'hammer')
 - b. Auditory Task - subject hears a word ('hammer') (e.g., 'hammer')
 - 3rd Level - subject speaks / says the word (e.g., 'hammer')
 - 4th Level - subject provides / says a word (verb) that describes / corresponds to function

26



27

Speech Perception

- 15 – 25 sounds/sec
- Characteristics of Speech
 - Variability (e.g. co-articulation)
 - No Boundaries in speech signal
 - Context allows filling in
 - Visual cues - McGurk Effect

28

28

Warren and Warren (1970)

- It was found that the *eel was on the axle.
- It was found that the *eel was on the shoe.
- It was found that the *eel was on the orange.
- It was found that the *eel was on the table.

29

29

Phoneme Restoration Effect Demonstration



30

30

CONTEXT AND MISPRONUNCIATIONS

Practice reading these sentences until you can read them smoothly. Then read them to a friend. Ask your friend to report which word in each sentence was mispronounced and to identify which sound in the word was incorrect.

1. In all the gunfusion, the mystery man escaped from the mansion.
2. When I was working pizily in the library, the fire alarm rang out.
3. The messenger ran up to the professor and handed her a proclamation.
4. It has been suggested that students be required to preregister.
5. The president reacted vavorably to all of the committee's suggestions.

31

31

McGurk Effect



32

32

What's going on ?



1. Sound recorded = "ba"
2. Lip movement = "ga"
3. You hear = "da"

33

33

VISUAL CUES AND SPEECH PERCEPTION. BASED ON SMYTH ET AL. (1987).

The next time you are in a room with both a television and a radio, try this exercise. Switch the TV set to the news or some other program where someone is talking straight to the camera; keep the volume low. Now turn on your radio and tune it between two stations, so that it produces a hissing noise. Turn the radio's volume up until you have difficulty understanding what the person on television is saying; the radio's "white noise" should nearly mask the speaker's voice. Face the TV screen and close your eyes; try to understand the spoken words. Now open your eyes. Do you find that speech perception is now much easier?

34

34

Perceptual Processes in Written versus Spoken Language?

- Writing is spread out across space; speech is spread out across time
- Readers can control the rate of input; listeners usually cannot
- Readers can re-scan the written input; listeners must rely much more heavily on their working memory
- Writing shows discrete boundaries between words; speech does not
- Writing is confined to the words on a page; speech is supplemented by additional auditory cues—such as stressed words and variations in pace—that enrich the linguistic message.

35

35

With this effect a secret influence on the understanding of written language different ideas he that reads books of science, though others can think them of improvement, will grow more knowing in the sciences, though still used in vulgar business, will improve himself in questions the other which are also related to the same.

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Figure 1.1 The letters all equally flow when we read. In this simulation, a page from Samuel Johnson's The Dictionary (1755) was filtered through an algorithm that equated the horizontal flow of letters to the flow of water. Regardless of size, any letter that is heavier can be identified. This is why we consistently report seeing letters that appear to be heavier when we read letters on green paper, or on any other color or two words.

36

36

Perceptual Processes in Reading

- Saccades
- Fixations
- Moving window technique
- Perceptual span
 - 4 letters to left
 - 15 letters to right

37

37

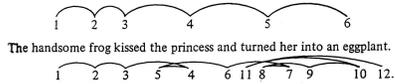
Saccadic Eye Movements Predictable Patterns

- No fixations on blank spaces
- Jumps over short words, function words (e.g., 'the' and 'of') and predictable words
- Misspelled or unusual words
- Good readers
 - larger jumps / fewer regressions
 - shorter fixations

38

38

Eye movement patterns for a good reader (top numbers) and a poor reader (bottom numbers).



Watch several videos on my Psy321 website to see eye-tracker recordings of readers' eye movements and how reading works.

<https://www.rcrutter.on-rev.com/psy321n/links/>

39

39

Theories About Word Recognition

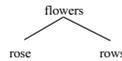
- 1. Phonologically Mediated Hypothesis
"television" → tel - e - vi - zun → 
- 2. Direct Access Hypothesis
"television" → 
- 3. Dual Route Hypothesis
"television" → tel - e - vi - zun → 

40

40

Evidence for Phonological-Mediation

- Sounding out difficult material
'insouciant'
'pullulate'
- Reading Tongue Twisters
- Categorizing Homonyms (Van Orden 1987)



41

41

READING TONGUE TWISTERS

Read each of the following tongue twisters silently to yourself:

1. The seasick sailor staggered as he zigzagged sideways.
2. Peter Piper picked a peck of pickled peppers. A peck of pickled peppers Peter Piper picked.
3. She sells seashells down by the seaside.
4. Congressional Caucus questions controversial CIA-Contra-Crack connection.
5. Sheila and Celia slyly shave the cedar shingle splinter.

Now be honest. Could you "hear" yourself pronouncing these words as you were reading? Did you have to read them more slowly than other sentences in this book?

42

42

Direct Access Hypothesis Evidence

- Homonyms
 - read - reed
 - sea - see
- Bradshaw & Nettleton (1974)
 - mown - down
 - horse - worse
 - quart - part
- Deep dyslexia

43

43

Dual-Route Hypothesis Evidence

- Flexibility
- Individual Differences
- Word Characteristics
 - Difficulty of words
 - Unfamiliar vs. familiar
- Children vs Adults

44

44

Implications for Teaching Reading

- Whole-word approach
- Phonics vs. phonemic awareness

45

45

