

## This Week and the Next Three Weeks

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Week 6:	Aphasic Language	Ch. 2&10, Quiz 3 Paper topic
Week 7:	Aphasic Language	Quiz 4
Week 8:	SLI Language	Ch. 4&9, 5 Paper due
Week 9:	SLI Language	Midterm (March 7)

1

## Jean 75

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- Some social sentences are unaffected
- Struggles finding words, particularly nouns
- Allows “fake” words (neologisms) to replace real words
- Appears to understand sentences more than she does. Understands some words and what a tester wants her to do and makes good guesses
- Cannot repeat words

2

## Wernicke's Aphasia

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- Fluent speakers
- Verbs are generally better accessed than nouns
- Grammatical but senseless sentences, social sentences better preserved (“I’m fine”)
- Poor comprehension, understands simple sentences, uses key words to guess at meaning
- Word loss (anomia) word creation (neologisms) and imitation problems

3

## Neurolinguistics

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- The neurology of language
- Goals
  - Locating the parts of the brain that control the processing of language
  - Understanding how each component of this neuron network works in the processing of language
  - Understanding the neurological changes that correspond to the development of a particular language within the network.

4

## The Left Hemisphere

Gyrus (hills)

Sulcus (valleys)



4.3 lbs

5

## Lobes of the Cortex

Occipital



Visual Processing

Parietal



Sensory & Language Processing & Sensory Intergration

Temporal



Auditory & Language Processing, Memory

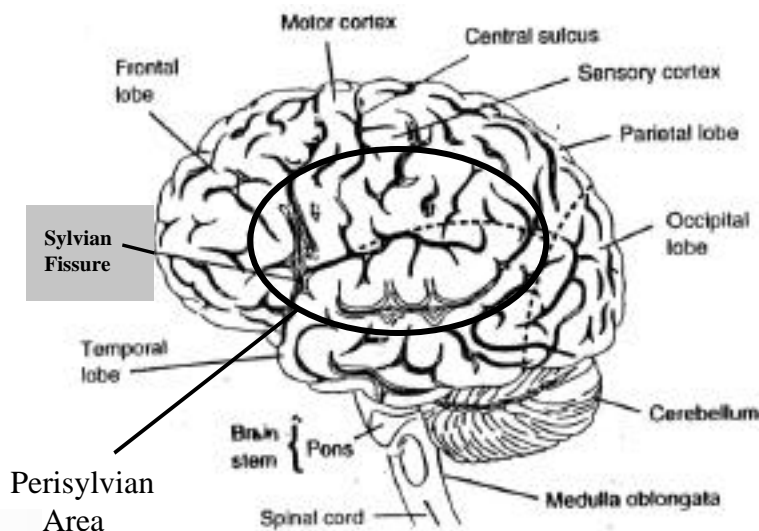
Frontal



Higher level planning & Reasoning, Language Processing

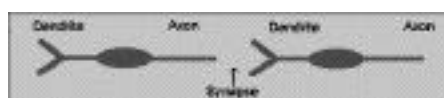
6

## LH Lobes and landmarks



7

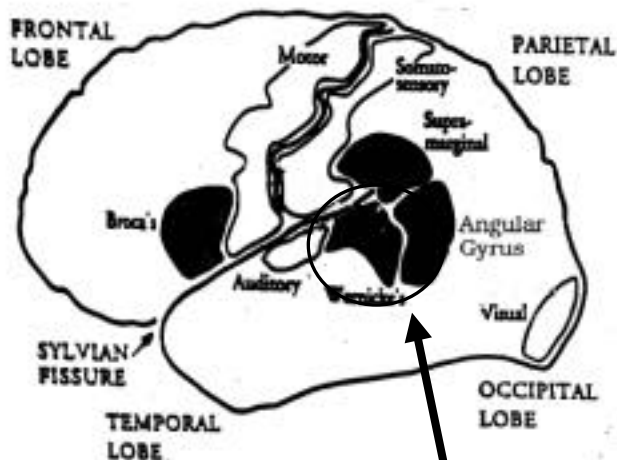
## Neuron Networks



The brain contains billions of cells, called neurons, that are networked together by communication links made of long fibers, called axons, which release chemicals, called neurotransmitters, that travel across a gap, called synapses, to the receiving mechanism, called dendrites, of adjacent neurons and by doing so pass along information. Some neurons are organized into smaller groups that perform specific functions. A group formed in the perisylvian area links sensory input (hearing and vision) and motor output (speech motor) networks to lexical and combinatorial information and is called the language processor.

8

## Wernicke's Brain Damage Site



9

First of all this is falling down, just about, and is gonna fall down and they're both getting something to eat...but the trouble is this is gonna let go and they're both gonna fall down...I can't see well enough but I believe that either she or will have some food that's not good for you and she's to get some for her, too...and that you get it there because they shouldn't go up there and get it unless you tell them that they could have it. And so this is falling down and for sure there's one they're going to have for food and, and this didn't come out right, the, uh, the stuff that's uh, good for, it's not good for you but it, but you love, um mum mum [smacks lips]... and that so they've ...see that, I can't see whether it's in there or not...I think she's saying, I want two or three, I want one, I think, I think so, and so, so she's gonna get this one for sure it's gonna fall down there or whatever, she's gonna get that one and, and there, he's gonna get one himself or more, it all depends with this when they fall down...and when it falls down there's no problem, all they got to do is fix it and go right back up and get some more.

10

**“What brings you to the hospital?” I asked the 72-year old retired butcher four weeks after his admission to the hospital.**

**~~“Boy, I’m sweating, I’m awful nervous, you know, once in a while I get caught up, I can’t mention the tarripoi, a month ago, quite a little, I’ve done a lot well, I impose a lot, while, on the other hand, you know what I mean, I have to run around, look it over, trebbin and all that sort of stuff.”~~**

**I attempted several times to break in, but was unable to do so against this relentlessly steady and rapid outflow. Finally, I put up my hand, rested it on Gorgan’s shoulder, and was able to gain a moment’s reprieve.**

**“Thank you, Mr. Gorgan. I want to ask you a few...”**

**“Oh sure, go ahead, any old think you want. If I could I would. Oh, I’m taking the word the wrong way to say, all of the barbers here whenever they stop you it’s going around and around, if you know what I mean, that is tying and tying for repucer, repuceration, well, we were trying the best that we could while another time it was with the beds over there the same thing...”**

11

## **Earl 68**

- **Difficult for him to pronounce words (non-fluent)**
- **Knows the nouns he wants to say but cannot pronounce some of them, can’t imitate**
- **Does not use verbs in phrases that require them**
- **Does not use grammatical words in phrases that require them, especially auxiliary words.**
- **Can understand most sentences spoken to him**
- **Subtle problems of comprehension, especially for sentences that are “rearranged” by movement rules; e.g., “The rat was eaten by the cat.”**

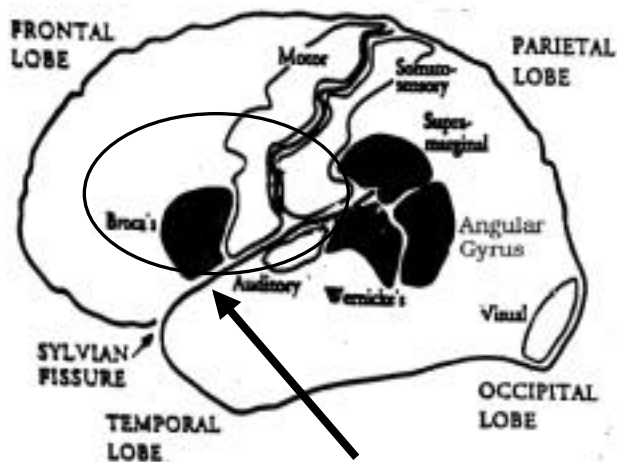
12

## Broca's Aphasia

- Agrammatical, usually verbless sentences
- Output the more obvious problem, but comprehension is impaired as well
  - Cannot detect agrammatical sentences containing errors in functional elements
  - Cannot understand sentences in which movement has occurred; e.g. passives
  - Problem is in constructing VP trees and functional category phrases

13

## Broca's Brain Damage Site



14

Yes . . . ah . . . Monday . . . ah . . . Dad and Peter Hogan, and Dad . . . ah . . . hospital . . . and ah . . . Wednesday . . . Wednesday nine o'clock and ah Thursday . . . ten o'clock ah doctors . . . two . . . two . . . an doctors and . . . ah . . . teeth . . . yah . . . And a doctor an girl . . . and gums, an I.

Lower Falls . . . Maine . . . Paper. Four hundred tons a day! And ah . . . sulfur machines, and ah . . . wood . . . Two weeks and eight hours. Eight hours . . . no! Twelve hours, fifteen hours . . . workin . . . workin . . . workin! Yes, and ah . . . sulphur. Sulfur and . . . Ah wood. Ah . . . handlin! And ah sick, four years ago.

15

## Clinical Classifications of Aphasia

Aphasia Type	Spont. Speech	Repetition	Para-phasia	Compre-hension	Naming
Broca's	Non-fluent	Poor	Rare	Good	Fair
Wernicke's	Fluent	Poor	Common	Poor	Poor
Conduction	Fluent	Poor	Common	Good	Poor
Global	Non-fluent	Poor	Variable	Poor	Poor
Anomic	Fluent	Good	Never	Good	Poor
Transcortical Motor	Non-fluent	Echolalia	Rare	Good	Poor
Transcortical Sensory	Fluent	Echolalia	Common	Poor	Poor
Mixed Transcortical	Non-fluent	Echolalia	Rare	Poor	Poor

16

## Brain Damage as Natural Experiments

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- Means for localizing the language processor
  - Correlate anatomical damage to different types of language deficit
- Anatomical effect of insults to the brain
  - Neuron death results from:
    - Mechanical shearing that tears the cell wall
    - Oxygen starvation caused by lack of blood flow
    - Synapse degeneration causing electrical under-stimulation of neurons
    - Electrical overstimulation from damaged neurons

17

## Two Types of Brain Damage

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- Diffuse Damage
  - Blows to the head caused by car and motorcycle accidents
  - Gunshots
- Localized Damage
  - Localized vascular accidents (Stroke) causing oxygen starvation
  - Penetrating wounds of certain types
  - Can cause aphasia if the damage occurs in the area of the brain containing the language processor

18

## Localized Damage to Perisylvian Area

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- Almost always results from strokes
- If in the left hemisphere, 97% of adults will suffer aphasia
- Depending on the site of greatest damage within the language area, two types of aphasia
  - > Brocas Aphasia
  - > Werniche's Aphasia

19

## Evidence for a Language Area in the LH of the Brain

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- Visual evidence: Autopsy & brain imaging of aphasic brains indicates LH lesions
- Evidence from related symptoms: Aphasics have right visual field and right motor impairments
- Evidence from isolated hemispheres:
  - > Epileptics whose hemispheres have been separated have no language (LH) for left side (RH) experience
  - > Sodium amobarbital injections to LH prior to surgery

20

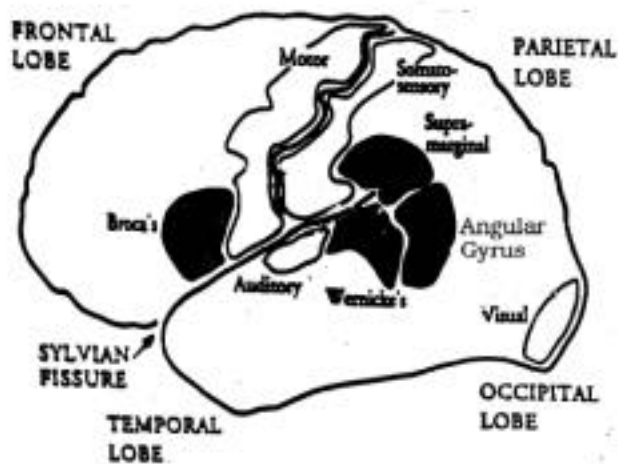
## Handedness Matters

Percent of the population with hemispheric dominance for language, analytic thought and certain types of memory

	LH	Equal	RH
➤ Righties:	90%		10%
➤ Lefties:	64%	16%	20%
➤ Ambidextrous:	60%	30%	10%

21

## Left Hemisphere Landmarks



22

# Language symptoms related to damage at specific sites

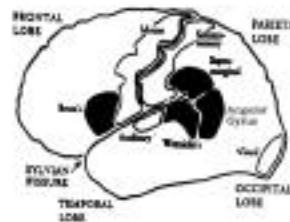
Nouns



Verbs

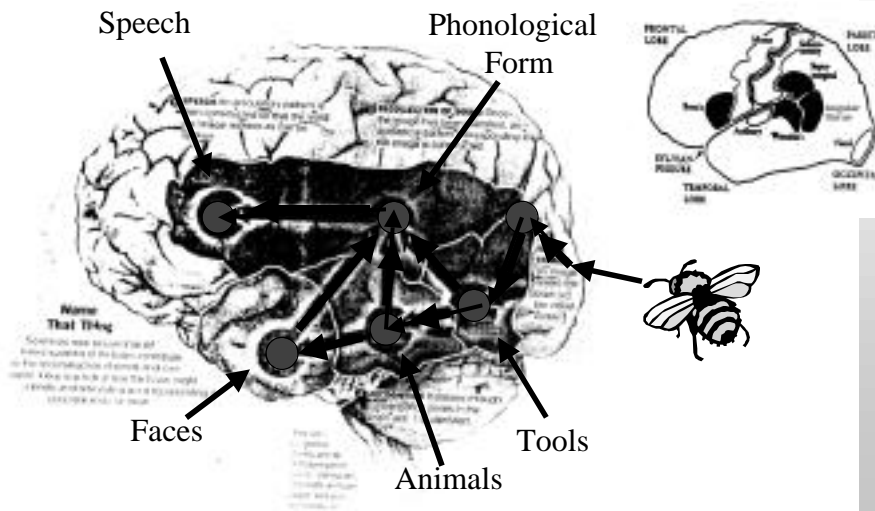


Concepts

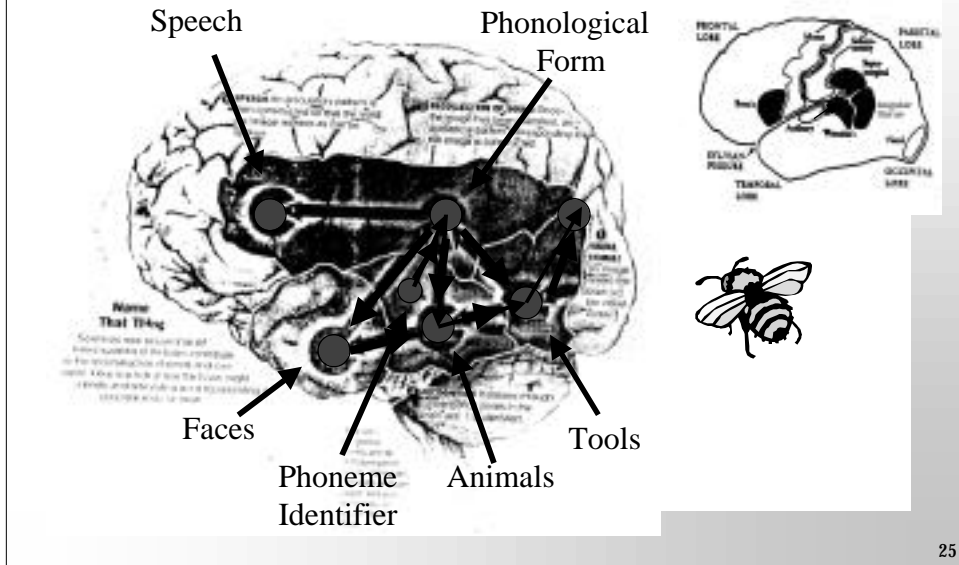


Source: Hanna and Antonio DaMasio

# Steps for naming pictures

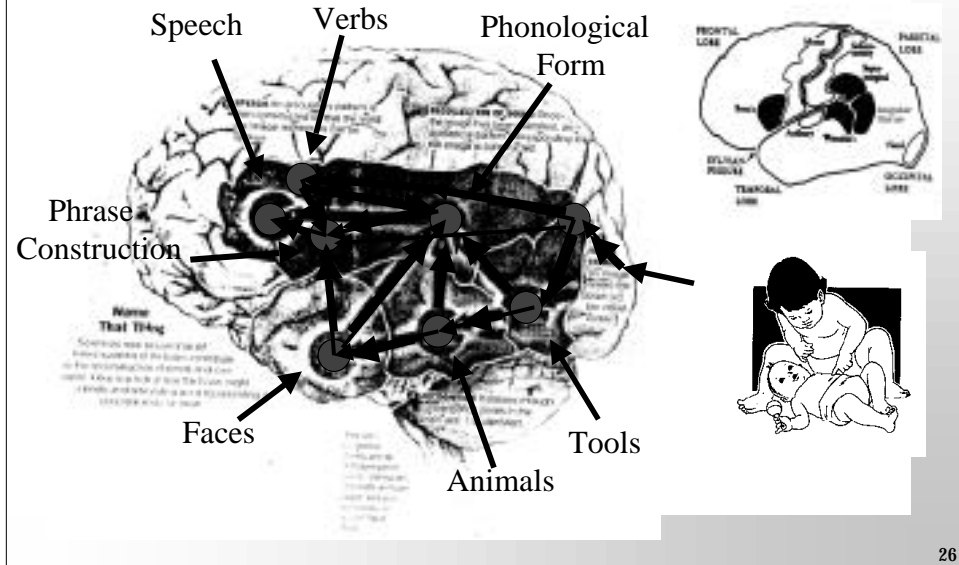


## Steps for identifying words



25

## Steps for composing phrases



26

## Steps for parsing phrases

The diagram illustrates the neural pathways for parsing phrases. It features a central brain map with several labeled regions and their connections:

- Speech**: Located in the frontal lobe, connected to **Verbs** and **Phonological Form**.
- Verbs**: Located in the frontal lobe, connected to **Speech** and **Phonological Form**.
- Phonological Form**: Located in the frontal lobe, connected to **Speech**, **Verbs**, and **Phrase Construction**.
- Phrase Construction**: Located in the frontal lobe, connected to **Phonological Form** and **Animals**.
- Faces**: Located in the temporal lobe, connected to **Animals** and **Tools**.
- Phoneme Identifier**: Located in the temporal lobe, connected to **Animals** and **Tools**.
- Animals**: Located in the temporal lobe, connected to **Phrase Construction**, **Faces**, and **Tools**.
- Tools**: Located in the temporal lobe, connected to **Faces** and **Animals**.

Additional elements include:

- An anatomical diagram of the brain showing the **FRONTAL LOBE**, **PARIETAL LOBE**, **TEMPORAL LOBE**, and **OCIPITAL LOBE**.
- A drawing of a child sitting on the floor, looking at a book.
- A small text box on the left side of the brain map with the heading "Name That Thing" and some illegible text below it.

27