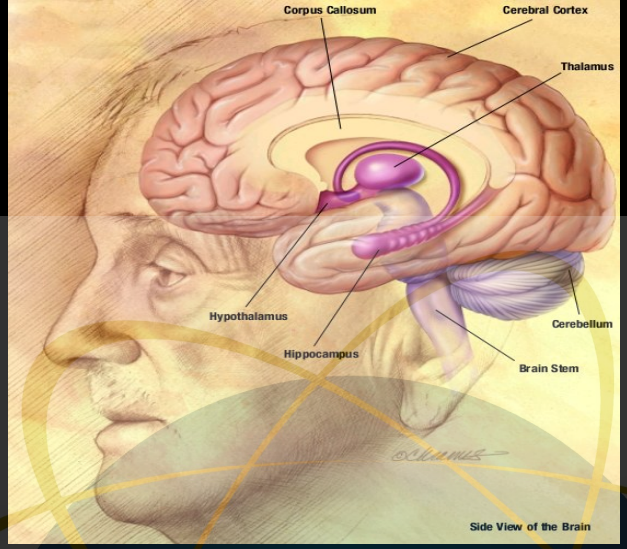


The study of the psychological & neurobiological factors that enables humans to acquire, use, comprehend & produce language.

PSYCHOLINGUISTICS

The scope of Psycho-linguistics

There are four major concerns:

- *Comprehension*: How people understand spoken and written language. (one question in realm of language comprehension is how people understand sentences as they read (also known as sentence processing)

- *Speech production*: How people produce language.

- *Acquisition*: How people learn language.

- *The Biological & Neurological* bases of human communicative behavior.

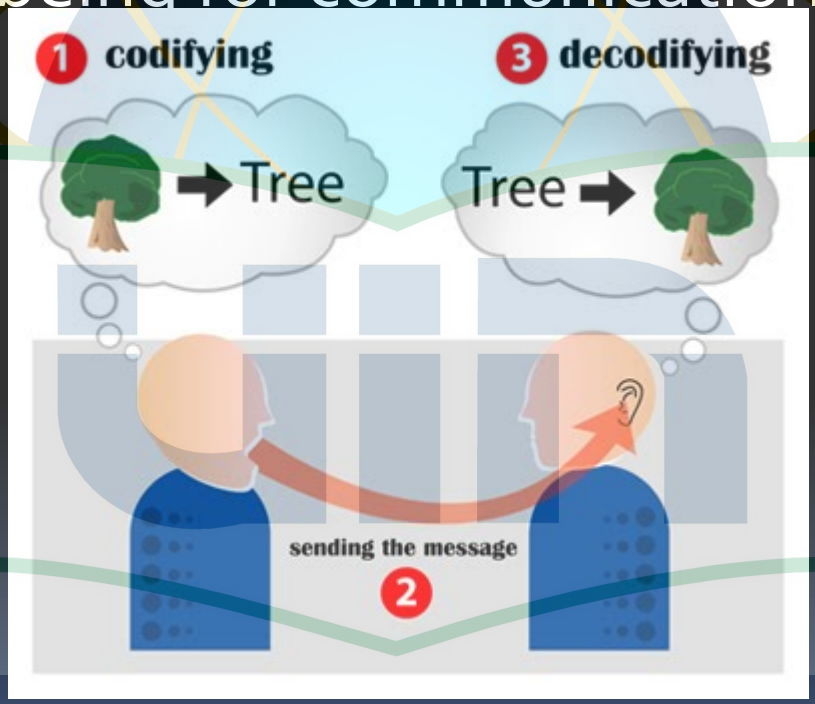
The history of psycolinguistics

- 1. Formative stage:
  - Wilhelm Wunt (early 20's Century)
  - John W Gardner & John B. Carrol (1951-1953)
- 2. Linguistics stage:
  - Behaviorism (Sapir & Whorf, Skinner)
  - Mentalism (Noam Chomsky)
- 3. Cognitive stage:
  - Neurological bases:
    - Innate property, LAD, Faculty of the mind
  - Biological bases :
    - anatomy, Psychology, behavior.
- 4. Theory of Psycholinguistics stage:

Neurology, Biology, Genetics, Philosophy, Primatology.

What is language

- A system of arbitrary vocal symbol used by human being for communication



Is language species specific?

- In what way do our brain differ from those of other primates which do not possess language?

  - Hierarchic Structure
  - Infinite creativity
  - Rule-governed System of behavior
  - Arbitrary
  - Vocal Auditive
  - Inter-change
  - Meaningful (semantic)

Animal communication

Animal communication is any behavior on the part of one animal that has an effect on the current or future behaviour of another animal. The study of animal communication — sometimes called **Zoosemiotics** (defined as the study of sign communication or semiosis in animals; distinguishable from anthroposemiotics, the study of human communication) — has played an important part in the methodology of ethology, sociobiology, and the study of animal cognition.

Form of animal communication

- Gestures
- Facial expression
- Gaze
- Vocalization
- ication

Levels of language analysis

- Phonology
- Sequences of sounds: *Phonotactic*
- The Lexicon and Semantics
- Morphology: *The study of word formotion*
- Syntax: *Combining words to form sentences*
- Pragmatics& Discourse
- Metalinguistic Capacity: *The abality to analyze our own language.*

Language Diversity & Language Universals

- Oral & Sign Language
- Written Language

Chapter II
The biological bases of human communicative behavior

- Language & the brain: Historical Perspective?
- Functional neuroanatomy &neuropathology?
- Localization,Comparison,Lateralization?
- Lateralization of function:

  - The Wada Test
  - Hemispherectomy
  - Dichotic Listening Test
  - Critical Age Hypothesis
  - Language damage in the brain

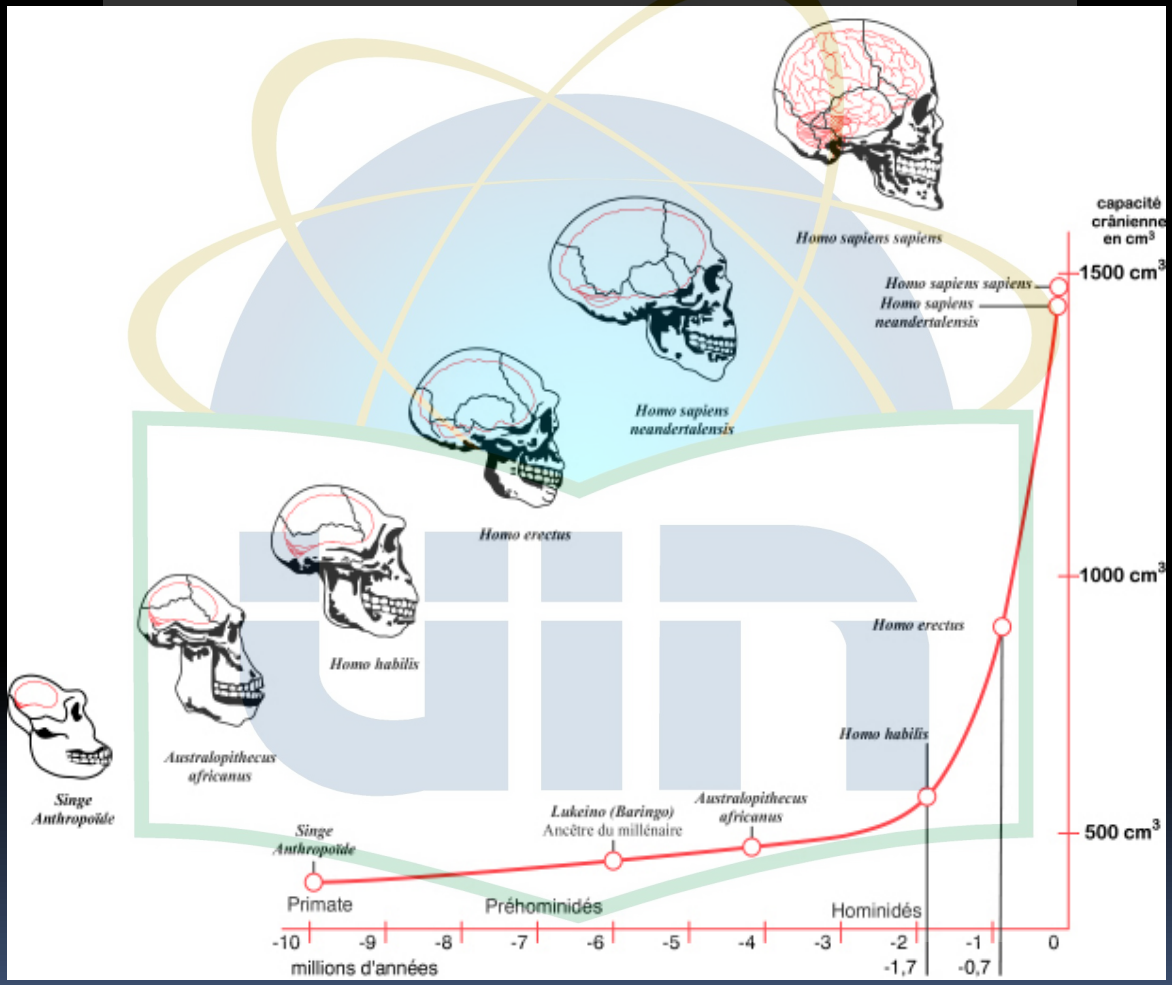
Language and the brain

Three important issues emerge in relation to language & the brain:

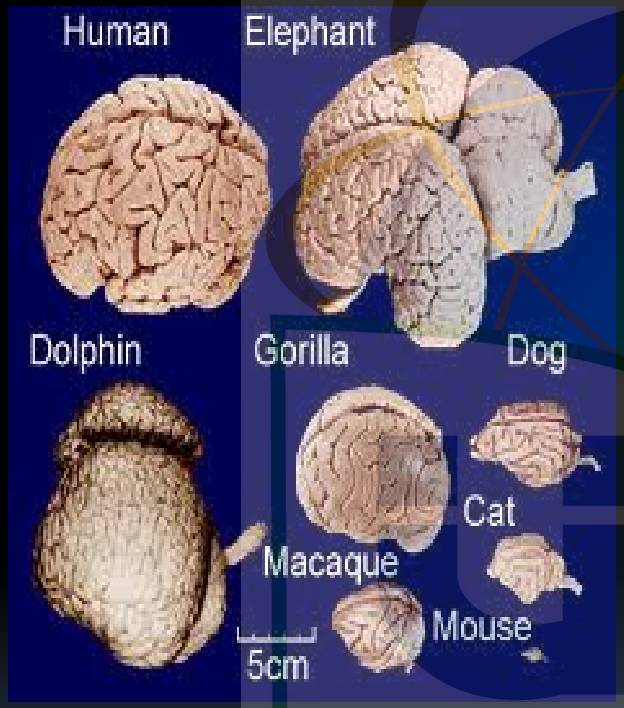
- *Comparison*: in what way do our brains differ from those of other primates which do not possess language?
- *Localization*: where is language located in the brain?
- *Lateralization*; is there a different in the way the right side of the brain contribute to language? At what age does that difference become establish?

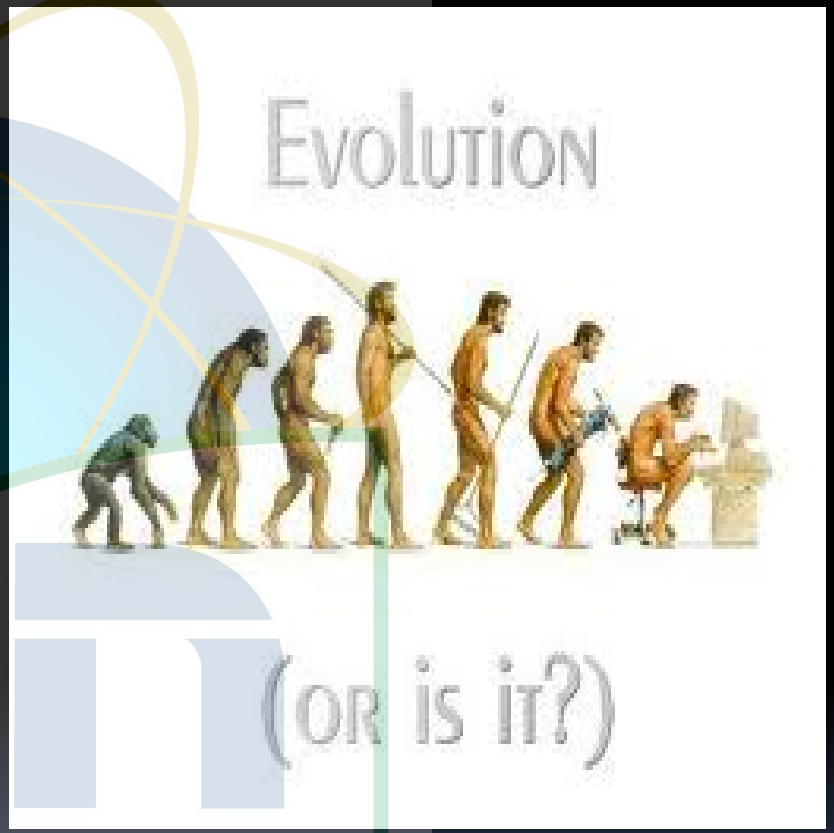
Comparisons

in what way do our brain differ from those of other primates which do not posses language?



Comparisons: brain Evolution

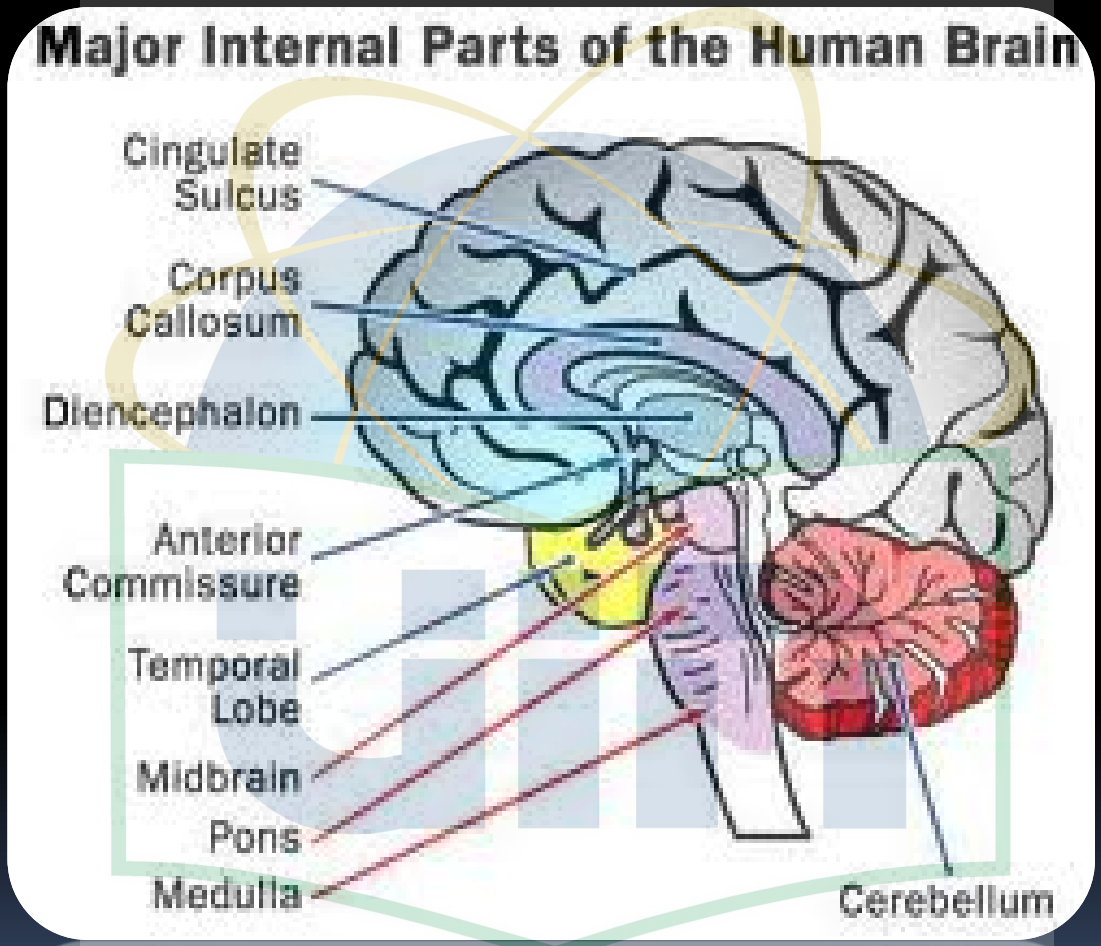




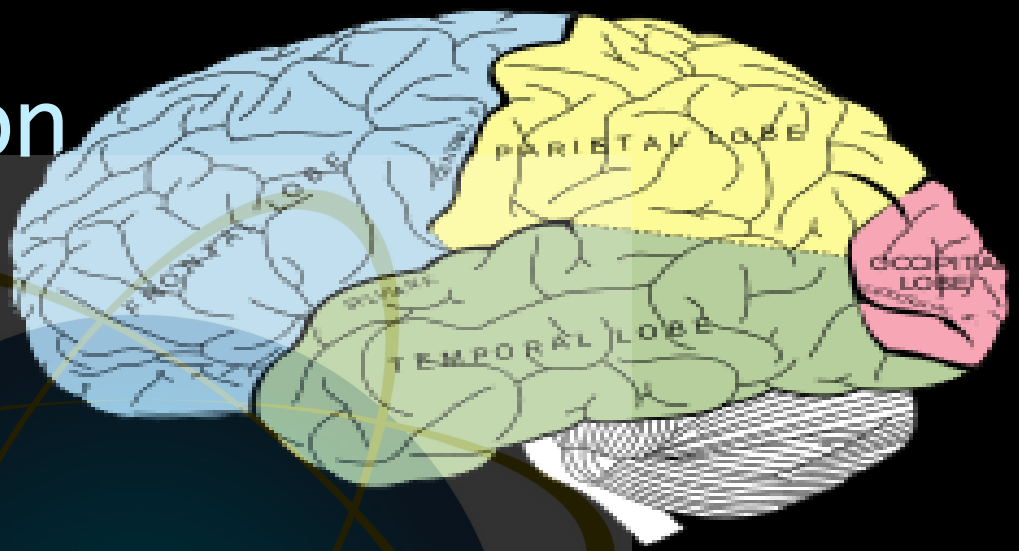
Comparison

- Here are some comparison the brains of human beings & those primates:
  - The cortex is much more extensive in human being.
  - Human pre-frontal areas are up to six times bigger that those of chimpanzees.
  - The brains of other species are divided into two hemispheres, like human beings. In monkeys, the left hemisphere dominates in the processing of rapid auditory stimuli.
  - The human cerebellum is very much larger than in other species.
  - In human beings, a greater proportion of the motor area is given over to the control of mount, tongue & jaw.

Human brain

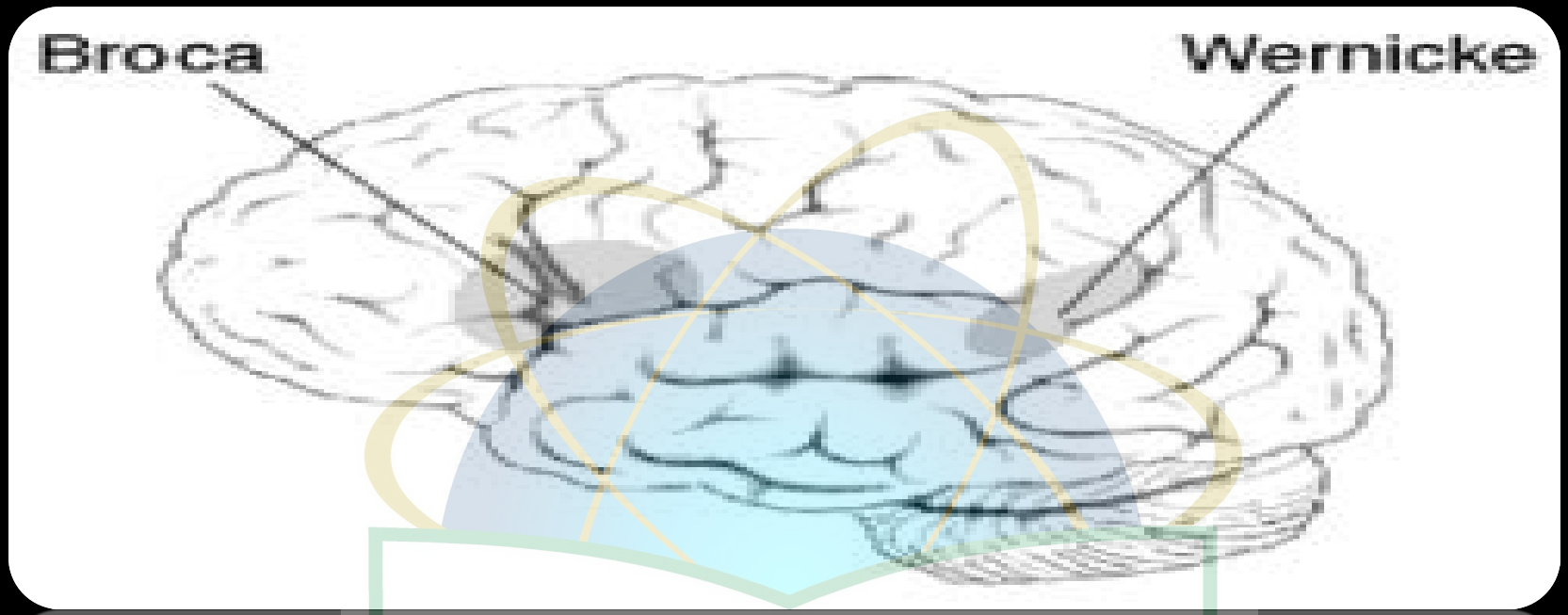

Major Internal Parts of the Human Brain
Cingulate Sulcus
Corpus Callosum
Diencephalon
Anterior Commissure
Temporal Lobe
Midbrain
Pons
Medulla
Cerebellum

Localization



- Where is language located in the brain:

  Noam Chomsky drew attention to fact that every normal child successfully acquires a first language, no matter what its intelligence or learning style. There for language must be an independent faculty & not part of our general powers of thought and reason.

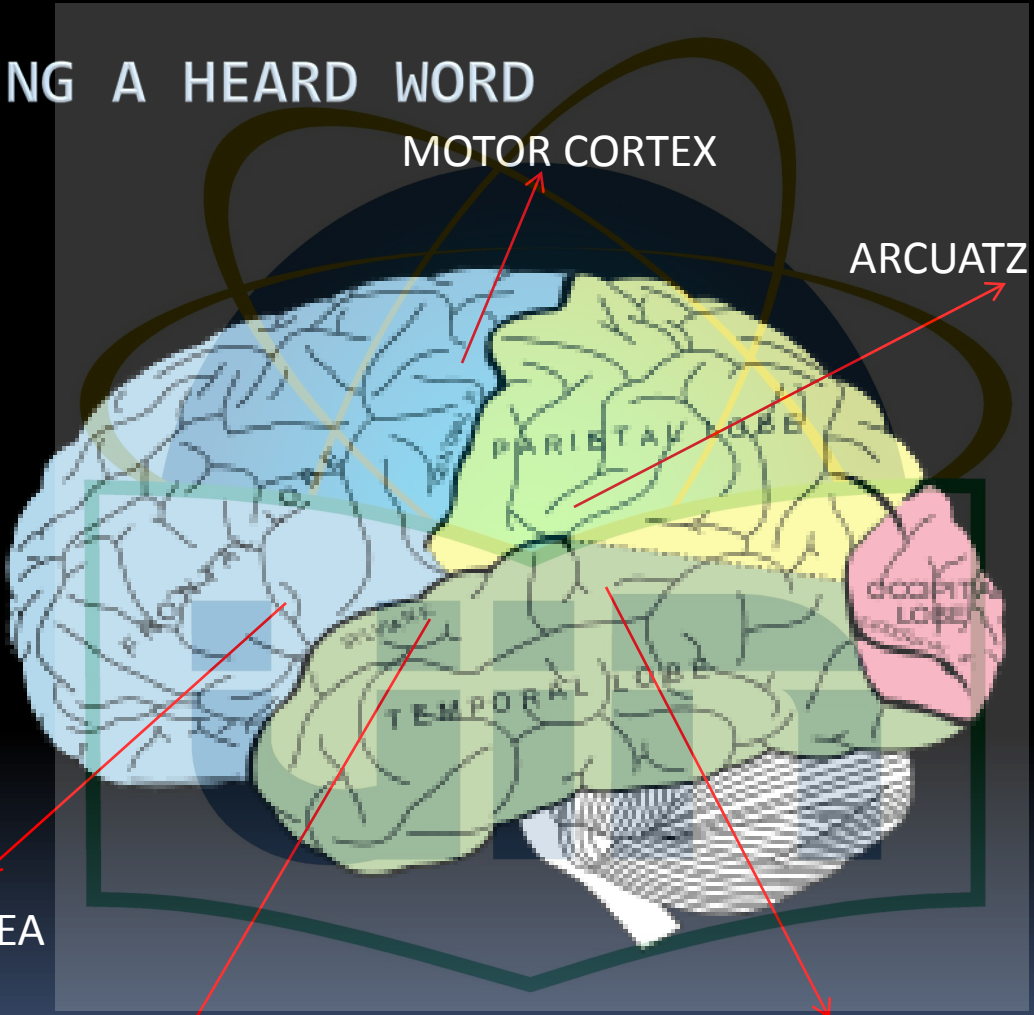


Pada lobe frontal terdapat suatu daerah yang dikenal sebagai daerah Broca.
Broca digunakan untuk kemampuan berbahasa.

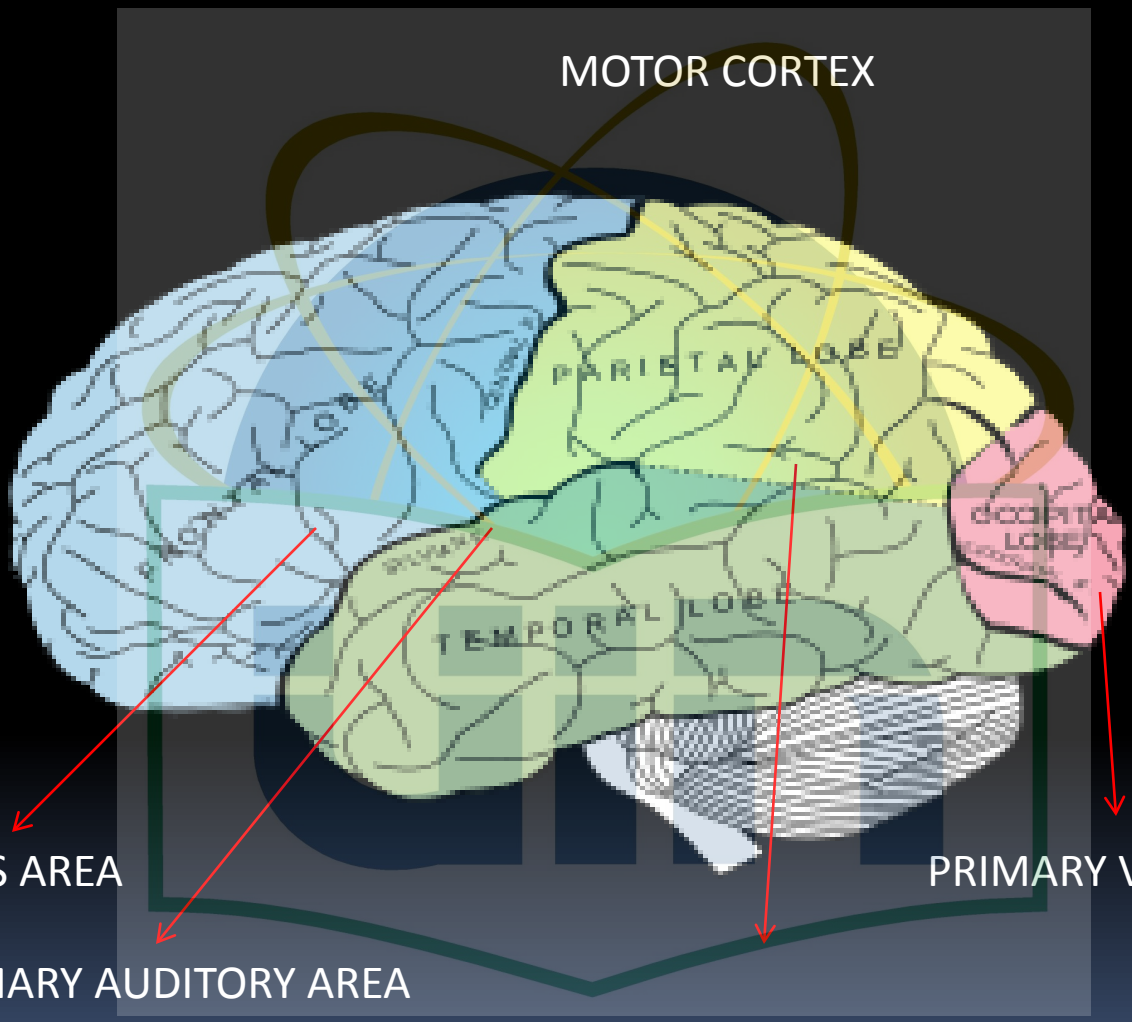
Lobe temporal dan agak menjorok ke daerah parietal ada bagian yang berkaitan dengan komprehensi maka disebut daerah Wernicke's area.

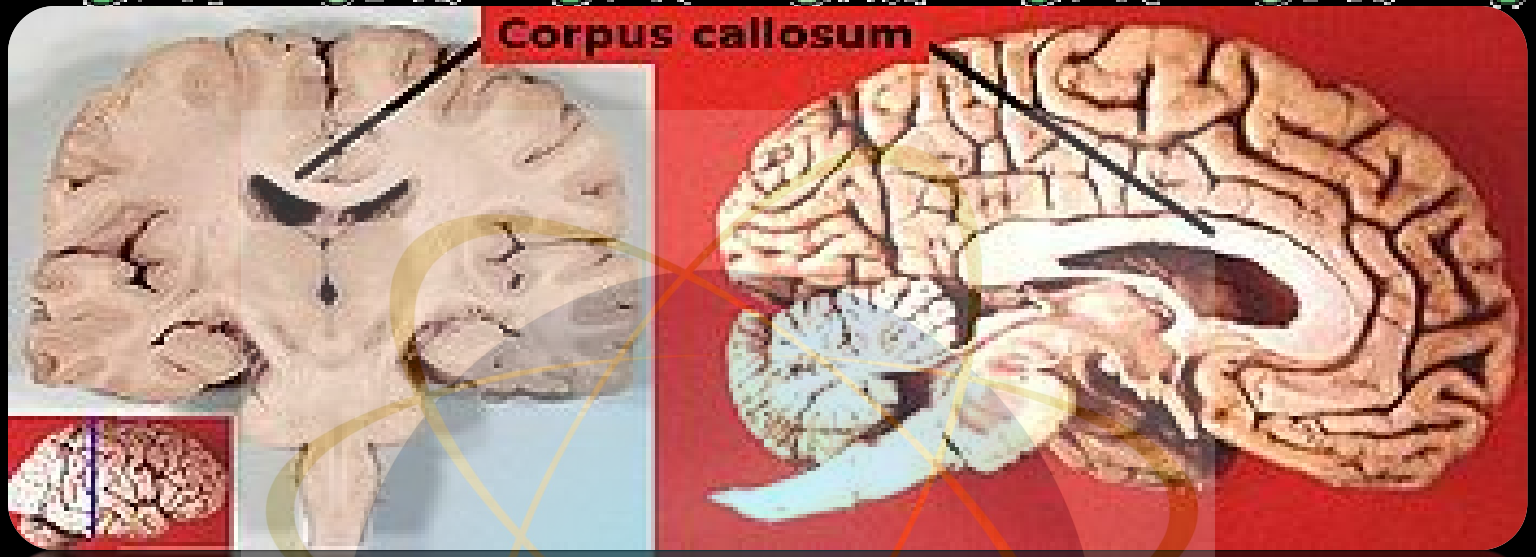
3. KAITAN OTAK DENGAN BAHASA

SPEAKING A HEARD WORD



SPEAKING A WRITTEN WORD





Bagian 2: hemisfir kiri dan hemisfir kanan

Pada waktu manusia dilahirkan belum ada pembagian tugas antara kedua hemisfir ini. Akan tetapi, menjelang anak mencapai umur 12 tahun terjadilah pembagian funsi yang dinamakan literalisasi. Hemisfir kiri(Wernicke's Area) berfungsi mengelola bahasa dan hemisfir kanan untuk hal-hal yang lain, tetapi hemisfir kanan (Broca's Area) juga bertanggung jawab atas penggunaan bahasa.

Lateralization

Lateralization of function:

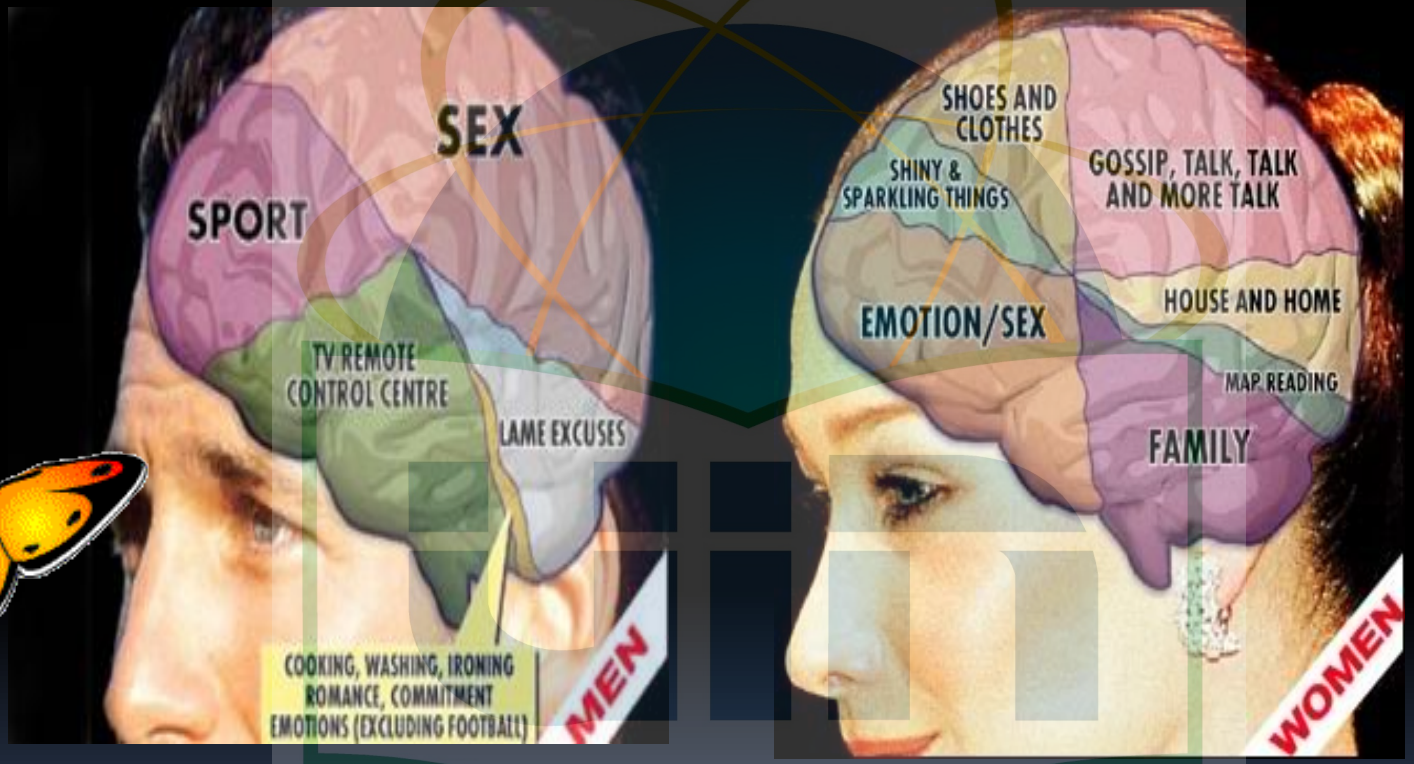
The observation that each cerebral hemisphere may control different types of behavior.

Theories of lateralization:

- Critical age hypothesis
- Wada Test (1949)
- Dichotic Listening test
- Hemispherectomy
- Handedness (left handed & right handed)
- Ambidextrous

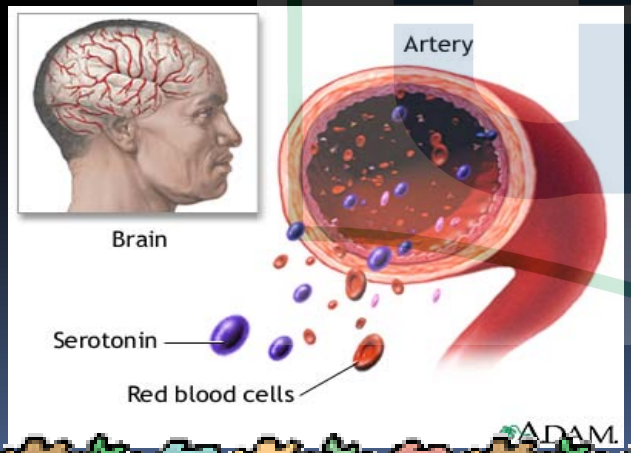
- Critical age hypothesis: a span of developmental time best suited for acquiring a particular behavior.
- Dichotic Listening Test: simultaneous presentation of different sound to each ear.
- The Wada Test: a test for language dominance that involved injection of the drug sodium amytol.
- Hemispherectomy: Surgical removal of one cerebral hemisphere.

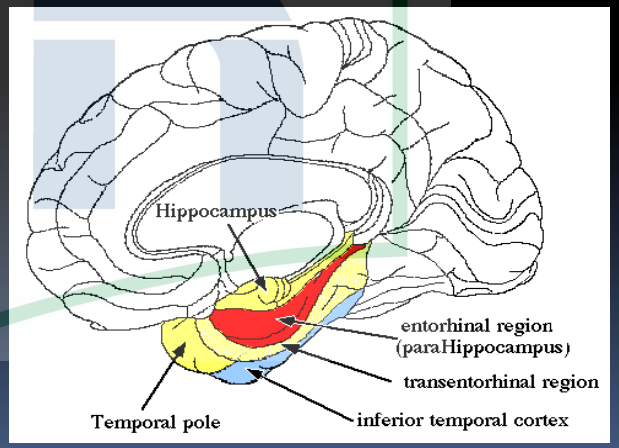
Otak Pria dan Otak Wanita



Perbedaan Otak Pria dan Otak Wanita

- Perbedaan Parsial
- Perbedaan Verbal
- Perbedaan Bahan Kimia
- Memori





Metode Penelitian Otak

- CAT
- MRI
- PET
- ERPs

The evolution of human brain

- Homo erectus phase (java & China) 400 m.g.
- Pra-austolopiticus – Austrolopiticus afarensis phase (change of reorganization) (800 mg).
- Fiber system phase (corpus collosum)
- Homo sapiens (two hemispheres 1300-1500 m.g)

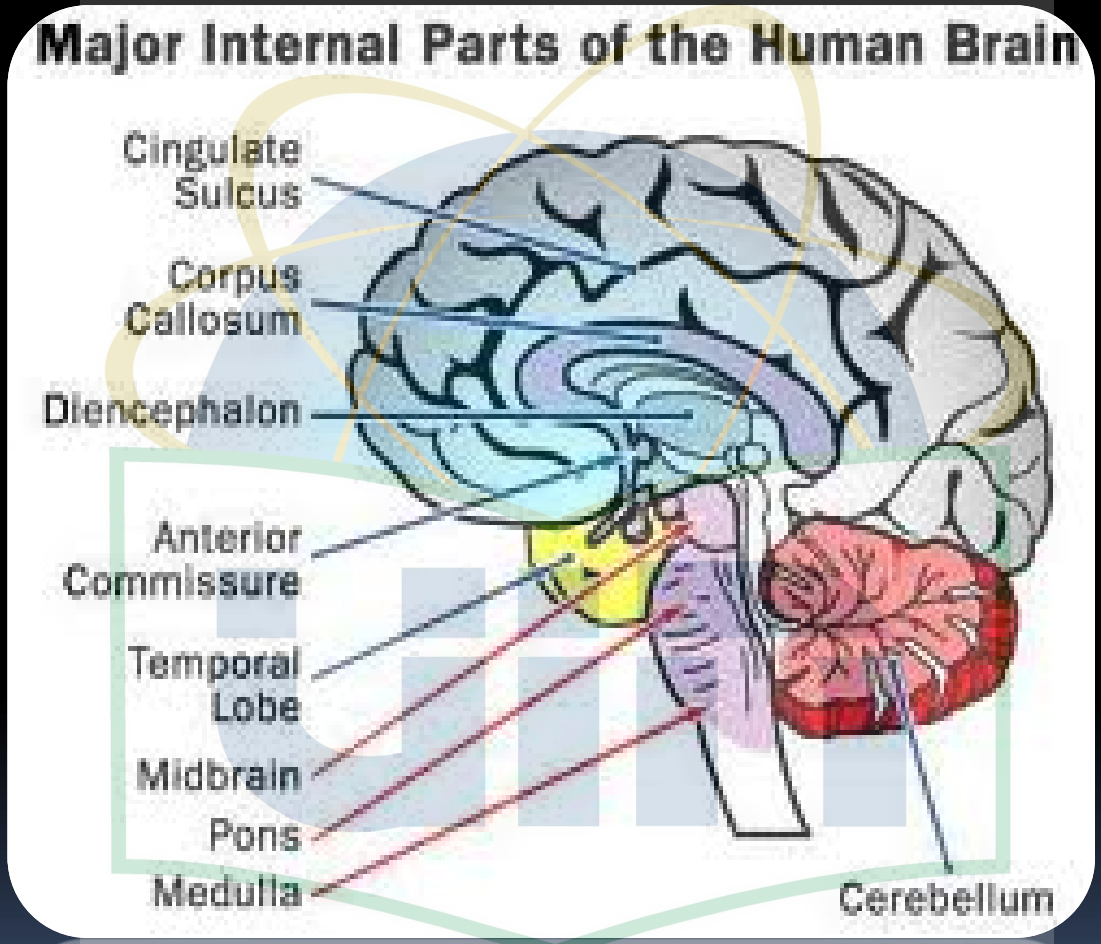
Keterkaitan Pertumbuhan Biologi dengan Bahasa Menurut Lennberg

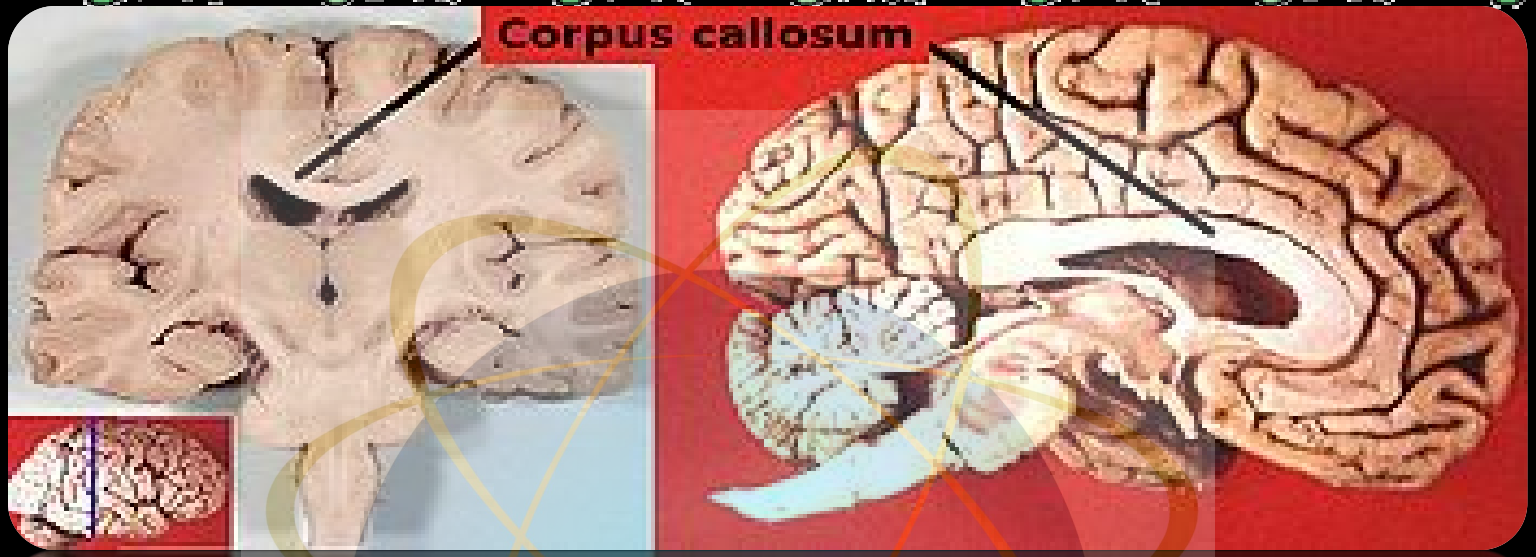
AGE	ABILITY	APPEARANCE
12 weeks	Crying has diminished; vowel like cooing has begun and is sometimes sustained for 15 to 20 seconds.	
18 weeks	Response to human sounds is more definite; eyes seem to search for speaker.	
20 weeks	Child can sit with props. Consonantal sounds are beginning to be interspersed with the vowel-like cooing.	

AGE	ABILITY	APPEARANCE
6 months	Cooing is changing into babbling with resemblance to single syllables. Most common sounds are ma, mu, da, di.	
8 months	Repetitions of sounds are becoming frequent, intonation patterns distinct, and utterances begin to be used to signal emphasis and emotions.	
10 months	Vocalizations are mixed with sounds play like gurgling or bubble-blowing; baby tries to imitate sounds, begins to respond differentially to words heard.	

AGE	ABILITY	APPEARANCE
12 months	Child walks when hold by one hand, or walks on feet and hands with knees in air and can seat self on floor. Identical sound acquiesces are repeated more often, and words (mamma or dadda) are emerging. Definite signs of understanding appear in response to simple commands.	
18 months	Grasp prehension, and release are fully developed; gait is still stiff. Child can creep downstairs backward. Word repertoire is more than three, less than 50, understanding is progressing rapidly but joining of word units into spontaneous into word phrases is uncommon.	

LANDASAN NEUROLOGIS PADA BAHASA





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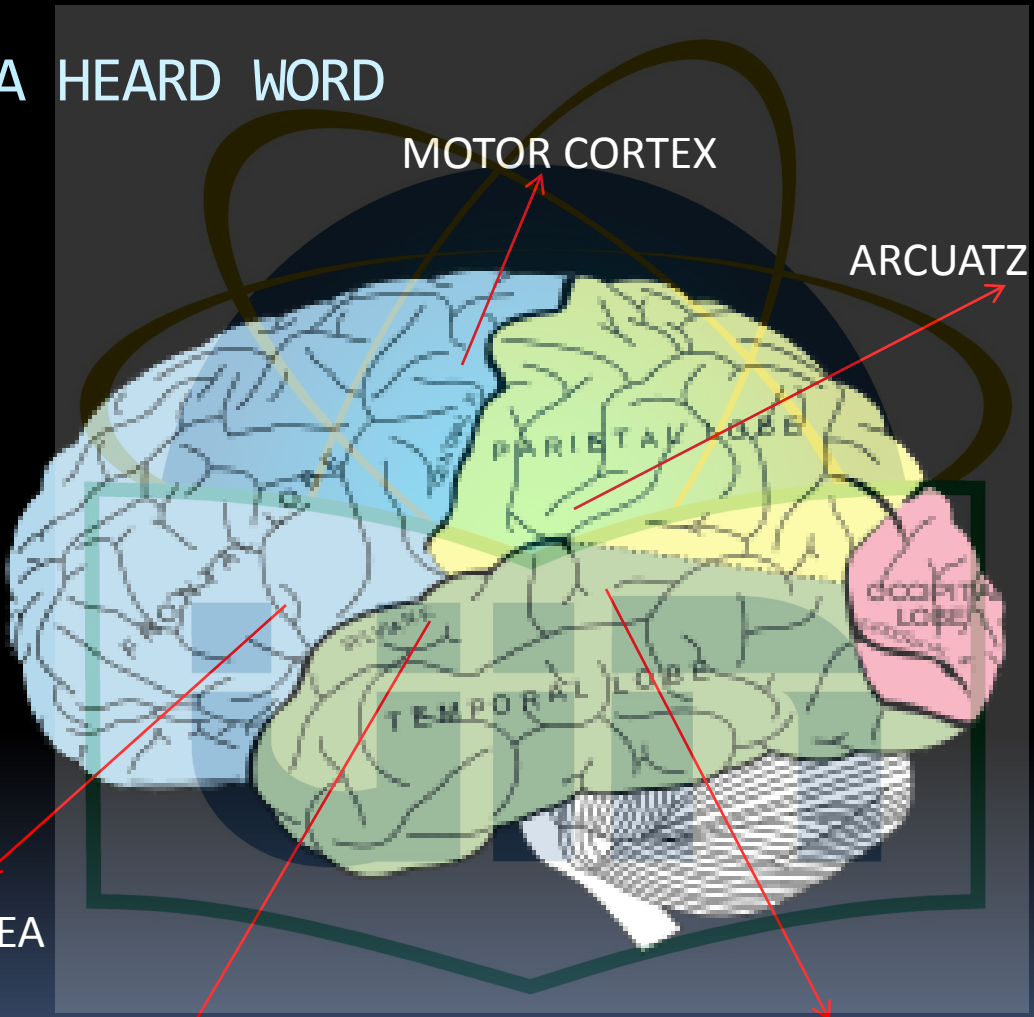
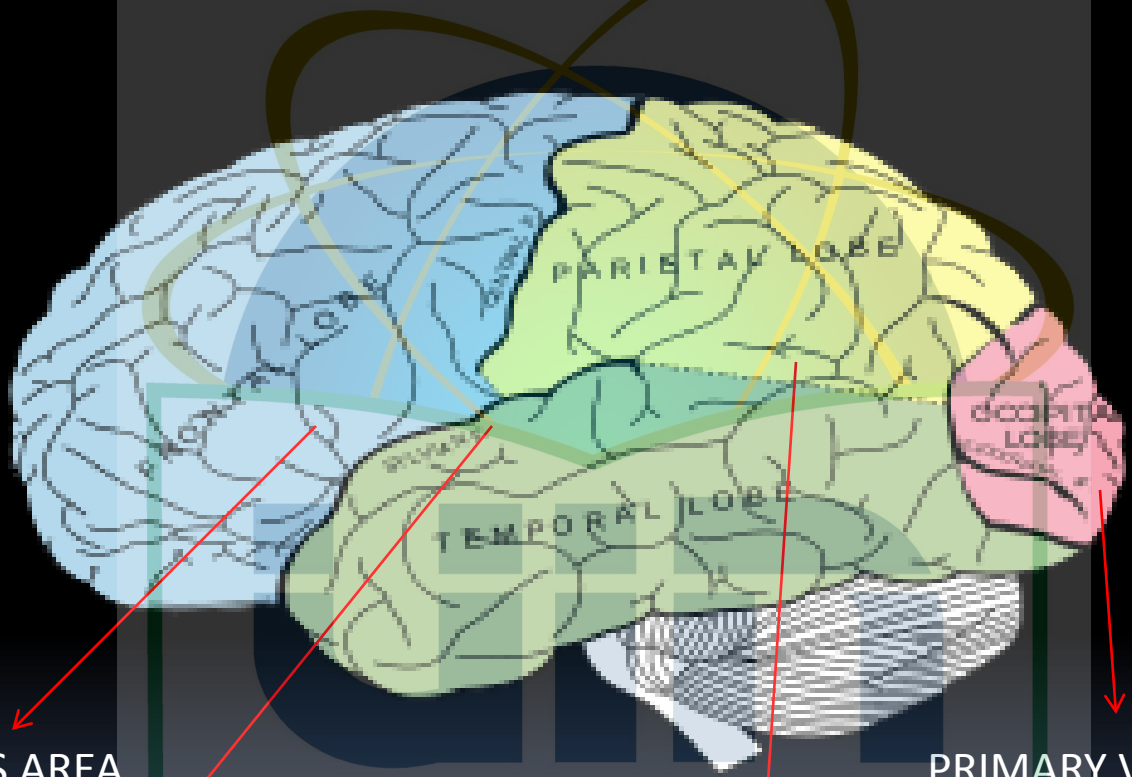


SPEAKING A WRITTEN WORD

MOTOR CORTEX



BROCA'S AREA

PRIMARY AUDITORY AREA

PRIMARY VISUAL AREA

Language damage in the brain

Aphasia

- *Broca's Afasia*
- *Wernicke's Aphasia*
- *Anomic Aphasia*
- *Global Aphasia*
- *Conduction Aphasia*

Disartria (dysarthria)

Agnosia (dementia)

Dyslexia.

Aphasia
language damage in the brain

- Broca's aphasia: non-fluent , agramatic language output caused by brain damage.
- Wernicke's aphasia: fluent but largely meaningless language output cucaused by brain damage.
- Global aphasia: loss of virtually all language abilities as a result of destruction of the perisylvian language area.
- Conduction aphasia: a type of aphasia, first suggested wernicke, characterized by an inability to repeat .

Language damage in the brain

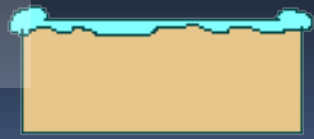
- Dysarthria: a class of disturbances of speech sometimes following brain damage, in which articulation is impaired by paralysis, loss of coordination, or spasticity of the muscles used in speaking.
- Dementia: a gradual deterioration of intelectual ability caused by brain diseases.
- Alexia: impairment of reading ability alone caused by brain damage.
- Dyslexia: a class of disturbance of reading, some of which are acquired, and some of which are developmental.

Kidal dan Kinan

- 99% dari orang kinan memakai hemisfir kiri untuk berbahasa. Demikian juga orang kidal: 75% dari mereka juga memakai hemisfir kiri, meskipun kadar dominasi hemisfir ini tidak sekuat seperti pada orang kinan.

- Kidal atau kinan itu sebetulnya bisa disebabkan dua faktor: Nature (bawaan lahir) atau nurture (pengasuhan). Orang yg kidal karena bawaan lahir, terjadi karena otak kanannya lebih dominan daripada otak kirinya.

- Kidal dapat pula bersifat genetic yang diturunkan. Selain itu kidal dapat disebabkan karena kekurangan pasokan oksigen (O_2) ke otak dalam kandungan. Oleh karena itu bayi kembar akan memiliki peluang menjadi kidal lebih besar. Karena harus berbagi oksigen (O_2) dengan saudarannya.



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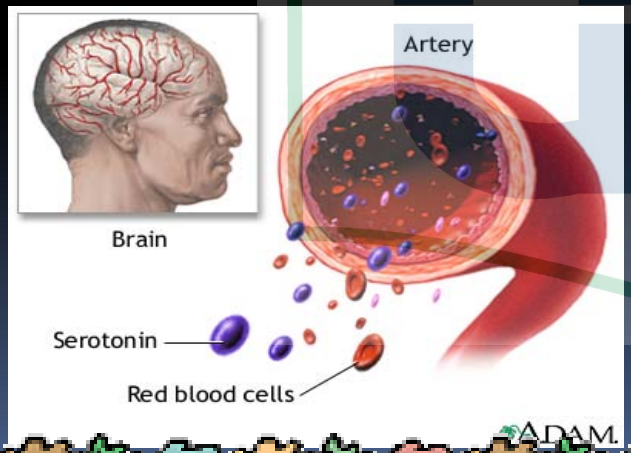

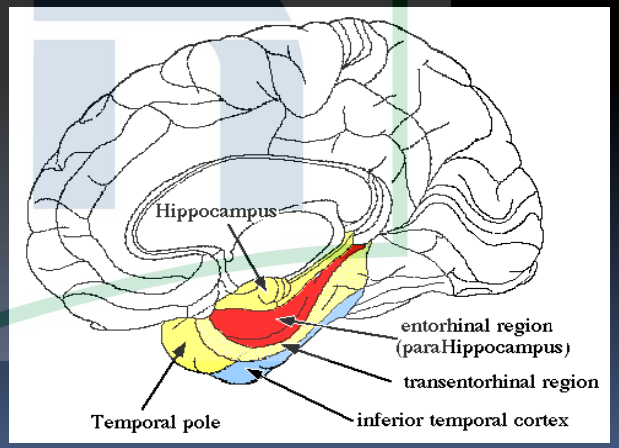

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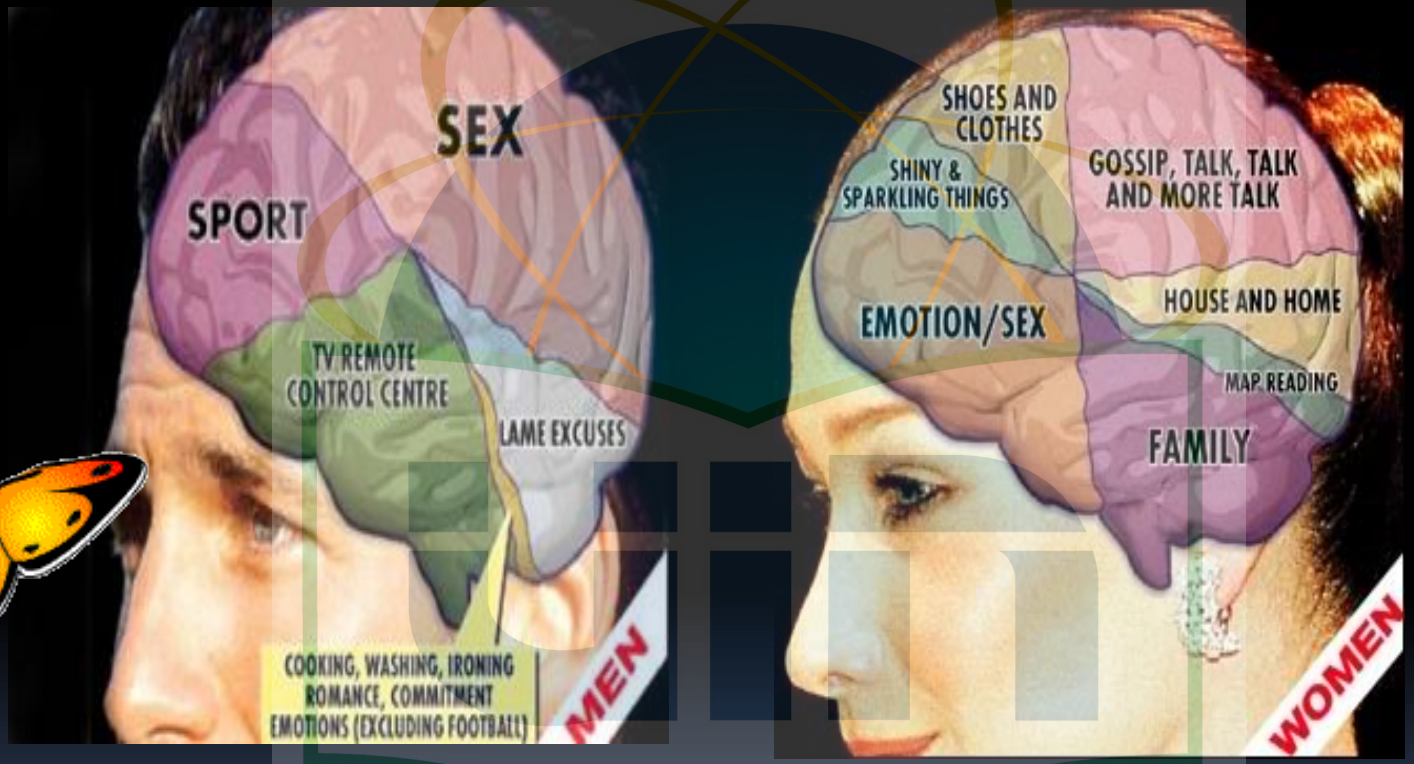

Bahasa Sinyal

Bahasa yang mempergunakan tangan dan jari-jari untuk membentuk kata dan kalimat. Orang yang tuna rungu dapat mempergunakan bahasa sinyal untuk berkomunikasi Karena hemisfir kanan lebih unggul untuk menangani tugas-tugas yang berkaitan dengan desain dan pola-pola visual maka kita mengharapkan hemisfir inilah yang juga mengurusi bahasa sinyal.

Metode Penelitian Otak

- CAT
- MRI
- PET
- ERPs

Chapter III
speech perception

- How speech is produced
  - Places of articulation
  - Manner of articulation
  - Distinctive features
- Models of perception
  - Motor theory of speech perception
  - Analysis –by – synthesis
  - Fuzzy Logical model
  - TRACE model tures

How speech Produced

- Place of articulation: in the production of speech sounds, the part of the vocal tract where the air flow is most constricted. (e.g. bilabial, interdental, etc.)

- Manner of articulation: features of phoneme that specify the way the air stream is obstructed as it travels through the vocal tract in the production of speech sound (e.g. voiced, voiceless, fricative, etc)

Models of Speech perception

- Analysis-by synthesis: a model of speech perception, the listener guesses the possible identify of a speech signal, mentally synthesizes its acoustic characteristics and compare the result to the input signal.

- Motor theory of Speech Perception: the assumption that speech is identified by reference to the motor speech movements that generate speech sound.

Models theory of speech perception

- TRACE Model: a neural network model of speech perception based on a system of processing units called nodes. Nodes exist for phonetics or distinctive features phonemes and words are highly interconnected.

Chapter IV
Words & Meaning

- What is word? Word is a minimal free form
- What is meaning?

- Models of lexical Access:
  - Serial search Models
  - Parallel Access Models:
    - Cohort Model
    - Connectionist Model
    - Logogen Model

Model of Lexical Access:

- Serial search model: a theoretical model of word access that claims items in the lexicon are searched serially or one at a time untill the correct item is found.

- Parallel access Model: a theoretical model of word access that claims that items in the lexicon are activated simultaneously or in parallel in an attempt to find the correct lexical item

Factors influence lexical access

- Frequency
- Imageability and concreteness & abstracness
- Semantics
- Grammatical
- Phonology