

Introduction to English Linguistics

Brain and Language

Modularity and the Human Brain

- different areas of the brain ‘specialize’
- *language* is located in the *left* hemisphere, i.e. the left side of the brain
- usually, the left side of the brain controls the right side of the body and vice versa
- this is called ***contralateral brain function***
- two important areas for language: ***Broca’s area*** and ***Wernicke’s area***
- we will discuss these later under ***Aphasias***

Evidence from Children

- brain lateralization may not be complete at birth
- children with early brain damage to one hemisphere may recover to some extent
- but left hemisphere damage in infants will result in language deficits

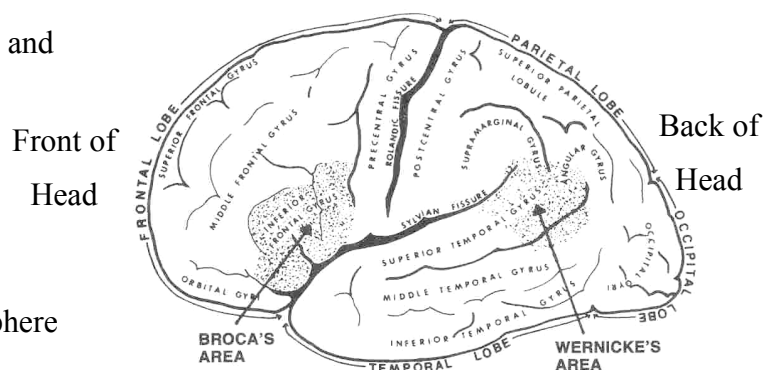


Figure 2.3 Lateral (external) view of the left hemisphere of the human brain, showing the position of Broca's and Wernicke's areas—two key areas of the cortex related to language processing.

(from Fromkin, Rodman & Hyams 2003:37)

Split-Brain Effects

- the link between the two hemispheres of the brain may be severed to treat severe epilepsy and certain other illnesses
- a consequence of this operation is that the two hemispheres no longer communicate
- information received by the right hemisphere, e.g. if something is placed in the left hand, cannot be verbalized
- this information supports the idea of the *modularity of the brain*

Dichotic Listening Tests

- two signals, one given to each ear
- linguistic signals are processed better by the right ear
- non-linguistic auditory signals (e.g. music, noise, etc.) are processed better by the left ear
- demonstrates that the left hemisphere is specialized for processing ***speech***

Aphasias

- Aphasia as evidence of localization of brain function (and, therefore, modularity)
- aphasia is a disorder which affects the brain due to disease or trauma (injury)
- depending on the area which is damaged, different effects may be encountered
- two areas with significant effects on linguistic ability are Broca's area and Wernicke's area, named after two 19th c. medical specialists.

Broca's aphasia

- Individuals with Broca's aphasia have damage to the frontal lobe of the brain
- difficulty in speaking and in finding words, incorrect word order, and in the use of function words like *to, is, and, the*, etc. (= non-fluent aphasia)
- loss of comprehension with complex or ambiguous sentences
- persons with a Broca aphasia can usually understand what words mean, but have trouble performing the motor or output aspects of speech
- other names for this disorder are 'expressive' and 'motor' aphasia

- often aware of the speech difficulties
- often have right-sided weakness or paralysis of the arm and leg because the frontal lobe is also important for body movement

Wernicke's aphasia

- different area of the left hemisphere: damage to the temporal lobe
- different effects: fluent speech with appropriate intonation and pronunciation (= fluent aphasia)
- many lexical errors with the production of nonsense words
- difficulties with comprehension
- may speak in long sentences with no meaning, add unnecessary words, and even create new "words"
- great difficulty understanding speech
- often unaware of their language mistakes
- no obvious physical weakness because the brain injury is not near the parts of the brain that control movement

The Autonomy of Language

- cases of children who have specific language problems (Specific Language Impairment (SLI)) but have normal intelligence
- shows that language ability is independent of general intelligence
- the alternative is also possible: children with mental retardation may have normal language ability
- examples of "Laura" and "Christopher" in the book
- Christopher is a language *savant* – mentally retarded in other ways but with a special language ability

Language and Brain Development

The Critical Period

- children start to learn language at birth
- in fact, there is some evidence that babies begin to acquire intonation patterns of the mother's language before birth, through the vibrations in the womb
- children learn language very quickly during the 'critical period' – from birth until puberty
- after this period it is much more difficult and children deprived of language contact during the critical period never acquire language properly
- there are a number of cases of children deprived of the opportunity to learn language, including the best documented case of Genie, who never properly learned to speak.
- the evidence suggests that the ability to use language must be acquired during the critical period if the speaker is going to develop normal language ability

Language Evolution

- How did language originate? – many theories
- most likely – begins with simple system linked to the development of our brains and speech mechanisms
- language organs are secondary to other functions, such as eating, screaming, hearing sounds, etc.
- the vocal tract had to develop so that it could make a wide range of sounds
- otherwise it would be difficult to have sufficient distinctions to develop a language
- more importantly, the brain had to develop enough to be able to use language
- not necessary to *hear* language to learn to use it - one can learn a sign language as a first language from birth