

“Sensory and motor aspects of speech”

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Ability to communicate each other is present in all living organisms. The most sophisticated form of communication is present in the form of speech.

Speech is defined as that form of human faculty by which thought processes are symbolically expressed as language either as written or verbal .It is brought by the coordinated activity of sensory, motor and psychic center.

The two aspects of speech are

1. Sensory speech
2. Motor speech

1. Sensory aspect of speech

Ability to understand spoken and written word

Steps in understanding a spoken speech

1. Hearing-This needs an intact auditory pathway from ear to the primary auditory cortex
(Broadman's area no. 41,Gyrus of Heschl)
2. Understanding –By auditory psychic area (Broadman's area no. 20, 21)
3. Interpretation and comprehension- By Wernicke's area (Broadman's area no. 22)

Steps in understanding a written word

1. Perception of written word-This needs an intact visual pathway from eyes to visual cortex
(Broad man's area.no17)
2. Interpretation-by visuopsychic areas (Area no.18,19)
3. Generation of ideas in Dejerine's area (Area39) and Wernicke's area (area no22)

Dejerine's area(Area no.39)

Situation: In angular gyrus behind Wernicke's area

Function: Initial processing of visual language. Information from printed words are processed in such a way that they can be conveyed into auditory form of speech in Wernicke's area (internal speech)

Wernicke's area (Area no.22)

Situation: Posterior part of superior gyrus of temporal lobe in the dominant hemisphere

Function: Interprets the meaning of written and spoken words

Somatic, visual and auditory association areas all feed into this area

Applied physiology

Aphasias-Abnormalities of speech that is not due to defect of vision or hearing or motor paralysis. It is commonly due to thrombosis of feeding artery to the affected region.

- **Auditory receptive aphasia (word deafness)**
Inability to understand spoken speech but can understand written speech due to lesion in **auditory Psychic area**
- **Visual receptive aphasia (word blindness or dyslexia)**
Inability to understand written speech but can understand spoken speech due to lesion in Dejerine's area in angular gyrus.
- **Wernicke's aphasia or fluent aphasia or sensory aphasia**
Lesion in Wernicke's area leads to Wernicke's aphasia .
Person can understand spoken and written speech but cannot interpret the thought that is conveyed. He talks fluently that makes little sense.

2. Motor aspects of speech

Ability to write and speak where muscle activity is needed

Coordinated activity of Broca's area, Exner's area and motor cortex helps in motor aspect of speech

Broca's area

Situation: Brodmann's area (44, 45) situated in frontal lobe of dominant hemisphere close to lateral sulcus.

Function: Concerned with **word formation**. Plans and motor patterns of expressing individual words are initiated and executed.

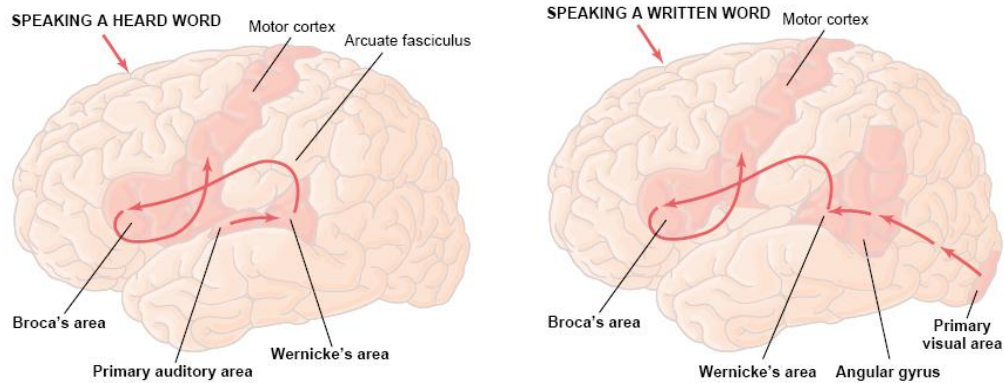
Signals from Wernicke's area are transmitted to Broca's area through a tract known as arcuate fasciculus.

After planning, the information is fed into the motor cortex(primary motor area, area no.4) that controls the muscular activity of larynx, pharynx, mouth and also muscles of respiration.

Exner's area (motor writing center)

Location: middle frontal gyrus in dominant hemisphere anterior to motor cortex

Function: Process the information from Broca's area into detailed and coordinated pattern which then along with motor cortex initiate appropriate movements of hands and fingers to produce written speech.



Applied physiology

Motor aphasia (Broca's aphasia or nonfluent aphasia)

Cause: Lesion in Broca's area

Symptoms:

- Slow speech. Words are hard to come and limited to 2-3 in which the whole meaning and emotion is to be expressed. They know what to speak but cannot.
- Nonfluent speech, often use automatic words
- Inability to write(agraphia)

Dysarthria

Difficulty in spoken speech i.e. imperfect vocalization

Cause: Defect in motor areas (area4, 6, 8) and their connections. So muscles for expressing speech cannot be used effectively

Response of patients with lesion in various areas when a picture of chair is shown

Type of aphasia and site of lesion	Characteristic naming errors
Fluent (Wernicke's area)	"Stool" or "choss"(neologism)
Fluent (areas 40,41 and 42,conduction aphasia)	"Flair..... no swair.....tair
Anomic(angular gyrus)	"I know what it is ...I have a lot of them
Non fluent (Broca's area)	"Tssair"

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