

# Speech and Language

- It is the highest function of the nervous system
- Involves understanding of spoken & printed words
- It is the ability to express ideas in speech & writing

## Types of speech

### 1. Spoken speech:

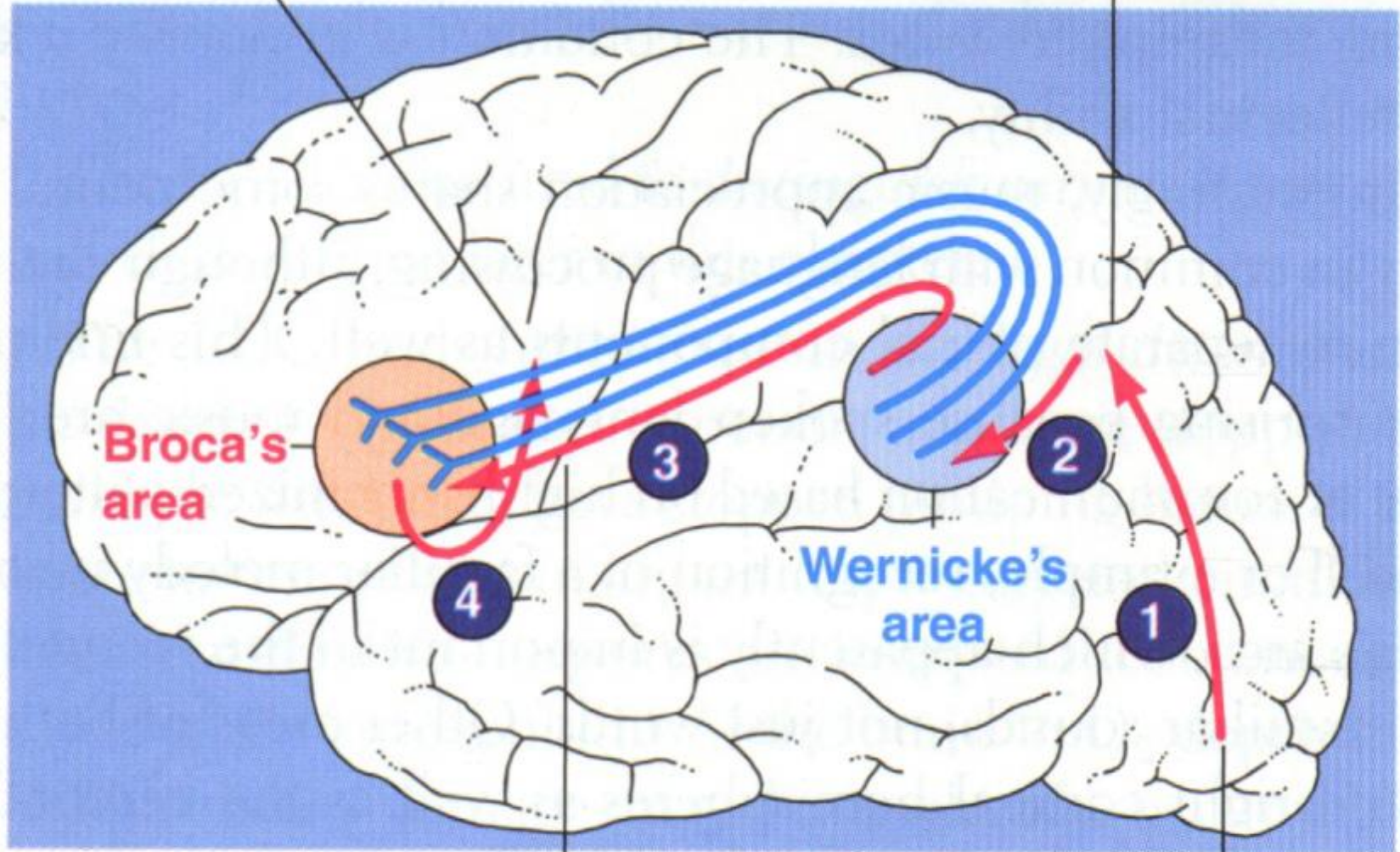
→ understanding spoken words & expressing ideas in speech

### 2. Written speech:

→ understanding written words and expressing ideas in writing

Facial area of motor cortex

Angular gyrus of parietal-temporal-occipital association cortex



Broca's area

Wernicke's area

Bundle of interconnecting fibers

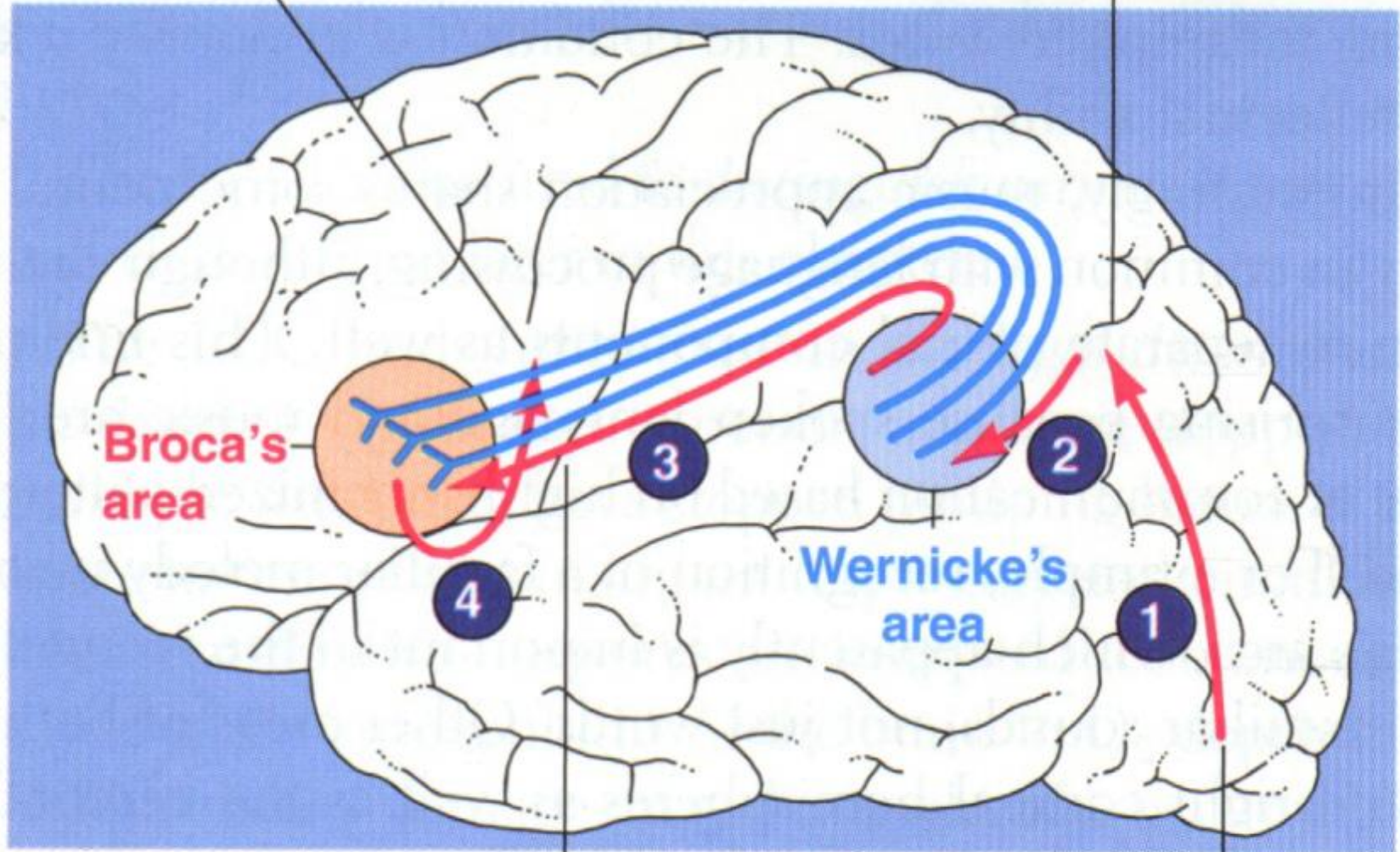
Visual cortex

# Areas involved

- 1- Wernicke`s area:
- At the posterior end of the superior temporal gyrus
- Closely associated with 1 & 2 auditory areas
- Responsible about comprehension of auditory & visual information, then project it to Broca`s area via arcuat fasciculus

Facial area of motor cortex

Angular gyrus of parietal-temporal-occipital association cortex



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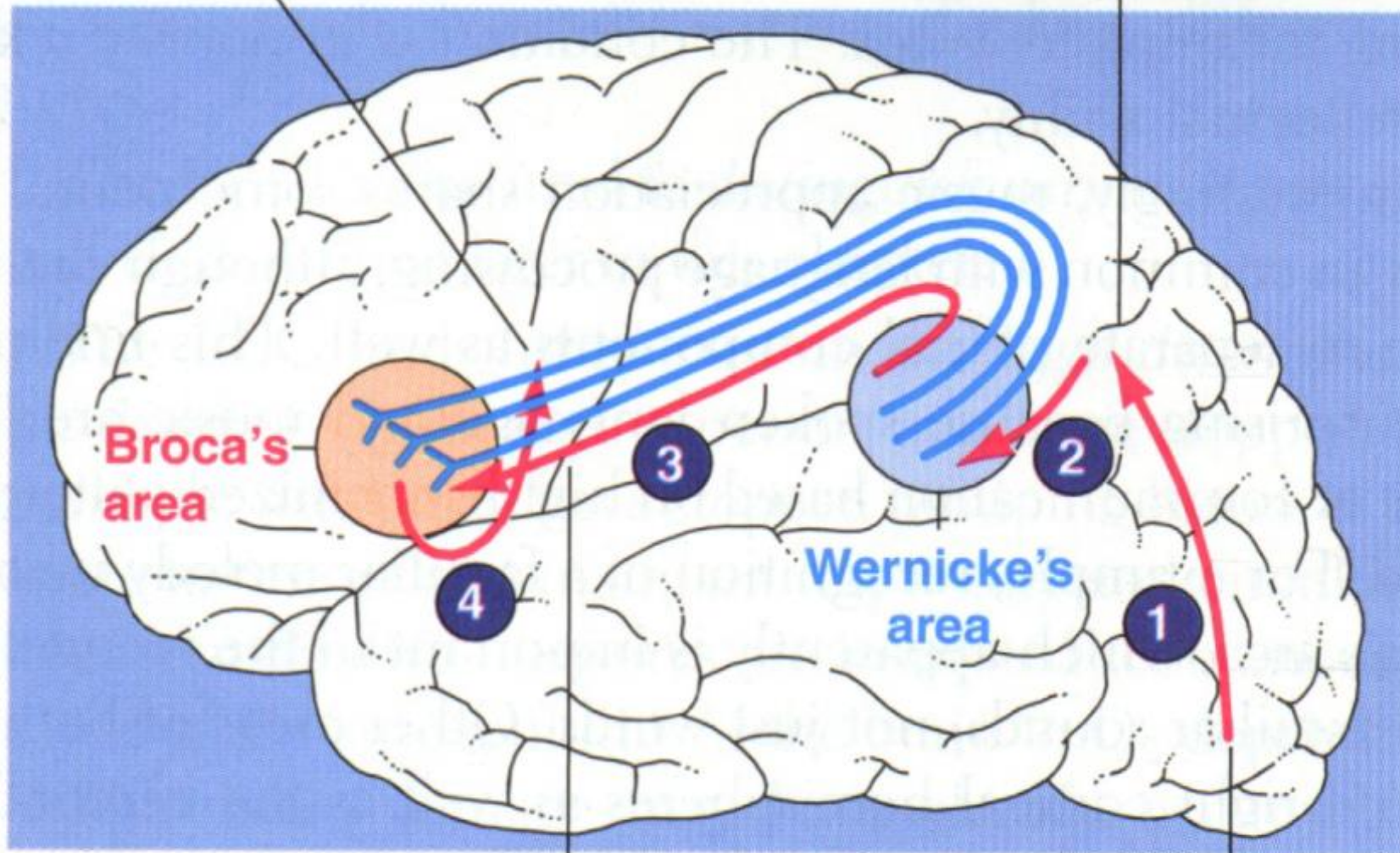
# 1- Wernicke`s area (cont.)

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- Interpretations of sensory experience
- Formation of thought in response to sensory experience
- Choice of words to express thoughts

Facial area of motor cortex

Angular gyrus of parietal-temporal-occipital association cortex



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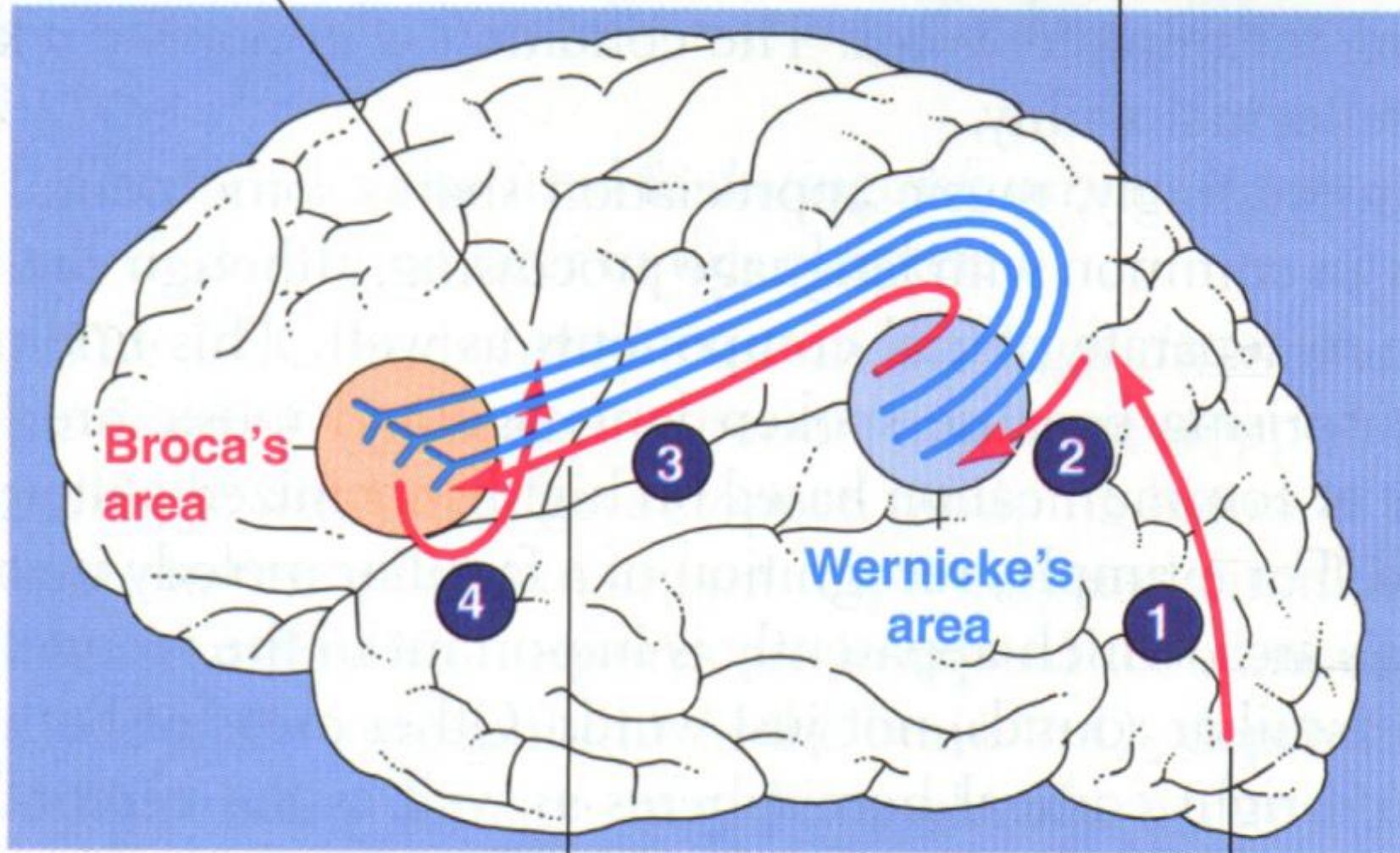
## 2- Broca's area:

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- At the lower end of premotor area
- Process information received from W. area into detailed & co-ordinated pattern for vocalization
- Then project it to motor cortex to initiate the appropriate movement of the lips & larynx to produces speech

Facial area of motor cortex

Angular gyrus of parietal-temporal-occipital association cortex



Broca's area

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## 2- Broca's area (cont.):

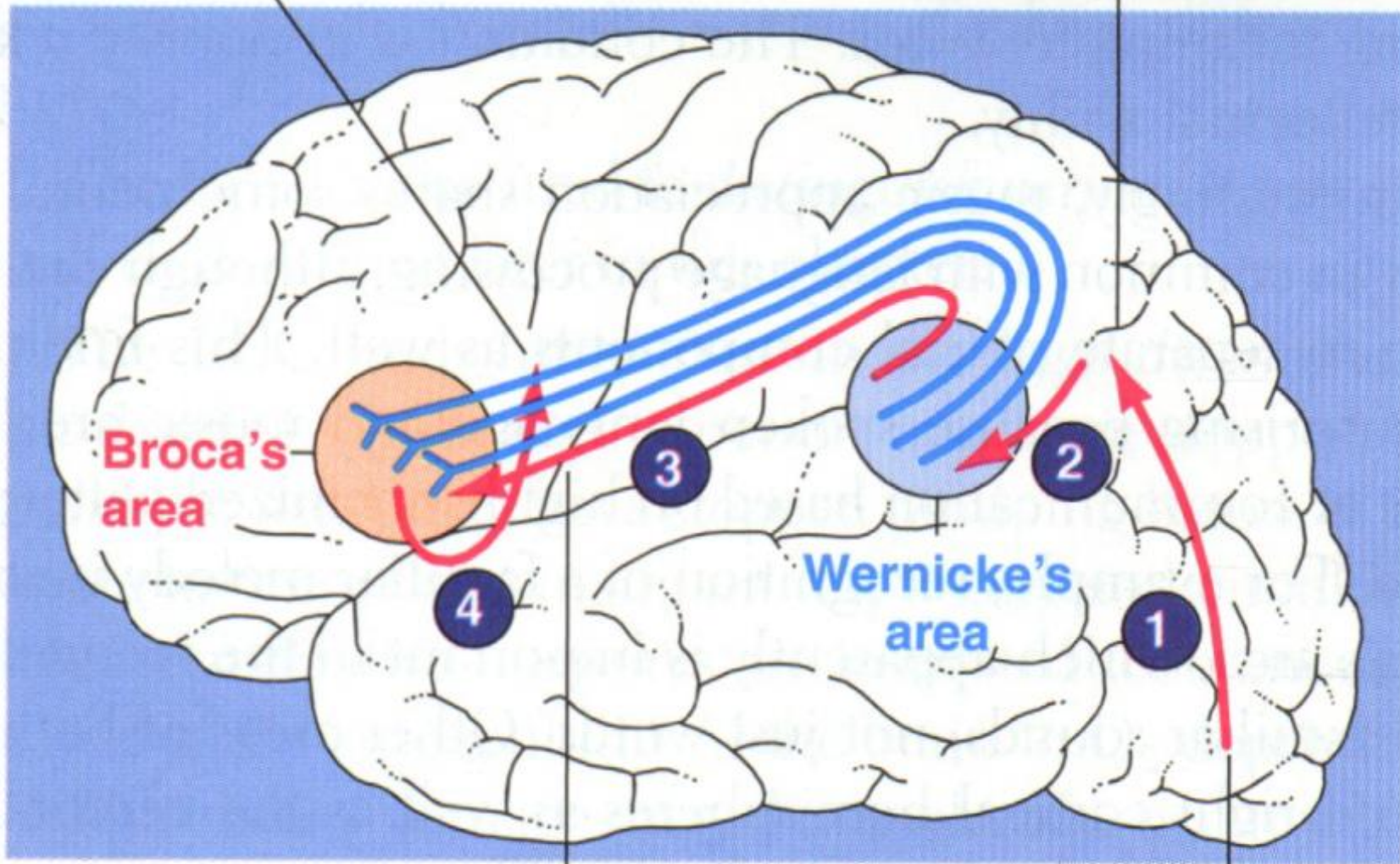
- In adult who learn second language during adulthood. The MRI shows portion of Broca's area concerned with it is adjacent to but separate from area concerned with the native language
- But in children who learn second language early in life there is only single area involved for both languages

# 3- Arcuate fasciculus

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Facial area of motor cortex

Angular gyrus of parietal-temporal-occipital association cortex



Broca's area

Wernicke's area

Bundle of interconnecting fibers

Visual cortex

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- 4- Angular Gyrus

- Lies behind Wernikes area fused posteriorly into the visual cortex

- Function: interpretation of information obtained from reading from visual cortex

- W. area receive information from both auditory & visual areas
- Project it to B. areas via arcuat fasciculus
- Broca`s area process information received into co-ordinated pattern of vocalization & then project that pattern to the motor area
- Initiation of movement of muscle of speech in tongue, larynx & lips

- If writing is concerned, then information received from W. area is processed in the area of hand skills
- >>>>>>>> co-ordinated pattern of muscle movement projected to the arms & hand region of the motor cortex
- >>>>>>>> initiation of necessary muscle movement in the hand & arms required for writing a particular word



- Aphasia
- Abnormality of language function

- Dysarthria:
- Abnormality in articulation (motor dysfunction)
- Due to neurological conditions involving motor function (upper or lower motor neuron lesion)

- Dyscalculia
- Difficulty in learning or comprehending arithmetic and mathematics
- Seen in developmental disorder.



# Aphasia

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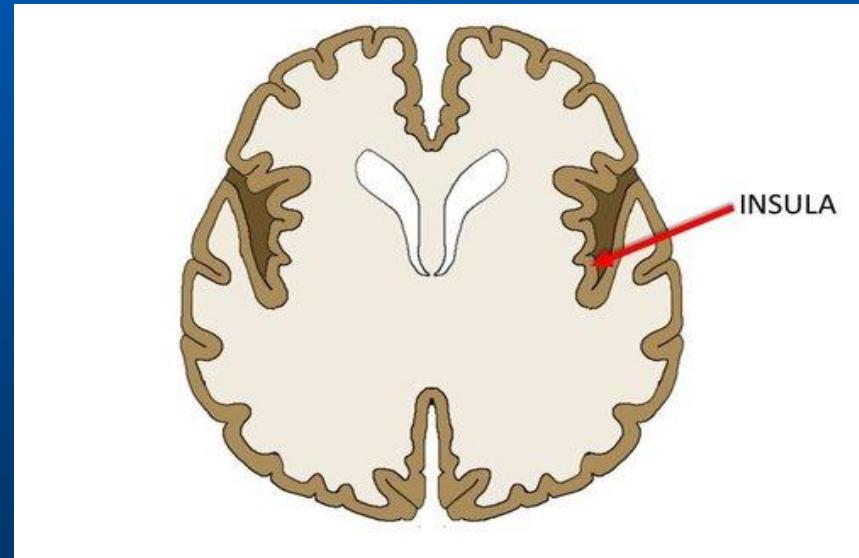
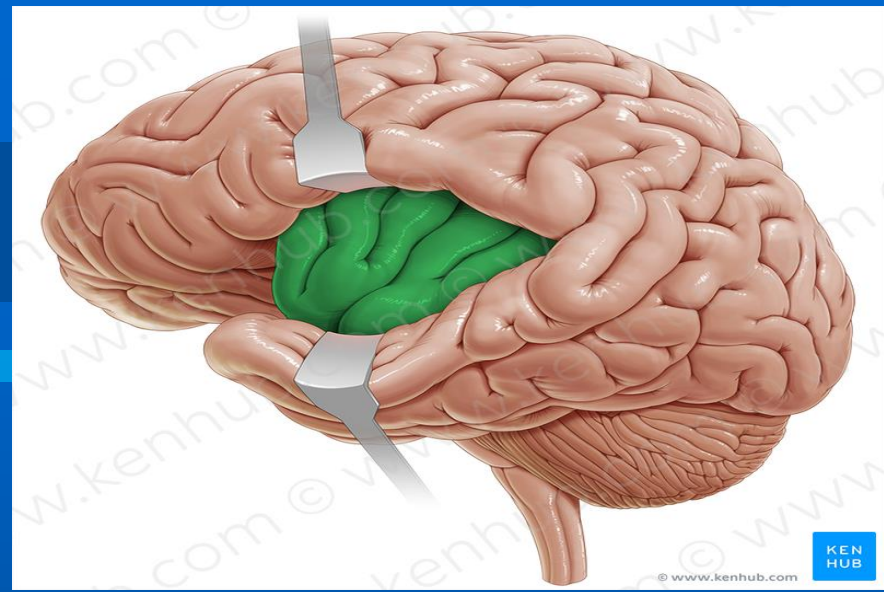
- Abnormality of language function due to injury of language centres in cerebral cortex. Comprehension or expression of words will be affected
- Due to thrombus or embolism of cerebral vessels, trauma

# Types of Aphasia

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# 1- Motor or Broca's aphasia (non fluent):

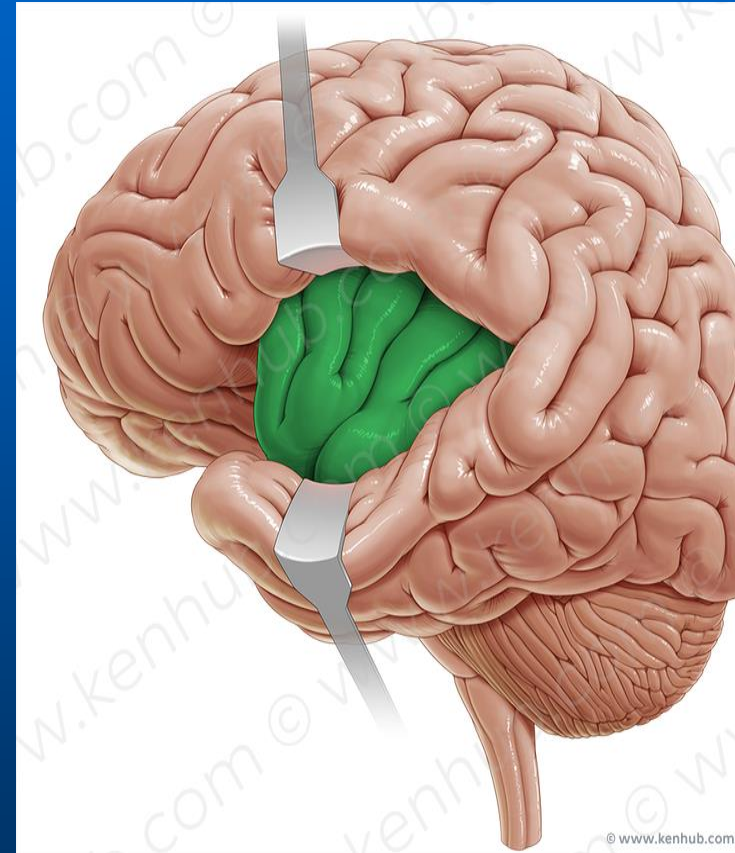
- Lesion of Broca's area
- Patient will understand spoken & written words but find it difficult to speech or to write
- Poorly articulated speech, slow with great effort & abnormal rhythm
- In some cases speech may be limited to 2-3 words





- Insula damage:
- Insula is a small region of the cerebral cortex located deep within the lateral sulcus

- Progressive non-fluent aphasia:
  - deterioration of normal language function
  - non fluent + normal comprehension
  - Intact other non-linguistic cognition
- Degenerative disorders
- Atrophy of the left anterior insular cortex



## 2- Sensory or Wernikes aphasia (fluent):

- Lesion of wernikes area +/- arcuate fasucul
- Impaired comprehension
- Loss of intellectual function
- Failure to interprets meaning of written or spoken words
- Meaningless & excessive talk (in sever cases)

### 3- Conductive aphasia (fluent):

- Lesion of nerve fibres of arcuate fasciculus
- Patient understand speech of others but can not repeat it
- Meaningless speech

## 4- Anomic aphasia:

- Lesion of angular gyrus, thus B. & W. are intact
- Speech & auditory comprehension is normal but visual comprehension is abnormal, due to visual information is not processed & not transmitted to W. area
- Dyslexia (word blindness) interruption in the flow of visual experience into W. area from visual area

