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

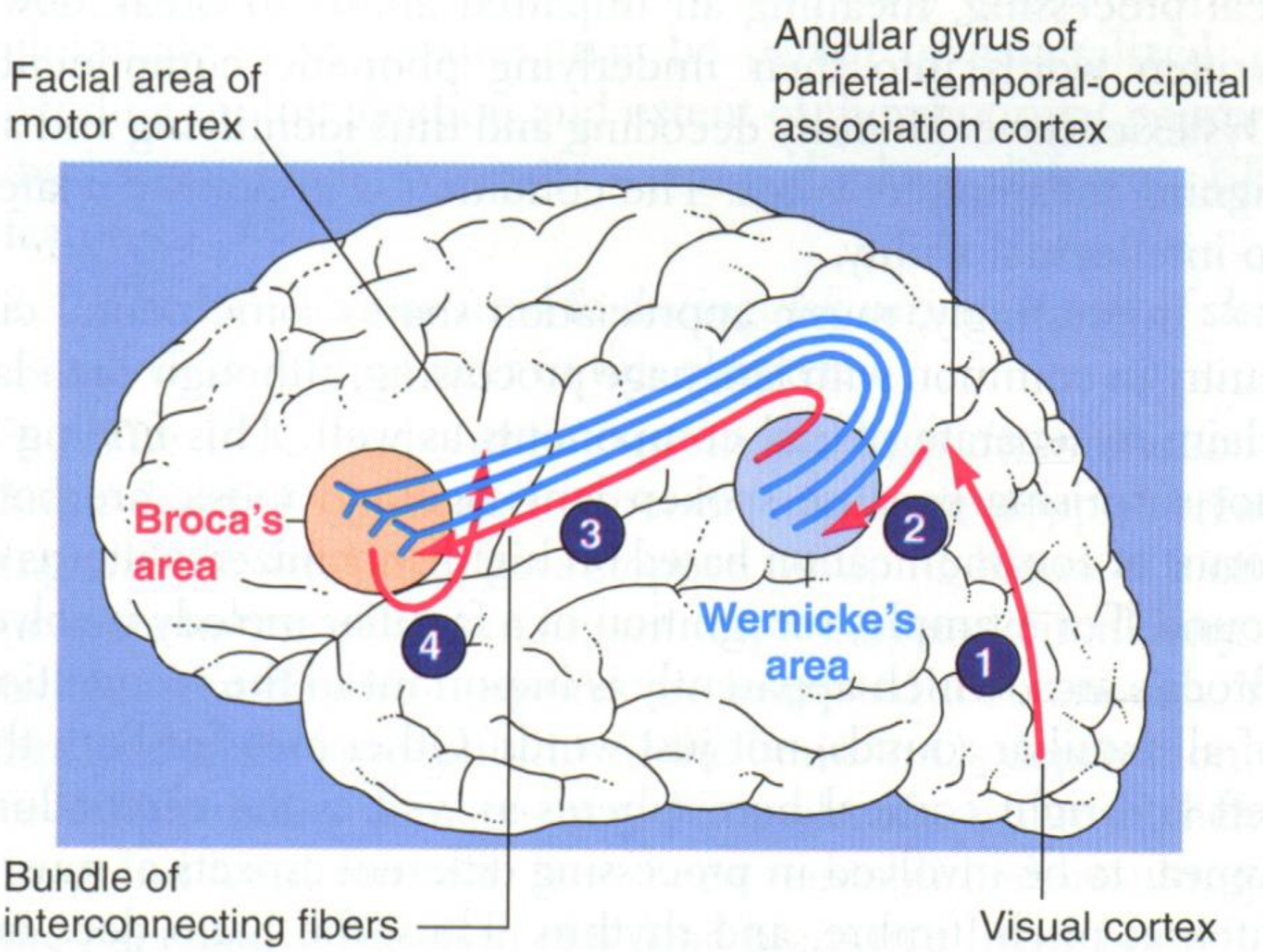
Types of speech

1. Spoken speech:

→understanding spoken words & expressing ideas in speech

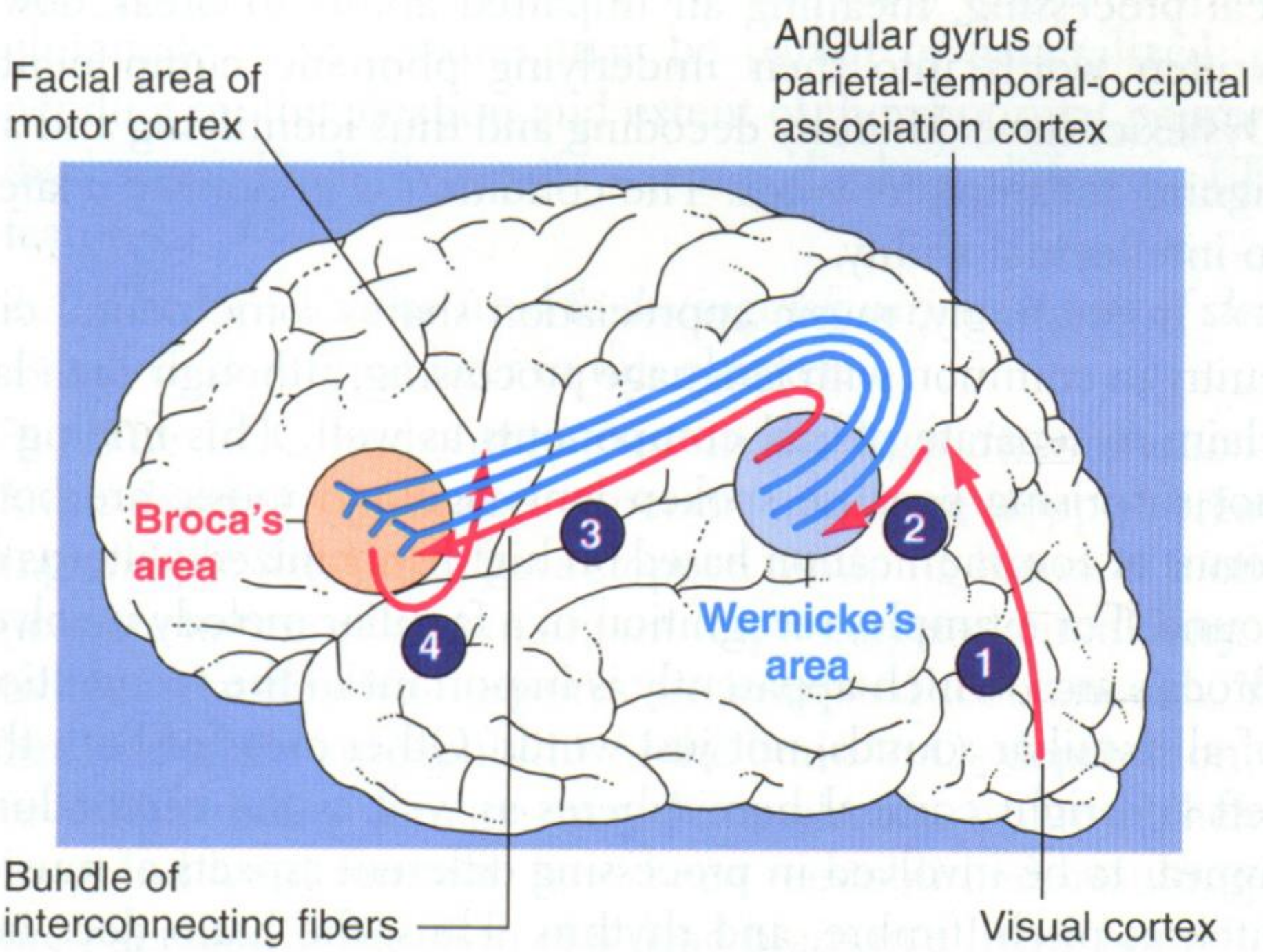
2. Written speech:

→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
1
2
3
4
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 fasiculus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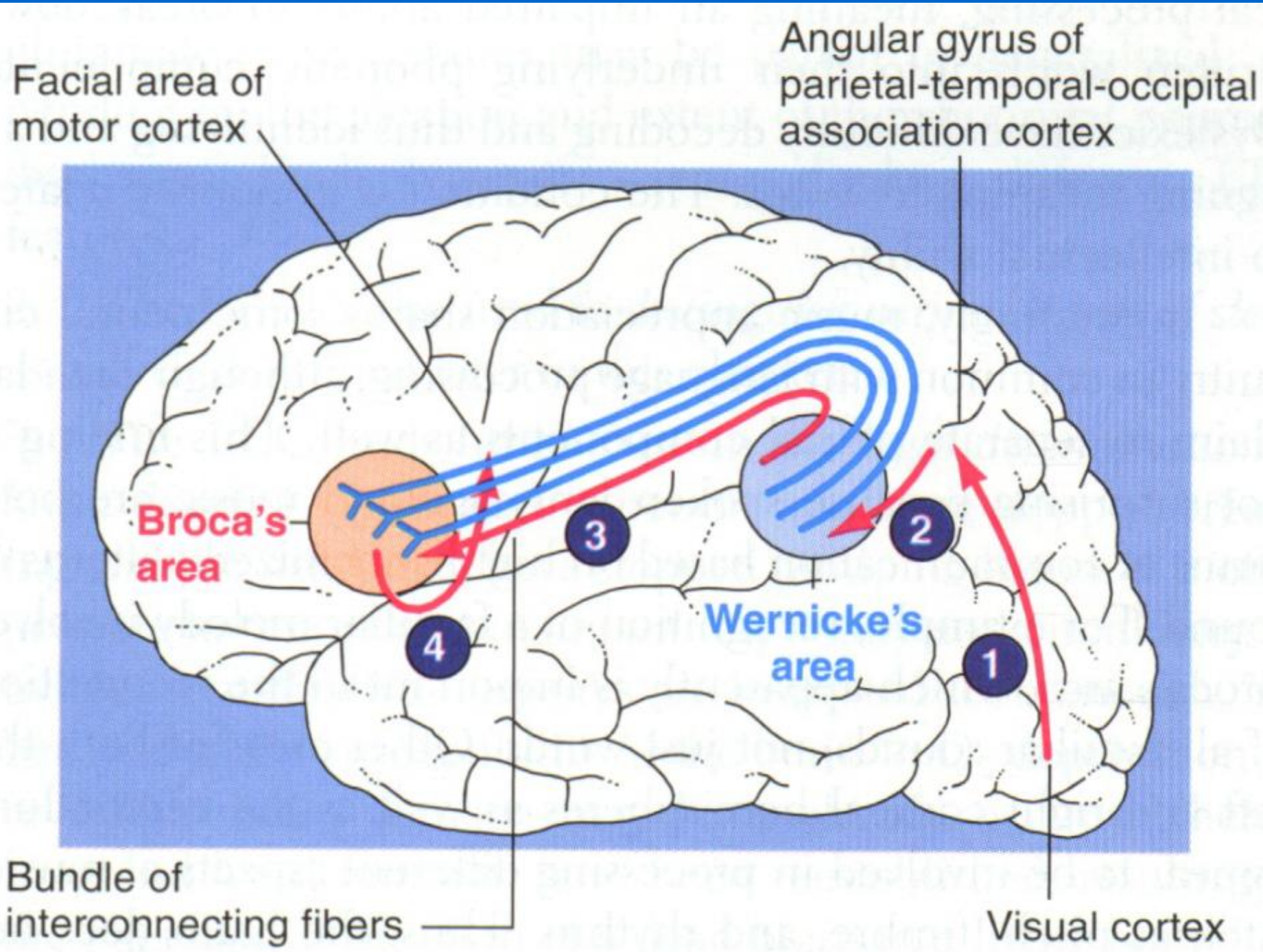
1- Wernicke`s area (cont.)

- Interpretations of sensory experience
- Formation of thought in response to sensory experience
- Choice of words to express thoughts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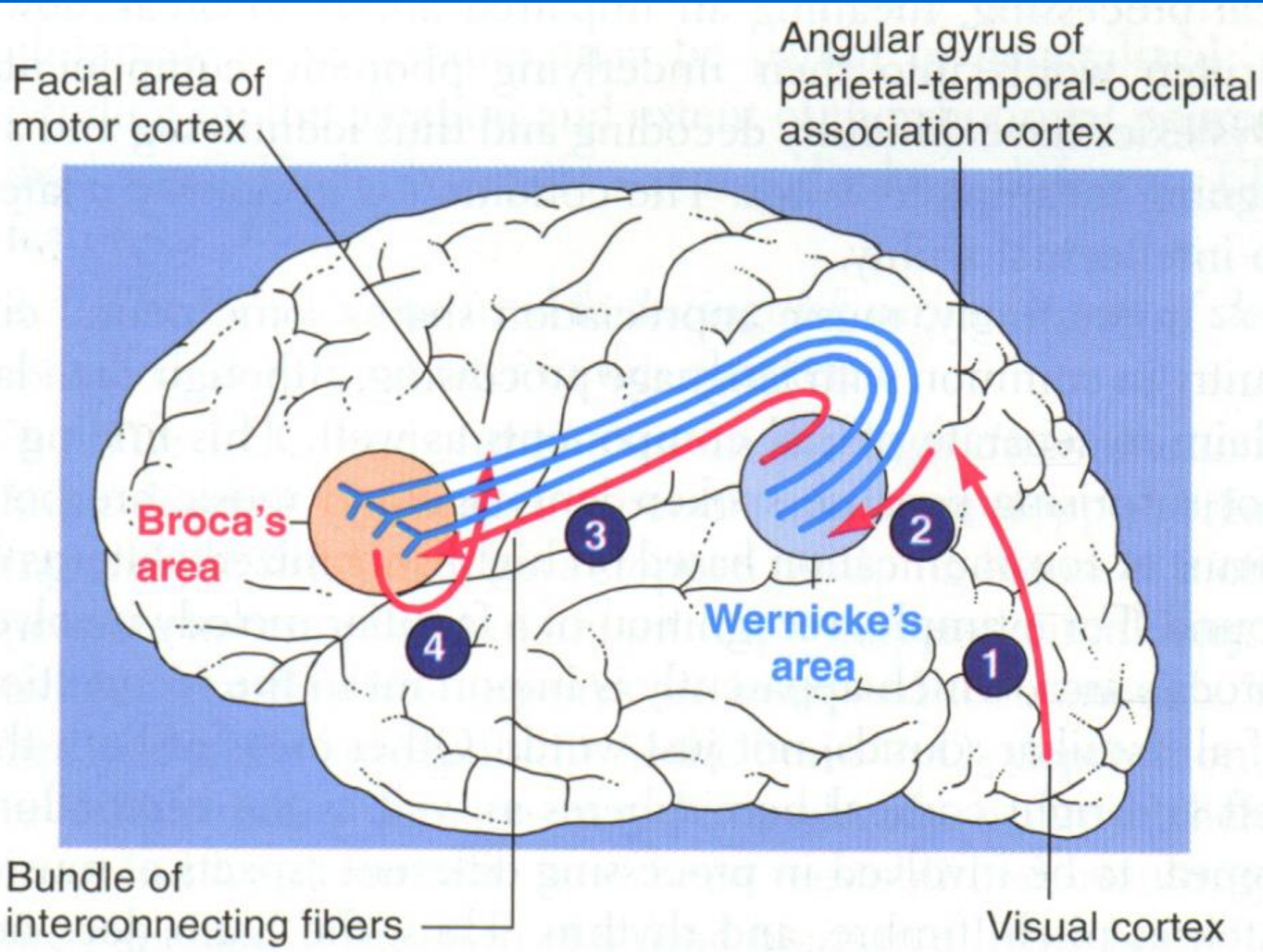
2- Broca`s area:

- 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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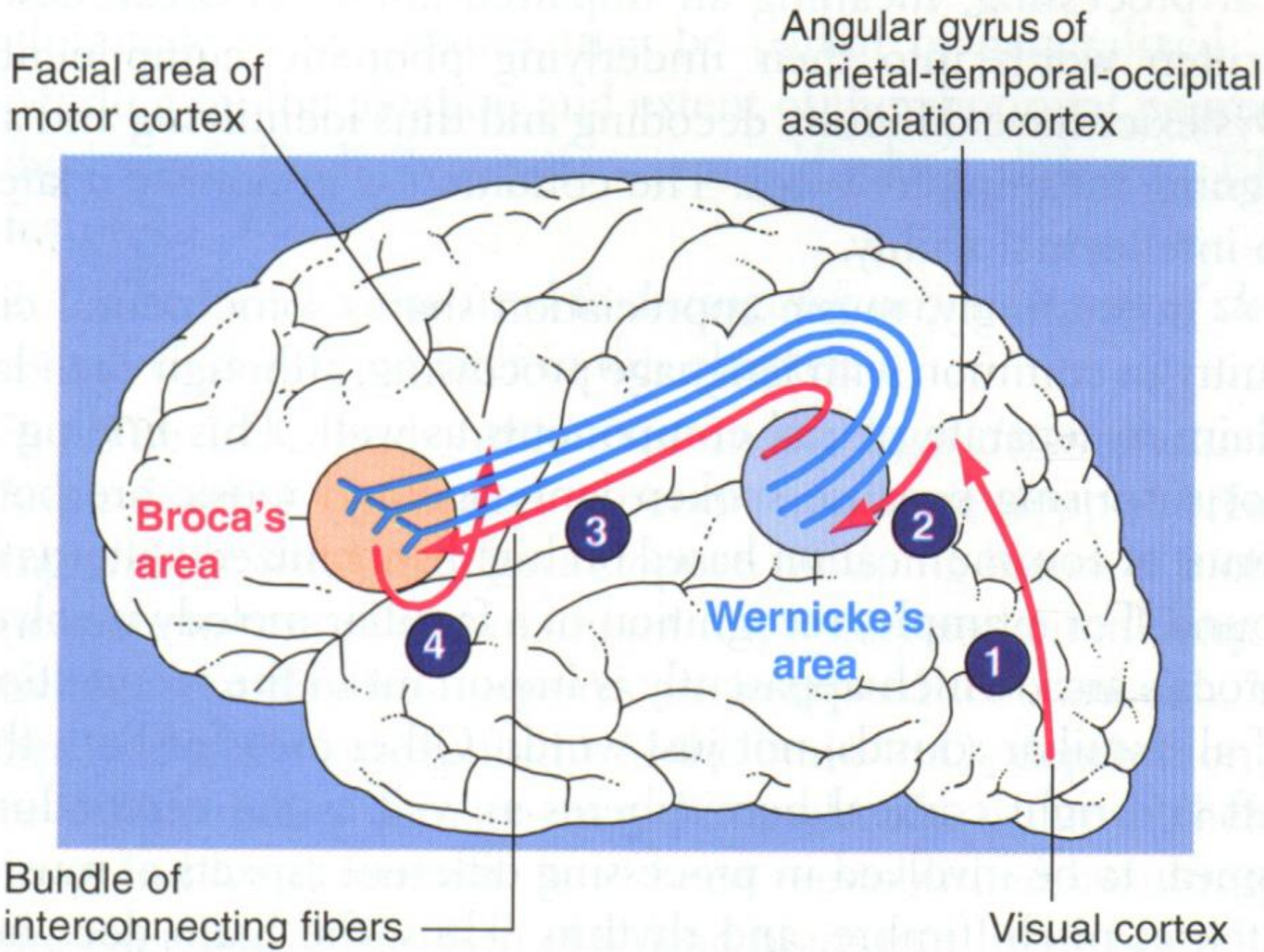
2- Broca`s area (cont.):

- 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 fasiculus

connect Broca's area and Wernicke's area.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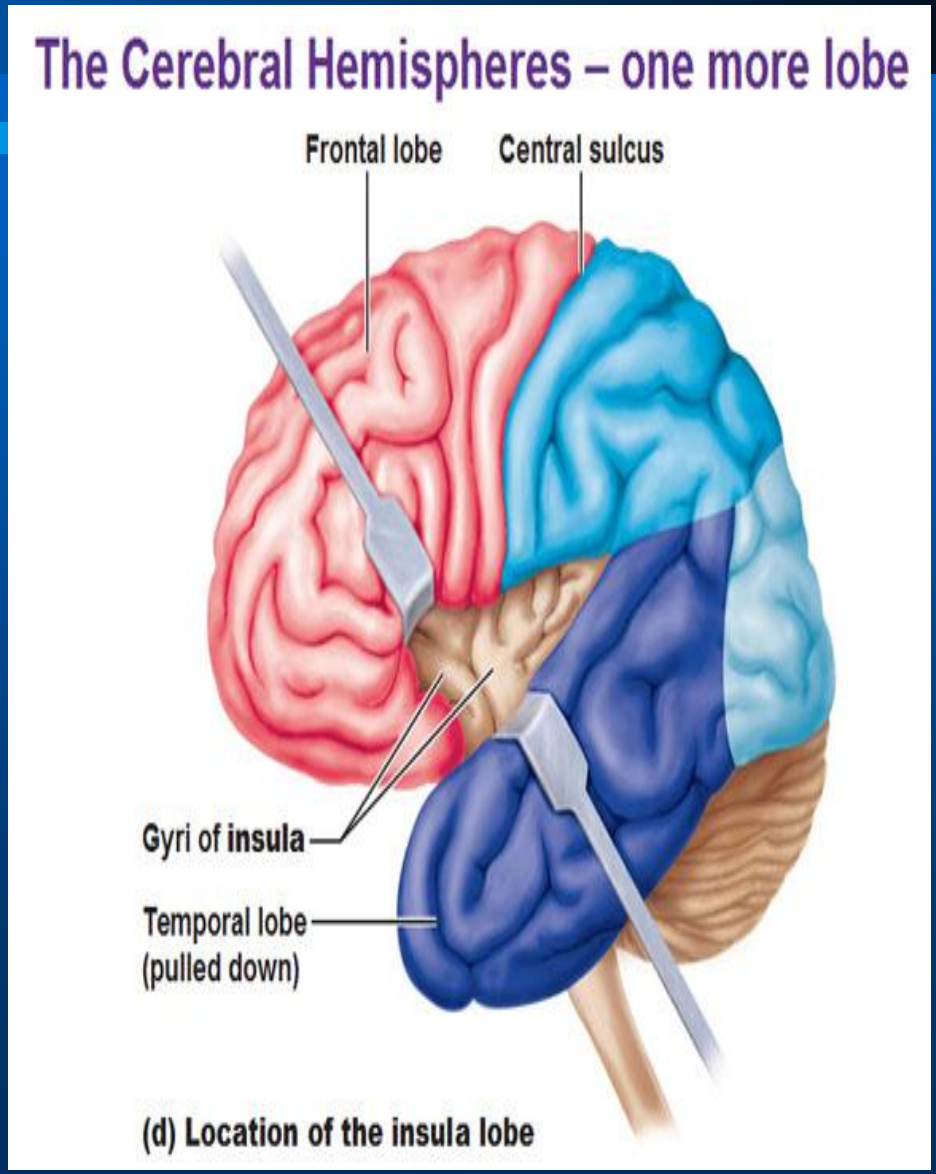
- 4- Agular Gyrus
- Leis behind Wernikes area fused posteriorly into the visual cortex
- Function: interpretation of information obtained from reading from visual cortex

Insula

- is a portion of the cerebral cortex folded deep within the lateral sulcus
- Hand and eye motor function



- W. area receive information from both auditory & visual areas
- Project it to B. areas via arcuat fasiculus
- 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

- 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

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:

- Progressive non-fluent aphasia:
- deterioration of normal language function
- non fluent + normasl comprehesion
- Intact other non-linguistic cognition

- Degdegenerative 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 fasiculus
- Patient understand speech of others but can not repeat it
- Meaningless speech

4- Anomic aphasia:

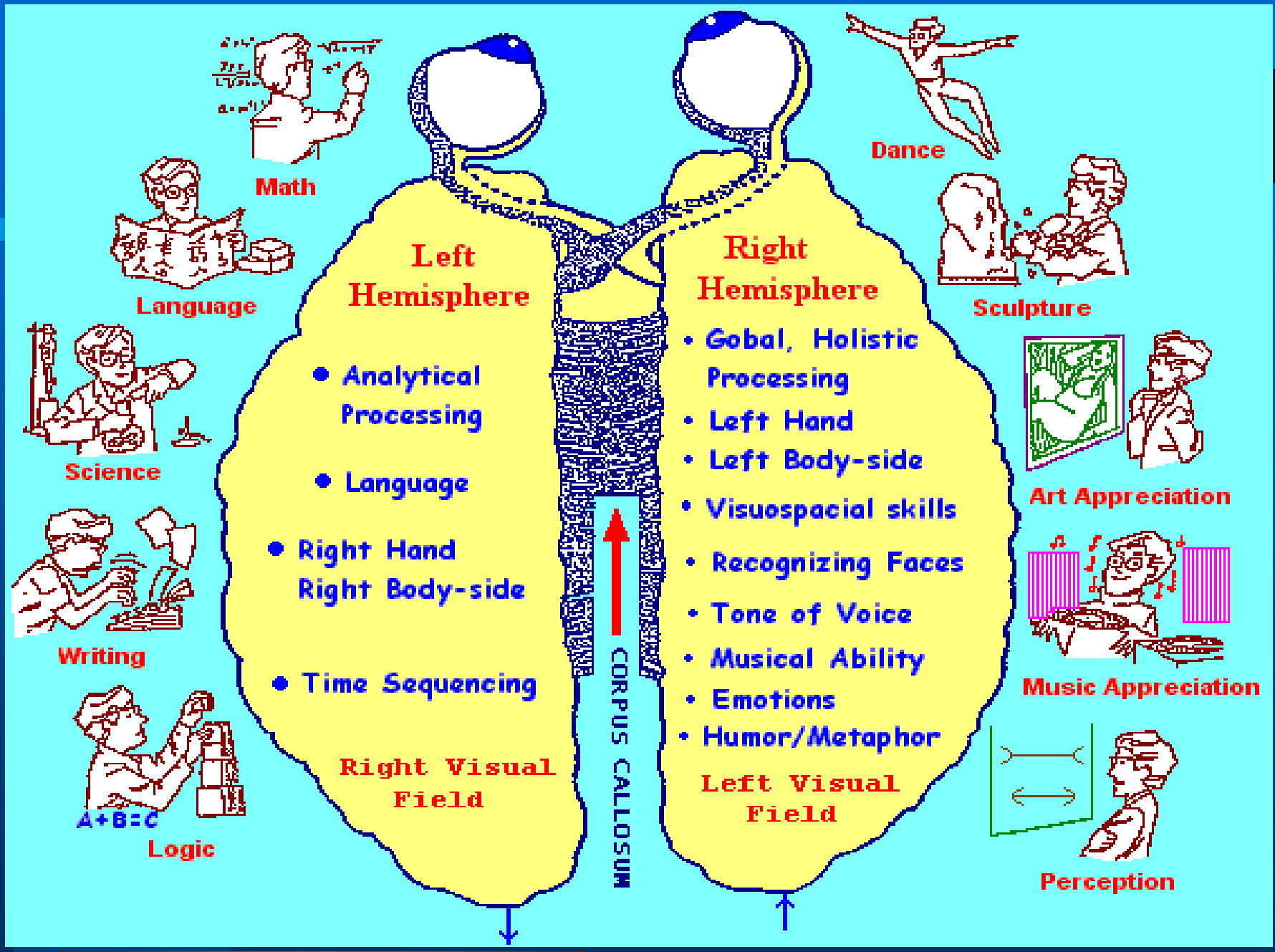
- Lesion of angular gyrus, thus B. & W. are intact
- Speech & auditory comprehension is normal but visual comprehension is abnormal, due to visual information is not processed & not transmitted to W. area
- Dyslexia (word blindness) interruption in the flow of visual experience into W. area from visual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

Right Hemisphere (the representational hemisphere)

- The right hemisphere controls the left side of the body
- Temporal and spatial relationships
- Analyzing nonverbal information
- Communicating emotion
- recognition of emotion
- Recognition of tunes, rhythms
- Holistic problem solving

- Left Hemisphere
- (the categorical hemisphere)
- The left hemisphere controls the right side of the body
- Produce and understand language

- understanding and manipulating language: recognition, use, and understanding of words and symbols
- Speech
- Identification of objects by name
- Mathematics, logic, analysis


Math
Language
Science
Writing
A+B=C
Logic
Dance
Sculpture
Art Appreciation
Music Appreciation
Perception
Left Hemisphere
• Analytical Processing
• Language
• Right Hand Right Body-side
• Time Sequencing
Right Visual Field
CORPUS CALLOSUM
Right Hemisphere
• Gobal, Holistic Processing
• Left Hand
• Left Body-side
• Visuospacial skills
• Recognizing Faces
• Tone of Voice
• Musical Ability
• Emotions
• Humor/Metaphor
Left Visual Field