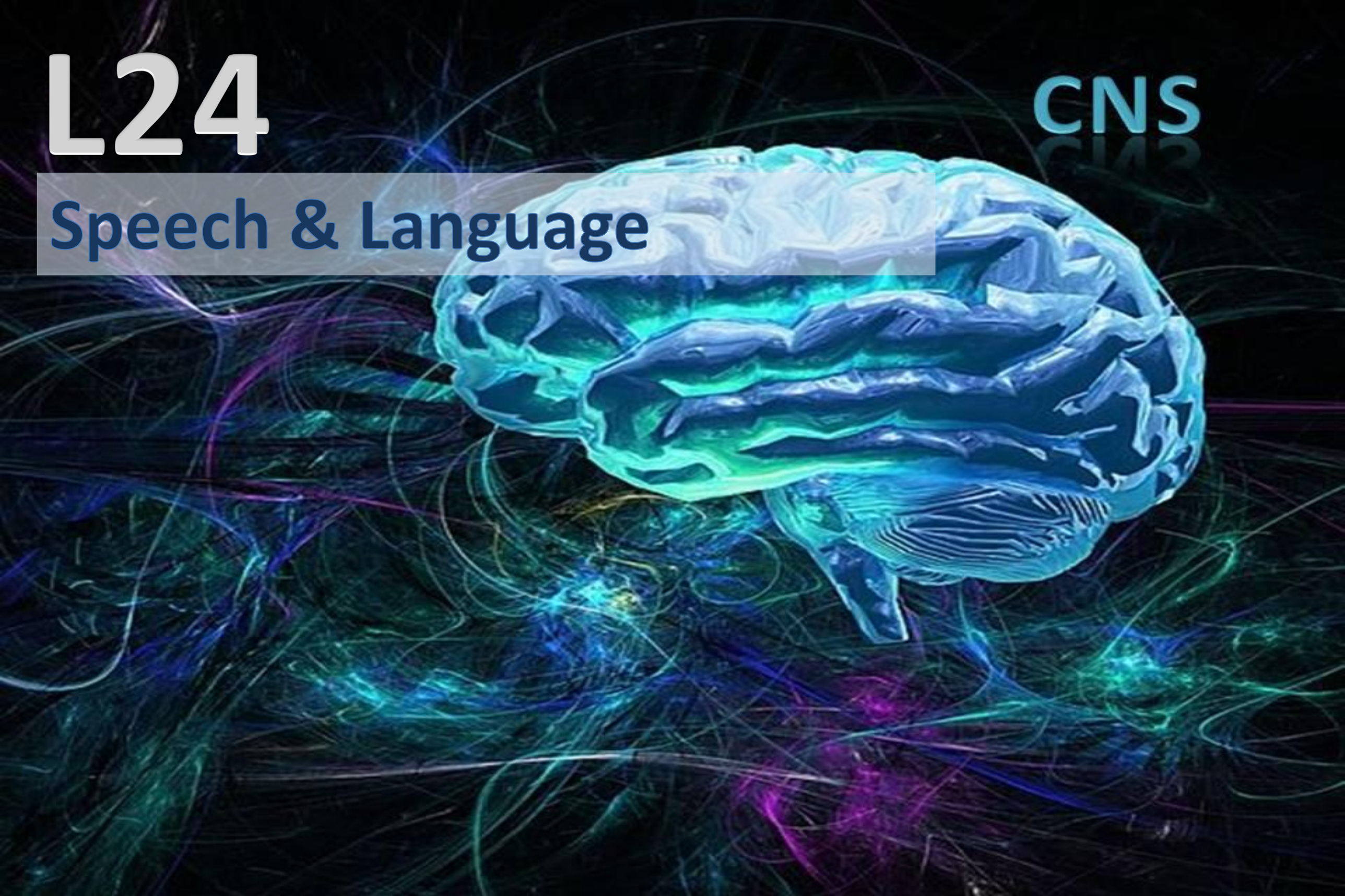
L24

CNS

Speech & Language



Objectives

- First; Describe brain speech areas as Broca's, Wernicke's and insula
- Second;Explain sequence of events in speech production
- Third; Explain speech disorders as aphasia with its types, dysarthria, and acalculia
- Fourth; Explain difference between aphasia and dysarthria.

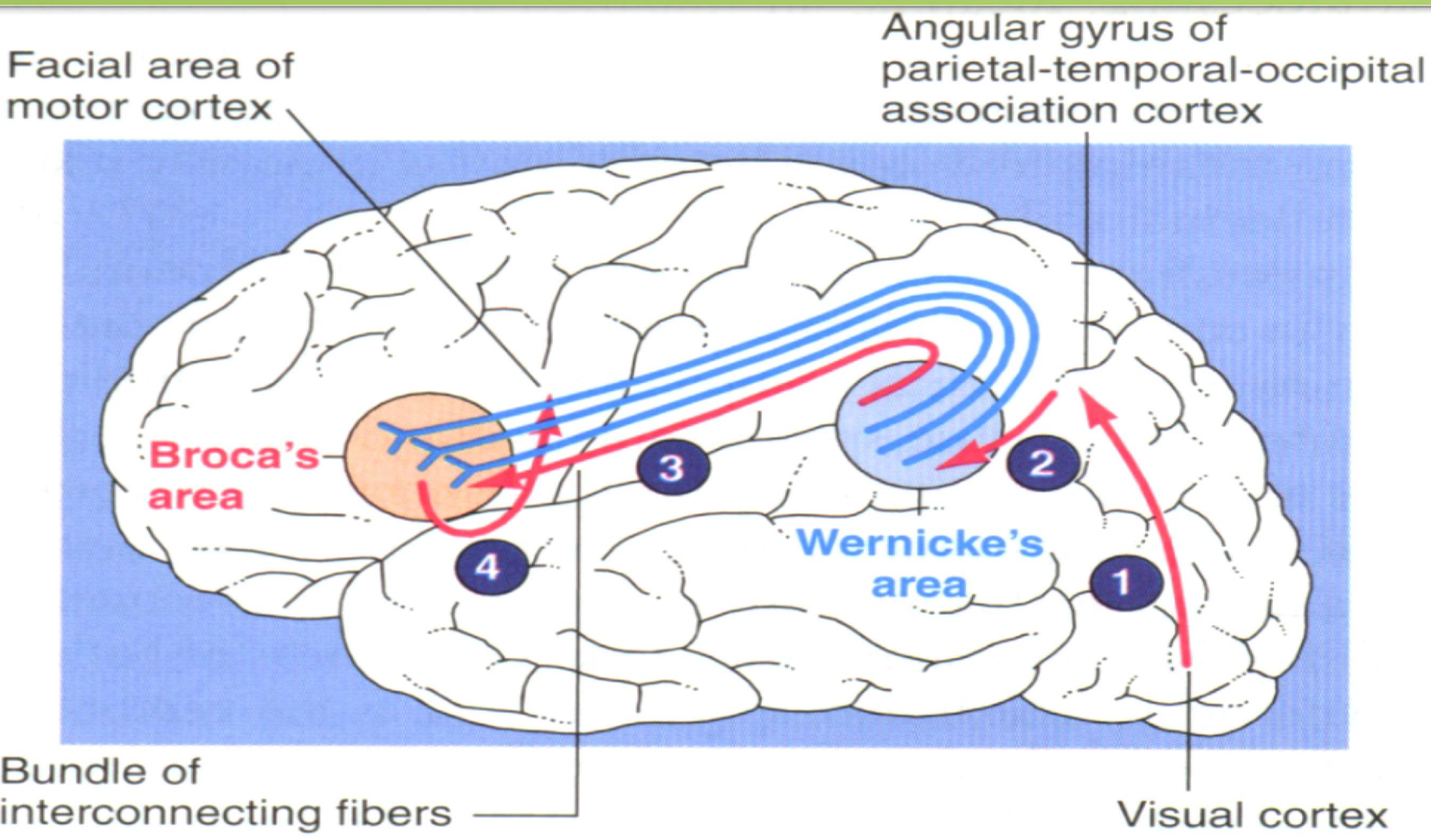
References

Females slide & Guyton

Definitions

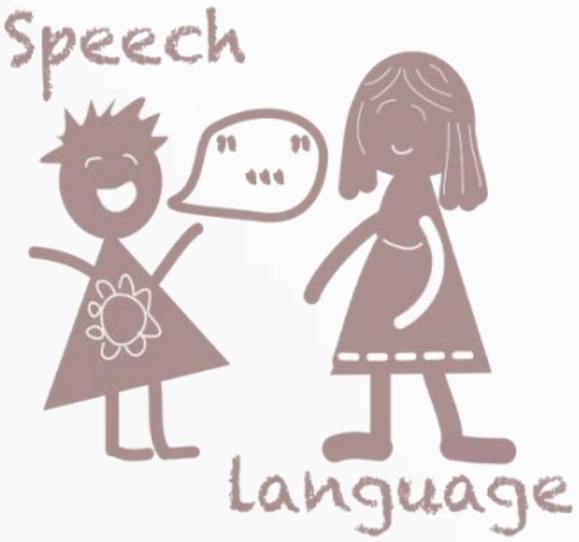
Aphasia	Partial or total loss of the ability to articulate ideas or comprehend spoken or written language, resulting from damage to the brain caused by injury or disease.
Dyslexia	word blindness
Dysarthria	Difficulty in articulating words, caused by impairment of the muscles used in speech

All the lecture is about understanding this Image, so it will be easy if you put it in mind throughout this lecture :)



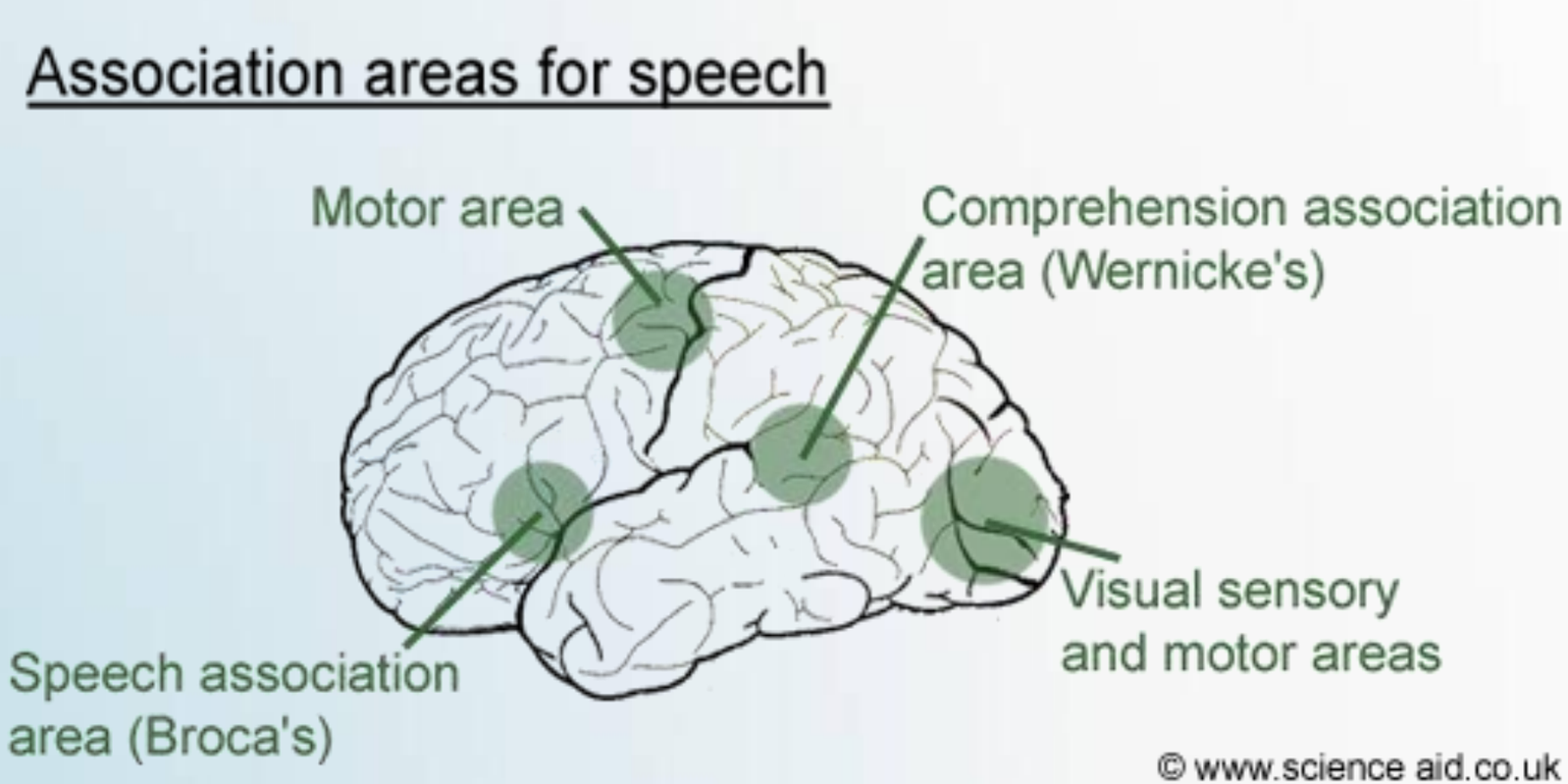
Before starting we should know the following about speech and language :

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



First: Areas involved in speech and language

1. Agular Gyrus
2. Wernicke`s area
3. Arcuate fasiculus
4. Broca`s area

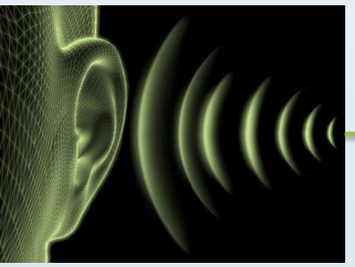


First: Areas involved in speech and language

Area		Wernicke`s area	Broca`s area	Arcuate fasciculus	Angular Gyrus
Location	Lobe	**posterior end of the superior temporal gyrus**	**the lower end of premotor area in frontal lobe**	Bundle of axons **connecting Wernicke`s area with Broca`s area**	**Inferior portion of the posterior parietal lobe**
	Association	Closely associated with 1 & 2 auditory areas			fused posteriorly into the visual cortex of occipital lobe
Responsible about; Function		1. comprehension of auditory & visual information 2. Interpretations of sensory experience → Formation of thought in response to sensory experience 3. Choice of words to express thoughts	1. Process information received from Wernicke's area into detailed 2. co-ordinated pattern for vocalization 3. initiate the appropriate movement of the lips & larynx to produces speech by projections to motor cortex.	Conduction between the two areas	interpretation of information obtained **from reading through visual cortex**

Extra-information: Children who learned more than one language early in their lives have both languages in one Broca's area. But who learned more than one language in further ages such as puberty they have more than one Broca's areas "one for each language.

Second: Mechanism of speech



auditory area

2- Wernicke`s area

3- Arcuate fasciculus

4- Broca`s area

If spoken words (Speech)

Broca`s area process information received into co-ordinated pattern of vocalization & then project that pattern to the motor area

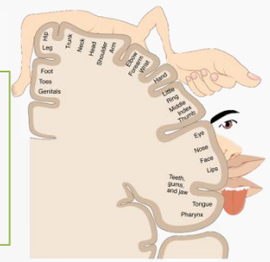
Initiation of movement of muscle of speech in tongue, larynx & lips.

If writing is concerned

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



Visual area

1- Angular Gyrus

Third: Explain speech disorders

Aphasia

- **Definition**
  - Abnormality of language function due to injury of language centres in cerebral cortex. Will effect:
    - Comprehension
    - expression of words
- **Causes**
  - thrombus
  - embolism
  - Stroke in cerebral vessels
  - trauma
- **Types**
  - Motor or Broca`s aphasia (non fluent)
  - Sensory or Wernikes aphasia (fluent)
  - Conductive aphasia (fluent)
  - Anomic aphasia

-phasia	suffix meaning "speech, utterance”
Dysphasia	Impairment of speech and verbal comprehension
Aphasia	Partial or total loss of the ability to speak
-arthria	suffix meaning a '(specified) condition involving the ability to articulate *
Dysarthria	Difficulty in articulating words

*articulate: the ability to speak fluently and coherently

TYPE		Motor or Broca`s aphasia (non fluent)	Sensory or Wernikes aphasia (fluent)	Conductive aphasia (fluent)	Anomic aphasia
Affected area		Broca`s area	1. Lesion of wernikes area With or without arcuate fasciculus	Nerve fibres of arcuate fasciculus	Angular gyrus
Patient status	Understanding	will understand spoken & written words	1. Impaired comprehension 2. Loss of intellectual function 3. Failure to interprets meaning of written or spoken words	understand speech of others but can not repeat it (because it won't reach Broca`s area as it is due to the damaged arcuate fasciculus)	visual comprehension is abnormal, due to visual information is not processed & not transmitted to Wernikes area
	Speech	it difficult to speech or to write	Meaningless & excessive talk (in sever cases)	Meaningless speech	Speech & auditory comprehension is normal
features of the spoken words		1. Poorly articulated speech, slow with great effort & abnormal rhythm 2. In some cases speech may be limited to 2-3 words			**Dyslexia** (word blindness) interruption in the flow of visual experience into Wernikes area from visual area
To help you in differentiation		Broca is broke. Speaks broken words. He is also frustrated because he is broke	Wernicke's like What? Wernicke's is all confused. Makes Word salads for a living. (Not broke :P)		
Videos		http://youtu.be/gocIUW3E-go	http://youtu.be/aVhYN7NTIKU		

Fourth: difference between aphasia and dysarthria.

	aphasia	dysarthria
Definition	**Partial or total loss** of the ability to articulate ideas or comprehend spoken or written language	**Difficulty** in articulating words
Cause	from damage to the brain speech areas	by impairment of the muscles used in speech **"Language centres are normal".**

Concept of the dominant hemisphere *

Right Hemisphere representational hemisphere	Left Hemisphere categorical hemisphere
5% of people either both sides develop simultaneously or rarely the right becomes highly developed	95% of people
controls the left side of the body	controls the right side of the body
1. Temporal and spatial relationships (objects and space) 2. Analyzing nonverbal information (body language or emotions) 3. Communicating emotion 4. recognition of emotion 5. Recognition of tunes, rhythms 6. Holistic problem solving (philosophy and spiritual)	1. Produce and understand language 2. understanding and manipulating language: recognition, use, and understanding of words and symbols 3. Speech 4. Identification of objects by name 5. Mathematics, logic, analysis

* Not within the objectives

Summary

Q1	**What are the Areas involved in speech and language ?**	**Q6**	**Where is Broca's area located?**
	1. Agular Gyrus 2. Wernicke`s area 3. Arcuate fasiculus 4. Broca`s area		At the lower end of premotor area of the frontal lobe
Q2	**What** wernicke`s area responsible about?	**Q7**	**what do we call the bundle of axons connecting the Wernicke's area to the Broca's area?**
	• Formation of thought, and choice of words. • comprehension of auditory & visual information		Arcuate fasciculus
Q3	**Where is Wernicke`s area located?**	**Q8**	interpretation of information obtained from reading from visual cortex happen in which area?
	Temporal gyrus		Angular Gyrus
Q4	**What is Broca's area?**	**Q9**	What’s the area effected in motor aphasia ?
	It is the motor speech area which co-ordinated pattern for vocalization		Broca`s area
Q5	Which area is effected in Dyslexia ?	**Q10**	**What is global aphasia or central aphasia?**
	Angular gyrus		combination of the expressive problems of Broca's aphasia and the loss of comprehension of Wernicke's. The patient can neither speak nor understand language.

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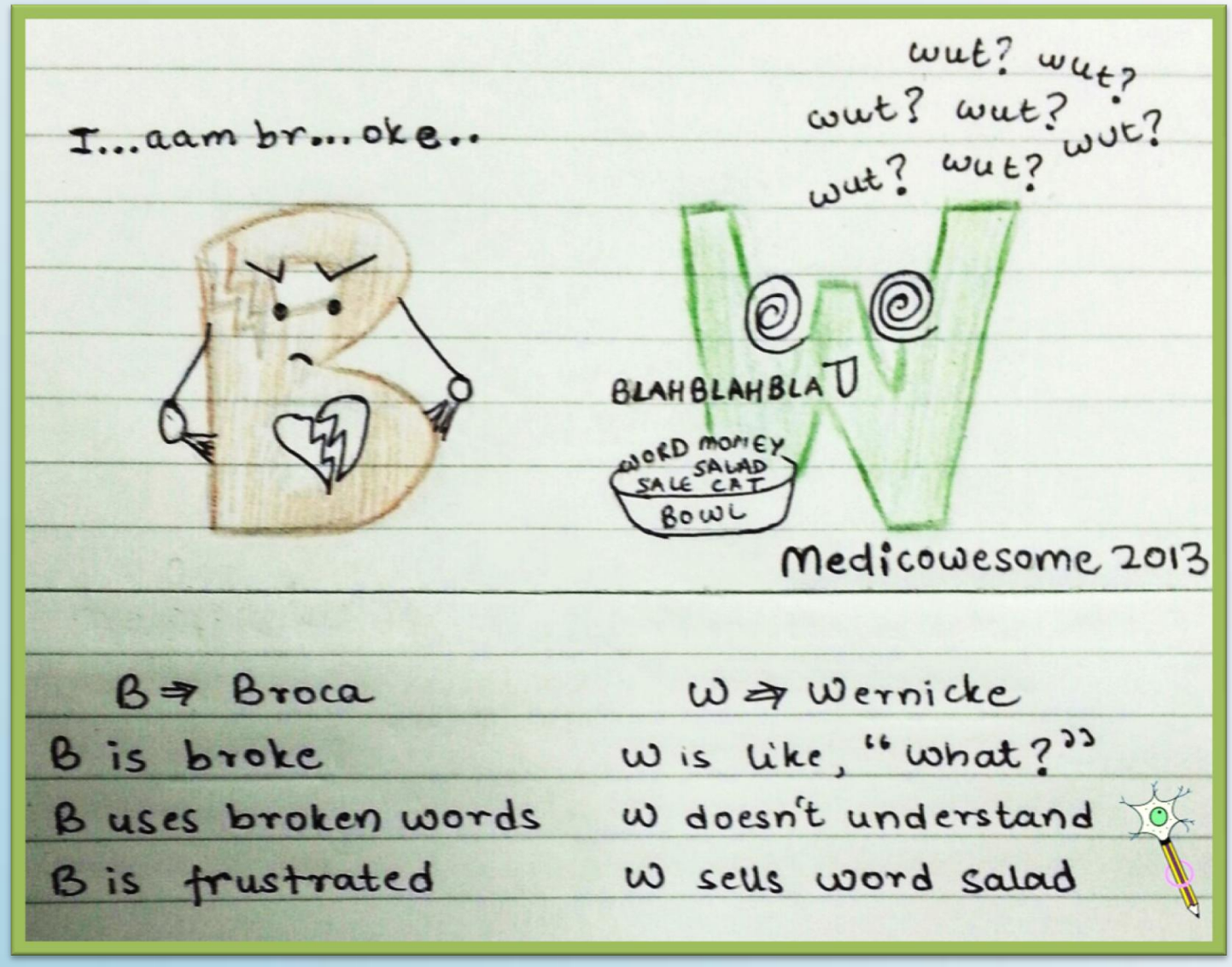

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