

Neurology

Chapter : Speech disorder

Learning object 1 : Speech disorder

objectives



At the end of this learning object student will be able to:

- Compare between formulation of speech and articulation of speech.
- Explain receiving sensory mechanism.
- Explain expressing motor mechanism.
- Compare between different types of speech disorders.
- List types of Aphasia.
- Distinguish between types of Aphasia.
- Explain sites of lesion in Aphasia.
- Enumerate causes of Dysarthria.
- Mention how to test speech.

Slide 1 : Speech process

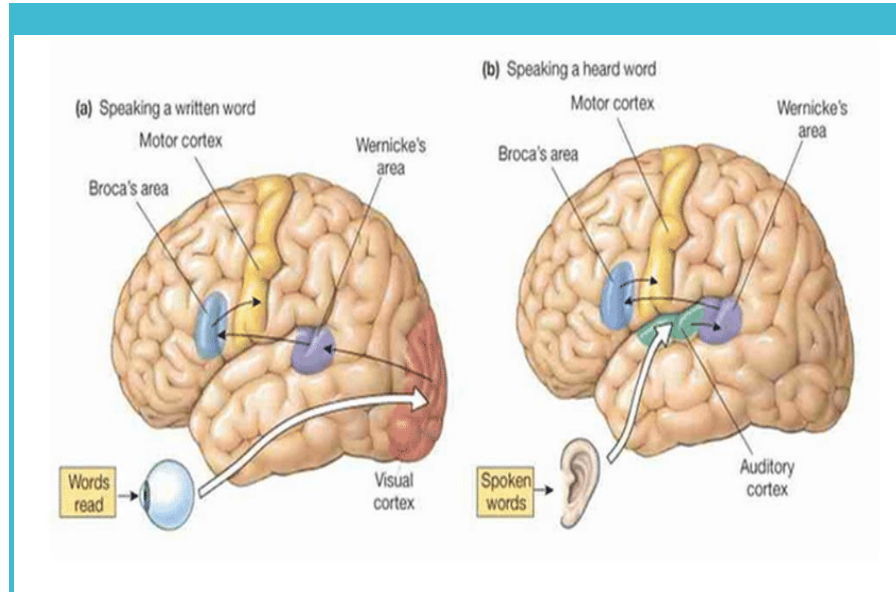
Speech process is formed of two important aspects :

(1) Formulation of speech:

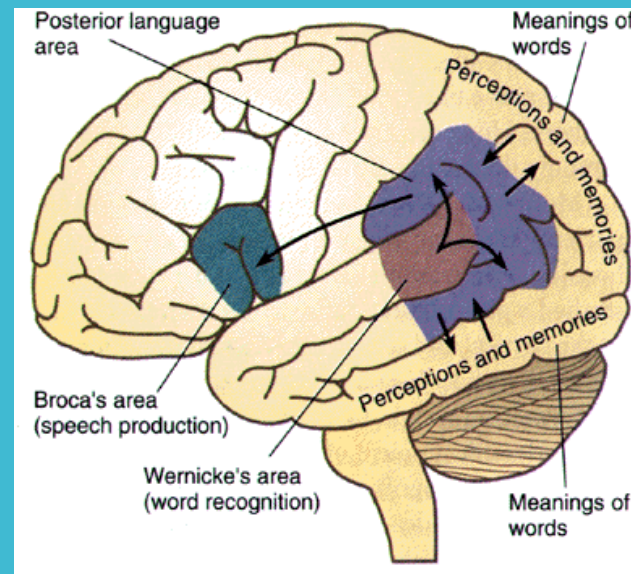
This is the function of higher centers, located mainly in the dominant hemisphere, through which ideas, feelings stimuli and thoughts are received, constructed, formulated and ready to be expressed in either spoken or written speech , -disorders here are called aphasia or dysphasias.

(2) Articulation of speech:

This is the process through which speech is expressed, conducted and produced as words spoken or written – disorders here are called dysarthria.



WHAT IS DYSPHASIA?



What is Dysarthria?

It is a condition when the muscles that a person uses for speaking weaken or it becomes difficult to control those muscles.

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Slide 2 : Anatomical and physiological considerations in speech process

-In the process of speech, there are two main mechanisms ;

Receiving (sensory) mechanism.

Expressing (motor) mechanism.

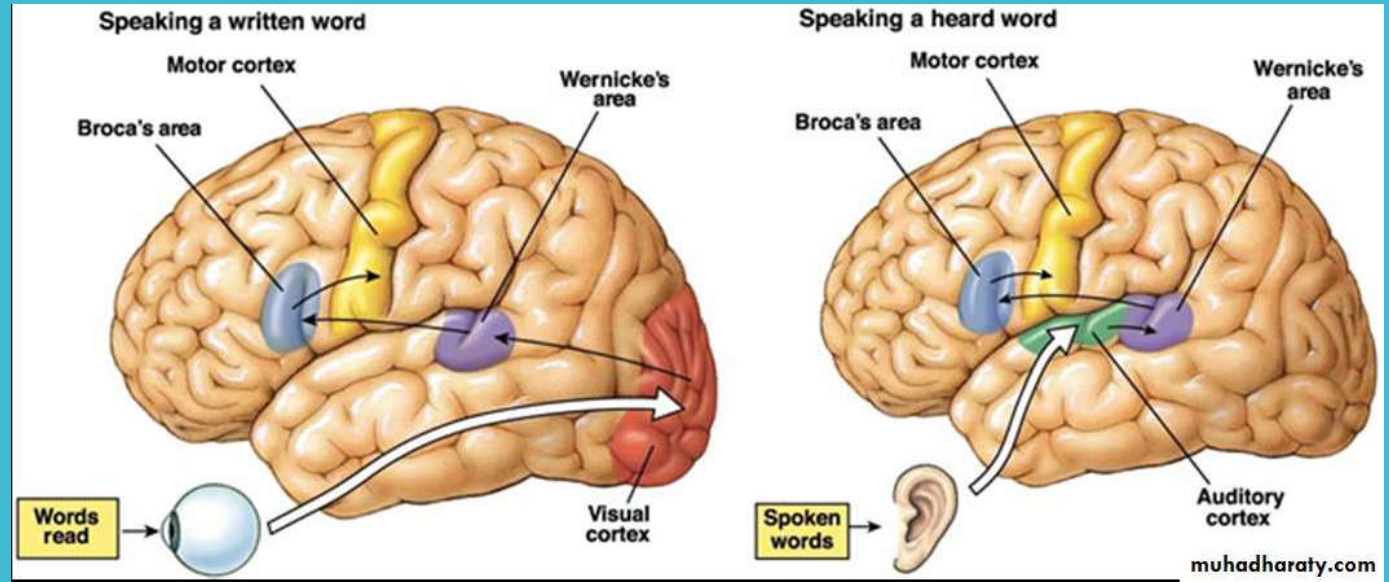
-In assessment of speech, both spoken and written speech are looked for;

-In spoken speech: One have to hear sounds and words at first which are received in the auditory sensory area in the temporal lobe as meaningless words.

One must be able to understand the meaning of what is heard, this is the function of the auditory psychic area.

-In written speech: One have to see at first the written stimuli which are received as meaningless stimuli in the visual sensory area.

Then, understanding the meaning of these stimuli is the function of the visual psychic area.



- Damage to **Broca's** area causes expressive aphasia

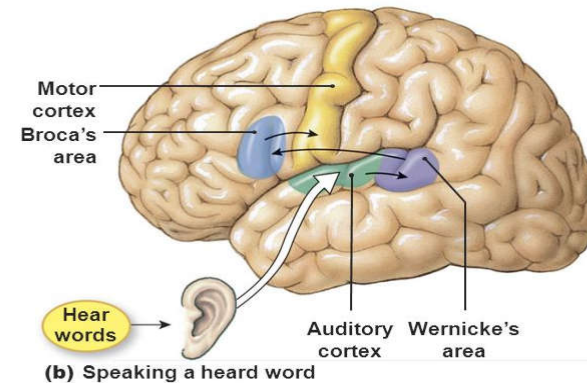
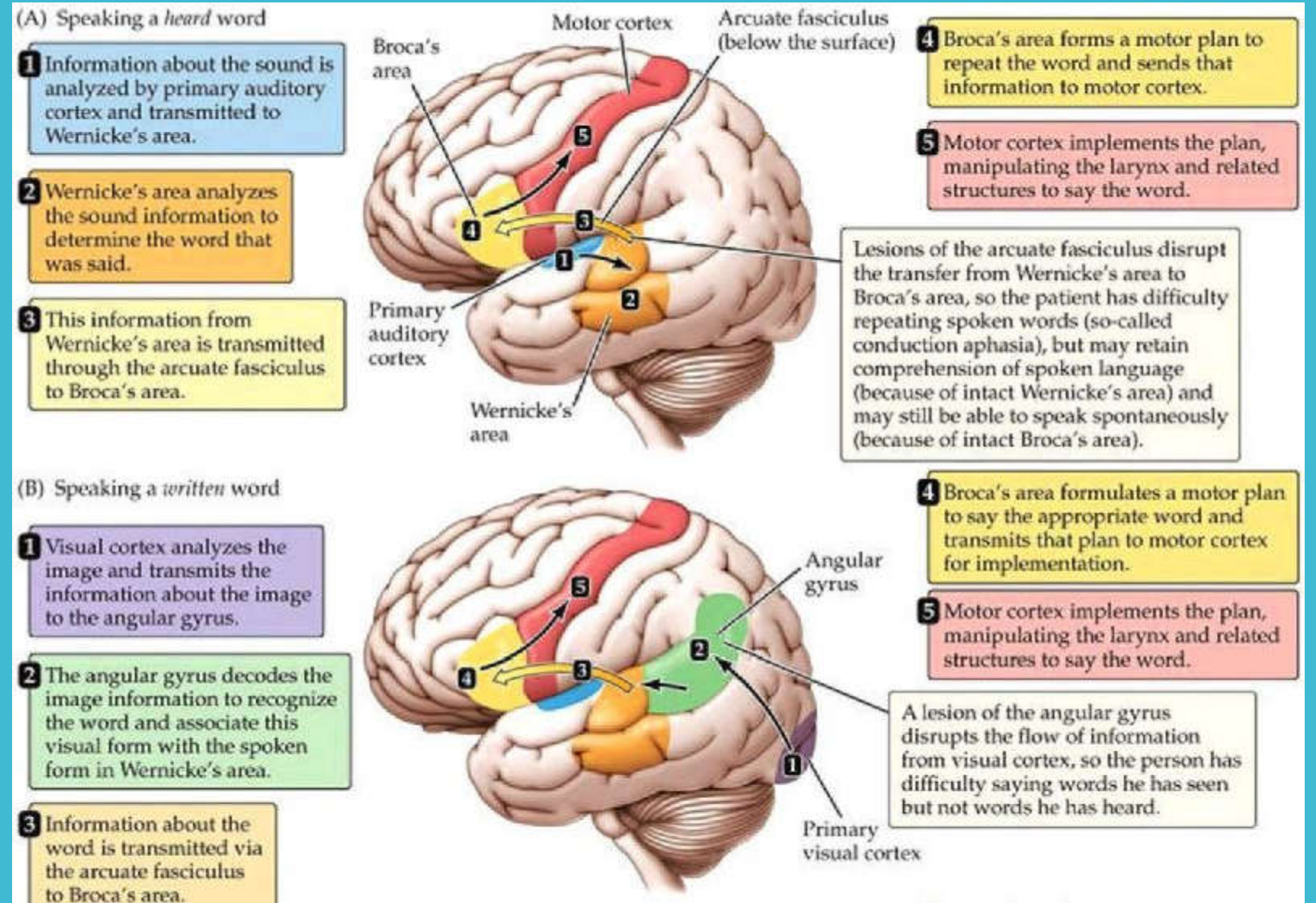


Figure 9-23b

Slide 3 : Anatomical and physiological considerations in speech process

-After hearing and seeing the sounds, words and then recognizing and understanding their meanings in the Wernick's and concept areas respectively, this is conveyed to the motor speech center (Broca's area) in case of spoken speech, and to the writing speech area (Exner's area) in case of written speech, this connection is through commissures and associative fibers which connect the auditory sensory and psychic speech centers, the visual sensory and psychic speech centers → Wernick's area → Concept areas → the Broca's and Exner's areas.

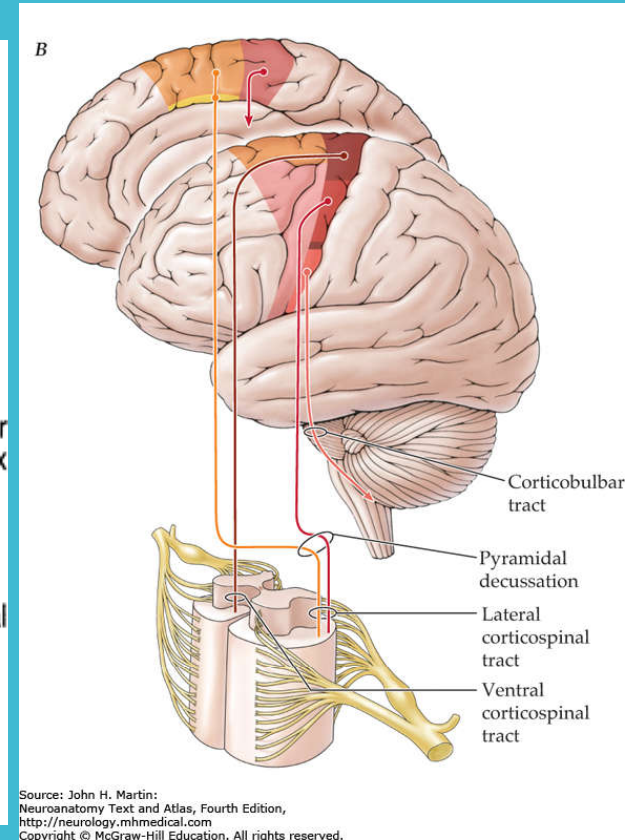
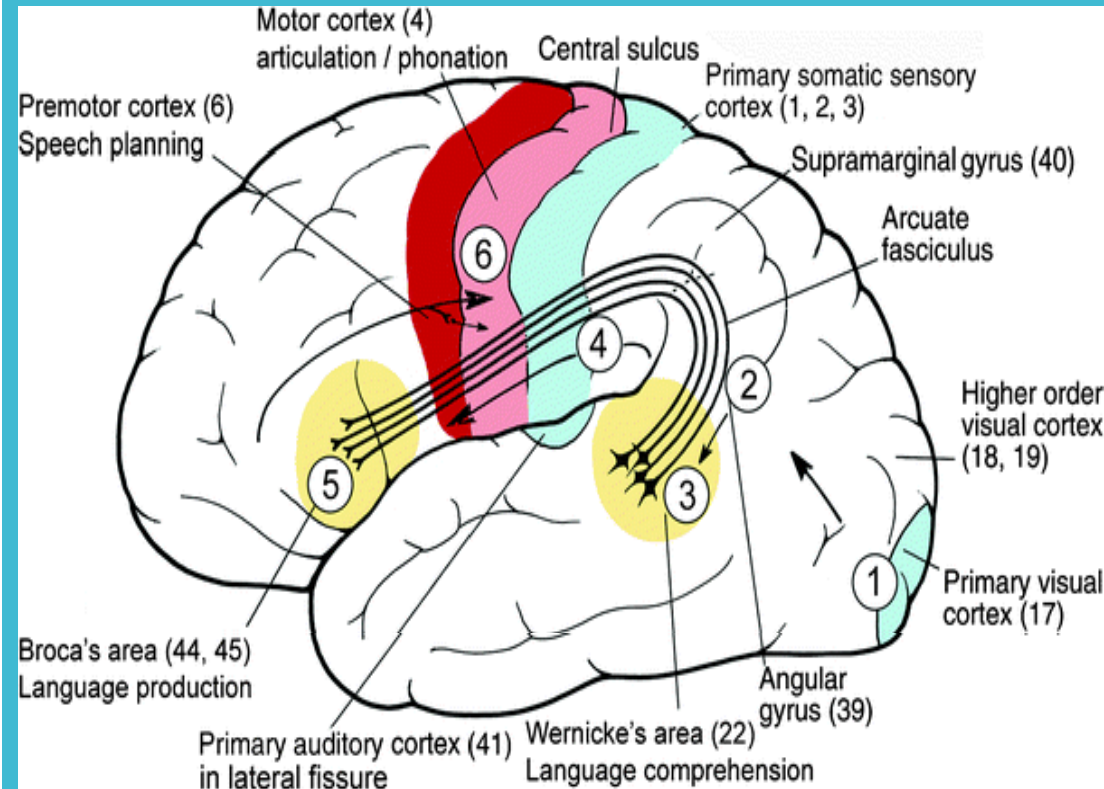


Slide 3 : Anatomical and physiological considerations in speech process

In the motor speech centers (Broca's and Exner's areas) the process of speech is constructed, generated and can be expressed now in words either spoken or written, this process of expression to be completed is in need for intact motor areas (4&6), corticobulbar tracts, intact cranial nerves involved in the process of speech (5,7,9,10,11&12) for spoken speech, also intact corticospinal tract, A.H.C., nerves and muscles of hands for written speech.

The process of conveying this expression through the corticobulbar and corticospinal tracts down to the required muscles is termed Articulation.

Articulation to be completed is in need for healthy basal ganglia and cerebellum for good cooperation, smooth coordination of various muscles in the process of articulation.



Slide 4 : Types of Aphasia

Types of Aphasia:

(1) Broca's aphasia (dominant hemisphere): With lesions in the motor speech area. The patient can see, hear, understand but can't express his emotions, ideas in spoken speech. i.e. comprehension is intact, but quantity and flow of speech is impaired "non fluent". Lesions here are usually due to stroke, tumors, degenerations.

(2) Wernick's Aphasia:

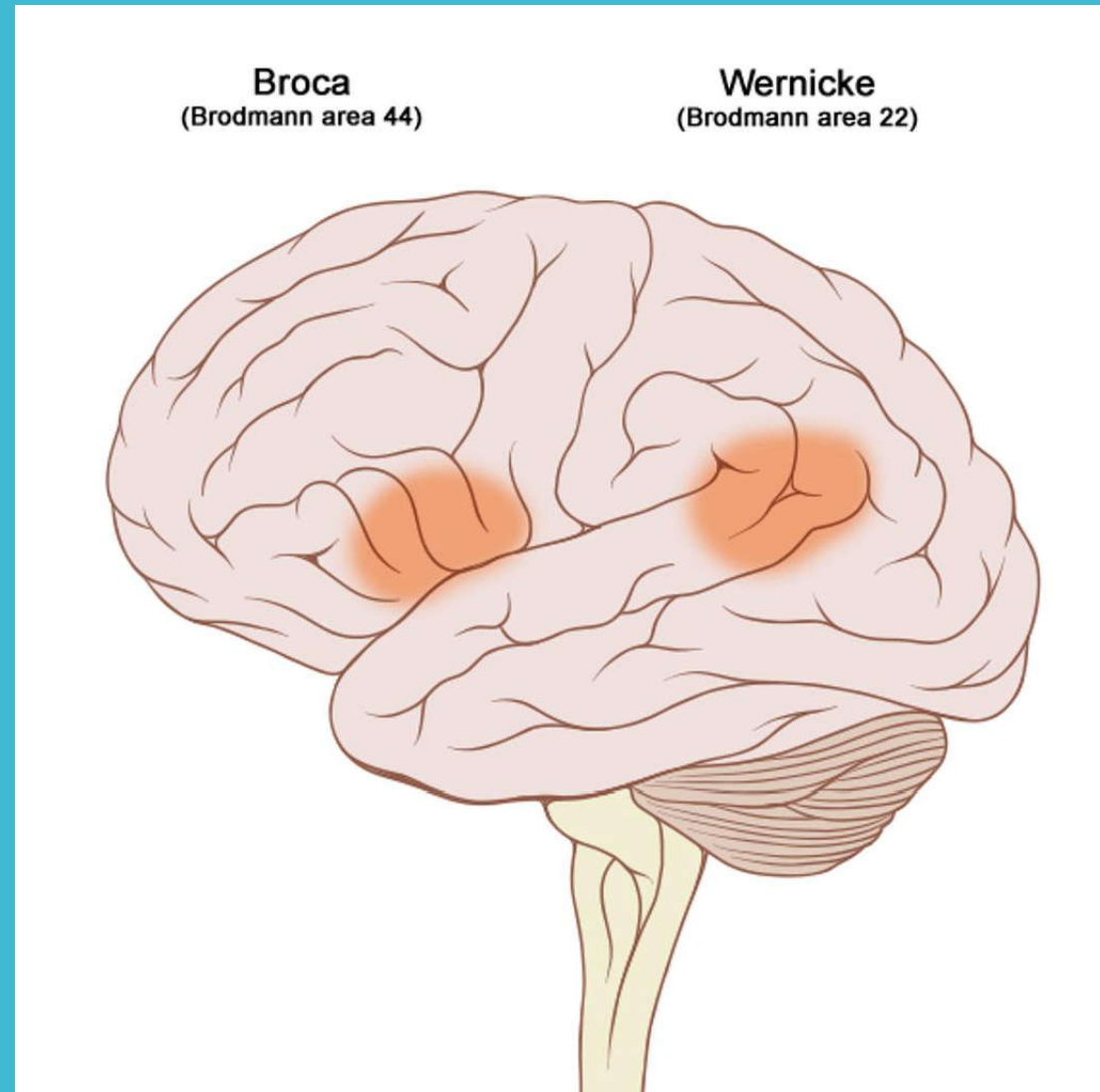
Due to lesions in the dominant hemisphere associative areas and fibers in the left posterior superior temporal gyrus. Speech is fluent, but with paraphasic errors, meaningless, impaired comprehension.

(3) Transcortical motor aphasia:

(4) Transcortical sensory aphasia :

(5) Conductive aphasia:

(6) Nominal → left angular gyrus (temp. lobe):



Slide 5 : Clinical Criteria of the dysphasic disorders

Clinical Criteria of the dysphasic disorders:

Wernick's Aphasia: **Comprehension** No , **Fluency** Ok , **Repetition** No .

Broca's Aphasia: **Comprehension** Ok , **Fluency** No , **Repetition** No .

Conductive Aphasia: **Comprehension** Ok , **Fluency** Ok , **Repetition** No .

Transcortical motor Aphasia: **Comprehension** Ok , **Fluency** No , **Repetition** Ok .

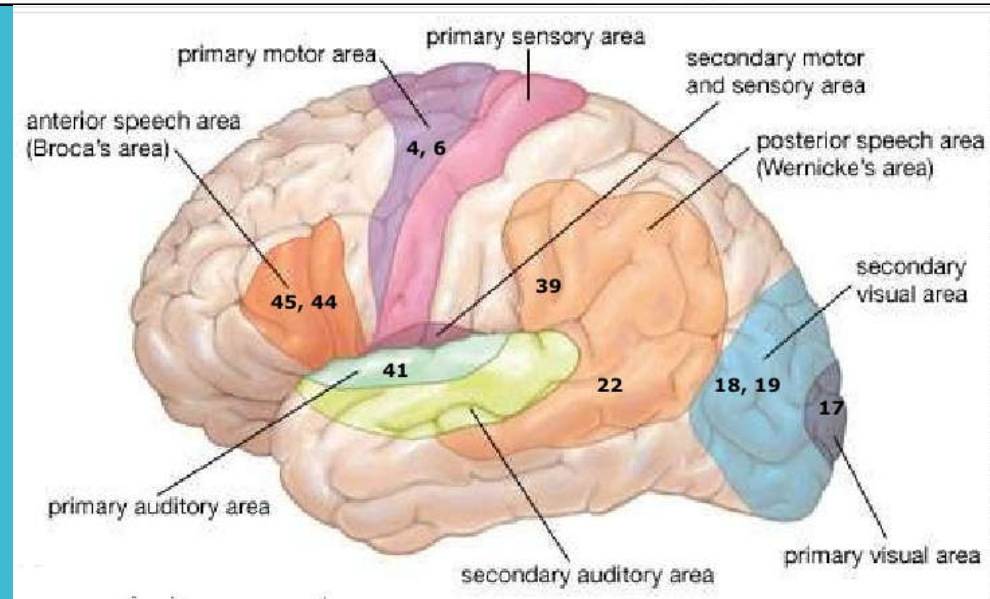
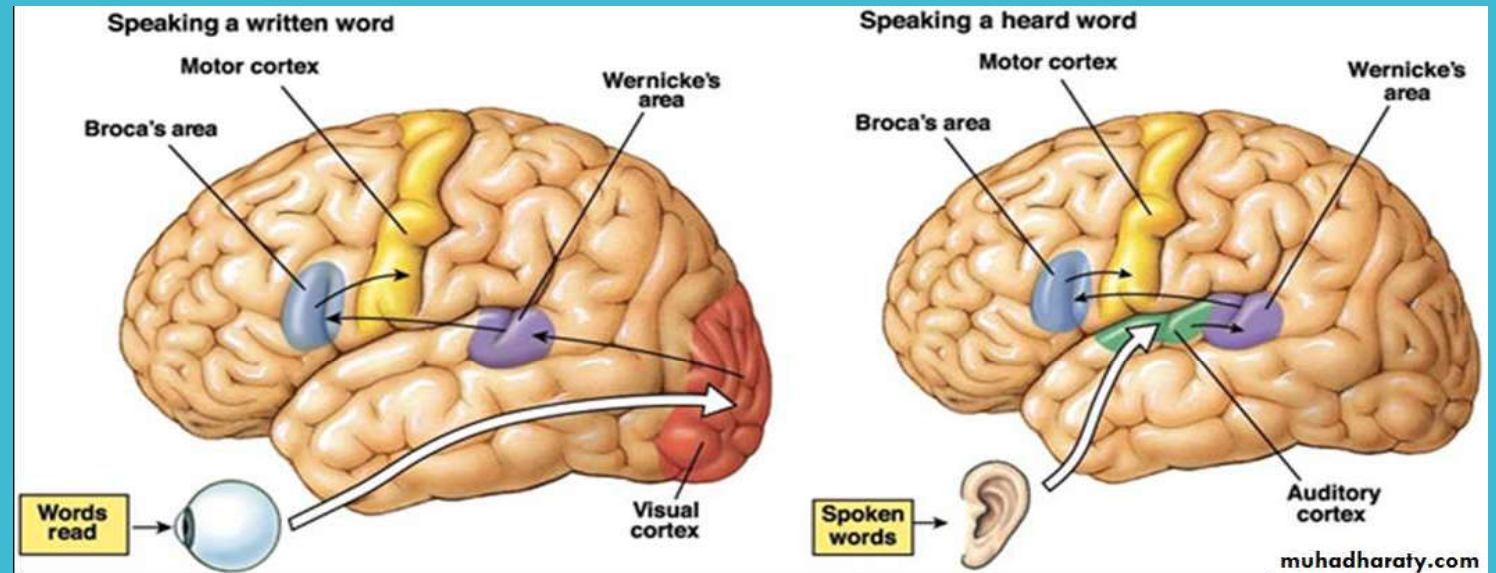
Transcortical sensory Aphasia: **Comprehension** No , **Fluency** Ok , **Repetition** Ok .

Global Aphasia: **Comprehension** No , **Fluency** No , **Repetition** No .

	Comprehension	Fluency	Repetition
Wernick's Aphasia:	No	Ok	No
Broca's aphasia	Ok	No	No
Conductive Aphasia	Ok	Ok	No
Transcortical motor Aphasia	Ok	No	Ok
Transcortical sensory Aphasia	No	Ok	Ok
Global Aphasia	No	No	No

Slide 6 : Other disorders of formulation

- Visual agnosia**: with lesions in the visual psychic area (18, 19), the patient can see, but (can't recognize) does not understand what he sees.
- **Alexia**: due to lesions in the visual sensory area 39 where the patient can see, but can't read, can write but can't read what he writes.
- Auditory agnosia**: due to lesions in the auditory sensory area 22. the patient can't recognize the sounds.
- Agraphia**: due to localized lesions in the motor writing center "Exner's area". Comprehension is intact but the patient cannot express his ideas in written speech



Slide 7 : Sites of lesion in aphasia

Sites of lesion in aphasia:

Global Aphasia: lesion in the dominant hemisphere affecting both Broca's and Wernicke's area.

Wernick's Aphasia: lesion in the Wernicke's area in the supramarginal gyrus of the parietal lobe and upper part of the temporal lobe may be associated with field defect.

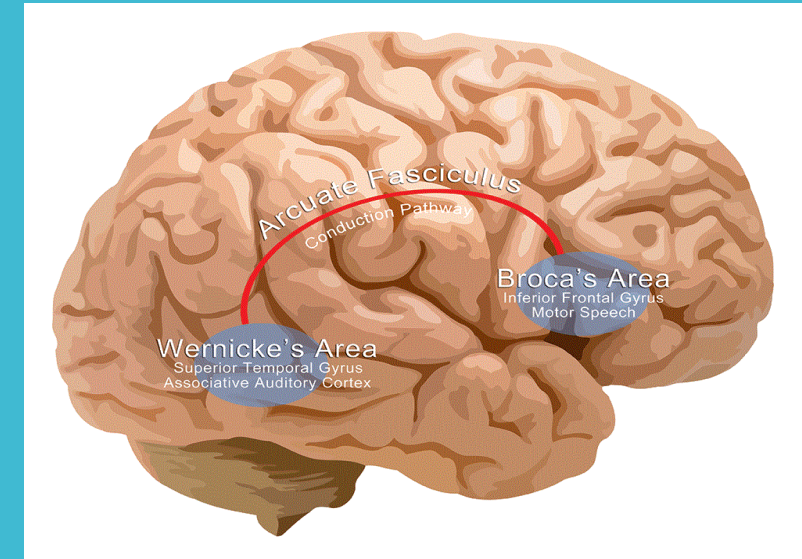
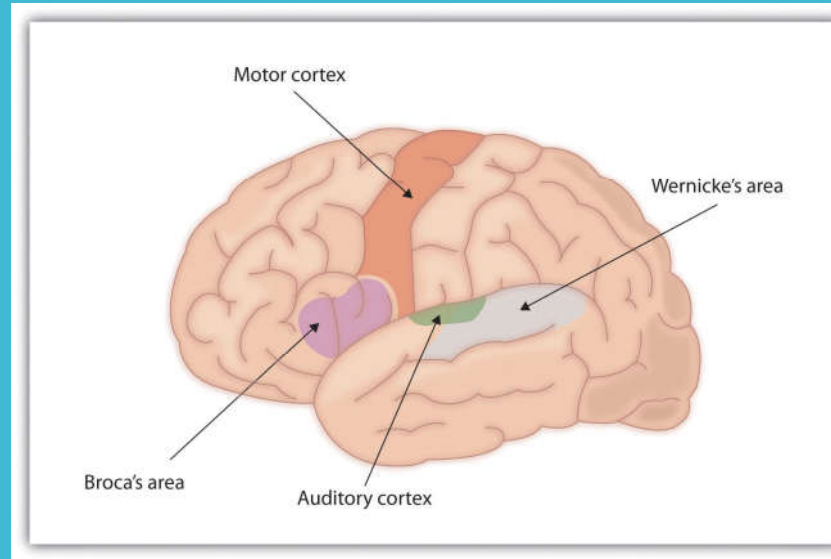
Broca's aphasia: lesion in the dominant hemisphere in the Broca's area in the inferior frontal gyrus.

Conductive Aphasia: lesion in the arcuate fasciculus.

Trancortical sensory Aphasia: lesion in the posterior parietooccipital area.

Transcortical motor Aphasia: lesion incomplete in Broca's area.

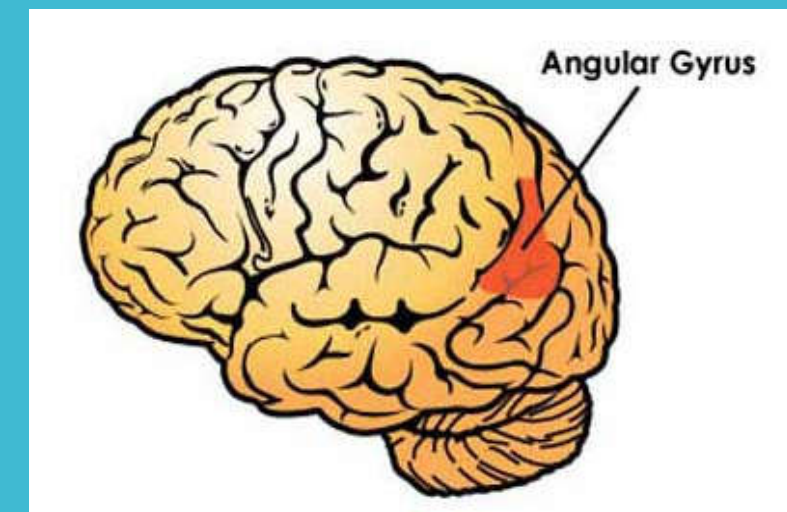
Nominal aphasia: lesion in angular gyrus.



Transcortical Aphasia

A lateral view of the brain with two areas highlighted. Transcortical motor aphasia is highlighted in purple in the inferior frontal gyrus. Transcortical sensory aphasia is highlighted in red in the posterior parietooccipital area.

- Transcortical motor aphasia:
 - Difficulty producing speech.
 - Good comprehension and repetition.
- Transcortical sensory aphasia:
 - Speech production and repetition are good.
 - Comprehension is poor.



Slide 8 : Causes of dysarthria

Causes of dysarthria:

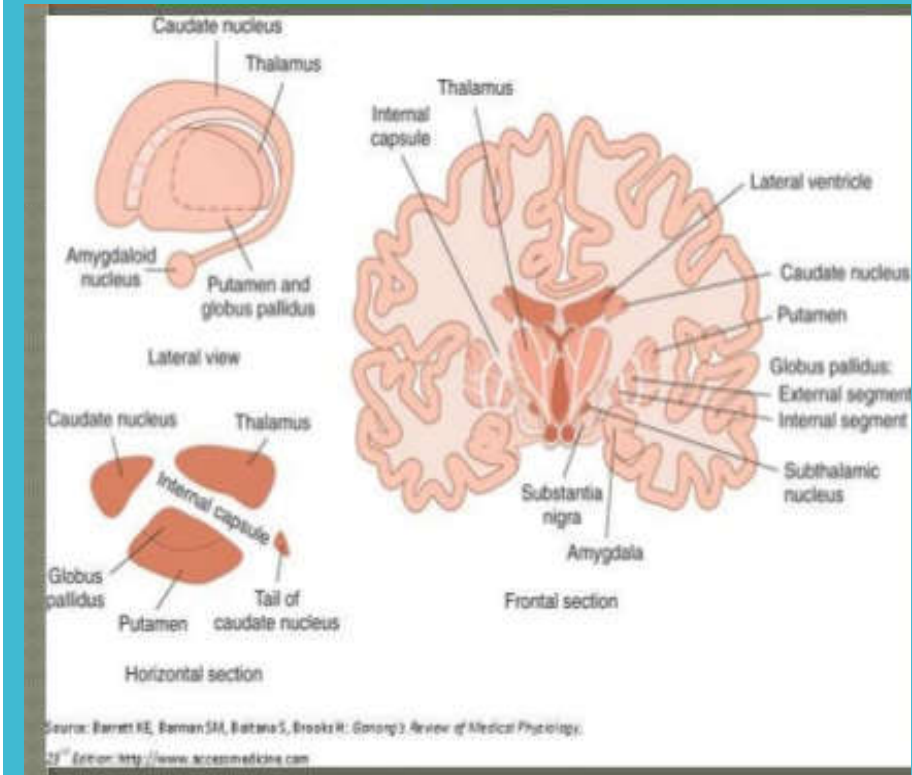
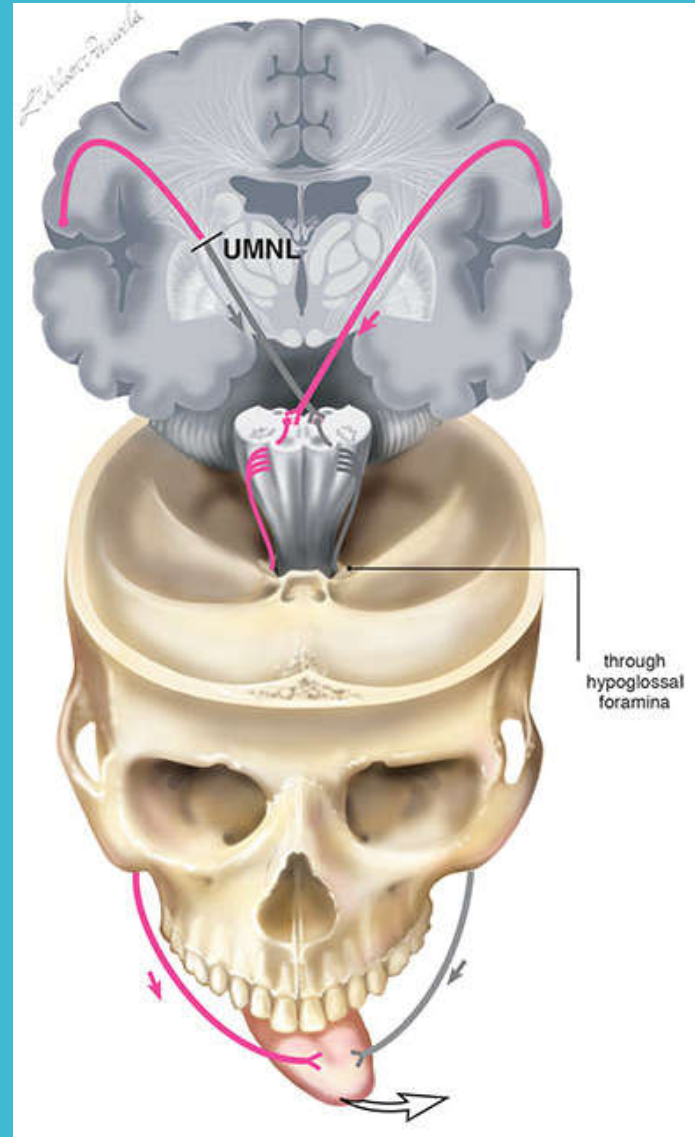
(1) Upper motor neuron lesions:

Muscles of articulations and their cranial nerves receive bilateral pyramidal tract supply, therefore unilateral UMNL rare to cause dysarthria except transient one or if the lesion is severe.

In bilateral corticospinal tract lesions as in stroke, diplegia, degenerations and tumours, speech is slurred (mainly labials and dental consonants) spastic, sometimes explosive, hardly produced.

(2) Extraparamidal lesions.

As in parkinsonism, and as a result of muscular rigidity. Speech is slow, slurred, monotonous and of low pitch, low volume.



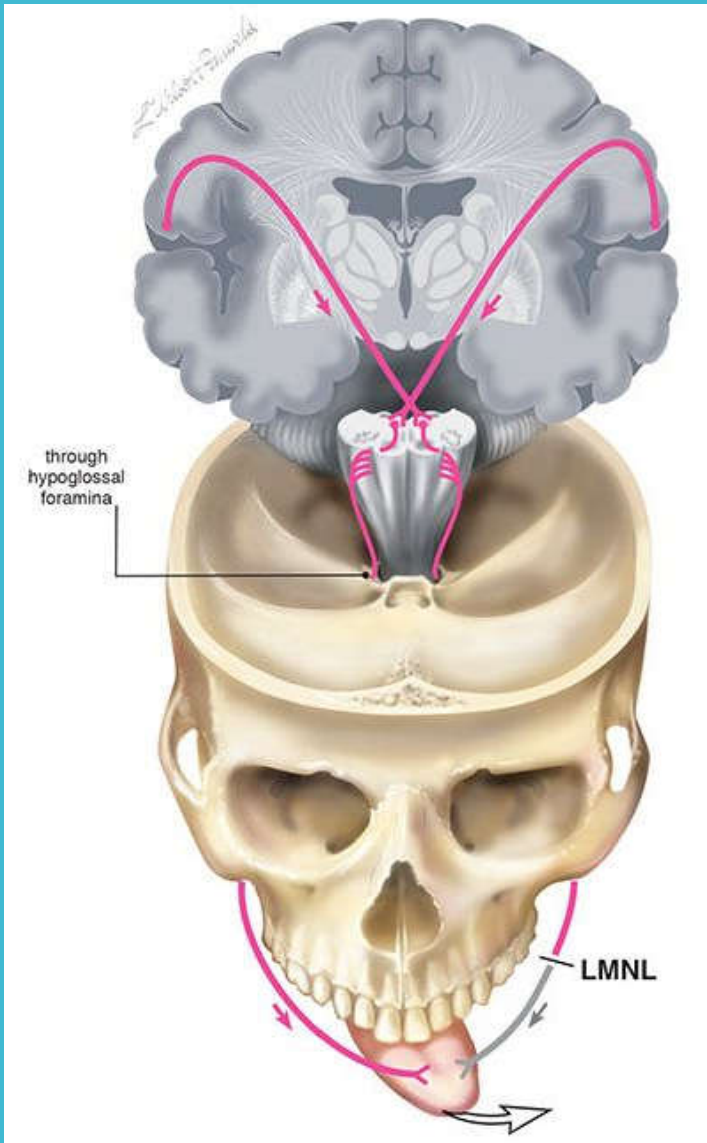
Slide 9 : Causes of dysarthria

(3) cerebellar lesions:

As in ataxias, M.S. due to defects in the co-ordination, co-operations of action of muscles of articulation, speech is explosive, slurred, with wide separation of syllables → Scanning and staccato.

(4) Lower motor neuron lesions:

In LMNL weakness, wasting of muscles of articulation occurs "bulbar palsy" as in motor neuron disease, syringobulbia, bulbar poliomyelitis, polyneuritis cranialis. Speech here of low volume, hypotonic, labials consonants suffer early then dentals and gutturals, nasal quality due to weakness of the soft palate with dysphonia. Also in myopathies → speech disorders as in LMNL occurs.



Slide 10 : Other rare speech disorders

Other rare speech disorders :

Palilalia: Compulsive repetition of last word or phrase of the patient own speech with increasing rapidity and decreasing volume finally into aphonic speech as in:

postencephalitic Parkinsonism, and general paresis.

Echolalia: the patient repeats words and phrases that he hears in a parrot like attitude as in dementia, stroke.

Aphonia: lost phonation which may be: - organic -Laryngitis "severe form", and Paralysis of adductors of vocal cords.

Hysterical –common→ ask the patient to cough if can→ Hysterical.



Slide 11 : Other rare speech disorders

Mutism: Complete loss of speech (phonation & articulation) in a conscious patient as in congenital Deaf-mute.

Coprolalia: uttering of swear words as in complex tics.

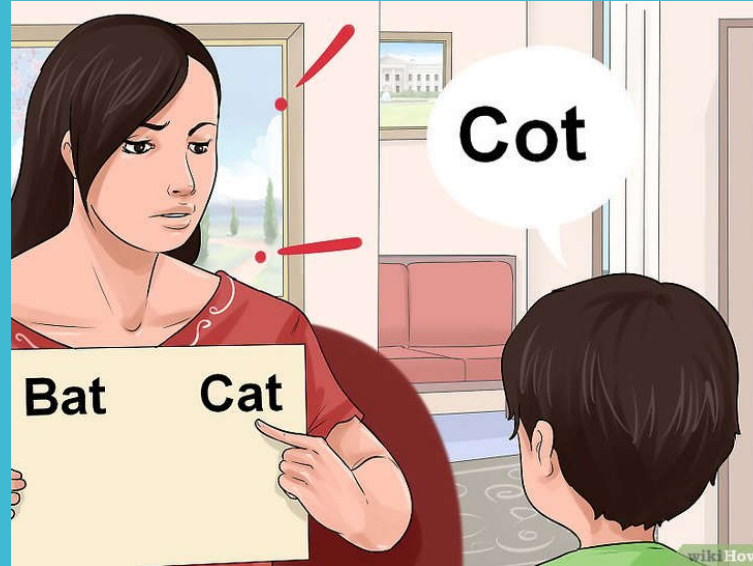
Stammering or stuttering: sudden stop of speech flow with forcible repetition of the sounds or syllables associated with various facial and other body muscle contractions. It is usually psychogenic or familial.



Slide 12 : How to test speech

How to test speech:

- 1-Test understanding→ ask simple questions then complicated ones.
- 2-Test spontaneous speech and look for:
 - flow of speech ,fluent or not.
 - content of speech.
 - If there is paraphasic errors or not.
 - slurring or other productive speech disorders
- 3- Test repetition.
- 4- Test naming, and word finding.
- 5-Test reading.→ disorder → dyslexia.
- 6- Test writing → disorder → dysgraphia.



summary

In this learning object we discussed disorders speech, we presented speech process that contain formulation and articulation speech, then we presented anatomical and physiological considerations in speech process, also we presented different types of aphasia like Broca's aphasia and wernick's aphasia, then we presented some disorders of formulation like visual agnosia, alexia, and agraphia. We presented also causes of dysarthia like cerebellar lesions and lower motor neuron lesions, and finally we presented some rare speech disorders like mutism, palilalia, and aphonia.