

Dysgraphia

Component of the Functional System

Visual image of letter

Symptoms of disturbances and compensations

- Substitutions of visually similar letters
- *Compensation* – the use of kinaesthetic analysis of graphic movements

The role in writing

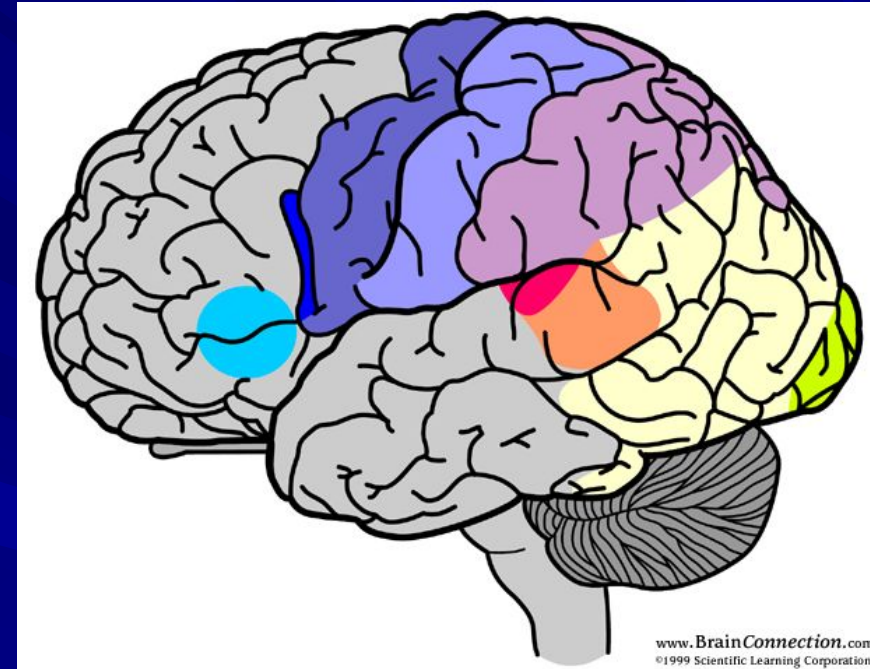
Visual analysis of details in letters

Brain area

Visual cortex (occipital lobe)

Brain mechanism

Processing of visual information



Dysgraphia

Component of the Functional System

Visuospatial image of letter

Symptoms of disturbances and compensations

- Mirror writing
- Problems in vertical and horizontal orientation of elements
- Problems of holding the line
- Substitution of spatial details of letters (v/y)
- Ignoring a part of the visual field
- Difficulties in finding the beginning of the line when writing

The role in writing

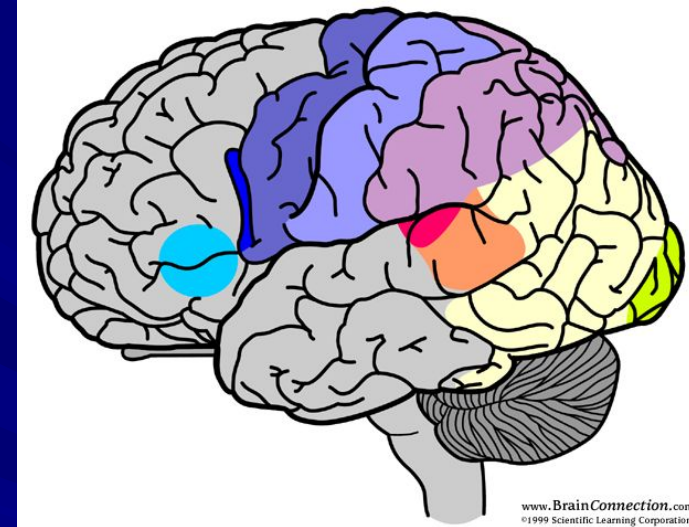
Visual analysis of letters which have only visuospatial differences

Brain area

Posterior-parietal associative cortex (parietal lobe)

Brain mechanism

Processing of visuospatial information



Dysgraphia

Component of the Functional System

Motor component

Afferent part

Symptoms of disturbances and compensations

- Disturbance of fine motor in writing
- Clumsy writing
- *Compensation* – big letters

The role in writing

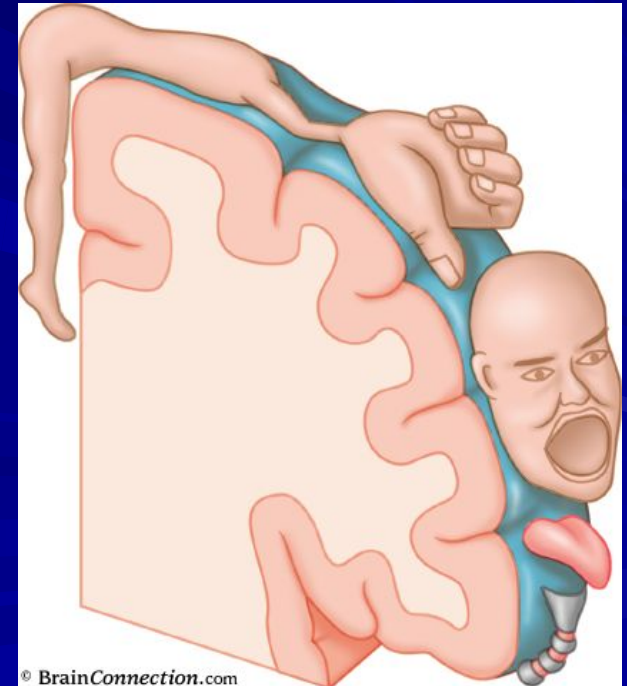
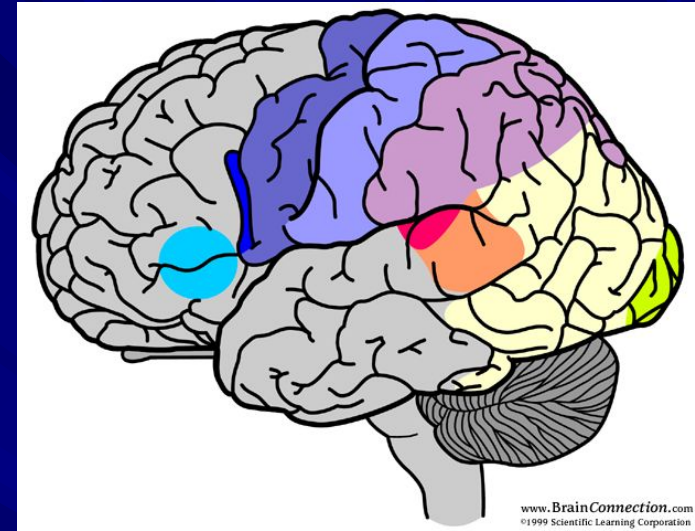
Kinaesthetic analysis of graphic movements (motor schema corresponding to the image of the letter).

Brain area

Somatosensory cortex (hand/wrist area)

Brain mechanism

Processing of kinaesthetic information



Dysgraphia

Component of the Functional System

Motor component

Efferent part

Symptoms of disturbances and compensations

- Perseverations of elements in letters, letters, syllables, words
- Disturbances of the sequence of letters in the word
- Fusing separate words
- *Compensation* – writing in printed letters

The role in writing

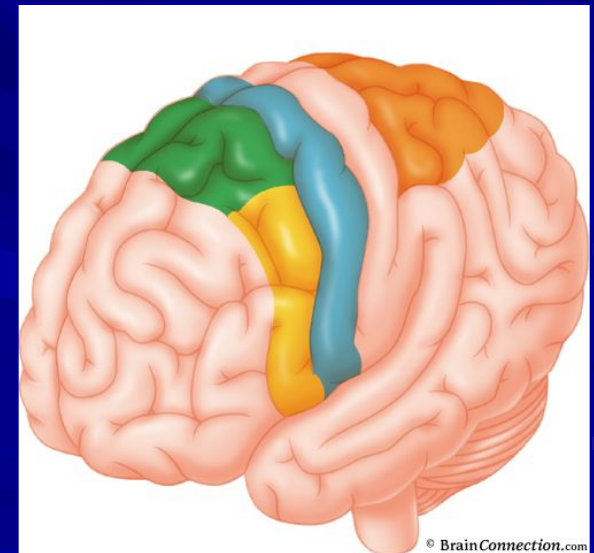
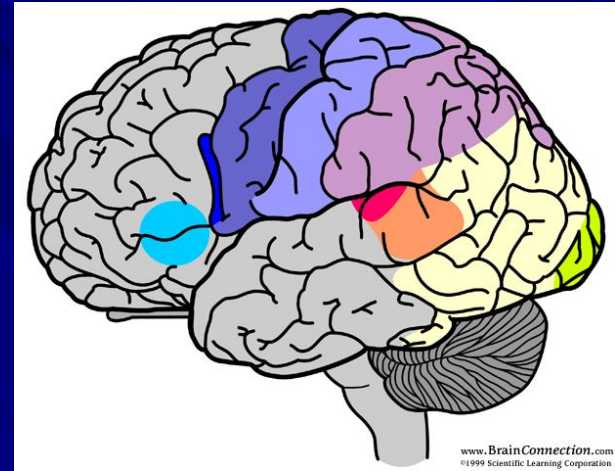
- Kinetic (sequential) organization of movements in writing
- Easiness of transition from one element of letter to another, from one letter to another.

Brain area

Premotor cortex (Supplementary motor cortex - SMA)

Brain mechanism

Kinetic mechanism



Dysgraphia

Component of the Functional System

Control in writing

Symptoms of disturbances and compensations

- “Stupid” errors
- Omission of vowels in stressed position
- Lack of capitalization and punctuation

The role in writing

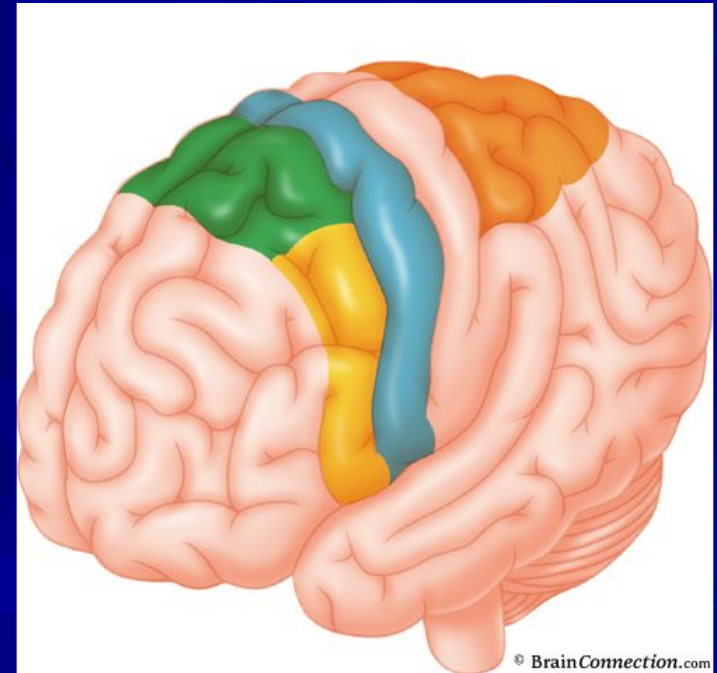
- Planning, initiation and control in writing
- Control in using punctuation and orthographic rules.

Brain area

Prefrontal cortex (Third functional unit - unit of programming, regulation and control)

Brain mechanism

Executive mechanism



Dysgraphia

Component of the Functional System

Phonemic perception

Symptoms of disturbances and compensations

- Substitutions of opposite consonants (b/p)
- *Compensation* – use of a context

The role in writing

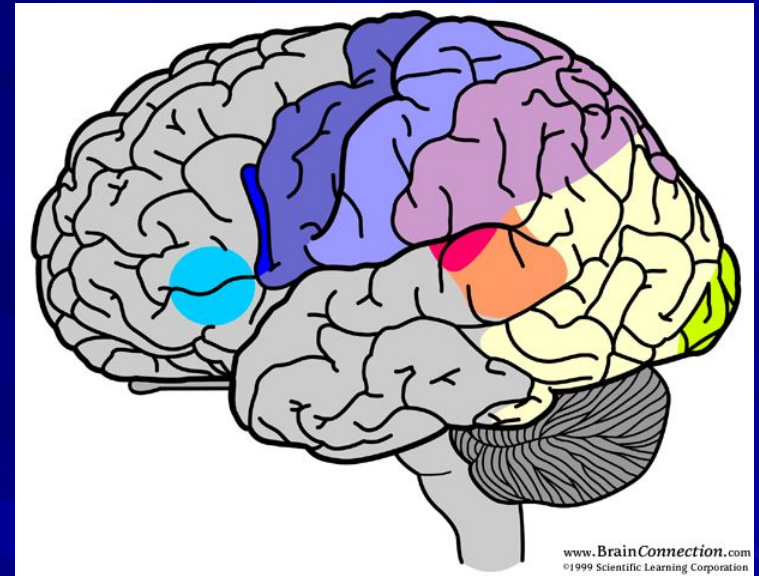
Differentiation of phonemes similar in sound (opposite consonants, soft and hard consonants)

Brain area

Primary auditory area of left temporal cortex

Brain mechanism

Processing of phonemic information



Dysgraphia

Component of the Functional System

Articulation

Afferent part

Symptoms of disturbances and compensations

- Substitutions of letters denoting sounds close in articulation (l/n/d)

The role in writing

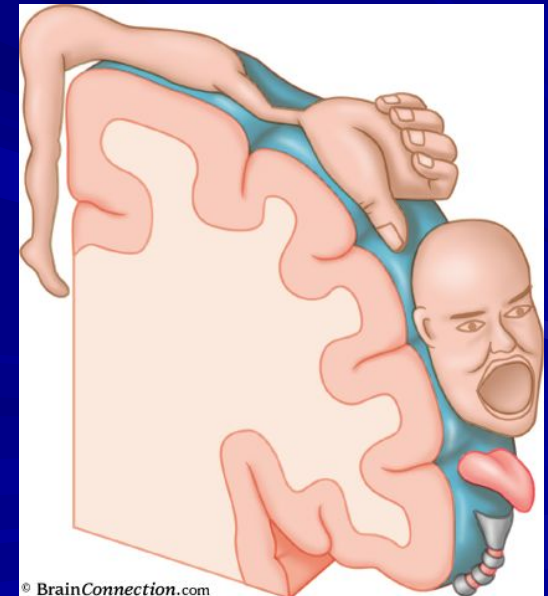
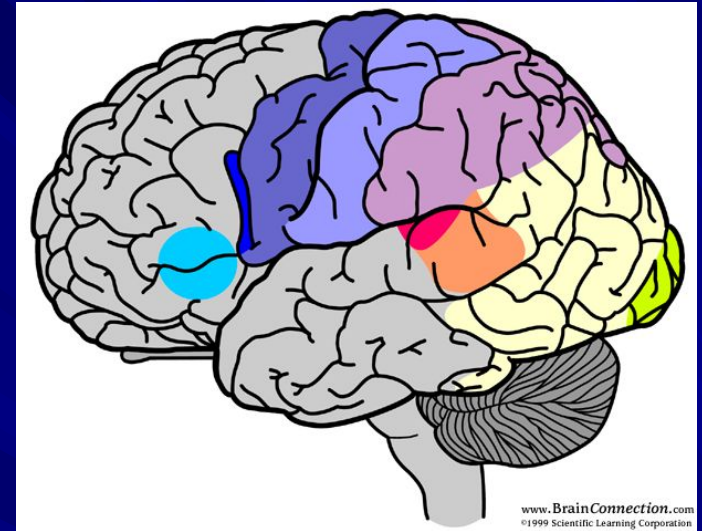
Differentiation of phonemes similar in articulation

Brain area

Somatosensory cortex (speech area)

Brain mechanism

Processing of kinaesthetic information



Dysgraphia

Component of the Functional System

Articulation

Efferent part

Symptoms of disturbances and compensations

- Omissions of consonants
- Changing position of letters in a word
- Including extra letters (vowels) in word

The role in writing

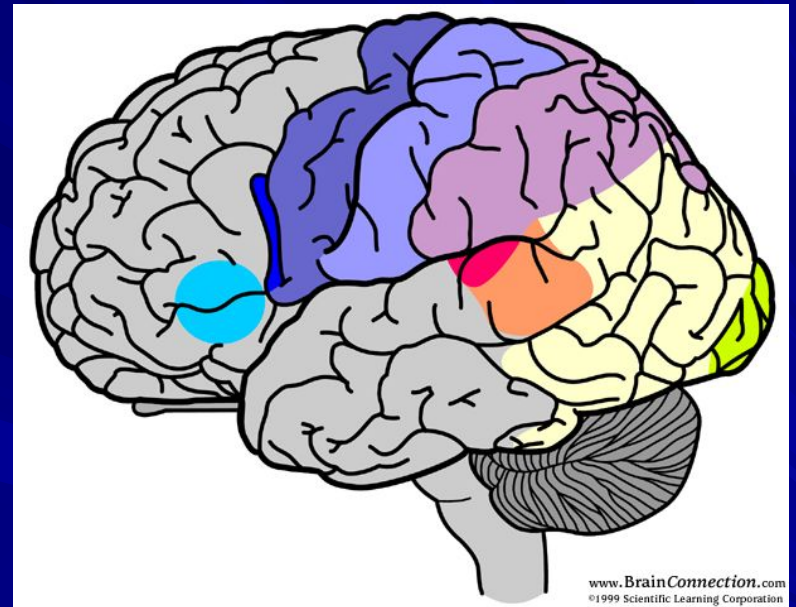
Differentiation of phonemes in complex combinations of consonants

Brain area

Prefrontal cortex (Broca's area)

Brain mechanism

Kinetic mechanism



Dysgraphia

Component of the Functional System

Verbal working memory

Symptoms of disturbances and compensations

- Omissions of words in sentences
- Changing position of words in a sentences
- *Compensation* – replacement words close in meaning

The role in writing

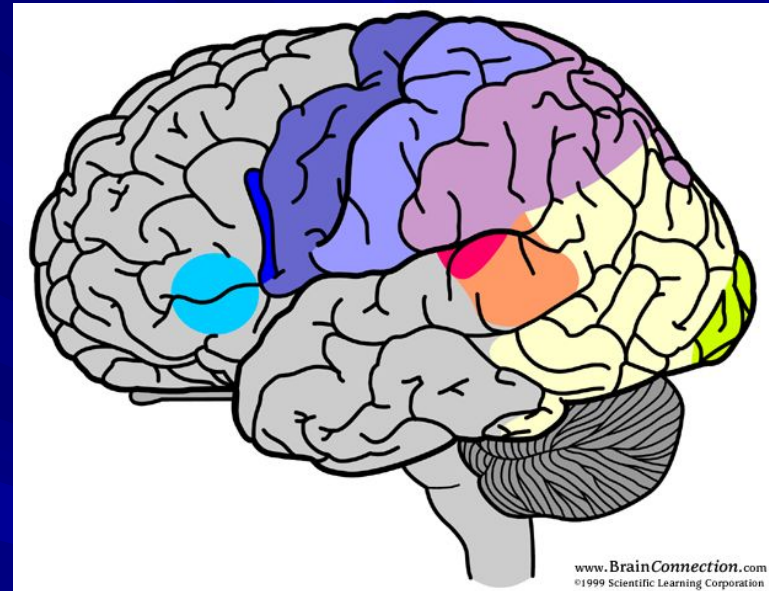
Retaining information for writing in the working memory

Brain area

Posterior-parietal associative cortex (parietal lobe)

Brain mechanism

Working memory



Dysgraphia

Component of the Functional System

Stability in writing

Symptoms of disturbances and compensations

- Micrographia
- Fluctuations in pen pressure, in altitude and inclination of letters
- Intervals disproportion
- Slow writing
- Difficulties in retaining working posture
- Large fluctuations in the rate and success of writing during a lesson

The role in writing

- Level of cortical activation during writing
- Stability of activation and attention
- concentration

Brain area

Reticular formation (First functional unit – unit of activation)

Brain mechanism Neurodynamic mechanism

