

## **Diagnosis and treatment of learning problems with a neuropsychological approach**

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<http://dx.doi.org/10.29009/ijres.6.4.3>

## Diagnosis and treatment of learning problems with a neuropsychological approach

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Received on 19th April 2023

Accepted on 1st August

2023

**Abstract:** One of the educational problems, especially in the early years of education, is learning disorders, which can be seen in some students and has effects on their personal and social life.

This research is a review of the methods of diagnosis and treatment of learning disorders according to the new approach of neuropsychology. In this study, 64 domestic and foreign articles and books of recent years (until 2021) have been used regarding treatment methods for various learning disorders, including dyslexia, math learning disorder, and dyslexia, according to the neuropsychological approach.

Neuropsychology studies the effects of brain structure and function on the formation of psychological processes and provides methods to improve students' performance in improving reading and writing and math skills. In this article, in these three areas, methods have been extracted that have more of a movement aspect and are in the form of a game; To improve brain function and learning disorders by stimulating cells and neural networks.

**keyword:** Learning disorders, dyslexia, dyslexia, specific math learning disorder, neuropsychology

## Introduction

One of the most important and influential stages of growth and life is studying at school. This period is the foundation for work and higher education in the future and learning the important and main subject in school. Knowledge students in school learn knowledge and skills necessary for life and to face and solve problems. But every year, students face problems in education and learning, and a significant percentage of them have learning disorders.

Although in the past years these students have been considered as brain damage, dyslexia, cognitive disorders and even slow learners, but today, a better understanding of learning disabilities has been achieved. In such a way that the main emphasis has moved towards the "malfunction" of the central nervous system and the emergence of more and more specific subtypes of learning disabilities (such as non-verbal learning disabilities). Experts' emphasis on "learning disorders and executive functions" (such as working memory, organization, self-regulation and inhibition) is also related to this orientation. (Alizadeh 2016)

Currently, special learning disorder is known as the main cause of severe academic learning problems, and considering that learning is the main tool for human adaptation to the changing environment, learning disability is considered as a weakness in one of the adaptation skills.

Regarding special learning disorders, education and training experts believe that in spite of having normal or even above normal intelligence and having healthy senses of sight and hearing, they are not able to learn educational materials and concepts of learning visa. Therefore, there is a gap between a person's potential abilities and his actual achievements. It is for this reason that physical disabilities are introduced as hidden disabilities.

The person is completely normal in appearance and seems quite intelligent and sharp; But he may not be able to perform the level of skills expected from a person of his age. A learning disabled person cannot be successful in school, work and social relationships; Because his failures in learning and consecutive failures make him

labeled as weak or weak at school and at home, which creates a negative self-concept and as a result, he suffers from emotional and behavioral disorders. With timely diagnosis and intervention, this group can be revived and many problems can be prevented for themselves and those around them.

In this research, based on the neuropsychological approach, we deal with the diagnosis and treatment of learning disorders.

### **History of neuropsychology**

The branch of neuropsychology is historically derived not only from the field of psychology, but also from fields such as medicine, education and law. The term neuropsychology is a combination of the two words neurology and psychology. Neurology is considered as a branch of medicine that deals with the nervous system and disorders related to it. Psychology is also defined as the scientific study of behavior and psychological processes. One of the first people who combined the two words neurology and psychology into a new word was Kurt Goldstein (a German neurologist and psychiatrist), who used it in his book called *Organism* in 1939. Today, neuropsychology is used to describe one of the fields of psychology that is limited to identifying, quantifying and describing behavioral changes that are related to brain structures. And he has also put the study of cognitive coherence on the agenda.

Neuropsychology is a trend of experimental psychology that studies the effects of brain structure and function in the formation of psychological processes. The purpose of this field of experimental psychology is to understand topics such as how behavior and cognition are in the brain. While classical neuroscience focuses on the nervous system, neuropsychology seeks to discover how the brain and mind are related, which is why it finds commonalities with behavioral neuroscience and psychiatry.

Neuropsychology is a branch of psychology that studies and treats patients with brain damage, and tries to find out normal and abnormal behavior from the symptoms of the responsible mechanisms.

**Definition of learning disorders**

The term special learning disorder includes a group of children who have a disorder in one or more basic psychological processes related to understanding language, speech or writing.

And this disorder may be manifested in the form of failure to listen, think, speak, read, write, memorize or do math (Bayat 2012). which the American Psychiatric Association differentiates it from learning problems that are basically the result of visual, hearing or motor disabilities, mental retardation, emotional disorders, or unfavorable environmental, cultural or economic conditions (American Psychiatric Association, translation by Razai et al., 2013).

Some believe that these basic neurocognitive disorders have a developmental process that begins before elementary school and continues until adulthood (Gartland and Strauss-Nieder, 2007). This term was accepted for the first time in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders and finally in the fifth edition, this disorder was classified as a subset of neuro-developmental disorders and its title was changed from learning disorders to special learning disorder. (Mirmahdi, 2016).

The theories related to the causes of this disorder include genetic, neurobiological and environmental factors. (Christopher et al., 2013)

**Prevalence of learning disorders**

The results of the studies show that the highest and the lowest prevalence rates of learning disorders, respectively, related to math disorder (9.38%) and reading disorder (4.84%) were assigned to girls. Reading, writing and math disorders have prevalence rates of 6.28, 5.5, 26 and 8.37 percent, respectively.

The overall prevalence rate of these disorders is around 6.75%, and 7.72% of boys have learning disorders, and 6.42% for girls.

## **Theories of learning disorders**

### **The theory of lateral dominance of the brain**

One of the most unique aspects in the organization of the human brain is brain asymmetry, according to which the left and right brain hemispheres have separate structures and functions to some extent (Toga and Thompson, 2003). Cerebral atrophy is observed not only in humans but also in all kinds of monkeys, and this brain pattern is disturbed in various disorders such as autism, schizophrenia, and dyslexia (Sagstad, 1999). In general, there are many asymmetries between the two hemispheres in terms of appearance and function. In most people, the right frontal lobe is larger than the left frontal lobe and the left temporal lobe is larger than the right temporal lobe, and the right hemisphere has a higher level of myelination compared to the left hemisphere (Biederman, Faraone, Spencer et al., 1993). Over a hundred years of research on brain asymmetry has established that the left hemisphere (often considered the dominant hemisphere in most people) is dominant in all language functions.

including reading, writing, understanding and producing words and processing sequences (verbal and motor) has a dominant role and the right hemisphere has a higher capacity in visual and spatial information processing, perception and production of non-verbal information, including music and facial expressions. (Craig et al., 2013).

Among the most important behavioral indicators of cerebral asymmetry are hand dominance and language lateralization, and based on Broca's observations, hand dominance is closely related to language lateralization. In addition, the results of previous research indicate that academic problems, language disorders, and behavioral problems such as attention deficit and hyperactivity are more common in left-handed people than in right-handed people, and failure in the lateral superiority of the brain is the mediator of this correlation.

### **The theory of cognitivists**

People like Werner, Piaget, and Bruner believe that verbal development occurs after non-verbal development. In other words, non-verbal development is the foundation of verbal development. In the opinion of these scientists, if due to the

<http://dx.doi.org/10.29009/ijres.6.4.3>

reasons of communication and balance of normal verbal and non-verbal development, the system that has developed better is likely to be used to solve the problem. One of the reasons that confirm this theory is that these children try to use their non-verbal abilities to do school work.

Students with learning disabilities experience low levels of self-efficacy beliefs due to successive failures and low levels of self-expectations. In another article, Narimani and Vahidi determined that children with learning disabilities experience low levels of self-efficacy and self-esteem.

People like Werner, Piaget, and Bruner believe that verbal development occurs after non-verbal development. In other words, non-verbal development is the basis of verbal development. According to these scientists, if for some reason the connection and balance of normal verbal and non-verbal development is disturbed or interrupted, it is possible that the system that has developed better will be used to solve the problem. One of the reasons that supports this theory is that these children try to use their non-verbal abilities to do their school assignments.

Students with learning disabilities experience low levels of self-efficacy beliefs due to successive failures and low levels of self-expectations. In another article, Narimani and Vahidi (2013) determined that children with learning disabilities experience low levels of self-efficacy and self-esteem.

Self-efficacy is one of the main concepts of Bandura's theory<sup>30</sup>. (Woodruff, 2011). Man's judgment of his abilities and talents in facing issues affects his way of facing. In fact, when people believe that they have the capability and ability to do an activity, they spend more time to do it and finally achieve better results. A person's self-perception affects their thinking, motivation, performance and emotions and enables them to do extraordinary things in dealing with obstacles and the feeling of competence, sufficiency and ability to adapt is manifested in them. which is called self-efficacy. (Wang, Gang, Hu, Du Chen, 2013). Self-efficacious people are more successful in solving problems and self-efficacy gives this success to a person.

With a positive judgment about their ideas and trust and confidence in their abilities and talents in creating new solutions using the facilities, they can step in the direction of unknown and new situations with more success and hope. Self-efficacy is an important factor for successful performance and basic skills. Self-efficacy is a strong predictor for the level of progress that students reach.

Also, motivation is an internal process that activates and directs behavior over time and sustains it (Slavin 2003). It seems that the motivational components that because appropriate executive performance are positive self-esteem, internal locus of control, and documentary beliefs related to effort. In other words, in order to have appropriate executive performance, students must believe that they can do something under They control the consequences and their efforts will lead to positive consequences (Brokowski and Burke, 1996).

### **Psychoanalytic theory**

Proponents of this theory believe that a normal child expands and evolves his "I" with the functions of a healthy nervous system. This child has many possibilities for his own satisfaction and with the knowledge that others feel satisfied with him. His happiness increases.

On the other hand, a child with special learning disabilities has incomplete "I" actions, and most of the child's efforts to accomplish his tasks turn into a feeling of failure. The various activities of such a child lead to self-condemnation instead of developing self-esteem and value of "I". Because the child's reactions and activities do not encourage him and therefore the child has a negative self-concept.

### **Short attention span theory**

Hallahan and Kaufman 35 (1994) found that students with attention problems cannot focus on them long enough to complete assignments, they have short attention spans, they clearly cannot screen additional stimuli, they cannot resist irrelevant stimuli. And they are extremely distracted; In addition, these people are sensitive and hyperactive. Sobhi and Qaramelki (1996) also showed in a research that children with learning disorders have poor performance in visual and auditory attention and selective

<http://dx.doi.org/10.29009/ijres.6.4.3>



attention. Lerner (1993) has proposed that most students with severe memory deficits understand the basis of the numerical system; But they are not able to quickly remember numerical matters. Kajbaf, Lahijanian and Abedi (2010) found; The memory of children with learning disabilities has a serious problem.

Abedi, Farahani and Bagherzadeh (2010) showed in a study that the neuropsychological characteristics including executive functions, attention, language, visual-spatial processing, memory and learning of students with mathematical learning disorder and normal have a significant difference.

Children with learning disabilities have an underlying role in the executive function of attention. So that Broadbent (1950, quoted by Erfani, 1997) proposed the theory of short attention span in children with learning disabilities, and the supporters of this theory believe that children with learning disabilities have problems in attention and accuracy. Rita Hari and Hannah Renval state in their review of many sensory motor related dyslexia. The main problem can be the slowness of changing attention.

Attention problems in dyslexic children have been divided into three categories: paying attention, making decisions and sustained attention.

Children with learning disabilities have many cognitive defects, including short-term spatial memory, selective attention, and working memory.

### **The theory of consciousness processing**

Emphasizing how the process of receiving knowledge by children and also the nature of the efforts they make to know the world around them, actually forms the core of the theory of knowledge transfer. Proponents of this theory believe that children with special learning disabilities have difficulties in receiving, recording and returning information given in a special learning channel. There are certain assumptions in the theory of consciousness processing.

- The first hypothesis: there is a growth sequence in acquiring skills.
- Second hypothesis: Children who have special learning disabilities have difficulty in analyzing received information and stimuli.

- The third hypothesis: treatment and training are effective when the existing forms in the processing of awareness are identified and determined.

### **Growth delay theory**

Developmental delay is a term that is used for children who do not show the developmental characteristics expected of them according to their age, and it is significant in motor, cognitive, emotional, language and social areas (Peterson, Lustsani, 2011).

Proponents of this theory believe that children with special learning disabilities absorb information and environmental stimuli in certain areas slower than their peers. Therefore, they act like younger children. A number of scattered researches show that such children are not different from other children in terms of learning quality, but they are different in terms of quantity; That is, they are slower or slower than normal children in learning material. This theory was mentioned by Kershili (1970).

Theories and researches related to child development show that children go through different stages of development from infancy to puberty. During infancy and early childhood, they go through the sensorimotor stage. At this stage, they experience their surroundings with the help of sense and movement. By touching, grasping, releasing, balancing, crawling, and tasting, children gradually progress toward perceptual stages. Although hearing and muscular-tactile sense also play an important role in the perceptual stage; But the main medium of learning at this stage is usually visual perception.

By examining the opinions and theories of Jean Piaget and Hebb, it seems that both of them believe in the existence of a direct correlation between meaningful movement experiences in the early years of life and the child's mental development. According to the opinion of these two scientists, during the sensory-motor period, the number of stimuli and their quantity has precedence over the quality of received stimuli; While paying attention to the qualitative aspects of stimuli becomes important at least from the age of four. (Piaget, 1996)

In both of the above stages, it is the basis of the child's development and promotion to the cognitive level. At this stage, the ability to understand concepts and acquire skills such as: naming, abstracting, verbal expression, reading and writing... emerges in the child, all of which are related to academic activities. Therefore, it is very important for children to have a rich background of perceptual movement experiences as a basis for school learning.

According to Getman, a person must go through a certain stage in order to acquire movement and perception skills and reach the next stage. People who have learning disorders have stopped at one of these stages or have not completed some stages well (Tabrizi, 2004).

Therefore, brain exercises are very useful in this case.

### **The theory of mild brain damage**

Here the question is whether children with special learning disorders. And there is no specific brain damage in them, do they have partial brain damage or lack of nerve development? A study of various medical records and reports of mothers conducted by Avon and others (1974) shows that mothers of children with special learning disabilities had more medical problems with their children than mothers of normal children. Also, their babies are restless and have more chronic pain than normal babies, and these children have problems in learning language and show more aggressive and angry behaviors.

### **Multifactor theory**

Hastrak (1976) writes in his article: "Although the various theories that make up the history of study and research on special learning disabilities and each of them propose different explanations and causes are very valuable; In most of them, it has been tried to show that this phenomenon is caused by one factor. who have tried to explain all types of special learning disabilities by them, to divide such children into different groups so that the different theories of each include a group of these children.

### **Special failures of seafaring**

Faith Hollis (1988) divided learning disorders into two main groups:

- 1- It divides verbal learning disorders.
- 2- Non-verbal.

### **Special deficits in non-verbal learning**

Non-verbal learning disorders (NLD) include a number of special potentially disabling symptoms that Rourke (1995) has divided into three main categories including: neurological deficits, academic deficits and socio-emotional, adaptive deficits 55. (Roman, 1998).

Neurological defects include problems in visual and tactile perception, mental-motor coordination, visual and tactile attention, non-verbal memory, reasoning, executive functions and special problems in language and speech.

Academic deficiencies include problems in areas such as: deficiencies in mathematical calculations, mathematical reasoning, comprehension and reading of some materials and aspects of written language and handwriting. Social deficits include problems in social perception and social interactions. Children with this disorder seem to be at high risk of suffering from various forms of psychopathy (Rourke, Jung-Velinar, 1989).

Non-verbal learning disorder includes: attention deficit/hyperactivity disorder, developmental inconsistency disorder, hyperactivity disorder, cerebral palsy, psychomotor disorders.

### **Special deficiencies in verbal learning**

Verbal learning disorders usually appear at the level of symbolization and hence affect the formation of concepts. Symbolization is the ability to communicate or turn visual and auditory ideas into meaningful symbols. Symbolic processing includes all the actions necessary to successfully read, write, spell, count, and speak. The formation of concepts is considered the most important form of intellectual activity and is related to the ability to classify, abstract, critically analyze, generalize and invent. Verbal

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learning disorders are usually divided into three categories: internal language, receptive language, and expressive language. Since effective education is based on correct communication, it is necessary for educational specialists to be aware of the individual differences of children in understanding and using language. (Secretary of Tusi, 1987)

Special deficiencies in verbal learning include: poor reading 65, poor writing 66, special failure in math learning.

### **Dyslexia**

Reading is the basis of learning. When a normal reader is in front of a visual stimulus such as a text, the stimulus first enters the occipital region of the right hemisphere through the optic nerve channel, and then enters the left hemisphere from there. After entering the occipital region, it enters the angular gyrus region. In the area of the angular gyrus, the letter matching occurs. There are two important areas in the angular gyrus. One is Broca's area and the other is Wernicke's area. It means matching between what is written and its sound. In Wernicke's area, the understanding of the material and the correct understanding of the word and recognition take place. Wernicke is responsible for the received language and the place of recording codes and auditory meaning of words. Then it enters Broca from Wernicke. Oral reading occurs in Broca's. Broca and Wernicke are located in the multisensory area. The multisensory area is also involved in reading, writing and math.

Wernicke and Broca's area does not work properly in dyslexic individuals. Therefore, he has difficulty understanding or expressing words.

Three important components in insufficient reading: accuracy, speed, comprehension

Broca's reading accuracy and reading speed is in the angular gyrus, and comprehension is in Wernicke's.

It should be noted that a poor reader is someone who is not a beginner.

Dyslexia is one of the most common learning disorders among primary school students. 80% of children with learning disabilities have dyslexia. According to some

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experts, dyslexia is the main cause of students' failure in schools. Reading experiences strongly affect students' sense of sufficiency and competence, self-concept and self-esteem. In addition, it can lead to behavioral disorders, anxiety and lack of motivation. (Bachen, 2009)

Based on Baker's reading balance model, dyslexia is caused by a disturbance in the structure and function of the brain hemispheres. This approach considers dyslexia to be caused by a failure in one of the left and right brain hemispheres or both brain hemispheres (Baker, 2006).

This model states based on the neuropsychological perspective; Reading skill consists of two main stages. The preliminary stage is carried out by the right hemisphere; According to the function of this hemisphere in spatial thinking, it is primarily responsible for extracting the spatial visual aspect of the written word. At the beginning of reading, the brain must analyze the written word in terms of spatial form and then understand this spatial form with its meaning (Baker, 2006). Over time, with the acquisition of skills in reading and the automation of this process, the importance of the first stage is reduced, the second stage of reading in which the left hemisphere is more important (semantic stage) begins, and in this stage, reading is done with greater speed and understanding. Takes. Based on this model, reading skill is a complex process that requires the transfer of work from the right hemisphere to the left hemisphere of the brain. In other words, the transition from the basic stages to advanced and complex reading is at the same time with more obvious activity of the right hemisphere to the left hemisphere of the brain. In children, this transfer does not take place or occurs faster than its time; It causes problems in the field of learning.

It is learned (Bachen, 2009). Therefore, perceptual disorders of the elementary form of reading and linguistic disorders distort the complex form of reading.

Based on Baker's balance model, there are many children who definitely start learning to read through right hemisphere strategies; But they fail in advanced reading that requires left hemisphere activity. The reading process in these children is relatively

slow and interrupted and accompanied by hesitation. This category of children is called perceptual type 70 (P) dyslexic children.

In another group of children, the activity of the left hemisphere started earlier or the left hemisphere played the main role from the very beginning. This group is indifferent to the characteristics of words or other perceptual tasks, so their reading is fast, hasty, imprecise and full of mistakes, and they usually suffer from addition and deletion errors. This group of people suffering from reading disorder of the cognitive-linguistic type is called 71 (L).

Based on neuropsychology, Bakr has classified and treated P/L dyslexic children. According to Baker's belief, the brain has the ability to change through the stimulations resulting from psychological interventions. That is, according to Bakker's balance model, P-type dyslexic children can be treated by stimulating the left hemisphere of the brain, and L-type dyslexic children can be treated by stimulating the right hemisphere of the brain. Because type P dyslexic children have insufficiency in the left hemisphere and type L dyslexic children. (Robertson 72 and Bakker 2002).

### **Dyslexia treatment**

For type P, I stimulate the left hemisphere. The left hemisphere is related to abstract concepts. For L, we stimulate the right hemisphere, which is related to objective concepts.

We ask the child to bring a book, open it randomly and read from it. We make a list of his mistakes, he reads and we write. Then we divide the words into objective and abstract groups and write them in two separate columns.

We use objective concepts to stimulate the right hemisphere, and we also stimulate the left hand, left foot, and left ear.

We use abstract concepts to stimulate the left hemisphere, and we stimulate the right hand, right leg, and right ear.

We stimulate the path of auditory and olfactory nerves, etc. We use the five senses.

We take two colored talaqs so that those colors do not cause allergies for the child. For example, one green, one red, concrete words are highlighted on the green talaq and abstract words are highlighted on the red talaq with the help of sewing roulette. for the child to touch

One of the headphones can be used to stimulate the right or left ear.

It is useful to use green and red balls with the same concepts and throw them with the desired hand or foot.

The olfactory nerve pathway passes right next to the reading nerve pathway. Therefore, smelling good smells can also be used. Smelling a good smell, a scented pen, a good perfume for any concept causes limbic stimulation.

### **special failure to learn mathematics**

In 1980, in the third edition of the Diagnostic and Statistical Manual of Mental Disorders, it was proposed as a disorder, which, based on the new changes in the 5th DSM, is referred to as a specific learning disorder called dyscalculia, and its characteristics are deficits in understanding numbers, memorizing The rules of arithmetic, the accuracy or smoothness of calculations, the correctness of mathematical reasoning, with mild, moderate and severe severity. (American Psychiatric Association, 2013, Ganji translation 2015). Mathematical disorders include four groups of disorders: language skills (understanding mathematical terms and converting written problems into mathematical symbols); Perceptual skills (identifying and understanding symbols and sorting sets of numbers); Mathematical skills (the ability to perform four basic operations) and attention skills (copying the correct shapes and observing the operational symbols correctly). (Sadok and Sadok, 2016; translated by Ganji, 2015).

Kaliski (1967, quoted by Faryar and Rakhshan, 2013) has pointed out that most of the symptoms that characterize children with learning disabilities can be related to problems in the area of calculation, confusion in spatial perception, abnormality in visual perception, unreasonable persistence, Difficulty understanding symbols and cognitive impairments are all obvious consequences for general learning



According to Piaget, logical and mathematical structures are all abstract. Mathematics is actually a science that studies the order of abstraction from specific objects and phenomena that represent them, and in other words, mathematics is a mental activity that has integrated systems of visual, spatial and geometric concepts. The role of mathematics is to study the connections between concepts and mental functions that can occur between them. According to some researchers, the problem in processing numbers of students with math disorder is due to their neurological defect.

This group of children usually have severe problems in the field of understanding spatial relationships, visual memory and understanding shape stability, and in examining the mathematical difficulties of this group, attention should be paid to their visual perception, attention and thinking problems, and sometimes factors such as weakness in visual information processing, lack of attention and difficulty in reading, dyslexia, especially for solving problems that are expressed descriptively, it causes disruption in solving mathematical problems and calculation skills.

Math skills are often divided into two categories: basic math calculations and math problem solving. Both categories, to a different extent, involve all processes and components of short-term memory and working memory. Even the simplest mathematical calculations obviously require three types of working memory processing, including: temporary storage to hold information, retrieval and access to related methods and processes, operational processing that transforms information into numerical output. Complex problems, such as those requiring transfer and borrowing, require multiple working memory operations. Whenever several steps are required, the additional numbers resulting from the results of intermediate calculations must be stored in the working memory until they are needed to be retrieved in the next step. If this information is lost, errors will occur.

Functional neuroimaging studies have also shown a significant overlap in the parietal and prefrontal cortical areas involved in working memory and numerical problem solving. Overlapping patterns have been commonly identified in the posterior

cingulate cortex and premotor cortex as well as the lateral prefrontal cortex. (Menon 80, 2016)

### **Treatment of mathematical learning disorder**

In the perceptual-movement theory he presented, Keparat believes: normal development helps the child to create a stable perceptual world for himself, but children with insufficiency have a shaky and unreliable world. When these children face symbolic issues, they face obstacles due to their incomplete bias towards the realities of the surrounding world (such as time, space, distances, etc.).

Davis has presented two reasons in his explanation of apathy. According to him, hyperactivity has two causes: the first cause is due to the feeling of being lost that occurs in a person with learning disorder, the sense of balance and movement are also distorted. Our senses of balance and movement are regulated by the force of gravity and the surrounding environment, and any kind of distortion in them may show a wrong view of the physical environment to a person, and the second reason is the lack of stability of perception and the lack of accurate perception. Because if we have a stable perception, even if it is not very accurate, we can learn to read, write, spell and do arithmetic. But most dyslexic people (Davis considers all these children dyslexic), do not have this perceptual stability.

Getman has introduced the learning model based on seeing and visual perception, and according to his model, certain learning levels have been determined and to reach a high level of learning, the child must have acquired the necessary stable and stable skills at the previous level. Several educational programs have been presented based on Getman's theory. One of them is the program for tactile strengthening of motor vision and it has programs for six developmental areas, including general coordination, maintaining balance, hand-eye coordination, shape and context recognition, eye movements, and visual memory.

Therefore, according to Piaget's stages of development and Kopart's movement theory and with the explanations mentioned above in relation to math learning disorder,

movement and balance games can be used to treat math disorder; such as swimming, martial arts; Sports, gymnastics, balance ball, balance board, li-li, steps and...

And to increase working memory, you can use all kinds of computer games or puzzles.

Symptoms of spelling disorder:

- Unreadable writings
- Abnormal size of writings
- Difficulty in writing and inverted words
- Delete words, letters or unfinished words
- muscle cramp
- Taking strange positions of the wrist or paper while writing
- Slow writing

Refrain from writing

- Fast fatigue while writing
- Inability to implement and organize your thoughts on paper
- Answers are too short
- Not interested in writing

Refrain from showing your writings to others

- Hasty and imprecise writing

Effective factors in spelling and writing disorders:

- Movement control disorders
- Visual perception disorder

- Visual memory disorders
- Lack of accuracy and attention
- Weak motor skills
- Deficiency in visual perception of letters and words
- Poor visual and auditory memory

Difficulty in transferring information from one sensory channel to another

- Abstractness of the content
- Damage in executive functions (Karim Sawari, 2007)

Types of dictation disorder

- Errors related to visual memory
- Errors related to visual sequence memory
- Errors related to visual cleaning
- Errors related to auditory memory

Errors related to auditory sensitivity (accuracy)

- Reverse writing
- Correspondence writing
- Underwriting
- Non-observance of educational points

treatment:

**Below are some suggested strategies for teachers and parents:**

- stimulation of nerve cells.
- Breathing exercises.

- Hearing sensitivity exercises.
- Exercises to strengthen listening memory.
- Visual memory strengthening exercises.
- Exercises to strengthen visual and motor coordination and exercises to strengthen sequence memory.

In children with learning disabilities, we introduce:

Exercises to stimulate nerve cells

- The student's walking according to the teacher's rhythm
- Jumping on both sides of the rope (side to side and front to back)
- Li-Li practice walking with both feet in different directions while holding a book on the head
- Turning the rod with fingers
- Sleeping and rolling
- Pantomime performance
- Performing emotional states with facial expressions

Crumpling the paper with both hands at the same time

- Counting numbers in reverse and in reverse, even and odd
- Imitation of animal movements

Breathing exercises

- The child should lie on his back and feel the movements of his chest by placing his hands on his chest and inhale and exhale.

- Perform the previous exercise in a sitting and standing position, breathing slowly through the nose and exhaling from the mouth, and if possible, perform this exhalation on a mirror or glass to witness it.
- Clean the dust on the table or surfaces by blowing.
- Play the balloon blowing game.
- Control and move an egg ball with feet.
- Use instruments that need to be blown and make sounds.
- To hold the breath and at the same time make the sound of one letter long and continuous.
- Whistle with different songs.
- With the therapist's command, take his tongue out of his mouth and take it inside or turn it in different directions.
- Open and close his mouth with the therapist's command.
- Touch the tip of the tongue in the inner and outer part of the gum and move it up and down.
- Imitate a song using only exhalation sound.
- Exercise for auditory sensitivity
- To teach a new sound, pronounce a number of meaningless words and make an agreement that whenever he hears the desired sound, he will give a special sign.
- Choose words that have more auditory discrimination and are likely to be confused with similar words and teach them to pronounce them correctly, then in a game ask the child to listen to the words you pronounce and if you pronounce it wrong say.

- In the form of a game, pronounce words in half and ask the child to pronounce them completely.
- Pronounce the sounds of a word with a space, let the child listen carefully and then pronounce the word completely (this exercise can be done in reverse, for example).
- Prepare pictures where the last sound and the first sound are the same and ask the child to say their names after showing the pictures.
- Show the child some pictures, among which the names of the two pictures start with the same letter and ask the child to say the names of the two similar ones.
- Similar to the previous exercise, but this time their final letter should be similar.
- Show a number of related pictures to the child and ask him to make a story for them and use the correct pronunciation in it.
- Write the letters of the alphabet on pieces of cardboard and give a few of them to Cook each time and ask him to make as many words as he can with them.
- You can pronounce some sounds and ask the child to make some words with them.
- Imitating the sounds of animals or different objects is also useful.
- The therapist reads a number of words out loud and the child repeats the last letter out loud; This exercise is also applicable for the initial and middle letter in three-letter words.
- The therapist hums a song and asks the child to imitate it.
- In order to strengthen the hearing sensitivity of the child, the teacher or therapist can place the child in the middle of the room and close his eyes, then move at a distance of two or three meters from him and pronounce a word and

the child should move in the direction of the sound. Each time you can pronounce the word in a quieter voice to strengthen the listening sensitivity.

#### Listening memory strengthening exercises

- First, say three words to the child and ask him to repeat them one after the other and proceed in the same way so that he can enjoy listening memory at the level of his developmental age (first without respecting the order of the words and then following the order of the words).
- Sit some children together and ask them to be the first person to say a word and the next person to add a suitable word to it and proceed in the same order.
- Repeat the previous exercise but this time do it with a sentence.
- The therapist gives two toys to the child and asks him to arrange them according to the therapist's instructions, then the number of toys becomes more and the commands to arrange them become more complicated, so make the exercise more complicated.
- Say one sentence to the child and ask him to repeat them and then say two sentences, continue this exercise until the child reaches normal ability.
- Visual memory strengthening exercises.
- Give two pictures one by one to the student and then take them out of his sight and ask him to describe them.
- Do the previous exercise with three images until the child's visual memory reaches a normal level. Show the complex to the child and ask him for a relative image so that he can remember the whole and its parts. After the time that the child thinks is enough, take the picture out of his sight and ask him to describe the details of the picture. Usually, in the first few times, few details remain in his visual memory, but after you provide him with the image again and ask him to view it again and remember its parts, we find out that this time the type and



quality of the look The child and the attention to detail are different in him, and this difference is actually the treatment we are looking for.

- Place some toys or any other equipment in front of the child and then cover them with a cloth.
- Take one of the toys away from the child and ask him to identify the device.
- Arrange a limited set of objects in a certain order and ask the child to remember their names and order, then close their eyes and move a few objects, then ask them to Arrange in the same order as before.
- Ask the child to go out of the classroom for a few minutes and in his absence, change the places of some of his classmates together, and then when he enters the class, you must identify who has moved and where they have gone.
- Prepare some 7\*10 cardboard cards with a word written on each one, give the cards to the student to remember; Then take the cards from him, take one or two cards from among the cards and ask him to identify which cards you took.
- Prepare cards similar to the previous exercise and ask the child to look at them carefully and pay attention to them, then take the card out of his sight and ask him to write its dictation in the air with his finger.
- Exercises to strengthen visual-motor coordination
- Prepare the geometric shapes and images in the form of dots and ask the student to complete the dots.
- Ask the student to copy geometric pictures, animal shapes, buildings and objects.
- Introduce three or four students and then this student should show their order.
- You stand in front of the student and do some physical movements and ask him to repeat them in order.

- Prepare a cardboard card and write three or four letters on it, show it to the student and after giving him enough time, hide this card from him and ask him to write those letters in order. say Repeat this exercise with words.
- Make several empty cans and put things like rice, beans, pebbles and nuts inside each of them, then shake the cans one by one. The child must recognize and name the substance inside the can from the sound of the can.
- Prepare a pair of plastic cans from the previous exercise, that is, two cans with pebbles inside, two cans of rice, two cans of beans, etc., then put the cans together in a box. The child should pick up a can and shake it, and after recognizing the sound and content of the can, find a similar can.
- Cover your student's eyes with a handkerchief and ask his classmates to call his name and he will recognize who called him. Calling the student's name by his classmates should not be in the same order as they are sitting, but people should call from the corners of the class.
- Teach the sound of musical notes and ask the student to say the name of that note by playing each note.

## Conclusion

Due to technological advances in neurocognitive research, more experts now accept that neuropsychological dysfunction is a major contributing factor in many cases of learning disabilities (Halahan, 2005). In this article, a review of the methods of diagnosis and treatment of learning disorders according to the new approach of neuropsychology was done in the three areas of dyslexia, special mathematical learning disability and dyslexia. Since the period of studying in school is one of the golden periods for the growth and education of children and adolescents, and learning disorders in adolescents and failure to deal with it in time can have destructive effects on the personal and social life of students, so it is suggested that counselors By being aware of the problems caused by learning disorders in their students and children and the effective methods of treatment and

recovery using the neuropsychological approach, the school, teachers and parents should help them to spend this time well and become a successful person in the future. to become independent in their lives and to prevent possible risks such as mental illnesses, dropping out of school, and delinquency.

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