The study of visual perception (space and movement) by the method of "VSS"

D.V. Kyryllov  
V.Ye. Lunov

Bagomolets national medical university

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The study of visual perception (space and movement) according to the created by the author's method of "VSS" (visual-spatial selectivity) includes the perception of the distance or distance in which objects are located from the observer and from each other, the direction in which they are located, the size and shape of objects. The perception of space - the position of an object in space, its size, contour, relief, as well as its peace and movement - is usually carried out by a moving eye. As our study has shown, many spatial perception operations are innate [9]. However, their coordination is carried out in vivo. An important role in the ontogenetic development of space perception is played by the inclusion of the indicated operations in the composition of practical and then perceptual actions. Based on data on the spatial position of objects, the perception of movement is built [1].

Key words: visual perception; "VSS" (visual-spatial selectivity); cerebral palsy (ICP); nystagmus; perceptual operations.

Introduction

Visual impairment may be associated with visual impairment, which is often observed in adolescents with cerebral palsy [4]. Severe visual impairment (blindness and low vision) occurs in 10% of adolescent's with cerebral palsy, and approximately 20-30% has binocular vision disorder [2, 7]. The impossibility of a consistent visual-tactile perception of space leads to the fact that the image of memory is fragmented, fuzzy; the adolescents is unable to evaluate the planes of space, details, proportions, and other features [10]. The basis of the perception of three-dimensional space is the function of a special vestibular apparatus located in the inner ear [5]. It is closely connected with the apparatus of the oculomotor muscles and each change in the vestibular apparatus causes reflex changes in the position of the eyes; with fast and prolonged changes in the position of the body in space, pulsating eye movements occur, called nystagmus, and with a long rhythmic change in visual irritations (for example, with a quick change in the pictures of space) [3].

Research results

We have developed the method of "VSS" (visual-spatial selectivity) for peripheral vision, which is aimed at revealing the ability to spatial perception and movement of objects, and with its help to study some mechanisms of visual perception disturbance and its pathogenically substantiated development. 20 color photographs depicting space and objects of A-4 format, having various shapes and topographic features. Since the visual perception of space is closely related to the processes of processing spatial information in such sensory systems as auditory, vestibular, musculocutaneous, and is essentially polymodal. In it we distinguish two groups of perceptual operations:

- 1st group provides an assessment of the remoteness of objects (depth of space);
- the 2nd group provides an assessment of the direction of movement (visible) in which a specific object of space is located.

A study on the 1st group of perceptual operations, which provides an assessment of the remoteness of objects, was carried out individually - based on the adolescent's specialized clinical sanatorium "Hadhzhibey". Time - the first half of the day, from 11.00 to 12.30. An individual
peripheral vision, but in adolescents with cerebral palsy, the image depth turned out to be distorted and unformed to the full. Most likely, the depth of the visible image in adolescents with cerebral palsy is affected by congenital pathologies of vision, such as amblyopia (also called a lazy eye, which reduces the visual acuity of one or two eyes), strabismus, double vision, a violation of the coordination of eye movements, the upper eyelid is lowered (ptosis), involuntary movements of the eyeballs (nystagmus) [12].

The study with adolescents was normally carried out in groups and individually based on two comprehensive schools in Odessa No. 13 and No. 73. Time from 14.00 to 16.00. All subjects were informed about the goals and objectives of the study - to study spatial disturbances. The test subjects did not cause any difficulties. To assess the parameters of remoteness and the degree of its deviation from the norm, the ability to recognize the image of visible space, which is a generally accepted indicator in psychophysical studies using the comparative analysis method. Statistical analysis was performed using the Microsoft Excel program.

The results of the study on the material of the author's methodology of VSS "visual-spatial selectivity, (image depth)" (n = 201 with cerebral palsy)

<table>
<thead>
<tr>
<th>Age (number of full years)</th>
<th>The boys</th>
<th>Girls</th>
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<td>33 12 14 2</td>
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<td>42 10 14 4</td>
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<td>51 9,5 13,5 4</td>
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<tr>
<td>Total</td>
<td>159 - - -</td>
<td>42 - -</td>
<td>201 - -</td>
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<td>Mean</td>
<td>- 9,5 12,83 3,33</td>
<td>- 10,6 14 3,4</td>
<td>- 10,1 13,4 3,3</td>
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Note:
N is the number of subjects;
S₁ is the front border of the visible image of space;
S₂ is the rear border of the visible image of space;
D - The depth of the visible image of space (depth of field image), is determined by the difference between the rear and front borders (D = S₂ - S₁).

From the analysis of table 1, we can draw the following conclusions: in adolescents (boys), we identified two age groups - 11 (n = 18), 14 (n = 34) and 15-year-olds (n = 42), which showed relatively good results in our research. The lowest rates according to the method of "visual spatial selectivity, (image depth)" in groups of 10 and 12-year-olds (n = 35).

Adolescents girls have the highest results in groups of 13 (n = 11), 14 (n = 9) and 15-year-olds (n = 9). Low rates in adolescents girls in the 11-year-old group (n = 5).

The indicators of the average norm in adolescents with cerebral palsy are "blocked" by more than 3 times (upward) according to the assessment of the remoteness of objects (depth of space).

The study of this indicator of visual function (the depth of the visible image) made it possible to identify an important fact in adolescents with cerebral palsy, there may be a relatively normal visual acuity in the center of the visible image and significantly decreases as it approaches the edges of the image [6]. This confirms our assumption about the differences in the mechanisms of formation of the image depth in relation to the visible space [8].

The measurement of this indicator (image depth) in adolescents with visual impairment in cerebral palsy is proved by the fact that the depth of the visible image often suffers in the presence of pathology of the vestibular system and the parietal cortex. It is worth noting that objects to the front of the visible space are colorless.

The study was conducted in a well-lit room and the eye is able to determine the boundaries of the visible image with...
to the average values of the ability to recognize the image of visible space in the groups of examined adolescents.

The results of the study on the material of the author’s method of VSS “visual-spatial selectivity” (image depth) (n = 200 normal)

<table>
<thead>
<tr>
<th>Age (number of full years)</th>
<th>Number (N) of subjects</th>
<th>The boys</th>
<th>Girls</th>
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<td>160</td>
<td>40</td>
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Note: N is the number of subjects; S is the rear border of the visible image of space; S1 is the front border of the visible image of space; D - the depth of the visible image of space (depth of field image), is determined by the difference between the rear and front borders (D = S₂ - S₁).

From the analysis of the results of table 2 we can conclude: All adolescents without developmental disabilities showed results above the average norm. In adolescent boys, a group of 13-year-olds stands out (n = 27), the overall result of which is in the region of maximum values according to the criterion D - the depth of the visible image of space (depth of field image).

Minimum results in the group of 14-year-old adolescent boys (n = 13). In adolescent girls, the maximum values according to the applied method in groups of 11 (n = 11), 12 (n = 10), 13 (n = 7) and 15-year-old (n = 4) adolescents without developmental disabilities.

Minimum indicators in the group of 10-year-old teenage girls (n = 2). Thus, in conclusion, based on the results of applying the experimental methodology of the author’s method of VSS “visual-spatial selectivity” (image depth); the following conclusions can be drawn:

Conclusions

The study of visual perception (space and movement) according to the created by the author’s method of “VSS” (visual-spatial selectivity) consists in the ability to recognize the image of the visible space presented in the form of stimuli (20 color photographs with the image of space and objects in A4 format) and allows to identify reliable information on the functional state of the visual perception of the subjects due to developmental factors. The experimental data indicate a high dependence of the state of the visual functions of the subjects (visual perception) on the defective and in some cases on the distorted perception of space and objects. In adolescents with cerebral palsy, the indicators of the average statistical rate have not been achieved [11]. This confirms our assumption about violations in the mechanisms of formation of the image depth in relation to the visible space. Measurements of the indicator (image depth) in adolescents with central visual impairment in cerebral palsy are proved by the fact that the depth of the visible image often suffers in the presence of pathology of the function of the vestibular system and the function of the parietal cortex of the central nervous system. And as a result, in adolescents with cerebral palsy, the image depth turned out to be distorted and unformed in full. The depth of the visible image in adolescents with cerebral palsy is affected by congenital pathologies of vision, such as ambylophia (also called a lazy eye, which reduces the visual acuity of one or two eyes), strabismus, double vision, a violation of the coordination of eye movements, drooping upper eyelid (ptosis), involuntary movements of the eyeballs (nystagmus). In adolescents without deviations in development, the following feature was revealed - out of 20 color photographs of space presented, in our methodology the maximum values are determined by determining the front border of the visible space and determining the back border of the visible space: for all 20 presented stimuli.

Violation of constructive praxis in adolescents with cerebral palsy is a very common pathology in practice. In this case, the etiology of visual-spatial syntheses, as well as the spatial representations that underlie visual perception, will be evidenced by the neuropsychological features of the detected disorders, reflecting their relationship with early organic damage to the parietal-occipital parts of the cerebral cortex. The presence, along with the neuropsychological symptoms of the parietal-occipital dysfunction of the primary violations of constructive praxis, testifies in favor of a mixed etiology of visual-spatial afforestation and control over the execution of actions, correction of errors (actions) in cerebral palsy.
References


