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NEUROPSYCHOLOGICAL MODEL OF SENSORY INTEGRATION

One of the main speech and communication disorders causes in childhood are currently considered the sensory integration disorders. Particularly, sensory disintegration is suggested to be a mental underdevelopment mechanism in autism spectrum disorders (ASD).

But the sensory integration neurological and neuropsychological models are not clear enough.

Our study included 91 pre-school children (3 to 7 years old) with severe speech disorders (SSD), including 63 boys and 28 girls. They were examined comprehensively, using speech therapy and neuropsychology methods.

Their parents complained on insufficient social inclusion, lack of interest to other children, emotional frigidity. Other ASD symptoms also were present in 2/3 of the sample (61 child). Part of the sample, 16 children, were officially diagnosed with ASD (F84.x according to ICD-10).

Speech and communication processes in these children can be generally characterized as follows (although the individual variability is quite large):

1) low or extremely low interaction activity, inability to initiate contact. Communicative initiative rigidly binding to specific desired objects or adults' actions;

2) significant (for the child) object mediated communication leads to the addressed speech understanding at the 1.5-2 years of normal ontogenesis level. These are quite short, 3-5 words, simple common sentences. Without an item (object), a child can't hear an adult. This applies both to the "alien" adult (specialist) and parents;

3) large motor skills are poor in repertoire, distorted in operations composition, do not stop for a moment. At the same time, there are only sporadic bursts of movement in the oral musculature. Most of the time, the muscles of the speech apparatus are motionless and have signs of mixed, afferent and efferent paresis. This paresis is inherent in the cerebellar and stem forms of dysarthria;

4) productive speech of this children ranges from proto-sentences such as subject and predicate combination to weakly intonated vocalizations. Oftenly, there was a 10-20 phonetically distorted words vocabulary what is normal at the rate of 12-14 months. Approximately the same number of babbling pseudo-words (woof, meow, beep-beep). Gestures perform in the role of verbs, vocalizations – in service parts of speech role;

5) when the passive vocabulary is tested with realistic toys or object pictures usage, it usually covers most of the household items. Passive vocabulary also envelops the summarizing household category words (food, animals, clothing). There are differentiation difficulties in same semantic group words. For example, when speech therapist shows an apple surrounded by a banana, grapes, and pears word mediated recognition takes longer than in entourage of car, airplane and soldier. There are more or less significant problems of similar sensory characteristics objects classification. A child can find a red apple among the yellow and green ones. But if it's put in group of orange and tangerine, the search slows down dramatically. Orange color, of course, is close both to red and

yellow. This is the different attributes combination inability. Finding blue items is not a problem. As well as searching for butterflies. But child can't point out the "blue butterfly", but often shows the correct object of a different color. Or the command is not executed simultaneously. Performed sequentially, the child runs his finger along the color row to the column with the correct object.

These children's drawings either consist of chaotic lines or do not have an object in it. Or the object image is simplified relatively to the calendar age. For example, the best result in the drawing of a person test in children at 5 years old kid may correspond to the age of 3 years norm.

Neurologically and neuropsychologically, symptoms of following brain regions dysfunction are detected: a) the cerebellum; b) the midbrain; c) equal strength symptoms from different brain stem structures.

This speech development picture corresponds to gross underdevelopment of the object image as a pathogenetic mechanism.

It should be taken into account, that the object image is the result of sensory integration.

And it correlates with the brain stem structures functions. Thus, the structure of sensory integration in preschool children may include the following components:

- the space coordination of large motor skills;
- the distribution of muscle and psychological tone, depending on the cognitive tasks;
- proprioceptor body image without verbalization;
- objects of child's interest overlay on the space grid of movements;
- the volume of words perception;
- connections between the object, the emotional attitude to it, and the word.

We hope that this model can help speech therapists in their correctional work.