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Sensorimotor Skills in Children of Early Age

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Abstract: Children between the ages of 0 and 3 get wounds. Even in the mother's womb, researchers found a developed vestibular sensory system in fetuses from 5 months of age, which is responsible for knowing the position of the body in relation to the force of weight. All sensory areas coordinate with each other. As we have seen, the integral model of perception functions from birth. After birth, the child is surrounded by various objects and phenomena that slowly develop sensorimotor senses. Early children learn best through play. The game stimulates all the senses — eyes for sight, hands for touch, nose for smell, mouth for taste, movement for space. Through play, the child focuses on research in which he spontaneously develops his sensory areas, which become food for the brain. Everything a child experiences through experience leaves a great impact on the child's brain and, over time, on later life opportunities and situations. It is important to offer the child a quality environment in which you will meet their individual needs and develop their sensory stimuli. The classic division of the senses refers to the vestibular system, which is important for movement and maintaining balance, the proprioceptive system responsible for muscles and joints, the tactile system for touch, the visual for sight, the auditory for hearing, the olfactory system recognizes smell, the sense for vitality and the gustatory system important for taste. All sensory systems in a child should be viewed as a whole. Only later, when the child reaches a satisfactory age-appropriate level of development, are complete observations differentiated and observed separately from each other as separate modalities.

Key words: child, development, sensory systems, play

1. Introduction

A child is a person who, from birth, has the ability to communicate with others, is unique, worthy of respect. A child is a person and it is more than psychological, physical, intellectual, social and emotional characteristics. A child is a developing personality. Children have an innate need for feeling, knowing, learning, communicating and have an inner dynamism that encourages them to strive to satisfy their needs (Mlinarević, 2004).

Children of an early age learn most through play. Play is the highest form of research, said Albert Einstein. Therefore, through play, children focus, test their body by turning, jumping, feel with their hands, touch, manipulate, taste, smell, listen to music, speech and facial expressions of adults. Children learn using their senses integrally and simultaneously. It is not possible to separate taste from smell, or touch from sight. For children, everything is complete. All the information that the child receives through the senses, those same senses send information to the brain and then the brain is fed. "Feelings are like food for a child's brain" (Car-Kolombo,

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Miculinić, 2013, p. 133).

In this paper, we will define sensory integration and see how it builds the integrity of a child at an early age, which will be the basis for building all experiences in the rest of his life. Through the text, we will explain some of the sensory systems and learn more about the meaning of sight, touch, and taste as the basis for the integrity of a complete child. During the writing of this paper, a project was implemented for the development of sensorimotor integration with the aim of integral development of children at an early age. An example of good practice integrated the tasks we set ourselves: acquiring knowledge and skills about the properties of objects in children's play with an emphasis on acquiring new knowledge about new objects with sensorimotor properties and ensuring conditions for free and undisturbed exploration of the environment.

2. Sensory Integration

The definition of sensory integration summarizes the neurological processes that organize sensations from the environment and enable functional use of the body in the environment (Ayres, 1972). Brack believes that through the senses we get information about the state of our body, whose stimuli flow into the brain like a torrent of water flowing into a lake. “Sensory integration allows us to gather information and sort it, so that our interactions with others are meaningful, so that we can learn successfully and live life to the fullest” (Brack, 2004, p. 1). A child at an early age has a great need for curiosity that seeks, explores, observes and studies various objects and phenomena in his environment. “The more stimulating the environment is for sensory experiences, the stronger children are challenged to activity, experiences become knowledge” (Bašić, 2007, p. 2). Brack also mentions how sensory integration happens on an unconscious level. This means that the sensory systems — tactile (touch), vestibular (movement), visual (sight), auditory (hearing), olfactory (smell) and gustatory (taste) — send all data to the brain via receptors for collecting information, which in turn it stores, sorts and compares, stores and uses for all subsequent periods of life.

Before we deal with the sensory systems individually, we need to look at the process that takes place in the brain during the processing of sensory data by the nervous system. Both hemispheres of the brain, the cerebellum, brainstem and spine are filled with many nerve cells called neurons which in turn transmit impulses from the body to or within the brain. “The main task of neurons is to give us information about our body and our environment and to stimulate and direct our activities and thinking (Ayres, 2002, p. 47). Over 80% of the nervous system is involved in the processing and organization of sensory input, which is why we consider the brain the most important organ responsible for sensory integration.

When children handle objects, they explore and study in different ways — by touch they feel the surface of the object, by listening they hear various sounds from nature or recognize the voices of their friends from the group, they feed their body with smell and taste. All these sensations are like a kind of food for the brain. This is why the brain needs a lot of stimulation to be able to strengthen and develop the rule. Everything that a child touches, tries, smells, sees, feels on his skin through a game or a story, all this affects the development of the brain. It is worth repeating that the integration of all senses has a positive effect on all later life situations that will happen to him.

It is important to distinguish between sensory stimulation and sensory integration. Sensory stimulation is the passive reception of stimuli, i.e., the child is passive, while sensory integration implies that the child is active and that through movement his body receives different sensory information. Accordingly, it is important to note that

all sensory areas are interconnected and coordinated. We cannot separate touch from sight, feel the rough bark of a tree from looking at the whole tree, or separate taste and sight from smell, smell the cake from looking at the shape and appearance of the cake. Everything is connected and integrated and provides a complete picture.

3. Tactile System

The tactile system is our most basic sense. He started developing already in the womb. Upon birth, the child immediately clings to the mother and absorbs the softness of her tissue. There is a special touch communication that never ends. Tactile receptors are not only present on the skin, but also in the mouth, ears, and throat, so we can talk about body image - stimulation of the child's entire body at this very early age. The sense of touch at this age is a source of emotional satisfaction and comfort and security (Ayres, 2002). The best tactile perception is achieved with the cheekbones of the fingers, the tip of the nose, lips and cheeks. In the cortex of the cerebrum there are many areas responsible for individual sensory systems. “Thus, there is an area for each part of the body, and the areas for the muscles of the fingers, hands and speech are much larger than those for other parts of the body. Thus, the cerebral cortex is particularly important for sensing and controlling precise, complex hand movements, such as for example using a fork and knife or pencil, and for speaking” (Ayres, 2002, p. 54).

In the nursery age, i.e., in institutional education, the need for touch is most noticeable, especially in the phase of adaptation to kindergarten when the child only communicates with hugs and caresses. Then he seeks touch for a sense of security and protection. At the same time, there is also an emotional-social aspect that creates a sense of the limits of one's own body in the child. We can say that there are two sides — on this side is ME as a person, and on the other side is OTHER; it is the skin that defines the place where it touches the other. This means that through the sense of touch I feel different from the other (Bašić, 2007).

Tactile stimulation has other aspects of development. With the mouth, the child eats food tactilely — hard, soft, crunchy — and thus develops his speech apparatus. The tactile system also contributes to the development of speech and communication. In addition, tactile stimulation also develops the vestibular system, which is important for movement and space. For example by catching or throwing a ball, the child develops and encourages the development of hand-eye coordination. We will talk about the vestibular system and its importance for movement in one of the other chapters of this text.

During growth and development, the child will upgrade his experience of touch through different types of touch such as hitting, pain, roughness, discomfort, caring, love. All this is necessary for the child to experience on his own skin, as the people say. This aims to form “healthy trust in physical existence in order to develop social skills” (Bašić, 2007, p. 19). Therefore, it is necessary to enable the child to build tactile perception, i.e., to build their base and thus tactile memory.

4. Visual System

Neurons in the brain responsible for vision must be stimulated. In order for the visual system to develop, light and an object that can be seen are needed. “Each new connection creates new possibilities for new sensory perception” (Ayres, 2002). Sight is responsible for perceiving objects in the near and far surroundings, it is responsible for creating logic between activity and action, for understanding signs and symbols, for perceiving other people and their gestures and facial expressions. There is really a lot that we can see, understand and experience with our eyes.

The area of the visual system is important for distinguishing colors, dimensions and shapes. The child develops this system by observing objects around him, he sees a round yellow ball, sees a green tree, cars of various shapes moving, blue sea or sky. If a child constantly moves in the same environment, he very quickly learns to notice and recognize the same things and people. Later, the child will pick up the picture book and connect objects from real life with those in the picture book or vice versa. If he observes a dog running AND barking, then he will experientially recognize the same movement in a picture book and it will be easier to name it. Here it is important to connect vision and touch. For example if he feels the cone, he will feel its folds, at the same time he sees its shape, he will undoubtedly remember it. Therefore, seeing AND feeling at the same time has a stronger effect on cognition than just memorizing its name.

Children have to “see things with their hands”. They have to feel things, smell them, taste them, throw them, play with them. A child understands both through the sense of touch and through the sense of sight at the same time. Maria Montessori also spoke about this a hundred years ago. She realized how important it is for a child to perceive the environment through the senses and how important it is to enable children to acquire appropriate experiences through the senses (Montessori, 2023).

5. Auditory System

Each sensory system has its own gradations of perception and development. With the auditory system, the child first sees the object and only then hears or feels the material of the object. If we bring that same object to sound, then it can also be defined. For example, we see paper, but we can make it sound by crumpling or tearing it, falling on the floor. Through hearing, we somehow reach what is behind the surface of an object, that is, we learn about something that is not available to the sense of sight. For example by knocking on a wall or a tree, we hear the sound of fullness or emptiness. It is also important for the auditory system of early-aged children — the voice or sound of a person important to the child. By the color of the sound, the way of speaking, the child recognizes his mother or father. Auditory perception also helps us in spatial orientation, in which we perceive from which direction the sound is coming. How do we explain the possibility of “hearing space”? This is physically explained by the fact that our two ears lie spatially next to each other and that is why the sound is not reached simultaneously in both ears, whether it comes from the front or the back. On this time difference (between the perception of one ear and the other) we know the direction from which the sound is coming.

The perception of the form of sound (speech) begins in the prenatal period. Experiments have shown that a baby can easily recognize a story read to it in the last month of pregnancy by the melody of the language, especially if the story is read by another female voice (not the mother). At the beginning of life, a small child can perceive all sounds and can distinguish more than 70 language sounds that appear in 6 to 8 thousand languages in the world. After half a year, the spectrum narrows unambiguously, and at the age of 6 to 8 months, the ability to differentiate is finally limited to the language/speech that the child hears in his environment. In short, a child can learn any language in the world. The only assumption is that it is surrounded by it, that it "finds" it in its surroundings. If we learn a certain language, we specialize in the sounds of that language, and we can later perceive this even more differently. “We don’t learn the language, we allow the language to grow in us,” said Derek Bickerton, world-renowned linguist.

We can sharpen children’s sounds with various auditory content activities. For example we fill the sensory bottles with rice or peas, or sand, beads, nuts, and through the recognition game we name the objects or match

them. We can design “auditory walks” — a walk through a forest or a city can be consciously designed as a “listening walk” in which one investigates what can be heard in a busy street, on a construction site, in a forest, on a river, on the sea, in a meadow, in tunnel, in a hollow tree. We can also divide the children into pairs that represent certain animals and make certain sounds: the children close their eyes, move around the room and look for a child that makes the same sound and vocalizes in the same way. There are really countless ways in which we can train the auditory system, because this significantly affects the development of speech.

6. Vestibular System and Proprioceptive System

Vurušić states that the body or vestibular system is already developed in a child in the fifth month of pregnancy. This system positions our body in relation to the earth's gravity and tells us in which direction and how fast our body is moving or at rest. “When the vestibular and proprioceptive systems do their job well and fully we have good control over head movements, a stable field of vision, good muscle tone and posture, we are able to maintain balance and generally enjoy swinging, driving, running and the like. For children whose sensory integration of information from the vestibular and proprioceptive body systems is poor, it is very challenging to walk without tripping or colliding with people or things, sit still on a chair, kick a ball, jump into the sea, ride a bicycle, tie shoelaces or find your way in the space of the new school” (Vurušić, 2013).

It is very important for a child to move, jump, run, roll, turn around its axis, spend time in water, touch mud, climb trees. Rajović talks about the fact that a child's job is to move because it is precisely the brain that develops the most into movement from the age of two to five. He even mentions the function of walking as the one that is necessary for the movements of a child at an early age. The child must develop primitive reflexes, i.e., allow them to fall and get up on their own, to find a way to catch, catch, climb, because this develops the brain. The physiology of the brain is such that billions of impulses are sent from the hand, leg, eyes, nose, mouth to the synapses, which in turn have the ability to connect everything. All this is important for the development of intelligence, says Rajović.

7. Olfactory System

The olfactory system is responsible for the development of smell. A child is already born with a sense of smell because it is connected to the mother. Bašić says that smell is always a materialized perception — we smell something that is in our environment as a substance, thing or being. Just like the sense of touch, the olfactory system represents an “encounter” with the external, something outside of my person, with something in a gaseous state, because smells are gaseous structures (Bašić, 2016).

The child experiences the sense of smell through the nose. It is used to orient oneself in space and obtain information about the environment. It is interesting to mention how the sense of smell connects the past and the present. For example an adult man “returns” to the past with the smell and remembers his mother’s Christmas cookies, he remembers his childhood and the joys associated with the holidays. The smell of cinnamon cookies is associated with pleasant and happy emotions. The wide spectrum offered by the olfactory system represents a whole series of related events, emotions, security and protection.

Children in kindergartens have various activities related to smells. There are various scented bottles with spices — cinnamon, oregano, rosemary, lavender, rose and many others. There are also fragrant oases where children express their emotional states, just like centers of solitude. Children were also offered outdoor activities

of planting herbs, picking and drying them, making tea and baking cakes. “Many phenomena can be expressed with the help of several different expressive media, which encourage the child to use different symbolic languages. For example, smells (pleasant and unpleasant) can be expressed by color, but also by facial expression (gesture), which can be documented (photographed), discussed...” (Slunjski, 2008, p. 141).

8. Gustatory System

Here we are talking about a system that is no less significant than the tactile system. It is a system of differentiating four basic tastes — sweet, salty, bitter and sour, which are connected in the oral cavity with about ten thousand different other smells. We see how they are closely related to the olfactory system because they provide and ensure a sense of satisfaction, happiness and comfort. A small child already enjoys his bottle of milk as an infant, but he will immediately react if it is not the same milk he has learned to drink earlier. The refined tastes of the tongue buds play a very important role in recognizing various types of food. The texture of the food is also related to this. Namely, today we meet children who have been taught to eat pureed food for a longer time, which is again not good for the proper development of speech. Rajović (2017) says that at the age of one and a half, a child must already switch to solid food. He notes that it is a mistake to give a child mixed and chopped food, because it does not stimulate a large part of the brain. Because the tongue moves weakly, the muscles inside the mouth weaken, so the child will be less able to pronounce certain sounds. Rajović goes even further when he says that milky tears are very important for the statics in the mouth, and their removal or falling disturbs the muscles of the face and neck, and with that changes both the statics and posture of the body.

Namely, children of an early age have many difficulties with the introduction of new food and new flavors. Bašić (2016) writes that sensitizing the sense of taste does not have to be about new tastes and new foods, but rather the ability to differentiate and perceive one quality is considered much more — about perceiving different shades of the same quality (various types of sweet, bitter, sour, etc.); therefore, it is sufficient to make only small changes regarding the concentration of, for example, fruit in yogurt or sweetness in juice. It is always important to emphasize that children’s meals must be of high quality, balanced and evenly distributed throughout the day.

An important segment in the construction of the gustatory system is the family meal together. The experience of togetherness and participation in the creation of joint gatherings has a very favorable effect on the child, who thereby nourishes his self-confidence and sense of belonging.

9. Conclusion

With this text, we tried to reach the sensory system of early-age children and thereby provide support for all forms of sensorimotor integration. We can conclude that with a rich offer of natural and pedagogically unstructured materials, we can satisfy the natural need of a young child to discover the new and unknown. Working on sensory projects is demanding, but also fun. It is necessary for children to integrate their senses and create an adaptive reaction, and thus we help the development of the brain and intelligence.

Through the project, we observed the progress of children in the field of speech development in terms of acquiring speech, enriching vocabulary, understanding and using new syllables, sounds, and words. Progress is also visible in the area of fine and gross motor skills and complex sensory skills. Guided by the idea that children learn from the immediate environment, we recognized, followed, nurtured and encouraged children’s interests and needs through constantly changing, expanding and enriching the spatial and material context. By creating a

stimulating environment, children came to knowledge spontaneously, through direct experience, research, discovery, and wonder.

We are aware that children are endowed with a special system of sensory stimuli that leads them to tireless research. When he grows up, he will also explore in a different way, but his interest will be much deeper and better because he has already gained experience of the same.

It is necessary to emphasize the importance and value of sensory experience because it contributes to better self-control, stability of emotional states, self-confidence and sensorimotor intelligence are strengthened.

References

Ayres A. J. (2002). *Dijete i senzorna integracija*, Naklada Slap: Jastrebarsko.

Bašić S. (2007). *Odgoj i njega osjetila (senzorna integracija)*, Predavanja u okviru seminara za odgojitelje predškolske djece 16. i 17. studenog i 7. i 8. prosinca 2007, Zagreb.

Bašić S. (2016). *Odgoj i njega osjetila*, Osjetilo za okus i miris, Seminar za odgojitelje. Zagreb

Brack J. C. (2004). *Učenjem do pokreta, kretanjem do spoznaje!* Ostvarenje: Buševec.

Car-Kolombo T. and Miculinić S. (2013). Kreiranje okruženja za rani perceptivno-motorički razvoj u jaslicama. Play and Playing in early childhood. OMEP Hrvatska. Alfa d.d. Zagreb.

Montessori M. (2023). *Otkriće djeteta*, Salesiana. Zagreb.

Rajovića R. (2017). *IQ djeteta — briga roditelja*, Harfa. Split.

Rajović R. (2022). "Posao je djeteta da se kreće, vrti, skače, a ne da satima gleda u mobitel!", pristup 24.4.2023, available online at: https://atma.hr/dr-ranko-rajovic-posao-je-djeteta-da-se-krece-vrti-skace-a-ne-da-satima-gleda-u-mobitel//.

Slunjski E. (2008). *Dječji vrtić zajednica koja uči*, Spektar Media: Zagreb.

Mlinarević V. (2004). Vrtićko okruženje usmjereno na dijete, Život i škola, 11/1. 112-119.

Vurušić V. (2013). "Znate li što je to senzorna integracija?", pristup 21.3.2023, available online at: https://www.poliklinika-djeca.hr/za-roditelje/razvoj-djece/znate-li-sto-je-to-senzorna-integracija.