

Sensory Integration Overview

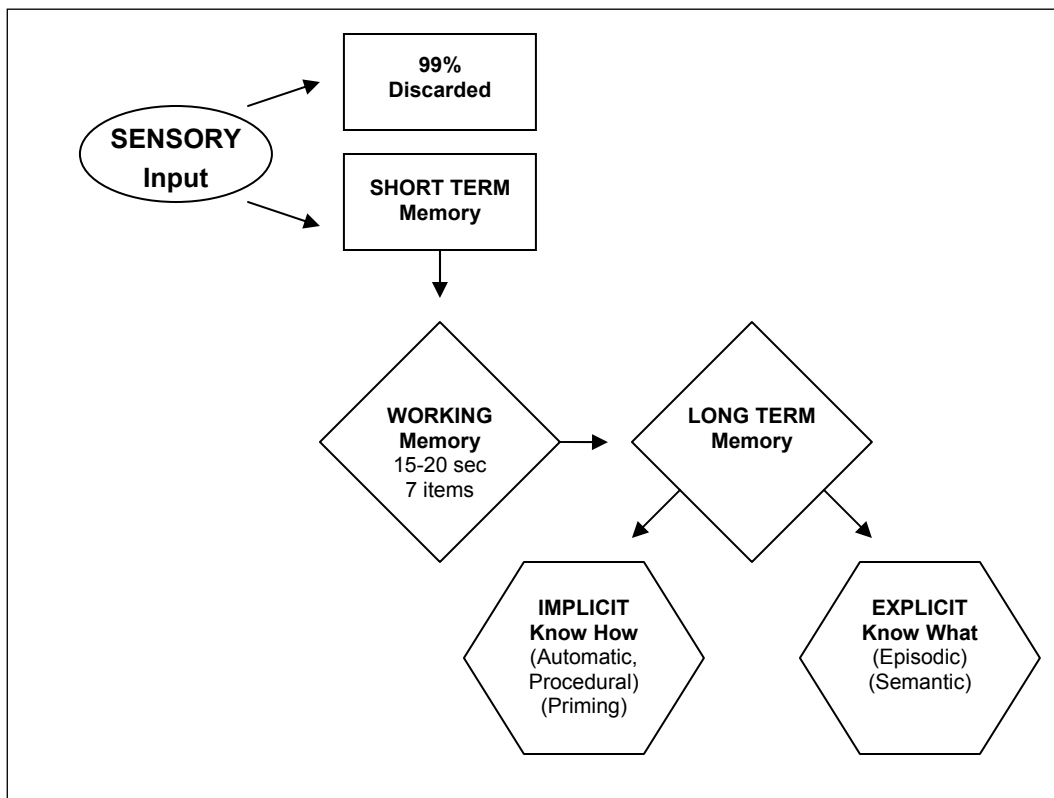


SENSORY INTEGRATION OVERVIEW

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Introduction to Sensory Integration

We as humans, spend every moment of our waking hours receiving input via our sensory system. Our brain interacts with the senses to regulate the quality and the quantity of the information we process. The most current brain based learning research tells us that 99% of the input we receive is discarded, leaving only 1% to hold onto in our short-term memory. In order to attend to our work, activity, or interaction, we learn over time to tune out extra stimuli and only respond to select information. Of the information we deem important, our working memory is responsible to decide how to act or react within 20 seconds, assuming we are juggling about seven items or less. From there we tap into our long-term memory to connect with existing knowledge and past experiences.



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The Problem

Imagine what a student experiences on a daily basis if their sensory system and brain are not providing them with the proper ability to regulate the quality and/or quantity of information they are learning and interacting with at school. They are in a constant state of struggle to balance what is expected of them and what they are able to perform. However, even students who do not experience this level of dysfunction can benefit from improving how they receive, filter, and retain information they gain through their senses.

The Seven Senses

Sensations are disparate pieces of information that must be organized and interpreted by the nervous system so that our body and mind can adapt to the world around us on a moment-to-moment basis. We experience the world through the conscious awareness of sight, hearing, smell, taste, touch, and the unconscious monitoring of balance/movement and body position.

The Hidden Senses

The vestibular and proprioceptive senses are the least present in our conscious awareness because they operate at an unconscious level. The only time we are aware of them is when something is not working to our expectations.

The Vestibular System - Balance and Movement

The Vestibular System responds to body movement and changes in head position. This system is responsible for coordinating movements of the eye, head, and body through receptors in the inner ear. It responds to the pull of gravity and registers where our bodies are in relationship to the earth, and is considered to be the bedrock of physical and emotional security. Vestibular input helps us maintain our balance by telling us whether we are at rest or in motion, how fast and in what direction we are moving, and by registering the movement of objects around us.

Students who are able to use balance and movement in effective ways are often far more successful than students who cannot. Healthy vestibular functioning allows students to orchestrate the movements and tactile feedback required to learn how to write with a pencil. However, for students with sensory integration issues, it can be a very difficult process to master the fine motor manipulation of these objects coupled with proper eye-hand coordination. The quality of our vestibular system has a direct impact on our gross motor skills as well, and can impede activities such as skipping, jumping rope, throwing or catching a ball, riding a bike, or participating in sports.

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The Proprioceptive System - Positioning of the Body

The term *Proprioceptive* comes from the Latin stem *proprius*, which means “one’s own,” and it is through proprioceptive input that we know our own body, where it is, and how it is moving. Proprioceptors send information to our brain from our muscles, joints, and bones. Because there are so many joints, muscles, and bones in our body, this system is almost as large as the tactile system (70% of our sensory receptors are located in our skin). It sends continuous information to the brain, but even when we try to pay attention to what our muscles and joints are telling us about our body position, we can only feel a fraction of the sensation that is generated by the proprioceptive system.

Students with healthy proprioceptive systems are able to move around the classroom and school with ease without bumping into other students, gather and organize their materials effectively, and sit at their desks and attend. However, for students with sensory integrations issues, it can be challenge just to take off their coat and hang up their backpack without bumping into someone, much less to sit at their desk for the majority of a seven-hour day. The quality of our proprioceptive system has a direct impact on how students function in the classroom and how their peers perceive them.

The Vestibular and Proprioceptive Systems Together

Together the vestibular and proprioceptive systems quite literally keep us grounded. They regulate our posture and muscle tone. They tell us whether we are standing or sitting, slouching or squatting, bending straightening, or stretching. They help us negotiate our distance from other people and things. As a result, we are able to move through space without falling or bumping into things. Almost all playground or gym activities – running, jumping, climbing, spinning, and swinging – excite the vestibular and proprioceptive systems. As students practice these skills, they come to understand where their bodies start and stop and how to move through physical space without crashing into other people or things.

Bilateral Coordination

The term bilateral coordination (sometimes referred to as cross lateralization) refers to our ability to organize the two hemispheres of the brain and simultaneously use our two feet, legs, arms, hands, and eyes in a coordinated manner. A baby often mirrors the movements of one hand with the other even though only one may be required to pick up the object. Over time as the baby’s brain develops, they learn how to use bilateral coordination to limit their movements to only one hand to accomplish the same task. As their bilateral coordination skills continue to develop, not

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only is the child is able to perform isolated movements, they are able to perform increasingly more complex activities that are in opposition -- such as, walking, running, jumping jacks, or riding a bike. In other words, when we walk or run -- one leg is in front of the other. Jumping jacks require are arms to be in opposition with the movement of our legs. Riding a bike requires that we balance, focus on what is around us of us, and pump the peddles all at the same time. All of these tasks require the brain is to cross the midline of the body which eventually enables us to develop many other gross and fine motor skills in which we depend on everyday at school.

Sensory Integration – How It All Comes Together

Sensory integration is the continuous neurological process of taking in information from one's body and environment through the senses, organizing and analyzing this information, and using it to plan and execute adaptive responses that lead to successful functioning in daily life. This complex set of interactions between the brain and the body and can be broken down into three complementary processes: sensory modulation, sensory discrimination, and motor planning.

1. Sensory modulation is the brain's automatic adjustment to the intensity with which sensory stimuli are experienced.
2. Sensory discrimination is the ability to distinguish one sensory experience from another.
3. Motor planning, also called praxis, is the ability to translate sensory input into organized, purposeful motor output.

Motor Planning - Praxis

Motor planning gives us the ability to conceive, organize, and carry out an unfamiliar sequence of movements in a coordinated manner. The process of motor planning includes: 1) coming up with an idea about the action, 2) having an accurate sense of where the body is, 3) starting the action, 4) executing the steps in the appropriate sequence, 5) making adjustments as needed, and 6) knowing when to stop the action. Without proper motor planning, a student will not be able to comply with simple instructions such as: *take your spelling book out of your desk, get a clean sheet of paper, put your name in the upper right hand corner, and number down the left side from 1 to 10, leaving a line between each number.* Nor will they be able to easily write legibly, write an essay, or organize their homework. Motor memory is what allows us to remember how to do things even though it may have been several days, months, or even years between each experience - like riding a bike, dancing, or swimming.

During the early school grades, sensorimotor activities are the primary vehicle for learning. Being able to sit in a chair, write, color in the lines, cut and paste, construct three-dimensional objects,

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and put together puzzles all require motor planning. These are the things that once we learn them, they become automatic and we can do them without having to consciously think about them.

Conclusion

Students with sensory integration dysfunction do not process sensory information efficiently. They are painfully aware and sensitive to input that other students do not seem to notice. Some of these students have difficulty in discriminating and integrating sensory input in a manner that leads to smooth and efficient motor output. Some students have trouble with auditory processing and often focus on the first two items without recognition or success with following the three other directions the teacher has given. Often these students have trouble making friends or feel like an outsider. For students with sensory integration dysfunction, life is a constant struggle.

The good news is with a proper diagnosis, guidance, and strategically planned efforts, these students can be taught how to regulate and organize their nervous system. Through focused effort on the systems that are lacking, many of these impediments can be greatly diminished. It is through this work that the brain becomes rewired to work in a more smoother and more graceful manner.

It is the goal of this series, to bring an overview of sensory integration, address specific issues that affect how all students learn and function in the classroom, share insights into interactions with teachers and peers, as well as provide practical teaching and learning strategies.

Reference - Sensory Integration International ~ Text Directly from Website

Sensory Integration International (SII) is a non-profit, tax-exempt corporation concerned with the impact of sensory integrative problems on people's lives. We bring together professionals, individuals, families, and researchers who want to know more about sensory integration. Our goal is to improve quality of life for persons with sensory processing disorders. We advocate early intervention to prevent sensory inefficiencies that have the potential of contributing to debilitating social or health conditions. In an effort to enhance wellness in the general public, SII promotes education about the impact of inadequate sensory processing and its relationship to health and one's occupation. A child's occupation is play and school performance.

Sensory Integration International was founded by a group of occupational therapists dedicated to helping people with disabilities through the application of knowledge from the neurobehavioral

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sciences. Historically the organization has focused its efforts on research and professional education in the area of learning disabilities, with emphasis on the pioneering work of Dr. A. Jean Ayres. While continuing this work, we now shift our focus and broaden our roles to promote evaluation of other treatment approaches and theoretical models that address sensory integration throughout the life span in a variety of diagnostic groups.

<http://www.SensoryInt.com/>

Reference - Brain Gym ~ Text Directly from Website

Brain Gym® is a program of physical activities that enhance learning ability. Brain Gym® includes 26 easy and enjoyable targeted activities that bring about rapid and often dramatic improvements in concentration, memory, reading, writing, organizing, listening, physical coordination, and more. Brain Gym® develops the brain's neural pathways the way nature does: through movement.

Educational Kinesiology – enhanced learning through movement – was created by Dr. Paul E. Dennison and Gail E. Dennison through their extensive research in areas that include education, brain function, psychology, and applied kinesiology. The Dennisons' visionary insight into the learning process led them to develop the unique approaches to education now known as Edu-K and Brain Gym - tools used to integrate the mind and body through movement.

Based on his understanding of the interdependence of physical development, language acquisition, and academic achievement, Paul Dennison early on devised simple yet powerful activities to enhance learning. Today these techniques, which Paul continues to develop in partnership with his wife Gail, are taught in a variety of settings, including schools, corporations, and athletic training programs. The Dennisons' contributions to the field of educational science are far-reaching, and have served to transform the lives of learners around the world.

<http://www.BrainGym.org>