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The Write Group

How does posture impact handwriting?

As part of the screening for The Write Group, children perform simple postural exercises in order to observe their strength and their ability to imitate body postures.

By the age of 5, children should have the muscular strength and motor control to attain and sustain the postural poses shown above for 30 seconds. When children show difficulty with these postural holds, they often show difficulty with sitting upright in a chair or maintaining their posture while sitting on the floor unsupported. As a result of postural weakness, it is often challenging for children to sit and attend for learning, as they show a slumped posture, lay their head on their desk, or have a tendency to wiggle and shift in their seat.

Rounded posture

OR

Upright posture

By working on core strengthening activities as part of The Write Group, we have found that children are more aware of their bodies within the environment, and more in control of their body while sitting. When a child has strong core musculature, they have a solid base of support and are more grounded for sitting to complete classwork. Core strength also provides a strong foundation for their neck musculature which supports functional vision. If a child is able to securely maintain their neck and head posture, their ability to use their eyes efficiently for visually tracking and visual scanning is improved.

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What is *low muscle tone* and how does it relate to posture and strength?

Low Muscle Tone

Normal Muscle Tone

Muscle tone is determined neurologically and is involuntary. In physiology, muscle tone is defined as a "response to quick stretch" of a muscle, or the speed to which muscles react to a stimulus. Muscle tone ranges from high to low. One can have high muscle tone, and react quickly to a stimulus, or show a slow response, which is considered low muscle tone. Babies with low muscle tone can be noted as "floppy" and show increased effort for moving against gravity and through their developmental stages. Individuals with low muscle tone cannot sustain a contraction of the muscle for as long as an individual with 'normal' muscle tone.

Children that have difficulty with attaining and sustaining postural poses against gravity are frequently noted to have low muscle tone. Their muscles take longer to react and contract to sustain these positions and they need to recruit more muscle fibers to complete the same action as their peers. As a result of the neurological difference in their muscle tone, they fatigue quicker and often frustrate easier than their peers.

Individuals with low muscle tone benefit from "alerting" activities to help get their bodies activated and more "ready" for postural activities. Alerting activities such as movement or tactile input to the body helps to facilitate muscle tone. Simple movement breaks such as jumping, skipping, marching, or running may be helpful before mealtime or homework as these activities require them to sustain their posture and attention. Tactile input to the muscles, such as deep squeezes to the arms and legs, bear hugs, gentle tapping, massage, or tactile play can also help alert muscle tone. These types of alerting activities are helpful to complete before participating in static activities as they prepare the muscles for activation.

With ongoing stimulation and strengthening activities implemented regularly, muscle tone can change as the brain develops new neural pathways. Even with low tone, muscles can become stronger and more efficient. During The Write Group we spend the first part of the sessions working on activities to elicit improved muscle tone and core strength.

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What are primitive reflexes and how do they impact handwriting?

ATNR Reflex

As part of normal development infants display a sequence of primitive reflexes. As the infant's nervous system develops and the baby goes through new developmental stages, these reflexes typically disappear. Primitive reflexes that remain present can cause decreased efficiency and control for motor activities, and impact cognitive and emotional development.

The Asymmetrical Tonic Neck reflex is a reflex that directly relates to handwriting performance as it impacts the child's ability to dissociate the head and neck from arm movements. As a result, if the child turns their head to look at the page of a book the reflex causes their arm to extend. It takes exaggerated effort to inhibit this reflex and children that show this residual reflex will often show increased tension in their body, an immature pencil grasp and increased fatigue related to writing. The ATNR can also impact visual tracking skills, reading, laterality, hand dominance and other motor skills such as catching a ball and riding a bike.

By working on specific activities that require the child to actively use both sides of their bodies and maintain their head and neck control, the ATNR reflex can be integrated.

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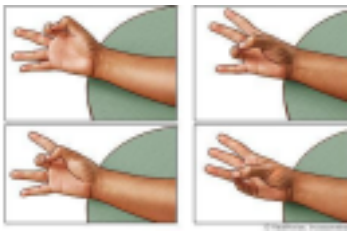
How does hand strength and dexterity impact handwriting?



The ability to maintain a functional grasp on a pencil is directly related to how strong a child's hand is. The anatomy and muscles of the hand are complex, leading different areas of the hand for specific functions including power and precision. There are two types of muscles within the hand and wrist. The intrinsic hand muscles are small muscles contained within the hand, whereas the extrinsic hand muscles are larger and originate in the forearm and have tendons that connect to the fingers. Both intrinsic and extrinsic muscles of the hand are used when sustaining a pencil grasp.

Often the small intrinsic hand muscles are weak in comparison to the larger extrinsic hand muscles. When the palm of the hand is narrow and flattened, it can indicate lack of development in this area and as a result, the child compensates with inefficient and inconsistent grasp patterns, or by switching hands. When children have both intrinsic and extrinsic muscle development, they are better able to control and grade fine muscle movements necessary for writing.

As part of The Write Group, occupational therapists look at finger dexterity and the ability for the child to isolate movements in their hands by translating coins from their palms to their finger-tips. This task allows us to observe how strong and coordinated a child's intrinsic muscles are. Finger to thumb opposition is also assessed, as this requires good awareness and dexterity of the fingers and thumb, and also assesses motor planning and sequencing skills, and the ability isolate left and right sides of the body.

Children that have decreased strength within their hands often have decreased postural control within their trunk musculature and within their shoulder girdle. Strength within these areas is necessary in order to provide proximal strength to support the forearm, wrist and hand. If children show decreased strength in their core or shoulder musculature, they often compensate with holding tension in their shoulders, or by resting their trunk or forearms on the desk in order to gain stability for handwriting.

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What is motor planning and how does it relate to handwriting?

Motor planning is the ability to plan ahead and prepare the body for participating in a motor action. It is part of the larger concept of praxis, a process which involves ideation, motor planning, sequencing, execution and adaptation. Each time a child performs a new motor action, for example, completing a jumping jack, they go through this process of thinking of the action in their mind, planning their body for the action, sequencing the steps of the action, doing it, and then adapting their behavior based on the initial performance.

This same process continues as a child picks up their pencil to write. Many times, children struggle with maintaining a consistent pencil grasp or being able to show consistent letter formation due to difficulties with one of the steps in this sequence. The steps that are the often the most challenging are the motor planning and sequencing components. A child that recognizes that they are having a hard time with a certain activity is often quick to adapt, for example, “fix their letter by adding on a stroke” or “finding a pencil grip that feels good to them, despite how the teacher has shown them” however, when they continue to struggle with the motor planning and sequencing of a task, they are often completing the steps of the process out of order to get to the end result, but the process is disjointed and inefficient.

Children that struggle with praxis are often very timid about trying new body activities, as they are typically very aware of their difficulties. They may be described as “talkers vs. doers” or “lazy.” Often, children that struggle with motor planning and sequencing are lacking foundational development within their sensory systems. Specifically, these children struggle with a decreased awareness of their body in space through the proprioceptive system, often have decreased tactile awareness and vestibular issues. For further information related to sensory development see the Sensory Processing information page.

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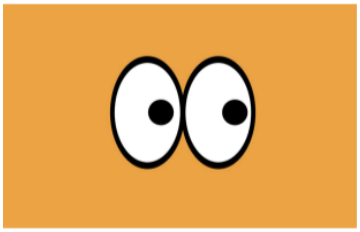
What are ocular motor skills and how do they relate to handwriting?



Ocular motor skills refer to the skills necessary for functional controlled movements of the eyes. Each eye has 6 small muscles surrounding it and controlling the precise movements it makes for tracking, scanning, reading and daily activities. When the muscles of both eyes have a hard time working together in a precise way, children can display increased fatigue and difficulty with completing routine activities. Children can have adequate visual acuity (seeing 20/20), yet still have difficulty with ocular motor control. During screening for The Write Group, children perform the following simple activities to determine the effectiveness of their ocular motor skills.

Visual Tracking: the ability to focus on an object as it moves in space. Children are asked to follow a penlight as it moves horizontally and vertically in space within 18 inches of their face.

Convergence: the coordinated turning of the eyes inward to focus on an object at close range. Children are asked to follow the penlight as it comes in toward their nose.

Divergence: the coordinated turning of the eyes outward to focus on an object as it moves in the distance. Children follow a penlight as it moves away from their nose.

Saccades: rapid movement of the eye between fixation points. Children are asked to look from one stimulus to another at verbal command.

Quick Localizations: quick movements of the eyes while focusing on a moving stimulus. Children are asked to follow the penlight as it "dances" in front of them to 8 different spots in their visual field.

While completing these simple visual activities, it is possible to observe eye strain, lack of eye teaming (eyes working together) and difficulty with crossing the visual midline. All of these issues need to be addressed in order for a child to have an efficient visual system. If these issues are present, a visit to a developmental optometrist is often advised.

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What is Sensory Processing?

Sensory processing is the ability for our brain to process, interpret and respond to the environment and its sensations in an efficient manner. This ability is the foundation needed for the development of higher-level motor skills, learning, attention, and behavior. Efficient sensory processing is needed for children to develop adaptive and functional skills of every day life such as self-help, social and emotional development, play, and school readiness. Adequate sensory processing promotes healthy self-esteem, confidence, adaptability, and a drive to learn without fear. Efficient sensory processing lays the foundation for higher-level skills in the developmental pyramid.

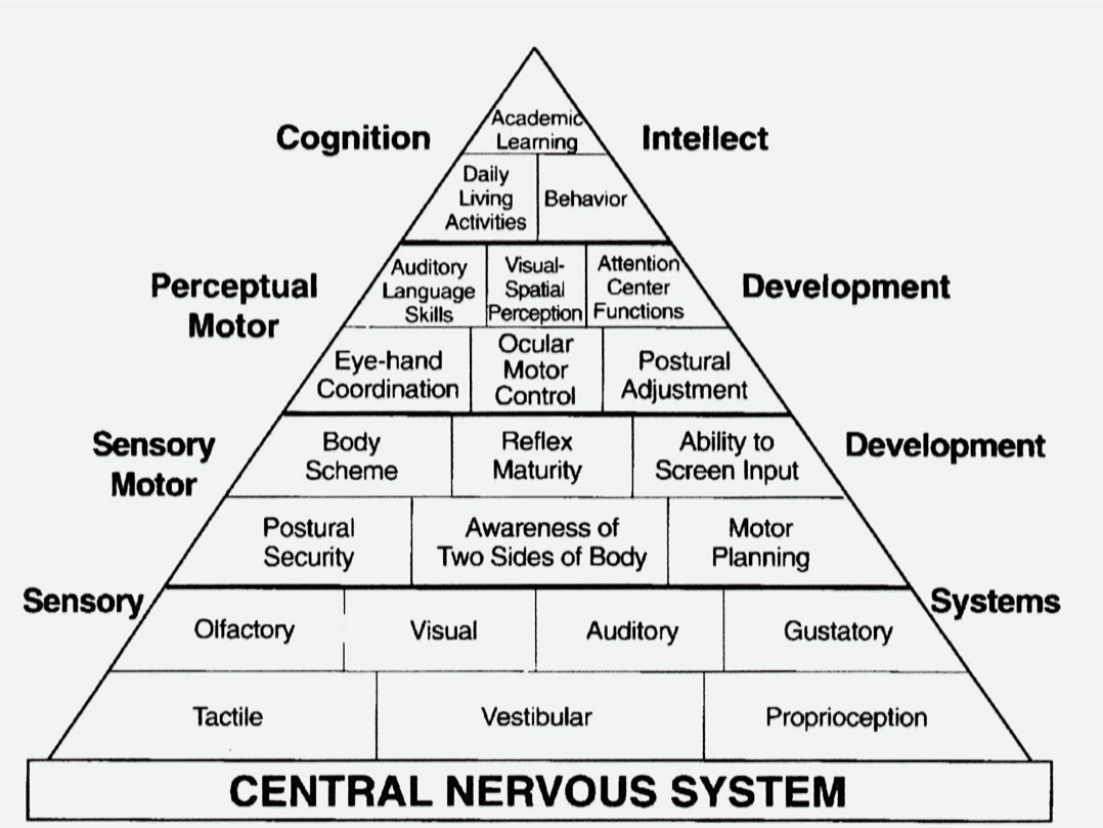

Figure 5. Pyramid of Learning. (Williams & Shellenberger, 1-4)

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Definitions related to Sensory Processing

Auditory Processing: *relates to what one hears and how the brain responds to the auditory information it receives. Once can be sensitive to sounds, have trouble registering sounds and language, or have combinations of both.*

Body Scheme: *relates to the awareness of one's body parts to each other and the relationship of the body to the environment*

Gustatory: *the sense of taste*

Motor Planning: *the ability to plan ahead and prepare the body for participating in a motor action*

Olfactory: *the sense of smell*

Ocular Motor Control: *the ability of the small muscles of the eyes to move in a coordinated way for functional vision*

Postural Security: *the ability to hold ones posture against gravity. This is necessary for functional activities such as holding ones head up, sitting up in a chair, and using appropriate balance reactions to maintain a position*

Proprioception: *refers to the internal awareness of one's body as perceived through muscle and joint receptors. This sense allows the brain to know where each part of the body is without having to use vision.*

Reflex Maturity: *the absence of primitive reflexes, indicating a mature central nervous system*

Tactile Sense: *Tactile refers to one's sense of touch. It is possible to be either over-responsive to touch (tactile defensiveness) or have decreased sensation (tactile dormancy) or show a mixed profile.*

Vestibular System: *The vestibular system is the sensory system that responds to motion (acceleration and deceleration) and changes in head position. It is important in relation to learning and behavior because of its influence over muscle tone, ocular control, bilateral coordination and balance.*

Visual Processing: *includes the sense of sight and how the brain processes visual information*

Visual Spatial Processing: *relates to the perception of spatial relationships between objects in ones environment. Adequate visual spatial processing necessitates efficiency in the visual system and one's body scheme.*