

Reflex Integrtion

WHAT IS SYMMETRICAL TONIC NECK REFLEX (STNR)?

A. ONSET AND PATTERNS OF THE SYMMETRICAL TONIC NECK REFLEX



The Symmetrical Tonic Neck Reflex (STNR), also known as the Leaning Reflex, is a reflex pattern present at birth that becomes dormant and reappears at around six months of age. It is fully present at about six months and integrates at approximately ten months after birth.

Symmetrical Tonic Neck Reflex is an involuntary reaction in response to the head going up and down.

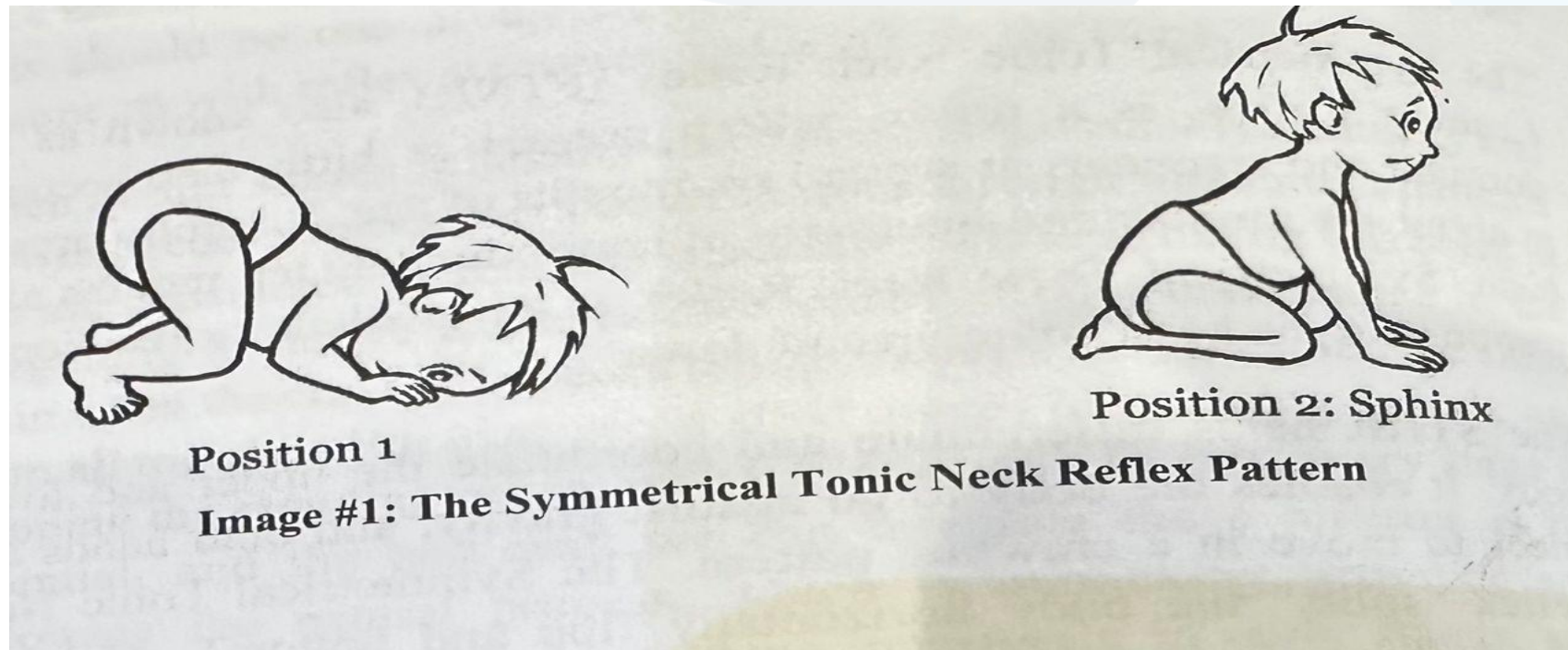
The STR helps differentiate and coordinate the upper and lower body. It enables the body to go against gravity, and onto hands and knees to move in a crawling pattern. The Symmetrical Tonic Neck Reflex "splits" the body horizontally (top and bottom), while the Asymmetrical Tonic Neck Reflex (ATNR) "splits" the body vertically (left and right).

At the beginning of an infant's life, the head may go up and down reflexively, but as the infant develops and grows, he/she will begin to respond to sensory stimuli, such as touch, sound or sight. These sensory stimuli can initiate the head going up or down, triggering the Symmetrical Tonic Neck Reflex (STNR) pattern.

Sensory stimuli which may cause the head to go up and down include:

- sound (auditory)
- light (vision)
- touch (tactile).

The STR consists of two phases (positions): flexion (downward movement) and head extension (upward movement), as in Image #1.



POSITION 1



Sensory trigger: Flexion of the head (downward movement)

Motor responses include:

- extension of the lower body, including hips and legs
- flexion of the upper body, including shoulders and arms
- upper body drops to the floor.

POSITION 2



(SPHINX)Sensory trigger: Extension of the head (upward movement)

Motor responses include:

- flexion of the lower body, including hips and legs
- extension of the upper body, including shoulders and arms
- upper body straightens and moves away from the floor.

B. BENEFITS OF THE SYMMETRICAL TONIC NECK REFLEX (STNR)



The Symmetrical Tonic Neck Reflex (STNR), also known as the Learning Reflex,

1. is an essential reflex pattern that directly and indirectly influences early life experiences
2. learning skills and developmental maturity.
3. The STR, directly and indirectly, influences the following developmental milestones: head control against gravity,
4. pulling self on hands and knees,
5. sitting, crawling
6. visual-motor skills (e.g., eye-hand coordination, visual fixation, near and far visual tracking),
7. auditory processing
8. posture
9. muscle tone,
10. fine motor and gross motor developments,
11. vestibular awareness
12. balance
13. focus and concentration.

CRAWLING



- The STNR helps the infant move against gravity to maintain hands and knees position and later move forward. Crawling has various benefits, including vestibular and sensory development, balance, coordination, visual skills development, shoulder stability, muscle tone, trunk control, strength, gait pattern development, and left/right and top/bottom coordination. An infant needs to have a correct crawling pattern to gain the full benefits of crawling skills. Adequate integration of STNR helps the infant to do so. If STR is retained, however, the child will have difficulty moving forward with a crawling pattern, and compensates by pulling forward, scooting and improper patterning or skips crawling altogether.

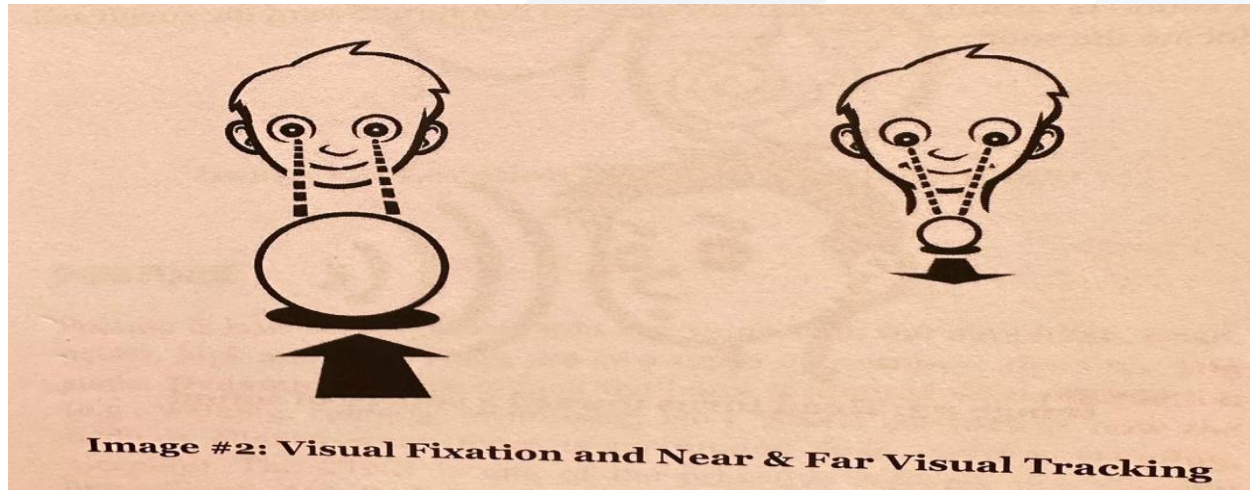
VISUAL SKILLS



- Any reflex pattern that moves the head, including the STNR, affects and influences visual skills development. In this book, we will focus on visual skills the STNR partially influences. If vision skills are an area of concern, consider working on additional reflexes, such as the Moro Reflex, Asymmetrical Tonic Neck Reflex (ATNR), Tonic Labyrinthine Reflex (TLR) and Spinal Galant Reflex (definitions of these reflexes are in the end Glossary). For a more in-depth understanding, screening, and treatment options on visual skills and perception, please refer to a trained vision therapist.

- **The visual perceptual skill** is the brain's ability to understand what the eyes see and interpret it appropriately, including depth, figure-ground (distinguishing objects from the background), location, visual closure (recognizing a familiar object when it is partially obscured), and more.
- **Visual acuity** is the eye's ability to see clearly. Note that a person can have high visual acuity (i.e., 20/20 vision) and still have difficulty with visual perception. Visual fixation is the eye's ability to maintain gaze on an object for an extended period of time. Visual fixation is the first critical skill to develop before more advanced visual skills. Once the eyes can fixate, they can learn to track a moving target. There are two visual tracking skills: smooth pursuit and saccade.

Near-to-far and far-to-near visual tracking are the eyes' ability to move in opposite directions to track an object. When both eyes focus on a near object, they have to converge (move inward, towards each other), and when both eyes focus on a far object, they have to diverge (move outward, away from each other). Therefore, fluid visual tracking requires coordinating both eye muscles to work together and in the opposite direction (convergence and divergence). During the STR integration, when a child is transitioning on hands and knees to explore the environment, these skills continue to develop.



Binocular vision is the ability to move and use both eyes equally and effectively. When binocular vision is poor, it can cause disorders such as amblyopia (also known as "lazy eye" with one eye having less acuity) and strabismus (crossed or misaligned eyes).

Saccade is the eye's ability to accurately jump back and forth between targets. **Smooth pursuit** is the eye's ability to smoothly and accurately track a moving object or line. For instance, while copying from a whiteboard, the eyes need to follow a straight line (smooth pursuit) to read what is on the board and look down quickly from the board to the paper without losing their place (saccade). Similarly, when we read our eyes follow a straight line (smooth pursuit) from left to right, then quickly jump to the second line of the first letter on the left side (saccade) During this process, both eyes have to cross the midline and work together.

- **Auditory figure-ground** is the ability to hear specific sounds in a noisy environment. For example: a child will be able to respond to your call amid all the noise at the playground or while watching TV.
- **Auditory localization** is the ability to perceive and locate from where a sound is coming. For example: a child can turn toward the sound and locate the source.

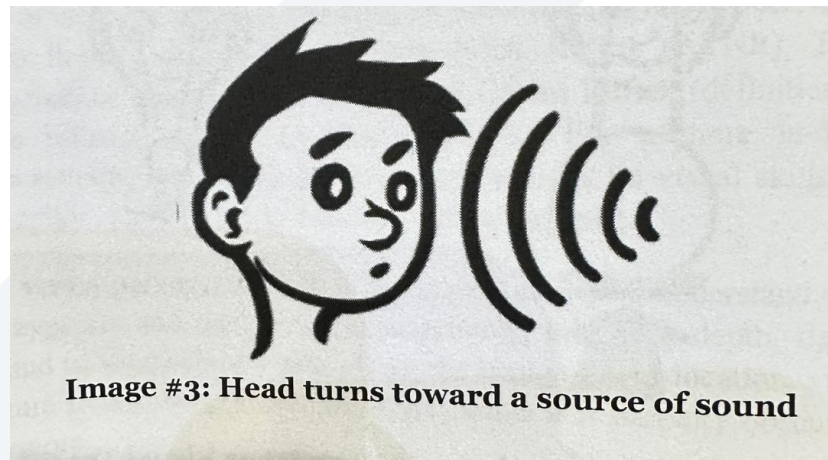


Image #3: Head turns toward a source of sound

- Binaural hearing is the ability to hear with both ears equally, and receptive language refers to the ability to understand and interpret sounds, words and sentences accurately. For a more in-depth understanding, screening, and treatment options for receptive language and speech, please refer to a speech therapist.

VESTIBULAR SKILLS

The Vestibular System is a sensory organ, located in the inner ear (see image below). It is located in both the right and left inner ears, and gives feedback to the brain regarding the head position, motion, balance, posture and spatial relation. Similar to the visual and auditory system, any reflex pattern that moves the head, including the STNR, affects the Vestibular System.

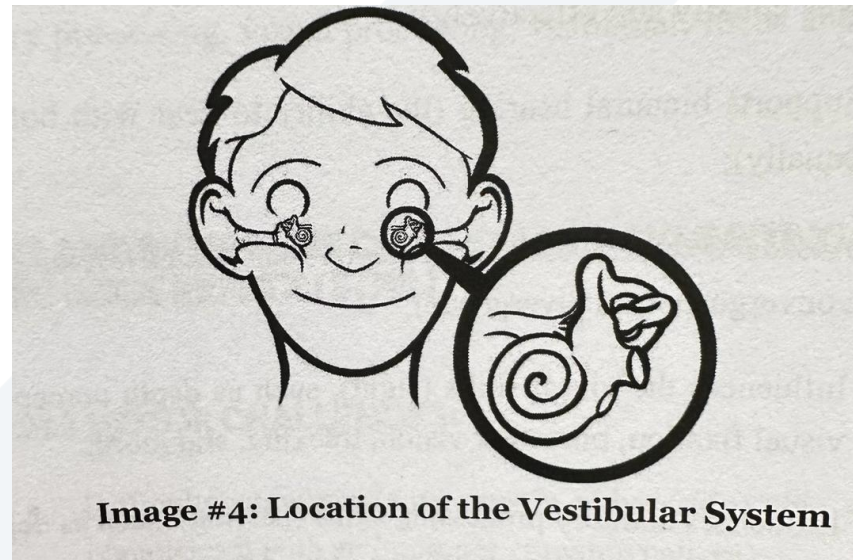


Image #4: Location of the Vestibular System

POSTURE



Posture is how we align and hold our spine with our shoulders, head, pelvis, hips and feet. There are two types of postures: dynamic and static. **Dynamic posture** is how the body is aligned while in motion (e.g., walking, running, swimming, etc.). **Static posture** is how the body is aligned when there is no motion (e.g., sitting, standing, sleeping). The STR is one of the primitive reflexes that directly influences both dynamic and static postures. It helps with muscle tone, separation of the top and bottom of the body, core stability, strength and head control.

An overview of the benefits of the Symmetrical Tonic Neck Reflex (STNR):

- Assists with the birthing process
- Assists with cross-lateral movements in early development, such as sitting, creeping, crawling and walking
- Contributes to the organization and perception of binocular vision and binaural hearing
- Supports binocular vision (the ability to move and use both eyes equally and effectively)
- Supports binaural hearing (the ability to hear with both ears equally)
- Assists with near-to-far and far-to-near visual tracking (i.e., convergence and divergence)
- Influences the visual skills (sight), such as depth perception, visual fixation, binocular vision, tracking, and more
- Influences auditory processing skills (hearing), such as depth, distance, localization, and figure-ground perception

An overview of the benefits of the Symmetrical Tonic Neck Reflex (STNR):

- Helps with fine motor skills and eye-hand coordination
- Assists with speech and language development
- Influences the learning process and skill
- Influences the vestibular system, which affects balance, spatial orientation and posture
- Influences standing, sitting and walking posture
- Influences gross motor coordination
- Supports muscle tone, neck control, and core stability developments
- Assists with overall motor coordination (movement)
- Assists with focus and concentration.

C. RETAINED SYMMETRICAL TONIC NECK REFLEX (STNR):

- **SIGNS, SYMPTOMS AND BEHAVIORS** When the STR is active (retained) in the body past the integration stage, it creates delays in a child's fine motor and gross motor skills, auditory processing, visual processing, vestibular, focus and attention skills.
- **SIGNS AND SYMPTOMS OF A RETAINED SYMMETRICAL TONIC NECK REFLEX (STNR)**

GROSS MOTOR CHALLENGES:

- Difficulty crawling (e.g., mostly either skips this stage or completes it with an improper crawling pattern);*
- Lack of balance, instability
- Lack of coordination
- Problems and frustrations with sports (e.g., activities such as swimming are difficult)
- Difficulty coordinating the upper body and lower body together
- Difficulty catching or throwing a ball
- Difficulty with swimming (e.g., challenging to lift head above water while coordinating upper and lower body strokes. Tends to swim better when the head is underwater.)

POSTURE CHALLENGES:

- Poor core strength (low muscle tone)
- Poor seated posture (e.g., slouches, W sits, wraps legs on the chair, or sits on heels)
- Poor standing posture (e.g., walks and runs with bent elbows)
- Maybe a clumsy or messy eater
- May sit on heels or prefers W sitting posture to maintain an upright upper body posture
- The body might look ape-like (e.g., when walking or running, the arms may move similarly or hang down from the side, with slumped shoulders or bent knees.)
- Low muscle tone and core strength.



Image #5: The child extends the lower body to bring the book closer by flexing the elbows.



Image #6: Child sits on heels to maintain straight back and compensate for STNR retention.

FINE MOTOR SKILLS CHALLENGES:

- Difficulty with fine motor skills, such as handwriting, coloring, scissor usage, etc.
- Slower when copying and writing, especially when looking up and down
- Fatigues easily.

VISUAL SKILLS CHALLENGES:

- * Poor eye-hand coordination
- Difficulty with binocular vision, and the ability to move and use both eyes equally and effectively
- Difficulty reading and copying from a board
- Difficulty with vertical tracking
- Difficulty with visual tracking skills
- Might be farsighted.

AUDITORY SKILLS CHALLENGES:

- Difficulty following multiple-step movement instructions
- Difficulty with binaural hearing
- Difficulty localizing sound; may have a hard time understanding from where a sound is coming.

ATTENTION AND CONCENTRATION CHALLENGES:

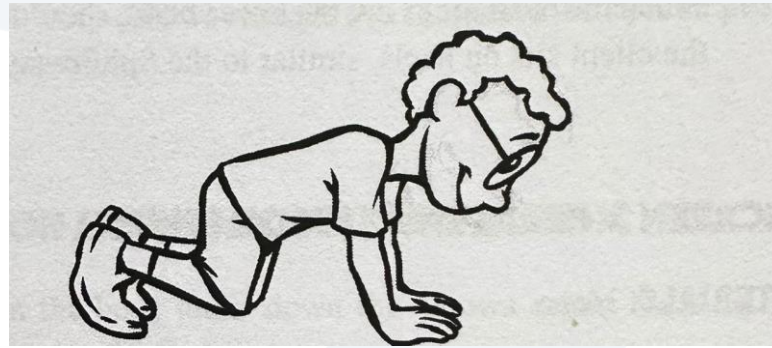
- Difficulty with attention and concentration
- Hyperactive and fidgety tendencies
- Lack of focus and attention: Attention Deficit Disorder (ADD) or Attention Deficit Hyperactivity Disorder (ADHD)tendencies.

TABLE #1: SYMPTOMS AND BEHAVIORAL CHECKLIST: SYMMETRICAL TONIC NECK REFLEX (STNR)

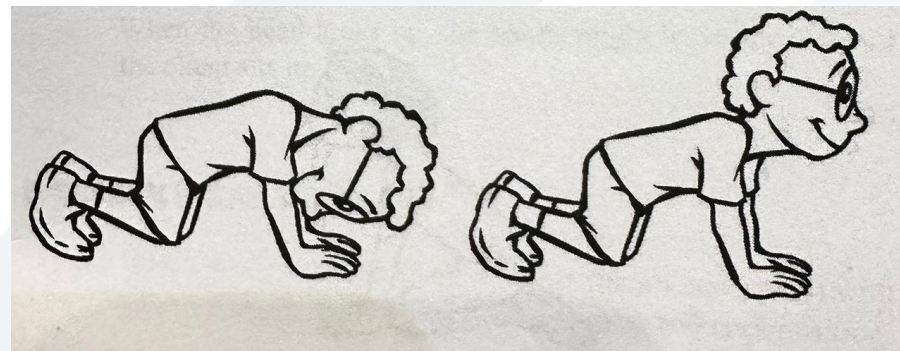
Observe the child and circle the number that best represents the severity of the symptoms you observe. You can use this checklist first to gather data for an initial baseline and then again 6-12 weeks after the start of intervention to assess progress.

B. SCREEN 1: HEAD PENDULUM ON ALL 4S1

1. Have the child get down on all fours (hands and knees) with elbows straight, while maintaining a straight spine and neck position.



2. Ask the child to drop head down and lift head up without moving the rest of the body.





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B. SCREEN 1: HEAD PENDULUM ON ALL 4S1

GOALS

1. Able to remain on all 4s without moving parts of the body except the head
2. Elbows are able to remain straight while the head moves up and down
3. Shoulders, hips and knees are able to remain at 90 degrees While the head moves up and down

OBSERVATION AND SIGNS OF STR RETENTION

1. When the head looks down, the elbows bend or even collapse to the floor and the lower body straightens.
2. When the head looks up, the knees bend, shoulders extend, and the client sits on heels, similar to the Sphinx position.



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C. SCREEN 2: HEAD PENDULUM ON SPHINX

GOALS

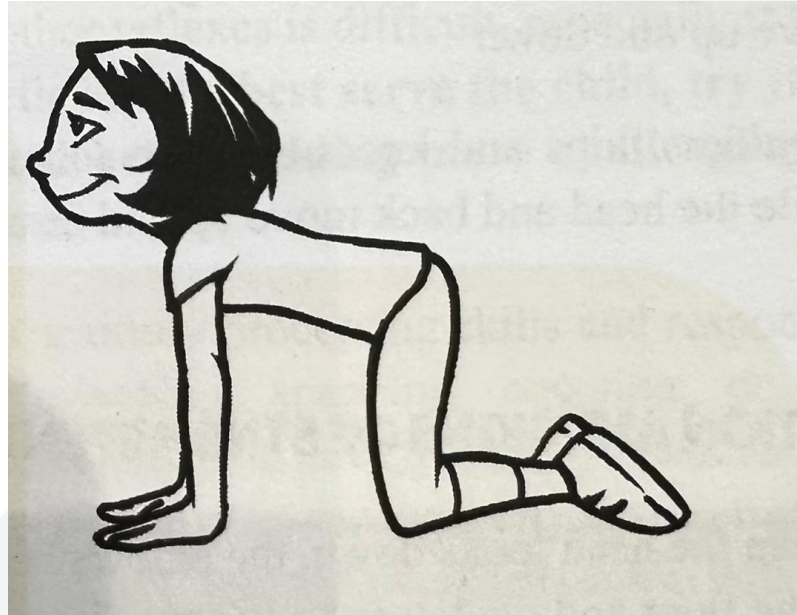
1. Able to move the head up and down without moving the rest of the body
2. Able to keep elbows straight and remain in the Sphinx position the entire time

OBSERVATION AND SIGNS OF STR RETENTION

1. When the head looks down the elbows might bend or even collapse to the floor.
2. When the head looks down, the lower body might begin to extend.
3. When the head looks up, the hands might leave the floor or the client sits on heels.

D. SCREEN 3: CAT & COW

1. Have the client get down on all fours (hands and knees) with elbows straight, maintaining a straight spine and neck position.



D. SCREEN 3: CAT & COW

2. Have the client inhale and drop the back down, with chest open, and head looking up (Cow Pose).
3. Have the client exhale, arch the back and drop the head to look towards the tummy (Cat Pose).



D. SCREEN 3: CAT & COW

GOALS

1. Able to remain on all 4s without moving parts of the body except the head and back
2. 2. Elbows are able to remain straight while the head and back move up and down
3. 3. Shoulders, hips and knees are able to remain at 90 degrees while the head and back move up and down

OBSERVATION AND SIGNS OF STR RETENTION

1. When the head looks down, the elbows bend or even collapse to the floor and the lower body straightens.
2. When the head looks up, the knees bend, shoulders extend, and the client sits on heels, similar to the Sphinx position

B. ACCOMMODATIONS

A child with a retained STNR may have delayed motor skills, visual perception, postural control, attention and concentration. For a classroom or workstation, choose one or more of the following accommodations to meet the child's needs:

1. Position the child in front of the classroom board.
2. Place materials to copy on the child's desk to minimize head movement during copying.
3. Allow working in different positions. Do not focus on the upright seated position when you are focusing on education. Allow the child to be comfortable and not expend a lot of energy to maintain postural balance. Instead, provide a variety of options, such as:
 - a. Standing at a desk to write.
 - b. Laying down on the floor to read.
 - c. Using a wedge to lift hips more than 90 degrees while seated.
 - d. Using a slanted board to elevate working materials and keep the head straighter.

B. ACCOMMODATIONS

4. Break down verbal instruction:

- a. Provide written instruction for review.
- b. Have the child repeat the first instruction before adding additional instructions.

5. For movement activities, accommodate right- and left-side confusion by providing the following:

- a. Visual cues to help differentiate the right and left sides of the body.
- b. A picture or video to imitate.
- c. A breakdown of the steps.

6. Provide movement breaks from the exercises described in this book to help promote STNR integration.

7. Do not force games and sports; the child may not be ready for advanced movements without breaking down the steps.

8. If reading is difficult, try the following strategies:

- a. Have the child track letters with fingers.
- b. Use a ruler or visual cues under the line the child is reading.
- c. Cover all text except the line being read.