

ATNR: It's Possible Impact on Motor Efficiency on Children

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Asymmetrical Tonic Neck Reflex (ATNR) is an involuntary primitive reflex that, through the process of normal development, is used by the infant when tracking sound and light. When this occurs, the arm on the side of the body the infant is extended and the opposite arm is flexed much like the *on guard* position in fencing.

Within the first few weeks of postnatal life, the ATNR appears for varying lengths of time, and then is integrated to a higher level of the central nervous system as the child matures (Ayres, 1972). This primitive reflex becomes integrated into the central nervous system largely through inhibition as higher centers of the brain mature. The ATNR never disappears during the life of the individual but the degree to which a person suppresses it usually reflects the degree of maturation (Ayres, 1965; 1972).

While this reflex generally disappears by 4 to 6 months of age, it has been observed in a subtle to serve amount in some school aged children which can contribute to, or interfere with, movement efficiency (Ayres, 1968; Freides, Barbat, & Van Kampen-Horowitz, 1980; Pyfer, 1983; Seaman & Depauw, 1989, Sherrill, 1986). Children with an abnormal ATNR might experience continued failure when participating in physical education activities so that by the time they reach adulthood they may have little interest in becoming involved in physical activities (Pyfer, 1988).

To provide effective programming, physical educators must understand how basic primitive postural reflexes such as ATNR affect the acqui-

sition of motor skills (Auxter, Pyfer, & Hattig, 1993; Folio, 1986). The purpose of this article is to discuss how the retention of this ATNR reflex can influence the motor performance of children functioning in regular physical education setting and what physical educators can do about it.

Influence of an Abnormal ATNR on Motor Performance

One effective way to utilize practice time is for an educator to continually analyze each student's motor performance and provide feedback relative to any detected deficiencies or strengths (Magill, 1989). Conceivably, an educator may apply appropriate motor learning principles and a student may still exhibit inappropriate motor patterns. The problem may lie in the retention of a residual amount of the ATNR.

Specifically the retention of the ATNR can influence motor patterns which involve the trunk and limbs attempting to be in alignment with the head (Montgomery & Richter, 1979). Because of this a child may experience difficulty performing motor tasks. For instance, a child may collapse while in the "all fours" position attempting to crawl if the head turns to either side or may not be able to perform a log roll. Specifically related to an activity such as swimming, a child may have difficulty moving the head independent of the body which may cause the shoulder and leg to come out of the water as the head is rotated to the side to breathe. Crossing the midline is another problem these children often encounter. This effects such activities as batting a ball, swinging a golf club, or throwing a ball.

In addition to these possible movement problems, children with the retention of the ATNR, while not directly related to these reflexive prob-

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lems tend to be easily distracted and have difficulty focusing. Because of this, these children often exhibit the following behaviors (McCarty, 1983): (a) not paying attention when instructions are given so they get at the end of the line during the drill to watch what is to be done; (b) avoiding direct eye contact when being spoken to; (c) losing articles; (d) absent mindedly dropping such items as towels, bathing caps, and kickboards; (e) daydreaming; and (f) missing details in the environment.

What Physical Educators Can Do about an Abnormal ATNR

In many cases, exercises may be recommended by a neurologist or occupational therapist, to temporarily inhibit the ATNR reflex or to enable the student to develop a conscious awareness to inhibit the detrimental effects of this reflex on motor performance. Some typical exercises include the following (Seaman & DePauw, 1989):

1. While on hands and knees, turn face, and touch chin to shoulder.
2. Perform log roll with arms and legs straight.
3. Creep forward and backwards with head turned sideways on shoulder.
4. Crawl forward and backward while focusing on a stationary object directly in front.
5. In supine or prone position with arms to sides, rotate head from side to side touching ears to floor.
6. In standing position and arms extended forward, move head from side to side.

The following is a case study in which exercises had a dramatic influence on the motor performance of a child who retained an ATNR reflex.

Megan took swimming lessons when she was 6 years old and when she turned 7 participated on a swimming team. Her times in the 25 meter freestyle were slow when compared to other 7-year old children. She also evidenced motor problems in other sports. For example, when playing soccer, she kicked the ball straight on, due to the inability to successfully cross her leg over the midline of her body. Consequently, she

began to shy away from any activities which involved kicking skills such as soccer and kickball.

In school, Megan would become confused when trying to watch and listen to the classroom teacher. Her mother recalls, "as far as having any interest in scholastics, she didn't." The principal said, "Megan was not emotionally mature enough to learn." She was labeled "lazy" and a "daydreamer." Consequently, based on reports from her parents, principal, and teachers, Megan lost self-confidence and became quiet and socially withdrawn.

In second grade Megan was evaluated by a neurodevelopmental specialist. It was observed that she had retained the ATNR reflex. This was based on the following examination technique. Megan was placed in a *quadruped position* (on her hands and knees) and her head was rotated passively from side to side while her eyes were closed. Flexion of her arm contralateral to the side from which the head had been rotated was considered indicative of the retention of the ATNR reflex. This finding may shed some light on why Megan rolled in a nonsegmented pattern (hip and shoulder joint malaligned) when performing the front crawl.

An individualized exercise program was developed for Megan to help overcome this reflex problem that interfered with her performing the front crawl and the backstroke. The three day a week exercise program ranged from 45 to 60 minutes, depending primarily on her attention span. A typical exercise session involved approximately (a) 15 minutes of swinging in a cradle-like swing; (b) 15 minutes of trampolining; and (c) 15 minutes of reflex inhibiting activities as those previously described interspaced with a selection of gross and fine motor exercises.

Could these exercises really cause this decrease in times in swimming? The answer to this cannot be determined by this basic case study approach of collecting data but it should be noted that there was a significant decrease in times when Megan participated in the exercise program within a week of the swim meet. When exercises were discontinued, her times increased; when exercises resumed, her times decreased.

Decreased swimming times during the exercise program and increased times during periods of no exercise were more evident with freestyle than backstroke in competition, thus through practice, she became more proficient in freestyle. A possible reason for this is that the ATNR affects freestyle stroke more severely than backstroke. In the freestyle stroke, the swimmer is in a prone position and needs to turn the head to breathe, there is no need to turn the head to breathe.

Retention of primitive reflexes such as ATNR in the case of Megan, can retard motor development (Pyfer, 1988). When a child exhibits inappropriate motor patterns in physical education and traditional techniques do not seem to remediate the problem, consider the possibility that the child may have reflex problems that can be detected through a simple examination generally given by a neurologist or an occupational therapist. If a reflex problem is identified, specialized exercises, used on an ongoing basis, may correct or inhibit inappropriate motor pattern.

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