The following article was written by Chris Guy in the 1990's for Patos (the professional association of teachers of students with specific learning difficulties) and is currently published on their website.

The fact that there is a neurological basic for learning difficulties (SpLD) is not new - it has been recognized by many international leaders in this field for more than a hundred years. Particularly in the last decade or so, with sophisticated scanning equipment, the rapid advance of technology has allowed a far greater understanding of the 'functional brain' than ever could have been imagined before.

It is clear beyond doubt that the efficient cognitive processing ability of the neo-cortex is dependent upon many factors, but ultimately on the integrity of the Central Nervous System (CNS). Research into learning difficulties has gone into the study of what affects the SpLD child's performance, not as much possibly, into why that effect should occur at all. Hence, widely accepted practice in educational remediation programmes has for some time been to intervene at the level of manifestations of the basic fault, rather than to deal with the basic fault itself.

A human baby comes into the world with a number of primitive reflexes, which contribute in various ways to its birth, survival and subsequent development (e.g. grasping, sucking, and turning the head when touched near the mouth). Each reflex has either to be inhibited or transformed in the course of normal interaction with the environment, so allowing the brain to release in chronological sequence a series of postural reflexes (e.g. the head-righting reflexes), to give us control of our sensory body within the environment and the ability to manipulate that environment. Almost at birth, the infant begins to learn ways of reacting that will satisfy its needs.

The age of transition from reflex to learned behaviour (approximately two to four months) is a true landmark in brain development that is essential to full maturation. The more primitive subcortical brain areas where reflexes originate, give up their control to the cortex – 'the thinking-brain'. This basic reflex system is mediated by the activities of the spinal cord, medulla, pons, midbrain, and cerebellum. This system, in conjunction with the earliest sense organs, feeds into the central nervous system information about orientation, movement, tension, pressure etc. and forms the substrata upon which the 'perceptual system' and finally the 'conceptual system' are founded.

Transformed reflexes only revert back to their original primitive format through physical trauma or pathological processes. In the normal developing foetus the simplest motor-moments in utero, followed by the infant's purposeful motor-movements and postural changes once born, depend on the appearance and subsequent integration of primitive reflexes (Capute '78).

The late A. Jean Ayres, PhD, (1972/73), an internationally recognized Occupational Therapist, saw the aberrant reflex responses affecting how the brain processes sensations, not only the

eyes and ears but from other parts of the body as well. Her findings and conclusions became the basics for S.I. – Sensory Integration Therapy, now widely used throughout the world.

Careful examination can ascertain the presence of any primitive or postural reflex, also whether there is evidence of transformed reflexes. An example of the latter is the possibility of testing, at any chronological age, for the presence of the Transformed Tonic Neck Reflex (TTNR), which is a development from the primitive Asymmetrical Tonic Neck Reflex (ATNR). Such testing can reveal whether the ATNR, which naturally persists over the first 24 weeks of life, subsequently became an aberrant reflex through failure of inhibition, or transformation by 8 months of life. The continued presence of this particular reflex, according to Bobath (1971), 'has a severe effect on a patient's motor functioning'.

Retained or residual ATNR is particularly important from an educational point of view because it can prevent a child from mastering the fine muscle co-ordination necessary for neat and comfortable writing. (Also self-feeding as an infant.) This reflex, when present in the new born, can be detected when the baby is lying on its back. If the head is gently turned to one side – the arm and leg on the jaw side of the body extend and the other arm and leg bend. Thus the continued presence of an ATNR causes a reflexive extension of the arm, hand and fingers on the side towards which the head is turned. This causes a necessary effort of muscular control when writing and results in excessive pressure, an awkward pencil grip, or both, together with immature letter formation and limited concentration span.

The concentration required to write over a period of time can curtail the cognitive ability to process information and rapidly results in fatigue, particularly of the arm and the hand. (Those children seen taking frequent rests from writing to 'shake out' the cramp may well have an aberrant ATNR). Such children when swimming front-crawl, for example, will not be able to prevent the shoulders from rolling, and when skiing will find great difficulty doing parallel turns so that the head and shoulders always remain facing down the hill.

Terms of early eye/hand co-ordination the ATNR allows the baby to develop long distance vision (another later reflex is responsible for bringing it back again to near point). If aberrant this reflex is partly responsible for erratic eye movements that can make reading so difficult when print appears to jump or move around. By 4 to 5 years of age, 'eye tracking' should be mature and very smooth. Children who omit letters or even whole words when reading, or who skip whole lines when not using a 'pointer' are at risk beyond the age of 6 to 7 years of age.

Development can be affected by the ATNR, particularly together with a retained or residual STNR, which should be controlled by the neo-cortex by 11 months of age. One of these reflexes prevents the infant crawling properly on its stomach, while the other prevents the child later creeping on the hands and knees. The involvement of head rotation as an integral part of these stages of motor development has been shown as vital, Crosby, Humphrey and Lauer (1962), in the maturation of oculo-motor functioning and visual perception.

Head Righting Reflex (HRR), which should emerge between 2 to 3 moths after birth, adjusts the eye and neck muscles to compensate for each movement of the head or body and is part of the oculo-vestibular system. A lack of this reflex results in inaccurate and/or inadequate sensory information reaching the brain about the body's position in space. This poor interaction of responsive muscle tone and posture manifests itself in problems with balance and eye functioning. Poor co-ordination of sequential movements, difficulty with spatial relations and problems in selective attention (particularly auditory) are all concomitant with such faulty vestibular processing. De Quiros (1976) points out that, 'vestibular-oculo-motor pathways control the skilled movements of the eyes which are essential for establishing the correct relationship between motion and space (and thus writing)'. He concludes that vestibular disorders and postural disturbances can produce learning disabilities associated with motor skills, the acquisition of language and the development of normal competencies in reading and writing'.

Children with learning difficulties may exhibit a wide range of symptoms which may include clumsiness and poor gross muscle co-ordination, poor fine muscle control, lack of concentration and often extreme excitability (Attention Deficit Disorder), marked ambiguity of laterality or cross-laterality, aberrant motor patterns of development, visual perceptual problems and poor hand-eye co-ordination (visual motor integration difficulty). The results of such symptoms emerge in the classroom as difficulties with reading, writing, spelling, sequencing, PE and memory recall. It may also cause difficulties learning to swim, ride a bicycle, tell the time, tie shoelaces and relate effectively with other children of similar age.

WHAT ABOUT REMEDIATION?

Not only can the underlying neurological dysfunctions be detected and directly related to an individual's learning difficulty but since 1975, INPP has repeatedly presented evidence to the effect that through employing a physical Reflex-Inhibition movement program, the brain can be given a second chance to 'control' the primitive reflexes and 'release' the postural reflexes – thereby allowing the teaching process in the classroom to be more effective.

As a result of completing a personalized reflex-inhibition programme each day at home (5 to 15 minutes a day) the postural reflexes emerge 'spontaneously' and, more importantly, the child ceases to have many of the earlier presenting learning difficulties. It is estimated that approximately 85% of those children with average to above average specialist remedial help have a cluster of aberrant reflexes (significant faults in the central nervous system) which in turn can have a detrimental effect on cognitive processing and voluntary movement.

This latter deficiency has its consequences in the weakened development of motor, visual/perceptual and emotional functioning. mechanistic motor processes involved as reflex-inhibiting or transformational stimuli are observable in the neonate, and thus are replicable at a later stage to assist in the remediation of learning difficulties.

This is the basis of the individual treatment programmes, developed originally by Peter Blythe, which are now practiced by I.N.P.P. Associates. A simple screening process is followed if necessary by a full diagnostic assessment during which a range of recognized neuro-psychological tests are carried out in the areas of balance, laterality, perception and reflexes. At a later date, an individual rehabilitation programme of specific movements (or exercises) is then demonstrated for daily use (5 to 15 minutes a day), and this is called the 'Home-Programme'.

On average a development programme takes about a year. Some children have completed their programme in seven/eight months, while others have taken up to two years, depending on circumstances. Once every six weeks or so a return visit to check progress is necessary; this takes about an hour. Improvements are usually seen soon after the home-programme commences and if the individual movements are faithfully adhered to good neurological organization will be promoted – making daily functioning less stressful.

To go for help or further information contact: -

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