Primitive and Postural Reflexes and Behavioural Optometry

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"Although all learning ultimately takes place in the brain, it is often forgotten that it is through the body that the brain receives sensory information from the environment and reveals its experience of the environment." [Goddard Blythe, S. (2009). p 1]

Behavioural optometrists are concerned with enhancing potential and improving physiological and neurological skills that are linked to better performance and achievement in various contexts. Their focus is on vision and visual function in life situations including learning and academic performance and success in schooling, sport and work. Other groups of professionals, including occupational therapists, speech therapists, physio therapists, neuro-developmental therapists and teachers, share that same desire and intention of improving function, but approach the topic from different perspectives and paradigms.

SOME BIOGRAPHICAL INFORMATION:

As an educator with over 25 years of involvement in education in various settings and contexts, I have also had the good fortune of gaining experience in the world of vision care. Our family has owned and operated a busy regional family based optometry practice in Far North Queensland since 1990. "Life" has ensured that parallel to my interest, passion, work and love of learning and education, for the last thirteen years in particular, I have also been immersed in the world of optometry as a practice manager, owner, dispenser, receptionist, cleaner… pretty much everything but the person asking "which is better 1 or 2?" Along that pathway of parallel professional universes which my life has bridged, I have also had the opportunity to spend time with a number of behavioural optometrists and participate in professional development programmes offered by ACBO. These experiences have enabled me to learn more about the realm of behavioural optometry and view learning from a different perspective to which many of my teaching colleagues do not have access.

Over the last few years I have also had the opportunity to study further in the field of physiological and neurological bases for learning and have since become a Neuro-Developmental Educator working with Neuro-Developmental Therapy (NDT). Central to my philosophy of practice as an educator is John Dewey's (1938) classic notion that learning is something we do from the moment we are born, through our experience

of the world, and is a lifelong process. 'How we learn' is incredibly complex incorporating physical, neurological, cognitive, behavioural and social elements that can enhance or hinder that learning and educational experience. Cross-disciplinary approaches to learning and development, using the skills and experience of allied health professionals such as behavioural optometrists, occupational therapists, speech therapists, educators and others offers immense opportunities to learn more about the process of learning.

It is obvious that the important, central and common element in the variety of professional approaches to enhancing learning performance and capacity is the notion of FUNCTION. How do we improve function of the sensory systems, posture, co-ordination, balance, cognitive approaches etc to enhance learning potential and capacity in various life contexts? It is important to remember that many aspects and combinations of syndromes and issues can contribute to poor functioning and learning and that any ONE solution and therapy is not the answer to every situation and difficulty. It is a reflection of the complexity of the brain, the nature of human development and the brain/body connection that there are indeed many ways to approach the issue.

INPP – REFLEX INTEGRATION

My interest in physiological and neurological bases for learning has taken me to the UK to study with Sally Goddard Blythe and Peter Blythe (PhD). Sally Goddard Blythe is the Director of the Institute for Neuro-Physiological Psychology in Chester, founded by Dr Peter Blythe in 1975. Sally is also the author of a number of books often quoted in various professional areas examining early childhood physiological and neurological development. Many of her books are based on the pioneering work conducted by the Institute for Neuro-Physiological Psychology (INPP) "researching the effects of immature primitive and postural reflexes on learning and behaviour, developing protocols for the assessment of abnormal reflexes and related functions." (Goddard Blythe, S. (2009), pp1-2) Dr Peter Blythe and Sally Goddard Blythe, have developed a specific method of effective remediation for individuals with aberrant primitive and underdeveloped postural reflexes that has been shown to impact positively on patients with learning difficulties including dyslexia, dypraxia and other dysfunctions, adults with anxiety issues and agoraphobia (the INPP method of Neuro-Developmental Therapy).

Since completing the INPP training programme I have developed my work as a neuro-developmental educator assessing and remediating neuro-developmental delay issues with children and adults. This includes working with individual clients, running school programmes and training educational staff in the school based INPP programme as well as working with other health care professionals who are interested in this perspective and aspect of human development. The INPP programme and assessment looks not only at primitive and postural reflexes, but

also assesses vestibular, cerebellar function, co-ordination, ocular-motor function, visual spatial and some visual processing. It is complemented by auditory processing assessment using the Johansen Individualised Auditory Stimulation programme (www.JohansenIAS.com.). As practitioners we also pay attention to proprioception and laterality.

So, what does this work offer behavioural optometrists? Essentially: a complementary approach providing a more comprehensive view of the behavioural optometry client and their neurological and physiological function.

"The presence or absence of primitive and postural reflexes at key stages in development provides 'windows' into the functioning of the Central Nervous System, enabling the trained professional to identify signs of neurological dysfunction or immaturity." (Goddard Blythe, S., 2009, p 1) It has been found that identifying these reflex issues and then remediating them can impact on the physiological supports that provide a platform and solid base for learning, thereby improving function.

> 'The central nervous system acts as a coordinating organ for the multitude of incoming sensory stimuli, producing integrated motor responses adequate to the requirements of the environment.' [Bobath B., (1978)] When the CNS is working well, the cortex is free to concentrate on 'higher' functions, being involved in intention and motor planning, but not the detailed mechanics of movement ... The maintenance of posture and equilibrium is carried out by the CNS recruiting lower centres in the brainstem, midbrain, cerebellum, and basal ganglia in the service of the cortex. (Goddard Blythe, S., 2009, p. 5)

This largely unconscious area of movement and postural control impacts on learning by impacting on the unconscious brain and body functions controlled at the brainstem and mid-brain level (primitive and postural reflex areas). Whilst it cannot be said that people with retained primitive reflexes and underdeveloped postural reflexes will definitely experience learning difficulties and are likely to be dyslexic, it has been shown that amongst groups of children and adults with learning difficulties including dyslexia, dyspraxia and dyscalculia and others, significant numbers of them have clusters of retained primitive reflexes and under developed postural reflexes and, when those have been remediated through carefully structured movement programmes, their learning and functional difficulties have improved and allowed more effective functioning in life, school, sport and other arenas.

If we look at brain function and development and its impact on learning, this view of neurological development considering the role of primitive and postural reflexes in that development and the impact on function and learning, is a 'bottom up' view. It suggests the need for a

firm foundation incorporating well developed physiological and neurological bases to support body function in learning. If the physiology and neurology isn't there as a strong basis, the "top down" cognitively imposed and cortically controlled functions often required in learning, sport and work settings require exertion of additional energy and effort, and in some cases can't work well enough to over-ride physiological responses that are fundamentally reflex driven. A reflex, by definition, is an uncontrolled response. It is triggered by a stimulus and the response is automatic with no opportunity for cognitive or cortically controlled over-riding of that response. Clusters of primitive reflexes that have not been integrated and underdeveloped postural reflexes can, consequently, impact on function in school, sport and everyday living activities. Primitive and postural reflexes influence the development of posture, balance and motor skills including the development of oculo-motor skills which in turn can impact on visual processing. Quercia, Feiss, and Michel (2013) report that "postural treatment, with the goal of modifying ocular and general proprioceptive signals, significantly improves the convergence of dyslexics" (p. 873).

Retained primitive and underdeveloped postural reflexes affect developmental aspects of motor, vestibular, and postural functions including:

- Visual and acoustic sequence processing;
- Inadequate perception'
- Graphic representation of geometrical forms;
- Confused spatial organisation
- Poor short-term memory
- Clumsiness
- Deficits in surface and deep structure language [Goddard Blythe, (2009),p7-8]

I am aware that "the concept that reflex status can interfere with cognitive performance still remains controversial. The role of abnormal reflexes in dyslexia as a discreet entity has never been conclusively established despite the fact that dyslexia is sometimes categorized as a developmental and neurological disorder." [Goddard Blythe, S. (2009) p7] This, however, is characteristic of considerable work in the study of dyslexia, its causes and, indeed the presentation of what constitutes "dyslexia" [Quercia P., Feiss L., Michel C (2013)]. There is a growing body of evidence in practice (and research) including personal anecdotal and qualitative evaluations indicating that work in this area has assisted many patients in many ways. The "Research" section of the INPP website (www.INPP.org.uk) outlines a body of research and publications. The INPP work is based on several decades of research and practice in the use of medically standardised reflex and cerebellar tests and the implementation of the INPP model of therapeutic intervention. The controversy associated with what comprises valid 'evidence-based'

research and what works in practice is not unfamiliar to many behavioural optometrists and quite possibly indicates difficulties in establishing appropriate and accepted research methodologies that also embrace and value qualitative data including individual's accounts of their learning and functional experiences. That, however, is an aside and not the focus of this discussion.

NEURO-DEVELOPMENTAL IMMATURITY

The reflexes identified as significant indicators for neuro-developmental immaturity that can impact on learning and sensory development and function include the *primitive reflexes* and the subsequent *postural reflexes* that we develop and help us interact effectively with and experience the world in which we live and help us to learn about that world. They help us learn to survive and operate as upright, bipedal beings in a gravitational environment. Neuro-developmental delay is defined as: "the continued presence of a cluster of primitive reflexes in a child above 6 months of age together with absent or underdeveloped postural reflexes above the age of three and a half years." (Goddard Blythe, S. (2009), p.4)

Primitive reflexes are those reflexes with which we are born. They develop in the womb and are inhibited by higher centres in the developing brain. Their general purpose is to help us develop in utero and then assist in our survival once we've left the safety of our mother's womb. Some reflexes assist in the birth process and remain present and functional for a period of time, usually up to 6 months, to help develop other neurological pathways and sensory systems.

Postural reflexes "emerge after birth and take up to 3 ½ years to be fully developed. By the time a child reaches school age, in theory at least, the postural reflexes should be developed, and no obvious signs of continued primitive reflex activity should be evident." [Goddard Blythe, S. (2009), p.32].

LEARNING AND MOVEMENT

Learning begins with and through movement: reflex movement. We learn to adapt and change from a very floppy form requiring complete postural support at birth to become independent, upright and move in a controlled manner in our gravitational environment. That process begins with primitive reflex movement. If one side of the mouth is touched, a neonate will open its mouth and turn ready to latch on (usually to its mother's breast, but, to whatever is close to its mouth). The palmar grasp reflex is triggered if an object is placed in the palm of a baby's hand as it grasps onto that object. These primitive reflexes are automatic. But, from the moment they emerge, the body begins a process of

integrating these primitive reflex responses, replacing them with postural reflexes that support posture, balance, movement and co-ordination in our gravitational environments. By the time an infant is around 6 - 12 months of age, the primitive reflexes should have served their function, become integrated and should be replaced by postural reflexes enabling us to develop greater and more controlled movement. Postural reflexes should be well developed by the time a child is 3 ½ years of age. These reflexes, the level of their integration and development are considered to be indicative of CNS function. It is important to note that primitive reflexes never "disappear". Rather, they become integrated and superseded by other postural responses and reflexes only to reappear if there is some form of neurological damage or illness associated with CNS dysfunction or disease. It is not uncommon to see primitive reflexes resurface in the very elderly or those with brain injury/damage. Transition from primitive to postural reflexes is gradual. It occurs not only as a maturational function within the CNS, but it is also partly environmentally dependent. (Goddard Blythe, S. (2009) Because primitive and postural reflexes are developmentally sequential, serve varying sequential purposes in human maturation and movement development and are also hierarchical in terms of neurological development they are considered to provide useful tools with which to assess the CNS.

> During the process of normal development, functional directional and organized control of movement proceeds from the lowest regions of the brain (the brainstem) to the highest level of the CNS, the cortex. This process of coritcalization is characterized by the emergence of behaviours organised at sequentially higher levels in the CNS with lower levels being recruited into the service of higher functions as maturation takes place. Each level of the nervous system can act upon other levels, higher and lower, in either direction depending on the task. Reflex status can therefore provide indications of integration in how the brain functions as well as point to specific receptors which may be involved in presenting symptoms. In order to gain an understanding of what primitive and postural reflexes can tell us, it is necessary to know what they do, both individually and collectively in early development, when they are inhibited, the interrelationship between inhibition and the development of new skills, and the possible effects if primitive reflexes fail to be inhibited or if postural reflexes do not develop fully. [Goddard Blythe, S. (2009) pp25 -26]

As mentioned previously, primitive and postural reflexes serve various functions in the acquisition of motor control, balance, and sensory development including the visual system. Primitive reflexes assessed in the INPP programme include: MORO, Asymmetrical Tonic Neck Reflex (ATNR), Symmetrical Tonic Neck Reflex (STNR), Tonic Labyrinthine Reflex (TLR), Palmar, Plantar, Babinski, Rooting, Sucking and Spinal Galant. Postural reflexes assessed include: Head Righting Reflexes (HRR), Landau, Amphibian and the Segmental Rolling reflex.

The focus of the remaining section of this paper will be on those reflexes considered to be associated with vision. The primitive reflexes include: MORO, ATNR, STNR and the TLR; the postural reflexes: Ocular Head Righting reflex (OHR) and the Labyrinthine Head Righting reflex (LHR). The following tables provide a summary of the reflexes including an illustration of reflex presentation in the infant; when it emerges and when it should be inhibited (primitive reflexes); stimuli or triggers for the reflex; the function of the reflex in development and the symptoms if the reflex is retained (primitive reflexes) or underdeveloped (postural reflexes.) The information compiled in these table is based on reading from Goddard Blythe, S (2009) *Attention, Balance and Coordination: The ABC of Learning Success,* and Goddard Blythe, S (2005) *Reflexes, Learning and Behavior: A Window Into the Child's Mind.* (See reference list)

Primitive Reflexes:

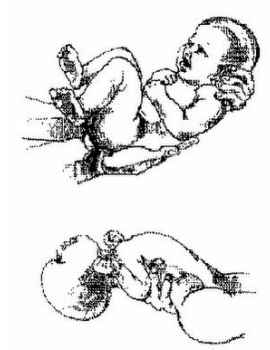
PRIMITIVE REFLEX — Multi-sensory reflex

Reflex (Name and description)	When?	Stimulus Triggers?	Function?	Retained symptoms?
Moro –a distress reflex (Instant arousal, rapid inhalation, momentary "freeze" followed by expiration, "flight or fight" sympathetic nervous system – adrenaline and cortisol increase, increase breathing rate (hyperventilation) Increased heart rate, increase blood pressure, red skin. Possible strong emotional response – tears or anger. Abduction followed by adduction (grasp)  Source: mororeflex.net Accesssed : 26/04/2012	*Emerges*: 9 wks utero *Birth*: Fully present *Inhibited*: 2 – 4 months	Multi sensory stimulus: Vestibular, Auditory, Visual, Tactile.	Involuntary reaction to threat Brainstem releases immediate Moro response. Inhibited by 2 – 4 months and replaced by adult startle reflex (or Strauss reflex) Role as survival mechanism in first months of life is to alert, arouse and summon assistance, also thought to develop breathing mechanism in utero, facilitates 1st breath of life	Child: exaggerated startle reaction, in constant state of readiness (high levels of adrenalin and cortisol); will present as acutely sensitive, perceptive and imaginative on one hand, but immature and over-reactive on the other. Can be withdrawn child or aggressive over-active child, highly excitable, cannot read body language needs to dominate situations. (Either child will tend to be manipulative, as he attempts to find strategies which will give him some measure of control over his own emotional responses) Eyes will be drawn to any changes in visual stimulation and light. Cannot filter out or occlude extraneous stimulus – easily overloaded, in effect "stimulus bound" **Symptoms:** Motion sickness, poor balance and coordination (esp during ball games) Physical timidity Oculomotor and visual perceptual problems (stimulus bound—ie cannot ignore irrelevant visual material within a given visual field so eye are drawn to the perimeter of a shape to the detriment of perception of internal features)

PRIMITIVE REFLEX Multi-sensory reflex	**MORO continued**				Poor papillary reaction to light, photosensitive, difficulty with black on white paper (tires easily under fluorescent lighting) Possible auditory confusion (difficulty shutting out background noise) Allergies and lowered immunity Adverse reactions to drugs Poor stamina Dislike of change or surprise Poorly developed CO2 reflex (hyperventilation) Reactive hypoglycaemia (has effect on the emotional profile of the child.) Secondary psychological symptoms: Free floating anxiety Excessive reaction to stimuli (mood swings, tense muscle tone and body armouring, difficulty accepting criticism) Cycle of hyperactivity followed by excessive fatigue Difficulty making decisions Weak ego, low self esteem (need to control events)

PRIMITIVE REFLEX

Positional Reflex

Reflex (Name and description)	When?	Stimulus Triggers?	Function?	Retained symptoms?
Tonic Labyrinthine Reflex: -- (Forwards) (Backwards) Extension of the head below the level of the spine causes immediate extension of the arms and legs. Flexion of limbs when level of head is above level of the horizontal plane of the spine.  Source: cataloguoferrors.blogspot.com Accessed: 26/04/2012	*Emerges* in utero – (flexus habitus) 12 weeks in utero *Birth:* Present *Inhibited:* approx 4 months (TLR backwards is gradual process involving emergence of several postural reflexes taking up to age 3 to be completed.)	Positional Stimulus – Vestibular. Movement of the head forwards or backwards, above or below the level of the spine. TLR in extension thought to occur as baby's head enters birth canal.	Primitive response to the problem of gravity (exerts a "tonic influence on distribution of muscle tone helping the neonate to straighten out – balance, muscle tone and proprioception are trained through this process." [Goddard Blythe, S. (2005) p 18] Influences muscle tone from head downwards – flexor and extensor muscle tone	• Postural instability arising from head position or movement of the head through the mid-plane (head movement will alter muscle tone – lacking a secure reference point in space, the child will experience difficulty judging space, distance, depth and velocity.) • Balance (effected by faulty visual info and proprioceptors of the body which mismatch) • Muscle Tone • Timing of signals in the vestibular-ocular reflex arc mismatched … messages from proprioception pass to vestibular nuclei and then to eyes. Messages from eye pass to vestibular nuclei and then to proprioceptors to make adjustments. Retained TLR affects the messages passing between the vestibular nuclei and the proprioceptors, which in turn affects the eyes. The 3 way mismatch causes problems) *Symptoms of retained TLR:* • Poor balance • Postural problems • Walking on toes above 3 ½ yrs • Under developed Head Righting Reflexes • Control of eye movements • Visual-perceptual problems (figure ground and depth perception) • Vertigo • Motion sickness continuing beyond puberty • Orientation problems

PRIMITIVE REFLEX / Positional Reflex	**TLR continued**				• Headaches • Auditory confusion • Hypo-tonus (weak muscle tone) • Poor sequencing skills • Poor sense of time • Poor organisation skills. *STNR will remain "locked" in the system in futile attempt to over-ride the TLR preventing creeping and crawling (Crawling is when vestibular, visual and proprioceptive systems all start to operate together for 1st time)*

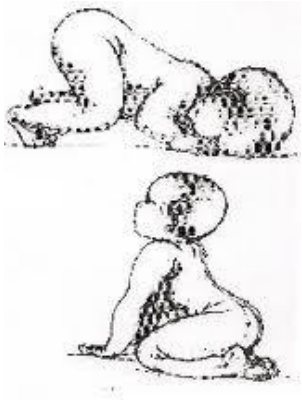
PRIMITIVE REFLEX

Positional Reflex

Reflex (Name and description)	When?	Stimulus Triggers?	Function?	Retained symptoms?
ATNR Movement of the baby's head to one side will elicit reflexive extension of the arm and leg to the side to which the head is turned and flexion of the occipital limbs.  Source: http://consciousbabyblog.files.wordpress.com/2011/11/atnr-prekop-institut-com-publikationen-html.jpg&imgrefurl Accessed April 26/04/2012	*Emerges:* 18 weeks in utero *Birth;* fully present *Inhibited:* by 3-6/9 months postnatal	Head movement /turning across vertical plane/ midline	• Facilitates movement in utero providing continuous movement which stimulates the balance mechanism and increases neural connections. • Develops muscle tone (extensor muscle tone, training one side of the body at a time also providing the basis for later reaching movements) • Develops homo-lateral movement • Assists in the birth process (lend flexibility and motility to the shoulders and hips , birth process in return reinforces the ATNR so that they are firmly established and active during first months of life) • Ensures free airway when lying prone • Facilitates early hand-eye training • Provides visual fixation point on nearby objects	• Balance problems when the head is rotated • Development of cross pattern movements effected – problems crossing the vertical mid-line, one side of the body to the other • Commando crawling with fluent cross-pattern movement is difficult/impossible (homo-lateral) • Hand –eye co-ordination (left & right) writing • Horizontal eye movements, eye tracking (esp. awkward at midline "stimulus bound at midline") • Bilateral integration difficulties • Associated with cross-laterality in child above 8 years • Vision may be tethered to arm's length • Pencil grip likely to be very tight or immature applying excessive pressure • Physical act of writing requires concentration at the expense of cognitive process • May rotate page up to 90 degrees • Visual perceptual difficulties particularly in symmetrical representation of figures.

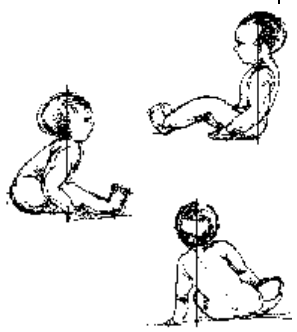
PRIMITIVE REFLEX

Positional Reflex

Reflex (Name and description)	When?	Stimulus Triggers?	Function?	Retained symptoms?
STNR: When child is in quadruped position, flexion of the head causes the arms to bend and the legs to extend. Head extension, causes the legs to flex and the arms to straighten.  Source: the-middle-way.org Accessed: 26/04/2012	*Emerges:* 6 – 9 months (although present for short time at birth) *Inhibited:* 9 – 11 months	Head position – as head flexes and extends past the horizontal midline in quadruped .	• Transient/bridging reflex to help defy gravity • Helps to inhibit the TLR forms a bridge to the next stage of locomotion – creeping and crawling on hands and knees, but if present/retained, will impede forward progress because at this stage, the position of the head decides the position of the limbs. "It allows the infant to defy gravity, adopt the quadruped position and to learn how to use the two halves of the body independently " [Goddard Blythe, S. (2005) p 22] • Child progresses to rocking motion which inhibits STNR and allows crawling • Aligns sacral and occipital regions in quad. Position • May help in training accommodation.	• Upper and lower body integration problems (horizontal midline barrier), problem with movements that involve upper and lower body integration eg swimming etc. • Can't creep or crawl • Posture –tendency to slump when sitting • Simian (ape like walk) • Sit in W position • Poor hand-eye coordination (messy eater, clumsy child) • Difficulties with adjustment of focusing distance to near 9accomodation) • Slowness at copying tasks • Difficulty learning to swim • Can affect attention as result of discomfort when sitting in one position. • Vertical tracking problems • Poor muscle tone/strength and energy. Bender institute found "..retained STNR to be a significant factor in children with ADD and ADHD. Both groups improved markedly hen the STNR was inhibited as a result of a specific movement program." [O'Dell and Cooke (1996) quoted in Goddard Blythe, S. (2005) p 24]

Postural Reflexes:

POSTURAL REFLEX – Righting Reactions to gravity which result from somatosensory, visual & proprioceptive influences acting together when the 3 inputs are available and functioning appropriately.

Reflex (Name and description)	When?	Stimulus Triggers?	Function?	Retained symptoms?	
Head Righting Reflexes: *Righting Reactions:* **Oculo:** (visual cues – cortical) **Labyrinthine:** (Vestibular – mid brain))  Source: http://puddingtownbears.files.wordpress.com/2008/06/hrr.gif?w=201&h=247 Accessed: 26/04/2012	Emerge: 2-4 months Should remain for life	***Equilibrium reactions***, "do not occur until connections to the cortex are more firmly established... They comprise the protection and tilting reactions … elicited if balance is lost or the centre of gravity altered." [Goddard Blythe, S. (2005) p28]	Ensures the head maintains a mid-line position despite movement of other body parts Oculo-head righting (cortex) – operate as result of visual cues (may also be elicted by combination of visual and vestibular stimulation, stretching of the neck muscles and/or movement of visual images on the retina. Labyrinthine: dependent on vestibular info. (otolithic organs stimulated) The two should synchronise to provide accurate data about head position Enable the VOR to function effectively ensuring stability of the retinal image despite head movement.	• "If they fail to develop fully, or only one develops adequately, balance, controlled eye movements and visual perception will all be impaired. • Muscle tension in the neck and shoulder region combined with poor posture may be symptoms of underdeveloped HRR" [Goddard Blythe, S. (2005) pp31 – 32] • Inadequate muscle tone, • Hypotonia • Impaired oculo-motor functioning • Reading ability, comprehension and spelling because visual isation and visual pursuit can be impaired "Children who have underdeveloped head righting reflexes in combination with retained tonic neck and tonic labyrinthine reflexes have difficulty shifting gaze without the head also having to move.... if the child additionally has an active ATNR, he or she cannot separate hand, head, and eye movements, which can affect coordination when writing." [Goddard Blythe, S. (2009) p 143]	

How can testing of Primitive & Postural Reflexes be used?

Because reflex responses occur below the level of conscious awareness, their presence or absence enables us to gain information about the CNS free from interference from the psyche. [Goddard Blythe, S. (2005, 2009)]. The INPP program developed by the Institute for Neuro Physiological Psychology offers a comprehensive system to complete a standardised method of diagnosis, treatment and subsequent clinical evaluation of neuro-developmental immaturity. Clinical assessment using standardised medically based tests enables us to:

- Identify signs of immaturity in the CNS (diagnose)
- Determine the type and developmental level of intervention (appropriate treatment)
- Measure change (clinical evaluation).

In this way reflex integration work can complement that of behavioural optometrists in enhancing learning and function in the patients we see. With more children being encouraged to have vision checks before commencing school and in early years of education, optometrists are well placed to identify children with developmental issues that impact on their learning. Reflex testing provides another window into understanding the neurological and physiological characteristics of the patients behavioural optometrists see. Reflex integration work is not primarily optometric work. It is, however, another dimension to consider when contemplating the function, learning and experiences of the child or patient in front of you in your practice. It is a possible screening device for referral to a reflex integration practitioner or can become an additional component in a suite of therapy programmes which you may offer.

A recent paper by Blythe and Goddard Blythe (2012), published in the Journal of Behavioural Optometry, draws attention to the testing and treatment of primitive and postural reflexes "using clinically unknown diagnostic procedures to test for the presence of aberrant reflexes, misinterpreting observations during the assessment of primitive reflexes, and applying clinically unproven reflex inhibition programmes without a clear understanding of the developmental basis for some of the exercises used in relation to primitive reflexes" (p. 138) In this paper, Blythe and Goddard Blythe outline the importance of using standardised tests and applying treatment programmes appropriately and with thorough understanding of the developmental basis for the use of particular exercises. I draw your attention to this paper in consideration of how you as a behavioural optometrist may choose to use reflex integration work and reflex assessment in your practice.

I also ask the following questions in the spirit of encouraging reflection on your practice and discussion amongst professionals who share the same goals of enhancing learning and function in patients:

- At what “brain level” do you aim to remediate the patient?
- What guides you in your treatment decisions, particularly about “where to start”?
- Do you take a top down approach and teach and practice cortically controlled skills and cognitive function? Or, do you look to see if there is an underlying developmental issue at the CNS level perhaps using the reflex profile of the patient as a window into determining a point of access for remediation?
- If you aim high, “top down”, without careful consideration of the underlying physiological and neurological profile of the patient, are you setting yourself and your patient up for more hard work, more attempts at cognitive and cortical control over something that is a reflex response?
- It has been said, that if skills are taught as splinter skills, the longevity of those is limited and unsustainable unless constant practice is maintained. Is that happening with your therapy work i.e. a constant need to revisit skill development? If so, perhaps there is an underlying reflex issue that needs to be identified and addressed.

If underlying physiological and neurological bases of balance, posture, co-ordination and attention can be addressed through another remediation programme first, then the results may be more long term and sustainable providing better outcomes for our patients. In this way, work with primitive reflexes and the accurate diagnosis of the presence of retained reflexes using standardised medically accepted tests will complement and indeed, enhance your work as behavioural optometrists facilitating learning and function in various contexts.

The INPP reflex integration programme provides a non-invasive assessment and therapy programme and may provide an appropriate place to start remediation in your practice. Twelve months of INPP therapy has been shown to remediate some of the ocular motor and vision issues concerning behavioural optometrists about their patients’ presentation in vision assessments. Assessment and remediation of neuro-developmental immaturity using the INPP programme including determination of the neuro-developmental and reflex profile, programme preparation, review and application of the programme occurs over a 12 month period. Some other therapy programmes are contra-indicated for patients and can delay and thwart remediation.

WHERE TO NOW? TRAINING OPPORTUNITIES:

A programme designed specifically to enable health care professionals screen for primitive and postural reflexes is currently under development in the UK and will be available in Australia in 2014. School based programmes for teachers and schools (including movement

programmes) are currently available. Individualised therapy programmes for individual patients are also available. **Integrating Thinking** is the Australian licentiate and training organisation for the INPP method in Australia. Information regarding the programme, and training opportunities is available on the website: www.integratingthinking.com.au. Please contact me for further information or if you have any inquiries regarding specific assessment and treatment of patients already in your care. I enjoy professional and collegial discussions across disciplines, so please feel free to pass on your reflections to my previous questions and the content of this presentation.

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