Certification Training Manual

MOBILITY

Stage I: Medulla/Spinal Cord Level: Movement without Mobility

The neonate is not yet mobile, that is they cannot move themselves off the spot where they have been placed. They must make the transition from an environment in which mobility was not an option to learning about the use of torso, limbs, and extremities that will one day carry them from home to school, from car to front door, and up and down mountains as they conquer the world.

A neonate, despite not having mobility, is certainly not paralyzed. They have movement without mobility. Their arms and legs move and squirm as they begin to find the articulations of their spine and joints, the range of their muscles and limbs. The tiny feet of the neonate placed on their tummy can be observed to push into the floor in an alternating pattern, thrusting against a blanket or mattress, in what appears to anticipate tummy crawling. However, this movement does not get them off the spot.

Additionally, the neonate has the reflexes needed to 'stand' by bracing his legs and feet against a surface and move, in what often looks like a walking pattern. While many see this as an early rehearsal of walking, Florence Scott, R.N. proposed that it is a necessary reflex that the fetus uses in utero to turn themselves. The fact that this reflex goes away after a couple of months suggests that, while this early pedaling motion is part of natural development, it is more likely to be the resolution of an in-utero reflex rather than preparation for walking. It is not a reason to suspect or to encourage early walking, which will occur only once the rest of the brain and body are ready to support walking.

A neonate put on their tummy will feel safest with the front side of their body, including their vital organs protected by the surface beneath them, just as they feel safe when facing towards the parent's body. This tummy-down position, while not producing mobility, is important to help them feel comfortable on the floor, and triggers neck strength, arms engaging on the floor, and the kneading-type alternating push of the feet, all of which support the upcoming developmental stage of crawling.

While many parents are afraid to put neonates on the floor at any time, the absence of tummy-down time can create a later resistance to crawling and interrupt the unfolding of the Developmental Sequence. Many parents, aware that crawling is beneficial, will bemoan the fact that their baby 'hates tummy time'. This is likely because they were not introduced to it early in life. Since we have 24 hours in a day and babies are not asleep for all of those hours, it only makes sense that we can find ways to give the baby time on their tummy from their earliest weeks of life, thus setting them up for good developmental progression over the span of their early childhood.

Stage II: Pons Level: Crawling

At about two and a half months, we will see a neuro-typical baby who is placed on the tummy beginning to move their arms and legs around a torso that is stable because it is on the floor. Over time, there is more coordination and purpose in this apparent flailing. They may engage the arms BEFORE the legs,

and in some babies, this will manifest as crawling backwards. Eventually, the legs will engage and begin to move forward.

Crawling begins as an instinct to move AWAY from perceived danger. So, a baby in a wet diaper might perceive the moisture as dangerous and will move AWAY from it, since they do not know that they can't drown in their diaper.

This urge to protect oneself from danger is characteristic of this stage of development. As we will learn in the sensory overview of the child, this level of the brain will simultaneously integrate their developing awareness of and response to the discreet sensations of heat, cold, pain, and hunger, and they will react strongly to these sensations. Crawling away from life-threatening sensation is part of this response. This baby is oriented towards survival in all of its sensory and motor functions. And should be of no surprise, then, that the amygdala, our fight/flight/freeze center, comes on board in the same time frame as the pons.

As babies move on their tummies with their arms and legs working together to propel them forward, they are developing the stability and alignment of the torso, plus range and mobility of the proximal joints of the limbs (shoulders and hips). This activity, which is colloquially known as 'tummy time', is the groundwork, literally, for upright posture, as this movement triggers optimal alignment of the cervical and lumbar spine. Additionally, as the feet thrust the body forward employing a good toe grip on the floor, the arches of the feet are strengthened and stabilized.

Babies who are tummy crawling get a great deal of stimulus to their genital area and this supports the appropriate development of toilet training. This does not mean that they will toilet train at this age! What they are developing is the sensory awareness of this genital area of their bodies, so that they will be more easily toilet trained at the appropriate time.

Crawling will trigger visual skills, as well. Movement of the eyes in the horizontal is prompted by crawling, which is why this activity is foundational for reading. Ultimately, as the result of continued crawling, eye movement becomes smooth and independent of head movement. In this way, the child will eventually be able to read across a line of words in a book without skipping the little words, combining two words, or misplacing words in the sentence.

The movement of the arms in crawling includes an active reach forward, then a passive rotation and turn under the torso as the arm goes from the prone to the supine position. This begins to establish one of several fine motor skills called supination/pronation. Since good fine motor skills include cortical opposition of the forefinger and thumb (a cortical skill), plus the ability of the arm to supinate and pronate, developed at the pons level of development, we can begin to understand how crawling supports fine motor skills.

The hands are triggered to open during the crawling phase of development. Prior to crawling, the baby maintains a fetal grasp with the thumb tucked into the fist. During the crawling phase, as the baby reaches out with their palm ever more in contact with the floor, the hand begins to release the grasp reflex.

Certification Training Manual

As all of these pieces fall into place, the crawl becomes more sophisticated. Ultimately, the baby will develop a cross pattern crawl in which the alternate hand and leg are moving forward, and the child can move across the floor.

Neurological functions related to a complete crawl, limited summary of the benefits of crawling:

- Eyes that track smoothly in the horizontal without head movement, leading to the ability to track words across the page of a book.
- Eyes that do NOT turn in. Nerves that go to the muscles that pull the eyes OUTWARD arise from the pons level brain. An inward turned eye can be addressed through crawling.

HISTORICAL NOTE | Reactive Attachment Disorder (RAD):

Florence Scott, one of the original researchers, founders of the work, and teacher of Jean Ayers, Nina Jonio and Bette Lamont among others, made an astute observation about the children who had suffered in Romanian orphanages under the Ceausescu regime. In 1989 the country was liberated and the orphanages were opened to cameras from the West. The horrific scenes led people from the U.S., the U.K. and other countries around the world to rush to these orphanages and bring the children into adoptive homes.

Florence Scott, prescient about the impact these children would have on families, said that we needed to find a way to diagnose the neurodevelopmental and emotional problems these children would bring with them. She stated "These children are going to destroy these families if nothing is done."

Ms. Scott made this statement before Reactive Attachment Disorder (RAD) had entered the Diagnostic and Statistics Manual (DSM).

The one thing she began to observe consistently in these children was that when they crawled their hands would be in the fetal grasp. She determined that it was a diagnostic marker for this as yet unnamed mental health disorder, which was researched and entered into the DSM in the early 1990s.

We have since learned that RAD has many neurodevelopmental features, but the fisted hand, beyond the normal time frame for its release, is a marker for anxiety and under developed neurology at the level of the pons.

- A startle to appropriately loud noises. Note: in autism, children who can hear may not respond to loud sounds.

- The ability to feel and appropriately respond to heat, cold, pain, and hunger.

The upright posture of an older child who has completed their pons-level work is another indicator of this stage. Cervical and lumbar curves must be in place. The arms will move naturally, swinging around an upright torso, and the legs will swing from the hip sockets. When this is not the case, you might see a very 'blocky' walk in which the whole pelvis rotates or the whole shoulder girdle rotates, rather than the legs and arms swinging around a stable, but not rigid torso.

Stage III: Midbrain/Mid Cerebrum Level: Hands and Knees Creeping

As the Developmental Sequence continues to mature the brain, prompted by myelination into higher levels of the central nervous system, an area called the midbrain becomes the dominant brain and new skills emerge.

By seven months of age, the infant will go into a stage of development whose core mobility activity is creeping on the hands and knees.

Creeping begins with the baby up on all fours, initially wobbly, perhaps rocking back and forth. The first forward progression may be achieved by both arms reaching forward simultaneously, followed by both legs pulling forward towards the arms. This is homologous creeping and is a valid stage in the

NOTE | The Terms "Crawling" and "Creeping"

When Neurological Reorganization was first being researched and developed into a treatment program in the 1940s and '50s, there was no clear known distinction between the two activities in any child development literature. One of the founders of the work now known as Neurological Reorganization had been in the military where you crawl on your belly, (think 'army crawl') and you creep on your hands and knees. Thus, they adopted this terminology because it made a clear distinction between the two activities. Parents are constantly confused by the terms, but we choose to stick with the original definitions. It will be important to clarify in emails and phone calls, when parents are asking questions, which activity they are talking about.

developmental process that the infant will move through quickly.The next stage is often a homolateral creep, with both limbs on the right side moving forward, then both limbs of the left moving forward. The baby will ultimately develop a cross-pattern creep in which the alternate hand and leg are moving forward. This is the first time the baby has had to engage with gravity, and balance mechanisms are both practiced and integrated into this infant's brain. Creeping is an activity that is triggered by the infant

intentionally moving forward towards something. This is the baby that heads for the cat, the toys scattered on the floor, or the lowest shelf in the kitchen with the pans, which they may quickly scatter about the house.

The tendency of many parents is to contain all of this energetic exploration through the use of various baby buckets – an Exer-saucer (or child passive entertainment center), a car seat that has been brought in from the car, a door swing, or jumper.

This is, however, prime time for the baby to stimulate new connections between the two cerebral hemispheres. And when the baby is creeping, they are maximizing the connections between the right and left hemispheres of the brain across the corpus callosum, a cortical structure that is stimulated during this phase of development.

This strong connection allows and supports the brain to control impulses, to remember, to pay attention, to understand which way the letters go (is it a 'p' or a 'q'; is it a 'b' or a 'd'?), to comprehend the story that is unfolding as they read the particular words, to bring comprehension to and describe their emotional state of mind. These very important jobs are dependent upon getting all of the activities of a healthy midbrain completed as part of the Developmental Sequence, and should be a goal for all parents.

Neurological functions related to a complete crawl, limited summary of the benefits of creeping:

Creeping will also support the two eyes converging with ease so you can use two eyes to look at the same thing at the same time. Visual convergence is critical for reading, sports, social interactions (see Visual Competence chapter), and as so, we want to keep our babies on the floor for as long as they need to get good visual convergence.

The work the baby does at this midbrain level, which is characterized by creeping, also helps mature areas of the brain that help them filter out excess environmental stimuli from visual, auditory, or tactile sources. By adequate stimulation of the midbrain level, and particularly creeping, we can support the child's nervous system to prioritize and filter incoming stimuli. The most supportive activity for a child who is described as 'sensory avoidant' is creeping and the reflex patterns that support creeping.

During the midbrain level of development, the cerebellum begins to become organized. The cerebellum, sometimes referred to as the 'lesser brain', not only plays an important role in controlling eye/hand coordination, movement, knowing where the body is in space, and balance, but also contributes to a variety of activities not related to movement.

Research has found the cerebellum may play an imperative part in short-term memory, attention, impulse control, emotion, higher cognition, and the ability to schedule and plan tasks. There is a growing amount of research suggesting that the cerebellum may be more involved with sensory input than motor output. Any child with dyslexia or ADHD may be dealing with an immaturity of the cerebellum.

Babies' gross motor skills are also impacted by creeping. The iliopsoas muscle group helps the knee fall into alignment with the hip socket so that as the baby moves forward, the knees are aligned with the hips. This keeps the knees healthy and aligned in the adult, avoiding injuries and ligament tears that can happen

in sports such as skiing. In a similar fashion, but not as noticeable, the elbows line up with the shoulders. This is important for the development of later fine motor skills. The rotation of two bones of the lower arm around the one bone of the upper arm, is one of the important components of fine motor functioning that develops during this time.

Summary of some the benefits of a well-developed completed creep and well-developed midbrain:

- Eyes that track smoothly in the vertical without head movement, eyes that converge appropriately.
- The ability to filter out background sensations and prioritize sensory information appropriate to the situation. For example, one may be able to hear a conversation against a background of other voices, or a teacher's instruction against a background of classroom noise; able to visually locate a pen against the background of a cluttered desk; able to wear a wide range of textures or eat a wide range of food textures without problem or distraction.
- The ability to prioritize what stimuli require one's attention and what can be ignored.
- The ability to hear vocal tonality and respond with appropriate tonality.
- Good social cueing: the ability to understand postural and gestural communications, facial expressions, eye contact, and other body language.
- Good alignment of limbs for sports and daily physical activity.
- Easy ability to supinate/pronate the arm, as a part of good fine motor skills.
- Learning skills that allow both fluency AND comprehension in reading.

Stages IV – VII: Cortical Level: Walking, Running, Skipping and Hopping

The Developmental Sequence begins to prompt the many levels of the cortical brain to become organized by the child's first birthday. In some rare situations, you might even see the baby take their first step and say their first word on their birthday, indicating that the cortex is coming on board. The activities that continue to organize the brain through this exciting phase are upright walking, running, skipping and hopping. Observing the development of these activities gives us insight into the cortical brain.

The quality of these upright activities depends on the completion of lower-level gross motor skills, crawling, and creeping. We want to educate parents to understand that early walking is not a sign of precocious development and that walking will emerge when the brain and body are ready. It is an exciting step into childhood that parents wait for eagerly, but we need to caution parents that early walking may even be an indicator that lower levels of development have not been completed.

Walking

Walking is a neurodevelopmentally significant activity. When we are walking, weight is transferred from one foot to the other and there is a moment when both feet are on the floor. This is an important part of our bilateral, cross pattern development.

Certification Training Manual

In his book Walking Your Blues Away, author Thom Hartmann discusses at length the inter-hemispheric communication that can occur during walking and the way that can be used to bring emotional and psychological challenges into perspective.

As our culture has become more digitally oriented and more sedentary, the many conveniences that take us from here to there and do tasks for us require less and less walking. Walking has become an activity on which we have to consciously focus in order to get adequate amounts into our lives. Thus, we will often be assigning walking to our clients.

Walking will demonstrate all of the body integration that has come during the crawling and creeping phases of development. The cervical and lumbar curves are well established, being neither too straight, nor too curved. Lordosis is the name for excessive forward curves in the cervical and lumbar spine. Kyphosis describes the lack of lumbar curvature with the rib cage caved in, creating a backward curve of the thoracic spine, a flattening of the lumbar spine, and the tail bone tucked forward. While walking or standing, the head should rest in a centered position over the rib cage, pulled neither forward nor back.

Shoulders are loosely hanging above the rib cage and the arms swing easily and fully from the shoulders. The shoulder girdle is responsive to the swing of the arm, but does not roll forward WITH the arm, which would be due to restrictions and lack of discreet movement in the sockets. The elbows are rotated into a position such that the inside of the elbow points diagonally forward and in, towards the midline.

Walking should always be in a cross pattern with opposite arm and leg swinging forward at the same time. Feet should be pointed forward, with a good arch. Knees should be aligned with hip sockets, and the legs should swing easily from the hip socket, rather than pulling the whole pelvis forward due to lack of discreet movement at the hip socket.

Running

Running is an activity in which BOTH feet come off the ground between steps. Running should meet most of the same criteria as walking. Additionally, the arms pump vigorously to support forward momentum.

Skipping

While crawling is a ‘get away’ activity, creeping is a ‘go to’ activity; walking and running allow us to move through our environment while freeing our upper body to manipulate and sculpt our environment. Skipping appears to be purely designed to elicit JOY.

Skipping is a cortical activity. However, there is a rhythm and coordination to skipping that is dependent upon the midbrain. Once the midbrain level is fully integrated, skipping appears to emerge spontaneously.

One note about skipping comes from an observation by Florence Scott, R.N. Ms. Scott said that when a person skips with the knee up and the lower leg at a right angle or even straight in front of the body, there

is a language processing problem in the brain. We have not seen any information about this anywhere else, and it is one area where none of the practitioners have a full answer. However, we invite you to explore this and note those clients where skipping and language development are simultaneously problematic.

When skipping, the lifted leg should pull up at an angle such that, seen from the side, the leg is making a triangle in relation to the supporting leg.

Hopping

When you ask a child to hop on one foot, you are asking for a very sophisticated task of standing on one foot, lifting all of the weight of their body off the ground with one energetic surge that requires well developed balance. The child will usually choose to hop first on their dominant foot.

Mobility Competence

Testing

Stage I – Medulla/Spinal Cord Level

Test process:

Unless the child is under two months, you will get this from the history. If under two months, put them on a smooth surface to observe:

- Did arms and legs move during the first three months of life?
- Was movement equal on both sides of the body?

What to note on your chart:

- If the neonate was floppy, note that.
- If one side of the body was more impaired than the other, note that.

Stage II – Pons Level: Crawling

Test process:

- Client will have socks off and be wearing long pants, so they do not create abrasions on their knees.
- Client will be put on a smooth surface, such as wood or vinyl.

Certification Training Manual

- Client will be asked to head towards the end of the room or track, keeping their belly button on the floor. No instructions about arm and leg movement.
- If the client does not use arms or does not use legs, you may suggest 'You can use your arms and legs any way you like'.
- Do not say or allow parents to say 'USE YOUR ARMS', or 'USE YOUR LEGS'. You need to see what their body does without any instruction.

What to note on your chart:

Any of the deviations from a complete crawl, listed below, should be noted.

Children who have not done crawling as a part of their normal developmental sequence will demonstrate many aberrant variations, and no two children are the same. However, some of the common elements you will see in an unfinished crawl include:

Pattern:

- Inability to move forward at all.
- Homologous crawling: the upper reaches, then the lower pushes.
- Homolateral crawling: the left arm and leg move, then the right arm and leg move.

CORRECT: Cross pattern - meaning arms and legs work in opposition to each other.

Torso/Spine:

- Inability to keep the belly button on the floor if the legs are used.
- Rolling of the torso, rather than torso stability.

CORRECT: Torso is stable on the floor and the arms and legs move around that stable torso with a range of mobility in the proximal joints.

Use of Hands and Arms:

- Hands in fists/fetal grasp with the thumb in the fist. Note throughout the appointment if the hand goes into a fetal grasp when the client appears to be stressed.
- Fingers are curled.
- Hands are lifted off the floor at the wrists, avoiding any contact with the surface.
- Absence of arm use, uses only right or left arm.
- Arms under the torso in what might be described as a fetal position, with rocking from one elbow to the other.
- Arms make 'L's out from the shoulder and client pulls homolaterally with arms.

Certification Training Manual

- All parts appear to be moving appropriately, but the child is pulling from the arms rather than pushing from a good toe dig.

CORRECT: Hands open and arm actively reaches forward at the midline, then the arm rolls partially under the chest into the supine position, alternating right and left.

In response to a toe dig on the opposite side, the arm reaches out with hand at about midline, then supinates and rolls almost under the chest as the body moves forward. The other arm responds after toe dig on the opposite leg.

Use of Legs:

- Absence of leg activity in one or both legs.
- Use of legs in a cross pattern to propel from the knees up, but the lower legs are in the air like flagpoles. This is the consequence of a retained Landau Reflex.
- Use of the legs in a cross pattern, but no toe dig.
- Both legs go to one side, looks like quotation marks: “

CORRECT: Legs are used in an alternating cross pattern to propel the body forward.

Use of Feet:

- Toes flexed in and cramped.
- Top of toes touch the floor but do not push/engage.
- Foot is inactive or limp from the ankle down.

CORRECT: Foot aligns with the rest of the leg, barely lifts off the floor as the leg flexes up. All toes dig into the floor and initiate a forward thrust of the body.

Any of the above done on one side of the body, but not the other; asymmetrical crawling.

Stage III – Midbrain Level: Appreciation of Detail and Vertical Eye Movement and Convergence

Test process:

- Client will have socks on.
- Client will be directed to travel across the room on the longest path possible on hands and knees.
- If knees hurt, either provide kneepads or limit the amount of travel on hands and knees.
- Children under about 10 years old have natural protection and being on hands and knees should not bother their knees.

Certification Training Manual

What to note on your chart: Any of the deviations from a complete creep, listed below, should be noted.

Children who have not done creeping as a part of their normal developmental sequence, or who have an injury to this area of the brain, will demonstrate many aberrant variations, and no two children are the same. However, some of the common elements you will see in an unfinished creep include:

Pattern:

- Homologous creeping: the arms reach forward, then the knees slide in to meet the hands.
- Homolateral creeping: both limbs on the right move forward, then both limbs on the left move forward.
- Inconsistent pattern: The client goes back and forth from cross pattern to homolateral pattern.

Torso/Spine:

- Curved up with head down.
- Curved down.
- Curved toward the right or curved left.
- Torso sways considerably side to side.

Hips:

- One leg circles out and around, causing the hips to sway back and forth, like a 'tail wag'.

Hands/Arms:

- Turned out or turned in.
- Fingers pronged.
- Curled hands are in fists or fingers are curled, rather than open on the floor with the client creeping on their knuckles.
- Wide base, with hands wider than shoulders.
- Narrow base, with hands closer together than shoulders.
- Elbows misaligned, inside of the elbow points forward.

Knees:

- Wide base, knees wider than hips.
- Narrow base, knees closer together than hips.
- Knees crossing midline.
- Knees that pass beyond the point where the hands land on the floor.
- Knees that swing out and around as they move forward.

Certification Training Manual

Feet:

- Lower legs are up in the air like flagpoles (at which point you want to check the Landau Reflex).
- Lower legs are down, but bounce up off the floor.
- Lower legs are down, but the toes are flexed under, so lower legs do not slide along the floor.

Head:

- Hanging down.
- Head held up and eyes looking forward. Note: some clients 'think' this is right. You may need to correct them if they are doing it to present you with a 'good' creep.

Also, look for: Any of the above done on one side of the body but not the other; asymmetrical creeping.

Stage IV – VII – Cortex Level: Laterality at Far Point and Near Point

Walking:

Oddly, this is the hardest test of all in the sense that no child who knows they are being observed, walks in their usual pattern. The best time to observe the walk is when you have, for instance, gone out to a waiting room to bring the child into the assessment area. If you can walk behind them and watch their natural walk, you will get the best results. If you cannot do this, then you can do it as one of the tests.

Test process:

Ask the client to walk the length of the room and back. The longer distance they walk, the more they may fall into a natural gait.

What to note on your chart:

- Homolateral walking, wherein the same arm and leg swing forward at the same time.
- Bulky, 'snowman'-like walk, due to lack of range of motion in the proximal joints, i.e., the shoulders and hips.
- Arms that don't swing.
- Kyphotic spine.
- Lordotic spine.
- Head jutting forward.
- Stiffness or rigidity in the shoulders, one or both.
- Feet pointed in, our out; knees pointed in or out.
- Leading the body forward from the chest rather than the pelvis.
- Toe walking or bouncing up on the toes.
- Asymmetry in any of the above.

Certification Training Manual

Running:

- The same issues that we see in walking may show up in running. If so, note that.
- If they are not pumping the arms, note that.
- If their hands are in fists, note that.
- If the person does not get two feet off the floor, but rather runs in a shuffling fast walk, note that.

Skipping:

Test process:

Ask the client to skip the length of the room and back. If they say, "I don't know/remember how", just tell them to do anything that feels like skipping. Don't correct them if they can't skip.

What to note on your chart:

- If lack of reciprocal cross-pattern movement in the arms, note that.
- If the lifted leg does not make a triangle shape against the support leg, note that and note the specific shape made by the lifted leg.
- If the movement is asymmetric, note that.

Hopping:

Test process:

- Ask them to find a spot on the floor and hop up and down on it.
- Whichever foot they choose first, ask them to switch and do the same thing on the other foot.

What to note on your chart:

- Note which foot they hop on first. This is their leg laterality, and over time it should be consistent from one assessment to the next.
- If they cannot hop at all, note that.
- If they can hop on one foot but not the other, note that.

Note: While this is primarily a way to understand their laterality, many children see this as a test of how many times they can hop on one foot, so we can count their hops. Sometimes we find that they have great balance on one foot and can hop almost infinitely on that foot, but have limited balance on the other side. We should take note of this imbalance.