



## Certification Training Manual

### TACTILE COMPETENCE

Our tactile system is the source of intimacy and it tells us about dangers to avoid; it gives us comfort and pain, tells us where our body is in space and informs our relationships. This system is active at birth and matures through all levels of the central nervous system.

We will be considering three types of tactile information. Pain, heat, and cold stimuli are perceived by the skin and muscles and are sensations that come on board during the pons level of development, with continually progressing accuracy as the central nervous system matures. Proprioceptive stimuli are perceived by the muscles and tendons and become functional during the midbrain developmental phase as is our third tactile source, touch, which is perceived by nerves located around the hair shafts in the skin.

To understand the competence of the nervous system in its tactile functions, we must have a way to test and understand these types of stimuli and where they are perceived in the brain. Our answers come from parent or client reporting, observation, and specific tests to understand tactile functions at all levels of the central nervous system.

We will also note the role of the thalamus, an organ in the midbrain, in transmitting sensations through the central nervous system to the cortex. This structure's primary function is as a relay center through which sensory nerves transmit signals from the spinal cord and brainstem on the way to the cerebral cortex. It's the thalamus that interprets the nature of the sensation and helps determine the reaction we have to it. Thus, the thalamus serves as a kind of traffic director that receives, prioritizes, and relays information.

For many of our clients, an immature thalamus is a major culprit and plays a big role in the condition known as Sensory Integration Disorder or Sensory Processing Disorder. Our job as NeuroDevelopmental Movement Consultants is to determine at what level this complex relay and feedback system has broken down and caused havoc in our client's life.

#### Stage I – Medulla/Spinal Cord Level: Primitive Reflexes

At birth, the child's tactile system is primarily responding to reflexes. Here we test the Babinski reflex on the bottom of the feet for insights into the health of the newborn's central nervous system. This reflex is

evoked by stimulating the outside of the sole of the foot, causing extension of the big toe and fanning of the other toes. The consultant begins the stimulation by touching a blunt instrument, such as a pencil, to the outside of the foot at the heel and moves the instrument across the foot forward to the base of the toes.



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Most newborn babies and young infants are not neurologically mature and they therefore show a Babinski reflex, which can be present for up to two years. The same response in an older child or adult is abnormal and is a sign of a problem in the cortical spinal tract, which runs through the brain stem and descends to the spinal cord. Another reflex that is present at birth is the spinal gallant reflex. In the newborn, stroking the low back to one side of the spine will result in side flexion of the lumbar spine (low back) away from that side, with raising of the hip on the same side. This reflex is critical for its active role in the birth process, with movements of the hip helping the baby to work its way down the birth canal.

These primitive reflexes indicate a healthy neonate. They should quickly be integrated and disappear in a healthy child. Their re-emergence signals an injury or pathology in the central nervous system. One of the last stages of Alzheimer's Disease, for instance, is the re-emergence of primitive reflexes.

### Stage II – Pons Level: Perception of Vital Sensation

As the neonate child becomes an infant, moving into the pons level, they are tactilely more aware of and respond distinctly to the discreet and threatening sensations of heat, cold, pain, and hunger.

A child who cannot feel and who does not respond immediately and appropriately to these stimuli has an injury at the pons level. We do not develop a high threshold to these critical and life-threatening sensations because of lack of developmental opportunity. We develop these higher thresholds due to injury, of known or unknown origin, to the pons level brain.

Children who do not feel heat may play in the sun, nearly getting sunstroke, and not notice the discomfort. Children who do not feel cold have been known, in the extreme, to run outside in subzero weather without socks, shoes, or coats. More typically they are children who dress inappropriately for the weather, wearing clothes for their looks or their textures rather than any consideration of temperature. Not understanding the life-threatening nature of extreme heat or cold is a strong indicator of a pons level injury.

Hunger, triggered at this primitive level of development, is another lifesaving signal to which we must respond in order to keep ourselves alive. Some people with a pons level injury drop into a category of illness known as anorexia. It is extremely rare to assess someone diagnosed with anorexia who does not have a dysfunction at the pons level.

In fact, 'failure-to-thrive' infants who survive, can become adults with a 'failure-to-thrive' profile, which can include anorexia and behaviors that cause a risk to the client because they cannot identify what might be a life-threatening experience.



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Some of our clients are not described as ‘anorexic’, but simply do not know when to eat. They may have to be reminded and have food set in front of them to stimulate their appetite.

Pain is a critical sensation that helps us relate to and have compassion for the pain of others. If we do not feel deep pain, we may not understand that pain is an experience that others experience that causes them distress. Thus, in young children with a pons level injury we may see bullying behavior because the child who hits, pinches, or otherwise injures another child, does not understand that it causes pain, since they do not feel that pain themselves. This child may be simply standing up for the fact that THEY want the toy next and can hurt another child to get their way without any remorse.

The words ‘sympathy’, ‘empathy’, and ‘compassion’, all have as their root meaning in the concept that ‘because I have the capacity to know how I feel, I have an idea of how you feel’.

In the 1990s, NeuroDevelopmental Movement was briefly introduced to the Napa State Hospital forensic unit through the ‘creative arts and dance’ department of the hospital. Of the nearly dozen ‘criminally insane’ patients tested there, it was found that 100% had an extraordinarily high pain threshold and an early separation from their primary caregiver. Many factors go into creating the criminal mind, but early childhood experience and inadequate neurological organization must be considered a part of it.

We might suggest that many serial killers and much crime in our society is related to individuals with an injury at the pons level who lack compassion. While this cannot be proven on a larger scale, an examination of criminal cases has revealed profiles of people who have had opportunity to have pons level injuries in their early lives that were untreated.

Children and adults with a pons level injury are often described as ‘sensory seekers’, who as children are louder, rougher, who run into walls and people, create chaos around them and take risks. As adults, these same individuals may be daredevils and take pride in how much pain they can tolerate, how many bones they have broken, how quickly they can ‘get back up on the horse’ without treating an injury.

### Stage III: Midbrain/Mid Cerebrum Level: Appreciation of Gnostic Sensation

At the midbrain developmental level, once incoming tactile information has been screened at lower levels of the central nervous system, the thalamus will now help us organize the myriad of non-threatening pieces of tactile information, most of which we set aside while we get on with more important input in our lives.

#### A note about reflexes:

NeuroDevelopmental Movement will, through the natural whole-body patterns that are part of the normal developmental sequence, fully integrate primitive reflexes. However, NeuroDevelopmental Movement is not a study of reflexes and reflexes will be noted primarily as part of larger body motor activity.



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When the thalamus has not sufficiently screened incoming tactile information, we often describe the client as being ‘tactilely defensive’ or ‘sensory avoidant’.

This client may hate being touched and is nervous about being bumped by others, thus creating anxiety in school or social settings. Holding hands in any setting, such as a circle game at school or a community setting can cause a great deal of anticipatory anxiety and avoidance. This client may stay away from the group, hiding at the side of the playground, or may take extended bathroom breaks for instance, to avoid being touched.

“Sensory avoidant” refers to the whole range of sensory information. Children and adults can be overly sensitive to incoming visual, auditory, tactile, and even olfactory data and will often go out of their way to avoid it. In this section, we are speaking specifically about TACTILITY.

The clothes some clients wear may be dictated totally by texture. Sensory avoidant children and adults will often wear only soft, loose clothes, with no zippers, no belts, and DEFINITELY no lace! It can be a victory when a child comes into a session wearing jeans for the first time.

To replicate the high sensitivity of some of our clients, note what happens when you cut your fingernail too short. The uncovered layer of skin that has not been touched because of the protective nail, is now exposed and may be highly sensitive. However, just in the process of doing ordinary tasks, that sensation normalizes quickly as that skin is touched or bumped.

Caregiving for children who are tactilely defensive can become quickly problematic. They may scream in annoyance or even ‘pain’ as you try to cut their hair. Note that this is not true deep pain but a misinterpretation of light touch as painful. Brushing their teeth can be a fight. And for those children who find being wet abhorrent, washing their faces or their bodies is a huge challenge. These are the children who are called ‘sensory avoidant’.

Adults with these issues find challenges in intimate relationships, where loving touch can be perceived as annoying. While this person may truly love his/her spouse or partner, the sensations of intimate contact can be aversive and damage the relationship.

Most individuals with this hypersensitivity to touch have varieties of ways of withdrawing, withholding, and rejecting that keep them from enjoying their lives and their families.

Another aspect of healthy tactile awareness is the knowledge of exactly where the body is in space, a skill known as ‘proprioception’. In the first six months of life, a child may notice their arm waving in front of them but may not recognize that it is their arm. By the time they are a year old and the midbrain is



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matured, the child knows it is their hand if it is in front of them, but also knows it is their hand when it is behind them.

The development of proprioception (or 'self-sensing') is the way the infant begins to know that they are a distinct and unique person rather than a part of their mother. They learn where their body stops and the world begins. Understanding personal space is the result of the development of proprioception, an innate understanding of the way we relate to others that cannot be taught. Today, many children struggle with this skill. Teachers and parents have to continually remind them to stay at arm's length or to stay in their 'bubble' in order to not cause conflict with other children. This condition is more common among children who have not had the opportunity to complete this component of the Developmental Sequence by creeping on hands and knees and doing related activities.

When this system is not working, the client cannot find a discreet point on their body that is touched by the practitioner, sometimes being inches off in this skill. We are very interested to learn if the child is worse on one side of the body or the other, or if they are worse in touching points closer to/more proximal to the body core, or more distal from the body core. A child who cannot find a discreet point on their face rings a particular alarm because the face is the first place we should know discreetly. Often the child with this deficit has feeding or language issues.

Not having a good sense of proprioception can lead to a general insecurity. The child or client may need to stand close to feel safe, or touch everything around them before they can get a sense of where their body is. In some children it can appear willful and disobedient, when in fact it is often just a child's attempt to know where s/he is and where the world is.

Of course, not knowing where one's body is can impact the motor system and lead to clumsiness in activities such as going down stairs, feeling your way across a challenging surface such as a rocky beach, playing sports, or dancing.

The midbrain also gives us the ability for one side of the body to replicate the actions of the other in an exact and balanced way. When we look at whether a child can replicate with one arm what we have done with their other arm, we have a good sense of how the two hemispheres of the brain are communicating, which will have huge implications for learning, memory, impulse control, reading comprehension, and a host of other issues.

We assess the corpus callosum, which is responsible for midline awareness at the level of the midbrain because it is the midbrain activities that generate new firing of neurons between the two cortical hemispheres. However, the corpus callosum is a part of the brain that connects the two cortical hemispheres and is thus used for many cortical functions.

### Stages IV – VII: Cortex: Stereognosis and Hand Dominance

In the same way that the eyes will ultimately work together to get a full three-dimensional sense of the world, the hands work towards a tactile sense of a complex three-dimensional world. The baby learns



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shapes not only by sight, but by feel. The roundness of the ball, the corners of a block, the curves of his/her highchair tray, all give him/her a tactile sense of the world that vision may not yet fully offer.

As children mature through the cortical levels of functioning, they develop a skill known as stereognosis, which means the ability to take in tactile information from an object, then an ability to compare that to other objects and determine what the object is without looking at it. Ultimately the child can feel, compare, and name an object placed in their hands with their eyes closed.

In some individuals, the skill can be refined to the extent that the client can feel the difference between different arrangements of small dots and read Braille.

As the cortex completes its development, the true laterality of the hand becomes more secure. The preference for either the right or the left hand in writing should be consistent with the laterality for all other hand functions, using utensils, grooming, throwing a ball, etc.

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### Testing

#### Stage I – Medulla/Spinal Cord Level: Primitive Reflexes

Tools Needed: blunt instrument, could be a pencil.

Test process:

- Stroke the sole of the foot from the heel to the toe. When the big toe bends up and back toward the top of the foot while the other four toes spread out from one another you are seeing a Babinski reflex.
- Spinal Galant: With the client in the hands and knees position, stroke the low back to one side of the spine. If there is a retained Spinal Galant Reflex, this will result in side flexion of the lumbar spine (low back) away from that side, with raising of the hip on the same side.

What to note on your chart:

- If the client is over two years old and the Babinski reflex is present, note that.
- If the Babinski reflex is present on one side and not the other, note that.
- If the client is over nine months and they have an active Spinal Galant Reflex, note that.
- If the Spinal Galant Reflex is just on one side, or is greater on one side, note that.



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### Stage II – Pons Level: Perception of Vital Sensation

Tools Needed: Very strong brush with molded plastic bristles. An Oster horse brush is ideal.

Test process: (Not all clients need to have their pain threshold tested. Parents may report that they are very sensitive and if we test a sensitive child, they may not want to return.)

- Ask the client to put their arm on the table and rest your hand lightly on theirs to feel their response in the case that they don't verbalize what they feel. Test both arms.
- Brush the back of their arms as hard as you can and watch their reaction.
- Ask them if they like it or do not like it.

What to note on your chart:

- If they wince, jerk away, even if they say they like it (which some children do), note that.
- If they say it hurts, note that.
- If they say they like it or even ask you to do it again, note that.
- If one side has a different response than the other, note that.

### Stage III – Midbrain/Mid Cerebrum Level: Appreciation of Gnostic Sensation

Tools needed: Soft therapy brush.

Test process: (Light Touch)

- Brush the lower part of one arm, then the other.
- Ask if they like it or don't like it.

What to note on your chart:

- If they don't like it, note that. (This finding may be consistent with parents reporting sensitivity to textures of clothes, etc.)

Test process: (Proprioception)

- With the arms on the table, show them this game with eyes open by touching a spot on their arm, then instructing them to touch the same place with the other hand. If they are sensory avoidant you can use a pencil to touch the arm.
- Ask them to close their eyes.
- With eyes closed touch 2 – 3 places on the lower arm, 2 – 3 places on the upper arm, once on the cheek, and once on the chin.
- Switch sides. (Younger or immature children may need to open their eyes when you switch.)



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- Note as you go, how far off they are on each spot, and if there is a difference between lower and upper arms, right and left arm.

What to note on your chart:

- If they were unable to touch the exact spot you did, note that, and record by how much. (Ex: “R. 1-inch lower arm, 1.5 to 2 - inches upper arm. Cheek  $\frac{3}{4}$ ”. Chin perfect.”)
- If they were different on the upper arms than lower arms, note that.
- If right and left arms were different, note that.
- Deviations on the face should be particularly noted.

Test process: (Position Sense or Corpus Callosum Functionality)

- Demonstrate once with eyes open, then ask them to close their eyes to test.
- With the client standing in front of you, lift one of their arms straight in front of them and tell them to do the same with the other arm.
- Ask them to close their eyes.
- Move one arm above their head and watch how they replicate it on the other side. Move the arm out to the side, bend it into the chest, move it straight ahead, rotate the arm, etc.
- If they match it easily then add to the difficulty and distract the cortex by asking them to say the alphabet, or name all the people in their family.
- Do this with both arms.
- Watch for the exact replication of the activity on the other side.

What to note on your chart:

- If they match well in any position, note that.
- If they move the arm across the chest when you move the other arm out, which is referred to as ‘crossing’, note that.
- If they do not cross the midline but cannot replicate what you are doing, note that.
- If there is a lot of hesitation and ‘trying to figure it out’ cortically, note that.





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### Stages IV – VII – Cortex: Stereognosis and Hand Dominance

Tools needed: A grab bag of various common items that the client would be familiar with. Example: Bottle top, dice, rubber band, small shell, Lego, coin, toy animal, screw, Barbie shoe, piece of fur, toy car, paint brush, eraser, cork, etc.

Test process:

- Ask the client to make a cup with their hands and close their eyes.
- If working with a small child who cannot help but peek, put their hands under the table.
- Put one of the items in their hands and ask them what it is.
- Test them on five items.

Note, if the client can name all five items easily, they have good stereognosis. There is no need to do the game again, but many young children like it, so you may continue to do this at every assessment.

What to note on your chart:

- If they have no idea and the item is something in their world they would know, note that.
- If they can describe it but not name it, note that.
- If they can do all five items correctly, note that.
- Note which hand you have observed to be dominant throughout the assessment.