ROOTING AND SUCKING REFLEX

Necessary building blocks for later functioning

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What is a reflex?
When a baby is ready to be born, it has a full repertoire of movements helping him through the birthing process, as well as to survive his first year of life. From conception to 7 months gestational age primitive reflexes develop which are essential for baby’s development and survival. These reflexes are imperative for the development of more random and coordinated movements.

“Primitive reflexes are automatic, stereotype movements directed from the brain stem and executed without cortical involvement…To survive, he is equipped with a set of primitive reflexes designed to ensure immediate response to this new environment and to his changing needs” (GODDARD, 1996:1)

“Reflexes prepare us for voluntary movement and assist the development of all the senses.” (HANNAFORD, 2005:111)

These primitive reflexes have a limited life span. As the reflex finishes its specific role in the initial survival of the baby, its function is taken over and controlled by the higher functions of the brain, the reflex is inhibited and more random and coordinated movements can take place.

“Primitive reflexes are essential in normal development. Response to these reflexes prepares the child for progressive development.” (FIorentini, 1976:5)

“As the nervous system evolved to meet the expanding needs of existence, the newer structures tend to duplicate older structures and improve upon them.” (AYERS 1980:10)

“One of the most basic demands of existence is interpreting sensory stimuli and responding to them. A reflex exemplifies the function in simple form …” (AYERS, 1980:8)

In her book The well balanced child (2005:29), Sally Goddard recites the following about the important role primitive reflexes play in our functioning: “Reflex action is the deputy of the brain, and directs myriad movements, thus leaving the higher powers free to attend to the weightier things.” (HALLECK 1898)

Kephardt (1971:4-6) and Knickerbocker (1980:18,51,52) stress the fundamental role the development and the integration of the primitive reflexes play in both preventing as well as treating possible later learning problems.
The ROOTING REFLEX and the SUCKING REFLEX are two of the essential primitive reflexes that will be discussed in detail in this article:

The embryo’s first response to tactile stimulation takes place in the vicinity of the mouth. Towards the end of the first trimester different withdrawal reflexes appear, amongst other the oral withdrawal reflex. The embryo will, for example, move away its head from the stimulus if its upper lip is stimulated. These reflexes are however normal and necessary within a certain period of development anticipating the integration of this function by the higher centers of the brain and before other reflexes can take over and dominate for a further developmental period.

The oral withdrawal reflex disappears 12 weeks after conception after which the rooting and sucking reflex can then take over and dominate. The fetus is now able to move his hands in the direction of his face, enabling him to suck his thumb or touch his face. The nervous system uses this repetition of sensory information that is being stimulated to form neural pathways to the brain. The neural pathways help to further develop the sucking and swallowing actions as well as the digestive and eliminating functions.

The baby thus starts exercising how to swallow and suck in the uterus. At 15 weeks gestational age, the sucking, swallowing and thorax movements are already visible.

“Taste buds are connected to nerve fibers by the twelve week and are functioning by the fifteenth week”. (CHOPRA, 2005:32)

Sucking, swallowing and breathing in utero
The breathing muscles are being used, not to inhale air, but to excrete the amniotic fluid that is being swallowed. If baby takes in too much amniotic fluid, the gagging reflex will open up the air passages. Swallowing, as well as hiccup movements can be noticed during this period of development.

Montagu (1986; 84) mentions that the baby does not use the same muscle movements when he suckles (nurses) as the sucking movements he used to perform in the uterus.

Sucking, swallowing and head movements are all part of the brainstem movements. “Sucking, swallowing and simple head movements are commonly recognized as directed by brainstem mechanisms” (AYERS, 1980:45)

“In the womb and in the early months of life, the higher centers of the brain are not fully developed. During this time we are protected and assisted by primitive reflexes controlled by the lower centers of the brain. “


The cranial nerves that plays a most important role in the development of the rooting and sucking reflexes is the first functional reflex and the first to start myelinating. The following cranial nerves are involved:

• TRIGEMINAL (V): muscles for chewing, sensory parts of the forehead and cheek
• FACIAL (VII): muscles for tasting in the front part of tongue and facial expression
• VAGUS (X): coughing, sneezing, swallowing, sensation of hunger, speech
• GLOSSOPHARYNGEAL (IX): back part of tongue and soft palate
• HYPOGLOSSAL (XII): controls movement of tongue for sucking and swallowing and later also for chewing and swallowing


Sucking, swallowing and breathing after birth
The baby’s ability to suckle on the breast is only fully developed by 35 – 36 weeks of gestation. His first communication with the world is through the movements of the lips and the mouth.

“His own body is the baby’s reference point by which he gauges the whole world. If his body image is accurate, he is getting good sensory feedback and is integrating properly.” (Smith, 1981:49)

The first 20 minutes after birth the baby desperately seeks food! Stimulation in the vicinity of the newborn baby’s lips elicits the oral orientation reflex – the mouth opens and the little head turns in the direction of the stimulus. This reaction takes place if only one little lip is stimulated. When both lips are being stimulated, a grasping action takes place. The oral orientation reflex inhibits and sucking can begin. The oral orientation and grasping of the lips are the two most important stadiums that have to take place before the rooting reflex can take over. The rooting reflex (searching with the nose and the mouth to find the nipple), is strongest developed a few hours after birth and is most visible with a hungry baby.

“A hungry baby will root at almost anything ….but it can be difficult to elicit the rooting reflex in a baby who has just been fed. “ (GODDARD, 2005:52)

Stimulating the sucking reflex
These reflexes are being stimulated during the birth process by the pressure and massaging experienced by the uterus wall on the baby’s head as baby moves down the birth canal. (DE JAGER, 2006:63) The mouth is the most dominant sensory organ of the newborn baby and any stimulation of the little cheek or lips will stimulate these two reflexes.

The rooting reflex may well turn out to appear weaker for three to four days after birth if the mother had medication during the birth process or, for example, if a baby had to be put into an incubator straight after birth. Although the reflex appears weaker, it is important to stimulate this reflex as soon as it is possible. It is recommended that the rooting reflex is stimulated for 10 days after birth. Thereafter the pattern is established well enough for the baby to find the nipple himself. The rooting reflex is not active while baby is asleep or when baby is not hungry or thirsty.

“The rooting reflex has for its purpose scanning and the finding and engaging of the nipple and areola between the lips. While rooting will soon be abandoned for visual scanning, it is so important in that it constitutes a reverification and a re-affirmation of
a pleasure-giving existence - we do not believe in reality of anything, unless we can touch it.“ (MONTAGU,1986:123)

The sucking action
The baby keeps his tongue against the palate or the little tongue moves forwards and backwards in between feeds. If his cheek is touched (with a finger or nipple) and he smells his mother’s milk, his head moves sideways until he finds the source of his food. As soon as he finds the source of his food, the tongue drops from the palate and moves forward over the lower lip. He opens his mouth and only then he starts licking the nipple with the front part of the tongue.

When suckling strongly, he performs difficult movements with the jaws and the process of him swallowing, is clearly visible. Normally the baby has a steady rhythm and you can clearly hear him swallowing. These intricate movements are all being used to prepare the muscles for feeding and for later speech and communication.

The common term used when a baby drinks, is “sucking”. We say the baby “nurses” when he drinks from his mother’s breast. In the English literature we use the terms “sucking” and “suckling”.

“A baby sucks at the nozzle at the top of the bottle, but at the mother’s breast, a baby suckles. In literature generally “sucking” and “suckling” are not distinguished...The baby knows better than to do anything so foolish, for were he to suck the nipple all he would for the most part succeed in achieving would be to produce a partial vacuum in his mouth and fail to develop the ability to suckle properly. The full suckling reflex is triggered off not only by stimulation of the lips, but also by touch receptors deep in the mouth. In suckling it is not the nipple that is grasped, but the areole region...The richly vascular spongy lips of the newborn are highly sensitive to touch, while the upper lip is equipped with a median papilla that ensures a firm grip on the roughened surface of the areola. Suckling is usually preceded by prolonged licking of the nipple and the areola. The licking serves to ready the breast for suckling. The suctorial pads situated in the baby’s cheeks, which give them their rounded form, are primary responsible for setting up the negative pressure that draws the milk into the oral cavity.” (MONTAGU, 1986:82,83,84)

It should look like the baby is using Donald Duck Lips to suckle!

While the baby is being nursed, it is important to keep the baby’s head in a neutral position and also not to confuse him by touching both sides of the face. One should try not to move the cheek with your hand in the direction of the breast as the baby will rather move his head in the direction of the hand in stead of turning it towards the breast. Thus the baby’s cheek is allowed to touch the breast, thereby getting the necessary sensory input to encourage the reflex. Refrain from any other sensory input, for example loud noises or bright lights while the baby is being fed, as the baby can stop nursing, swallowing and breathing while concentrating on the extra stimulation. Keep your voice calm and as regular as possible. Restrict your touch to a quiet, firm grip and be aware that the baby may battle to suck if he is swaddled too tightly in a blanket. Remove the blanket and allow the baby to have his skin touch mommy’s skin. Sucking is very hard work and babies sometimes prefer to rest a while when they are nursing.
“The baby interrupts the automatic sucking instinctively and learns gradually the stopping and beginning of sucking. If the baby is breastfed, it can control the flow of the milk via the elasticity of the nipple and the way it sucks. This is not possible for bottle fed babies. The plastic nipples have the same size and shape for all babies and the flow of the milk stays constant. Often the hole is too large so the milk flows too fast and too easy. “ (WENNEKES, 1996:23)

In this way the sucking reflex cannot sufficiently develop as the tongue performs thrusting movements in stead of sucking movements.

The consistency of breast milk also changes with every feed. Colostrum – the first milk to appear - has big volume, but little fat and will therefore quench the baby’s thirst. The milk that follows has a high fat content and less volume. The high fat content supplies the necessary fatty acids which are essential for the development of a healthy brain and nerve system.

Breastfeeding/ bottlefeeding

The different structures in the mouth, especially the tongue, do not always perform the same movements with breastfeeding as with bottle feeding. The structures in the cheeks that help build up the negative pressure in the mouth, thereby sucking the milk into the mouth, is supported by two small creases that appear on the upper and lower jaw. Already in 1860 Robin and Magitot described these structures as the “labium tertium” - “the pair of assisting third lips” as quoted by Montagu (1986:84). These creases disappear between the age of three and six months. Together they help seal the area around the nipple and the areola. In this way the structures of the baby’s face and mouth help to “pump out” the milk. It also helps develop the structure of the jaw, the palate and the teeth.

“In the depressed (distressed) baby suckling is facilitated by flexing its knees against the abdomen and by placing the adult’s fingertip in the baby’s palm to be grasped. The baby begins to suckle and pinks up immediately.” (MONTAGU, 1986:78)

The palms of the little hand can also be massaged to encourage the sucking reflex.

“Touch sensations flow throughout the entire nervous system and influence every neural process to some extent.” (AYERS, 1983:39)

The Babkin response can be encouraged by stimulating both hands with deep pressure so that the little mouth can open. This response describes the neurological connection between the hand and the mouth. Goddard quotes Holt describing this reaction in 1991 (1996:13). This reflex should be integrated by the age of four months.

The sucking reflex may cause pain. The baby appears to be hungry, but the moment he starts feeding, he cries bitterly. Carefully observe him for any discomfort or possible illness. A medical examination could be necessary if this reaction continues.
Tactile sensitivity of the mouth and the lips
The lips have a huge sensory representation in the brain.

“Measurements have shown that individual body parts and regions are represented in specific zones of the cerebral cortex. The size of their zones derives from the number of receptors they have. Lips and fingertips have high numbers of receptors... and they have a larger zone in the cerebral cortex than e.g. the legs and elbows.” (KOLSTER, 2005:116), (PANSKY, 1975:255), (GODDARD, 1996:45)

“In the early months of life it is the mouth - through rooting, sucking and exploring with the lips and the tongue - which provides the neonate and the infant with its primary source of tactile stimulation.” (GODDARD, 1996:47)

The sensory feeling in the mouth is most important for the motor movements taking place in the mouth and lips.

“Increasing muscle power... rest largely on strong sensory stimulation.” (BOBATH, 1974:37)

The tongue touches the palate and then moves according to the feedback it gets from the palate. These movements are most important for speech development. Integrated sucking reactions prepare the baby for the forming of different sounds. It is therefore important that the baby will not always only suck with the front part of the tongue.

“The hands may grasp simultaneously while the baby is sucking, further strengthening the communication loop between the hands and the mouth in preparation for speech and writing skills.” (DE JAGER, 2006:64)

Suckling/sucking and emotional development
Whether it is a finger, teat or nipple, the sucking reflex takes over to further investigate. This reflex is not only important for eating.

The feel good and pleasure hormones that are being released while the baby is sucking make him feel content, calm and soothed. His eyes are intensely focused on his mommy and his hand lie relaxed and open against his mommy’s breast – bonded and cherished!

“When the baby has an appointment with the mother for feeding, grasp recedes and allows for an open hand on the breast a pattern for feeling which stimulates the flow of milk. These ‘appointments’ with function or ‘developmental dates’ are important to the understanding of motor development”. (COMPARETTI, 1981:15)

These reflexes must be seen as appointments (dates) with the mommy. He has an appointment with his mommy so that by means of these movements he can further enhance his motor and emotional development.

“The sucking reflex prepares the baby for feeding, but also has a generally calming effect”. (LOMBAARD, 2007:134)
It is important for the baby to suck his fingers or hand even if he is not hungry. In this way he learns the technique for self calming.

Dit is nodig dat die baba sy vingers of handjies suig selfs al is hy nie honger nie, want sodoende leer hy die tegniek van “seelftroos” aan. “n Baie belangrike mylpaal in emosionele ontwikkeling, is die aanleer van die vermoe om sefftroosting toe te pas. Om dit te kan doen moet die baba haar eie waarskuwingstekens van oorstimulering herken” (FAURE, 2002:71). “Laat haar eerder die suigaksie ondersoek om op haar eie te kalmeer.“ (FAURE, 2002:104).

Die gewaarwording wanneer die duim teen die boverhemelte vryf, is die gevoel wat so verslawend vir duimuisers is. (SISTER LILIAN, 1999:130)

The sensation when the thumb rubs against the palate is that sensation that is so addictive for thumb suckers. (SISTER LILIAN, 1999:130)

Nature makes the child dependant on his mother for a few years, because he needs a lot of tactile stimulation for physical development as well as emotional bonding.

Eating habits

Tactile sensation also helps the baby with the development of the rooting and sucking reflex. This will later help the baby to swallow and chew. If the tactile system is not well developed, the baby may battle to identify certain food textures in his mouth and later on he may not like solid food or certain food textures.

“A picky eater may have trouble getting the food to his mouth because of insufficient processing of sensations coming from the muscles. …another reason may be that he has not developed a basic sensory-motor pattern involving the co-ordination of sucking, swallowing and breathing." (KRANOWITZ , 2005:24)

“The density of touch receptors in the mouth may be the key to explaining why so many individuals with touch sensitivity also have oral sensitivity with particular food aversions, mostly based on texture.” (LOMBAARD , 2007:72)

“The infant may experience difficulty when solid foods are introduced, as a persistent suck reflex will prevent the tongue from developing the mature combination of movements necessary for swallowing and remains too far forward in the mouth to allow effective chewing." (GODDARD, 1996:13)

In the uterus the baby already prefers sweet tastes. By 28 weeks gestational age he can already distinguish different tastes and smells.

“We do not usually think of the fetus as a gourmet. But he is one….add saccharin to his normally bland diet of amniotic fluid and his swallowing rate doubles. Add iodine-like oil …and those rates not only drop sharply, but he also grimaces.” (VERNY, 1981:25) “Studies have suggested that an unborn baby will increase or decrease his swallowing based upon the flavors present in the amniotic fluid, and it looks as though even unborn babies like sweets." (CHOPRA, 2005:32).
Sweet tastes keep him in an optimum state of interaction and also encourages him, for example, to bring his hands to his mouth. (FAURE, 2002:18)

“Smooth and sweet tastes are calming.” (LOMBAARD, 2007:138)

Breast milk is sweet and for the first three months of baby’s life, he strongly sucks with the front part of the tongue. This part of the tongue hosts the receptors for sweet tastes. After three months the posterior (back) part of the tongue is used and after one year he sucks with the pharynx (behind the uvula).

“Human milk is the sweetest of all, containing 7% of milk sugar, compared with 4% in cow’s milk.” (MONTAGU, 1986:95)

For mature sucking and swallowing, it is most important that the movements are coordinated. When we swallow, we stop breathing. When our mouths are dry, we cannot talk.

Sucking is primitive speech and vision
Tongue and eye muscles work synergistically, for example: a child that makes poor eye contact, most probably also has poor lip forming on trying to blow a flute.

“The grasp, sucking and other reflexes...being the substrate upon which the perceptual system and finally the conceptual system are founded.” (BLYTHE & McGLOWN, 1979:44)

“Some observers have noted a relationship between sucking movements and blinking activity, particularly in premature infants, suggesting that there is a connection between mouth movements and eye movements in the early stage of development.” (GODDARD, 2005:54)

The jaw, tongue, lips and cheeks are all building blocks for further speech development. In their own way the communication between the mouth, eyes and hand, are the essential precursors for the developing of speech, communication, writing and visual perception. The following movements are important:

- Blowing is necessary for controlled breathing and should be encouraged with the head in extension, for example blowing candles.
- Sucking is necessary to swallow saliva. Encourage sucking with the head in a flexed position.
- Swallowing saliva.

Later on biting, chewing, licking and crunching are necessary for speech development.

A healthy condition in the middle ear is being maintained through swallowing. “Dit help om oormatige vog uit die skedelholtes te dreineer en verminder sodoende die kans op oorinfeksies en sinusitis.” (DE JAGER, 2004:28). Children with a high palate and teeth that stand out tend to swallow with the tongue between the teeth.
and are more prone to ear infections. Activities promoting swallowing should be encouraged!

“An interesting fact about the smell and taste systems is that they regenerate new cells – over a period of 10 days for taste and 30 days for smell. This is necessary because the receptors of these systems are exposed… and bombarded by bacteria and dirt and constantly at risk of dying out.” (LOMBAARD, 2007:21)

The sucking reflex declines round about four months. This action has now been repeated enough times so that the action of sucking and what to suck, now becomes a conscious choice and it is no longer necessary to stimulate this reflex.

The mouth hosts 10 000 super sensitive taste buds that in return perform warning- and protecting functions. (DE JAGER, 2002:11)

Baby’s hands are not sufficiently developed to experiment before the age of 8 months. They therefore put all objects in their mouths. For them this is a trustworthy source of reference for further learning processes.

Boys and girls
In her book “SMART MOVES” dr. Carla Hannaford mentions that at birth the digestive system of boys are more or less three weeks less mature than that of girls. A boy will therefore eat more regularly, wee more regularly and sleep less than girls! (Hannaford, 2005:182)

A baby that battles to root or suckle could give us an indication of a poorly developed tactile system or possible neurological integration problems. Studies show that 7% of children with underdeveloped sucking reflexes and 33% of children with underdeveloped rooting reflexes may later experience learning or speech problems. www.sallygoddardprimitivereflexes.

Sucking and stress
“If any of the basic reflexes are aberrant the developing CNS will have a structural weakness, and the inhibitory activities of the cortex will be lost or impaired… when the CNS comes under accumulated stressors it will eventually malfunction.” (BLYTHER & Mc GLOWN, 1979:44)

“It is through the sucking process that the baby feels calmed and nurtured. It is appropriate and relevant for babies, but we are eventually weaned off our dummies. Sucking on a cigarette, eating and chewing to manage our stress are some of the self-regulatory strategies that replace this primitive action (sucking) of calming the brain and the body.” (LOMBAARD, 2007:131)

With a young baby it is logical that the primitive reflexes help him to survive. The sucking reflex, for example, helps with feeding. As the baby grows and becomes stronger, he develops more integrated and acceptable ways of surviving. If this does not happen, reflexive behavior is the best strategy for survival in a specific situation.
“In adults we often see the sucking reflex as a need to suck or chew objects, fingernails, etc and especially the need to smoke.”
http://www.steppingstones.info/learning/Primitive R.htm.

Underdeveloped sucking reflex
The following signs could give us an indication of an underdeveloped rooting or sucking reflex:

- Tongue movements seem to be heavy and clumsy.
- Slow speech development.
- Highly sensitive around the lips.
- Sensitive to certain types of food or certain food textures.
- Drooling.
- Thumb sucking or dummy sucking for an extensive period of time.
- Untidy eating or stuffing the mouth with food.
- Being overweight.
- Emotionally immature behavior.
- Battle to chew and swallow meat.
- Tend to overeat.
- Poor articulation.
- Clumsy handwriting and clumsy hand skills.
- Slow working tempo.
- Poor eye contact.
- Chew on pencils, a shirt’s collar or putting objects in the mouth.
- Finds it difficult to self calm.
- Problems with slow teeth development or tooth decay.

In her book “BABAGIM” p. 29, Dr. Melodie de Jager recommends the following exercises to stimulate the sucking reflex. These exercises are highly recommended as they are being used very successfully with babies who do not develop a sufficient sucking reflex.

* To stimulate this reflex, touch baby’s chin with one hand and his belly button with the other hand. The umbilical cord is the original source of feeding and by stimulating both ends simultaneously, the transition of being fed to an active way of feeding is encouraged.

* With your one hand, massage baby just above his upper lip. With the other hand you simultaneously massage his coccyx. Hereby the sucking reflex as well as his metabolism is enhanced.

* With small circular movements, massage the jaw’s muscles just underneath the cheeks.

* With your finger, a feather or a cotton ear bud, lightly draw the outline of the lips in small circular movements.
“Massage may be used to promote lip closure…may be useful as a preparation for feeding.” (DREHOBL, 1991:10)

If the person is very sensitive to certain food textures, he may, for example, first suck on a piece of ice before he tries out food with a new texture. It is also recommended that you first experiment with cold foods as the cold causes the receptors in the mouth to be somewhat less sensitive. If the food is handled with the hands first, before the person eats it, the feeling of the food is already more familiar and acceptable. (LOMBAARD, 2007:76) Eat different foods, for example first the potatoes, then the carrots and then the meat.

**Stimulate the sucking reflex in older children and adults**

The following activities are recommended to stimulate the sucking reflex:

* Suck on an ice lolly.
* Suck on a peppermint or a hardboiled sweet or a lollipop
* Lick an ice cream with the tip of the tongue.
* Eat biltong, pretzels, carrots, crackers or pop corn to create the sensation of resistance in the mouth.
* Drink with straws or drink from a sport bottle with a spout.
* Blow bubbles.
* Blow a flute or a mouth organ.
* With a straw, blow paint to form different patterns.
* With your lips, draw pictures on a window that is being steamed up.
* Draw interesting lipstick pictures.

In her book, THE OUT OF SYNC CHILD HAS FUN p. 205-228, Kranowitz mentions a lot of activities that can be used with a lot of fun both at home or in a classroom.

**CONCLUSION**

While the baby is sucking and being cuddled, caressed and cared for by his mother, many building blocks is laid down for further motor and emotional development which is most important for the integration of his learning process. All baby’s senses are involved: mommy’s touch stimulate his tactile sense, he smells her milk, tastes the sweet milk, hears her tone of voice and her heartbeat end he sees her face. As he is being picked up to be put in a comfortable position for feeding, his muscles, joints and balance are stimulated. He also becomes aware of his near senses which make him sense being hungry, thirsty, full, or the discomfort of a wind. Feeding time is a most important and very special date between mommy and baby.

“*THIS NEW LIFE HAS BEEN INTRUSTED INTO YOUR PROTECTION SO THAT HER PHYSICAL, EMOTIONAL AND SPIRITUAL NEEDS ARE ATTENDED. PAY ATTENTION TO NOURISH ALL YOUR BABY’S SENSES*”

(Chopra, 2005:257)
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