

## TEACHING BABIES

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The neurodevelopmental approach to learning has given much hope to those with learning, speech, mobility and academic problems. By providing specific stimulation to eliminate sources of inefficiencies, function has been improved in all areas, labels have been defied, IQs have changed and learning has been accelerated.

The logical next question is, if we can accelerate the learning of those with problems, what about those that appear to function normally? Can we accelerate the development of the average child or adult? Also, knowing these developmental steps, can we design an environment to help babies develop superior function and avoid making mistakes that have consequences later? The answer to this is of course!

### History

A student of history cannot help but discover that we do not know the history of our fathers, the religion of our fathers and the capabilities of our fathers. The second sentence of George Washington's inaugural address is one and one half pages long! Read the speeches and sermons of the 1600s and 1700s. Can you understand them? Can you imagine such being delivered today? Could a modern audience process this information? Does this prove that despite popular science, we are not evolving, we are de-evolving? We read biographies of men of the past, men that graduated from college at the age of 16. It does appear that society in general is less intelligent today than our forefathers. The conclusion that we can reach is that compared to peoples of 200 to 300 years ago, we are all learning disabled at best!

Today, we are rediscovering some of the God given potential of our children. We know that the brain is very plastic, that is, through specific stimulation, we can increase neural connections that improves function! effectively making the individual smarter and more capable. Intelligence and function is a reflection of stimulation opportunities. By creating more opportunities that are specific to the needs of the individual, everyone can function at higher levels.

### The neurodevelopmental approach

In the 1940s, a team of specialists including educators, neurologists, physiatrists and so forth, explored the potential to improve function in brain injured children. The result was the famous/infamous Doman-Delacato developmental profile. This profile was an attempt to decide what was necessary and sufficient to achieve normal human function. It looked at the inputs to the brain tactile, auditory and visual, and the corresponding outputs speech and language, manual function and mobility from birth level to normal human function. Having completed all the steps of this profile, an individual was pronounced neurologically organized and hence capable of any normal

human activity. If one of these developmental steps was missed, specific stimulation was supplied to complete that step and hence accelerate the individual through that step so that higher levels of function could be achieved.

This was a true work of genius. First, it challenged the premise that the brain was fixed in function and that if an injury occurred or a developmental step missed for whatever reason, be it illness, genetic anomaly, etc., that there was nothing that could be done to improve function. The ability to evaluate an individual that couldn't talk or move or take standardized tests was an important breakthrough. Plus, by stripping away unnecessary developmental steps, it simplified the evaluation process. This work brought great hope to those that previously had been considered hopeless. It has given rise to many early intervention and over stimulation programs and the whole sensory integration therapy now claimed as the territory of occupational therapists.

Many have taken this neurodevelopmental work forward. More specific steps of development have been identified, and new ways to provide specific stimulation as well as nutritional and metabolic breakthroughs have added greatly to helping individuals function at high levels than ever before.

#### Implications for babies

The great news for parents is that knowing the developmental steps used to evaluate individuals with problems helps us design an environment for the best development for our babies. Since we can accelerate the learning and function of an individual with problems, we can also accelerate the learning and function of newborns.

Why would anyone want to do this? Visions of pushing little ones in inappropriate activities come to mind. The fact is that little children love to learn. Very few respect babies wonderful abilities to learn, to absorb information from their environment. By simply improving the environment of the child so that developmentally appropriate activities are available, little children can be physically and mentally excellent, avoiding errors that result in learning problems down the road. Plus, we can approach the God-given potential that individuals have. Perhaps we can approach the abilities of our forefathers and send Godly, intelligent and capable children into the future.

This author's own son was a fully automatized reader at the age of 24 months. He read at college level at the age of seven. By the time he was 12, he could read faster than any individual the author has seen. The author had a Montessori school in the 1980s and ALL of the 3 and 4 year olds were readers. This was not a population of bright and superior children. Some children started at the age of 2 years old not even talking, but by the age of 3, children were reading and speaking.

All of this is possible using the principles derived from the neurodevelopmental approach. What a refreshing vision in a country that enjoys a 40 to 50% illiteracy rate, despite the millions and billions spent on public education.

## The Developmental Profile

A neurodevelopmental evaluation looks at how the brain receives, processes, stores and utilizes information. The first area we will consider is how the brain receives information through the major channels of tactility, vision and hearing.

### Inputs to the brain.

**Tactility.** At birth the baby has little tactile sensation and therefore correspondingly, little organized motion. There are three major tactility sensors to be considered. The deep sensors next to the bone are responsible for pain response, muscle tone and mobility. The skin sensors are responsible for touchy, ticklish sensation, feeling of textures and fine motor abilities. There are also the hot and cold sensors in the skin. Other tactile sensory areas to be considered are mouth tactility, which must be normal for normal tongue control and speech, and trigeminal sensation, which is the large nerve that covers the head and face function. Lip tone and tongue control are important to evaluate. Each of these tactility sensors must be evaluated individually and problems with one have corresponding problems in function. Good tactile development allows for excellent gross and fine motor development and excellent speech and language.

**Vision.** A baby sees very little. He has a pupillary response and very little detail. By knowing the steps of vision development, we can offer the little child chances to develop good vision and good visual processing. First the child learns to track large objects horizontally and then vertically. Central detail vision starts to develop. Once the child is starting to move, the eyes start learning to work together and convergence and depth perception are developed: the brain learns to control the eyes. Once the child has good central detail vision and convergence, he is ready to take in large amounts of information visually, lots of large pictures of single objects which will fascinate him. And, once the child is identifying many pictures, it is time to introduce visual language: that is, sight words. Children can learn to read and speak at the same time. The brain of a little child is wired to learn language and cares little whether that language is visual or auditory!

**Hearing.** Good auditory function is extremely important to future auditory processing, maturity level, mature intellectual function and the ability to simply function in our noisy environments. Ear infections in the first two years of life are a major cause of learning problems down the road and a major source of the ADD label. The brain has to learn to interpret environmental sounds and to hear the information of interest and block out background noise. The auditory pathways to the brain are laid down in those critical first 2 years by hearing a wide variety of sounds. Fluid in the middle ear distorts sounds and causes auditory pathways to be laid down in a very inconsistent fashion. A child with learning problems, low auditory processing or even one with no language, can test OK on an audiogram which simply tests threshold hearing using pure tones. An audiogram does not test the quality of hearing. A child can be hypersensitive to certain sounds or not able to concentrate on the sound of interest, be very auditorily distractible and still test well on an audiogram. This author has seen children labeled autistic, who

are so sensitive and distracted by sounds that the children simply shut down auditorily to the roar of noise, and still these children will test well on an audiogram. This distortion can occur because of injury to the auditory pathways to the brain (or any part of the hearing system) or simply because of constant and chronic ear infections. It is suggested that ear infections be treated very aggressively and tubes be used to keep the middle ear fluid level normal if necessary. It is also good to identify sources of ear infections such as allergies to milk and other foods and eliminate them from the diet during these critical developmental years. Frequent tympanograms should be done to ensure that there is no fluid buildup in the ears if a child has this history. If the ears are clear, exposure to a wide range of high quality information and sounds will help develop superior auditory function.

**Vestibular.** Another part of the hearing system is the vestibular system, those semicircular canals in the middle ear that are responsible for balance. Ear infections interfere with the development of good balance and can also put pressure on the visual system and cause tracking and convergence problems.

**Vital capacity.** Mouth breathing is inefficient breathing. Chronic sinus infections and ear infections causes a child to mouth breath. This keeps the body from getting the oxygen it needs for good brain development (a baby's brain uses up to 50% of the body's oxygen). Mouth breathing also deadens the tongue, which causes articulation problems down the road. Mouth breathing also keeps the lips from developing appropriate tone, keeps the sinus cavities from developing normally. Many children with learning problems have low vital capacity, that is, low breathing capacity with a cascade of consequences.

**Outputs from the brain.**

The inputs to the brain have corresponding outputs or functions. Gross motor or mobility function. If the child has good tactile development, he will have good gross motor function, good muscle tone, and appropriate pain sensation. This child will go through the developmental steps of crawling, creeping and walking in a cross pattern. This child will develop normal structure, will walk with good posture, without pronation or supination of hips, knees or feet and ankles and without a hip swing. Hip joints will develop normally. Without good tactility, low muscle tone can result in structural problems down the road. Good muscle tone is necessary to keep from hyperextending joints and causing functional and structural problems when a child starts to move and put pressure on joints. These gross motor functions also help organize the wiring to the brain for higher level, cortical functions. Cross pattern activities help develop good lateralization or interhemispheric communication which avoids future problems of long-term memory, reversals, stuttering, etc. Good proprioception, that is, knowing where your body is in space, bladder and bowel control, coordinated physical movement is dependent upon developing good tactility and corresponding good cross pattern movement. It also sets the stage for development of cortical hemispheric dominance, which will be discussed later.

Speech and language. Good speech and language depend on many things. First the child must be able to hear clearly and have been exposed to a wide variety of excellent auditory information. Next, the vital capacity, that is, the breathing capacity of the child must be good in order to develop good sinus function and to make oxygen available to the system and to have enough breath for good resonance and phonation. Mouth tactility, lip tone and tongue control must be good in order to have good articulation. Auditory processing must be good in order to speak in longer sentences and to understand multi-step instructions.

Vision. Vision is developmental. It is important that the child go through the appropriate developmental steps in order to develop good central detail vision and good convergence. Once good vision is developed, the child should be exposed to appropriate, high quality visual information to develop good visual processing abilities. By accelerating the visual and auditory functions of a child, early reading abilities are possible. As can be seen above, ear infections, lack of opportunities to develop good convergence and many other things can interfere with this visual development. Often, with children with learning problems, remedial eye exercises are necessary to fix developmental problems.

#### Processing information

Once the child can see and hear well, visual and auditory processing, being the main channels of learning, become an area of focus. One way of measuring visual and auditory processing is to administer simple digit span tests.

To do an auditory digit span test, simply say a sequence of numbers or names of objects or steps (such as touch your nose and your hair), and see how many pieces the child can process and respond to in the order in which the numbers or steps were given. For instance, say 1-3-9-7 about 2 seconds apart and have the child repeat those numbers back to you in that order. If the child can repeat the numbers, the child has an auditory digit span of 4. A 1 year old should have an auditory digit span of 1, two year old 2, three year old 3, four year old 4, up to the average adult has an average digit span of 7. Low auditory processing means that the child cannot process information at an age appropriate level, gets lost following directions, cannot process or output longer sentences and can even get the child labeled delayed or retarded. Superior processing is a big step in improving academic function. By superior, auditory digit spans to 10 to 15 should be achieved. These are achieved by practicing them. Practice following directions of 1-2-3-4 steps, wherever the child is, and stretching their ability to the next level. Practice having the child repeats back numbers or names of objects. Also, have the child listen to much superior language of high interest. This will also increase auditory processing and historically, this is how our forefathers developed the ability to attend to sentences that go on for one and one-half pages!

To do a visual digit span test, have the child look at a sequence of numbers or objects for 3 seconds, take them away and have the child repeat the sequence left to right. To improve visual processing, the child should be taught lots of high interest visual information such as pictures of objects in categories: dogs, trees, cars, foods, insects, etc.

High quality input of information will result in superior visual processing. Once the child is identifying pictures, the child can start to learn sight words.

A note on teaching phonics: a child with an auditory digit span of less than 6 will probably not be successful at learning to read using phonics. This is because the child cannot hold the auditory pieces in his brain long enough to figure out what the word is. So, until the child has an auditory digit span of 6 or better, we recommend teaching sight words while the auditory processing is being improved. Once it comes in, phonics is taught quickly and easily and the reading takes off. Trying to do this prematurely frustrates you and the child. Superior processing means that the child is capable of taking in much more information from his environment than the individual with low processing. This is simply short-term memory, but it greatly enhances the child's ability to grab information around him.

### Storing information

To assure good long-term memory, a child must achieve cortical hemispheric dominance. This means that if the child is right-handed, he should do all skilled activities with his right hand and he should be right-eared right-eyed and right-footed. That means the child has a controlling, dominant hemisphere. If the child is left-handed, the reverse is true. Once good lateralization has been established, attention should be paid to dominance. Lack of dominance results in problems with long-term memory, control of emotionality and general organizational abilities.

A young child has no dominance. If you ask a 2-year-old to look at you through a tube, the child will bring the tube to the bridge of his nose and say that he can see you. No eye dominance. This is normal. By the age of 6 or 7, dominance should be established. This is why it is normal to see little children writing letters and numbers backwards, going through a period of stuttering or speech hesitation.

If, by the age of 6 or 7, a child has not established dominance, then remediation is necessary. The side that will be dominant is genetically determined and parents must not push the little child one way or the other, but offer opportunities to the left and right side until the child's central nervous system matures to the point that he decides which way he is going. Some children are genetically predisposed to be mixed dominant and careful evaluation is necessary by a trained observer to decide which side should become dominant for the child.

### Utilizing information

In order to move information from short-term memory to long-term memory, the child must convert this information to conceptual or linear information, or visual or global information. Conceptualization is the ability to think linearly, logically, in words. Assuming the processing is good, a child is a good conceptualizer that has good language abilities, that thinks logically, draws inferences and can organize information in a hierarchy. Visualization is the ability to think in pictures or globally. A child that is a

good visualizer is usually good at math and directions, creative, has good sense of where things fit with respect to other things. Both types of thinking are necessary for good mental functioning. Without abilities in one area, an individual can have some bizarre personality traits and major communication problems with people that think in realms he cannot even imagine. There are ways to test how your child is thinking and help him improve in weak areas. We generally do not worry about visualization and conceptualization until the processing is up in the 6 to 7 digit range, both visually and auditorily. There are lower level developmental activities that can assure that your child is developing well in both realms, though. Doing puzzles, drawing, design, completing pictures, chess and checkers are all good visualization activities. Word games, reading, logic activities, analogies, are all ways to help develop good conceptualization skills.

## Conclusions

It is a very exciting and humbling process to watch the development of a young child. Their curiosity, their love of learning, their awesome abilities are a source of great joy. Creating a stimulating environment is not an accidental process. We have gained great knowledge in the area of neurodevelopment and instead of letting a child accidentally develop by random inputs; we can wisely give the child what he needs to achieve the next developmental step. This is not pushing a child. This is not demanding inappropriate things before the child is ready. It is wisely studying God's design and providing what your child needs to reach the potential that the Lord has given him.

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