



Behaviour, Learning, and Mobility Cause and Effect of Rehabilitation

In 1953, after 1 year of working with Temple Fay in Philadelphia, Carl Delacato, Bob and Glen Doman gave a presentation in New York to the Staff of the Institute of Physical Medicine and Rehabilitation, which contained the following pronouncement.

“It must be considered as a basic principal that, when a lesion exists within the confines of the brain, treatment to be successful must be directed at the brain, wherein lies the cause, rather than to that portion of the periphery where the symptoms are reflected. Whether the symptoms exist in an almost undetectable subtlety in human communication or in an overwhelming paralysis, this principal must not be violated by those seek success with the brain-injured patient”.

From this simple beginning, Dr Carl Delacato set out on a long journey, which has culminated in what we now practice today as Delacato therapy. Along the way Carl developed the principals of the relationships between the senses, hearing, seeing, touching, which he referred to as the “in” channels which have a direct effect on brain development and the “out” channels of mobility, speech and hand use, which depended on the “in” channels. He found that a lack of opportunity for development for any of those channels, had an effect upon the development of the others, and as such showed the way in which integration of the senses into a therapy, that overcame the brain injury and lack of development opportunity.

Today, we accept without question, the presence of abnormalities affecting the Central Nervous System (CNS) of individuals exhibiting behavioural, learning and mobility problems, after a mild diffuse brain injury.

In 2001 The American Academy of Neurology (AAN) published in its Journal “ Neurology” October 9th issue, a study undertaken by the PET Center at Children’s Hospital of Michigan in Detroit on 26 children with tuberous sclerosis complex (TSC). Researchers used MRI and PET examinations to study how brain lesions resulted in common behaviours of autism, including difficulties in social interaction and communication and narrow and repetitive stereotyped behaviour. They found that more than one area of the brain was responsible for autistic behaviour in children with brain lesions, and that autism results from a complex combination of events in different parts of the brain, rather from one single source. In Feb 2002 the AAN published a report of a study carried out at the Medical College of Georgia, using computerized imaging in the frontal, and temporal lobes of autistic patients, and observed minicolumnar abnormalities. A minicolumn is a basic organizational unit of brain cells and connective wiring, allowing an individual to take in information process it and respond. Thus any changes in size shape or location of the minicolumn will have an effect on the processing capacity of the brain.

In that original paper presented in New York, the premise that the development of the CNS is the result of the interaction of the organism with its environment. Increased interaction produces increased development and decreased interaction results in decreased development. This interaction, which is prerequisite to development, is also a prerequisite to learning.

The brain interacts with its environment through a cybernetic loop, which begins in the environment, follows afferent or sensory pathways to the brain and then efferent or motor pathways from the brain back to the environment. Thus the environment as it reaches the brain through the sensory pathways, is the primary prerequisite for the development of the CNS, and consequently for learning. Any changes that occur which have a direct effect of the CNS to function effectively with the environment, have a profound effect on the ability of the CNS to experience the environment, and effectively learn from that experience.

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The creation of a sensory integration therapy, enables the CNS to re-establish itself through the sensory pathways, to effectively integrate with the environment. The benefit from that re-establishment, is based on the premise, that introducing new experiences to the CNS, or reliving the experience, that due to brain abnormality, were missed or not effectively experienced during childhood development, is a valid presumption that the CNS is a plastic organ, and due to that plasticity, has the ability to readjust to those new experiences.

There is ample confirmation in the literature that brain function and structure can be altered. In 1979, in an article in the Journal of learning Disabilities, doctors Marianne Frostig and Phyliss Marlow stated, "Neuropsychological research has demonstrated that environmental conditions, including education, affect brain structure and functioning". In their book "Brain, Mind and Behaviour" Floyd E. bloom a neuropharmacologist and Arlyne Lazerson, state, "Experience i.e. learning can cause physical modifications in the brain". This is confirmed by Michael Merzenich of the University of San Francisco. His work on brain plasticity shows that, while areas of the brain are designated for specific purposes, the brain cells and cortical maps do change in response to experience (learning). It seems that, while learning causes brain growth on one hand, lack of learning, on the other hand, causes a lack of brain growth.

Delacato, as a result of his investigations, put forward the idea that learning delay, is, not only a result of changes of sensory inputs, but also as a result of missed stages in the child's normal development through the stages of creeping, crawling, to walking. This is born out in the Delacato Clinics, that children who did not crawl on hands and knees, who went directly from floor crawling to walking, were subject to development delay. A part of the Delacato Therapy is for the child to learn the missed experience By looking at all the sensory gathering systems, sight hearing touching, tasting and smelling and evaluating which of those sensory gathering systems have become compromised either by brain abnormality or missed experience, a therapy for rehabilitation, can be devised to help the child overcome his problems. We use the plasticity of the brain and its ability to grow by effectively creating new neural pathways to store that new experience, to re-establish the CNS with the environment.

Professor Janet Eyre at the Department of Child Health, Royal Victoria Infirmary, Newcastle upon Tyne has been conducting studies into children who had suffered a stroke as babies or in later childhood, reinforcing that premise that when babies suffer brain damage near the time of birth, there is considerable scope for reorganization of brain development, this reorganization to include transfer of the brains control of sensory output from damaged to non damaged areas of the brain, using the brains plasticity, for appropriate targeted intervention to improve the outcome of brain injured children.

Professor Eyre is the author of two papers on the plasticity of the brain in 2003.

"Developmental Plasticity of the corticospinal system", in: Boniface S and Zimmerman U (Eds.), Plasticity of the Nervous System, Cambridge University press p62-91.

"Development and Plasticity of the corticospinal system in man", Neural Plasticity,10,P 93.

Today, the original ideas first promoted by Delacato and co-workers in Philadelphia, revealed in a presentation in New York in 1953, developed by Delacato both in his written work through the 1960's and 1970's and his work in clinics worldwide, the proposition of a sensory integration therapy based on brain plasticity, to overcome the effects of brain injury and missed experiences, all now verifiable using brain imaging techniques actual rehabilitary therapy in published form worldwide are used in today's clinics for the benefit of brain injured children.

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