



MOVEMENT and NEUROPLASTICITY

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Movement in a seating system and mobility device is essential for neuroplasticity in the neurologically challenged client. I have worked with neurologically challenged children and adults for 30 years and have observed the changes in our professional/medical understanding of how the brain develops and copes with these issues and the resultant changes in treatment. Most of the individuals I work with have very limited motor skills and require mobility devices to support their daily needs. Early on, our treatment adapted the client's world to overcome the challenges created by damage to the brain. Now, with our understanding of how the brain changes, we can enhance their skills and neuroplasticity through enriched environments.

Neuroplasticity is defined as the brain's ability to reorganize itself by forming new neural connections throughout life. It is the creation of new neurons and the ever-changing wiring that happens through interactions with our environment. Enriching and enhancing one's environment has been shown to positively affect neuroplasticity in numerous research studies. While the

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exact definition of enriched environments is still open ended, one of the most important characteristics of enrichment is movement. Movement is defined as an act of changing physical location or position. Movement encourages our brains to understand how our world is set up and how we form relationships with our world. Movement can be something that is done to us or, more important, is something that is intrinsic or intentional to that individual, done under one's own desire, intent or motivation. The type of movements referred to here is either vestibular, the sense of our body moving through space or movement of joints that is self-initiated. The vestibular system is always 'on,' has connections throughout the central nervous system that effects reflexive and planned movement, and effects our state of arousal and cognition. Self-initiated movement, also called experience dependent activity, feeds our brain, creating new connections and possibly improving sensorimotor performance. Experience-dependent activities enhance brain-derived neurotrophic factor, a protein that enables a brain's recovery at the structural and chemical level. This factor is imperative in allowing new wiring and connections between neurons. The more experience-dependent activities, the more brain derived neurotrophic factor. Enriched environments that stimulate an individual to move and explore enhance neuroplasticity. We all are familiar with the research studies that provide one group of animals with lots of opportunities to move and play while another group of animals has limited access. The animals with enriched environments have more axons and dendrites at their neurons than the comparison groups.

Our seating systems and mobility devices are a perfect starting point to look at enriching environments for individuals. In most cases these systems are used daily and are a vital part of a person's life. Movement in these systems, while still encouraging postural control and pressure relief, is one way of enriching the environment. This movement can be as simple as adding an air bladder to a seat or a back or as complex as a manufactured dynamic add-on part or a full frame. Enriching environments for our neurologically challenged clients, including movement within the system, should be a goal for most seating clinicians.

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