



University Learning in Schools

Psychology

**My Brain During the Day:
Infosheet**

Lesson 6



Question: What Is Brain Plasticity?

Brain plasticity, also known as neuroplasticity or cortical remapping, is a term that refers to the brain's ability to change and adapt as a result of experience. Up until the 1960s, researchers believed that changes in the brain could only take place during infancy and childhood. By early adulthood, it was believed that the brain's physical structure was permanent. Modern research



has demonstrated that the brain continues to create new neural pathways and alter existing ones in order to adapt to new experiences, learn new information and create new memories.

History and Research on Brain Plasticity

Psychologist William James suggested that the brain was perhaps not as unchanging as previously believed way back in 1890. In his book *The Principles of Psychology*, he wrote, "Organic matter, especially nervous tissue, seems endowed with a very extraordinary degree of plasticity." However, this idea went largely ignored for many years.

In the 1920s, researcher Karl Lashley provided evidence of changes in the neural pathways of rhesus monkeys. By the 1960s, researchers began to explore cases in which older adults who had suffered massive strokes were able to regain functioning, demonstrating that the brain was much more malleable than previously believed. Modern researchers have also found evidence that the brain is able to rewire itself following damage.

How Does Brain Plasticity Work?

The human brain is composed of approximately 100 billion neurons. Early researchers believed that neurogenesis, or the creation of new neurons,

stopped shortly after birth. Today, it is understood that the brain possesses the remarkable capacity to reorganize pathways, create new connections and, in some cases, even create new neurons.

According to the website *Neuroscience for Kids*, there are four key facts about neuroplasticity:

1. It can vary by age; while plasticity occurs throughout the lifetime, certain types of changes are more predominant during specific life ages.
2. It involves a variety of processes; plasticity is ongoing throughout life and involves brain cells other than neurons, including glial and vascular cells.
3. It can happen for two different reasons; as a result of learning, experience and memory formation, or as a result of damage to the brain.
4. Environment plays an essential role in the process, but genetics can also have an influence.

The first few years of a child's life are a time of rapid brain growth. At birth, every neuron in the cerebral cortex has an estimated 2,500 synapses; by age of three, this number has grown to a whopping 15,000 synapses per neuron.

The average adult, however, has about half that number of synapses. Why? Because as we gain new experiences, some connections are strengthened while others are eliminated. This process is known as synaptic pruning. Neurons that are used frequently develop stronger connections and those that are rarely or never used eventually die. By developing new connections and pruning away weak ones, the brain is able to adapt to the changing environment.

Types of Brain Plasticity

- **Functional Plasticity:** Refers to the brain's ability to move functions from a damaged area of the brain to other undamaged areas.
- **Structural Plasticity:** Refers to the brain's ability to actually change its physical structure as a result of learning.