**12 Basic Principles – What Everyone Should Know about their Brain**

**Principle 1: The brain is one system within a system of systems**

There is a two-way interaction between the brain and other biological systems of the body. For example, with the circulatory system, by relaxing, you can slow your heart rate and lower your blood pressure. At the same time, the operation of the brain requires blood flow and if the brain does not receive enough blood, it does not operate as well – this happens when you have been lying down and stand up too quickly, and feel “light-headed.”

**Principle 2: The brain is a biological engine**

To function properly, the brain must be adequately fueled and maintained. There are five things that you must provide your brain for it to function at its best: (1) food and other nutrients; (2) water; (3) oxygen; (4) sleep; and (5) stimulation. If deprived of any one of these, there are a measurable impairments in the brain’s performance.

**Principle 3: Experience continuously shapes the brain**

The brain is “plastic,” continually changing throughout life. In fact, scientists are finding that surprisingly little exposure to an activity, such as playing a computer game, can produce measurable changes in both the structure and the function of the brain.

**Principle 4: Every brain is different**

As with the body, our DNA has the instructions for building a basic brain. Yet, in the same way that everyone’s body comes out somewhat different, every brain is also different. Consequently, some people may be naturally better at certain activities. However, experiences can have an enormous effect on the brain, in some cases increasing inherited differences and in other cases, making a person good at an activity for which they were born with an average level of ability.

**Principle 5: Brain performance varies over time**

Over the course of a day, and with tiring activities, individual performance capabilities vary. In the same way that the body tires and reaches a point that you can no longer perform well, the brain tires and your performance suffers. Consequently, it is important to schedule your time so that you do difficult and demanding activities when your brain is at its best.

**Principle 6: Brains mostly operate at an unconscious level**

We have conscious awareness of a small fraction of what goes on in the brain. Our brain is constantly sensing and responding to events happening around us, however we consciously attend to very little of this sensory processing. Much of what the brain senses, we only notice if something unexpected happens – for instance, there is something new or different, or out-of-place. This property of the brain makes it possible for people to be influenced by others without them knowing about it. Similarly, activities that we do regularly and are well-learned become automated and we no longer have to think about them.

**Principle 7: Attention may be focused inward or outward**

Under certain circumstances the brain naturally shifts awareness from the external to the internal. When externally focused, we are attentive to the things happening around us. When internally focused, our awareness shifts to the thoughts inside our head, whether daydreaming, mentally rehearsing something we plan to say or do, replaying scenes or other experiences, etc. When events are not sufficiently stimulating, the brain naturally shifts from an external to an internal focus, with this happening more readily when we are tired.

**Principle 8: The brain senses and responds to patterns**

The brain constantly monitors the world around us and detects regularities and patterns in events. This often occurs at an unconscious level outside of our awareness. The brain uses this learning about patterns to make predictions about what to expect in different situations. When the predictions are violated and something unexpected happens, the brain reacts, creating the experience of surprise.

**Principle 9: Memory relies on association and elaboration**

Memories for the things we learn, as well as everyday experiences, are stored as patterns of activity in the brain. When trying to recall a memory, we must re-create the corresponding pattern of brain activity. Memories consist of many different associated items such as the people, places and things present during an experience. These associated items may act as cues that make it easier to recall a memory. Activities such as elaboration – for example, creating a story that includes the items that are trying to remember - help us to form more cues, improving our ability to recall a memory.

**Principle 10: Brains constantly appraise the world around us**

The brain is constantly monitoring what happens to us, taking note of all of our positive and negative experiences. The brain reward systems respond to positive events such as receiving an award or complement, or even someone smiling at us. The activities of the brain reward systems create positive emotional associations to certain experiences, which are translated into preferences and influence our decisions. However, over time, the brain reward systems become less responsive to a given positive experience. This results in the reward systems being most responsive to unexpected positive and negative events.

**Principle 11: Brains would be useless without emotions**

There is a broad range of emotions that serve to motivate and steer behavior. This includes the emotions people commonly think about such as fear, anger, disgust, sadness and joy, but also includes other experiences such as surprise, curiosity, disappointment and remorse. Without emotions, a person would have great difficulty making decisions, or getting anything done.

**Principle 12: Our brains are uniquely sensitive to others**

The brain has a natural capacity to sense and respond to other people. This often occurs outside of our awareness. Special circuits in the brain respond when watching another person and cause patterns of activity in our own brain similar to what would occur if we were doing the same behavior. This can lead to us unconsciously mimicking the behavior of other people, such as when one person yawns and it causes other people to also yawn.