

Exercise 1: Brain Summary

1. Evolution and Major Brain Areas

- The major brain areas or the Triune Brain includes the R-complex or “reptilian brain” (governs instincts), the Limbic System (governs emotions), and the Neocortex (governs higher-thinking).
- Downshifting occurs in the presence of perceived threat.
- Human beings have a highly developed forebrain, the Neocortex.
- This evolution makes higher-level thinking skills possible.
- The Limbic System is the seat of emotion and consists of structures like the hypothalamus (drives and actions, heart rate and respiration, flight or fight), the hippocampus (long-term memory), the reticular activating system (arousal, master switch that indicates urgency), and the amygdala (aggression).
- The Neocortex is divided into four lobes and is where higher-level thinking occurs.

2. Sensory Systems and the Cerebral Cortex

- Sensory systems include the five senses: hear, taste, touch, smell, and see.
- Countless data comes in, all the time. We do not pay attention to all of it.
- A “go or no go” signal occurs to regulate the transmission of stimuli. This is sometimes called the neuron spike point, or sensory gating. Without this data monitoring, sensory overload, or flooding, would occur. This automatic physical process is a key aspect of what we actually process on a conscious level.
- Sensory flooding is what happens when too much data is getting through. There is some indication that disorders such as autism are in part, caused by this type of physiological data transmission problem.
- There are different parts of the brain (cortex) that are responsible for each sensory system: the primary visual cortex, the primary auditory cortex, and the primary sensory/motor cortex (thus tactile/kinesthetic – touch sensation and body movement).
- There are four lobes in each hemisphere of the Neocortex: frontal lobe (thinking, planning), parietal lobe (touching), temporal lobe (hearing), and occipital lobe (seeing).

3. Nerve Cells and the Nervous System

- Nerve cells consist of dendrites, a cell body, and an axon.
- The gap in between neurons is called a synapse.
- The nervous system is like a hard-wired electrical circuit, except it has gaps.
- Therefore, instead of just electrical current, electrochemical reactions occur to transmit the data. The signal turns chemical to get across the gap (and then turns electrical again).
- The nervous system links up to the brain through the spinal cord.
- The brain stem is the most primitive part of the brain and handles some automatic things.
- The midbrain includes the Limbic System and structures that directly affect our emotions.
- For complex and abstract thinking, the Neocortex, made up of two main hemispheres, gets involved.
- Dendrite growth and new connections between information sparks creativity.

4. The Limbic System and Emotion

- The human brain has a unique capacity for emotion and passion partially due to our unique interpretation of experience in terms of the passage of time. We have expectations for the future and vivid memories of the past.
- The midbrain includes an area called the Limbic System, which is central to the processing of emotion.
- The Limbic System includes the amygdala, which appears directly involved with aggression.
- The reticular activating system (RAS) is an important feature of the Limbic System. The RAS keeps us alert and responsive. It is this area that registers whether data is urgent, or not.
- The hippocampus processes long-term memory, which connects to current emotions.

5. Memory Systems

- The brain handles long-term and short-term memories differently.
- Previous knowledge enhances memory, which creates context for storing the new information.
- The more associations you can make, the better chance you have of long-term memory storage.
- These associations include involvement by multiple sensory systems: taste, touch, smell, hear, and see.
- Thus the saying: “What I hear, I forget. What I see, I remember. What I do, I know and understand.”
- Different techniques that touch upon the multiple intelligences of individuals aid memory such as rhymes, writing, song, body movements, drawings, or continual repetition.