

# Important Brain Structures: A Cheat Sheet

## *Emotion, My Thought, Movement, and me*

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### “The Miraculous Symphony”

#### Cortex:

“Bark of the tree” this is the outer ruffled folds (Gyri) and grooves (sulci) most of think of as the brain. This is our **conscious** information processing system and where we perform some of our most complicated cognitive tasks. The brain weighs about 3 pounds, is comprised of 60% fat, and demands 25% of the blood from each heartbeat! This is the most recently developed region of our brain.

The cortex includes the Frontal Lobe, Temporal Lobe, Parietal Lobe, and Occipital Lobe. (Rational/analytic, Cognitive, Superego).

#### Subcortex:

The older and more primitive part of our brain lies just under the Cortex and includes a number of integrated structures that help us with emotion, procedures, automatic movement (arm swing), and processing considered **subconscious**. The subcortex is connected via multiple pathways to the Cortex. (Spiritual, Emotional, Ego)

#### Limbic System:

A set of structures sitting within the subcortex that represents our “**Emotional Brain**.” One of the most important structures is the Hypothalamus that helps us maintain the homeostasis of our body, triggers our hormonal system, and enables production of dopamine and other neuromodulators such as Oxytocin and Vasopressin.

Another important structure in the Limbic System is the Amygdala (almond) that is bigger in men than women. This structure is keenly responsible for the brain’s ability to react to life threatening stimuli and to evoke our “fight or flight” response. As such, the amygdala is integrated with the hypothalamus that sets off our endocrine system via the pituitary and adrenal glands and also with the autonomic

nervous system in the brain stem where our sympathetic and parasympathetic nervous system lie. Interestingly, women tend to cope with stress using a “tend and befriend” approach more than a “fight or flight” response.

### Reward System:

Beautiful and miraculous older part of the brain within the limbic system that integrates neurochemicals, critical structures, and hormones permitting us to feel love, forgiveness, compassion, empathy, kindness, happiness, hope, and faith. Perhaps a critical seat of our spirituality and the seat of our ability to heal and be whole. This is also a region susceptible to addiction due to Dopamine receptors and hence maladaptive reward (ETOH, Cocaine, Porn, Gambling, etc).

If properly stimulated with the practice of Love, our judgmental and moralistic regions in the Frontal, Temporal and Parietal lobes will be de-activated. You cannot be angry when you love! What is the implication of this for health and peace on earth?

### Brain Stem:

Sometimes called the “reptilian brain” and seat of our 12 cranial nerves. The brain stem is the seat of our vital and automatic functions of respiration, heartbeat, blood pressure, glucose level, body temperature, etc. The brain stem contains the “autonomic nervous system” involving the sympathetic and parasympathetic systems critical to our mood and behavioral regulation. The ANS is connected with the endocrine and neurochemical systems to provide a complicated and integrated underlying mechanism for behavior, emotion, and thought. (Reptilian, Appetitive, Id).

### Raphe Nucleus:

In the brain stem and a factory for Serotonin (sleep, mood, appetite, OC).

### Locus Coreulus:

In the brain stem and a factory for Neuropinephrine (driven, assertive, aggressive behavior).

### Hippocampus:

Perhaps the most important structure in the human body, the hippocampus sits in the middle of both temporal lobes and is critical to new learning and spatial navigation. It gives us our ability to encode new information and to build our “life story.” Alzheimer’s and chronic stress (PTSD) can damage the hippocampus and our

learning of new information. This is likely due to the fact that the neighbor of the Hippocampus is the Amygdala and if the Amygdala fires and does not shut off, cortisol will be released and over time do damage to the hippocampus.

The hippocampus is also the site where we know “neurogenesis” or development of new brain cells occurs. This can be achieved through exercise and mental stimulation. It helps to achieve “brain resilience” that can delay onset of symptoms of brain disease and achieve brain health (see. Dr. Nussbaum’s Brain Health Lifestyle ® at [www.brainhealthctr.com](http://www.brainhealthctr.com)). Bigger in women than men.

### Hypothalamus:

Important structure within the Limbic System that has a direct relationship with the endocrine system and helps to regulate our feelings and emotions. The Hypothalamus is also important to sexual and intimate behavior, love, body temperature, and other vital functions of the body. Oxytocin and Vasopressin get released and stored in the Pituitary gland where they can then be distributed into the blood system. Dopamine is also a key neurochemical of the Hypothalamus that can lead to euphoria, love, and addictive behavior with a relationship with the Reward System.

### Insula:

Located deep in the temporal lobe and critical for consciousness, empathy, and compassion.

### Precuneus:

Located in the parietal lobe and critical to self-awareness/reflection, consciousness, social awareness, compassion, distinction of me from my outside world and mirror neurons. Yawning stimulates and can bring peace and enhanced attention to us by stimulating the Precuneus.

### Frontal Lobe:

Youngest and largest member of the Cortex. Site of your personality and the “Chief Executive Officer” of you. The frontal lobe does not contain facts and figures, but it organizes, structures, and plans for the rest of the brain. Site of our personality features and of psychiatric disorders. The frontal lobe is analytic and judgmental and moralistic. Love disengages the frontal lobe (“Love is Blind”).

## Parietal Lobe:

Large lobes just in back of the frontal lobes and above the temporal lobes. Helps with mental calculation, spatial processing, memory, self-awareness, and distinction between the outer world and me. Those who master meditation shut down the parietal lobe.

## Motor System:

Sits at the rear of the frontal lobe near the middle of the Cortex and in front of the Sensory System. Strip of cells laid out in relationship to the body with more cells dedicated to areas of your body that need to move. (Your legs and fingers have more cells dedicated to them than your ear lobes). Conscious and purpose driven movement.

## Cerebellum:

“The Little Brain” that sits below the cortex and near the brain stem. Important for fine motor coordination, balance, and cognitive processing that involves motor function (Imagine playing tennis).

## Sensory System:

A strip of cells that lie near the middle and top of the Cortex that provides representation of all body surfaces for sensation. You have more cells dedicated to those areas of your body that are more sensitive (Is your face more sensitive than your back?).

## Anterior Cingulate Gyrus:

“Front Band Bump” is the area of the Limbic System that sits at the front between the frontal lobe and the subcortex. Important for attention, focus, and the grand mediator between the analytic and cold frontal lobe and the tumultuous and emotional limbic structures in the subcortex. When engaged, the ACG can bring peace and emotional balance to the brain and body.

## Corpus Callosum:

Large band of white matter that bridges the right hemisphere to the left hemisphere in the Cortex. Information travels across the CC all the time permitting an integration of the world. Women tend to use both hemispheres more than men (We are not the same) and hence women tend to have larger CC than men.

