ALPHABETICAL BRAIN™ VOCABULARY
HUMANIST FAMILY BRAIN STUDY

THE 10 BRAIN FACTS
February 1, 2017

Curiosity is the primary motivation that you need to get started learning about the ten most important brain facts. You need to know them so you can control your mind's mental force in order to prosper in the future.

Fundamentally, you need to know them in order to organize your consciousness, which is your self-organized memories.

Your mind's mental force is defined scientifically as the result of your brain's incredible parts and the neuronal connections (wiring) of your nervous system, which connects your brain to all of the other parts of your body.

And your profound ability to adapt to changes in your physical and social environments is caused by the process of your brain's neuroplasticity (neuronal wiring).

The entire physical features of your neuronal pathways are known as your connectome.

In short, your brain has evolved and is continuing to evolve to provide your consciousness and your mind. They are the ultimate products of about 13.7 billion years of evolution on our planet Earth.

If you clarify your knowledge about the following ten brain facts, in the linguistic context of the new scientific evolutionary knowledge about your brain's functions, your thoughts will be able to control your feelings in a far more predictable and exciting way.

When you learn the new brain vocabulary that describes your consciousness in the language of the new empirical

knowledge about evolution, your mind's mental force will be able to organize your consciousness in predictable ways under ordinary or emergency conditions.

In addition, you will be able to use your humanistic values to provide purpose and meaning to your life and avoid useless social anxieties that can weaken your human spirit and destroy parts of your brain.

Just ask yourself three big questions: **"How does my brain work?"** and **"What is my brain's evolutionary function?"** and **"How does culture shape my consciousness?"**

Because of the courageous work, which brain scientists did during the 20th century, and especially what they have done more recently during the 21st century (during the past 16 years), incredible new discoveries have been made concerning the true facts about how human brains function and the true causes of human consciousness.

Now because of the new brain knowledge, there are better medical treatments, therapy techniques, and educational methods than ever before in human history.

Modern medical diagnoses and treatments for brain disorders and injuries, including interventions and rehabilitation for injured brains, can help disabled brains recover better than ever before for disabilities like strokes, brain tumors, and traumatic brain injuries such as sports concussions and bomb blasts, as well as many other brain disorders and injuries.

Since there are so many incorrect claims by mass media advertisements about ways to optimize brainpower, it is important that you use critical thinking skills and critical

reading skills so you will be able to understand the scientific perspective about the true ways that you can efficiently apply the new brain knowledge to improve your brain functions.

Then you will be able to apply the brain facts and ideas to your own unique life situation and social circumstances.

If you want to have good brain functions, it is crucial that you learn to eat, sleep, exercise, and relax appropriately at all ages, using the best scientific advice available, because good blood circulation is required for good brain health.

FIRST FUNDAMENTAL BRAIN FACT:

[1] Human consciousness (self-awareness) is caused by the global connectivity of all of the neuronal pathways and all of the signaling processes in your brain and the rest of your body.

Approximately 900 trillion synapses attach your 100 billion neurons to each other and to all of your internal organs, glands, and muscles.

The cell bodies of neurons start action potential spikes that flow from neuron to neuron through trillions of synaptic clefts (gaps between neurons) to connect your brain and nervous system in a vast biochemical web.

The vesicles of your synapses release sodium or potassium ions depending upon what the potentiation (electrochemical potential) is across the gaps at the synapse terminals.

Your dendrite terminals and synapse terminals typically

attach to your muscles, internal organs, and many glands.

SECOND FUNDAMENTAL BRAIN FACT:

[2] The physical structure of your cerebrum is the intellectual resource center of your life. It is the newest region of your brain to have evolved during the last few hundred thousand years.

It contains four lobes (four sections), which include your frontal lobe, temporal lobe, parietal lobe, and occipital lobe on both sides of your brain.

Thus your cerebrum consists of eight sections, since your brain is divided into two cerebral hemispheres, commonly referred to as your "left brain" and your "right brain." They typically have predictably unique separate functions.

Distinct skin-like membranes separate the eight sections of your cerebrum, with numerous neuronal pathways connecting all eight of the sections for dynamic interactive communication.

THIRD FUNDAMENTAL BRAIN FACT:

[3] The physical structure of your prefrontal cortex (PFC) is the executive decision-maker of your life.

Your PFC is located in the two frontal lobes at the front of your cerebrum just behind your forehead with neuronal connections to all other major areas in your brain.

The notable major areas include brain function activators associated with; [1] your conscious willpower in your cerebrum; [2] your feelings in your limbic system; and

[3] your unconscious behavior in your combined cerebellum and brainstem. The last area is referred to as your "cerebellum-brainstem complex," since together they control your involuntary heartbeat and breathing.

FOURTH FUNDAMENTAL BRAIN FACT:

[4] The essential components of your self-awareness are two small clumps of neurons, which are the central control hubs of your prefrontal cortex, located in the front of your cerebrum behind your forehead.

These two small functional modules are each the size of a penny and are located high in the forward part of your two frontal lobes behind your forehead.

They are located above your eyes (about one inch under the skin) in both the left hemisphere ("left brain") and the right hemisphere ("right brain") of your cerebrum.

The two clumps or clusters of neurons (two modules) are on the inside front of both of the prefrontal cortices (PACS) of your divided cerebrum.

FIFTH FUNDAMENTAL BRAIN FACT:

[5] Your ability to think and make decisions depends upon having healthy neuronal pathways inside your two anterior cingulate gyrus.

This means that your neurons, which produce the electro-chemical current (biochemical signals), and your glial cells, which form the structure of your neuronal pathways, must be healthy so the biochemical current can be conducted (move) rapidly and efficiently through those two cingulate pathways.

The two cingulate pathways are located on the insides of your divided brain (two hemispheres), on both the left side and the right side of your two cerebral hemispheres.

In addition, your glial cells coat the axons of most of your neurons with a white fatty substance known as myeline sheaths, which nourish, insulate, and provide the structure for your neurons.

They protect neurons from toxic chemicals floating in cerebral fluids.

The myelination process allows action potential spikes (biochemical currents) to move more quickly than they would without the protective coating.

Historically, your glial cells were called white matter and your neurons were called gray matter. Those were their colors when they were exposed to air. That is why ancient people knew they were different kinds of brain tissue, but did not know what their functions were.

SIXTH FUNDAMENTAL BRAIN FACT:

[6] The memory consolidation process in your long-term memory system is activated by four triggers in the specialized long-term memory circuits located in the two parts of your hippocampus.

The physical structure of your hippocampus, contains the four separate circuit activators (triggers). They are your semantic, episodic, autobiographic, and procedural memory (muscle memory) areas.

The four memory areas in your hippocampus have the vital evolutionary role of keeping you alive.

Their location on the two sides of your hippocampus

(one in each hemisphere) are both nestled safely at the bottom of your limbic system in the most protected part of your brain.

It is the connection between your prefrontal cortex and your hippocampus that is vulnerable to being obstructed (blocked) as you age. Such damage to the structure of the two neuronal pathways can cause many disabling dementias as well as the incurable and often fatal Alzheimer's disease.

Therefore, it is imperative that you understand how important your long-term memory system is for your having a comprehensible and enduring sense-of-self (self-identity) and a socially acceptable personality (self-image).

YOUR CONSCIOUSNESS DEPENDS UPON HAVING A HEALTHY CONNECTION BETWEEN YOUR PREFRONTAL CORTEX (PFC) AND YOUR HIPPOCAMPUS

Your working memory directs all of your conscious executive brain functions, since it is neuronally wired to control the functions of the other major parts of your brain.

Those physical structures include your cerebrum, limbic system, and brainstem-cerebellum complex. Your brainstem and cerebellum together are the oldest "reptilian" parts of your continuously evolving brain.

SEVENTH FUNDAMENTAL BRAIN FACT:

[7] Your brain's neuroplasticity (plasticity process) gives you the ability to control your body and also to learn new words (such as the new brain vocabulary).

The dynamic plasticity process can expand your long-term memory system, by adding words and images to your memory system, in the two parts of your hippocampus located in both hemispheres.

This process of memory consolidation converts stem cells into new memory molecules in your hippocampus.

Your long-term memory system can store memories both instinctually (implicitly) and consciously (intentionally).

Your long-term memory contains old facts and images about things and events in your past and also the new thoughts and feelings that you have chosen to remember because of their relevance to your daily life.

For your brain to control your bodily movements, your prefrontal cortex had to learn how to connect and control all of the neuronal signals in your neuronal pathways in both your sensory cortex and your motor cortex consciously and also unconsciously.

Through many thousands of experiences over many years, you learned the essential habits of living. All you have ever learned has been reinforced, both consciously (deliberately) and unconsciously (tacitly) many times since you were a toddler.

At each of the predictable developmental physical growth stages of your body, your brain's parts were also changing in their connectivity, especially during the "adolescent pruning process," as well as more predictable adult learning experiences that cause many mental changes due to neuroplasticity (plasticity process).

Remarkably, there are only two parts of your brain that are able to create new neuron cells daily. They are your olfactory glands (smell organs) and your hippocampus (long-term memory consolidation system.)

These two particular examples of the incredible neuroplasticity process are known as neurogenesis, since new neuron brain cells are created in those brain tissue areas throughout your life.

New neurons are essential for the sensory function of your olfactory glands and also for the memory function of your hippocampus.

EIGHTH FUNDAMENTAL BRAIN FACT:

[8] For you to be conscious of yourself (self-aware), your prefrontal cortex must be connected to the language module in your left temporal lobe and also to your hippocampus at the bottom of your limbic system and your amygdala at the front of your limbic system.

YOUR LANGUAGE MODULE MUST BE ACTIVE FOR YOU TO BE SELF-AWARE

In addition, for you to be conscious of yourself as a passionate and conscientious human being with the freedom to choose your own thoughts and actions, your prefrontal cortex must be connected to your reticular activating formation located in your brainstem.

Also, simultaneously, your prefrontal cortex must be connected to the two triggers of the two vital unconscious brain functions that regulate your breathing (lungs) and your heartbeat (heart) located in your brainstem-cerebellum complex so your heart will be pumping oxygenated blood into your brain at all times to

keep your brain alive.

The constant neuronal signaling that activates your lungs and heart muscle ensures that freshly oxygenated blood will continuously flow into and throughout your brain at all times.

NINTH FUNDAMENTAL BRAIN FACT:

[9] If you learn the new brain knowledge and educate yourself so you will have the confidence necessary to develop proper self-management skills, the source of your thoughts, which is your cerebral cortex, can control the source of your feelings, which is your limbic system.

This supreme brain fact is derived from the new brain knowledge about the flexibility of your working memory and its mechanism of causation, which is the vast global connectivity of all of the neuronal pathways in your connectome (your brain and nervous system that are inextricably intertwined.)

This is a revolutionary and transformative idea since it means that you are totally in charge of your own thoughts and feelings and actions. Bluntly, it means that there is a sensory self but no spiritual soul. What historically has usually been called "spiritual" is now known scientifically as being "emotional."

No matter whether or not you give yourself full credit for your brain's phenomenal mind (mental force), it exists for you to exploit (or to let others exploit you by fooling you) for as long as you are alive!

This explanation of your brain's primary functions has been verified with scientific certainty by raw human experience and exquisite pure methodical

experimentation hundreds of thousands of times during the past few years.

Hundreds of thousands of fMRI brain scans have proven the existence of a vastly complicated biochemical communication system, made up of your brain and nervous system, which is biologically driven and psychologically controlled, if you have the proper practical brain knowledge.

By measuring the blood flow and the sugar levels inside the brain with the most powerful new block spectrum optical fluorescent microscopes, the communication system of your brain has finally been revealed to be activated by its own physical biological parts, including your brain's mind (mental force).

To repeat for clarification, the source of your thoughts is the biochemical activity in your cerebral cortex. And the source of your feelings is the biochemical activity in your limbic system, assuming that all of the other systems in your brain and the rest of your body are functioning normally.

To summarize for even more clarity, your cognitive resources are a function of your cerebrum while your decision making ability is a function of your prefrontal cortex in collaboration with the long-term memory circuits and amygdala emotion circuits in your limbic system, which competes with your prefrontal cortex to control your memories and emotions.

TENTH FUNDAMENTAL BRAIN FACT:

[10] When the neurons in the pathways of the two anterior cingulate gyrus get entangled or interrupted, neuronal signals from the brain's prefrontal cortex to the

hippocampus get blocked or damaged.

This blockage or destruction of neurons can cause the usually fatal Alzheimer's disease and other less severe dementias.

In addition, Alzheimer's disease can be caused by tumors as well as the buildup of amyloid plaque caused by toxic proteins or tao tangles or cellular debris such as prions that can make holes in brains.

When the cingulate pathways, which connect the prefrontal cortex to the long-term memory circuits, are interrupted due to tumors or toxic chemicals or traumatic brain injuries, such as concussions from sports injuries or bomb blasts, there is usually permanent damage to a person's brain resulting in mental disorders.

The mental problems can compromise a person's sense-of-self (self-identity and personality) to one degree or another forever.

Damage to the neuronal signals (biochemical current) between the prefrontal cortex and the hippocampus causes the dramatic loss of self-awareness or the loss of the sense of time or the loss of facial recognition skills or the loss of all three essential survival functions even though some awareness of nonpersonal routine situations may not be affected.

Sadly, that is why most Alzheimer's patients cannot recognize the faces of their spouses or their friends or remember what they were doing or where they were a short time before. A classic example in neuroscience is the study described in the book **The Man Who Mistook his Wife for a Hat; and Other Clinical Tales** by Oliver Sacks.

Also the documentary film on **CNN** Sunday night (June 28, 2015), honoring the great guitar player and singer Glen Campbell, depicted the terrible impact Alzheimer's can have on a person and their family and entire social network.

In addition, a brain research study published in the neuroscience journal, **The Neuron**, in July 2015 reported that loss of memory can also be caused by biochemical imbalances in the medial temporal lobe, which can destroy the protein bridges that connect memories to each other.

Therefore, any disruptions of neuronal signals along the cingulate pathways or in the medial temporal lobe can damage the operation of both the brain's working memory resources or its long-term memory consolidation system or both.

To restate this alarming fact, Alzheimer's disease and the other dementias are usually caused by damaged cingulate pathways, which cannot relay neuronal signals (biochemical current) back and forth efficiently anymore.

This means that the neuronal signals (impulses of information) from the brain's executive control mechanism in the prefrontal cortex cannot reach the brain's long-term memory consolidation system in the hippocampus.

Likewise, old memories stored in the long-term memory system cannot get to the conscious level of working memory resources in the prefrontal cortex.

With no cure available to stop Alzheimer's disease, it is essential that you become aware of the specific scientific ways that you can avoid or delay the onset of permanent

brain damage due to Alzheimer's or the many other kinds of dementias.

Also it is imperative that you plan to stay out of situations that are likely to cause traumatic brain disorders or injuries that block neuronal signals from communicating between your working memory resources and your long-term memory system.

The short-term value of some thrilling popular extreme sporting activities or over-eating or under-exercising or the lack of sleep (the purpose of sleep is to wash away anti-oxidants from cerebral brain fluid and to consolidate important memories of the past day to prepare for the challenges of the future) are all too dangerous to experience when your brain health is so important for a long happy and productive lifetime of meaningful experiences and relationships.