

## Transcript of Foundational Knowledge Audio Lecture 2

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Welcome to a discussion of **how the brain of Jesus is the perfect model for our faithful brains!** It's important to have this discussion because many people don't consider Jesus fully human.

As we practice faithful brain counseling and as we have discussions with others about the faithful brain model, a regular topic of discussion will involve how we identify the model to which we should adhere as we attempt to develop faithful brains. These are necessary discussions for many people and they must be handled carefully. Ultimately, we want to encourage people to consider Jesus to be our fully human and fully divine best example and model to follow.

The Bible offers Jesus as our best example. In Colossians 1:15 calling Jesus the “image of the invisible God the firstborn over all creation”. And the Bible also describes Jesus as fully human, in Hebrews 2:17 calling Jesus, “like his brothers in every way.” If we are to use Jesus as our best example, we must simultaneously accept that he is Emmanuel, God with us, and just like us. Fortunately the Bible provides this testimony.

People who are not able to accept Jesus as fully human and fully divine will cast around unsuccessfully for a model on which to base optimal character comparisons. As we participate with these people in faithful brain development, they will struggle due to a lack of clarity in this area.

Thus, discussions with clients and others early in their experience of faithful brain development, will help them come to accept the tension and the mystery between Jesus being fully human and fully divine and accept that beautiful mystery that God provides to us.

Jesus was born with a perfect brain that developed perfectly. Although our brains are like the brain of Jesus, they are different in two fundamental ways:

The first difference between our brains and Jesus's brain is due to *neural epigenesis*, a process through which the effects of sin are passed down from one generation to the next. This is a very new area in neuroscience.

Our experiences bring about changes in our genome some of which are passed down through subsequent generations. these genetic changes are expressed in cells throughout the body including nerve cells. The message from Colossians 1:15 that

Jesus was the firstborn over all creation makes it clear that Jesus had a perfect genome, we do not.

The second difference between our brains and Jesus' brain is due to our sin that brings about changes here and now in our brains through the specific effects of *neuroplasticity* and the cumulative effects of sin on neurogenesis. Our trajectories of growth are very different from that experienced by Jesus. As a consequence we can think about ourselves as having stunted growth and/or growth that has veered from God's design.

To the degree that we do not engage in God's perfect will for our lives and do not participate in concert with God's created reality, our bodies and our brains develop over the course of our lives sub optimally.

In addition to being our best example, Jesus is also our best teacher. Though we are imperfect, once we are redeemed we can embrace the lessons of Jesus to guide and nurture our own *neuropsychiatric rehabilitation*. Asking "what would Jesus do" is crucial to our brain health and development and through the lessons of Jesus we can participate with God to support the development of our brains, to have life and have it to the full, as in John 10:10.

Grace allows us to pierce our imperfection so that we can embrace the lessons of Jesus and use them as a model for optimal neuropsychiatric rehabilitation. and this was my own experience starting at about age 30. I began to read the Bible and continued to adjust my behavior to maintain integrity with the lessons of the Bible. This harnessed my *neuroplasticity* and protected my *neurogenesis*.

Neuroplasticity, in the service of God's will for our lives, that places us in concert with God's created reality, protects our neurogenesis by the secure love of God. This gives us the opportunity for a restart when we depart from what the apostle Paul calls the pattern of the world and start to live within God's perfect will for our lives. Our brains rapidly grow with optimal brain health and development, it's never too late.

God built deep redundancy and permanent potential into our brains. As we live lives honoring God and accepting Jesus as our Lord and Savior, we have what John calls in chapter 10, life and have it to the full. What is most exciting about this, is that our capacity for life-to-the-full continues to increase as we move out into our potential.

Although I often wish that I had started earlier in my journey with Christ, I'm amazed that starting as late as I did has allowed me to have as full a life as I am experiencing now. Everyone with whom I have journeyed along this path expresses the same grateful disbelief.

So let's take a closer look at some of the neuroscientific fundamentals of brain health and development.

Your brain developed from stem cells that began to turn into neurons organized as what we call a neural tube at about 21 days after conception. Your brain developed about 1.1 million new neurons per hour through early childhood. After nine months of gestation the human brain has about 200 billion neurons. The birth and development of new neurons continues at a slower pace during the first several months of life.

Now it takes about 21 days for a neuron to go from a stem cell to a fully operational neuron and begins to link up with other neurons. High levels of constant stress stop neurogenesis from developing in a healthy manner. One of the main effects of constant high stress is to stop neurons from linking to other neurons. At any age, when neurons are unable to link to other neurons they will wither and die. Neurons need to be linked just like humans need to be linked.

*Neurogenesis* slows down in adulthood but never completely stops. with about 1,500 new neurons per day produced in the older adult brain. A typical middle-aged adult brain has about a hundred billion neurons with 1 trillion *glial cells*. The glial cells spelled g-l-i-a-l provide support to the neurons, nourishing them and handling the brain's housekeeping when we are asleep. The brain is constantly changing, neuroplasticity and neurogenesis and synaptogenesis are ongoing 24/7.

As we know, neuroplasticity is the constant linking of neurons into new neural networks and the unlinking of neural networks that are no longer needed or used. Neurons become linked to other neurons to allow the brain to perform necessary tasks. Neurons need to be linked to other neurons, those that are not put into service and link to other neurons will wither and die.

The linking of the neurons is through *synaptogenesis*, the development of new synapses which are the links between the tips of the axons of one neuron to the dendrites of the next neuron. These synapses are not actually physically linked but bridged by neurochemicals that transmit the electrical signal from one neuron to the next neuron.

The dendrites that receive the signal are very tiny filaments that are very fragile and easily damaged by stress. Actually it's the cortisol that is a consequence of stress that causes the dendrites to wither and die. If too many of these dendrites wither and die, the neuron itself will wither and die.

When I came in from the cold dark restless night that was my life before I accepted Jesus as my Lord and Savior, I was met with the love of God that began to heal my

brain. And the healing took place in the protection of synaptogenesis, the production of these dendrites that is so fragile and can be so easily damaged by high levels of stress.

Love is the perfect antidote to the damaging effects of stress and God's love which is perfect love is the perfect antidote. There are literally dozens of mechanisms that promote the healing effect of love on the brain. We were designed for love. Love protects what would otherwise be a very fragile and complex structure with billions of neurons and trillions of connections.

There are many estimates of how many neurons we have and how many linkages each neuron has the potential to experience. Part of the difficulty with developing estimates is that we are designed with so much complexity. For example although each neuron averages about 10,000 links or synapses. Purkinje cells, which is a type of neuron, have about 200,000 synapses.

Now, each synapse either excites or inhibits the next neuron. The possible combinations and permutations is beyond counting. I've invented a word that makes this point "godzillion". Scientists hate the idea that we can't count something. Well, we need to be humble about how complex the human brain is and how many possible linkages there are and that's why the word godzillion works.

There are hundreds of different types of neurons and we've not yet finished discovering the different types. This is because the technology necessary to study such small structures is still developing.

We think of our current computers as quite powerful but the capacity of one human brain can quickly gobble up all the storage capacity of most computer systems. It is useful to think of the human brain in terms of computers so that we can develop a sense of proportion. But that thinking is limited because computers are hardwired and we are not.

Our brains are always changing in response to experience. Some of the most sophisticated new computer designs are based on models of the human brain but are inelegantly implemented with electronic circuits.

These neural networks are the next step up from neurons in changing a piece of data into information. A neuron sends one signal that may be sufficient to produce a response but anything above a very simple response requires a neural network.

*Neural networks* are organized links of neurons developed by experience.

*Neuroconsolidation* is the process by which neural networks are created and developed.

Neural networks that are values-based guide the organization of our brains which is why it is important to start developing values early in life.

As neurons are born and develop, they are recruited through a process that involves experience. We only have a dim understanding of this but they are recruited by a process that involves experience into neural networks. We call this process neuroconsolidation.

Neuroconsolidation takes advantage of the neuroplastic properties of neurons and their synapses to organize information. Our best guess about *dominant neural networks* is that they are often values-based. Thus we can think of values as guiding the organization of our brains which is a very key concept for faithful brain counseling and right at the center of Values-based Goaling.

As counselors, when we listen to the thoughtful or careless decisions described by our clients, we should be thinking in terms of the degree to which their neural networks were guided by coherent values. We should also consider the degree to which those coherent values are God honoring.

Many of the people who come to see us have incoherent neural networks based on sloppy value systems. They are often confused and usually make choices that are inconsistent day-to-day and perhaps even hour to hour.

Our clients come to us in trouble with their brothers and sisters and spouses and families and perhaps with the legal system because they have coherent values that have developed neural networks that are at odds with the basic rules of society.

Counselors must become very familiar with the process of neuroconsolidation and how to properly promote it. Much of what we do in this training program will equip you to examine and interpret your clients' neural networks and promote their future healthy development. But before we get to that we have to have a better understanding of the brain and some of its major components and processes.

Let's start with the *cerebrum*. the cerebrum accounts for two thirds of the brain's mass and is divided into two *hemispheres*. Each hemisphere has four lobes that control most of our cognition and volition. We have the *frontal lobes* and then going backwards the *temporal lobes* and the *parietal lobes* in the very back the *occipital lobes*. The cerebrum is covered by the *cerebral cortex*. The cerebral cortex is composed of neuron cell bodies in layers.

The two halves of the brain are linked by the *corpus callosum* which has about 250 million neurons that help the two halves communicate. We can think of people as

primarily being right-brain or left-brain but in reality the healthy brain is integrated right to left with complex tasks requiring both halves to do the best work.

Areas of specialization for speech and reading are found in the left brain for most people but some people have these areas in the right brain. Similarly areas of specialization for measuring and distance and direction are found in the right brain for most people but some people have these areas in the left brain.

For everyone, the right brain controls the left side of the body and the left brain controls the right side of the body. When you use your left hand to scratch an itch on your left leg both the control of your hand and the sense of the itch and the scratch are handled by your right brain.

The cerebral cortex is the covering of the cerebrum. Its called gray matter because it consists of neurons that control our cognitive processes. Its actually pinkish gray in color because it's composed of tightly packed neuron cell bodies.

What you are actually looking at is the neuron cell body, you can't see the axons streaming down below unless you look at the cerebral cortex from the side. The cerebral cortex can be thought of as your thinking brain. That doesn't mean that the other parts of the brain don't participate with your thinking.

Your choices known as your volitional control are orchestrated by the front of the cerebral cortex known as the *prefrontal cortex*. The cerebral cortex develops throughout childhood and into early adulthood from back to front with the final linkages of the cerebral cortex to the emotional *limbic system* beneath it not being completed until about age 21 to 23 for women and age 23 to 25 for men.

Let's take a closer look at the gray matter covering of the cerebral cortex. The gray matter is composed of six layers of neurons each about as thick as a business card. Each layer has a different function. Neurons synapse within and between layers and are also organized in terms of columns. The synapses are too small to be seen by light microscope. The gap in the synapses is bridged by chemicals that send the electrical signal from one neuron to the next neuron.

Each cortical layer has a different job to do and is different from region to region throughout the brain. There are probably more than 500 different functional regions throughout the brain. Some of these have yet to be discovered and most of these we still don't fully understand. The integration of these functional regions is orchestrated so that we do not experience chaos but (the integration) can be disrupted if we are not careful about how we treat our brain.

Of the four different lobes of the brain, in each hemisphere the frontal lobe is the most important for counselors to understand. The frontal cortex is where most of our attention and volitional behavior is initiated and organized.

Because the cerebral cortex is the last part of the brain to develop fully and because it develops from back to front and because our self-control is found in the very front part of the frontal cortex known as the prefrontal cortex, self-control and values-based ethical and moral choices are more difficult for adolescents and young adults. They just don't have the wiring to support consistent values-based ethical and moral choices.

For these people at this time of their lives they require more values-based structure. This is one reason that I favor participation of young people in the armed services or in other structured activities such as an adequately structured school environment or work environment. Unfortunately we don't have many of these available in modern society which gives rise to many of us going through very difficult experiences in late adolescence or early adulthood.

In the cerebral cortex, gray matter volume is greatest at about age 5 and decreases to age 20 although intellectual capacity improves because neuron pruning increases the brain's efficiency. Its surprising to most people that pruning of neurons is such an important process. Most people think of neuroplasticity as been predominately a proliferation of neurons and neural connections, that just isn't the case. In fact, the balance of pruning seems to bring about major changes in the brain and behavior during adolescence.

Some of the most recent research now has allowed us to understand that schizophrenia is probably a consequence of too rapid pruning at this time. Schizophrenia normally evidences itself in the late teens and early 20s just at the time the brain is finalizing its most rapid pruning.

To wrap up this lesson, I want to talk about *epigenesis* which is something we don't understand very well but it's very important for counselors. As we know epigenesis is the switching on or off of genetic code directed by life experiences. Research is now finding support for how, what the Bible calls the sins of the father, are passed down to the next generation.

Epigenesis appears to be the mechanism. It's a biological process that involves changes in the genetic code based on life experiences. Epigenesis can take place in any cell in the body and is now being explored as a possible cause of cancers.

Neural epigenesis, that is the epigenesis that takes place in neurons, seems to be brought about by early stressful experiences that cause enduring changes in brain health and function.

Gene-based behavioral predispositions are expressed or lay dormant as experiences trigger epigenesis. Part of the reason that one identical twin develops a genetic psychological disorder such as schizophrenia or depression and the other does not probably has to do with epigenesis and the interface between epigenesis and stress.

Very recently, the National Institute of Mental Health has started to devote huge sums of money for research in this area. What is absolutely clear is that adolescence is a crucial time for triggering the onset of adult mental illness. We need to do a much better job with our teenagers and young adults.

The church can do a lot in terms of helping young people develop values that lead to resilient character strengths. The church can also help families maintain the stability that an adolescent needs to avoid the expression of underlying genetic predispositions that can lead to adult mental illness. Christian counselors should be at the forefront of this work.

To wrap up this foundational lesson, I want to give you the two messages the two main messages that I give my clients.

First, **your brain is your responsibility**, it takes care of you better than you take care of it and we need to be intentional about caring for our brains. It's the site of the most highly leveraged epigenesis of any component of our body.

The second message is that, **your brain is your opportunity**. God intended you to participate in your brain's care and development. The Bible provides you with necessary and sufficient guidance to care for your brain. Neuroscience helps to explain what's happening as we choose to follow or ignore Jesus.

In addition to developing strategies to successfully fight mental illness, participating in our brain's care and development through our relationship with God, by using Jesus as our model, gives us a high expectation for successful growth. Reflect on the stressors that Jesus encountered and the resilience that Jesus demonstrated.

To the degree that we can use Jesus as our example, our ability to avoid limiting our neurogenesis and dangerous neural epigenesis and degradation of our resilience, is greatly enhanced.

So, thank you for your time and attention. We've reached the end of your Faithful Brain (Counseling) Foundational Lesson Two.



We welcome your feedback. Please send ideas questions or concerns to the Faithful Brain Institute at [www.faithfulbrain.com](http://www.faithfulbrain.com)

Take care.