

LIVING YOUR POTENTIAL

The Brain Explained



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About the Author

My name is Marianne Love, and I am the principal Psychologist at Aspire Health & Psychology in Newport, Victoria, Australia. I feel as if I have been in this field my whole life. I have always been deeply interested and passionate about people. I love being a part of people's transformation to happiness and wellbeing. I started volunteering when I was 12 and have continued serving the community to date. I have put together this information with the hope that this will assist you to overcome some difficulties that you may encounter in your life.

I am keen to make available as many resources as possible so that you will be equipped for a speedy recovery. It is also my hope that through pain you can gain wisdom and free yourselves from the emotional burden. I believe in the power of knowledge and information in order to achieve this. The more equipped you are, the more you will ultimately be able to make the decision to drop the suffering. It feels very complex being human. As Pa'Ris'Ha, my mentor and teacher, so beautifully puts it, sometimes we simply need to 'get over ourselves'. I have pondered this for a long time, researched and studied, and talked to clients and colleagues. What are the ingredients of simply dropping it? What does it mean to get over it? It sounds so simple and yet, when caught up in the middle of a thought and emotion, can feel like the most difficult thing in the world. This is especially true when we feel justified or right about something. It becomes harder yet when we are deeply entrenched in the idea that we were very powerless in a situation to exert our own will; that we have been wronged.

It is my hope that you will be able to apply this information to your own unique situation and use it to support some of the processing you are doing with a trained professional.

May you know 'All Good Things' and live the love, joy and happiness that is your birthright.

"There is no way to Happiness, Happiness is the way."
- Pa'Ris'Ha

Introduction

Each of us have our own unique purpose for being here. What we all have in common is that a part of our purpose is to live health, happiness, wealth and wellbeing. Why? Because we can! The trillions of cells that make up the physical experience of who you are have come together under your command to serve this purpose.

To that end, it isn't a question of can you do something, but rather it is a question of will you do something. Will you seek and gain all the knowledge you need? Will you direct your will with the focus and determination to get off automatic pilot? Will you take charge and steer the ship?

The first step is to be kind to yourself. Most of what is programmed in your system and body you were born into. It isn't your fault. Changing however, is your responsibility. No one is able to override your free will. No one can make the deep choices within you to relieve your suffering; it is personal to you and there is no one judging you either way. As Pa'Ris'Ha once taught me, we simply exchange time for experience. It is up to each of us to figure out what that looks like. What do you want this trade to look like? How do you want to experience your life beyond what you have been exposed to and taught to date.

There is no right or wrong in the examination of yourself. In being born you have an amazing opportunity to evolve and grow. Your birth parents gave you life. The significant people in your life gave you what they knew. They gave you what they were taught and how they understood life . It is time to undo any impact from this that doesn't serve you. They gave you what they know and you add your own ability and perception and being to it. The invitation here is to gain wisdom from the experiences and drop the emotional charge and life limiting beliefs. It is yours to do, to evolve past them and to appreciate them for giving you the opportunity of life.

You are reading this because in your heart you would like to change your reality. You are not alone. There is every avenue open to you to do this. Gaining new knowledge combined with your determination, interest and will are a major part of your transformation.

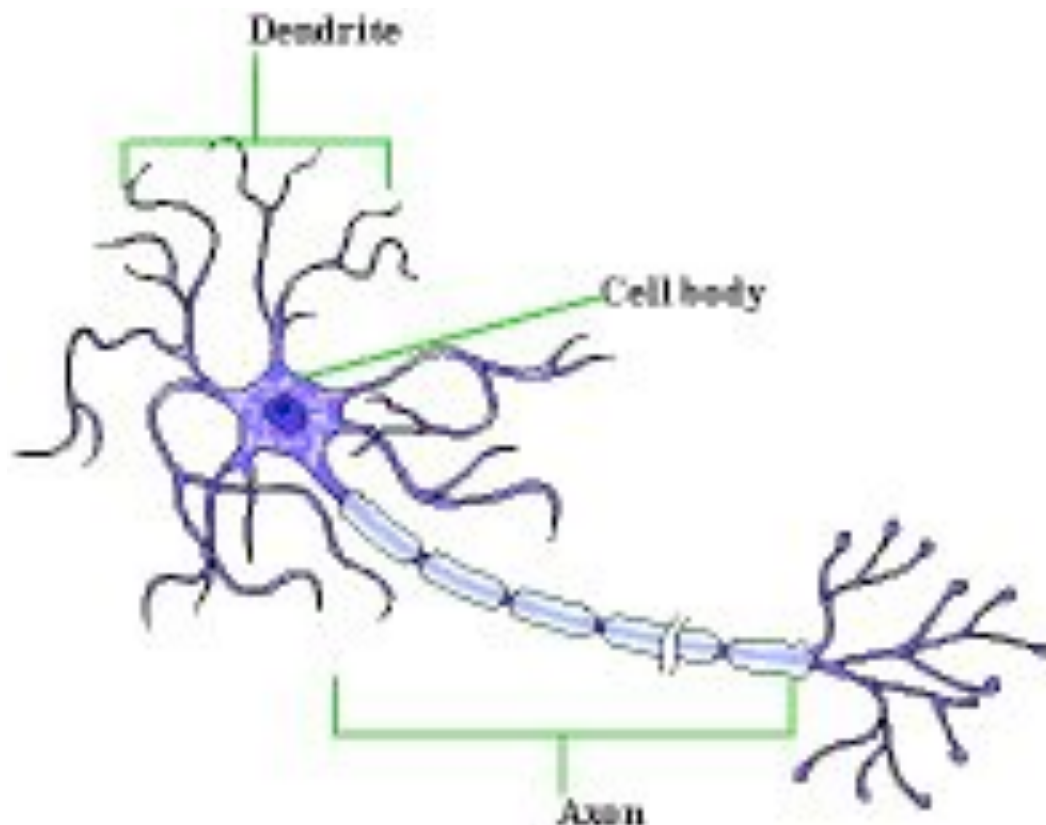
What is the Brain?

We have a beautiful and magnificent tool right here in our skulls. Did you know we are currently only using less than 10% of our brains capacity? Imagine what could be possible when we use more than that. If we are only using 5-10%, then who or what is controlling the rest?

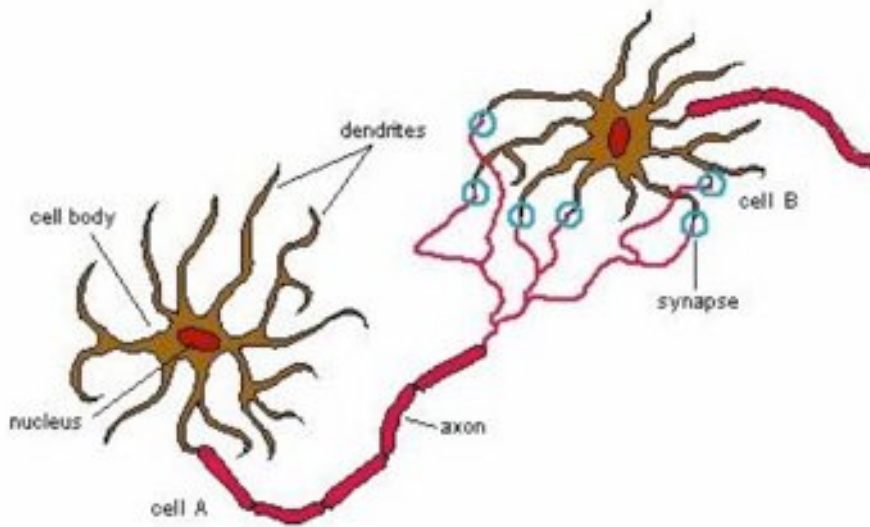


Simply put, the brain is a network made up of billions of neurons that fire and wire together to give us our experience of life. When we have a thought, the message is sent through the brain and then relayed to the body. This gives us a sense of feeling; it validates us and makes us feel alive. The brain is the tissue that allows us to understand and know ourselves. It allows us to relate, to feel, to interact with our environment and to experience life. All we are ever doing is trading time for experience. It is up to us what this trade looks like.

NEURON

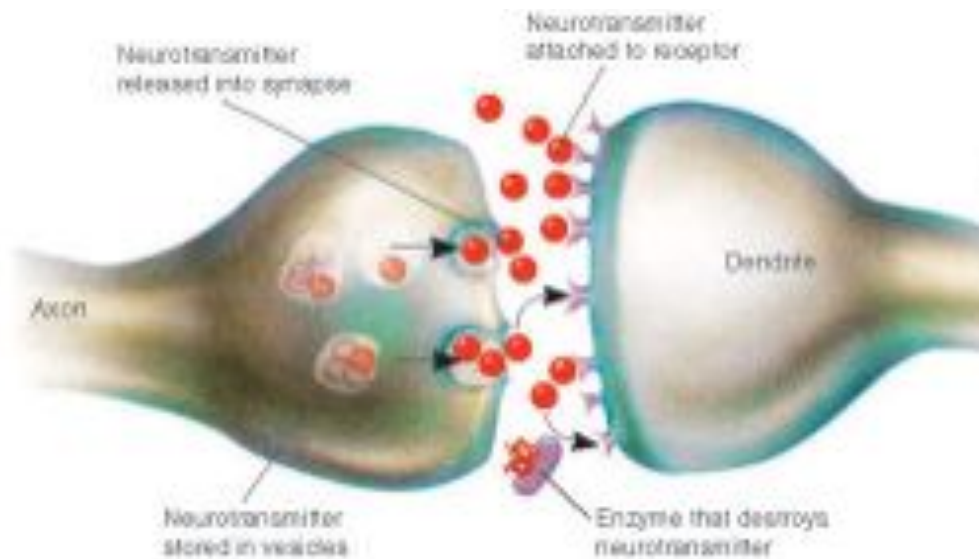


One neurons attaches to another neuron in over 50,000 places.



The moment we have a thought, an electrical charge flows along one neuron and then releases a chemical, called a neurotransmitter, at the synaptic connection to the next neuron. This neurotransmitter relays the information across the gap, which in turn activates the next neuron to fire the information electrically down its axon and then chemically to the next neuron. This process continues until the information reaches its destination. The information is then relayed to the limbic part of the brain, which creates the chemical messengers that travel through the body to create feeling. For example, when a person has a thought such as “I made a fool of myself when I said that comment”. Memories related to this thought will all fire off at the one time. These could be memories of previous experiences when the person believed that they were being judged by others or times when they judged themselves socially. When this occurs a huge web of neurons will be firing off in the brain. All this information, thoughts , and decision are then relayed to the limbic system. This all occurs within a fraction of a second. The limbic system in this case will create just enough serotonin, dopamine and noradrenaline which are neurotransmitters that cause chemical reactions in the body to give a feeling of embarrassment.

`Synaptic connection between neurons



Several Interesting Facts About The Brain:

- It is made up of approximately 100 billion neurons.
- It consumes 20% of the body's energy.
- It weighs 2% of your total body weight.

Hebb's Law and Eric Kandel:

As far back as 1949, Donald Hebb was fascinated with how humans learn. He was most curious about what the building blocks and processes were. As part of his research, he coined what has become a very common phrase in psychology that, "Neurons that fire together, wire together". In modern psychology, this has become known as Hebb's Rule.

In the 1970's, another man named Eric Kandel provided valuable insight into the field of neural plasticity, continuing the work of Hebb before him. His research was on one of the simplest living organisms; a sea-slug called *Aplysia Californica*. He chose to use it because of the simplicity of its neural network and size of the neurons; their's only a few neurons compared to humans (about 20,000), and they're actually visible under a microscope.

What he found was that during the process of learning, neurons that were triggered as part of that learning process wired together more strongly. Kandel found that when a neural pathway was repeatedly fired off it strengthened its synaptic connection between neurons. When they poked the slug, the slug learnt to withdraw its gills. They noticed the synaptic connections had strengthened between the neuron responsible for withdrawing the gills in association with a poke. The neurons changed in the process of learning. The simplicity of the neural system of the sea slug allowed them to see this clearly. Kandel won a nobel prize for his great findings.

Aplysia Californica



So learning is the process of strengthening the connection between neurons. Remembering is when this relationship is kept alive. This relationship between neurons is developed through rehearsal and association.

Rehearsal: The repetition of a thought and action.

Association: The connection of ideas, thoughts, feelings, sensation to other ideas etc.

So the more we think a particular thought, the more strongly the neurons on the chain become wired. We are constantly either reaffirming current ideas or building on existing ideas and associations.

The stronger neurons are wired, the less attention it requires for it to fire off; this means that thoughts go on autopilot. This is great

when the programming relates to an activity that we do regularly like riding a bike or driving a car. Unfortunately, this is not so great when it happens over fear-based thoughts that create anxiety, stress, anger etc.

In essence, the brain can be compared to a computer; it doesn't discriminate between good thoughts and bad thoughts, happy or painful. It does whatever it is programmed to do. Whatever you practice and rehearse is what is wired more strongly. Also it is like a computer in that it is possible to rewrite the software and reprogram it. It is possible to override thoughts that act like a virus to the agenda of living your full potential.

There is an executive in you that sits overseeing the operating system. This executive has the ability to get the brain off automatic pilot and to direct and determine thoughts and experience. This is when life gets interesting. It is when you start doing this, you become the master-creator of your life. You take the vessel off automatic pilot and take back command of the 57 trillion cells in your body.

What's so special about your brain?

The brain has developed over millions of years, and even now continues to advance and upgrade itself. Out of all the species on Earth, the human brain is the most advanced. In comparison to other animals, this gives us a greater range of emotions, experience and awareness of ourselves. What makes human brains so special is that we are aware of time; we can imagine and project images into the future. We are able to simulate ideas in our mind and explore what the outcomes may be. The brain is constantly simulating ideas about the future based on information from the past.

This ability to imagine and project forward in time is our greatest gift but it can also be our greatest downfall. We can use this ability to imagine a great future; we can imagine that we will actually live it and make it happen. In our imagination we can dream up that great career, we buy that dream house, start that business, study that course, have children; the list goes on.

Equally though, we may use the same ability to imagine losing our wonderful house, our job, a family member; we may use it to see ourselves as incapable. To imagine such an awful existence is to live in a state of fear or anxiety of the future. It seems so real that we withdraw and move away from our living experience. We give up on things important to us and limit ourselves. Sometimes, what we fear seems so real that we can become highly distressed.

Throughout history some of our greatest revolutionaries on the planet used this ability to envision a new future to overcome great obstacles and opposition. We revere them as heroes and value their great achievements. They were able to hold onto their vision beyond the point where others gave up. To me, this is a key ingredient of success. They had faith in their vision and they put heart and feeling behind it. They focused on it so passionately until they made it into reality. They put actions behind their vision and assessed the value of every action compared to this vision.

Although sometimes it doesn't seem like it, one thing we do have control over is how we decide to view and perceive a situation at hand. As an example:

Person A & Person B have a motorbike accident in the prime of their life and they are not able to use their right hand. They require extensive rehabilitation. They can no longer do their previous job as a forklift driver so they leave their job.

Person A was angry at first, as well as deeply saddened and frustrated. They decided after some weeks that they wanted to move on with their life and return to feeling good. Person A decides that this is a great opportunity to retrain themselves, so they continue their rehabilitation on their hand and begin to study business management. Person A has always wanted to be a business owner and long dreamed of using their gift for dealing with people to manage their own transport company. After much adversity, determination and success they say that the accident was the best thing that ever happened to them.

Person B was angry at first, as well as deeply saddened and frustrated. Over the weeks they thought more and more about the accident and how the other driver could have easily averted the situation. They become increasingly bitter about

this accident and are frustrated they cannot return to their original activities. They feel very let down by their employer and caused conflict with management. Person B spends their days complaining and focusing on how difficult and painful the situation is. They attend their rehabilitation and don't feel like retraining in any other area of life. Life seems to be getting worse which is having effect on the family.

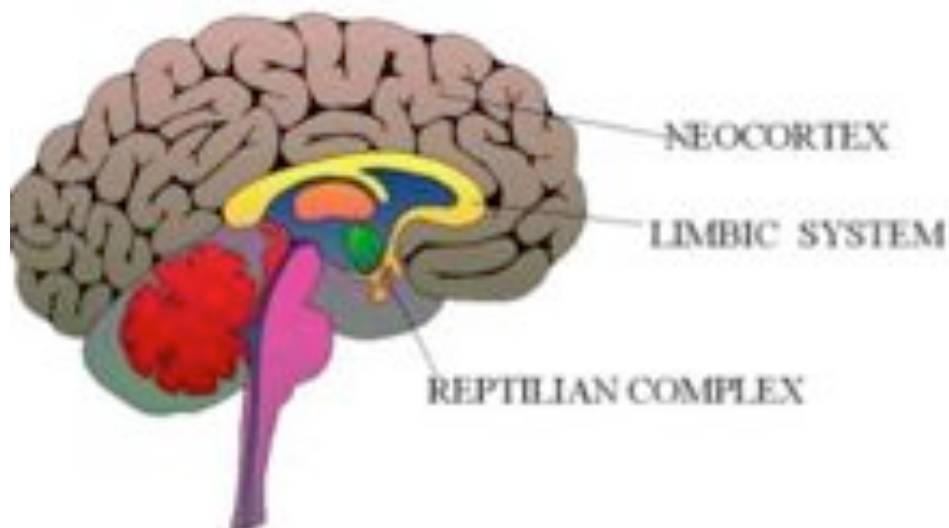
There are times in our lives we are Person A and times we are Person B; there is no judgement made on either. With awareness comes choice, and with choice comes freedom. The key is to be conscious of the choices that we are making and ensure that we are heading in the direction of our desire for happiness.

Sometimes it can feel like we're not in charge, that life simply happens to us. I hear people say sometimes, "I can't help the way I think, I just think it". Let me share with you more of the science behind how in fact it is possible to change the course of your thoughts and experience.

Our three brains

Did you know our brain is made up of 3 brains? From an evolutionary perspective, it's actually quite remarkable.

Diagram of the three brains



The Reptilian Complex:

This is the oldest part of the brain in evolution, it's over 5 million years old. It is responsible for keeping our heart beating and our bodies breathing. It also manages the flight or fight response when there is a perceived threat.

The Limbic System:

The emotional brain. This one is 1.5 to 3 million years old and evolved with mammals. This part of the brain automatically controls blood temperature, blood sugar, blood pressure, digestion, and hormone levels. This part of the brain creates the chemical messengers for the entire body as well as managing our emotions.

Whenever you have a thought, the limbic system creates what we call a peptide (chemical) that goes into the blood stream to tell the body to respond in a particular way. For example, if you have a thought like "That guy is going to attack me", then a peptide for fear or perhaps anger is created. This peptide makes its way into your blood stream and tells the cells to gear up for a fight.

In this way it triggers the bodies survival mechanism and prepares your body to fight by readying your muscles and getting your blood flowing. Blood moves away from the digestive systems and into the muscles. The muscles become prepared to strike or run.

The Neocortex:

This is the youngest part of the brain. It is about 250,000 years old and is folded in on itself so much that about 98% of it is hidden. It is this part of the brain that really sets us apart as humans. It holds all the personality, self-awareness, creativity, thinking, reasoning, planning, intellectualising, learning, remembering, analysing, verbal communication and executive decision making functions of the neocortex. It is because of the neocortex we have a conscious sense of who we are and our thoughts and memories.

The Neocortex



The frontal lobe

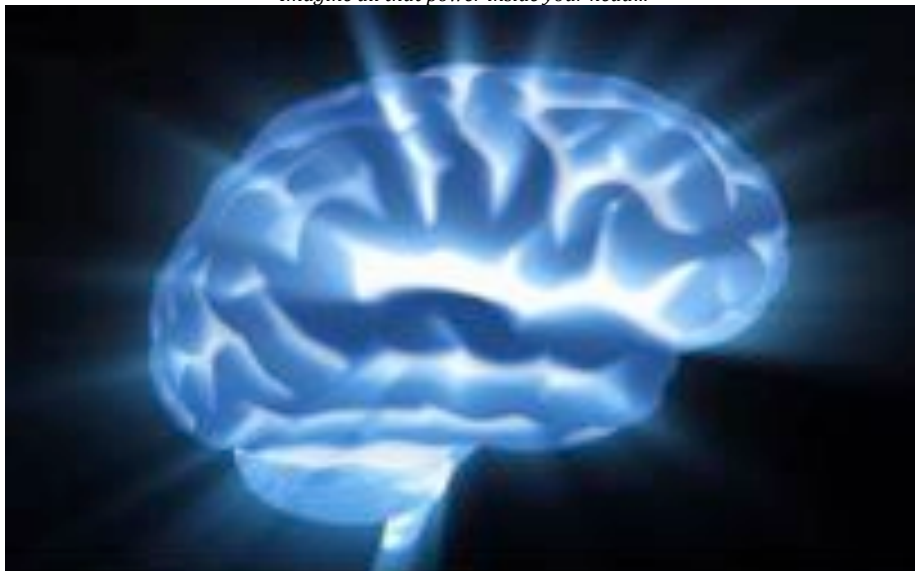
The frontal lobe is the part of the neocortex where the sense of I exists. It is where you gain insight and awareness of yourself and how you are being and feeling. It houses the CEO and makes executive decisions. It is the part of the brain that is involved with problem solving, planning, motivation, spontaneity and setting intention. It pioneers and directs changes in the rest of the brain and body. The frontal lobes is able to make your imagined thoughts more real than any environmental cue. It lowers your attention to the outside world. This can be great when you are breaking habits of thinking and feeling. Most of us have the experience when we are focused on imagining something that we are so far into our internal

world we no longer relate to the environment. We have effectively turned the dial down on our senses. A great example of this is when you are involved in creative problem solving, or an artistic venture. Hours can go by without any awareness of time. The frontal lobe can turn the dial down on the neurons firing off in all other parts of the brain such as your association centres (thoughts of identity), sensory centres (how you feel in space), and your motor senses and parietal lobes. Because the frontal lobe can turn down the rest of the brain's information at will, it is able to make imagined thought more real than memory and your experience with the environment you are in. Therefore engaging the frontal lobe is key to rewiring the brain and developing new emotional habits. The frontal lobe is crucial in the awareness of a current experience, visioning the new, deciding to go down a new path, rehearsal and practicing this new way of thinking and acting.

The Brain and the Mind

The mind is the brain in action. When many parts of the brain are firing off together we have the experience of consciousness; an awareness of many thoughts feelings and emotions all occurring at once. We are aware that we are greater than any single thought, that we are the experience of all our thoughts combined.

Imagine all that power inside your head...



One of the keys in moving through change is to be aware of the thoughts that are firing off at any one time. Awareness is like shining a light on a particular pathway. It isn't so relevant how the pathway

or thought got there in the first place, it is more relevant to answer the question, “Does it serve you?” If it doesn’t, then it’s time to change through new awareness and new choices. By changing our thought paths we create new experiences, and with new experiences and new emotions we upgrade the model of our thought path and we are no longer the same person we used to be when we started.

Even as you read this the brain is constantly wiring new networks and pruning old networks back. Every single time we build on information and knowledge we are rewiring the brain. Just by reading what you have been you are already a different person, with new connections having already been made. Exciting, isn’t it?

Change

It helps to understand how the neocortex and the limbic system work in order to answer the question of how does change occur.

The first aspect of this is when we have practiced a thought too regularly. By simply believing the thought to be true and thinking it over and over again, our brain becomes what we call ‘well wired’. When the brain is ‘well wired’ it requires very little attention to fire off because it has many neurons and neural pathways all linked together.

A neural network



The other aspect to why change is so difficult is associated with the body developing a habit or addiction to emotions. Thoughts that you might have in the neocortex trigger the limbic system to produce what I introduced earlier as a peptide. This goes into the blood stream and travels to the glands and the cells.

Peptides and hormones are the communicators between the brain (and Central Nervous System) and the body. They enter cells through what we call receptor sites. Receptor sites work as gatekeepers, and will only allow chemicals into the cell that fit into it; exactly like a lock and key system.

This means that if we have a particular thought regularly then the limbic system produces a lot of a particular peptide. The cells then adapt to the amount of that peptide being produced by creating more receptor sites to manage the load. Once the cell has more receptor sites for a particular peptide or hormone it becomes dependent on receiving it.

If one day you decided to no longer think those thoughts and no longer produce the associated peptide, the cell will, like with any addiction, try to get the hit. It will send messages to the brain to prompt it to send the peptide. Without intervention, this will cause a cascade of chemicals to pump through the body.

The part of our brain that regulates the automatic distribution of chemicals is the hypothalamus. When the hypothalamus notices the usual levels of a chemical dropping in the body, it attempts to fix this by releasing more of that particular peptide or hormone. Unfortunately, this means that when you're on automatic pilot, if you are used to a certain level of stress the body will continue to pump out that peptide with out you being aware of it.

In order to overcome this process, we have to think and act greater than the urge itself. We need to make a clear decision to create a new thinking and feeling state. All this requires getting off automatic pilot. This is one of the values of mindfulness and awareness practices.

Why does the fear response seem so automatic?

Whenever we experience change there's always a certain amount of fear associated with it. Sometimes, when this fear gets too much, we start to have problems. The reason why we have an automatic fear response is because of the part of the limbic system called the amygdala.

This part of the brain is constantly on alert for a threat. It is, to your brain, what a smoke detector is for a house. Whenever there is a perceived threat the amygdala shoots a message straight to the reptilian brain that coordinates the survival response. We call this the fight or flight response, and it prepares us to either fight or run away from a threat. You will no doubt recognize when this is happening; your heart rate increases, your muscles feel tense, and you breathe a little heavier. These are all common signs of this response.

Because it is so automatic, this whole process bypasses the neocortex. It doesn't pass through our conscious awareness. It is an immediate, knee jerk reaction that feels like it is out of our control.

This means that when we experience something traumatic, the amygdala may become very sensitive. It may start to activate even when there is no threat, simply as a precaution to protect ourselves. However, you can, through conscious effort, learn to regain control and prevent your level of fear from rising too high.

Who is the boss?

You might be questioning by now whether you are in control of your body or if your body is in control of you. The answer is both. It is a reciprocal relationship where the part in control can and will change. For example, you will no doubt be aware of moments when your emotions take over and you feel like you have no control, and yet there would be moments where you feel like everything is within your power.

Getting the mind out of the body is the biggest part of the change process. That means getting your thoughts and feelings off automatic pilot. It means becoming conscious of the thoughts and

feelings you have regularly and intervening on the automatic process as you choose. It means overcoming emotional habits and addictions.

You become the master when you determine how you want to live and experience the world. It happens when you change how you feel, and steer the thoughts you have regularly to get yourself off your old automatic pilot.

How does the brain rewire?

Modes of thought are continually reaffirmed or remodeled through experience and learning new information. We take the new information and adjust what we think. When we adjust what we think, we adjust how we feel.

As I have said before, the more we think a thought, the more well wired it becomes. Eventually, this becomes programmed in our cerebellum and forms our sense of identity. This is usually after we have practiced a way of thinking and feeling for some time.

As you will be aware, nothing is set in concrete. Who you thought you were and how you identified yourself at age 10 is likely to be very different to how you felt at age 15. As you get older and develop so does your identity. That doesn't make your previous identity wrong; it simply means that you have developed and continued to remodel yourself.

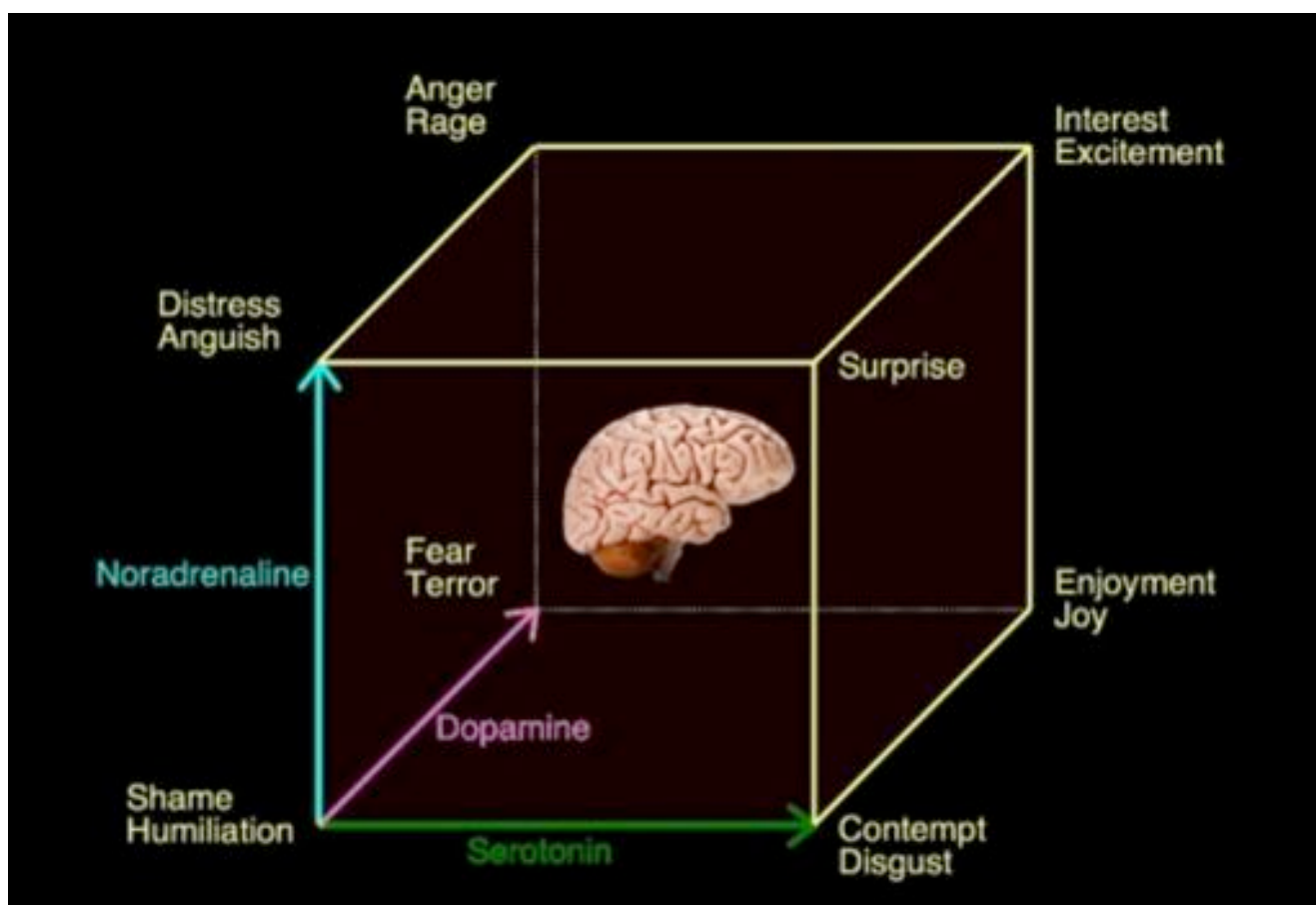
It is this process that, over time, eventually rewires our brains into new modes of thought and new personal identities.

A key to rewiring the brain is engaging the gifts of the frontal lobe in the process of change. By simply asking the question "I wonder what it would be like if I felt differently than they way I do right now?" The frontal lobe loves new and novel. It loves pulling information from various parts of the brain to remodel it into a new experience. So when you ask a novel or new question, it will create an image of what life could look like...What would it look like if I was fit? What would it look like if I was healthy? Happy? Calm?. The frontal lobe is the CEO, it directs the rest the brain and therefore the body. The rest of the brain doesn't know the difference between what is real and what is imagined. So by simply asking the question, and imagining the answer, the rest of the brain believes it to be true. The

limbic system then creates neuropeptides that communicate with the rest of the body the new state of feeling. This in turn creates new proteins and chemical reactions in the body. The cells in the body start to learn and get familiar with a new state of being. This wires the brain for the new state of being and upgrades old models of thinking. The more that we choose and practice this, become more familiar and learn about this new state, the more it becomes our automatic. At this point it becomes habitual that is when it now becomes part of our identity. So it is very possible to change any habitual thinking and emotional state with awareness, mindfulness, choice and action.

The following diagrams give you an indication of the chemistry behind many emotional states. The key is becoming more and more aware of how you feel habitually and what your thoughts are behind these feelings. Naming the chemistry increases your level of awareness of what is happening in the body and therefore what you are aiming for.

The Chemistry of Emotion



Basic emotion	Serotonin	Dopamine	Noradrenaline
Shame / humiliation	Low	Low	Low
Distress / anguish	Low	Low	High
Fear / terror	Low	High	Low
Anger / rage	Low	High	High
Contempt / disgust	High	Low	Low
Surprise	High	Low	High
Enjoyment / Joy	High	High	Low
Interest / excitement	High	High	High

Getting in touch with more positive emotions such as kindness, compassion, gratitude, (oxytocin) actively turns down and shuts off the amygdala. Oxytocin is hormone in the brain and heart which plays a part feelings of love, bonding, attachment and sexual intimacy . When we are no longer so actively engaged in the fear response we are open to a range of more fulfilling experiences. We increase our levels of trust, love etc. Because we are less caught up in the survival mechanisms, we become less focused on ourselves and more about others.

What is mindfulness?

Mindfulness is simply awareness. Awareness in it's true sense has no judgement, no agenda, makes nothing right or wrong, it is fully objective. We can bring awareness into any moment in our life and in doing so we become present in our experiences. Awareness allows us to gain more information in any one moment. We are able to more fully see, hear, smell, taste, feel and relate. Have you ever noticed that in some moments you can do several actions and not remember....driving from A to B ...hmm how did i get there?... As we get older and do less new activities more and more of our life experience goes on automatic

pilot. This means that it requires very little of our attention to do those things and in doing so we relate less and less to the experience.

Remember what it is like doing something for the first time? Isn't it beautiful watching the excitement and fun of a child as they go through many first experiences? Mindfulness brings us so fully into our experience, in this moment that we are able to experience life with renewed depth, and fullness. This moment is the only truth we have to relate to. Any experience in the past is simply a memory, and future hasn't occurred as yet. Awareness in this moment is the doorway to creating a life of health, happiness and well-being.

Why practice mindfulness?

Through the practice of mindfulness you are able to gently guide yourself out of any thought path or emotional charge you don't want to experience. With mindfulness present you will firstly notice that your thoughts are stuck on a particular thought pattern. The noticing guides your attention back to your desired focus.

Mindfulness assists you to notice and observe without judgment what you are experiencing in the present moment. This awareness enables the frontal lobe to communicate directly with the amygdala to turn it off. By simply noticing you are safe in the present allows this part of the limbic system know that there is no perceived threat. This switches off the fight/flight response therefore reducing anxiety and stress symptoms. Noticing safety has great effects in reducing the symptoms of trauma and PTSD.

Mindfulness allows you to become aware of when you have fallen into habitual thinking and emotional patterns. It allows to gain more in-depth understanding of the thoughts that underlie your feelings. Often people say they don't know why they feel a certain way, they just do. Training awareness makes it clearer what is creating the feelings and emotions. With the intention and decision to retrain your thinking, this awareness allows you to direct your thoughts towards how you would like to think. This in term wires the brain in a new direction until this now becomes the thinking and feeling habit. For example if peace and calm is your goal, mindfulness will

gently bring into your awareness when you are stressed and anxious. It will allow you to see what thoughts create the stress. Is seeing this you have room to challenge and question it. Are you really unsafe? Will the world end if you are late? This awareness will be the cue to train the body to breath calmly, experience peaceful emotions and think well-grounded thoughts in the present moment.

There have been several studies now indicating the benefits of mindful practice. One study published in 2012 indicated that after a simple body scan technique participants with chronic pain reported significantly less pain and more perceived ability to manage the pain in a social setting than those who had not practiced mindfulness. There are also several studies that indicate that mindfulness improves health conditions and immune function.

Several studies have found that mindful based practices activate both sides of the brain's hemisphere. This aids in improving emotional regulation and reducing stress. It also improves performance outcomes, memory and attention. In a study completed at Harvard University in 2011, researchers found that mindfulness meditation practices completed one half hour per day over an 8 week period resulted changes the structure of the brain. They found that the meditators had more gray matter in several areas of the brain including the hippocampus region of the brain. They found the areas of the brain that changed were related to emotional regulation, empathy, compassion, taking on others view points and introspection. Other areas affected related to remembering the past and imaging the future. An earlier study found that meditation practice reduced the concentration of gray matter in the amygdala. This is the region of the brain associated with fear , anxiety, and stress. They found that reducing the gray matter resulted in less stress and anxiety.

So there are many avenues for developing a healthy happier existence and changing the patterns of the brain. The brain is very malleable and will change in the direction of what you are interested in and what you practice. Mindfulness is key for directing the brains' innate ability to heal itself. While awareness or observer has no agenda of itself, it does allow greater levels of conscious awareness. From the perspective of a greater consciousness many of life's problems and obstacles fall away.

“ You can not solve a problem from the level of consciousness that created it” Albert Einstein.

The key thing to remember is that

“What you think and do is who you become”