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Tunnel Vision Effect (TVE)

Dr. Robert W. Lebovits, PhD
Dr. Gerard S. Meyer, PhD

https://mindfocusedcoaching.com/

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What is TVE?

- **T**unnel **V**ision **E**ffect is a specific kind of combination of physiological & psychological stress:
  - Peripheral vision loss with retention of central vision, results in constricted circular tunnel-like field of vision
  - Physiological and Psychological
  - Once you are in **TVE**, you do not feel it, so you cannot get out
  - Impacts our everyday lives in both big and small ways
  - Caused by Fight or Flight, and all other conditions on next page

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What causes TVE?

- TVE is the result of a mental and emotional hormonal discharges.
- TVE is a Physio/Biological condition with psychological consequences:
  - Stress
  - Fear
  - Panic
  - Polarization
- Can have lasting consequences like Post Traumatic Stress Disorder (PTSD)

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Physiology & Biology of TVE

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Physiological Triggers:

- Sympathetic Nervous System is activated by stress
- SNS causes several different hormones to releases which can put the body into fight or flight mode
- Fight, Freeze or Flight mode can lead to TVE, (as well as all conditions listed before)

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Physiological Consequences:

Vision:

- Ciliary muscles surround the lens of the eye; contract instead of relax for optimal focus
- Adrenaline causes a somatic reflex in the ciliary muscles
- Muscles contract thickening lens for distant focus almost eliminating all near focus
- Reduces Field of vision and increases pupils dilation to let more light in

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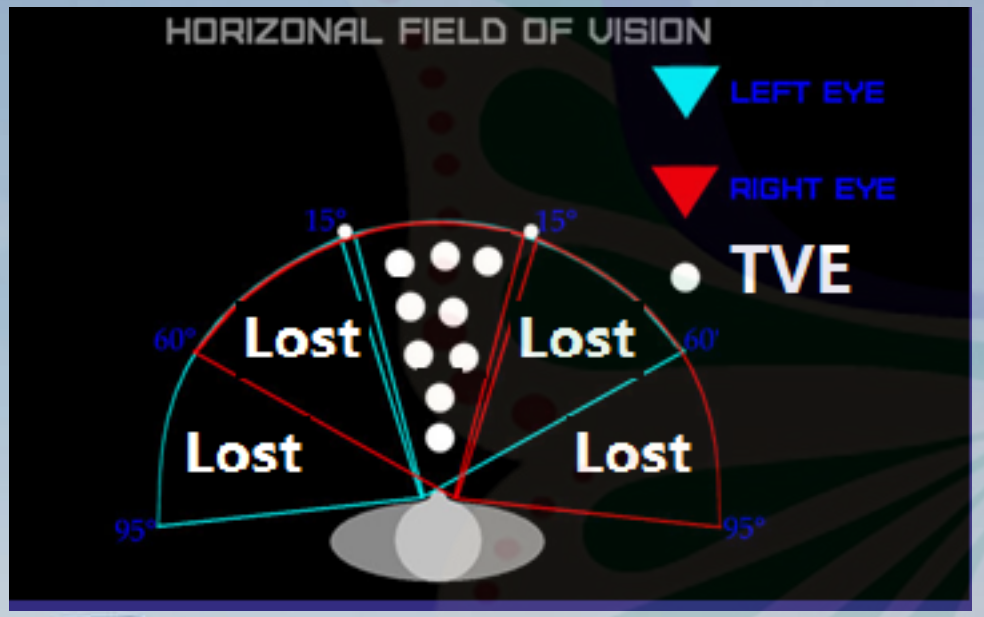
Lost of Horizontal Vision with TVE

Physiological Vision

- Cortisol effects perceptual error detection blocking visual input from being processed by visual cortex.
  - The information is being seen, but just being seen as important and therefore is not given the same attention as what is in front of the person.
  - 20-30% loss of peripheral vision (with TVE)
- On average humans have a 190 degree total of horizontal vision. When the sympathetic nervous system is activated the degree of vision goes down to 57 degrees (with TVE).

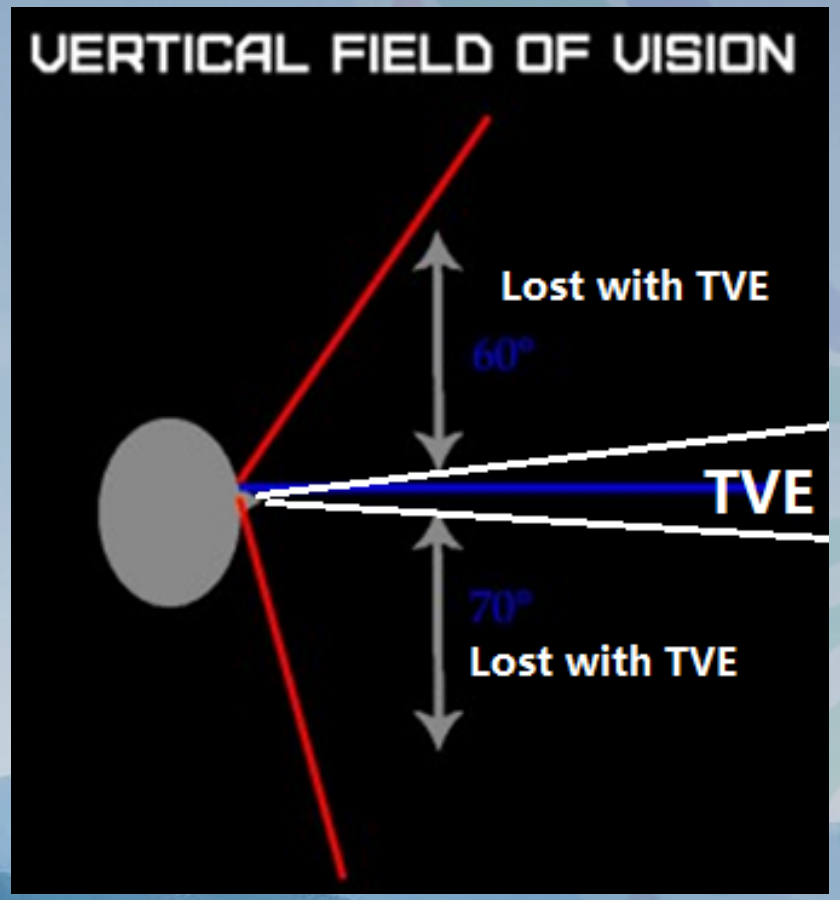


© 2015

Lost of Horizontal Vision with TVE

Physiological: Vision

- Vertical field of vision averages about 130 degrees. When the sympathetic nervous system is activated, the top field of vision can be reduced to as little as 18 degrees while the bottom can be reduced to 21 degrees (with TVE).



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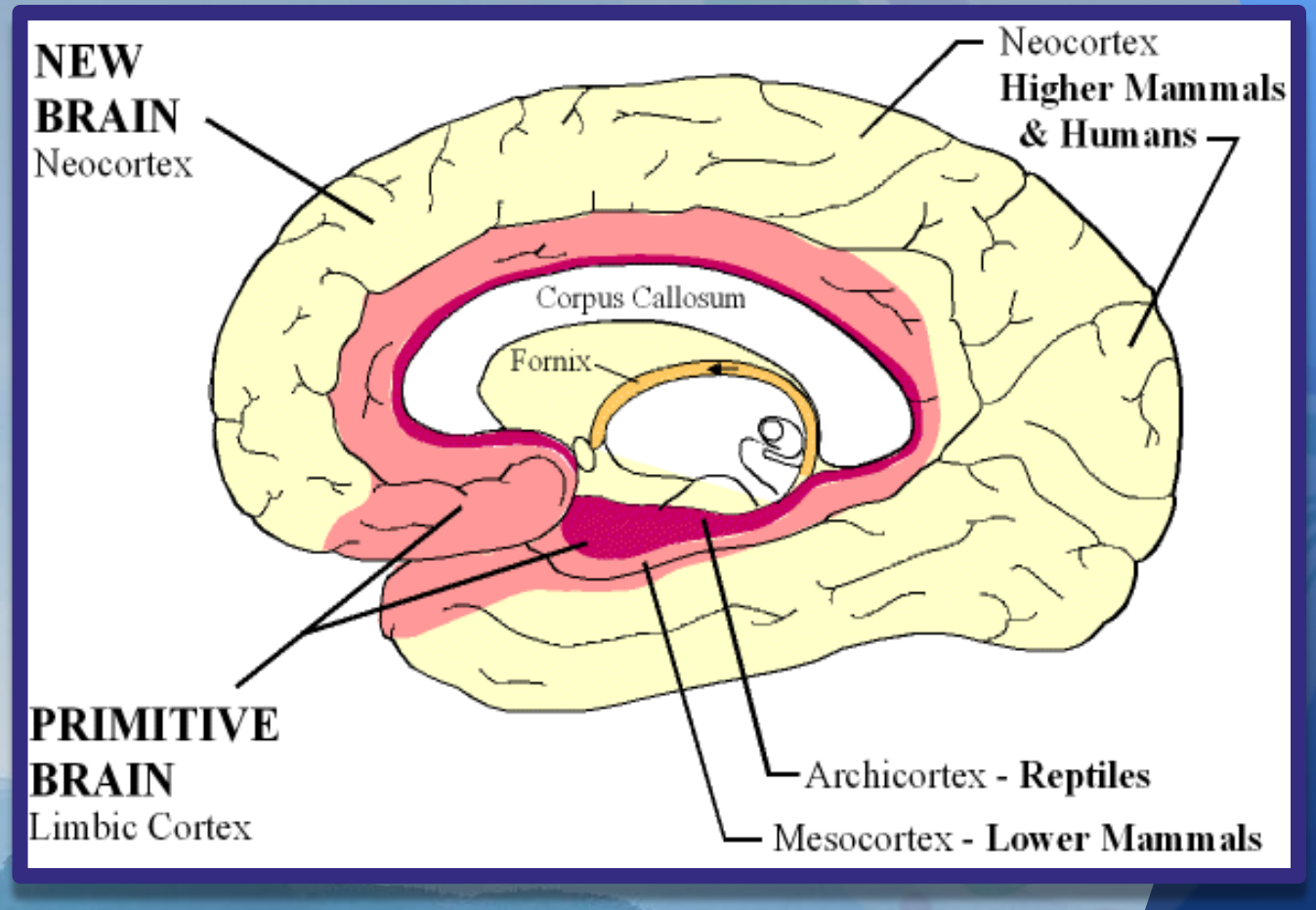
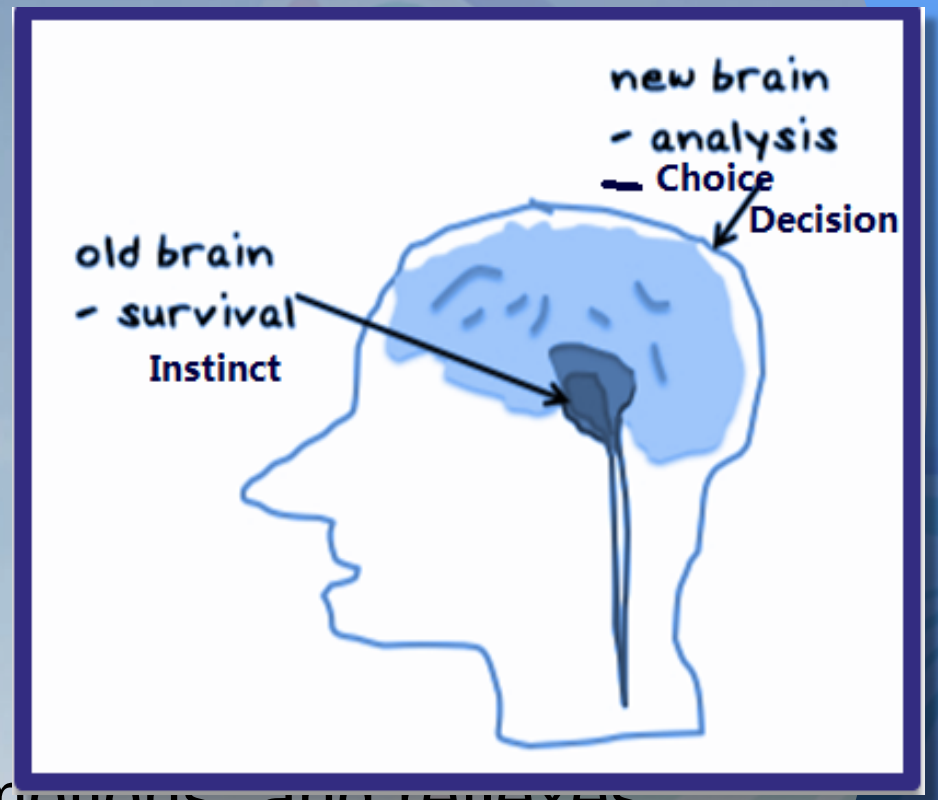
Old Brain vs New Brain

- Old brain (also known as primitive brain) is a combination of the reptilian and limbic brain
- New brain is the neocortex



Old Brain for All Mammalians **(Humans Too)**

- Reptilian brain
  - Cerebellum
  - Brain Stem
- Limbic Brain (Midbrain)
  - Hippocampus
  - Amygdala
  - Hypothalamus
- Responsible for: Breathing, instinct, emotions, and reflexes



All mammals have only three innate response mode to alarming events:

But only humans can chose an alternative to not act that way!

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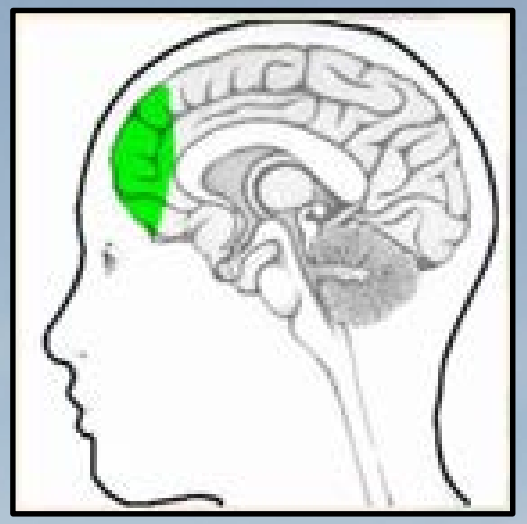
Fight - Flight - Freeze

- Primacy of frontal lobe cortex function over forebrain, impulse-driven reactivity.
- Animals are constrained by “fight or flight”
- Humans posses “new brain”, cortical reasoning to guide emotions.



Reason Vs. Emotion

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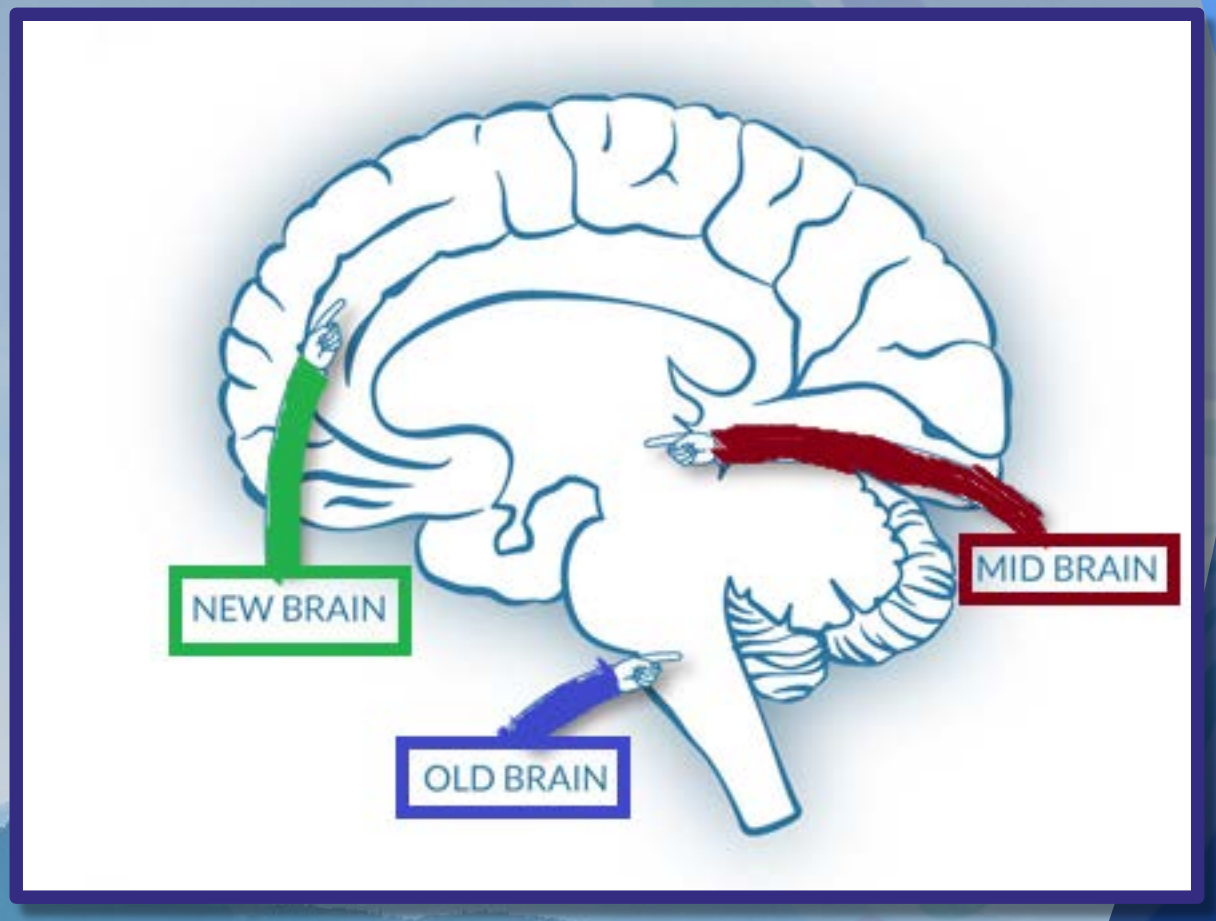
New Brain

- Differentiates humans from other mammals
- Neocortex
  - Right and left lobe
  - Should control but sometimes not (TVE)



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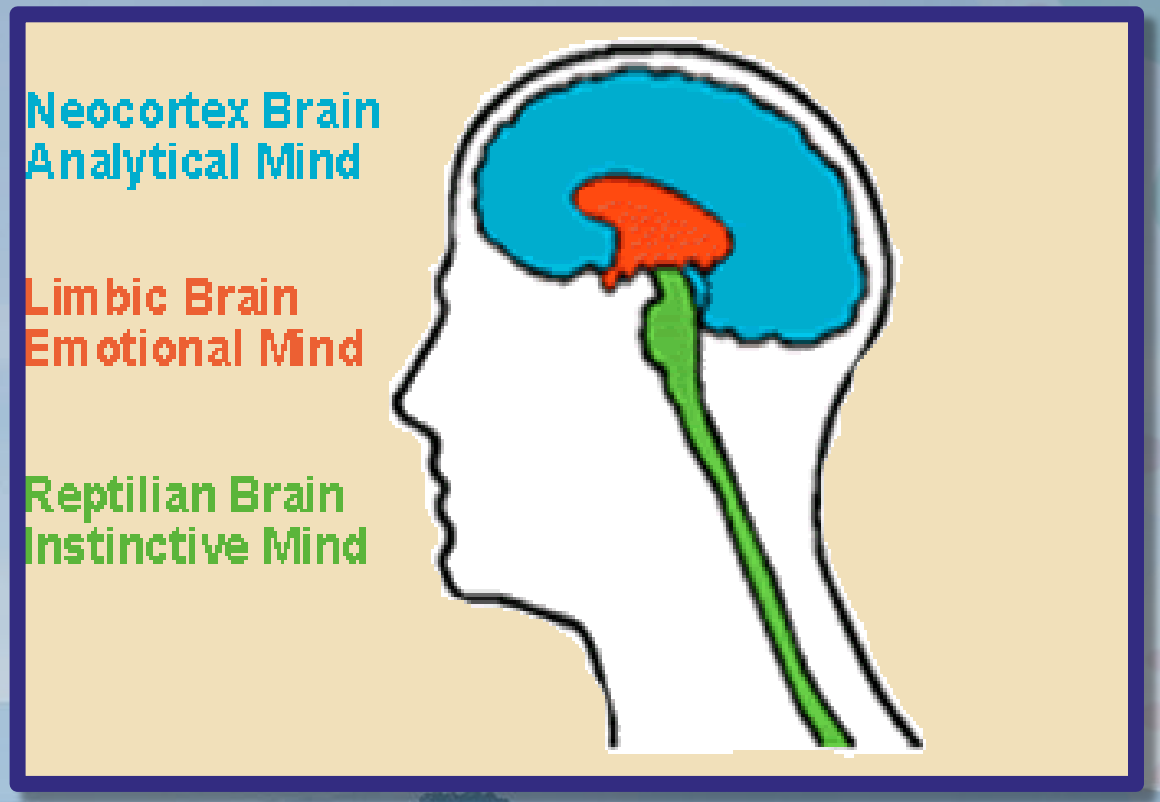
New Brain

Forebrain

- Metacognition
- Logic
- Empathy
- Art
- Sociability
- Consciousness



Cortex = Reasoning, Annalysis, Choice and Priorities

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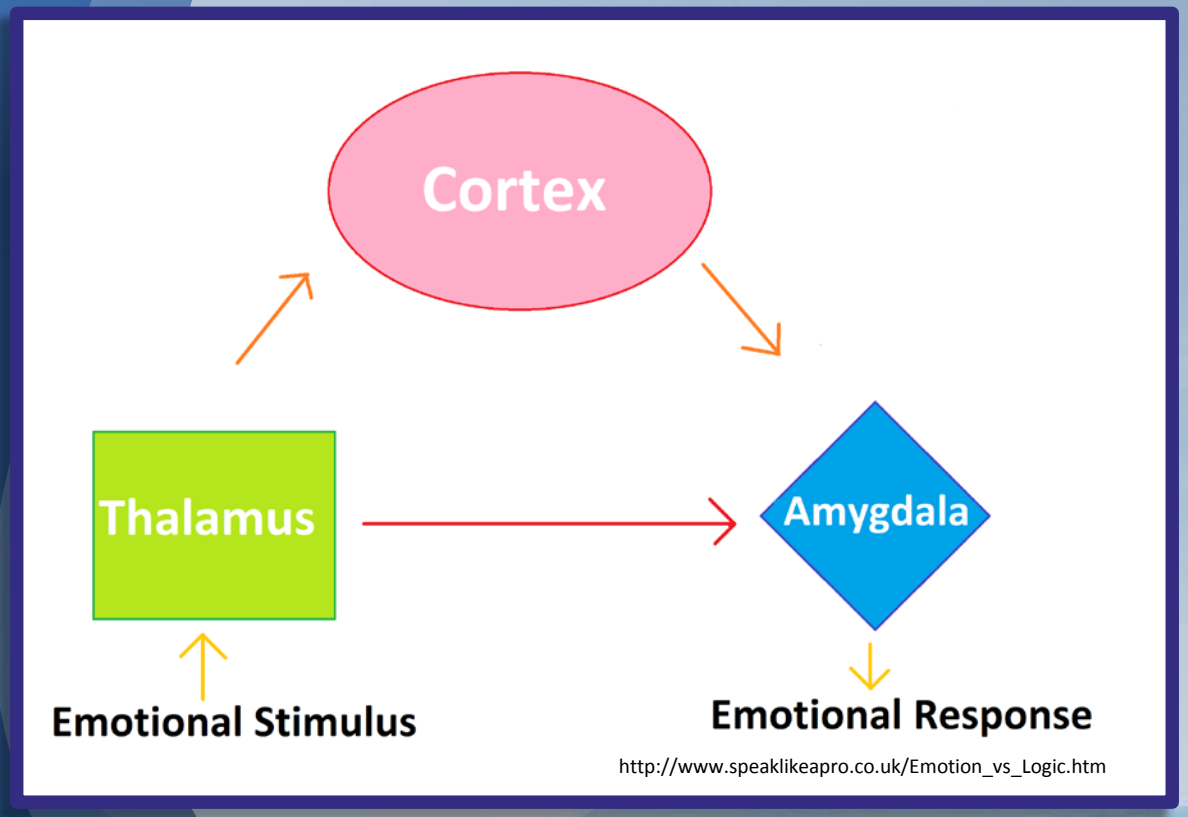
How does this pertain to TVE?



- The New brain causes an emotional stimulus such as fear to go through three parts of the brain: Thalamus, Cortex and Amygdala.
- When in TVE, or in extreme situations of stress, freeze, fight or flight kicks in and the brain reverts back to the limbic brain and surpasses the cortex, ridding the emotional response of any logic or reasoning

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SPIDER !

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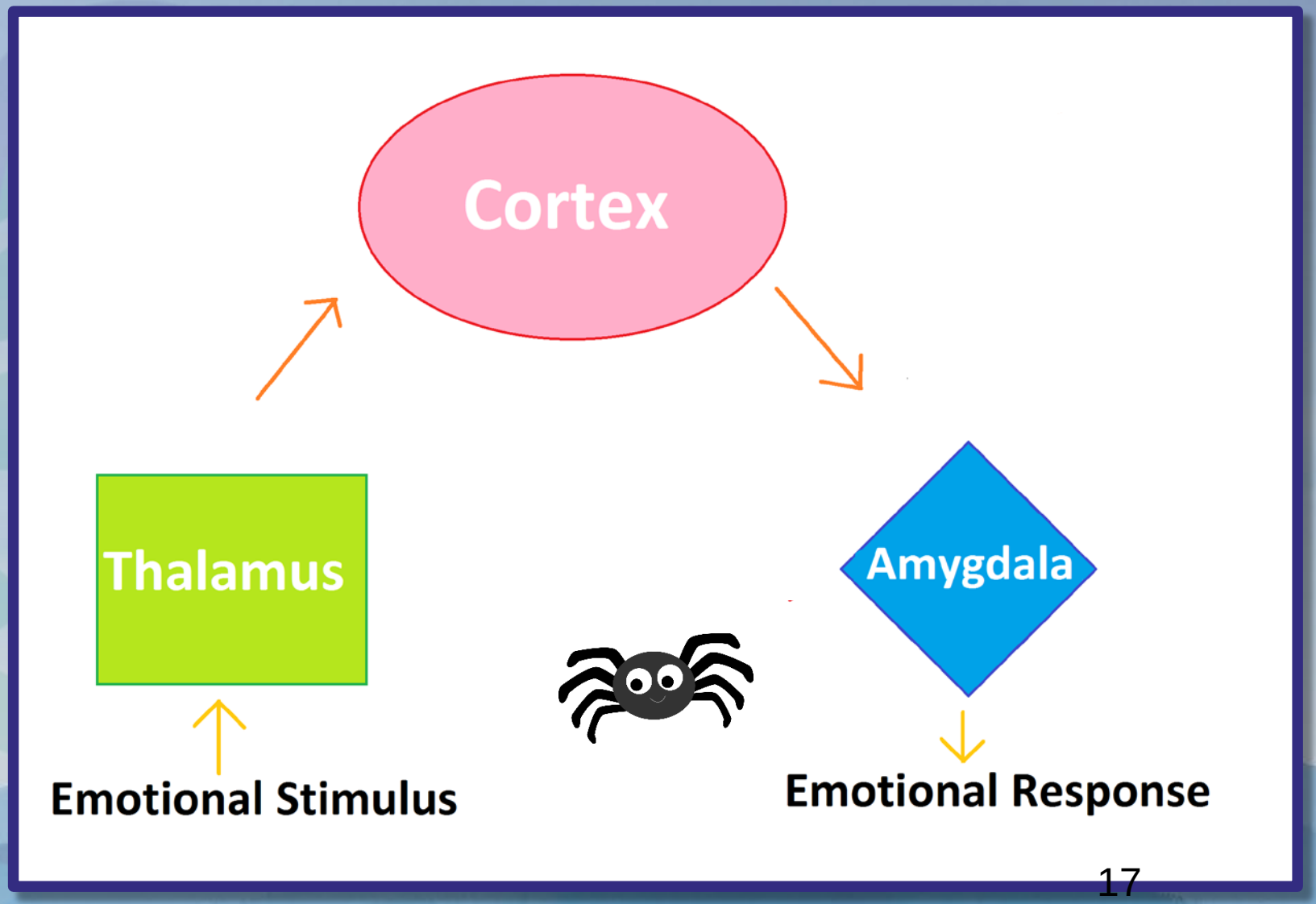
SPIDER !

Fear response

- **New Brain**
  - **(Human Brain)**



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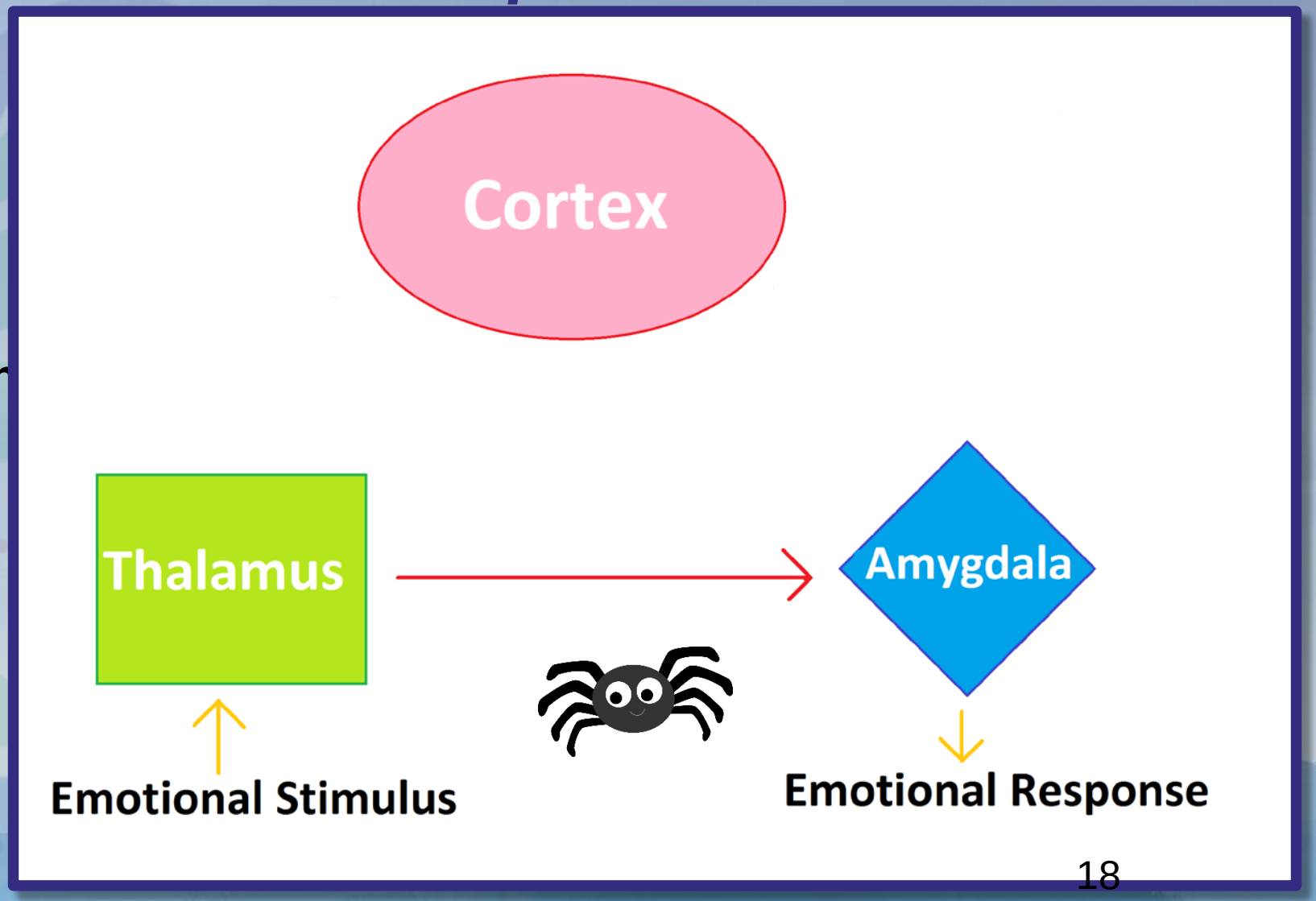
SPIDER

Fear response!

- **Old Brain**
(Reptilian Brain
-



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Physiology of Close Combat

- Tunnel vision, auditory exclusion, the loss of fine and complex motor control, irrational behavior, and the inability to think clearly are byproducts of combat stress
- SNS is activated when the brain perceives a threat to survival, in which it releases stress hormones
- Arterial pressure and blood flow is increased to the large muscle mass while vasoconstriction of the minor blood vessels at the end of appendages occur.
- Heat rate increase from the average 70 bmp to more than 200 bpm in less than a second.
- Heart rate will stay at the increased rate until the threat is no longer present and the parasympathetic nervous system is activated

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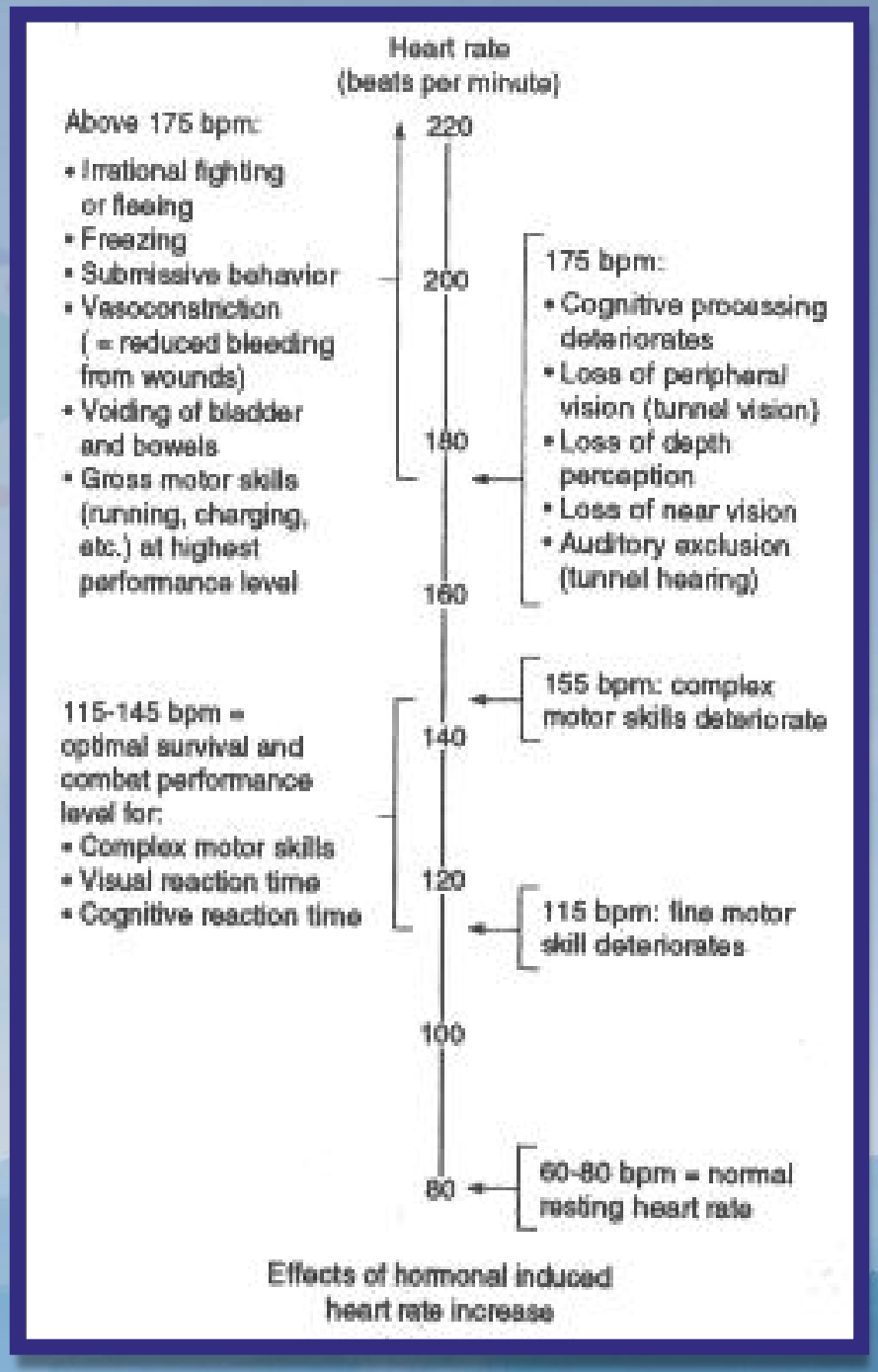
175 bmp + Old Brain mode



115-145 bmp New Brain full capabilies

Psychomotors capabilities important declinining when heatbeat increases

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What Happens When You Are in TVE?

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Learning to avoid Tunnel Vision

https://www.youtube.com/watch?v=J4OF6gNtoIE&feature=player_embedded

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CAN'T SEE THE WHOLE PICTURE

- You only have a narrow field of view and can no longer see the whole picture. You can only see the problem and not the possible solutions !

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What Happens When You Are in TVE?

- Heart rate increases to 175+ bpm
- Adrenaline is released
- Freeze, fight or flight (Old Brain)
- Peripheral vision becomes obsolete
- Field of vision narrows to only focus on the problem
- Hyper focused on the issue rather than the solutions
- Cannot STOP being in TVE whilst in it

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Examples of TVE

- Driving in a busy part of town whilst on your cellphone. A car pulls out in front of you, where do you look?

You incorrectly look at the car pulling out (**the problem**) rather than where you should move your car (**the solution**) to avoid getting hit.

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Common Signs of TVE

- Having an intense focus on a visual stimuli that results in screening out of peripheral sights and sounds
- Irritation when anything interrupts your focus
- Unwilling to accept suggestions to change your plan
- Refusing offers for assistance
- Reluctant to take breaks from work
- Confusion with what is going on around you
- Being told things by others that don't make sense

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Remove all the noises to focus on the significant details

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PTSD

- **According to the DSM IV the criteria for PTSD is as follows.**

- A. Person has been exposed to a traumatic even in which the person both experienced, witness or was confronted with an event or events that involved or threatened death or serious injury and the response involved intense fear helplessness, or horror
- They have reoccurring thoughts or dreams about the event which causes extreme distress as well as any type of stimuli that reminds them of the event causes physiology and psychological symptoms
- These disturbances cause clinically significant distress or impairment of functioning

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PTSD continued…

- Acute: Symptoms > 1 month but <3 months
- Chromic: Symptoms > or = to 3 months
- Delayed Onset: Onset > or = to 6 months
- Number of factors impact it such as if you were directly exposed, the number of sense effected and whether of not one was injured physically
- **TVE** is seen as combat stress which occurs within 2 days of the event and is before acute PTSD. Repeated **TVE** can cause PTSD
- Found that people not injured physically in a traumatic event are more likely to experience PTSD because they are not focused on recovering

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Examples of TVE not only about visual cues

In the midst of taking an exam that you have extensively prepared for, you feel like you are doing very well. You finish the exam before everyone else and had no questions that you did not have an answer to. When you get the exam back a week later, you got a less than satisfying grade. How can this be an example of TVE?

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False Positive TVE

- Cannot perceive well neither problem nor solution
- Went through the exam and was focused on how well you were prepared and how well you were doing that...
  - you had tunnel vision and did not notice small details or tricky wording

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Can you think of a time you have been in TVE?

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Enabling Research to Develop:

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Teaching counter-intuitive skills

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Video

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Most MFC research results arose from $20M R&D conducted by Dr. Meyer at Carnegie Mellon Driver Training and Safety Institute (including $12M Federal grant attributed by U.S. Congress)

Development and implementations were conducted in controlled clinical therapy environment for general audience

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Early Highways

Small amounts of traffic then:

- Less Powerful Vehicles
- Less Distractions
- Less Stress
- Less Accidents

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Present Highways

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Saturated amounts of traffic now:

- High Congestion
- High Distractions
- High Stress for the Road
- High Stress for the People

= **High Accident Rate**

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Tunnel Vision Effect (TVE):

Peripheral vision loss with retention of central vision, which results in a constricted circular tunnel-like field of vision

TVE on behavior caused by:

- Fatigue
- Anxiety
- Impulsivity
- Stress
- Obsession
- Noise
- Fear
- Inattention
- Physical Overload
- Mental Overload

- **Unnoticed TVE → human errors + preventable accidents**

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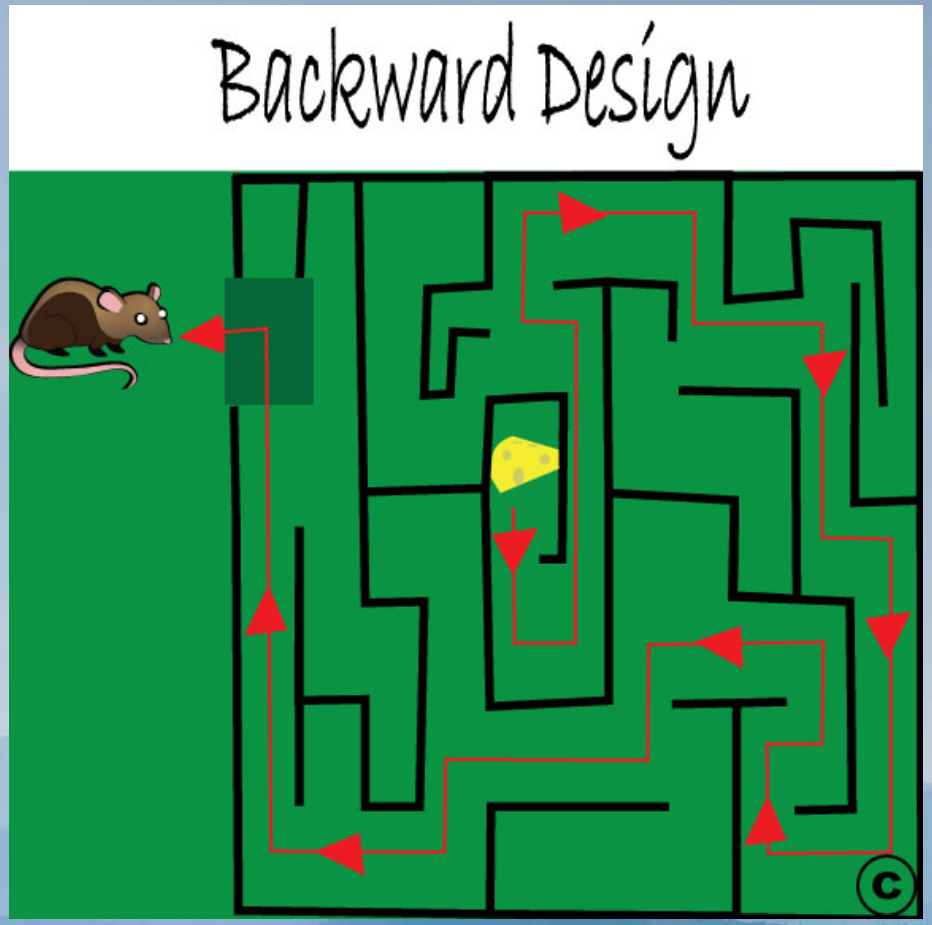
MFC: a backward design expert system where we begin by the end!



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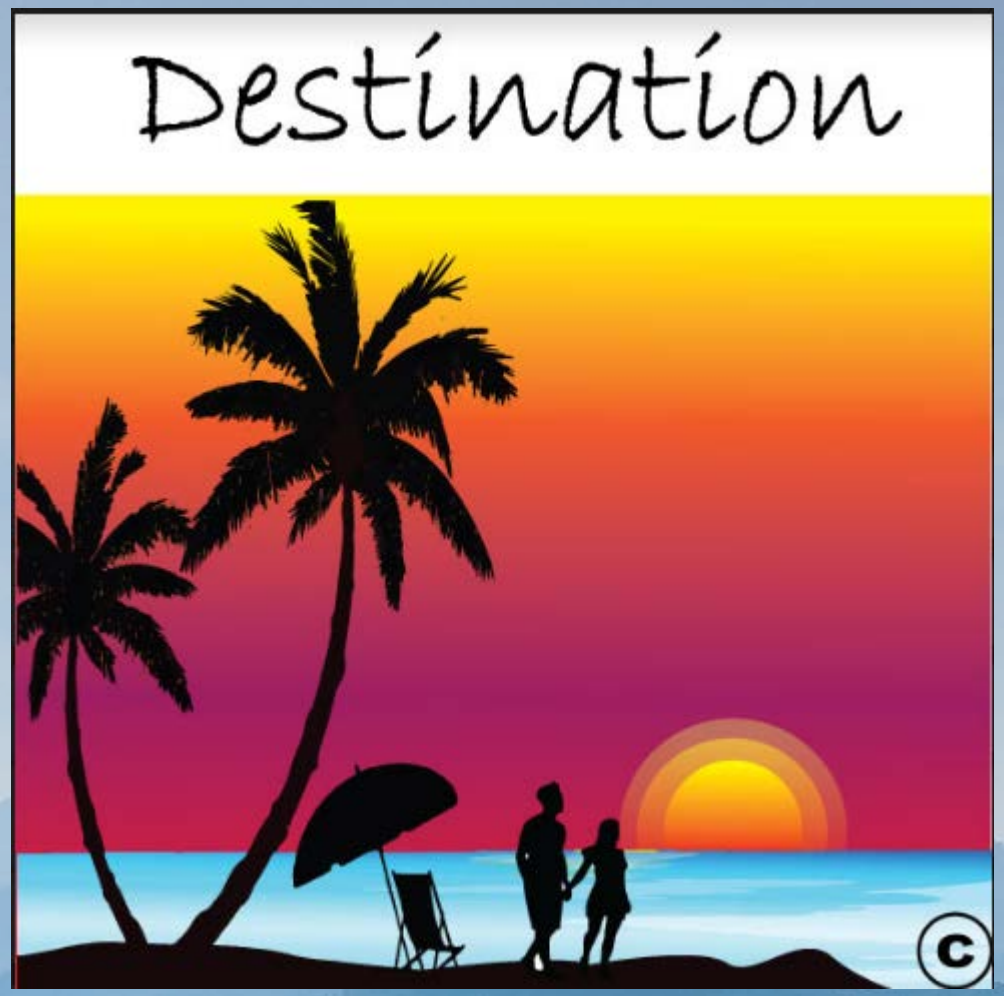
First:
You decide what is your destination!

Justyna, what is your <u>destination in life</u>?



Please, write here your answer:

Destination:

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Off Road Skid Pad

- A realistic skid pad was constructed to reproduce icy road. Cars or a trucks driven at 70km/h must avoid hitting an obstacle (water wall) representing a reel obstacle on a slippery road…Without loosing control!

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Gaze Assessment

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Eye Tracking System:

- 85% of the needful driving information are provided by the vision
- Decoding time and visual information flow analysis: from 0, 4 up to 2 sec.
- Vision considerably determines the psychomotor reactions
- Point of focus determines the destination
- Recording 24 different parameters at 1500 Hz (1500 times per second)

To prevent is to see

© 2015

Eye Movement Recorder

- Old systems:
- 30 Hz sampling rate
- No real time analysis

Our new system:
1500 Hz sampling rate in real time with 23 other parameters, including heart rate and sweating

Your Focus is Your Destination:

Video

MFC is Focusing on the Solution – Not the Problem!

(1) Acknowledging

(2) Awareness

(3) Choice

(4) Self-evaluation:
focus on where I needed to go?

© 2015

Our Research Laboratory demonstrated that you always end where you look!

Mental Multitasking is impossible

Avoiding Multi-Tasking

- Multi-tasking does not exist:
  one task is prioritized,
  others are secondary!
- Under stress and distraction, secondary activities override primary task (Fight or flight)
- Practice and simulation are necessary to learn how to avoid distraction from the primary task (Driving vs. cell phone)
- Two tasks simultaneously create mental overload = **T**unnel **V**ision **E**ffect

Video

© 2015

TVE can be removed only with practice

- Inexperienced drivers fixated more often on in-vehicle objects (**due to TVE**)
- Inexperienced drivers had more fixations on the dashboard than experienced drivers (**due to TVE**)
- Experienced drivers were able to adapt their number of fixations on the dashboard according to the route (No **TVE**)

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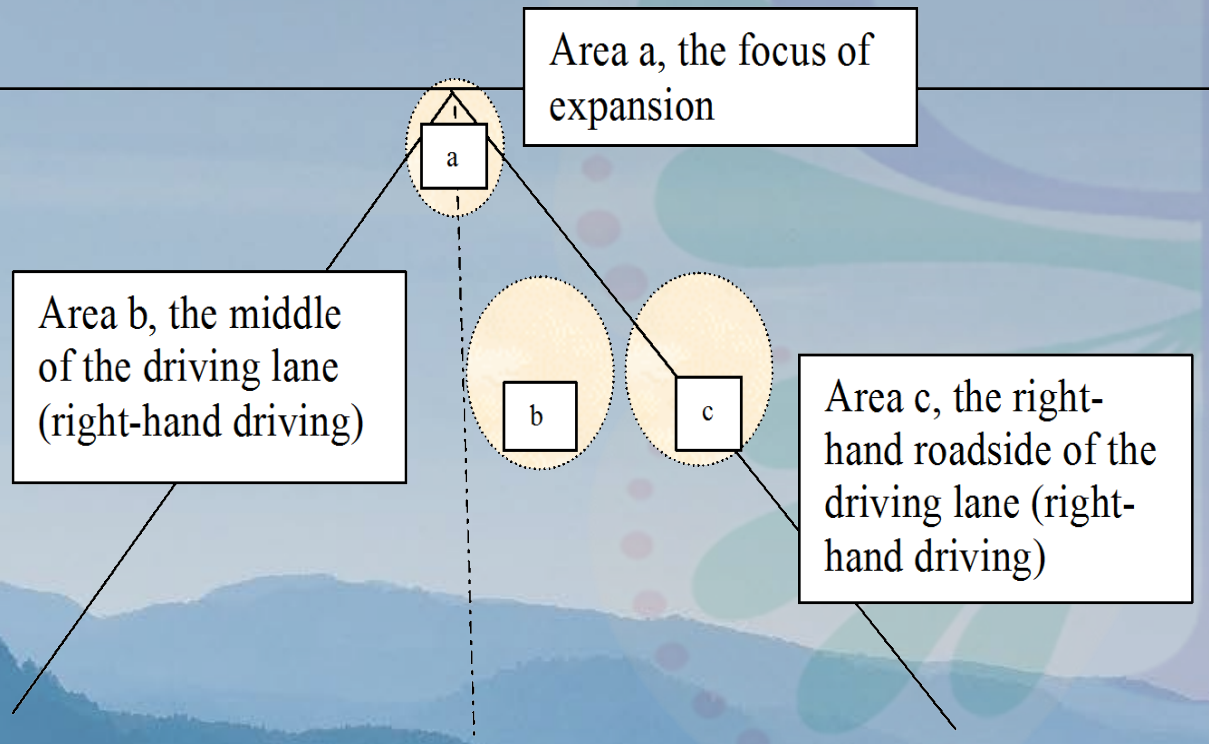
Inexperience Increases Risks

- The study confirmed that inexperienced drivers were fixating closer to the vehicle and more on the dashboard than experienced drivers.
- They also spread their fixations less among the horizontal meridian.
- Their less developed visual search strategies probably tend to generate a higher number of fixations on irrelevant potential hazards



Less Experience = Stress = TVE

- Based on the results from pilot study, a lack of flexible visual search strategies may be one of the characteristics for novice drivers lower ability to detect hazards, and become subjected to more accidents.

- Teaching visual search strategies as an integral component of driver education for learner drivers may contribute to safer driving among inexperienced drivers.

- As developed by MFC teaching visual search strategies can be extended to master all kind of potentially problematic situations.

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Other Research

- College athletes showed the greater amounts of TVE during stress, coupled with more negative life event situations, incurred more athletic injuries than those with the opposite findings. Their perceptual vision narrowed.
- People were asked to keep track of the number of low sounds they heard (they heard both high and low). Stimuli were increased in numbers (different mental tasks at different levels), level of mental effort was found to increase overall stress in attempt to maintain high performance. Visual field was reduced to 92.2 in medium condition and 86.41 during heavy workload condition.
- Researchers at the University of Nottingham asked novice and experienced automobile drivers to search video clips taken from a driver's perspective to look for potential hazards while responding to peripheral target lights. It was found that increased visual demands in the dynamic scenes led to a reduction in the ability to detect the hazards.

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Police Shootings

- Researchers at John Hopkins looked into audio blocking and tunnel vision often experienced during deadly encounters
- Tracked how brain handles competing demands for attention
- Simulated the “clutter visual and auditory input people deal with everyday”.
  - When subjects directed their attention to visual tasks “tunneling in” on the screen, parts of their brain responsible for processing auditory information decreased in activity.
  - When subjects focused on spoken messages, brain areas responsible for visual images decreased in activity
- The brain **CANNOT** multitask
- Reason why when officers recount their experience they cannot recall the sound of their gun going off or how many shots were fired

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Mesuring Cognitive Distractions

- Mind **Cannot** multi-task
- Too many cues decrease cognitive functions

https://www.youtube.com/watch?v=6VukCuYu_Q&feature=player_embedded

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MFC Complete Model

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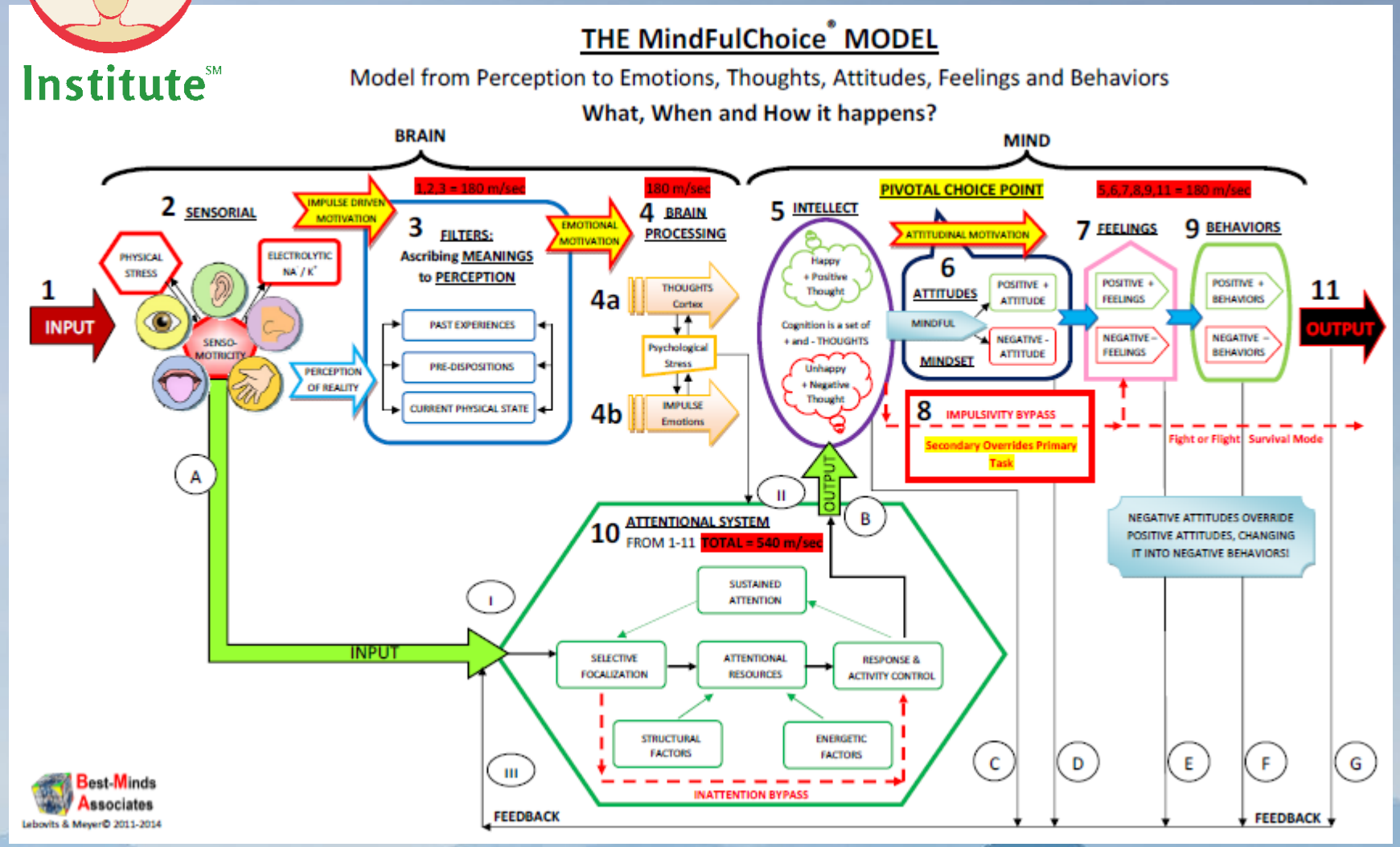

Think Before Reacting

Time	Reaction Type
220 ms	Automatic/Impulsive
380 ms	Inattentive Response
660+ ms	Delayed Response

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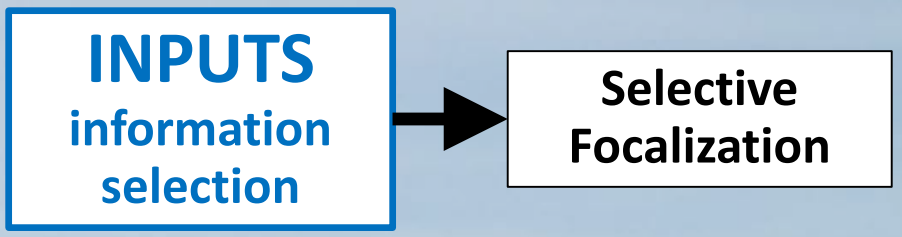
Attentional System: 4 Components

1. Information selection



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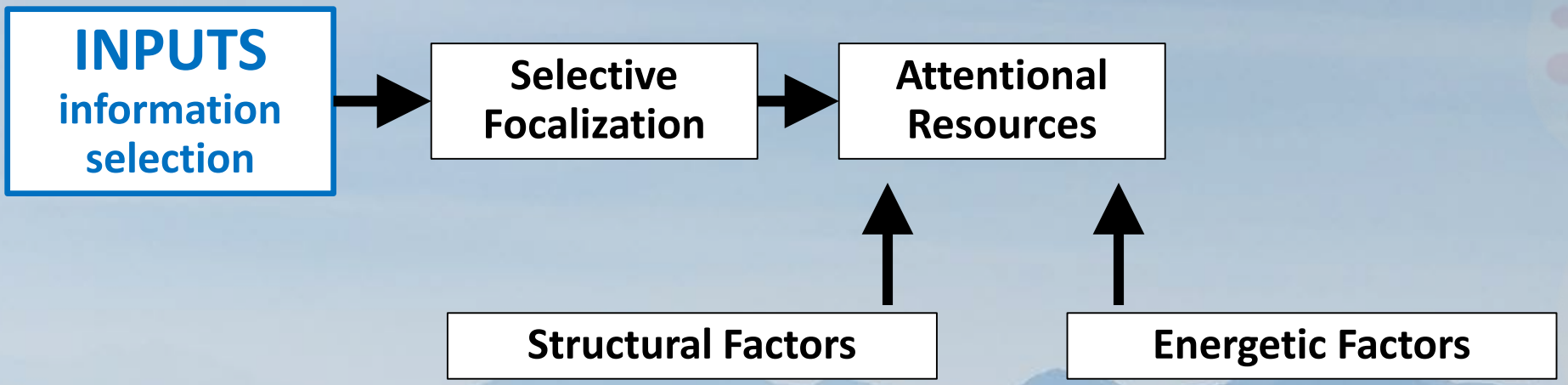
Attentional System: 4 Components

1. Information selection
2. Attentional resources



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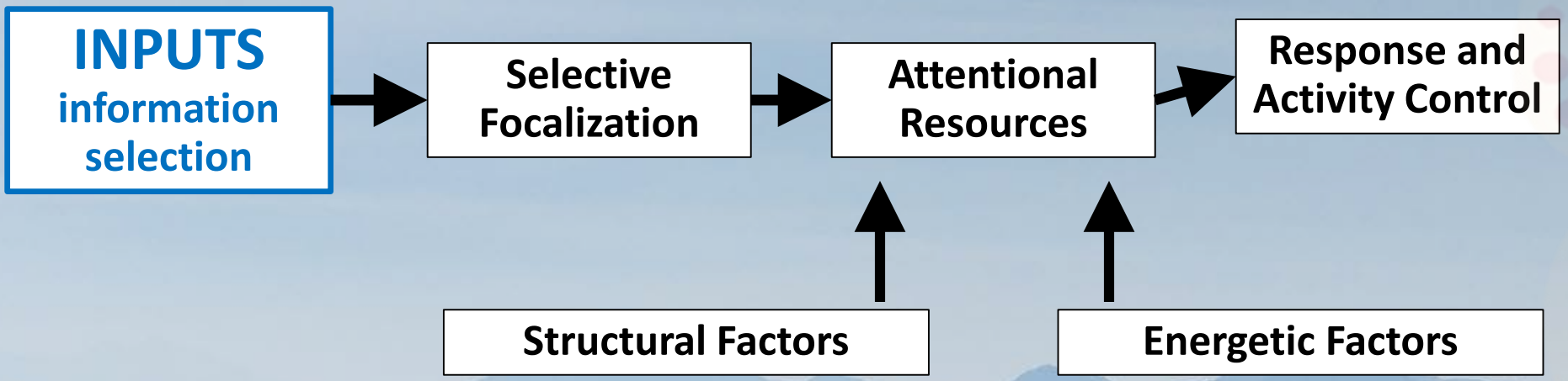
Attentional System: 4 Components

1. Information selection
2. Attentional resources
3. Response and activity control



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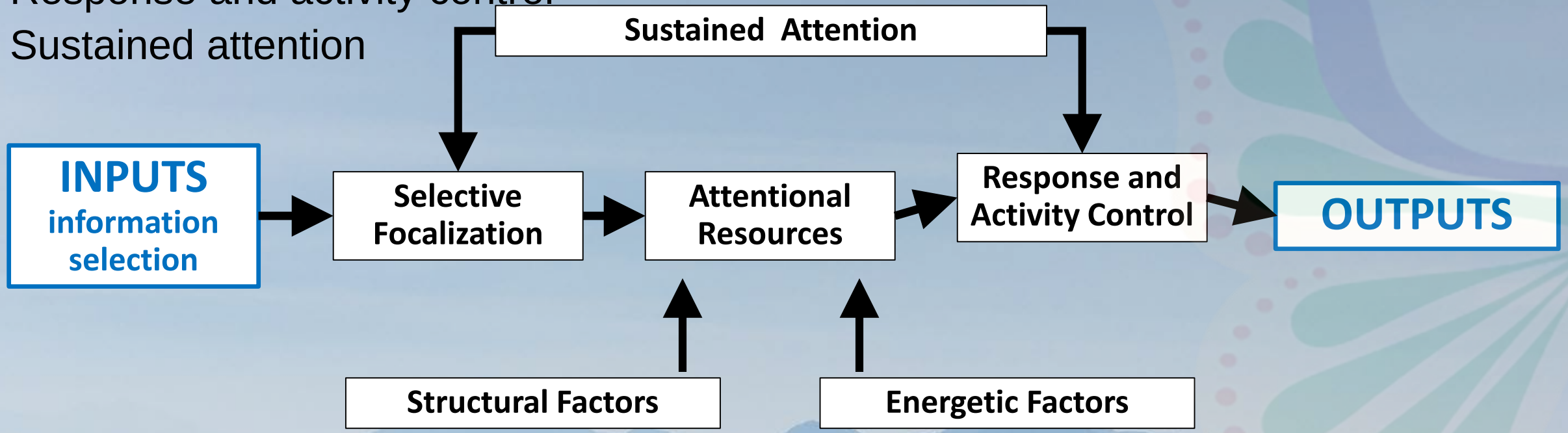
Attentional System: 4 Components

1. Information selection
2. Attentional resources
3. Response and activity control
4. Sustained attention



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1000 milliseconds = 1 second

Milliseconds	How long?
1 ms	Camera flash
5 ms	Honey bee's wing flap
200 ms	**Time for human brain to recognize emotions**
300 ms	Eye blink
400 ms	Time for fast ball pitches to reach strike zone
860 ms	Average human resting heart cycle

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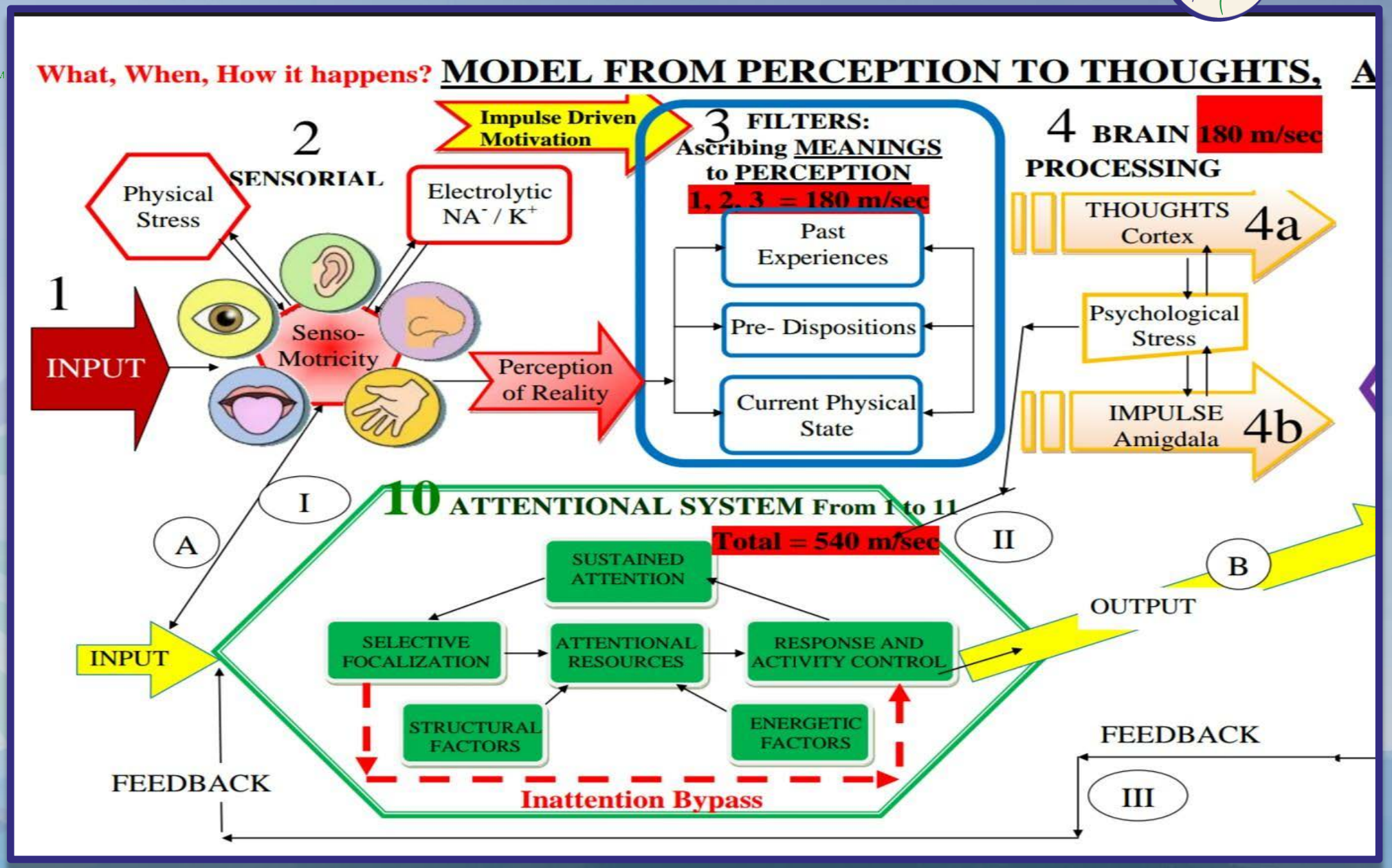
What, When, How it happens? MODEL FROM PERCEPTION TO THOUGHTS, A
1
INPUT
2
SENSORIAL
Physical Stress
Electrolytic NA⁻ / K⁺
Senso-Motricity
Perception of Reality
Impulse Driven Motivation
3 FILTERS:
Ascribing MEANINGS to PERCEPTION
1, 2, 3 = 180 m/sec
Past Experiences
Pre- Dispositions
Current Physical State
4 BRAIN PROCESSING 180 m/sec
THOUGHTS Cortex 4a
Psychological Stress
IMPULSE Amigdala 4b
I
A
10 ATTENTIONAL SYSTEM From 1 to 11
Total = 540 m/sec
II
B
SUSTAINED ATTENTION
SELECTIVE FOCALIZATION
ATTENTIONAL RESOURCES
RESPONSE AND ACTIVITY CONTROL
STRUCTURAL FACTORS
ENERGETIC FACTORS
INPUT
OUTPUT
FEEDBACK
Inattention Bypass
FEEDBACK
III

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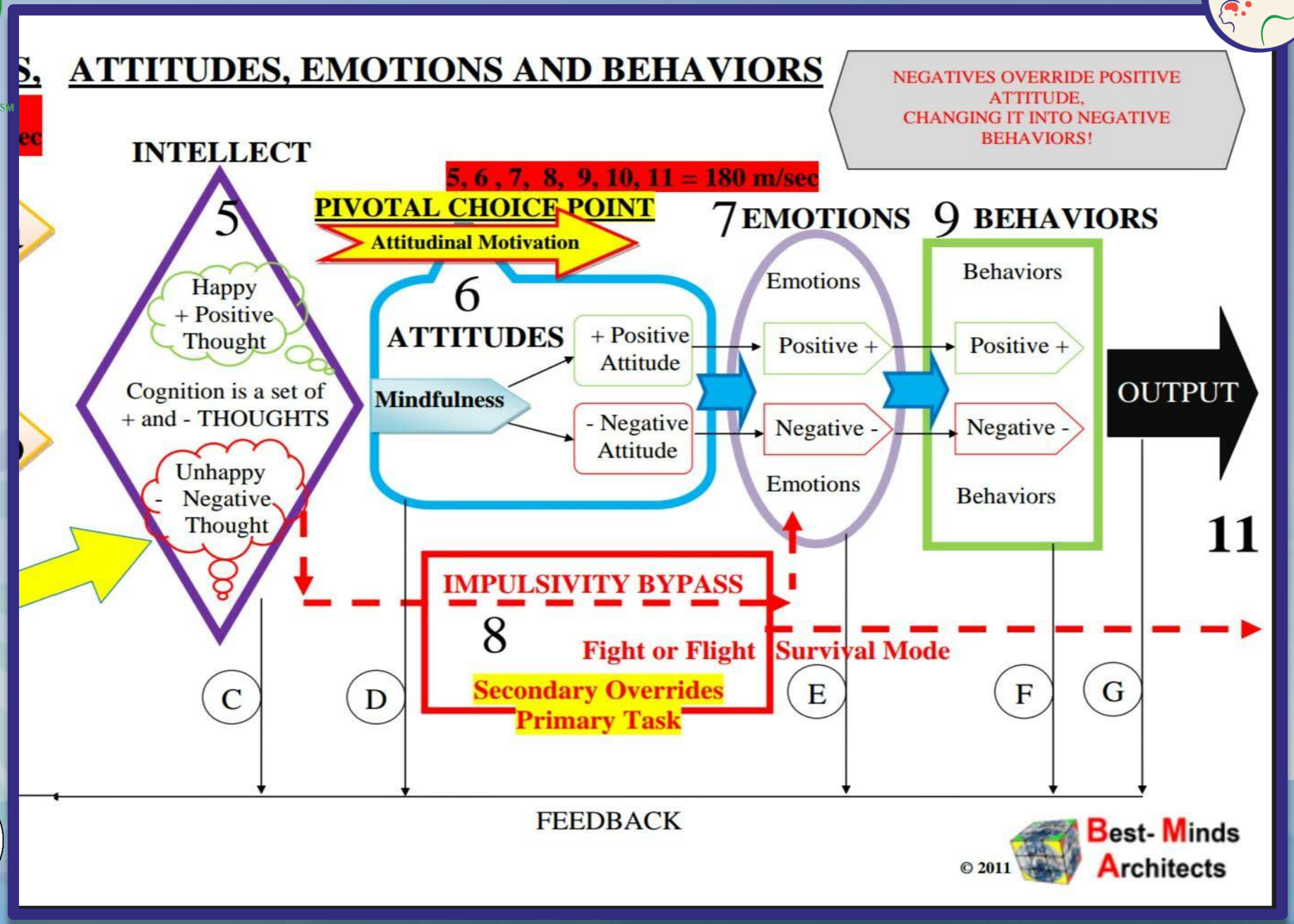
ATTITUDES, EMOTIONS AND BEHAVIORS
NEGATIVES OVERRIDE POSITIVE ATTITUDE, CHANGING IT INTO NEGATIVE BEHAVIORS!
INTELLECT
5
Happy + Positive Thought
Cognition is a set of + and - THOUGHTS
Unhappy - Negative Thought
5, 6 , 7, 8, 9, 10, 11 = 180 m/sec
PIVOTAL CHOICE POINT
Attitudinal Motivation
6
ATTITUDES
Mindfulness
+ Positive Attitude
- Negative Attitude
7 EMOTIONS
Emotions
Positive +
Negative -
Emotions
9 BEHAVIORS
Behaviors
Positive +
Negative -
Behaviors
OUTPUT
11
IMPULSIVITY BYPASS
8
Fight or Flight
Survival Mode
Secondary Overrides Primary Task
C
D
E
F
G
FEEDBACK
© 2011
Best- Minds Architects

© 2015

MFC Sequential Model

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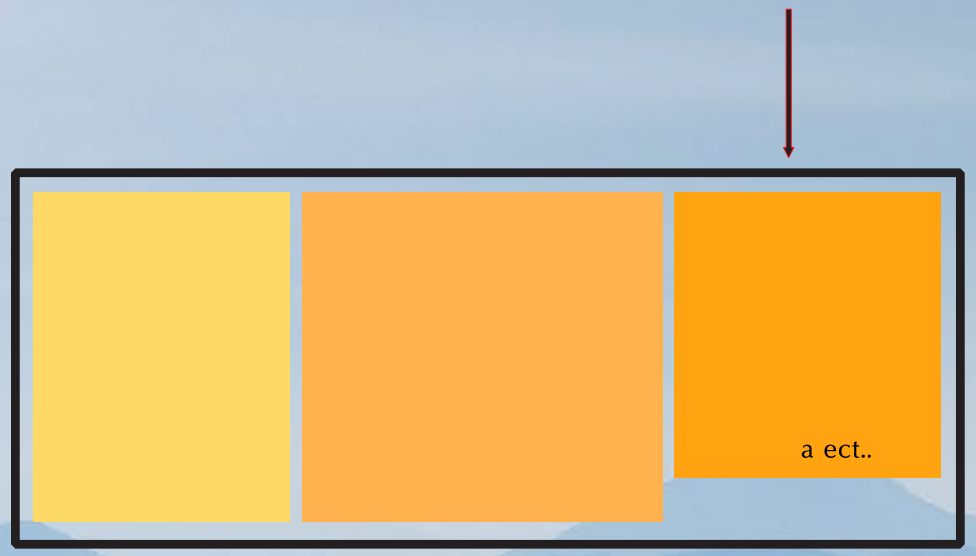
Success vs Failure



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Negative Results:

Causes	Consequences	Effects
➢ Stress	➢ Loss of Peripheral Vision	➢ Blood Loss
➢ Fatigue	➢ Increase Heart Beat	➢ Glaucoma
➢ Noise/Distraction	➢ Sweating	➢ Tumers
➢ Obsession	➢ Dizziness	➢ Attitude Sickness
➢ Fear	➢ Irritability/Mood Disorder	➢ Cataract
➢ Anxiety	➢ Sleep Deprivation	➢ Nausea ect..
➢ Inattention	➢ Difficulty to Concentrate	

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What MFC Does

Since TVE is primal it may seem like there is no way to control… it, but MFC teaches to train our brain, and breathe to diffuse TVE in non-emergent situations, or emergent situations that require critical thinking and forethought

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MFC Wholistic Approach, Where Body and Cognition are Synergetic:

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MFC developed B.E.S.T.

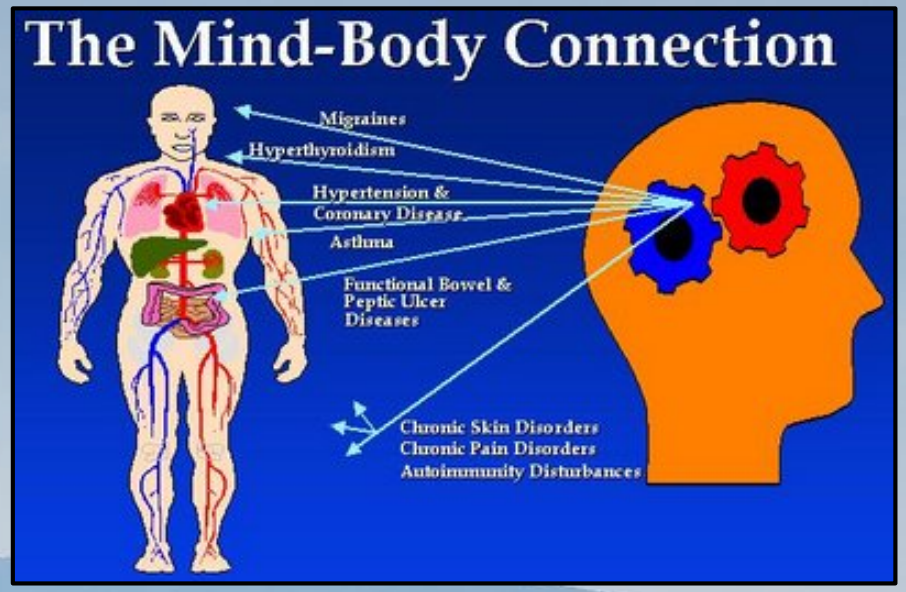
Bio-Ergonomic Safety Theory For Mind & Body

MFC is a Wholistic approach

Research into MFC concluded that difficulties arise from an absence of awareness of how to think and therefore react.

Inadequate attention to mind-body link:

- Stress
- Fatigue
- Sleep
- Channel capacity
- Tunnel-vision effect
- Drugs and alcohol
- Breathing
- Food and beverage



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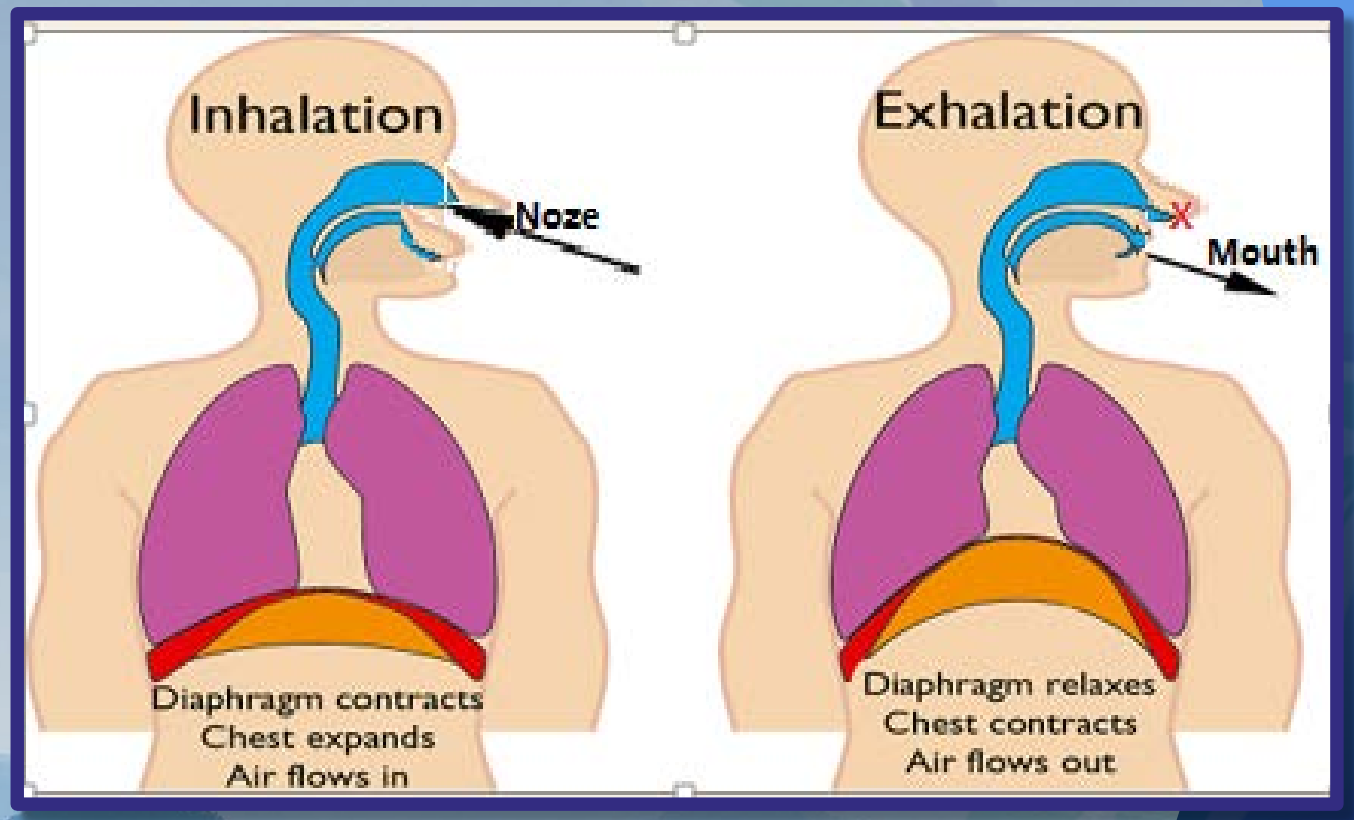
What Breathing Does

Proper abdominal breathing (Yogi like) deep inhaling through the nose and exhaling through the mouth. Feeling the abdomen near diaphragm area to go up and down…

Inhale + sympthatetic system (stress), exhale = parasympatheric system (repair) this is the benefit of proper vagal system



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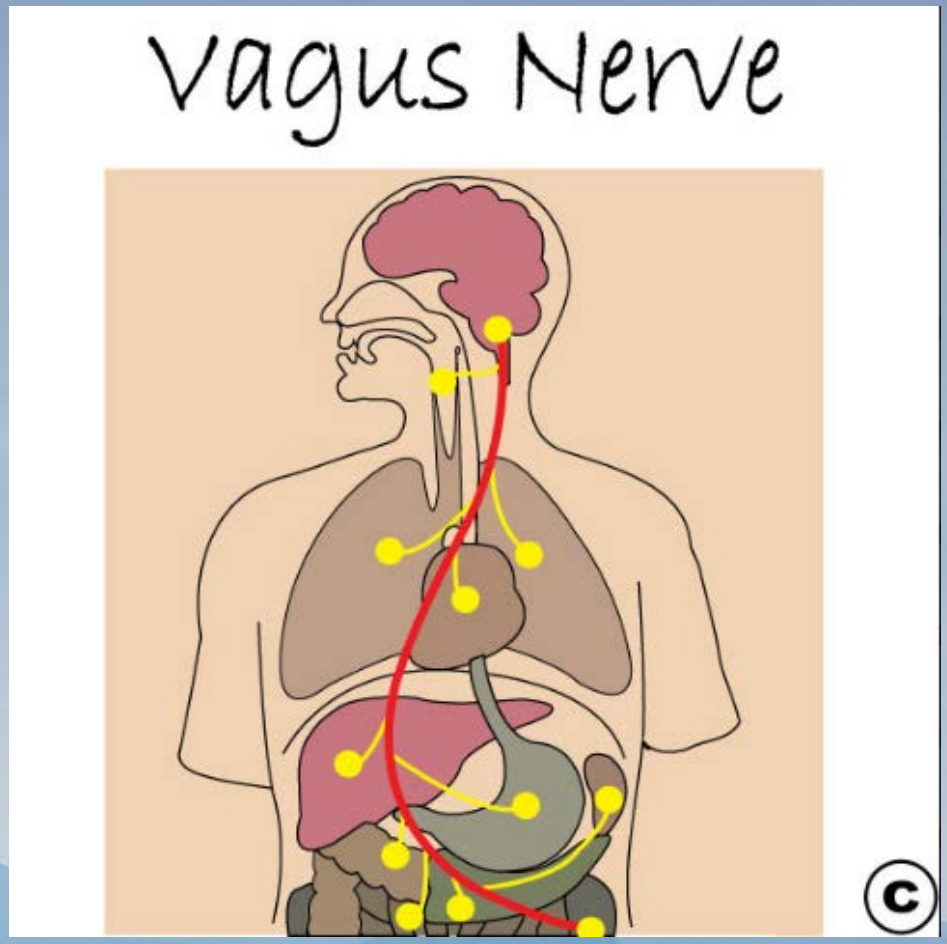
Diaphragmatic Breathing Stimulate the Vagus Nerve & Limbic System



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Vagal Nervous System Response

- Element of the parasympathetic nervous system; helps you calm down and rest
- Can be initiated in a variety of ways; one way being deep breathing
- When stimulated, it relases an array of anti-stress hormones such as vasopressin and oxytocin
- Associated with benefits such as imporved memory, immune function, sleep and higher levels of growth hormone

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How to use MFC to Avoid TVE

Referring to the MFC Model:

- Recognize when you start having a negative thought to avoid the unattentional bypass
- Since bp goes up and vasoconstriction begins it is important to control breathing to increase oxygen flow into blood and organs. Increased oxygen flow will make it easier for the heart to pump and will increase oxygen to the brain. Focus on breathing is also correlated with focus on problem solving and “clearing the mind”
- Concentrate on recognizing if you have negative or positive thoughts about the stressor-if it’s negative train yourself to think about the positive outcomes. So, instead of “what if this doesn’t work” think “what if I succeed at this?” When you train yourself to become attentive to your thought processes you avoid the unattentional bypass (fight, flight or freeze)

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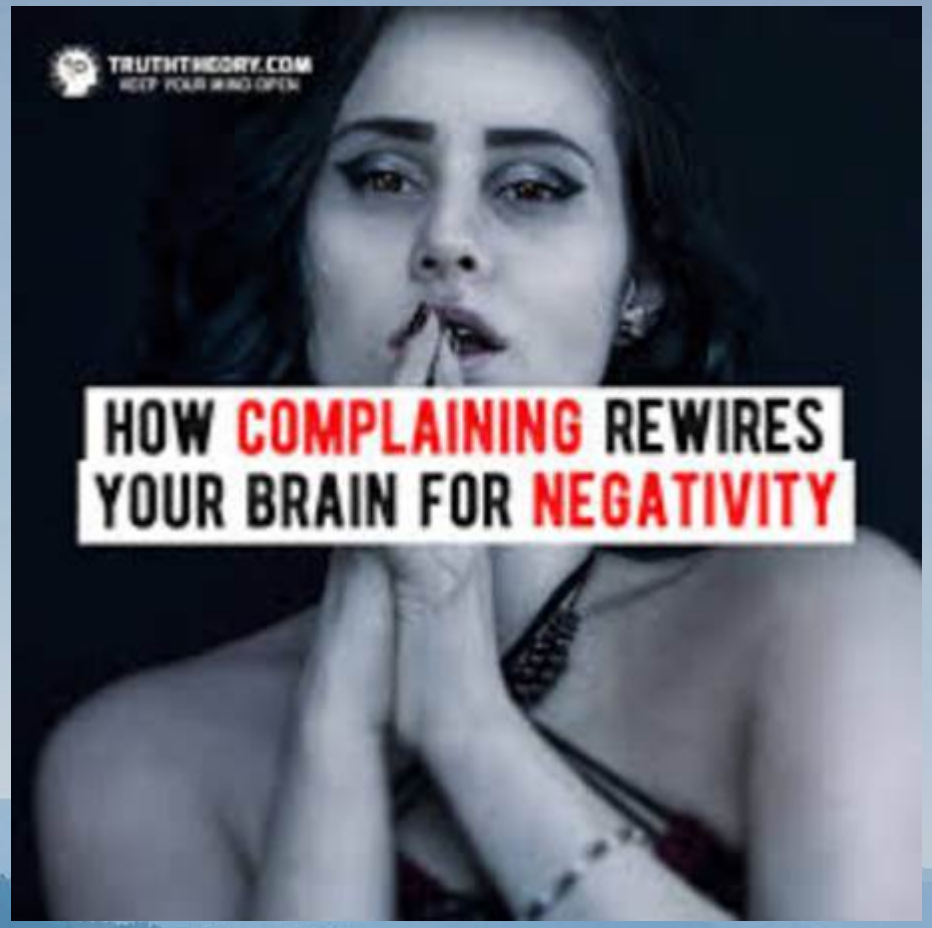
Hormones Response First, Then YOUR Emotions



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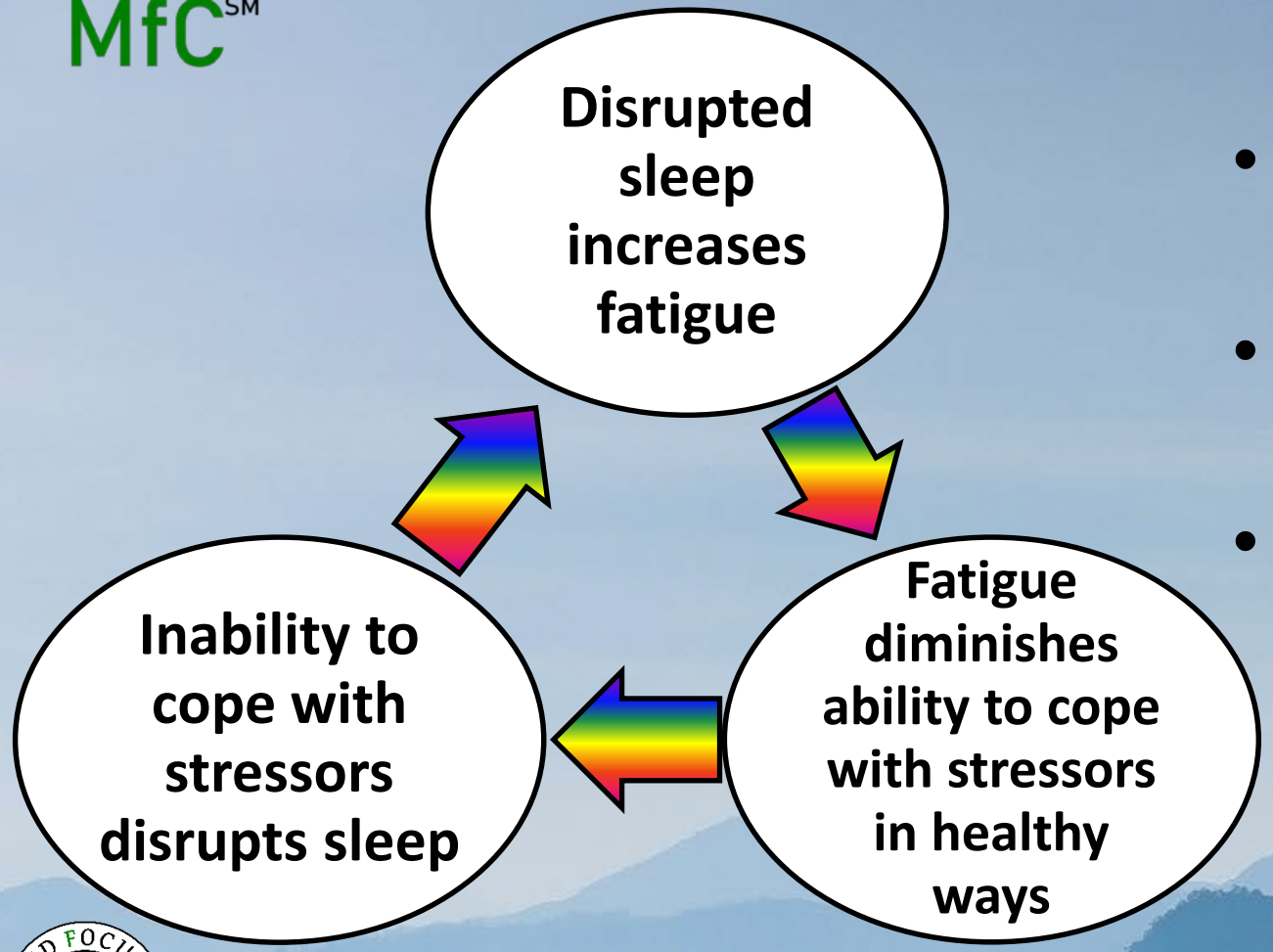
Stress and Fatigue



- Impact on Emotions and Feelings, Judgment and Behavior .
- Behaviors and reactions when fatigued mimic substance abuse.
- When very fatigued, a person may act intoxicated.
- Alcohol consumption greatly increases the level of fatigue and resistance to stress.

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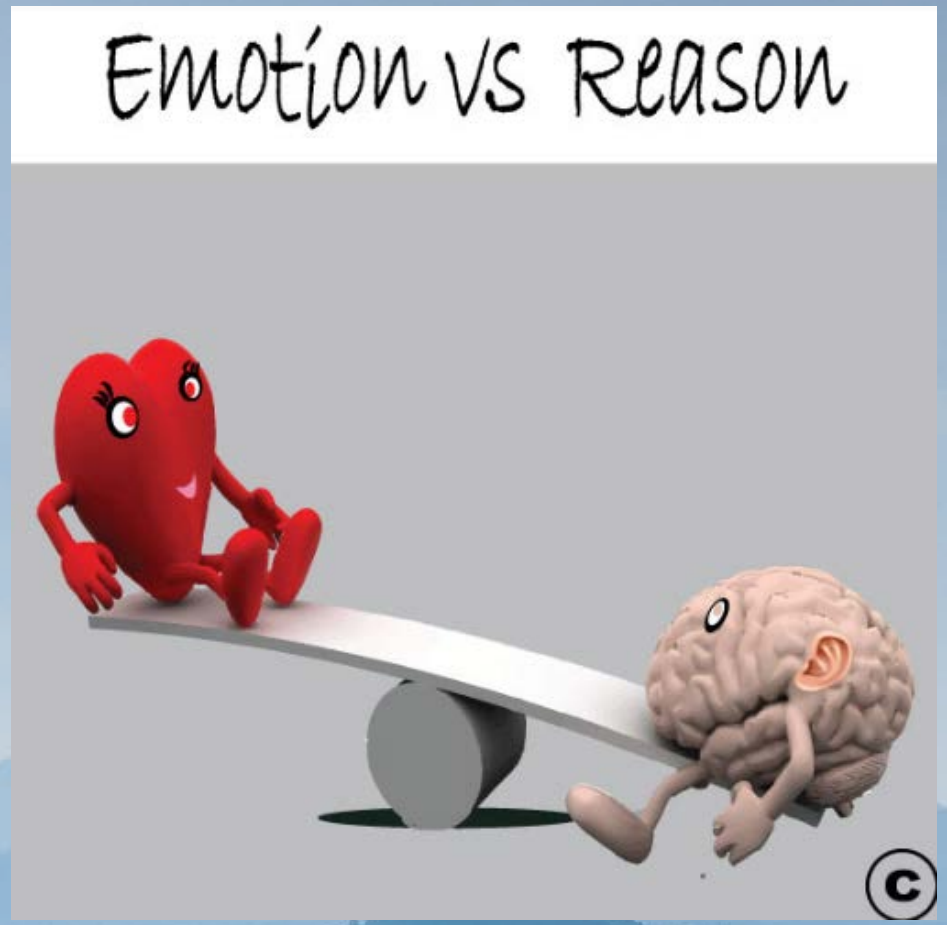
MFC is teaching to follow the reason rather than emotional impulses:



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Chose to remain non impulsive at all times:

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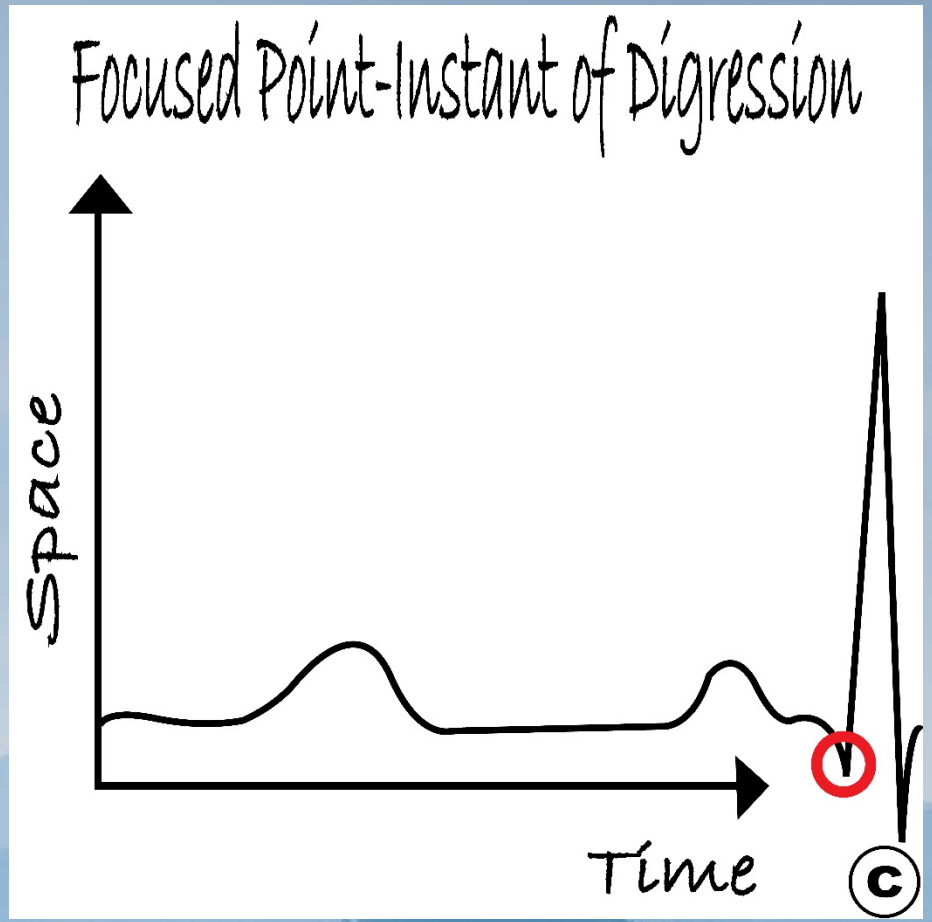
If you can control your response of few Milliseconds – you will avoid most mistakes…



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Fear is real & can be useful, but Anxiety is just the fear of virtual future events

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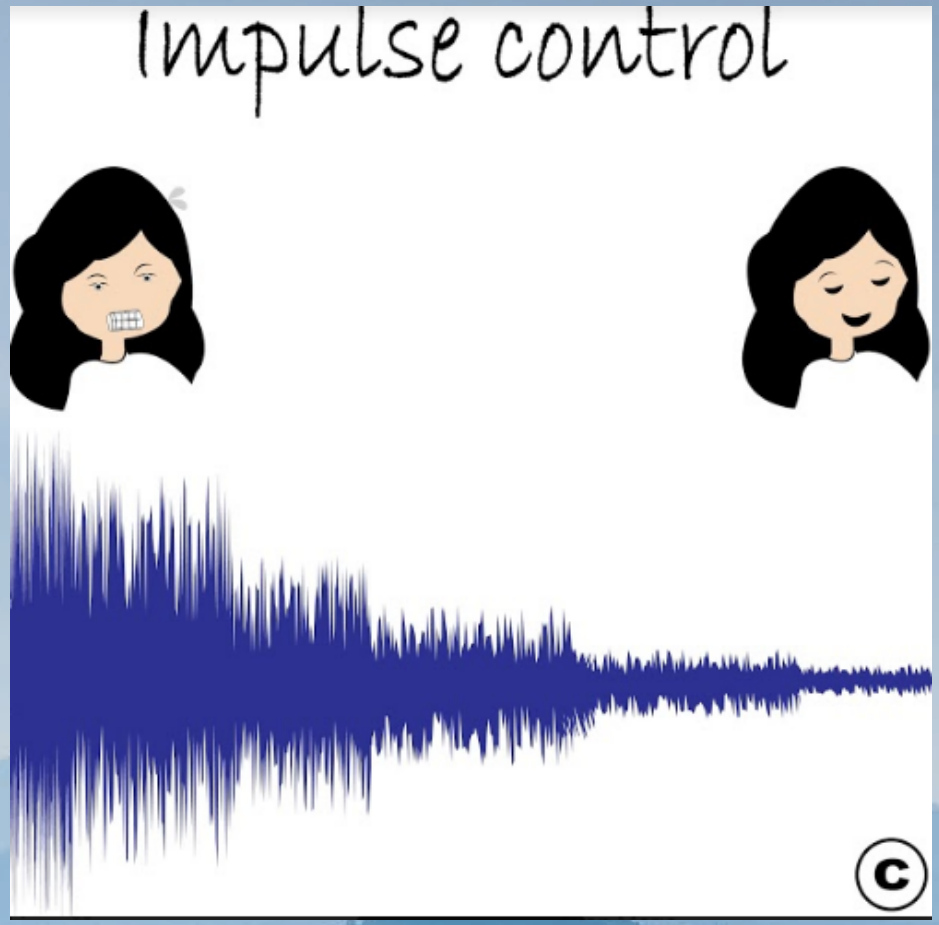
MFC first about impulse control:



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Remain poised and calmly in control:

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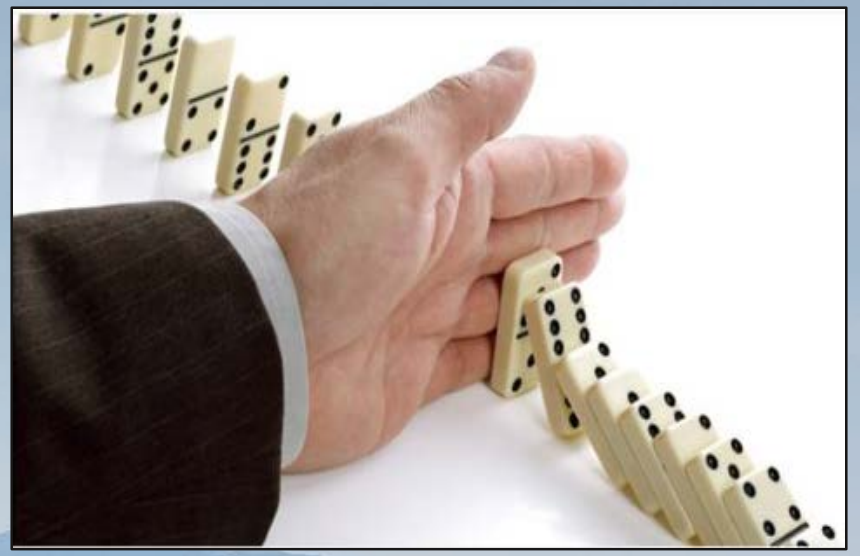
Decision Tree and Binary Choices

- At each moment, there is only ONE choice:
  □ yes / no □ do / don't □ go / stop …
- The **NEXT** choice does not exist until after the **PRESENT** choice.
- A decision can never be undone – but it can be corrected.



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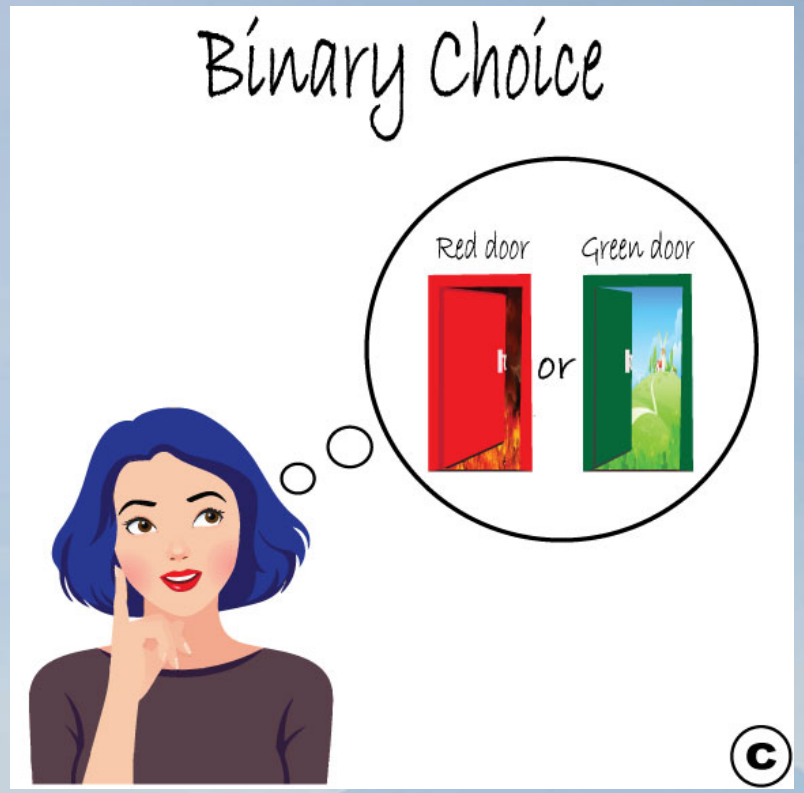
Choice



"For all practical purposes, we choose everything we do, including the misery we feel."

- William Glasser, MD

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Best Choice Seeking:

Reasoned Choice is not Emotive

- **MindFulChoice**℠ focuses on minimizing impulsivity and inattention in decision-making and behavior.
- Research shows that they are at the root of most problems in our lives.

Emotions are an extremely fast response signal from the brain – It cannot be changed but only contained – The brain does not analyze it only process data.

Only the **mind** can reason therefore an emotional reaction cannot be throughout and will be dysfunctional

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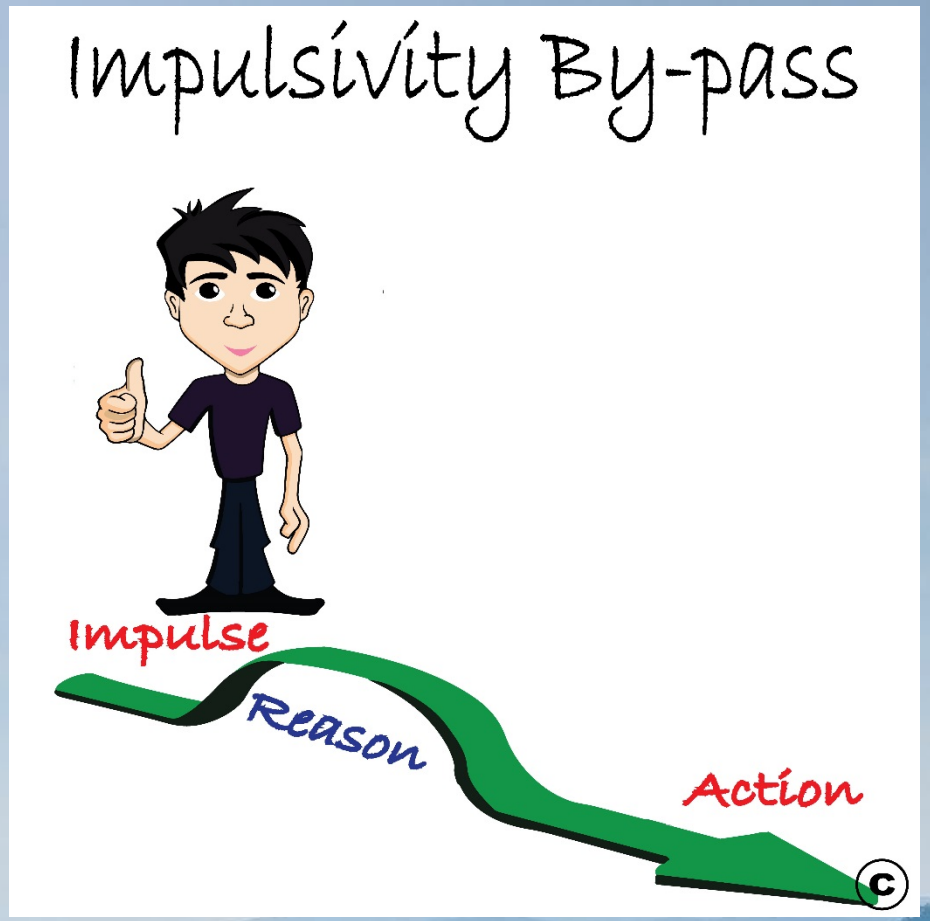
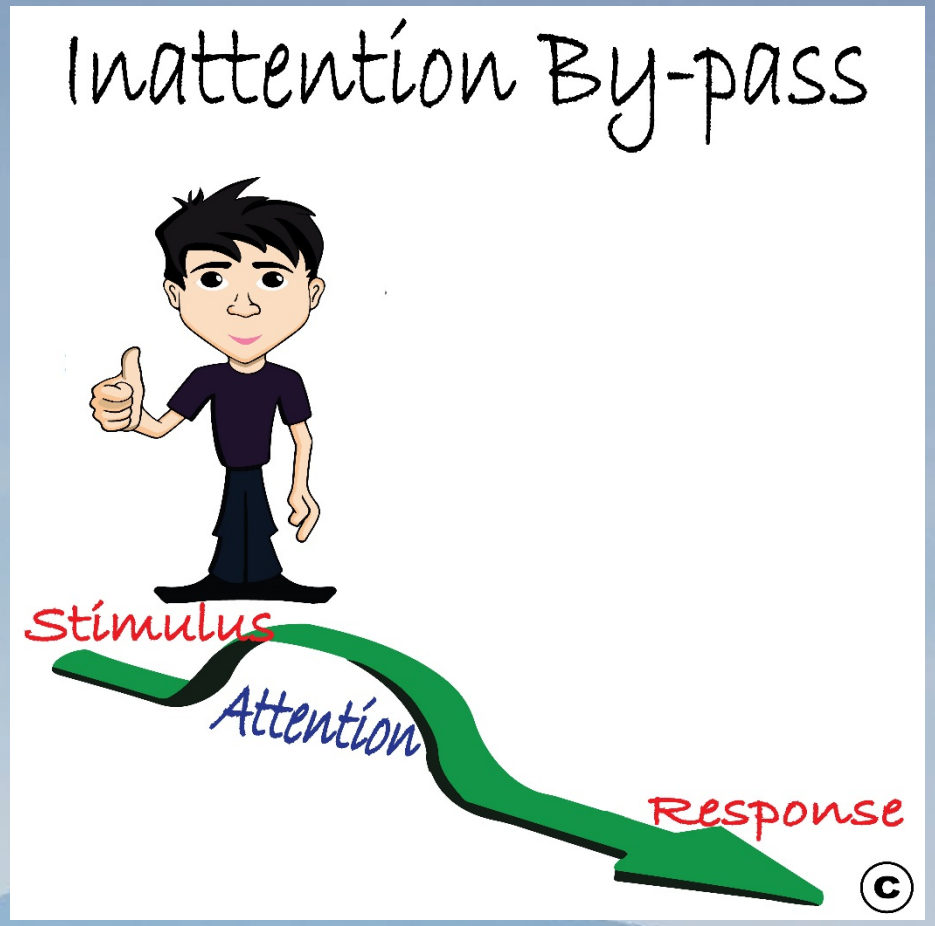
Two By-passes Responsible for most dysfunctions!





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MFC core philosophy

To be consciously aware of constantly making choices

- MFC is an acquired skill and self-discipline.
- MFC immunizes against biased, dysfunctional decisions.

MindfulChoice℠
Destination ~ Awareness ~ Choice

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Be aware of how you create your own reality

- Over time, you are presented with decisions you have to make
  - ✓ With each decision you generate new branches in a decision tree.
  - ✓ Your unique personal reality is made up of all the alternatives you choose
- Your choices are determined by your needs, thoughts, attitudes and emotions.
  - ✓ As your priorities and values change, so do your choices and your reality.
- The **MindFulChoice**[SM] process focuses on questions of :

  "What? Where? When?" and "How?"
- Self awareness is key to creating the reality that is the most productive and satisfying.

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Don’t let your mind be full, but learn to become mindful

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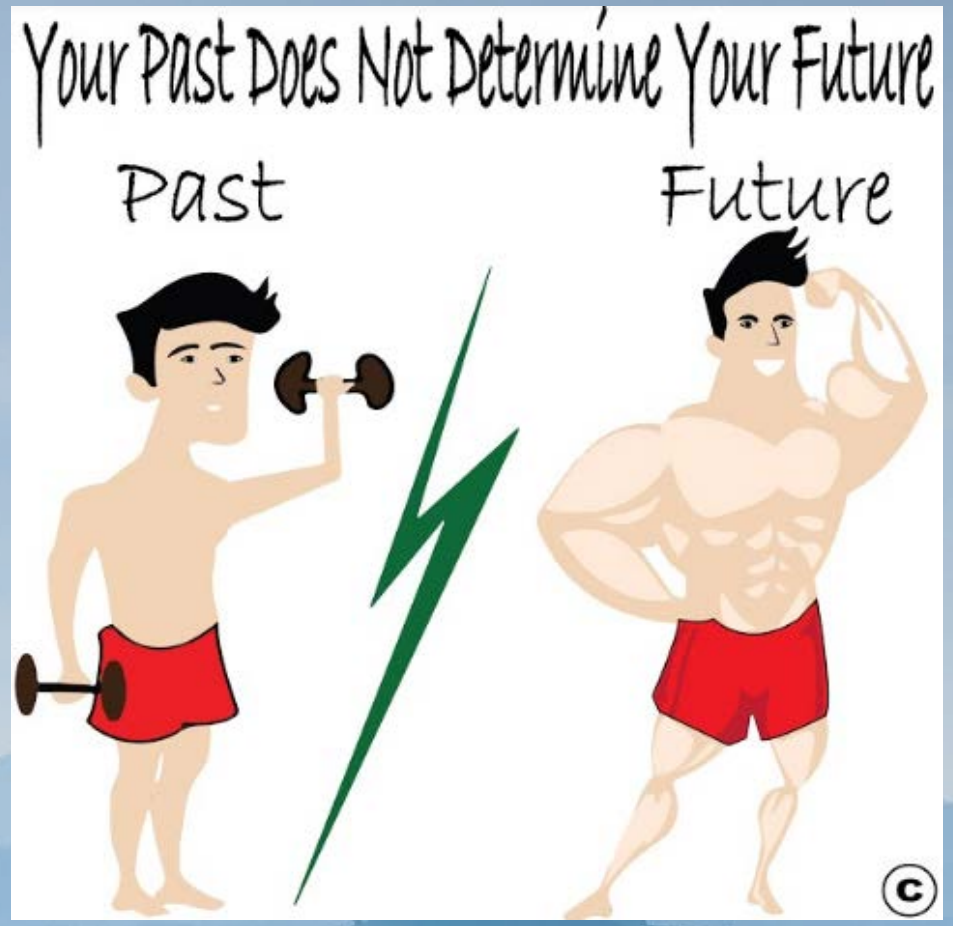
MFC is about making present decisions to ensure a better future!



Stay Motivated & Proactive

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MFC is Meta-Cognitive Positive Psychology

Positive Psychology

- Positive Psychology is meant to improve the lives of people who are healthy.
  - It's different from traditional psychology, which developed to treat disorders
  - It's meant to be used by healthy people who just want to improve their lives using psychology

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Positive Psychology

What is Positive Psychology? - YouTube
https://www.youtube.com/watch?v=1qJvS8v0TTI

Feedback

https://www.youtube.com/watch?v=1qJvS8v0TTI

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Positive Psychology

- **MindFulChoice**℠ is a type of Positive Psychology
  - It can be used by a mentally healthy person who wants:
    - ✓to live a better life
    - ✓to change a certain behavior
    - ✓to pick up a desired habit

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Metacognition

- Metacognition is "knowing about knowing"
- It's about knowing when and how to use specific knowledge and thinking strategies
- Part of metacognition is thinking about how *your* thought process works
- **MindFulChoice**℠ is a metacognitive model

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MindFulChoice℠ & Metacognition

- **MindFulChoice℠** recognizes that to change behavior you have to change thinking
- A metaphor: a human is a computer
  - the brain is hardware
  - mental models/thought processes are software
- **MindFulChoice℠** helps you to upgrade your software by changing the way you think and process emotion

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MFC Metacognitive Approach

- Thinking is a learned behavior
- Different ways of thinking are NOT equally effective
- Dysfunctional thinking → Dysfunctional feelings and behaviors

MFC focuses on the process of thinking (not the content).
→ MFC alleviates dysfunction and achieves change.

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Relevance to Mental Health:

"Individuals with psychiatric disorders show altered decision-making. They select options that are either non-optimal or non-homeostatic. Theses dysfunctional patterns of decision-making in individuals with psychiatric disorders may fundamentally relate to problem with homeostatic regulation"

– Martin Paulus.

By focusing on enhancing an individual's decision-making skills, **MFC** remediates the underlying dysfunction rather than attempting to treat the pathology.

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MIND FOCUSED COACHING℠

Thank you for your active participation!

https://mindfocusedcoaching.com/

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