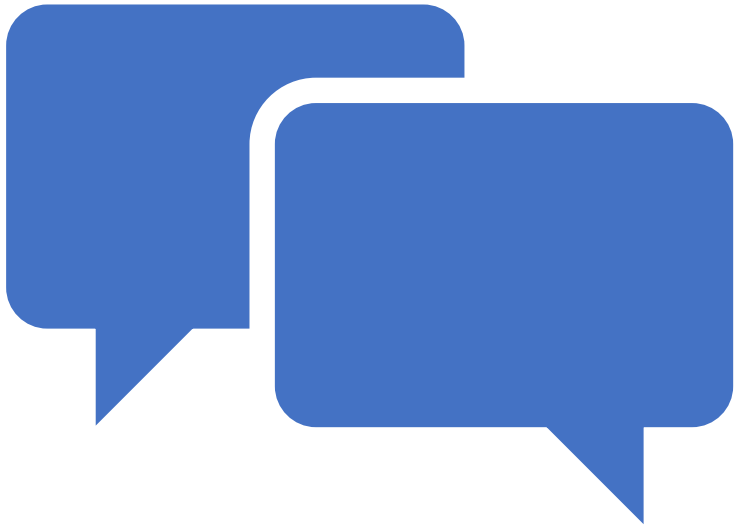
Think Again

Fall Term 2021

Class 7

Email and Website



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On Tap for Today

- Review
- Loss and the Brain
- Swearing
- Bad Feelings

Review From Prior Weeks

- I have used the term emotion to describe the feelings we use to describe our awareness of neurotransmitters and brain waves.
- Sometimes we have a negative or ‘emotional’ response to the term.
- It may be more easily understood if we just call them feelings.
- We use our rational minds infrequently but when we do, it is usually to rationalize what we feel. (more on that in coming weeks)
- On occasion, and more frequently with practice, we can use our rational mind to control how we act in response to feelings and even to modulate the feelings themselves.

Different Folks, Different Strokes

- Kahneman and Tversky showed the tendency to value avoiding loss over realizing gain.
- Even with identical scenarios, wording as loss or gain leads to different choices.
- Receiving $50 and keeping $20 vs. losing $30
- It works that way even when the losing framed option is a better outcome.
- Also applies to sure thing vs. risk.
- Different people react differently; some avoid the loss, others think it through, and others react based on outcomes instinctually.

Brain Activity Reflects Choices

- Conform to the frame – choose sure thing and avoid loss – amygdala lights up (emotions)
- Not conform to frame – anterior cingulate cortex lights up (conflict and self-control)
- Most rational of subjects – prefrontal cortex lights up (reasoning) – little or no emotional or conflict responses
- Evolutionary progression from Amygdala to Prefrontal Cortex mediated by the ACC

I’ll Swear to That


LEAVE THEM ALL HERE! I'M SURE I'LL FIND A USE FOR THEM!
!@*%!!
!#@*%!!

Why Do We Swear?

- Reduces pain or increases pain tolerance link
- Increases Performance link
- But does not increase heartrate, not related to fight/flight response
- Those who swear are more honest. link
- Impact does not apply to habitual swearers, probably since lacks emotional context.
- Effect and offense taken by others go together.
- If it empowers the speaker, it threatens others.
- May be related to monkey behavior of throwing feces when angry.


Why It Is Good To Feel Bad

Yossarian Talks about God in Catch-22

"And don't tell me God works in mysterious ways," Yossarian continued. . . Good God, how much reverence can you have for a Supreme Being who finds it necessary to include such phenomena as phlegm and tooth decay in His divine system of creation? What in the world was running through that warped, evil, scatological mind of His when He robbed old people of the power to control their bowel movements? Why in the world did he ever create pain? ... Oh, He was really being charitable to us when He gave us pain! [to warn us of danger] Why couldn't He have used a doorbell instead to notify us. . .? When you consider the opportunity and power He had to really do a job, and then look at the stupid, ugly little mess He made of it instead, His sheer incompetence is almost staggering. ..."

As we think of each of the feelings, consider why Yossarian was wrong.

Whether it Was a Creator or Evolution

- We have those feelings and reactions. They developed for a reason.
- It is up to us to figure out how to use them as they were designed.
- Sometimes they do not work as designed and we are not always capable of correcting the balance.
- Think about the immune reaction and some of the uncomfortable feelings associated with its activation.
- We would not survive without it but can result in autoimmune diseases and out of control responses as may occur with COVID.
- The same is true for sadness that can turn into depression or the fight/flight response that can turn into an anxiety disorder.

Beware Bad Advice About Bad Feelings

- They are signs of weakness.
- Overcome them.
- They are not real.
- Divert your attention until they go away.
- Healthy people do not have them.

- Problems when out of balance or not used as intended.
- They are real, natural, and beneficial if we use them as nature intended.

Some Things We Can Control

- What we call bad feelings are evolutionary advances that help us survive.
- Each has four components.
- The source
- How we perceive it
- How we respond to it
- What we learn from it
- Some things are within our control and some things are not.

Our Focus

- We will look at common so-called bad feelings.
- For each we will look at its purpose and how it is intended to direct our behaviors.
- They are extremely beneficial when they work as designed.
- The become problematic when they occur in the absence of direct stimulus or last too long.
- Understanding what they are trying to tell us can often help to prevent the problematic aspects.

Prefrontal Cortex to the Rescue

- There are many benefits to learning how to move our focus to the prefrontal cortex when we experience uncomfortable feelings.
- Simply labeling a feeling decreases its severity.
- Insight into what it is shows the brain the message was received and it no longer has to signal us.
- We are less likely to make mistakes and create greater problems.
- Through the thalamus, we are training our brains to create less discomfort since it would be unnecessary.

Instinctual Emotions or Feelings

- We will look at a number of instinctual feelings.
- Some developed originally as physical feelings.
- Some moved from the physical to the emotional, particularly in species with more advanced brains.
- Think of the Insula and its response to physical coldness as warmth and then emotional coldness and warmth.
- For social species, such as homo sapiens, many relate to maintaining group or tribal cohesiveness.
- Given the time limitations, we will touch on some only briefly but there are volumes of research on all of them.

Instinctual Feelings

- Anger
- Pain
- Fear
- Shame/Guilt
- Disgust
- Regret
- Sadness
- Anxiety/Stress

The Purpose of Some May Be Obvious

- Anger
- Pain
- Fear

Anger

Anger Does Not Exist Independently

- The brain has no component, neurotransmitter, or wave that creates anger.
- It is a name we give to our response to fear, pain, or frustration.
- There are ways in which it can be helpful but is often maladaptive.
- Many Native American cultures saw it as a sign of weakness.
- A number of Eskimo tribes intentionally train children not to get angry since it clouds judgment and their environment is too dangerous to take that risk.
- In our society, anger is often conflated with strength.

Anger, Like Fear But Better and Worse

- Many of same physical attributes as fear but eliminates the feeling of fear and sensitivity to pain.
- Adds flow to prefrontal lobe, maintaining the reasoning often lost in fear response, but more of a strategic reasoning than a reflective one.
- Creates sense of moral high ground, can act without self-doubt.
- Empowering.
- While that attitude removes obstacles to action, it also can make action ineffective or counterproductive since it makes you feel that everyone else must assume you are right and justified.
- Think about drafting an email in anger but holding off sending it.

Anger, Use Only in Case of Emergency

- Anger is an instinctual response, designed to allow us to react quickly, strongly, and without fear of physical threats to ourselves or those we protect.
- Anger can also be threatening and can keep others in check, particularly when there is a physical or hierarchical power advantage.
- It can even even the playing field against a more dominant foe.
- The risks include physical toll on the body, failure to act rationally or with appropriate caution, and producing unintended consequences.

Controlling Anger

- As with all emotions, rational thought is our best defense.
- If the threat is not physical and immediate, anger serves little purpose.
- First ask what triggered it.
- Since it is a response to a feeling, identify the feeling.
- Then focus on whether there is anything you can do to resolve the issue in a rational way.
- If so, try it. If not accept it.

Hot Stove

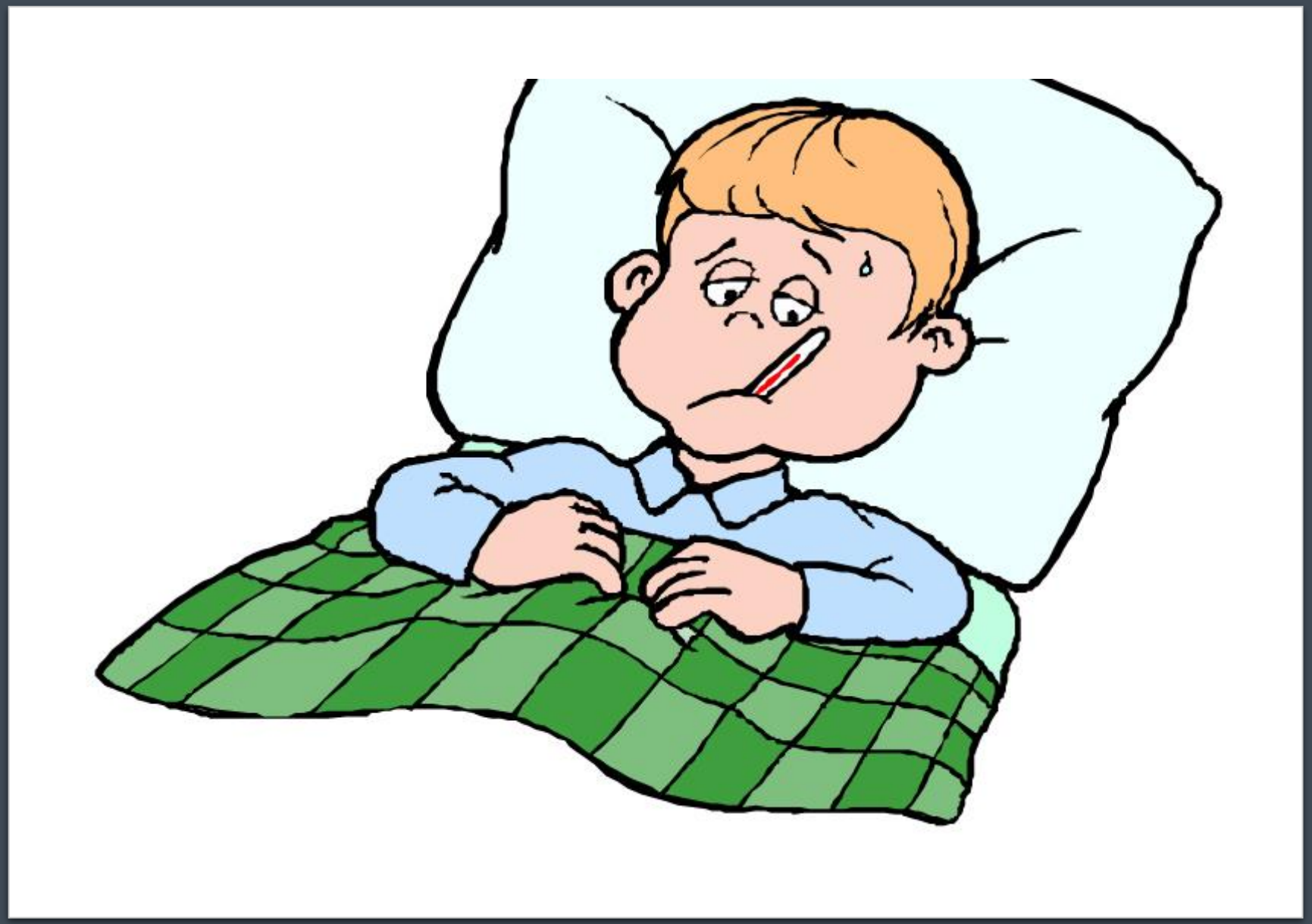
Pain

Physical Pain Serves a Purpose

- The primary purpose of pain is obvious, protection from harm.
- Not all pain is created equal.
- Sharp or acute pain is designed to require immediate changes in behavior with little or no opportunity for reflection. Pain receptors associate the sensation as immediate threat to survival.
- The classic example is moving your hand from a hot stove.
- Other pain sensation provides more opportunity for reflection and adaptation, such as shoes that hurt over time.

Pain Is All in Your Head

- How often do we hear that?
- It is true to the extent that the awareness of pain is a mental process, but that is not the way it is generally used.
- Pain has two components, the source and the experience.
- It is clearly best to address the source.
- Avoid behaviors that cause or increase pain and encourage behaviors that ameliorate it.



Sick in Bed

Low Energy

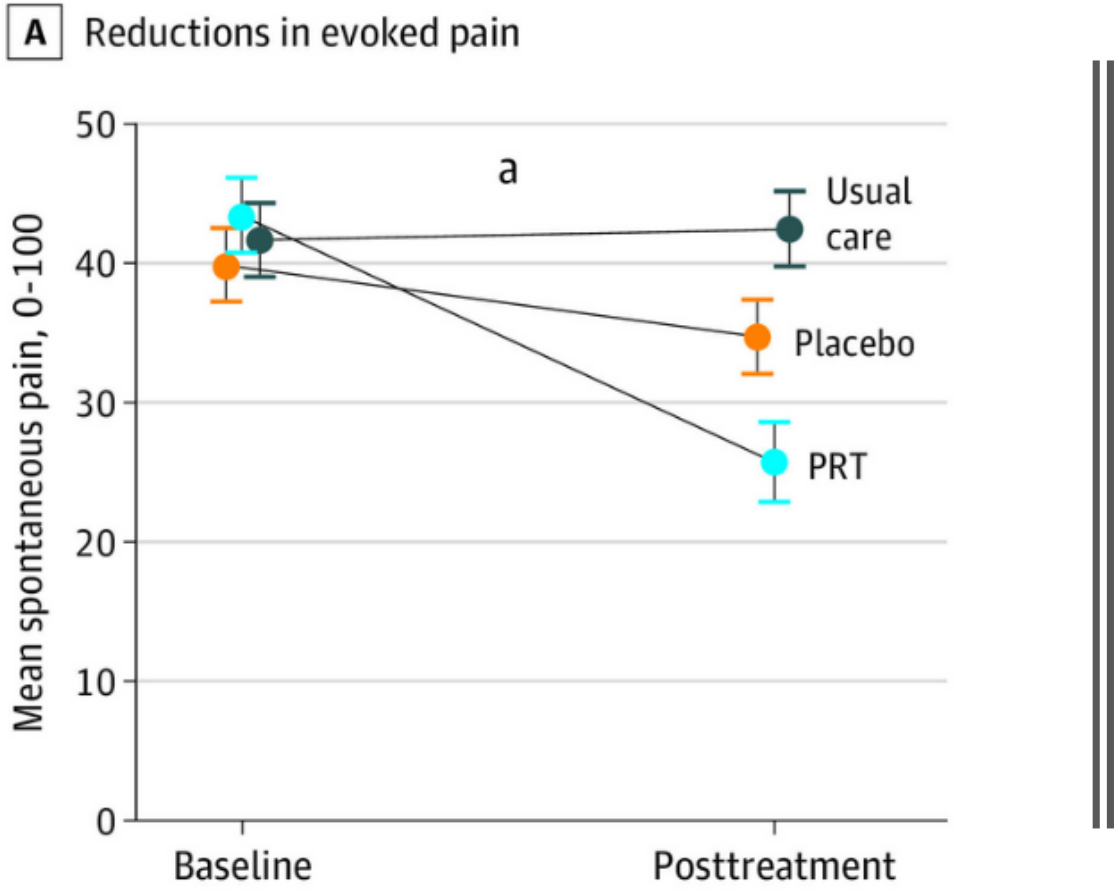
We Can Also Address the Awareness

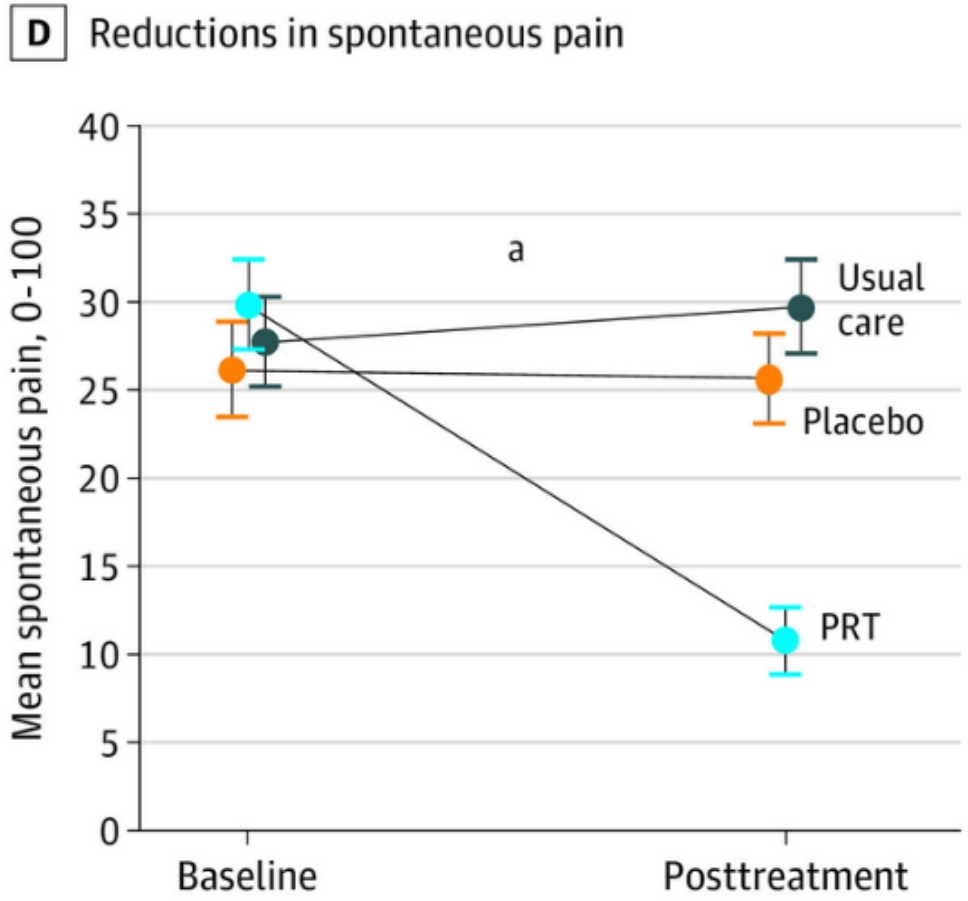
- If used correctly, natural and pharmaceutical substances can be effective, particularly in the short term.
- Those are fine if not overused or if they replace focus on the cause of the pain.
- As with all feelings, identifying and thinking about the feeling often reduces its severity.
- Meditation, exercise, rest, and psychedelics are often effective.
- Recent research is focusing on the awareness component without potentially harmful and addictive substances.

Pain Reprocessing Therapy (PRT)

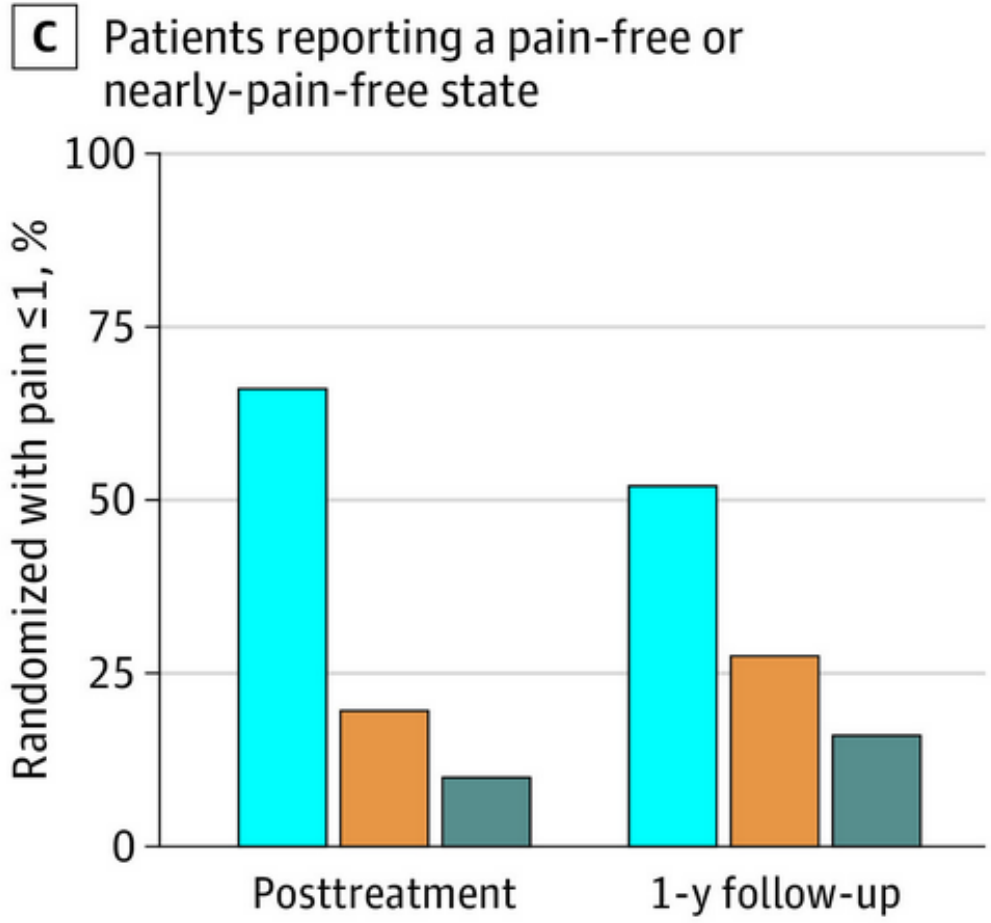
- Trained chronic back pain patients to reconceptualize pain as due to nondangerous brain activity rather than peripheral tissue injury.
- Results were beyond expectations in terms of pain relief, both evoked and spontaneous.
- A surprising number were pain free on follow-up. Study

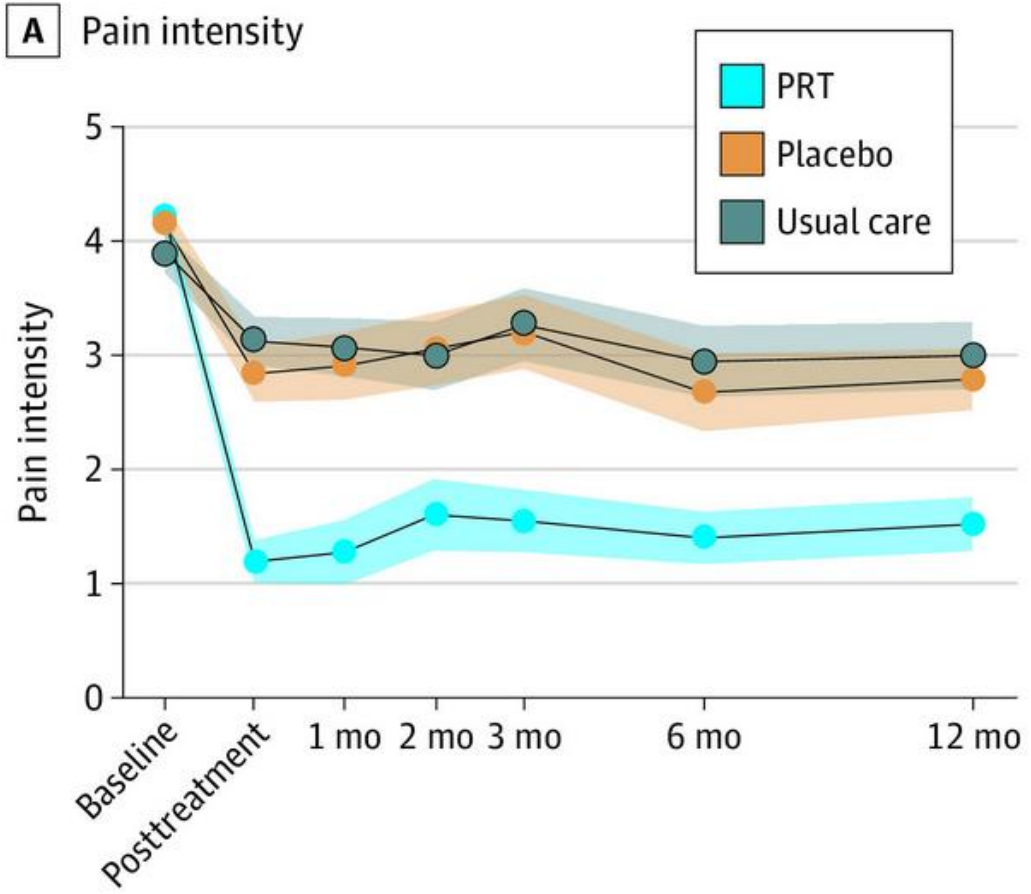
Pain Reduction





Even Pain Free





Fear

Dune – Litany Against Fear

- I must not fear.
  Fear is the mind-killer.
  Fear is the little-death that brings total obliteration.
  I will face my fear.
  I will permit it to pass over me and through me.
  And when it has gone past I will turn the inner eye to see its path.
  Where the fear has gone there will be nothing. Only I will remain.
- Misses the point – learning how to use fear in a positive way is quite different than treating it as the enemy.

Fearless Leader - From Rocky and Bullwinkle

Should You Really Follow a Fearless Leader?

- If your goal is to get yourself killed, not a bad idea.
- A good leader uses fear as an alert to danger but then acts rationally in the face of it.
- A leader without fear would be oblivious to dangers and be unprepared to cope with them.
- Yet we use the term as a positive descriptor.
- Maybe we should learn from a flying squirrel and a moose.

Prepares Us To Protect Ourselves Fight, Flight, or Freeze

- Amygdala, the alarm system for threats, senses danger, shuts off what is not needed to divert energy to what is.
- Conscious thought and reasoning serve little purpose and basically shut down.
- Diverts blood from the intestines to muscles, stops insulin production.
- Makes us hyperattentive, blocking out all irrelevant stimuli.
- If feel like prey, often freeze as in scared stiff.
- Goosebumps probably designed to make us look bigger when we were covered in hair.

Experiencing Fear vs. Being Fearful

- Fear is a survival mechanism designed to protect us from immediate or even distant harm.
- Problems arise when the response is more pronounced than circumstances dictate, arises in the absence of fearful circumstance, or lasts beyond what is necessary.
- Again, the appropriate response is to identify the threat and the feeling and then ask whether the threat still exists.
- If not and you are still fearful, change focus from the threatening stimulus to the mind and body holding on when it is not needed.

The Natural Response

- Watch a dog that reacts to threat and then goes to sleep as if nothing happened seconds later.

- Or a child who falls and starts crying only to be playing happily seconds later while the parents remain scared.

Others May be Less Obvious

- Shame and Guilt
- Disgust
- Regret
- Sadness
- Stress/Anxiety

Shame and Guilt

GUILT vs. SHAME

Guilt:
Feeling bad about your behavior

Shame:
Feeling bad about yourself

Shame and Guilt

- Both arose as the result of the creation of social groupings.
- They serve the purpose of controlling and eliminating behaviors that threaten social cohesion.
- Guilt relates to specific acts that are non-conforming or that threaten the group ethos.
- Shame is a more permanent condition that can relate to personal characteristics or reputation based on behaviors.
- It creates the desire to hide, basically self-exile from the group.
- The desired response is elimination of the undesired characteristics, atoning for or addressing the disapproved behavior, or removing the transgressor.

When Shame and Guilt Go Bad

- Shame and guilt can be powerful weapons and like all weapons, they can be used indiscriminately or for harmful purposes.
- Just because characteristics or behaviors are unacceptable to others or the group does not make them inappropriate.
- The natural aversion to shame or guilt makes them effective tools of control or retribution.
- Adults, family members, and other children often use them as tools at an age when the pain can be acute and resistance difficult.
- It can become ingrained and internalized to the point where people become overly susceptible or even feel it in the absence of stimulus.

Plants, Animals, and Other Species Know Better

- Successful species that live in groups appreciate the importance of divergent behavior.
- They survive because a relatively stable percentage explores alternatives.
- They usually do not work but at times demonstrate pathways to survival that the group would not otherwise discover.

Fire Ants Behavior on Water

- Fire ants do not particularly like being on water but sometimes end up there, on the way elsewhere or because of flooding.
- The form a tight ball, holding on to each other with jaws, legs, and stickiness.
- Some lie upside-down, forming a raft like structure, while other stay on top right side up.
- The top ones in groups take turns extending out in tentacle like fashion and returning, most likely to find the way to dry land and so direct the others.
- Those extending out expose themselves to danger but collectively it protects the group. Article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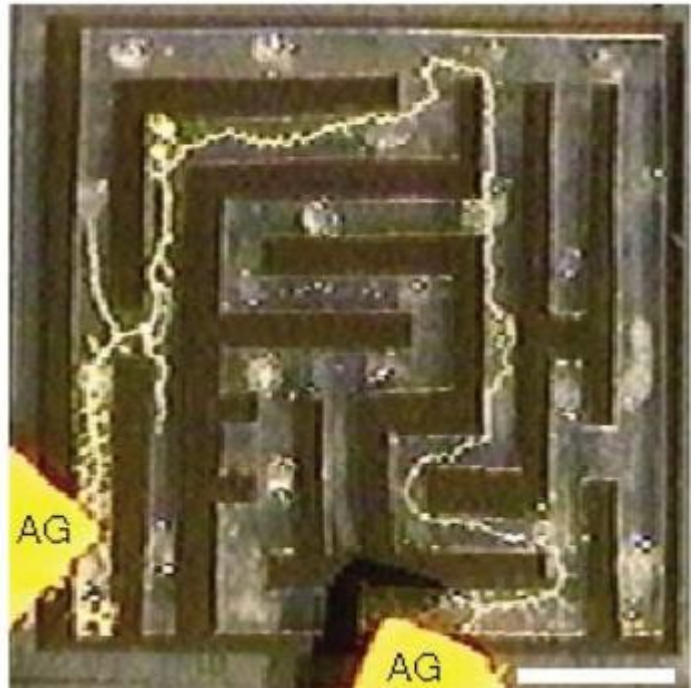
Figuring Out Mazes

- In 2000, researchers found that slime mold could figure out the shortest route through a maze.
- They cut up slime mold into multiple pieces and spread them out.
- They build a maze out of plastic strips and place food attractive to slime mold at the end of the maze.
- The slime mold came together to form a single cell, reached out in multiple directions and then formed in a straight line along the shortest route from the starting point to the food. Abstract

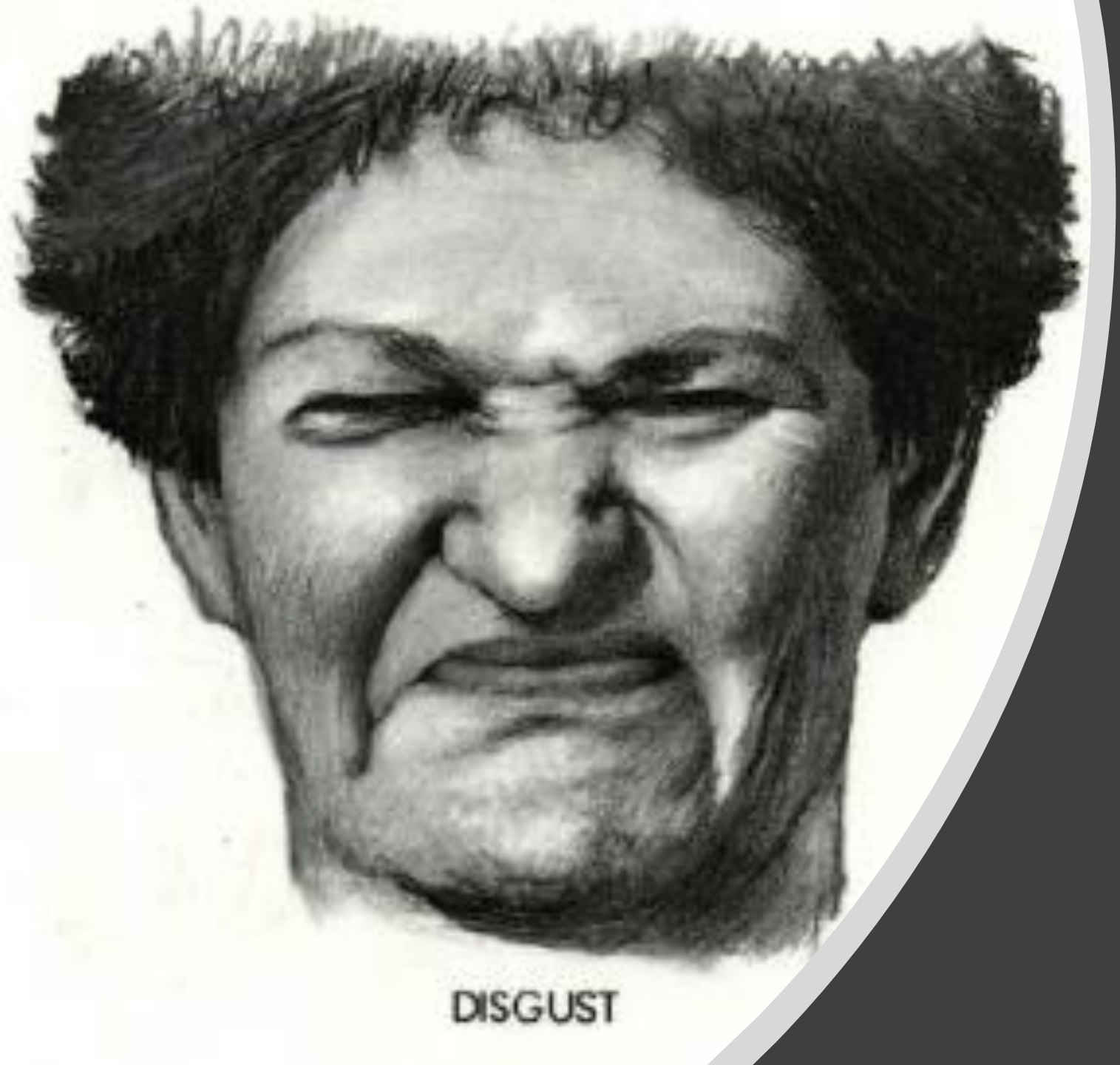


Video

How to Deal with Shame and Guilt

- As always, first label the feeling.
- Then identify the source.
- Assess the characteristic of behavior yourself and ask whether you objectively feel there is a personal problem.
- If not, focus on the motivation of the causal agent and appreciate your own susceptibility.
- If it is internalized, resolution is beyond my expertise but at least change the thinking from I am shameful or acted wrongly to I have a shame or guilt problem.

Disgust
Push Away



Disgust

Nose Wrinkle

Disgust

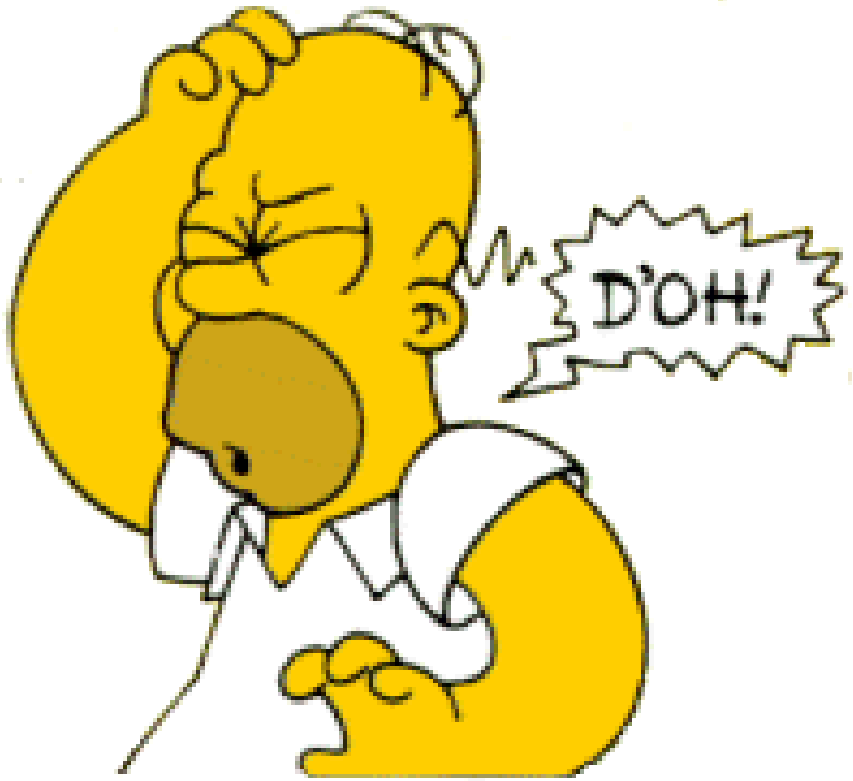
Vomiting

Why Do We Feel Disgust?

- Protects us from harm
- Primary reactions in the Anterior Insula and to lesser extent Anterior Cingulate Cortex
- Brain does not really distinguish between physical and emotional reactions (remember holding warm coffee or iced drink)
- Disgust at vomit creates same brain response as disgust at sexual practices of others.
- Disgust often contrasted with Empathy
- Too little can put us at risk. Too much can cause us to harm others

Article on Disgust

- Good article, Disgust Made Us Human - Article
- Disgust was way to avoid contamination.
- Same response to that which may seem morally repugnant.
- Both mediated by the Insula.
- Supports development of communities with shared values and group response to threats.
- Also victimizes those who are different.



Regret

Learning

What is Regret?

- Negative feelings associated with sense of having made a bad choice or acted badly
- Different from disappointment where locus of control outside of individual link
- fMRI shows activity in medial orbitofrontal cortex and the amygdala, both negative feelings and learning
- Pathway does not respond to disappointment such as when decisions made by computer

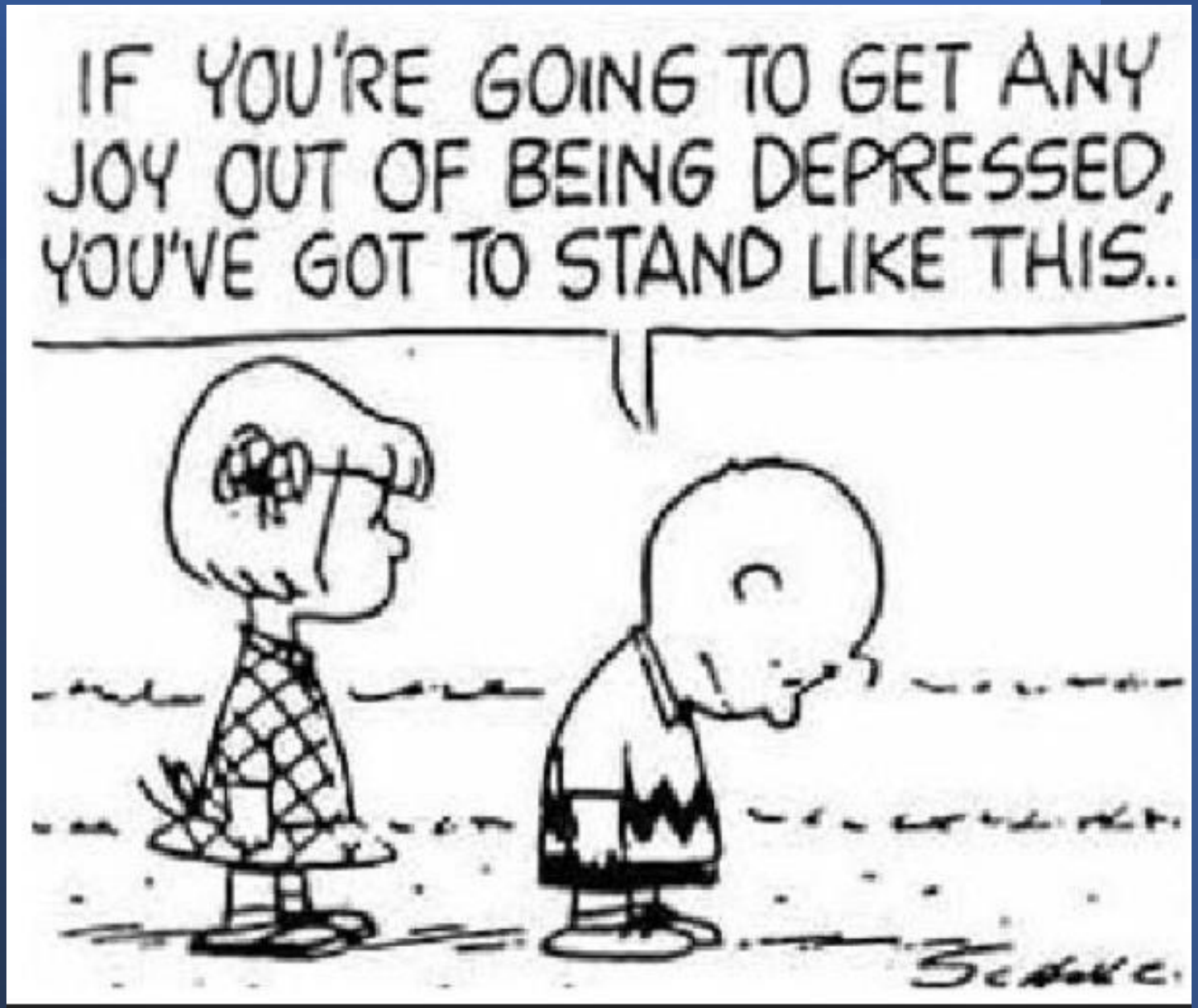
Using Regret Positively

- Creates impetus and opportunity for relearning or reprogramming
- Feeling bad about past decisions or missed opportunities can lead to depression.
- Accepting that it cannot be changed in the past but can instruct the future improves mental health.
- Depressed versus healthy elderly – depressed showed decrease activity in ventral striatum (reward processing) while healthy showed increased activity in the ACC (learning). link

Sadness

Ecclesiastes 7:3

- **1**A good name is better than precious oil;
- And the day of death than the day of one’s birth.
- **2**It is better to go to the house of mourning,
- Than to go to the house of feasting;
- For that is the end of all men,
- And the living will lay it to his heart.
- **3**Vexation is better than laughter;
- For by the sadness of the countenance the heart may be gladdened.
- **4**The heart of the wise is in the house of mourning;
- But the heart of fools is in the house of mirth.


IF YOU'RE GOING TO GET ANY JOY OUT OF BEING DEPRESSED, YOU'VE GOT TO STAND LIKE THIS..

Sadness vs. Clinical Depression

- Sadness is a natural process with positive aspects that can help us adapt and grow.
- Clinical Depression may have some of the same components but is far more serious and dangerous.
- Depression is sadness without cause or purpose.
- While the line between them can be blurry, it is important to treat them separately.

Can Sadness Be Good for Us?

- Article by Joseph Forgas link

- Sadness is not usually valued in our current culture. Self-help books promote the benefits of positive thinking, positive attitude, and positive behaviors, labeling sadness as a “problem emotion” that needs to be kept at bay or eliminated.

- Evolution must have had something else in mind, though, or sadness wouldn’t still be with us. Being sad from time to time serves some kind of purpose in helping our species to survive. Yet, while other so-called “negative emotions,” like fear, anger, and disgust, seem clearly adaptive—preparing our species for flight, fight, or avoidance, respectively—the evolutionary benefits of sadness have been harder to understand…until recently, that is.

Findings from Forgas Research (1)
Sadness Tends to:

- Improve Memory – It seems that negative mood reduces the likelihood that later false information will distort the original memory.

- Improve Judgment –
  - . . . people are more likely to make social misjudgments due to biases when they are happy.
  - . . . a sad mood reduces tendency to believe that what is familiar is true.
  - Sad moods reduce other common judgmental biases, such as "the fundamental attribution error," . . . the "halo effect," . . . "primacy effects"—when people place too much emphasis on early information and ignore later details.

- Increase Motivation – "Happiness signals to us that we are in a safe, familiar situation, and that little effort is needed to change anything. Sadness, on the other hand, operates like a mild alarm signal, triggering more effort and motivation to deal with a challenge in our environment.

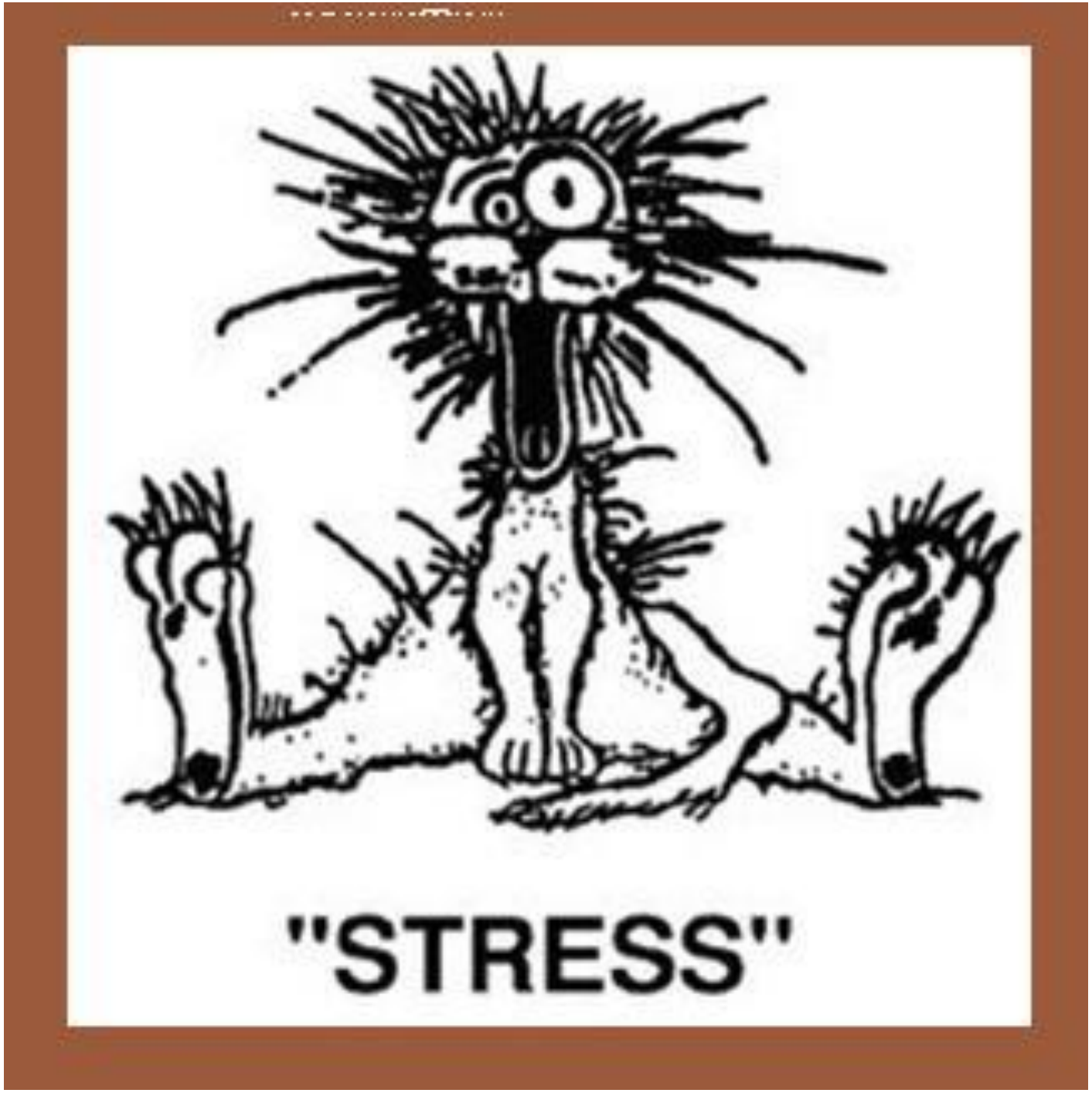
Findings from Forgas Research (2)
Sadness Tends to:

- Improve Interactions in some cases
  - In general, happiness increases positive interactions between people. Happy people are more poised, assertive, and skillful communicators; they smile more, and they are generally perceived as more likable than sad people.
  - However, in situations where a more cautious, less assertive and more attentive communication style may be called for, a sad mood may help.
  - Those in sad moods gave significantly more to others than did happy people
  - . . . those in a sad mood were more concerned with fairness,

- Reduces judgmental bias, increases perseverance, and promotes generosity

Sadness Can Motivate In Positive Ways

- Diet
  - Too little of essential dietary elements or too many toxic or harmful elements can elicit sadness.
  - Motivating us to add or avoid certain foods
  - Processing, artificial flavors, artificial colors, and flavor enhancers can undermine our natural tendencies
- It makes me sad. – Once we connect an activity to sadness, we learn to avoid it.


"STRESS"


ANXIETY
- WHAT TRIGGERED YOU THIS TIME?!

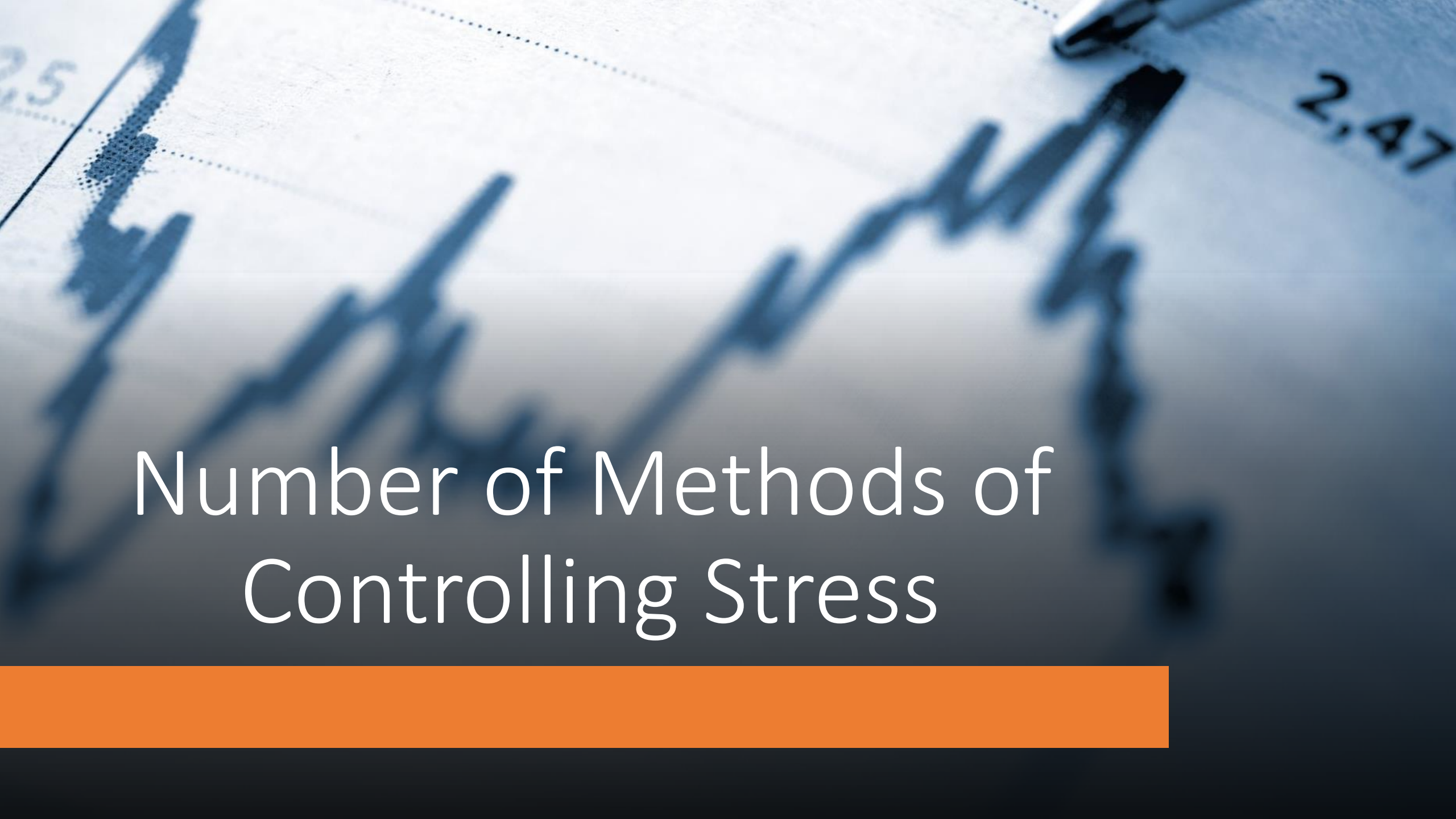
Catastrophizing → Fear

Persistent Fear, Anxiety, and Stress

- Fine line distinguishes between the healthy and unhealthy versions.
- Stress and fear are responses to external triggers, fear focusing on immediate and specific harm and stress more generalized, although there are no clear lines.
- Anxiety is similar to stress except that the triggers tend to be internal rather than external.
- All are normal ways to feel when the situation warrants but become unhealthy when they persist beyond the actual triggering event.
- Considered an anxiety disorder when internalized to the point of no longer requiring a legitimate trigger or any trigger at all.

Stress Response – Necessary but

- What we call stress is a physical reaction to significant threat that allows us to respond most effectively to that threat.
- Physical reaction should be limited to what is needed for as long as it is needed.
- Excess or prolonged reaction creates harm.
- Multiple methods of restoring healthy state.



Number of Methods of Controlling Stress

**"Howl at an ambulance or fire siren every chance you get.
Run around the room in circles with a sock in your mouth.
Eat a messy meal without using your hands or utensils.
Ask a friend to scratch your belly..."**

Alternative Methods

- Think – moving attention to prefrontal cortex changes neurotransmitters and brain waves, relieving stress.
- Meditation – both immediate and long term
- HeartMath – specific method that focuses on bringing heart into healthy rhythm
- Military or Box Breathing
- Silence
- Many others

Video

Hormones and Neurotransmitters

The main difference between hormones and neurotransmitters is that hormones are produced in endocrine glands and are released into the blood stream where they find their targets of action at some distance from its origin whereas neurotransmitters are released into the synaptic gap by a terminal of a stimulated presynaptic nerve cell, transmitting a nerve signal to its neighboring postsynaptic nerve cell.

Epinephrine (Adrenaline)

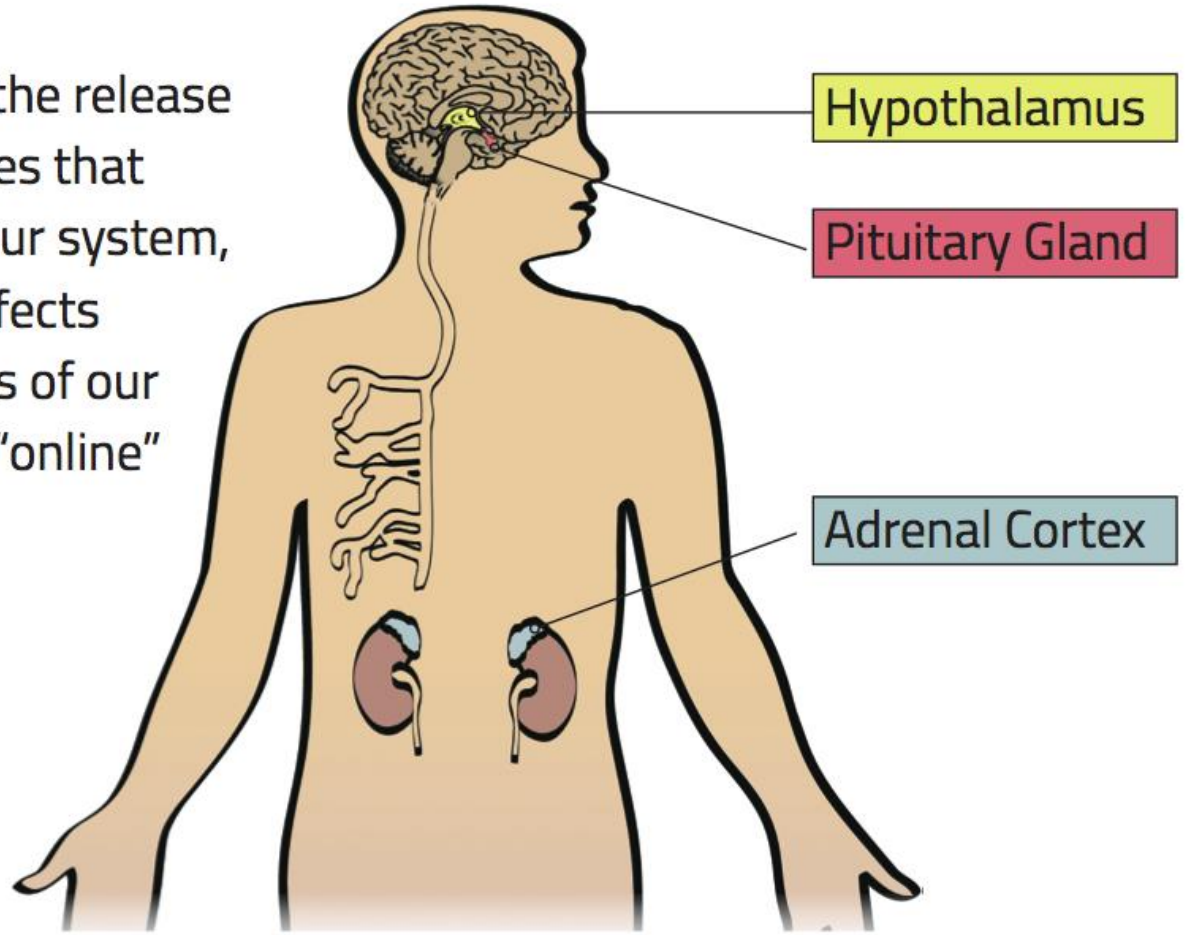
- Mostly released by adrenal gland but also neurotransmitter
- Increases oxygen and glucose to muscles
- Suppresses other processes not vital to immediate safety such as immune system
- Modulates memory by strengthening so memory is proportionate to importance

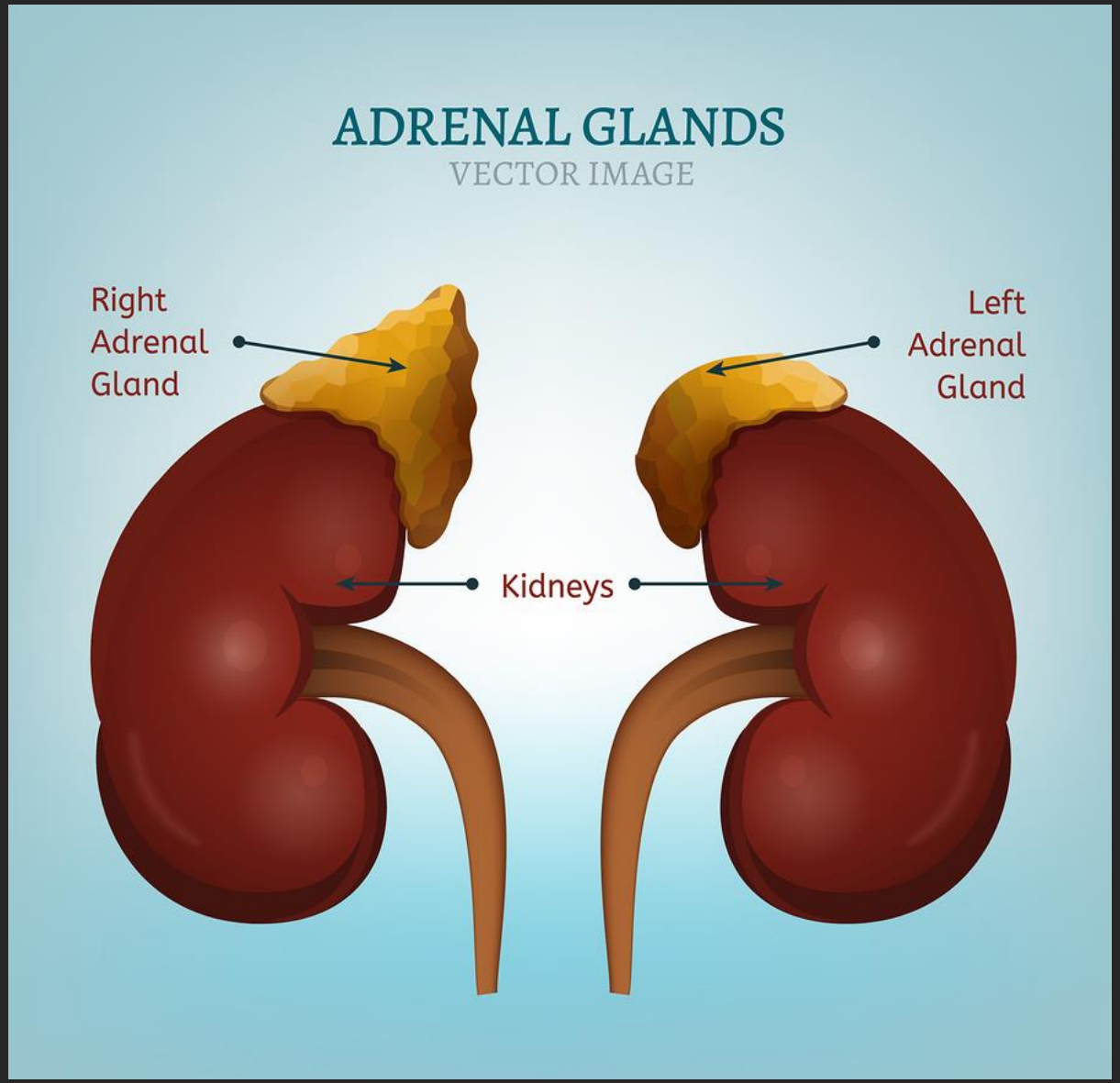
Norepinephrine (Noradrenaline)

- Also released as hormone by adrenal glands and also a neurotransmitter
- Leads to arousal and increased attention

Hypothalamic-Pituitary-Adrenal (HPA) Axis

Results in the release of hormones that activates our system, but also affects which parts of our brains are "online"



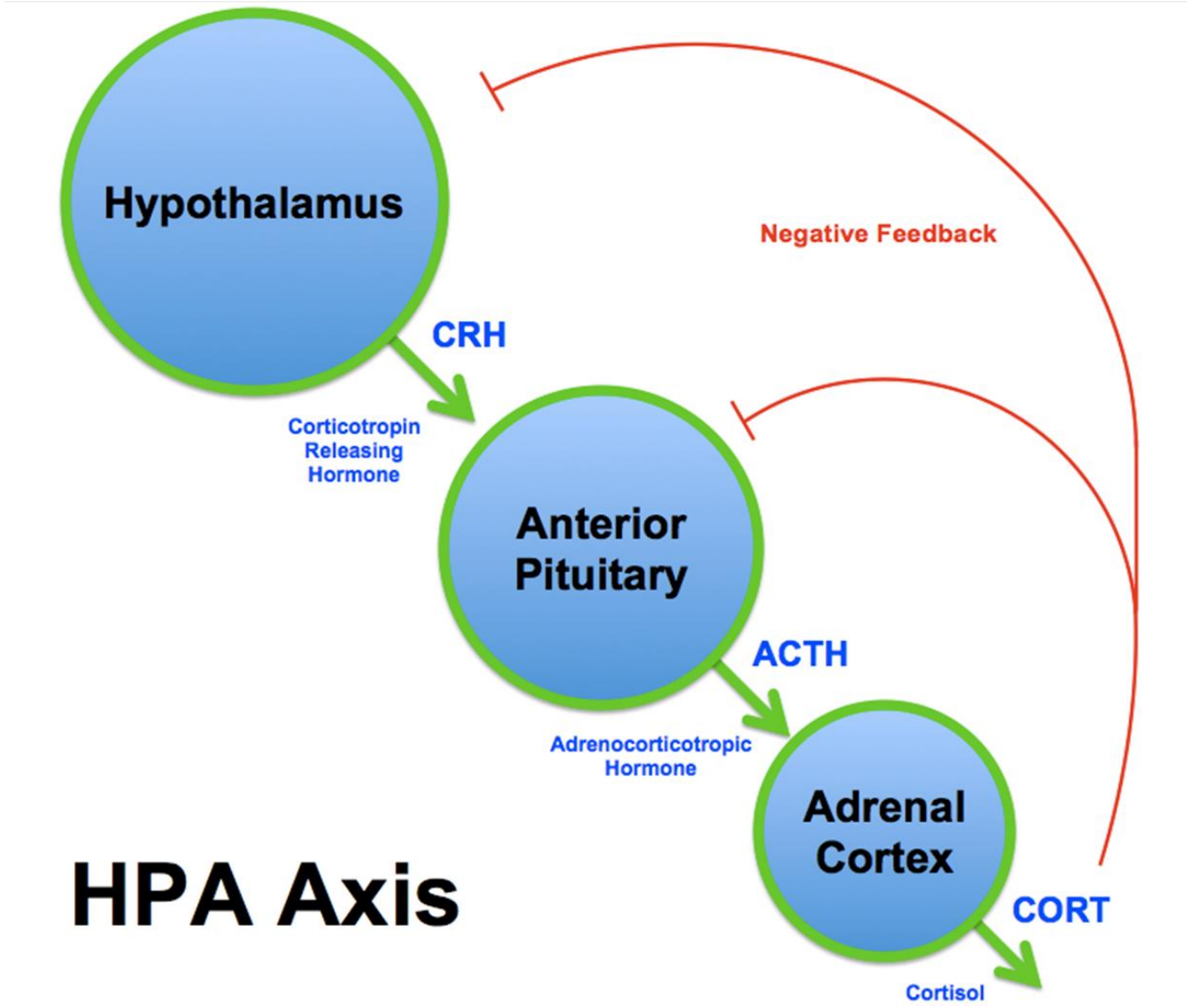


Adrenaline

—

Means at or alongside the kidneys

HPA and Negative Feedback Loop



How HPA Works

- Neurons in the Hypothalamus create and secrete Corticotropin-releasing hormone (CRH) and vasopressin (AVP).
- They travel to pituitary gland and cause secretion of adrenocorticotropic hormone (ACTH).
- ACTH works on adrenal cortex to release hormones, particularly cortisol.
- Negative feedback loop to pituitary and hypothalamus to stop producing CRH and ACTH (in other words – message received).
- A healthy stress response is characterized by a quick rise in cortisol levels, followed by a rapid decline with the termination of the stressful event.

Cortisol

- In healthy individuals, cortisol rises rapidly after wakening, reaching a peak within 30–45 minutes. It then gradually falls over the day, rising again in late afternoon. Cortisol levels then fall in late evening, reaching a trough during the middle of the night. This corresponds to the rest-activity cycle of the organism
- Increased production of cortisol during stress results in an increased availability of glucose in order to facilitate fighting or fleeing.
- Cortisol also suppresses the highly demanding metabolic processes of the immune system and raises blood pressure.

Good Cortisol and Bad Cortisol

- Correct regulation of cortisol is critical to health.
- Too little or too much creates problems.
- Healthy stress response – stimulus creates rapid rise in cortisol levels followed by rapid decline after stimulus removed.
- Chronic stress or failure of decline creates excess wear and tear on body resulting in neuropsychiatric and metabolic disorders.
- Failure of systems to respond properly can result from genetic predisposition, early childhood exposure to stress, and current life stress.

Eustress vs. Distress

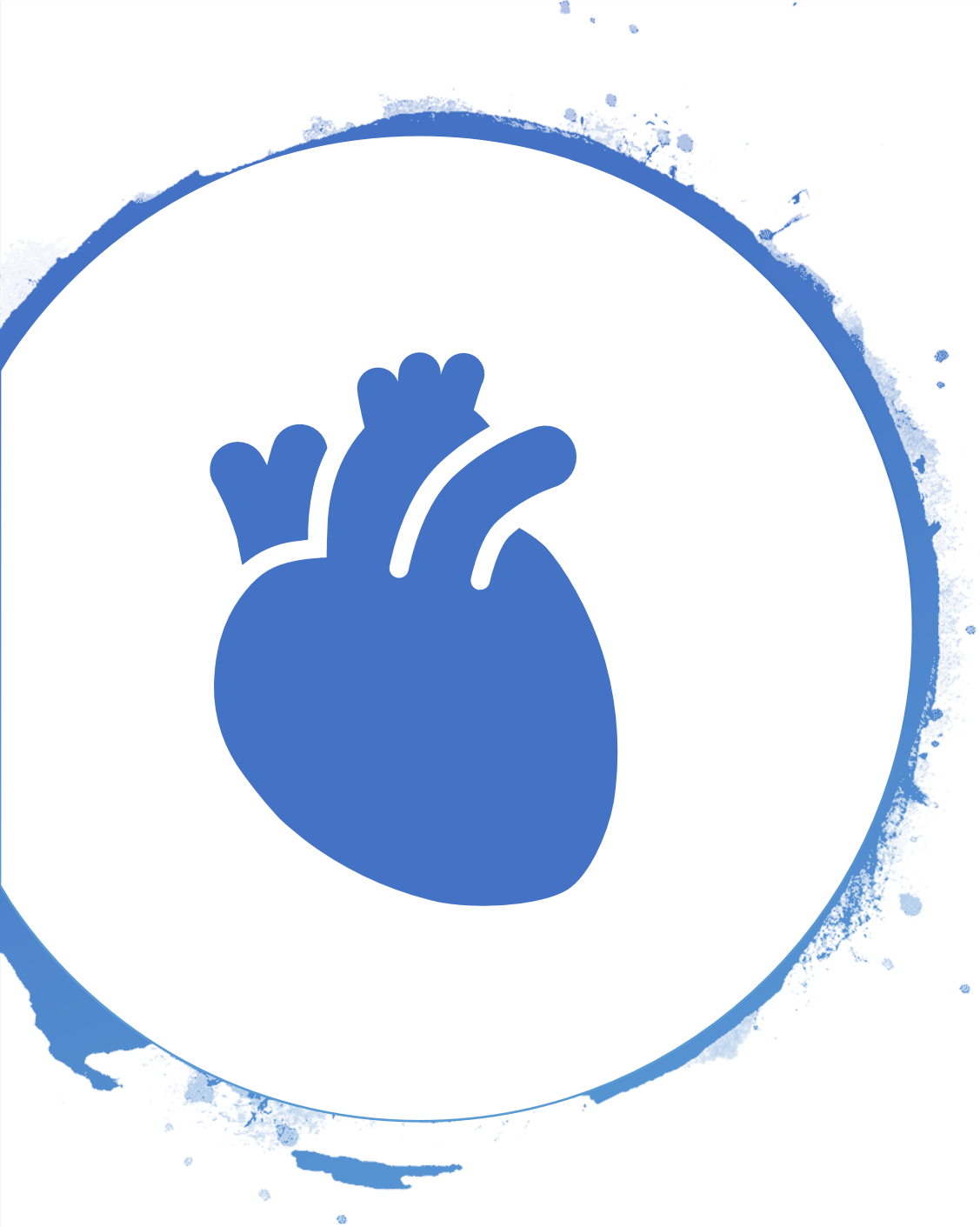
- Eustress (Good Stress) includes excitement and other positive high energy states.
- Distress (Bad Stress) includes fear and other negative high energy states.
- Distress can be divided into short term, adaptive responses and long term destructive responses.
- Three states can be categotized - in control, temporarily out of control, and despair.

Parts of Brain Affected by Stress

- Dopamine, epinephrine, and norepinephrine released
- Prefrontal cortex (executive functions) impaired – more instinctual than thought out
- Lower levels of stress enhance prefrontal cortex.
- Turns on amygdala – emotions, fear, anger
- Impacts hippocampus to facilitate instinctual memory, enhance memory related to the stress, and weaken memory of less emotional details
- Article with research cites article

Excess Stress Reduces Learning, Memory, and Performance

- Stress can induce a bias by promoting habit-based forms of learning and memory in lieu of goal-directed performance.
- The secretion of cortisol and norepinephrine in response to acute stress is known to affect learning and memory.
- Chronic exposure to elevated glucocorticoid levels also can have a detrimental effect on prefrontal cortex function with neuronal degeneration.



When It Does Not Shut Off

- Any stress lasting longer than a few minutes results in increased levels of cortisol being released from the adrenal cortex.
- Raises blood sugar (to feed muscles so you can run or fight), raises blood pressure, and modulates immune function.
- After 18 minutes or so, stop feeling the rush and fatigue and anxiety set in.
- Cortisol levels rise with old age and take more time to return to normal levels after experiencing stress.
- Techniques to regulate excess cortisol release critical to good health.

Ways to Reduce Cortisol

- HuffPost article by Dr. Gottfried link
- Vital Choice article link
- Psychology Today article link
- Dehydration causes cortisol levels to rise link
- Black tea can reduce cortisol levels link
- Avoid sugars, simple carbs, and processed foods
- HeartMath, Meditation, and other relaxation techniques
- Fish oil
- Adaptogens – Panax Ginseng, Rhodiola Rosea link

Anxiety – Good or Bad

- By evolution we naturally tend to focus more and be more attentive to the negative than the positive. Loss vs. Gain
- Some are more likely to try to anticipate and look for errors than others.
- Error-Related Negativity (ERN) – electrical charge that spikes when we make errors but also shows sensitivity to potential errors. Link
- Generated from ACC that allows us to correct errors and learn new things.
- What allows us to grow and learn can also make us anxious if fires too often or too easily. link

We Can Learn to Reduce Anxiety

- Cognitive Bias Modification (CBM) is designed to help reduce anxiety by reprogramming the brain. Link
- Even though we may always notice unhappy or threatening faces more readily, practicing choosing happy ones lessens the ERN and therefore anxiety. Link
- Apps are easy to download, free, and take about 15 minutes to show improvement. link

When You Feel Bad

- Identify what you are feeling – by itself moves locus from lower feeling components of brain to higher thinking and learning components.
- See if you can identify it with an event or specific cause.
- Ask whether you can change what occurred.
- Ask whether you were responsible.
- If so, focus on how you could act differently in the future or otherwise learn from it.