

Horses and the Human Brain

OR Horses as the Coolest Neurofeedback Providers Ever!!

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Today...

- ...we're going to look at how horse interactions can provide training for the human brain, why that is helpful to our clients and students, and how we can set up sessions to encourage those positive results.



Learner Objectives

- 1) Participants will describe
 - a) how human brain arousal (or the frequency of brain cell firings) impacts function,
 - b) how brain arousal needs to match the needs of the task, and that
 - c) the key to effective function is to be able to regulate the brain arousal levels.
- 2) Participants will describe the 4 different types of dysfunctional brain arousal patterns and one diagnosis that goes with each.
- 3) Participants will list one horse activity to use with for each of 2 types of brain dysregulation.
- 4) Participants will describe one way the brain can learn to shift arousal patterns.
- 5) Participants will describe how equines can help regulate the human brain
 - a) through allowing horses to be responsive
 - b) through selecting appropriate equines, activities, and environment,
 - c) and how these activities can help train the human brain to function more effectively.

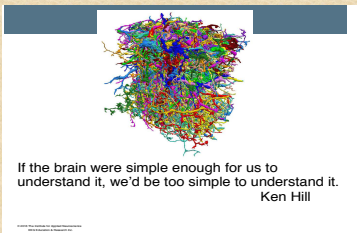


Outline

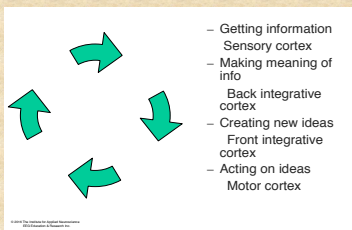
- A brief layman's look at human brain function, brain arousal and how experience changes brain functioning.
- Impact of human brain arousal on day to day function.
- How an equine can change human brains.
- Ways to set up situations where the horse can train the human brain, thus becoming the coolest neurofeedback provider ever!



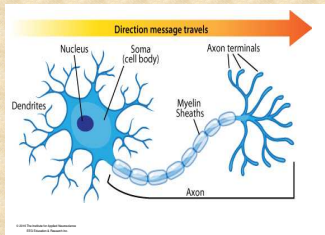
Human Brain Complexity



Four Basic Functions of the Brain

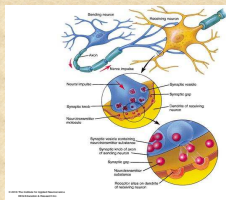


At the cellular level...



Each brain has a hundred billion of these.

Brain cells connect to other cells to electrically send messages to one another through synapses.



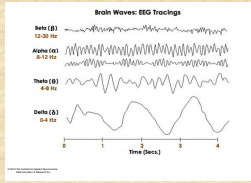
Each brain has 10,000,000,000,000 connections or 10^{13} synapses.

These connections are organized into neural networks which allow us to do all that we do.



- Everything you sense, or do creates the next input for the brain.
- The brain is constantly passing information all around from cell to cell.
- Cells "fire" or use electricity to pass information.
- The speed with which the cells fire is called the frequency. The higher the frequency, the higher the level of brain arousal and focus.
- A hertz is the unit of frequency equal to one cycle per second.

Different frequencies of brain waves are good for different activities.



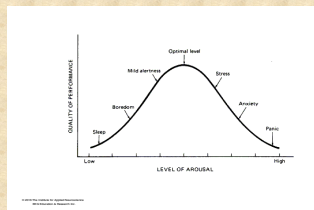
- High Beta (22-36 Hz)** body tension, anxiety
- Beta (15-18 Hz)** Activated with attention to externals, higher task orientation.
- Low Beta (12 to 15 Hz):** Focused, alert, calm, external attention.
- Alpha (8-12 Hz)** Relaxed, disengaged, internal attention. Meditation increases this level.
- Theta (4-8 Hz)** Day dreaming, inward focus, imagery, inattentive to external world. Creativity.
- Delta (0-4 Hz)** Sleep.

There are times in the average day when each frequency is beneficial. We need a range of focus and arousal levels to successfully get through our day and the flexibility to **shift** when we need to.

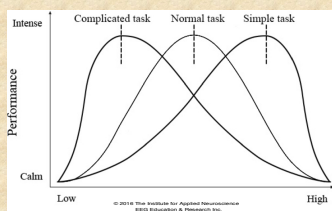
A well regulated brain is one that can shift to meet the needs of the situation or task at hand, and can change its ability to focus as needed.

Yerkes-Dodson Curve

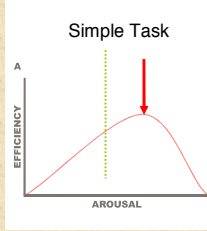
- Yerkes-Dodson Law looks at the relationship between focus, arousal and efficiency.
- The medium level of focus & arousal is best to perform many tasks. (For horses, "zero").
- If we increase or decrease focus and arousal, efficiency declines.



The requirements of the task determine the needed level of arousal.

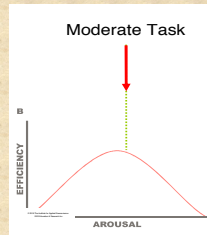


Simple Tasks



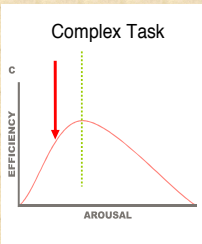
- Example- Hitting a nail with a hammer
- Slightly greater than average arousal or focus is necessary.
- If the focus or arousal level is too low, task performance suffers.
 - Miss the nail.
 - Need to hit it more times to drive it in (low efficiency).
 - Hit your thumb.

Moderate Tasks



- Example--Listening to my presentation
- Requires slightly more than medium arousal and focus.
- If arousal level is too low:
 - Drowsy,
 - Day dreaming
 - Poor concentration
- If arousal level is too high:
 - Fidgety, impatient
 - Distractibility
- In either case you might miss important information!

Complex Tasks



- Example: playing chess
- Requires maintaining lower than average arousal and sustained, focused attention.
- Sustained attention lowers arousal.
- If arousal level is too high:
 - Careless errors
 - Become restless, hyper or bored.
 - You lose the chess match.

- The arousal and focus levels need to be appropriate to the task.



- The key is to be able to regulate arousal and flow with the situation.
- But sometimes our brains get stuck in unhelpful arousal patterns or can't shift to meet the needs of a new situation.
 - Spectrum from mental rigidity to mental chaos (Dan Siegel, Mindsight). Or from all thinking, to all feeling (Janina Fisher).
 - Most of us tend to spend more time slightly to one side or the other, where we can think and feel at the same time. Others get stuck in the extreme ends.
 - Many factors contribute to our ability or inability to shift or flow to a different arousal level:
 - Genetics
 - Life experiences
 - Complex interaction between the two

Mental Health and Arousal Levels



- Arousal levels are the frequency of brain cell firings.
- Arousal levels are on a continuum from strongly under-aroused to strongly over aroused. Most of us are somewhere towards the middle.
- Most mental health problems and diagnoses generally reflect brain and nervous system arousal levels at the extremes.
 - over-arousal (tending towards chaos)
 - under-arousal (tending towards rigidity)
 - shifts from one state to the other. Or can shut down completely.
 - over-arousal and under-arousal at the same time, or shifting very quickly from one state to the other—early & frequent trauma.

Under or Hypo-arousal

- Low Arousal Levels
- More of the theta, & alpha frequencies
- Diagnoses examples:
 - Depression
 - ADD and ADHD



Hypo-arousal Behavior Examples



- Poor concentration
- Inattentive
- Distractibility
- Frequent daydreaming
- Spacy/foggy thinking
- Forgetful
- Confusion
- Lack of motivation
- Depression/low mood
- Lethargy
- Sensitive/feelings easily hurt
- Tears easily
- Low self-esteem
- Tends to introversion
- Excessively shy
- Falls asleep in low stimulation situations
- May have trouble getting back to sleep if awakened.

Over or Hyper Arousal:

- High brain arousal levels
- More of the high beta frequency levels
- Diagnoses examples:
 - Anxiety
 - Trauma victims - PTSD
 - Oppositional Defiant Disorder
 - Insomnia
 - Tics
 - Sensory overload



Hyper Arousal Behavior Examples:

- Busy mind/many competing thoughts
- Impulsive
- Fidgety
- Hyperactive
- Easily bored
- Risk seeker
- Impatient
- Agitated
- Aggressive
- Anxious/fearful
- Tense
- Feel overwhelmed
- Frequent tension headaches
- Teeth grinding or clenching
- Holds resentments
- Many social conflicts
- Sensory overload
- Low emotional awareness
- Heart palpitations
- May have trouble getting to sleep



Shifting or Unstable Arousal

- Difficulty maintaining an arousal state.
- Difficulty controlling shifts in arousal states.
- Shifting from higher to lower frequencies.
- Diagnoses examples:
 - Bipolar
 - Range from migraines, asthma, panic attacks all the way to seizures
 - Chronic fatigue
 - Personality disorders: borderline
 - Dissociative disorders



Shifting Arousal Behavior Examples

- History of head injury
- Severe migraine headaches
- Severe sleep disruptions
- Unusually intrusive PMS symptoms
- Angry depression
- Shifts from high anxiety to depression and back
- Shifts from manic behavior to depressive behavior and back



Complex or Disordered Arousal Patterns

- Under-arousal and over-arousal at the same time.
- Brains are not well integrated from lack of security and sense of safety, so the parts of the brain don't work well together.
- The survival centers are well developed and will take over quickly.
- Diagnostic examples:
 - Autism
 - Developmental disabilities
 - Neuro Developmental (complex) Trauma Disorder (childhood traumas that occurred early and often)



Complex Arousal Behavior Examples

- Explosive anger
- Dysregulated attachment
- Substance abuse



In general....

- For hypo arousal, we want to bring the energy level up.
- For hyper arousal, we want bring the energy level down.
- Co-regulation.



It is important that we “meet” people where they are, by externally matching their intensity level externally, while remaining calm at our core.

The good news is that our brains can shift to new different levels based on experiences..

- Neuroplasticity-- Discovered that experience changes the structure and the organization of the brain. Researchers have yet to find the limits of neuroplasticity.
- Learning to alter the brain pattern improves the self-regulation of brain waves and brain state.
- When the brain is better regulated, the individual functions & feels better.
- Neuroplasticity is always at work, for positive and for negative.



Neurofeedback



Operant conditioning to train the brain

- Based on biofeedback—empowers self regulation of the body.
- Operant conditioning uses positive rewards to increase a desired behavior, or in this case, brain frequencies.
- Rewarding experiences will teach the brain that a different way to operate works better, and it will shift to those frequencies.
- Given enough training the brain will discover that it “likes” the new pattern, and will continue to use it because it “works” better.
- Improvements are not quick, but they can be very long lasting.
- Neurofeedback can change the brain without use of medication and is an alternate treatment for things like ADHD, Autism, Anxiety, PTSD, Depression, etc.

In a neurofeedback training session:

- Electrodes glued to the client’s head and connected to the computer.
- The computer reads (only reads) the brain frequencies and presents them in a “game” format.
- The client focuses on a computer “game”.
 - The frequencies read by the electrodes are interpreted by the computer. When in the desired range they are rewarded.
 - The client’s brain responds by shifting to the better functioning frequencies.



Over time these training experiences will shift the arousal patterns of the brain.

So how does the horse train human brains?

- Horses try to manage their arousal levels as well.
- As social prey animals, one of the horse’s survival tactics is to be very sensitive to the arousal levels of those around them.
- They want to save reserves so they avoid overreacting.
- Given a choice, most horses love to be at a “zero” state (Sharon Wilsie).
- While zero is a state of calm, it also allows for quick responsiveness, and fun!
- Zero is that flow state between rigidity and chaos that allows the most flexibility in response.



A horse at rest at “zero” will...

- Have his head low
- Place his ears in a sideways, “airplane” position
- His body will be relaxed, look rounder, softer.
- His tail will be calm and quiet.
- He can still quickly respond alertly.



Social Zero

- As social animals horses want those around them to be relaxed and at zero as well.
- Some horses who have been through trauma, etc. have a difficult time finding their zero state.
- When feeling safe, some horses are particularly adept and helping others find zero.
- Some horses are care takers of each other, and will try to help others in the herd get to zero.



Horses as Neurofeedback Providers

- Some horses offer to be care takers for humans as well.
- When allowed to be responsive to our clients, these horses can provide the operant conditioning that helps to train the human brain.
- When they communicate with our clients, they can give feedback with their body language.
- Horses response serves as the “reward”.
- Some will try to co-regulate the client, for better or for worse.
- Some horses will suggest activities that help.



In a horse assisted therapy or education session, neurofeedback is at work.

- Horse assisted therapy and education provide experiences that can allow the human brain's neuroplasticity to shift to more effective levels of arousal.
- Given enough experiences with the client, the horse's responses will provide feedback to the brain, i.e. neurofeedback, to train the client's brain to be more flexible.
- **I believe that this is how horse assisted psychotherapy and learning actually works!**
- Can work with all of the different arousal patterns.
- But horses can use some human help to provide the best results.



Humans can help by:

- Staffing—Horse and human. Team approach is often best (diamond model).
- Taking care of the horse.
- Selecting activities that will help raise or lower the client arousal level as needed.
- Interpreting for the horse.
- Monitoring the interaction.
- Setting up the environment to be conducive to the change desired.
- Adjusting all of the above as needed.
- Give the horses time to help it work.



First of all.....You must keep it safe.

- Sense of safety crucial in ALL cases.
- There is no learning, healing or growth without safety. The brain learns best at "0".
- When overly anxious the brain shifts to fight, flee or freeze frequencies
- Includes physical, emotional, cognitive, spiritual safety.
- Embarrassment is a safety issue.



Have the appropriate staff

- Therapy—requires credentialed Mental Health Professional, who focuses on client.
- Education requires an educator who is knowledgeable on the topic taught. His/her focus will be on the student.
- Both need a certified equine specialist or therapeutic riding instructor will focus on the horse.
- Dually credentialed people can sometimes work, alone but safety must be carefully considered.
- Diamond team approach preferred: MHP/Ed, participant, ES and the equine.



Taking Care of the Horse

Horse Selection

- Willingness and interest.
- Predictable
- Level of horse arousal—is he or she appropriate with the client you have?



Taking Care of the Horse, cont.

Horse Preparation

- Help horse find “0” in various situations
- Become a good communicator with your horse so that you can interpret what he or she is trying to say to your client.
- Look out for your horse’s well being.



Taking Care of the Horse, cont.

Provide a living situation suited to the needs of the horse.

- Buddies, pasture, proper care, etc.
- Be the person the horse needs for support and safety.
- Human mindfulness. Be at "0"
- Slow way down. "Linger longer"



Activity Selection

Activities can shift the arousal in the direction it needs to go.

- Select those that match the focus and arousal level needed.
 - Increase arousal—competitive activities, vaulting
 - Decrease arousal—rhythmic, slow grooming, helping a horse get to zero, riding softly while being led.
- Simple task (requires higher arousal level): grooming to get a horse clean
- Moderate task—(slightly higher than medium arousal required) grooming procedure to get the horse clean, steering a horse while riding.
- Complex task—(lower than average arousal but high level of focus required) riding a pattern, doing a dressage test.
- Let the client's behavior be your guide.



During a Session/Lesson

Provide the horse what he/she needs to do the job:

- Allow for slow decoding, slow presence, slow responding, clear encoding and decoding.
- Provide clarity and consistency.
- Give them time. "Linger longer".
- Horse Assessment during a session or lesson
- Decompression after a session or lesson



Monitor the participant side of the interaction

- Select participants who are appropriate for work with horses
- Assess before, after and during a session
- Monitor your own arousal levels!
- Teach the participant:
 - how to monitor their own arousal levels
 - how their arousal level and behavior impact the horse, and how the horse lets him or her know.
 - How to calm him/herself, and to notice if the horse responds to that calming.
- Teach the participant strategies to calm the horse
- Know when it's time to intervene and step in when it happens.
- Notice improvements and comment on them. Adjust what you do accordingly



Monitor the horse side of the interaction

- Monitor the horse's arousal level—know your horse
 - what "0" looks like.
 - what out of 0 looks like.
 - your horse's preferred calming methods.
 - when your horse has had enough and needs you to step in and change the interaction.
- Assess and support your horse throughout.
- Consider horse's needs when scheduling sessions/ lessons.
- Assess how you are doing.
- We can only do this work if we keep it safe for all.



Environmental Considerations

Some environments provide better surroundings than others to allow for client brain training..

- Sense of safety crucial.
- Level of stimulation will impact activity & energy level.
- Consider what environments you have available and select the one that will best match your client's arousal needs.
- Time of day may have an impact on both the activity level at the barn and the arousal level of the client.
- Give it time so that the improvements become more long lasting.



In Conclusion....

Take homes:

- The human brain is a complex instrument that is constantly changing in response to experience.
- Arousal levels effect focus and function. The level of arousal and focus needs to match the needs of the situation.
- Human brains can get "stuck" at different arousal levels:
 - Under-aroused
 - Over-aroused
 - Shifting arousal
 - Complex arousal
- Neuroplasticity: Brain change comes with experiences. Constantly happening. We have not yet discovered the limits of this capacity!
- Neurofeedback: Brains can be trained to shift to a more effective patterns.



Horse experiences can also change the human brain...

- Horses want to be at a calm, alert, and in the present level state of arousal, or zero.
- Horses' social nature and desire to be at zero makes them very responsive to others around them.
- Caretaker horses will help clients come to zero.
- Enough experiences can shift human brain arousal patterns.



Humans can help horses help humans by...

- Taking care of the horses who are willing to help.
- Helping participants to understand the horses' needs and interpret their responses.
- Monitoring the interaction—self, horse & participant.
- Providing activities and tasks whose complexity meets the needs of the client.
- Providing a setting to support client needs.
- Noticing & documenting when they make progress.



The End!!



- Many thanks also to Ed Hamlin, Mary Ammerman, Sharon Wilsie and Lasel Bartlett for their contributions to this talk. And to all the horses who have trained all our brains!!!

Because, guess what...

- It works on us too!!!



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