

Objectives

- *State the main area of the brain involved in the storage of autobiographical, explicit, declarative memory.*
- *Name at least two types of “memory errors” that can occur during trauma processing.*
- *Describe one mechanism of action of memory reconsolidation tools.*
- *Learn two basic memory reconsolidation techniques.*

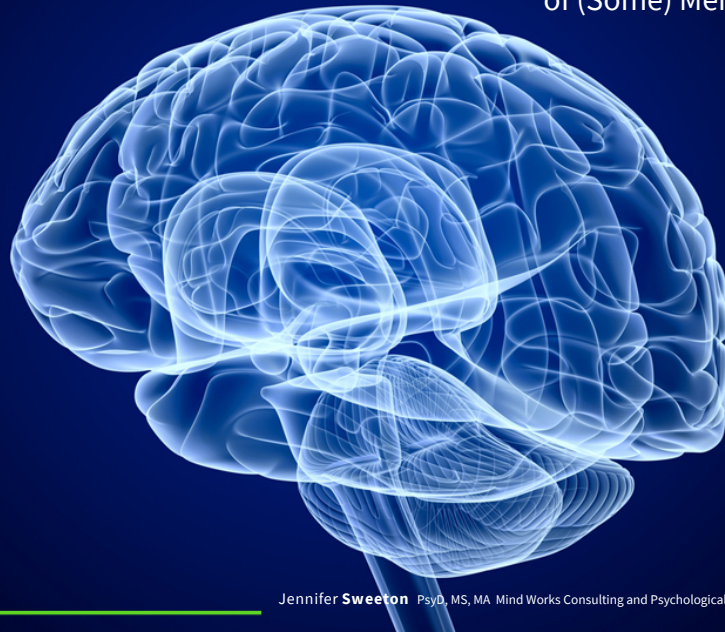
Jennifer **Sweeton** PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Outline

- Part I: The Neuroscience of (Some) Memory
- Part II: Memory Errors
- Part III: Steps of Memory Reconsolidation
- Part IV: The Neuroscience of Memory Reconsolidation
- Part V: Memory Reconsolidation in Therapy
- End Contact Me

Jennifer **Sweeton** PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Part I: The Neuroscience of (Some) Memory



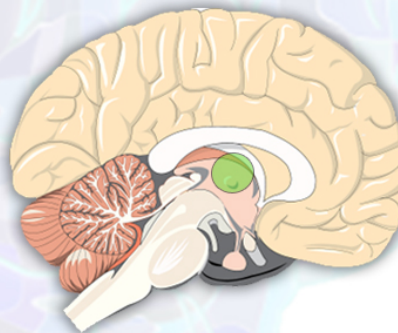
Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Limbic System

Thalamus

Gateway for sensory information
(except smell)

Main objective is to share sensory
information with as much of the brain as
possible, as fast as possible!

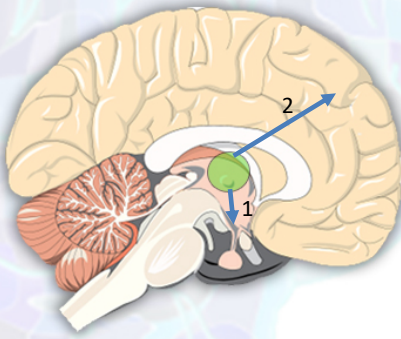


Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Limbic System

Thalamus: The Two Pathways

1. Fast, short path to the amygdala...
2. Slow, long path to the cortex...

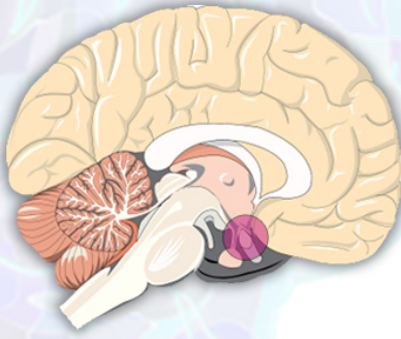


Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Limbic System

Amygdala

- "Fear brain" or "smoke alarm"
- Asks "Is this dangerous?"
- Involved in fear/threat detection
- Involved in implicit memory
- Begins stress response through activation of the HPA axis




Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Limbic System

Hippocampus

- Involved in learning and memory
- Explicit, declarative, autobiographical memory
- Impaired functioning when under stress




Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Limbic System

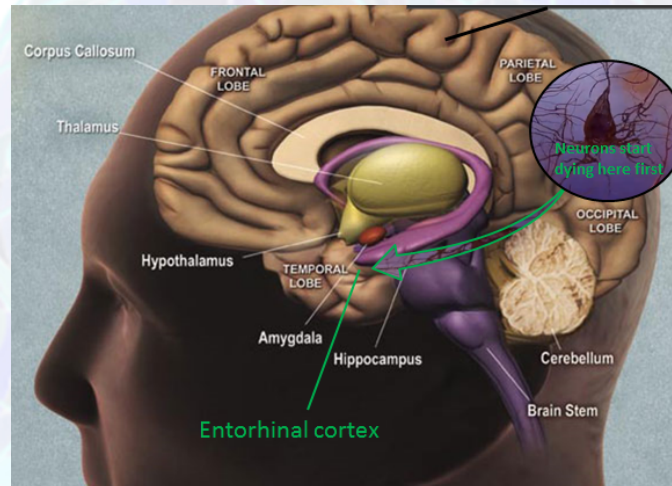
Entorhinal Cortex

- Involved in learning and memory
- Explicit, declarative, episodic memory
- Seems to store long-ago memories more than hippocampus



Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Entorhinal Cortex and Hippocampus



7mike5000 / CC BY-SA (<https://creativecommons.org/licenses/by-sa/3.0>)

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

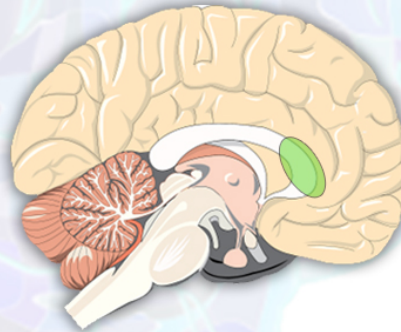
Limbic System

Insula

Site of proprioception and interoception

Allows us to be aware of internal experiences and states

Critical for emotional awareness



Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Cortex: Frontal Lobe

Prefrontal Cortex:

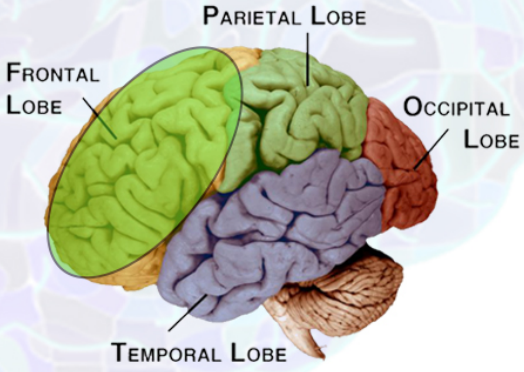
- Rational thought
- Goal-making
- Decision-making
- Sense of others
- Personality
- DLPFC important in memory!

Primary Motor Cortex

- Movement

Cingulate Cortex

- Emotion regulation
- Expectation of pain
- Conflict monitoring

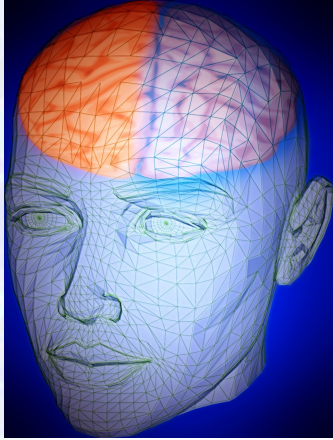


Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

The Two Hemispheres

Left Hemisphere:

- Labels thoughts and feelings
- Develops new narratives
- Logical
- More about tasks
- Practical language
- Detail monitoring
- Verbal memory

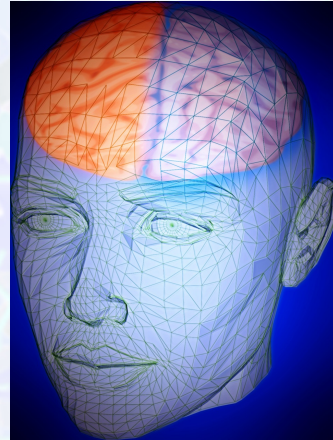


Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

The Two Hemispheres

Right Hemisphere:

Attunement
Prosody
Circuits of attachment
Awareness of body
Self-regulation
Empathy
Intuition
Spatial memory



Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Part II: Memory Errors (During Trauma)



Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

When Trauma Happens...

1. Context Disappears.

Panoramic picture isn't taken; memory may be fragmented. Small chunks, out of context, are remembered, which can lead to generalization of fear (hippocampal underactivation).

2. Fragments Blur.

Some fragments may be blurry (though, some are very clear), which can also lead to generalization of fear (hippocampal underactivation). Perhaps all cars feel dangerous, for example.

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

When Trauma Happens...

1. Temporal Sequencing Difficulty.

Order of events may not be encoded, leading to a feeling of disorientation. This can also lead to survivors changing their story about the traumatic event and what happened, and when (hippocampal underactivation).

2. Time Stamp is Missing.

The "time stamp" may not get attached to the memory; instead of remembering it, you relive it, including the emotions and physical sensations you experienced at the time. Flashbacks are also possible (dorsolateral PFC underactivation, insula hyperactivation).

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

When Trauma Happens...

The result?

Trauma may memories feel intrusive, overwhelming, and like they are still happening in the present. They may not age, and they may have components that haunt us, such as images, sounds, etc. that we can't get out of our minds. It can result in these memories feeling too hot to touch, unbearable, even dangerous. The natural response is to avoid these memories and anything associated with them.

Jennifer **Sweeton** PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Part III: Steps of Memory Reconsolidation



Jennifer **Sweeton** PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

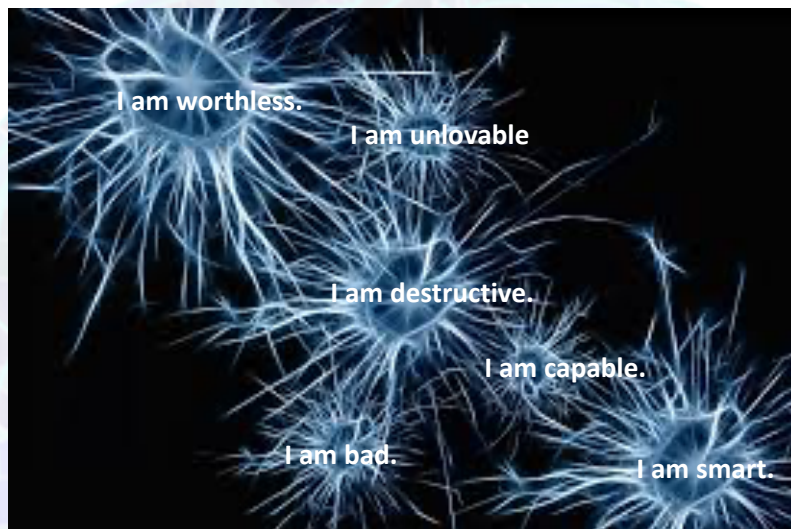
Avoidance After Trauma

- Cognitive theory of PTSD says avoidance drives the disorder.
- Hallmark of anxiety disorders and trauma: AVOIDANCE!!
- Why people avoid – it's intelligent, but doesn't work. What it lures you to do is a trap.
- Importance of treating avoidance in trauma and anxiety.

What are people avoiding??? Memories, but really, it's ACTIVATING NEURAL NETWORKS!

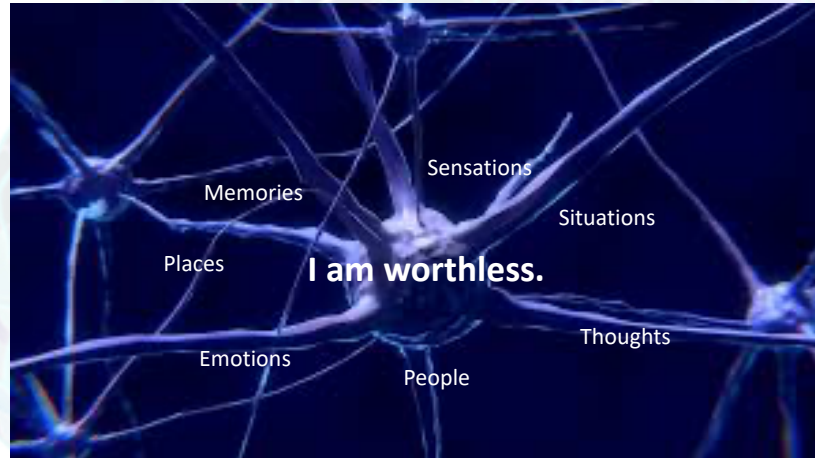
Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Neural Networks



Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Neural Networks



Jennifer **Sweeton** PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Trauma Networks

Why is it so hard to change trauma networks?

The memories consolidate incorrectly, creating networks that are...

- Rigid (concrete wall)
- Fragmented (difficult to integrate components)
- Easy to trigger (due to survival instinct)
- Very difficult to get out of once in
- Impervious to new information or influence from more adaptive networks

Jennifer **Sweeton** PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Trauma Networks



Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Trauma Networks

Memory reconsolidation techniques change these networks!

With therapy, networks can...

- Loosen
- Integrate internal components
- Shift
- Restructure
- Become less dangerous, harder to trigger
- Become easier to exit
- Allow in new adaptive information

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Memory Reconsolidation

Memory Reconsolidation Steps:

1. Activation of the memory network: Access and (re)activate the memory.
2. Desensitization/habituation: Access a contradictory experience in tandem to disrupt the experience of the memory, making it less distressing.
3. Repeat steps 1-2 a LOT.

There is an assumption here that you retrieve the most recently-re-encoded version of the memory every time you recall it, NOT the original memory trace!!

Unlocking the Emotional Brain (Ecker, Ticic, & Hulley, 2012)

Jennifer **Sweeton** PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Part IV: The Neuroscience of Memory Reconsolidation

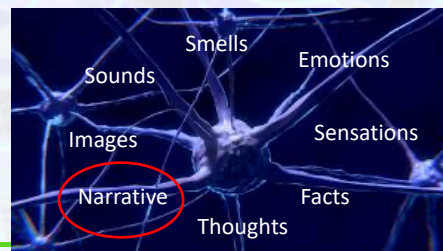


Jennifer **Sweeton** PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Memory Reconsolidation

Activation of the memory network: Access and (re)activate the memory.

- Rule #1: We have to activate a network in order to change it.
- Rule #2 Your attention is the network you're in.
- Hippocampus activates as memory is retrieved.
- Prefrontal cortex activates as memory is held in mind (in short-term memory), along with possibly insula and amygdala.
- The memory is part of a larger network, which includes emotions, sensations, etc. linked to the memory. By accessing the narrative of the memory (or any other piece of it), you activate the whole network!



ting and Psychological Services, PLLC

Memory Reconsolidation

Desensitization/habituation: Access a contradictory experience in tandem to disrupt the experience of the memory.

- Rule #3: Neurons that fire together wire together (Hebb's Rule) – repeated experience forms new connections, associations.
- You shift the entire network when you introduce new information or experiences into it.
- Prefrontal cortex activates as memory is held in mind (in short-term memory), and insula and amygdala may also be activated.
- Goal = neutralize the network or even shift to something positive.
- Multiple points of entry are possible!!



ting and Psychological Services, PLLC

Memory Reconsolidation

Repeat steps 1-2 a LOT.

- Rule #4: State to Trait: Repetition and effort promotes brain change.
- Rule #5: Brain change is active, not passive.
- Repetition is key to reconsolidation – iteratively, you shift the experience of the memory and your relationship to it, leading it to become less distressing and more integrated with adaptive networks.



ing and Psychological Services, PLLC

Part V: Memory Reconsolidation in Therapy



Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Memory Reconsolidation

- EMDR
- EFT, including “Tapping out of Trauma” (Craig Weiner)
- Brainspotting
- Neuromodulation
- Cognitive Processing Therapy
- Somatic Experiencing
- Possibly psychodynamic psychotherapy
- Possibly Internal Family Systems

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Memory Reconsolidation

Concepts can be integrated into other approaches as well...

- Prolonged Exposure
- Therapies utilizing fear hierarchies
- Trauma-Focused CBT
- Exposure and response prevention (not accessing memories, but distressing situations, in-vivo)

But, if you subscribe to more pure extinction-based theories, you may NOT opt to do #2 (provide a contradictory experience), relying solely on #1 (repeated exposure to the aversive stimulus/memory). In that case, you'd still be doing exposure therapy, but not exactly memory reconsolidation.

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Memory Reconsolidation Tools: EMDR

Some of the Main phases of EMDR:

- Phase 1: Target Sequence Planning – identify the Negative Cognition and memory to target with the exposure work (Phases 3-4)
- Phase 2: Preparation: Grounding, resourcing, stabilization
- Phase 3: Access and Activate
- Phase 4: Desensitization/Exposure
- Phase 5: Installation of Positive Cognition

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Memory Reconsolidation Tools: EMDR

Some of the Main phases of EMDR:

- Phase 1: Target Sequence Planning – identify the Negative Cognition and memory to target with the exposure work (Phases 3-4)
 - Phase 2: Preparation: Grounding, resourcing, stabilization
 - Phase 3: Access and Activate
 - Phase 4: Desensitization/Exposure
 - Phase 5: Installation of Positive Cognition
- Pieces of memory reconsolidation!*

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Memory Reconsolidation

Tools: EMDR

- **Phase 3:** Access and Activate the distressing memory network by bringing to mind an image of the worse moment along with the interpretation of the event (called the Negative Cognition, NC). Usually the NC is an “I” statement that captures how the event was processed. Examples: “I’m going to die,” “I’m bad,” “I’m not good enough,” “I’m abandoned. So, activate the NC and image together, and then apply bilateral stimulation/movement (BLS) for several sets. This is #1 of memory reconsolidation.
- **Phase 4:** Desensitization/Exposure: With the NC and image held in mind, BLS is applied (usually eye movements or tactile stimulation) for several seconds or event minutes. There are breaks between sets where the client is asked what they notice. The goal here is desensitization. It’s a way of doing #2 of memory reconsolidation (simultaneously introducing a new less distressing experience via desensitization). BLS leads to desensitization via the “working memory” and/or “interhemispheric communication” hypotheses. #3 is that this is done several times, repeatedly.
- **Phase 5:** Installation of Positive Cognition (PC): Once desensitization has occurred, the client pairs the original image with a PC, which is a positive statement about the self that they *wish* they thought when they recall that memory. Examples: “I am capable,” “I am lovable,” “I am strong,” “I am safe,” etc. This is also part of #2 of memory reconsolidation.

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Memory Reconsolidation

Tools: EMDR

Bring to mind something *slightly* aversive, or gross. This should NOT be a traumatic event or image, but rather an image of something you simply do not like.

<https://www.youtube.com/watch?v=Uul1tXDgCy4>

If you notice that it becomes harder to keep the image vivid, or to react to it, the BLS is working. This is a common experience and one reason that EMDR is believed to be effective.

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Memory Reconsolidation Tools: EMDR

Incorporating BLS into your life:

- Walking/pacing
- Jogging/running
- Drumming
- Dancing
- Tapping
- Rocking back and forth

Fast BLS will desensitize; slow BLS will intensify an experience! BLS is one way to accomplish step #2 of memory reconsolidation (changing your experience of a memory, or thought, etc.)

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

EMDR Protocols

- Early Intervention after Disasters: Adler-Tapia, R. (2013). Early Mental Health Intervention for First Responders/Protective Service Workers Including Firefighters and Emergency Medical Services (EMS) Professionals. In M. Luber (Ed.), *Implementing EMDR Early Mental Health Interventions for Man-made and Natural Disasters: Models, Scripted Protocols and Summary Sheets*. New York: Springer Publishing Company
- Lots of Different Scripts: Artigas, L., Jarero, I., Alcalá, N., & López Cano, T. (2009). The EMDR integrative group treatment protocol (IGTP). *Eye movement desensitization and reprocessing (EMDR) scripted protocols: Basic and special situations*, 279-288.
- Blind to Therapist Script: Blore, D. C., & Holmshaw, M. (2009). EMDR “blind to therapist protocol.” *Eye movement desensitization and reprocessing: EMDR scripted protocols basic and special situations*, 233-240.
- Specific Phobias: De Jongh, A., Ten Broeke, E., & Renssen, M. R. (1999). Treatment of specific phobias with eye movement desensitization and reprocessing (EMDR): Protocol, empirical status, and conceptual issues. *Journal of Anxiety Disorders*, 13(1-2), 69-85.
- Chronic Pain Modifications: Grant, M., & Threlfo, C. (2002). EMDR in the treatment of chronic pain. *Journal of clinical psychology*, 58(12), 1505-1520.
- Kids' Protocol: Greenwald, R. (2012). *EMDR within a phase model of trauma-informed treatment*. Routledge.

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

EMDR Protocols

- Recent Critical Incidents Protocol: Jarero, I., Artigas, L., & Luber, M. (2011). The EMDR protocol for recent critical incidents: Application in a disaster mental health continuum of care context. *Journal of EMDR Practice and Research*, 5(3), 82-94.
- Somatic and Medical-Related Conditions Protocol: Luber, M. (Ed.). (2019). *EMDR Therapy Scripted Protocols and Summary Sheets: Eye Movement Desensitization and Reprocessing: Treating Trauma in Somatic and Medical-related Conditions*. Springer Publishing Company.
- Grief Protocol: Luber, M. (2012). Protocol for excessive grief. *Journal of EMDR Practice and Research*, 6(3), 129-135.
- BPD/Complex Trauma Modifications: Parnell, L. (2013). *Attachment-focused EMDR: Healing relational trauma*. WW Norton & Company.
- Recent Traumatic Episode Protocol: Shapiro, E., & Laub, B. (2008). Early EMDR intervention (EEI): A summary, a theoretical model, and the recent traumatic episode protocol (R-TEP). *Journal of EMDR Practice and Research*, 2(2), 79.
- EMDR for Eating Disorders: Shapiro, R. (2009). *EMDR solutions II: For depression, eating disorders, performance, and more*. WW Norton & Company.
- Kids' Protocol: Tinker, R. H., & Wilson, S. A. (1999). *Through the eyes of a child: EMDR with children*. WW Norton & Co.

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Neuroscience of EMDR

Decreased activation in limbic areas and increased activation in prefrontal brain regions (Pagani et al., 2007).

Reduced:

- Amygdala activation, leading to fear extinction (Voogd et al., 2018)
- Thalamus activation, leading to less reactivity (Rousseau et al., 2019)
- Insula activation (Malejko et al., 2017)

Increased:

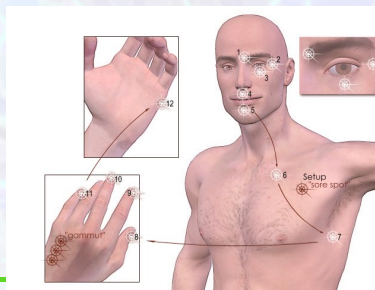
- ACC activation (Boccia et al., 2015)
- PFC activation, including dlPFC and vmPFC (Rousseau et al., 2018)
- Hippocampal activation (Malejko et al., 2017)
- Enhanced amygdala and hippocampus resting state functional connectivity with prefrontal cortical regions (Zhu et al., 2018)

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Memory Reconsolidation

Tools: EFT

- Emotional Freedom Techniques
- Gary Craig: <http://www.spiritual-web.com/downloads/eftmanual.pdf>
- Original believed to be pseudoscience, but attitudes are changing...



Consulting and Psychological Services, PLLC

Memory Reconsolidation

Tools: EFT

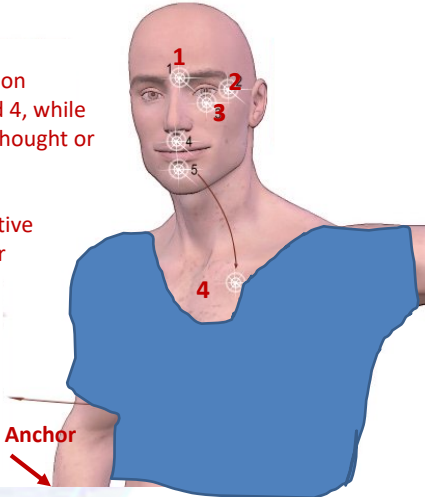
- EFT/tapping shares some common elements with EMDR.
- Tapping often is not bilateral, but is done quickly for desensitization, and is believed to take up working memory space.
- Tapping instructions:
 - Identify a distressing thought or memory that you want to “tap out of.” Also identify a positive thought or memory that is the opposite, or contradictory, to the negative thought or memory. (NO NOT bring to mind something traumatic!!!)
 - Bring clearly into mind the distressing thought or memory.
 - Follow tapping positions 1, 2, 3, and 4, tapping quickly on each spot for several seconds.
 - End with “anchoring” – holding the opposite arm with your hand firmly, as you bring to mind and connect with the contradictory (positive) thought or memory.

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Memory Reconsolidation Tools: EFT

Tap several seconds on locations 1, 2, 3, and 4, while holding distressing thought or memory in mind.

Then anchor to positive memory/thought for several seconds.




https://commons.wikimedia.org/wiki/File:Eft_punkte.jpg – Acupoints for EFT

Jennifer **Sweeton** PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Memory Reconsolidation Tools: Brainspotting

- Developer: David Grand, PhD
- “Where you look influences how you feel.”
- <https://brainspotting.com/about-bsp/what-is-brainspotting/>



Jennifer **Sweeton** PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Memory Reconsolidation Tools: Neuromodulation

- **The BAUD: Bio Acoustical Utilization Device**
<http://www.baudtherapy.com/studies.html>
- “The BAUD is a novel therapy device originally developed for improving ADD/ADHD symptoms, and clinical use revealed it to also be helpful reducing stress associated with emotional issues, addictive urges, and even chronic pain. FDA-cleared in 2006 as a class II device for adjunct therapy, the BAUD has since been used in over 500,000 clinical sessions in 20 countries.”
<http://www.baudtherapy.com/about.html>

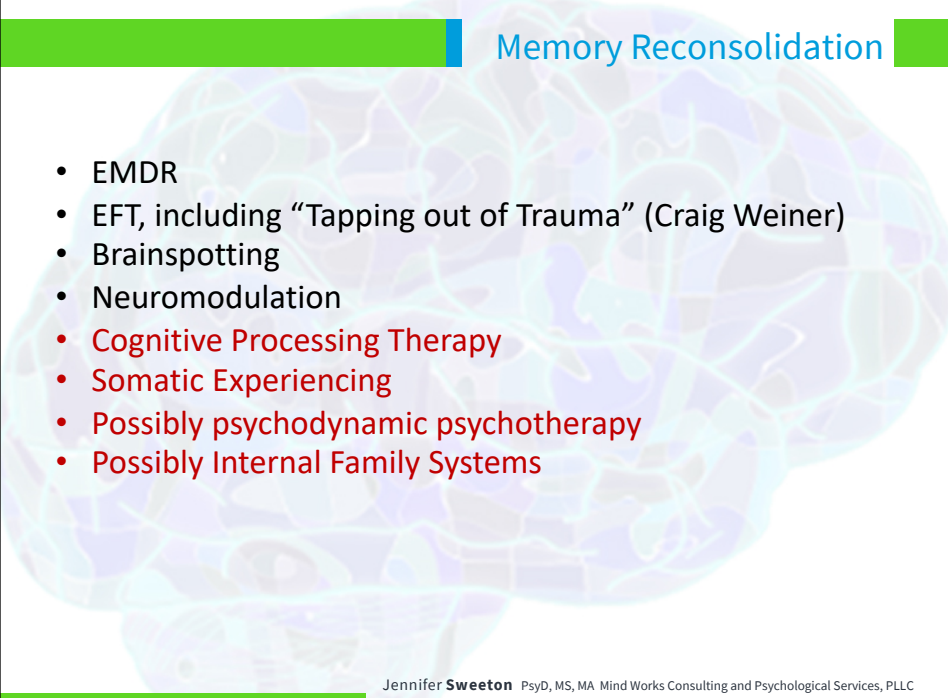


Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC

Evidence-Based vs. Cutting Edge

- **You can't be both evidence-based AND cutting edge...**
- Pay attention to proposed mechanisms; if we stay true to mechanisms, we are at least evidence-informed!!!

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC



Memory Reconsolidation

- EMDR
- EFT, including “Tapping out of Trauma” (Craig Weiner)
- Brainspotting
- Neuromodulation
- Cognitive Processing Therapy
- Somatic Experiencing
- Possibly psychodynamic psychotherapy
- Possibly Internal Family Systems

Jennifer Sweeton PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC



Change Ahead

Contact me!

officeofdrsweeton@gmail.com
 www.jennifersweeton.com
 www.facebook.com/drjsweeton

Jennifer Sweeton PsyD, MS, MA
 Mind Works Consulting and Psychological Services, PLLC

Limitations of Research

- Not all studies are randomized clinical trials.
- fMRI imaging measures blood flow, and cannot directly measure neuronal activity. Neuronal signaling occurs approximately 1,000 faster than blood flow, meaning that what we observe in fMRI research is much slower than actual neuronal activity, and may not correspond directly to this activity.
- Due to the high cost of conducting neuroscience research, many studies have a relatively small sample size compared to other types of psychological research. This can compromise validity.
- fMRI research identifies brain activations through the measurement of blood flow. However, some research has shown that it is possible for mental tasks to produce *less* activation in specific brain areas compared to brain activity at rest. Thus, looking solely at brain activations, not deactivations, may produce an incomplete picture of brain functioning.
- Some neuroscience research has been conducted on animals, and may not be directly applicable to humans.

Jennifer **Sweeton** PsyD, MS, MA Mind Works Consulting and Psychological Services, PLLC