

## Traumatic Memories Rekindled: When the Past is Always Present

This story was recently told to me of a brutal scene witnessed by a girl of ten, perhaps not unfamiliar to those who hail from the cattle ranges of eastern Montana. Subsequently, she says, all these years later, when a particular kind of predatory energy is present, the scene returns to her, carrying waves of rage and reactivity.

*“My father and I were riding horseback in the late 1960’s, gathering a couple dozen bulls out of their winter range, and trailing them to spring breeding range several miles away on the ranch in a pasture 10 sections large. When my father rode forward to lead and flank the front bulls through a coulee, I brought up the drag pushing those along that would rather be going in any other direction. But then they all caught up to a roiling mass of fighting bulls; a bellowing, charging, parrying, snot-flying knot of raucous bulls. And the reason became apparent between mountings; they had found a cow in heat with a broken leg. Her right hind leg jutted out at a very unnatural angle as she tried to hobble frantically on her remaining three. Bull after bull rammed his yard-long phallus into the helpless cow, who staggered desperately, but to no safe place. Hooves scraped long gashes of hide off her back and flanks, and she balled out in pain. The bulls were rushed on to their breeding range, but on the way back home we found the cow dead.”*

This traumatic memory only surfaced when the woman, now in her 50’s, went in for a routine procedure to remove a hemorrhoid. She agreed to a needless colonoscopy only because the doctor wanted to do one: she was fine except for “the fruits”. But she was very clear that she didn’t want to have to keep pushing herself back up inside each day, and before the anesthetic took effect she emphasized to the doctor, “I want them gone.”

When the gastroenterologist admonished her as she was regaining consciousness in the recovery room, to get them attended to by another doctor, she was incensed. She felt extremely offended by the doctor’s business practices: he had not previously disclosed the limits of his range of competence thus exposing her unnecessarily to anesthesia and the hospital operating room, and charging her thousands of dollars for a medical procedure that was not needed nor wanted while forfeiting the very reason she sought his help. In her words, she felt “passed on to the next herd bull.” Her perception of being disregarded in her need, request, intention, and trust in favor of his economic priorities all sent her into wails of fury, especially when she would awaken enraged in the middle of the night for months on end. She detailed several piquant strings of adjectives I probably couldn’t share and laughed about the voodoo dolls she’s gone through in her mind’s eye in effigy of that doctor as she sought neurofeedback to improve her self-regulation. But her reaction tells us something important about memory.

In early life, when the limbic system has not completely formed (the hippocampus is not yet functional), highly emotional moments that occur become stored in a separate memory system called procedural memory. Emotion-laden events stored in memory via the amygdala are part of what drives our behavior. If these memories were traumatized, they never fade. That traumatized memories, stored below conscious awareness and not subject to ready retrieval, are of great consequence is beyond doubt.

The fundamental process required to create a memory is dependent on the neurotransmitter glutamate and its receptors. Glutamate is an excitatory amino acid needed for each new learning and associating process to take place. A traumatic memory can be imagined as neuronal pathways connected by glutamate receptors that are laid down during the event. When reactivated by a stimulus it causes us to re-experience the original moment. This is synaptic consolidation. Under non-traumatizing conditions, after experiencing an emotionally charged event, the residual emotional responsiveness on recall of the memory decays over time. On the other hand, after an event is encoded as a traumatic memory, subsequent stimuli can reproduce various aspects of the event as if it were happening for the first time; there is no decrement over time. Non-traumatized memories can change, but when a haven cannot be found or an escape cannot be perceived at the moment of traumatization, we never feel safe; the threat, concomitant vigilance, and feelings of vulnerability are always with us.

Cortisol has been shown to enhance synaptic memory consolidation of emotionally arousing experiences. It is released during stressful circumstances, and all intense emotional states activate the stress response. Very high levels of cortisol released during a traumatizing event appear to affect how the event is stored in memory. As a consequence, we cannot consciously recall the event. This is called cognitive dissociation, and the memories are only available in episodic flashbacks, intrusive thoughts, or nightmares. The inability to consciously recall these dissociated memories is protective; so we don't need to actively block the memory from our mind. Unfortunately, this memory remains biologically active, often causing dysregulating emotional reactivity.

Subsequent recall of a component of a previously traumatized event by thought or other stimuli causes an inhibitory signal to be sent to the prefrontal cortex, ensuring that the pathway is not erased. Treating the traumatized memory requires discovering the origin of the emotional core of a traumatization. Since the emotional distress from recall of a traumatically encoded moment is experienced as if it were occurring for the first time, a neurobiological equivalent of safety can be generated after emotional activation, and the pathway can be disrupted. That is what happened as this woman (a teenage rape victim) resolved her PTSD symptoms with neurofeedback training. At last report, she has returned to a normal, quiescent flow of energy, without nightmares; sleep has returned to restful, sustained, natural rhythms; she's able to direct her mind and attention as she chooses, responding and self-regulating efficiently in the moment.

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