Post-Traumatic Stress Disorder?

“In her dreams she hears calls for help from people trapped in the offices of Cantor Fitzgerald, the bond firm that lost more than 600 employees, and in the Windows on the World restaurant, which occupied the top floors of the north tower.”

From Wikipedia:

“Posttraumatic stress disorder (PTSD) is the term for a severe and ongoing emotional reaction to an extreme psychological trauma. The latter may involve someone’s actual death or a threat to the patient’s or someone else’s life, serious physical injury, or threat to physical and/or psychological integrity, to a degree that usual psychological defenses are incapable of coping. It is important to make a distinction between PTSD and traumatic stress, which is a similar condition, but of less intensity and duration.”

From Wikipedia:

“PTSD symptoms may include: nightmares, flashbacks, emotional detachment or numbing of feelings (emotional self-mortification or dissociation), insomnia, avoidance of reminders and extreme distress when exposed to the reminders ("triggers"), loss of appetite, irritability, hypervigilance, memory loss (may appear as difficulty paying attention), excessive startle response, clinical depression, and anxiety. A person suffering from PTSD may also exhibit one or more comorbid psychiatric disorders. These may include clinical depression (or bipolar disorder), general anxiety disorder, and a variety of addictions.”
Traditional approach: what we get from philosophy and “common sense”

- The people governed by reason are “philosopher kings”
- The people governed by emotion are “warriors”
- The chariot where the sole rider is Reason, which guides the two horses – “Appetite” and “Spirit”….. (Plato’s “Republic”)

Motivation and Emotion are inherently interconnected with action, reasoning and decision making.

- Theoretical perspective
- Neural perspective
- Examples from current research

Psychological Theories of emotion and affect:

- James – Lange
- Cannon – Bard
- Cognitive Appraisal Theory:
Autonomic Nervous System

Thalamus sends sensory information to other parts of the brain.

Neural Structures important in Emotion:

Amygdala
Research on the Amygdala in Affect:

- Fear Conditioning (rat, monkey, human)
- Enhancement of emotional memories
- Recognition of emotional facial expressions (human studies)
- Psychopaths
- Sex and Addictions…

Coronal MRI of a human brain at the level of the amygdala

An Affective “Power Couple”

Prefrontal Cortex

Amygdala

Hippocampus

Central Control of Physiological Responses
(Some) Inputs and Outputs of the Amygdala

Basic “Fear Circuitry”

Fear Conditioning
Is PTSD a Persistent State?

According to *DSM-IV*, symptoms that appear within the first month of the trauma are not called PTSD but Acute stress disorder. If there is no improvement of symptoms after a month, PTSD is diagnosed. PTSD is divided into three categories: Acute PTSD subsides within three months. If symptoms persist, the diagnosis is changed to chronic PTSD.

Extinction of Fear Memories

- Extinction of fear represents either new learning or a reduction in the salience of old fear memories.
- Research from Quirk’s lab demonstrates that extinction is likely mediated by the (infralimbic region) prefrontal cortex,
- This same line of work demonstrates that rats with reduced prefrontal cortex volume (in the infralimbic region) fail to extinguish fear memories.
- Also, neurons in this region demonstrate differential responding during learning and extinction, whereas neurons in the amygdala do not differentiate between these conditions.

Fear Learning and Extinction

- The anatomical relationship between the amygdala and the prefrontal cortex is critical in maintaining appropriate responding to stimuli associated with fearful outcomes. This appears to be true in rodents and in primates.
What does this mean for PTSD?

• Rather than only considering the amygdala and temporal lobe systems of patients with PTSD, it is critical to also examine the role of the prefrontal cortex in this disease.

• PTSD was formerly considered overlearning of Fear. This may be correct, but the addition of a failure to downregulate the fear response must also be considered.
An explosion projected a tamping rod through his left cheek. Miraculously, he recovered and had “normal intelligence”.

Months later, however, Gage began to have startling changes in personality and in mood.

He became extravagant and anti-social, a fullmouth and a liar with bad manners, and could no longer hold a job or plan his future.

He was quick to anger and often got into fights.

"The equilibrium between his intellectual faculties and animal propensities seems to have been destroyed.” - Harlow

- One recent study reports that children who received damage to their prefrontal cortex before age seven, developed abnormal social behavior, characterized by an inability to control their frustration, anger and aggression.

- A brain imaging study of murderers found evidence that, on average, the prefrontal cortex as well as some deeper brain areas, including the amygdala, functioned abnormally.

- Impaired activity in prefrontal cortex and the amygdala also appeared in a preliminary examination of psychopaths with extensive criminal records who, as a group, are generally prone to violence.
**Neural Basis of Romantic Love?**

- The activity in the brains of 17 subjects who were deeply in love was scanned using fMRI, while they viewed pictures of their partners, and compared with the activity produced by viewing pictures of three friends of similar age, sex and duration of friendship as their partners.
- The activity was restricted to foci in the medial insula and the anterior cingulate cortex and, subcortically, in the caudate nucleus and the putamen, all bilaterally. Deactivations were observed in the posterior cingulate gyrus and in the amygdala and were right-lateralized in the prefrontal, parietal and middle temporal cortices. The combination of these sites differs from those in previous studies of emotion, suggesting that a unique network of areas is responsible for evoking this affective state.

(Quite Obviously, love has been too difficult to experimentally define, so most studies address lust rather than love.)

**Activations to Viewing Erotica**

The anterior cingulate, medial prefrontal, orbitofrontal, insular, and occipitotemporal cortices, the amygdala and the ventral striatum all demonstrated activation during viewing.

The study further demonstrated that the sexual arousal experienced, in response to the erotic film excerpts, was associated with activation in "limbic" and paralimbic structures, such as the right amygdala, right anterior temporal pole, and hypothalamus.

**Sexual Addictions: Cybersex Internet Heroin?**

- Some cybersex addicts develop a conditioned response to the computer and become sexually aroused even before turning it on, Dr. Putnam said. This can exacerbate the problem for people whose jobs involve work on a computer. "Simply sitting down to work at the computer can start a sexual response that may facilitate online sexual activities," he wrote in the journal.

**Inhibitory Systems**

- The attempted inhibition of the sexual arousal generated by viewing the erotic stimuli was associated with activation of the right superior frontal gyrus and right anterior cingulate gyrus.
- No activation was found in limbic areas.
Summary of Findings

• These findings reinforce the view that emotional self-regulation is normally implemented by a neural circuit comprising various prefrontal regions and subcortical limbic structures.
• This mirrors the importance of anatomical circuitry between the amygdala and prefrontal structures in other types of affect or emotion.

One More Point 😊

The brain is in no way obligated to function according to the psychological principles that we impose on it!