

LECTURE 3

THE NEUROBIOLOGY OF MEMORY

The Neurobiology of Memory

The Developing Mind

Daniel Siegel ('Parenting from the Inside Out' - pg. 22)

Implicit Memory

- Present at birth
- No sense of recall when activated
- Includes behavioral, emotional, perceptual and possible bodily memory
- Conscious attention is not required for encoding
- Does not involve the hippocampus

Right Hemisphere

Siegel- 'Parenting from the Inside Out' pg. 46

- Nonlinear / Holistic / Visual
- Specializes in:
 - Implicit / Non-Autobiographical information
 - Sending and receiving of nonverbal signals.
 - Mirroring neurons
- Empathic inter-subjective communication
- Pre-reflective (at the unconscious level)
- Intense and raw emotions
- Social cognition and mindsight
- Non-verbal communication

Explicit Memory

- Develops during 2nd yr. of life and beyond
- Sense of autobiographical recall when activated
- Autobiographical, sense of self and time
- Includes semantic (factual) and episodic (autobiographical) memory
- Involves the hippocampus
- If autobiographical, also involves the prefrontal cortex

Left Hemisphere

Siegel- 'Parenting from the Inside Out' pg. 46

Linear / Logical / Linguistic

Specializes in:

- Reasoning—looking for cause and effect
- Linguistic analysis—using words to define the world
- 'Right vs. wrong' thinking

The Purpose of Memory

Adaptive learning, emotional health (survival)

- are not replays of the past
- are reconstructions of the important components of the past
- to be efficient, are generalizations
- provide guidance to us now
- are therefore selective & unreliable

Psychological Health

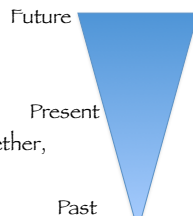
- Psychological Health:
 - “The ability, at any given moment, to have choices
 - along a belief schema continuum, which is accomplished by:
- Reconsolidation:
 - The human brain is capable of ‘re-wiring and updating’ itself throughout its life-span”. Facilitated by:
- Adaptive Information Processing (AIP):
 - “Humans have a drive toward survival and emotional health based upon their ability to adapt to the present environment by building upon past experiences and updating to the present.”

The Adaptive Information Processing Theory

- The ‘Past’ is recalled in the ‘Present’
 - Past experiences form the basis of our present and future anticipated responses
- A Memory (positive and negative)
 - Sensory (images, sound, taste, touch, smell*)
 - Thoughts at the time (become schemas over time)
 - Emotions (stored in Implicit Memory / Right Brain)
 - Sensations (stored in Implicit / Right Brain)
 - Beliefs (accumulate over time, become Schema)
- Memory Networks
 - Hebb’s axiom: neurons that fire together, wire together – developing channels of association

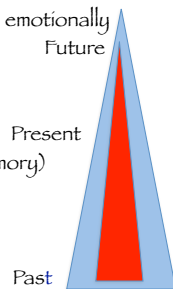
ADAPTIVE LEARNING

- The human brain is capable of ‘re-wiring and updating’ itself throughout one’s life-span
 - Present experiences link with and
 - Integrate past neuro-networks with
 - present experiences leading to
 - adaptive learning (reconsolidation)
- Hebb’s Axiom: neurons that fire together, wire together
- Reconsolidation = Learning = Psychological Health



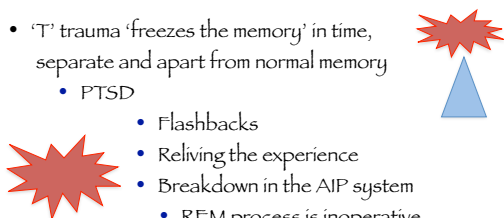
'Isolated' Memory Networks

- 'I' life experiences
- Prolonged exposure over time
- Adaptive learning within a closed system
- AIP is working – just cannot 'up date' emotionally
- Cognitively?
 - I know, I just can't stop doing it!
- The past distorts the present's
 - Emotions / Sensations (Implicit Memory)
 - Belief Schema (Here we go again)
 - Attitudes
 - Perceptions
 - Behaviors



A 'Frozen' Memory

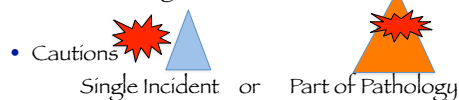
- 'T' trauma 'freezes the memory' in time, separate and apart from normal memory
 - PTSD
 - Flashbacks
 - Reliving the experience
 - Breakdown in the AIP system
 - REM process is inoperative
 - Nightmares of actual event
 - Frozen in the experience
 - Reliving:
 - The past is re-experienced as if it is the present!



- Childhood PTSD
 - Physical / Sexual / Abandonment
 - Developmental
 - Axis II type behavior
 - Dissociation



- Adult PTSD
 - Assaults / Disasters / War / Terrorism
 - Hyper-vigilance
 - Intrusive thoughts/Flashbacks



The AIP Approach to Psychotherapy

Based upon The Adaptive Information Processing theory

- Life experiences form the basis of health and pathology
- Neuro-logically: The 'Present begins with the Past'
 - Past emotional memory networks are activated in the present
 - Present responses are, therefore, influenced by past experiences
 - Past perceptions, attitudes and behaviors are 'up-dated' to the adaptive present

Psychotherapy treatment (up-dating)

- Up-dating is essentially 'linking past neuro-networks with present, adaptive neuro-networks
- Clients presenting complaints are
 - Illustrations that the client's up-dating process is not sufficient (or lacking) for the client's adaptive, emotional health

The Psychotherapy Intervention Process:

(with and without BLS (bi-lateral stimulation))

- Identify:
 - Mismatches between past and present emotional memory networks
- Treat the mismatches (BLS or otherwise)
- Integrate new insights (neuro-networks) to form present adaptive responses (trait change)
 - Behaviors
 - Perceptions
 - Attitudes
 - Belief Schema