The Neurobiology of Reduced Autobiographical Memory Specificity - Tom J. Barry Et Al

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October 27, 2020

Autobiographical Memory

What is Autobiographical Memory ?

Autobiographical Memory

What is Autobiographical Memory **Specificity**?

What is the research paper all about?

- What is emotional disorder?
- Recalling specific autobiographical memories (and events)
- Are they both correlated?

This paper discusses this from the point of view of both brain as well as cognitive mechanisms.

What is the research paper all about?

2 theories

- **Idiosyncratic** activation in regions of brain associated with assigning salience and self-relevance to emotional memories.
- Regions associated with inhibiting distraction and constructing vivid memory representation are also important.

Work in concert or independtly.

Reduced autobiographical memory specificity (rAMS)

- Difficulty in recapitulating AM.
- Is one of the core cognitive mechanism associated with **depression**.

Further this paper, examines what we know about the neurobiology of autobiographical memory and memory specificity in particular.

Some Questions

- Why rAMS occurs and its role in emotional disorders?
- Neuroscience evidence with cognitive models of rAMS
- How these advances in neuroscience help in diagnosing or intervention?

The Biological Architecture of Autobiographical Memory

Researchers have identified a network of brain regions across

- The Prefrontal Cortex
- Medial Temporal Lobe (MTL)
- Limbic System
- Occipital Lobe

that is associated with the retrieval and re-experiencing of AMs, **irrespective of their specificity**.

Areas and their related functions

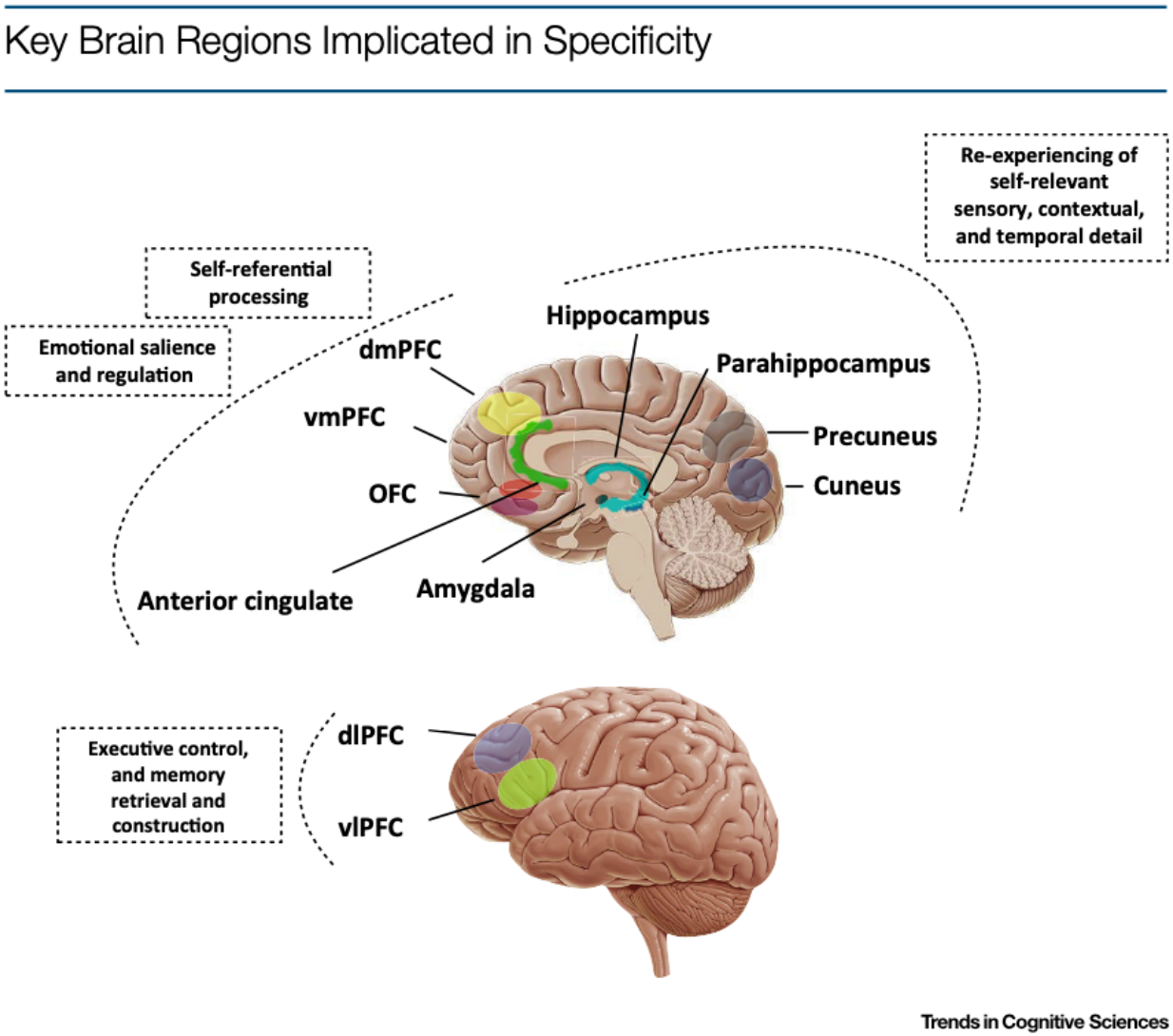
- **Later Portions of PFC**
  Early semantic processing and **selective** and **controlled** retrieval of memories from store (or the brain?).
- **Ventrolateral PFC**
  Ensuring only cue-relevant information is retrieved.
- **Dorsolateral region**
  Elaboration in working memory and modifying (if necessary).

Areas and their related functions - Continue

- **Medial PFC (mPFC)**
  The detection and representation of the **self-relevance**.
- The **amygdala, hippocampus, parahippocampal** formation, and regions within the **occipital lobe**, including the **cuneus and precuneus** are all into
  Re-experiencing of self-relevant, sensory, and emotional detail.

Disorders in these areas can lead to?

Figure 1


Key Brain Regions Implicated in Specificity
Re-experiencing of self-relevant sensory, contextual, and temporal detail
Self-referential processing
Emotional salience and regulation
Hippocampus
dmPFC
Parahippocampus
vmPFC
Precuneus
OFC
Cuneus
Anterior cingulate
Amygdala
Executive control, and memory retrieval and construction
dlPFC
vlPFC
Trends in Cognitive Sciences

Question?

Everything earlier said was in context of **specific memories**.

But what happens when brain tries to recollect **non-specific memories**?

Specific Memory Retrieval

Models for AM suggests the following process

1. Semantically-related information (eg. Happy)
2. Sensory-Perceptual detail

A person's ability to progress through this process is then likely to be determined by neural processes involved in the construction of a specific memory from general information and which separates the re-experiencing of a specific memory from the re-experiencing of other more general, semantic information. — what does this mean?

Specific Memory Retrieval

Models for AM suggests the following process

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mPFC and areas of MTL

Early investigations where participants listened to recordings of prior recollections of specific memories found that the mPFC and areas of the MTL showed **dissociable** activation when participants listened to

1. personally relevant specific AMs relative to personally relevant general memories (e.g., autobiographical facts or repeated autobiographical events)
2. non-personally relevant specific memories
3. general knowledge

mPFC and areas of MTL – Continue

These studies showed evidence that this activity, particularly within the hippocampus and amygdala, might be modulated by the strength of memory emotionality.

- Patterns of activation were likely to reflect reminiscence and elaboration on memories rather than retrieval and construction

mPFC and areas of MTL – Continue

Another study with emotionally neutral words, showed the same lateral and medial areas of the **PFC** and **MTL** were **differentially** recruited during specific, compared with general, AM construction.

For general memory – greater efforts.
Electroencephalograph (EEG)?

General and Specific memories

- Specific memories $\mapsto$ the **lateral PFC**, involved in early search processes and executive functioning were most active during **construction**, with a decrease in activity as memories were elaborated on.
- General memories $\mapsto$ no decrease in activity was observed. Why?

Reduced Specificity and Emotional Disorders

During retrieval of specific memories, people who are currently **depressed, compared to healthy participants with and without a first-degree family member with major depressive disorder (MDD), as well as people remitted from MDD**, have shown enhanced activation in aspects of the brain involved in the processing of **emotional salience** (e.g., insula, the pregenual anterior cingulate cortex, lateral orbitofrontal cortex), **re-experiencing** (e.g., parahippocampus/ hippocampus), **self-referential processing** (e.g., medial frontal gyrus, precuneus), and also abnormal patterns of activity in areas of the prefrontal cortex associated with **cue specification, executive functioning, and emotion regulation** (e.g., dmPFC, dlPFC).

Reduced Specificity and Emotional Disorders

Pattern of activation during recall $\sim$ *Specificity of their recall*

People with depression **works harder** to retrieve memory than healthy.

Reduced Specificity and Emotional Disorders – Continue

What is Volumetric Analysis

Volume of certain region of brains and their correlations...?

- Lower grey matter volumes in the hippocampus and precuneus are both associated with reduced recall of specific memories.

People with depression – Lower grey matter volumes

Valence Specific Studies

Participants with depression, specific memories cued by

- Positive words — weaker activity in areas of the brain associated with emotional salience and arousal (e.g., insula), self-referential processing (e.g., precuneus) and increased activity in executive functioning regions (e.g., lateral PFC)
- Negative words – stronger activity in areas of the brain associated with focusing one's attention on others (e.g., superior temporal gyrus) and increased activity in areas of the brain associated with emotional salience.

To Be Continued