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The Role of Semantic Cognition in Mood and Anxiety Disorders Pathophysiology

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Introduction

The functional role of the bilateral anterior temporal lobes has received increased attention over the last two decades. They have been linked to semantics and social concept processing, and are thought to be a key region in depression. Due to geometric distortions in the BOLD signal, the role of the ATL has frequently been overlooked in semantic models based on functional magnetic resonance imaging. Previous research, however, has unequivocally linked bATLs to these higher-order cognitive functions following advances in neuroimaging techniques to overcome geometric distortions. Simultaneously, the significance of the neural basis of conceptual knowledge in understanding mood disorders became clear. Theoretical models of the neural basis of mood and anxiety disorders have traditionally been studied from an emotion standpoint, without focusing on conceptual processing [1].

Description

Depression and anxiety have traditionally been studied from an emotion standpoint, focusing on the disruption of emotional regulation in patients. Recent research, however, suggests that understanding these mental health disorders requires an understanding of the neuroscience of conceptual processing. This review focuses on the neural basis of semantic cognition's new role in the development and treatment of mood and anxiety disorders. According to a recent review, the right superior anterior temporal lobe underpins the conceptual processing of social feelings like compassion and guilt. Negative social feelings, particularly guilt, play a role in mood and anxiety disorders, and understanding the functional role of the ATL in these processes will advance clinical research and treatment development [2].

In recent decades, neuroscience research on mood and anxiety disorders has attempted to identify biomarkers for diagnosis, treatment outcome prediction, and treatment development. The neural correlates of each of these mental pathologies, as well as their symptomatology and some proposed aetiologies, such as emotional regulation, have been studied. An fMRI meta-analysis, for example, found both distinct and overlapping functional and structural changes for depression and anxiety disorders, indicating a possible transdiagnostic view. The cingulum, medial frontal gyrus, precentral gyrus, amygdala, and hippocampus were associated with depression, whereas the orbitofrontal cortex, fusiform gyrus, anterior cingulate cortex, and insula were associated with anxiety. Certain areas of the anterior cingulate cortex, amygdala, hippocampus, and orbitofrontal cortex overlapped for both disorders. These areas are linked to emotion processing and emotional regulation [3].

Furthermore, certain biomarkers in the alpha band are linked to both anxiety and depression, with this signature becoming more visible when the comorbidity of these disorders is considered, reflecting the close relationship between mood and anxiety disorders. In line with this, emotional dysregulation is regarded as a causal factor for both mood and anxiety disorders, as evidenced by a shared cognitive profile for depression and anxiety patients during emotion-related experiences and regulatory strategies such as reappraisal or distancing. These factors are linked to altered functioning of amygdala prefrontal cortical circuitries, though the exact pattern of interaction is unclear. Furthermore, patients suffering from anxiety and depression frequently deal with self-blaming biases and guilt. According to the theory, in order to feel guilty, the brain must access related conceptual information via the ATL.

The bilateral ATL is thought to be the foundation of a transmodal hub region that integrates modality-specific concept information distributed throughout the brain to form a unified transmodal semantic concept. This region is thought to be at the centre of all daily tasks that require semantics, allowing one to understand verbal and nonverbal conceptual information and act accordingly. To drink a cup of tea, for example, one must recognise the related objects and interact appropriately. To accomplish this, the bATL works with modality-specific regions. In more detail, bATL interactions with visual and praxis-related regions are required for visual recognition and recognition of the need for reaching behaviours. This theory corresponds to the pattern of damage seen in patients with semantic dementia [4,5].

Conclusion

Understanding the neural signatures of mental health issues like anxiety and depression will pave the way for new clinical treatments and prevention. As previously stated, mental health disorders are extremely common in the population, posing a global public health problem. In addition to direct health-care costs, indirect costs pose a significant challenge for patients. As a result, research on mental health issues is critical for gaining new insights into these diseases as well as rehabilitation. The ATL has long been overlooked as a critical region in mood and anxiety disorders. However, advances in imaging techniques now allow for the mapping of the functional roles of ATL subregions in these disorders.

This will have significant implications for the development of theoretical clinical models of mental health disorders, as well as for treatment development. This will have significant implications for the development of theoretical clinical models of mental health disorders, as well as for treatment development. For example, neural regions that exhibit a distinct pattern of decoupling in association with a mental health disorder can be targeted for real-time neural coupling training as a treatment option. Understanding how bATL-fronto-limbic interactions work will thus have important implications for clinical research. Establishing the validity of ATL connectivity as a biomarker of symptoms and treatment efficacy, in particular, should be a major motivator for future research.

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Conflict of Interest

There are no conflicts of interest by author.

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