# The Blue Brain: Hemispheric Asymmetry in Depression as an Explanation for Working Memory Impairment

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*"If you immediately know the candlelight is fire, then the meal was cooked a long time ago."*
*– Oma Desala*

To Colin, my rock, for always helping me to see the big picture.

## Abstract

Due to substantial variability in past research regarding the cognitive and neurobiological correlates of depression, the current study investigated whether taking the possible relationship between asymmetric brain activity and cognitive impairment into account would help to clarify the matter. A total of 78 participants including 36 currently depressed, 11 previously depressed, and 31 never depressed participants, completed three mood questionnaires (Beck Depression Inventory, Hamilton Depression Inventory Short-Form, and the State-Trait Anxiety Inventory), and four working memory tasks (a spatial and verbal variant of both the N-back and complex span task). All participants had their resting brain activity recorded using an electroencephalogram. It was hypothesised that depressed participants would show relatively reduced left frontal activity, since left frontal activity is linked to positive affect and approach motivation, and that participants with depression but low levels of anxiety would show reduced right parietal activity while those with high anxiety would show increased right parietal activity due to the role of the right parietal area in arousal. These hypotheses were not supported as there were no differences in asymmetry scores between the currently depressed and the never depressed groups. However, investigation of this hypothesis was hindered by the high comorbidity of anxiety and depression making it impossible to disentangle the effects of depression and anxiety on parietal activity. It was also hypothesised that participants with depression would show impaired working memory with disproportionate impairment in the verbal working memory tasks that are thought to utilise left frontal brain activity. There was no clear support for this hypothesis. In fact, there was a trend toward improved performance possibly related to increased attention to detail due to activation of stress systems signalling a potential threat in the environment. A final hypothesis was that there would be an association between different patterns of brain activity and WM impairment but no association was found. These results highlight problems with research in this field including the conceptualisation and measurement of depression and cognitive performance as well as problems distinguishing between anxiety and depression. Future research needs to address these issues.

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