Title: Rest and active-state EEG dynamics: A mechanism for cognitive decline in mild cognitive impairment

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Abstract: Neural oscillations are brain waves produced by the repetitive and coordinated firing of cells in the brain. These oscillations underlie several mental processes including working memory. Working memory is the ability of the brain to hold onto information while manipulating this information, for example doing mental mathematical calculations. Older individuals with mild cognitive impairment (MCI) experience working memory deficits and are at an increased risk of developing further memory decline and Alzheimer's dementia. The overall goal of my proposed PhD project is to study the relationship between neural oscillations and working memory deficits in MCI. I propose to measure brain activity using electroencephalography (EEG) while participants are resting with their eyes closed as well as during a working memory task. The memory task as well as a resting-state condition will be administered to 30 older healthy controls and 60 individuals with MCI. We hypothesize that differences in oscillations between individuals with MCI and older controls will only be observed during the memory task and not during rest. More specifically, we expect that these differences will be greatest during trials on the memory task where participants perform incorrectly. Finally, we hypothesized that decreased oscillatory activity will be associated with lower accuracy. This is one of the first studies to examine the relationship between brain activity and working memory performance, with a focus on incorrect trials, in older individuals with MCI. Findings from this study will advance our understanding of the mechanisms underlying memory deficits and decline in this population. Furthermore, new knowledge from this research will hopefully lead to more effective preventative approaches for those at risk of developing Alzheimer's dementia.