sought to evaluate the ability of this mind wandering CPM, derived from response time variability, to predict CSF p-tau/Aβ42 ratio in 289 older adults from the Alzheimer's Disease NeuroImaging Initiative. We hypothesized that the combined mind-wandering model including functional connections that predict high mind-wandering and functional edges that predict stability in attention, would predict AD pathology.
Participants and Methods: Resting-state functional MRI data from 289 older adults (147 healthy older adults, 111 individuals with mild cognitive impairment, and 31 older adults with AD) from the Alzheimer's Disease NeuroImaging Initiative was analyzed for the current study. Participants were only included in the analyses if they had resting-state fMRI data, CSF measures of amyloid beta and tau pathology, and performance on cognitive composites of global cognition, episodic memory, and executive functioning. Using the well-established methodology of connectome-based predictive modeling, the mind-wandering model was applied to the resting-state fMRI data to predict CSF-based biomarker levels of p-tau and Aβ42. Moreover, we also examined if this mind-wandering model predicted individual differences in composite measures of global cognition, episodic memory, and executive functioning
Results: The high mwCPM model successfully predicted measured CSF p-tau/Aβ ratios (high model: ρ = .137, p = .0196), controlling for mean framewise displacement. However, the combined network and the low MW network were not significant (combined model: ρ = .0731, p = .216; low model: ρ = -.0027, p = .960). We next examined the association between connectivity strengths of the high mwCPM and cognitive functioning in the domains of general cognition, episodic memory, and executive functioning. Connectivity strength in the high mwCPM—functional edges that were associated with high behavioral variability—were negatively associated with all three cognitive composites (global cognition: r = -.239, p < .0001; episodic memory: r = -.208, p = < .0001; executive functioning: r = -.178, p < .0001).
Conclusions: This study provides the first empirical support for a link between a neuromarker of mind-wandering and AD pathophysiology. Moreover, mind-wandering also has downstream consequential effects for key domains of cognitive functioning in older adults. Interventions targeted at reducing mind-wandering, particularly before the onset of AD pathogenesis, may make a significant contribution to the prevention of AD-related cognitive decline.

Categories: Cognitive Neuroscience
Keyword 1: aging disorders
Keyword 2: awareness
Keyword 3: cognitive neuroscience
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2 Intentionality of Self-Generated Thought: Contributions of Mind Wandering to Creativity

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Objective: Studies suggest that internally oriented cognitive processes are central to creativity. Here, we distinguish between intentional and unintentional forms of mind wandering and explore their component contributions to creativity. Furthermore, we describe resting-state connectivity profiles associated with these trait-level measures of mind wandering. Bearing in mind the role of the DMN in internally directed cognitive processes, we hypothesize that, in general, mind wandering will be associated with increased connectivity of voxels in the medial prefrontal and posterior cingulate cortices, key nodes in the DMN. We further hypothesize that intentional and unintentional mind wandering will be associated with distinct patterns of connectivity across DMN core regions.
Participants and Methods: We used a sample of 155 healthy adults from the mind-brain-body dataset, all of whom completed resting-state fMRI scans and trait-level measures of mind wandering. We analyzed intentional and unintentional mind wandering tendencies using self-report measures. Next, we explored the relationship between mind wandering tendencies and creativity, as measured by a divergent thinking task. Additionally, we describe patterns of resting-state network connectivity associated with mind wandering, using graph theory (weighted degree) functional connectivity analysis.
Results: At the behavioral level, results showed a significant positive association between creativity and both intentional and unintentional

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mind wandering. Neuroimaging analysis revealed higher weighted degree connectivity associated with both forms of mind wandering, implicating core regions of the default network and the left temporal pole. We observed topological connectivity differences within the default network: intentional mind wandering was associated with degree connectivity in posterior regions, whereas unintentional mind wandering showed greater involvement of prefrontal areas.
Conclusions: In this study, we highlight patterns of resting-state network connectivity associated with intentional and unintentional mind wandering, and provide novel evidence of a link between mind wandering and creativity. These findings represent a promising step towards understanding the neurocognitive mechanisms that underlie productive mind wandering and demonstrate its relevance for the study of creative thinking.

Categories: Cognitive Neuroscience
Keyword 1: creativity
Keyword 2: neuroimaging: functional connectivity
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3 Mind-Wandering in Neuropsychiatric Diseases of Ageing

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Objective: Disruptions to mind-wandering are common across neuropsychiatric disorders. Whilst the large-scale brain networks associated with mind-wandering are increasingly well understood, we know very little about what neurobiological mechanisms trigger a mind-wandering episode and sustain the mind-wandering brain state.
From a clinical perspective, we aimed to understand dysfunctional mind-wandering in neuropsychiatric diseases of ageing: frontotemporal dementia, Alzheimer's disease and Parkinson's disease. We also tested the hypothesis that mind-wandering relates to visual hallucinations in Parkinson's disease. From a theoretical perspective, we advance the hypothesis that the hippocampal sharp wave-ripple is a compelling candidate for a brain state that can trigger mind-wandering episodes. The occurrence of the sharp wave-ripple is heavily dependent on hippocampal neuromodulatory tone. Neuromodulatory systems that regulate the sharp wave-ripple may be crucial for understanding the disruption to mind-wandering in neuropsychiatric disease.
Participants and Methods: We developed a thought-sampling task to probe mind-wandering in neuropsychiatric diseases of ageing. To explore brain patterns related to mind-wandering, we used multi-modal neuroimaging (i.e., resting state and structural scans). In separate studies, we applied these techniques in frontotemporal dementia and Alzheimer's disease; and in Parkinson's patients with and without visual hallucinations.
Results: We showed reduced mind-wandering in frontotemporal dementia, associated with functional and structural changes across the default network. In Parkinson's disease, we also found a reduction in mind-wandering compared with healthy controls. However, in patients with visual hallucinations, mind-wandering was preserved and associated with increased connectivity between the default network and early visual regions.
Conclusions: Together, disrupted mind-wandering occurs in neuropsychiatric diseases of ageing. It may contribute to some of the more recognisable symptoms in these conditions, including apathy and hallucinations. These findings also provide a unique clinical validation of current brain network models of mind-wandering that have been developed in healthy populations. Neuromodulatory influences over mind-wandering have implications for treating impairments in this process across neuropsychiatric conditions.

Categories: Cognitive Neuroscience
Keyword 1: aging disorders
Keyword 2: awareness
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4 Minds at Rest: Characterizing Clinical and Demographic Sources of Variability in Spontaneous Cognition During the Resting State.

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