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.

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3 Mind-Wandering in Neuropsychiatric Diseases of Ageing

Claire O'Callaghan
University of Sydney, Sydney, Australia

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.

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4 Minds at Rest: Characterizing Clinical and Demographic Sources of Variability in Spontaneous Cognition During the Resting State.

Jessica Andrews-Hanna, Quentin Raffaelli, Teodora Stoica, Matthew Grilli

University of Arizona, Tuscon, AZ, USA

Objective: Over the past decade, resting state functional connectivity has shown great promise as a diagnostic and prognostic tool when applied to neurological and psychiatric populations. For example, the integrity of the default mode network – among other large-scale brain networks – has emerged as a common target of neurological disease and psychopathology. Despite this explosion in research, relatively little is understood about the cognitive characteristics of the mind at rest, and most inquiries have relied on retrospective self-report questionnaires that pose challenges for clinical populations with memory or metacognitive deficits.
Understanding how different people mentally structure their idle thoughts may shed light on existing clinical neuroscience findings. Furthermore, the resting state is common context in daily life, and the lack of external stimulation during rest periods may foster the emergence of dysfunctional and/or impoverished thoughts for individuals with mental health or neurological conditions. Considering these important gaps, we conducted a line of research quantifying clinical and demographic sources of variability in resting state cognition.
Participants and Methods: Across three studies, resting state cognition was captured by training adults to voice aloud their thoughts in real time across 7-10 minute rest periods in the lab, the MRI scanner, and participants' own home. Participants were audio recorded using this think aloud technique, while efforts to minimize thought censorship were also employed. Audio-recorded speech was then transcribed and analyzed for content and dynamic characteristics by external coders and automated text analysis. Relevant characteristics were isolated and examined in relation to variability across participants in trait rumination, divergent thinking (a measure of creativity assessed with a separate Alternate Uses Task), as well as age.
Results: Across studies, the think aloud paradigm in resting state contexts showed promising ecological validity. Participants reported a low degree of thought censorship and a moderate-to-high degree of similarity of thoughts to everyday life. Additionally, total word counts across the transcripts were similar to typical rates of natural speech.
Notable variability across participants also emerged in the content and dynamic characteristics of resting state thought.

Increased trait rumination was associated with the emergence of brooding in real time, including a) more negative, self-focused, and past-oriented thoughts, as well as b) dynamic signatures marked by an attraction towards negative conceptual states, and c) a narrowing of conceptual scope following negative content. In contrast, more creative individuals exhibited a pattern of exploration and curiosity in their idle thoughts, with thought transitions characterized as more loosely associative. Finally, older adults generated more linguistic diversity in their use of positive emotional words (a novel marker of emotional granularity), accompanied by increases in psychological well-being.
Conclusions: Taken together, these studies highlight substantial demographic and clinical sources of variability in resting state cognition, with important implications for resting state functional connectivity findings. They also offer a promising methodological tool and theoretical framework to promote further research in neuropsychology and related fields.

Categories: Cognitive Neuroscience
Keyword 1: creativity
Keyword 2: emotional processes
Correspondence: Jessica Andrews-Hanna, University of Arizona, jandrewshanna@arizona.edu

Symposium 04: Innovative Ways of Applying Digital Technology in Neuropsychology - A Sneak Peak into the Future

11:45am - 1:15pm
Thursday, 2nd February, 2023
Town & Country Ballroom D

Chair

Michelle Madore
Stanford University School of Medicine, Stanford, USA

Discussant

Yakeel Quiroz
Massachusetts General Hospital, Boston, USA