On-Task, Off-Task, Rinse, & Repeat: Oscillatory Patterns of Mind Wandering predict Real-World Functioning

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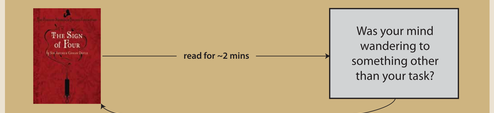
Mind wandering is associated with both detriments and gains in outcomes, contributing to deficits in task performance and emotional control (Killingsworth & Gilbert, 2010), while also facilitating creative thought and future planning (Smallwood & Andrews-Hanna, 2013).

Variability *between* individuals can lead to differences in real-life outcomes (Pereira, Gurguryan, & Ristic, under review), suggesting that mind wandering may operate variably *within* individuals to influence the degree of real-world functional outcomes experienced.

We characterized variations in mind wandering processes within individuals (N = 50) to examine the effect of these internal patterns on behaviour and cognitive functioning.

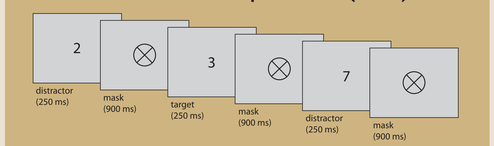
Tasks

Experimenter Caught Reading Task



Self Caught Reading Task

Sustained Attention to Response Task (SART)



Questionnaires

Temperament Traits: The Adult Temperament Questionnaire (Evans & Rothbart, 2007) assessed individual traits, across the cognitive-attentional and motivational-emotional spectrum.

Social Functioning: The Autism Spectrum Quotient Questionnaire (Baron-Cohen et al., 2001) assessed the degree of autistic-like traits in the typical population.

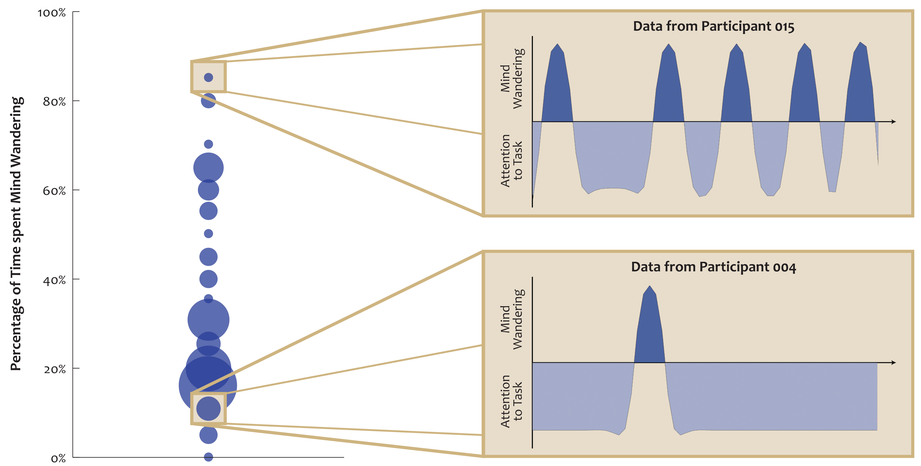
Real-world Outcome: Academic achievement assessed the highest degree completed or in progress.

Characterizing patterns of mind wandering

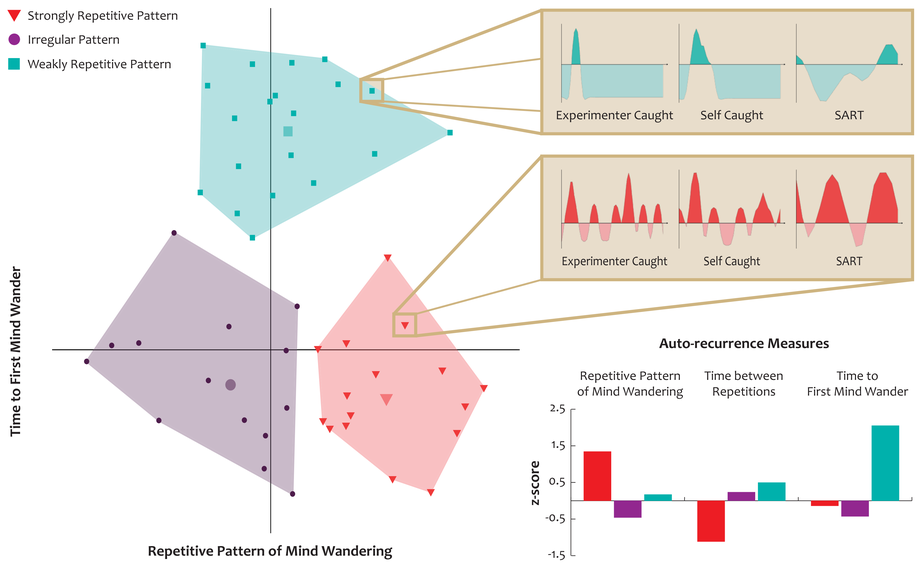
Mind wandering is typically measured as the percentage of time not attending to a task. We characterized patterns of mind wandering as the temporal fluctuations between mind wandering and attentive states within tasks.

$$\text{Percentage of Mind Wandering} = \frac{\text{\# of Mind Wandering instances}}{\text{Total \# of probes}}$$

Pattern of Mind Wandering = 5min Average Moving Time Window across the task

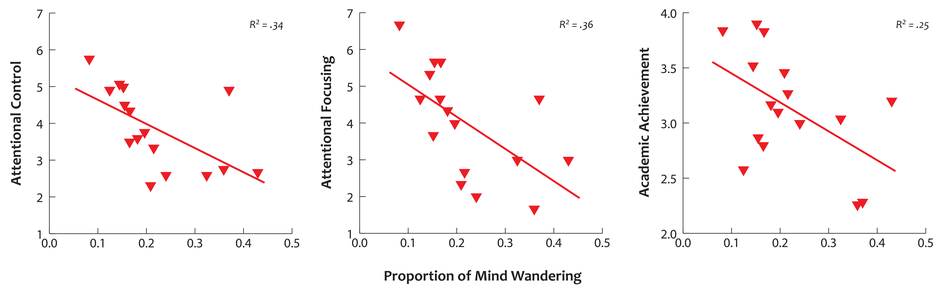


Auto-recurrence analyses were used to assess the temporal patterns of mind wandering for each individual, and cluster analyses uncovered three distinct types of mind wanderers.

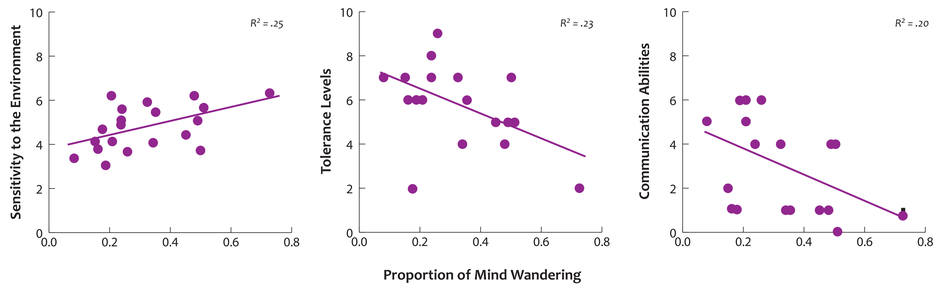


The effect of oscillatory patterns on real-world functioning

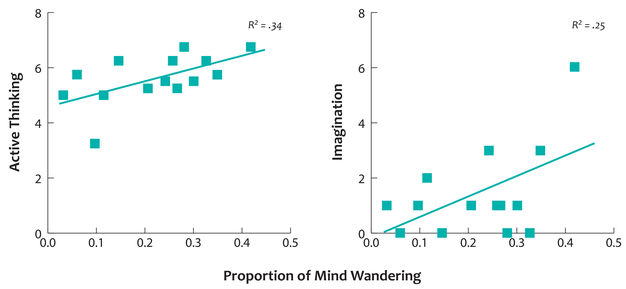
Strongly repetitive mind wanderers showed lower temperament trait scores across attentional control and focusing domains, and displayed lower academic achievement.



Irregular mind wanderers exhibited higher sensitivity to their environment and lower social skills across tolerance levels and communication abilities.



Weakly repetitive mind wanderers showed higher trait levels of active thinking and imagination.



Our data reveal that oscillatory patterns of mind wandering within individuals are meaningfully related to individual differences and real-world outcomes, thus providing some of the first insights into the underlying factors that result in negative and positive effects of mind wandering on cognitive functioning and persistent behavioural styles.