AUTONOMIC SIGNATURES OF MIND WANDERING DURING SUSTAINED ATTENTION AND MINDFULNESS MEDITATION IN EXPERT MEDITATORS AND CONTROLS

Sara Sorella, Alessio Matiz & Cristiano Crescentini

University of Udine, Italy

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Background: Mind wandering (MW) is a spontaneous fluctuation of attention associated with cognitive and physiological changes; however, it remains unclear how mindfulness experience modulates these correlates and whether different methods of MW detection capture distinct underlying processes.

Aims: We report two studies investigating cardiac and ocular correlates of MW in experienced meditators and non-meditating controls.

Methods: In the first study, 28 meditators and 28 controls performed a Sustained Attention to Response Task (SART) with thought probes, during which they indicated whether their attention was on-task or mind wandering. In case of MW, participants were asked after the task about its phenomenology. The same participants took part in a second study, in which MW was assessed during focused-attention meditation using two methods: self-caught (spontaneous reporting) and probe-caught (external probes). In both studies, heart rate and eye movements (EOG) were recorded.

Preliminary Results: In the first study, MW was associated with poorer performance (longer reaction times) and increased eye movements (number of blinks) in both groups. However, a critical autonomic difference emerged: only meditators exhibited a reduction in heart rate during MW episodes compared to on-task periods. This reduction was predicted by higher levels of experiential acceptance and was accompanied by a more concrete and realistic phenomenology of MW. In the self-caught paradigm of the second study, analyses revealed a significant Group (Controls vs. Meditators) by Time (Pre vs. Post probe) interaction in heart rate: while it increased during the sustained attention phase following MW in controls, it remained stable in meditators. Eye movements (vertical and horizontal) were overall greater in controls. By contrast, in the probe-caught paradigm, no significant modulation of heart rate emerged, whereas eye movements differentiated both Group (Controls > Meditators) and attentional state (MW: yes > no). Overall, these findings indicate that mindfulness experience modulates autonomic responses to MW. In particular, increased heart rate in controls may reflect higher cognitive effort related to MW interference during attentional tasks. Furthermore, during meditation, the method used to detect MW apparently influences the observed physiological correlates, with self-caught MW capturing more physiologically meaningful cognitive transitions between MW and sustained attention.

Keywords: Mind wandering, Mindfulness, SART, Self-caught, Probe-caught

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E-mail contact: sara.sorella@uniud.it