

BLINDED BY OUR THOUGHTS? INDIVIDUAL DIFFERENCES IN THE IMPACT OF SENSORY THOUGHT ON EXTERNAL VISUAL PROCESSING

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Grant 153/22

Background: Perceptual decoupling describes a phenomenon whereby the brain's processing of external sensory input is attenuated when our minds are occupied by our thoughts. However, as this phenomenon has typically been studied using within-subject paradigms, it is not known whether this 'tuning out' of the external world occurs more strongly for some people than others.

Aims: The aims of this study were to test for reliable individual differences in the perceptual decoupling effect, using a novel 'instructed sensory mind wandering' paradigm. The aims, hypotheses and analysis plan were pre-registered:

Forster, S., Bosten, J., Somers, L., & ROZMAN, A. (2024, June 2). Individual differences in perceptual decoupling using SSVEP. Retrieved from osf.io/6y3a8

Methods: 100 participants (mean age: 22, SD: 4.69, 27% male, 66% female, 7% another gender) performed the instructed sensory mind wandering paradigm while EEG data were acquired. In this paradigm, participants monitor visual stimuli (flickering dots), while either focusing externally or simultaneously imagining instructed scenarios designed to simulate naturalistic off-task thoughts and imagery. Participants rated the degree of absorption and mental imagery after each trial. We used EEG to measure the steady state visual evoked potentials (SSVEP) elicited by the dots. 51 of the participants completed two sessions of this task, ~10 days apart, in order to measure test-retest reliability in the decoupling effect. Participants also completed a battery of questionnaire measures of attention and imagery.

Results: Contrary to expectations, on average SSVEPs were significantly enhanced, rather than being reduced, while participants imagined the instructed scenarios. However, approximately 1/3 of participants showed a decoupling effect (i.e. reduced SSVEPs while imagining the instructed scenarios), and these effects were quite consistent across sessions (ICC = .714). These individual differences were not significantly associated with any questionnaire measures of trait level differences in attention and imagery ability.

Conclusions: Our results are intriguing in pointing to a stable form of individual differences in the impact of off-task thought on external perception – such differences would have striking real world consequences. However, further research is required to explain why the majority of participants experienced enhancement, rather than decoupling, in our paradigm.

Keywords: Mind wandering, SSVEP, Perceptual decoupling, Attention, Mental imagery

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