FEELING GOOD AND FEELING IN CONTROL: A LONGITUDINAL STUDY OF MOOD AND SENSE OF AGENCY

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Background: Human beings are immersed into a sea of emotions where episodes of high mood alternate with episodes of low mood. Feeling in control generally leads to a positive mood, while a lack of control can trigger negative feelings like anger or anxiety. Despite these common experiences, there is limited scientific understanding of the link between changes in mood and changes in the sense of agency (i.e. the feeling of controlling our actions and influencing the outside world).

Aims: This project uses mobile tech, machine learning and an innovative paradigm to explore our inner life's fluctuations. Through a longitudinal study, we will study if a better mood is associated with a stronger sense of agency.

Method: We designed a novel touch-screen based paradigm for online longitudinal studies (50 sessions per subject). In each session, participants first report their mood, level of stress, quality of sleep, etc. Then they perform a drawing attribution task whereby they reproduce non-familiar characters with their finger, displayed afterwards with some distortion. They then judge whether the image matches their drawing or someone else's. By fitting a psychometric function to subject responses across distortion levels, we estimate the level of distortion that leads to 50% of the rejection options, providing an implicit marker of a participant's current sense of agency. To separate the component of agency from other visual and executive processes at play, we use a control condition where the trace is drawn by a 'ghost' instead.

Preliminary results: Preliminary single-session results confirmed that the level of distortion modulates the attribution judgment very effectively, in both conditions. We calculate the accuracy of the drawing based on a convolutional neural network trained on distorted drawings to provide feedback on a fraction of trials. We hypothesize higher self-attributions: (i) in correct trials, due to self-serving bias; and (ii) after errors, due to post-error agency boost. We will analyze the association across sessions between mood fluctuations and our marker of the sense of agency. In another experiment using electroencephalography, we will analyze neural markers of attribution judgment during the task, reflecting the variance between expected and actual outcomes of the drawing. We aim to uncover the dynamics of internal states and their impact on behavior, potentially leading to new diagnostic approaches based on implicit digital markers for pathological episodes.

Keywords: Computational neuroscience, Sense of agency, Mood, Longitudinal study, EEG

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