Distinct electrophysiological markers of task-unrelated and dynamic thoughts

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BACKGROUND.

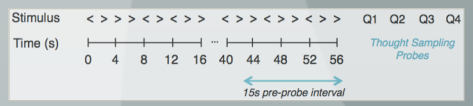
Traditionally, research has focused on whether or not these thoughts are related to the ongoing task, and has revealed reliable behavioural and neural correlates of task-unrelated thoughts. A recent theoretical framework focused on the dynamics of thoughts, particularly whether one's thoughts move freely between topics, are deliberately constrained by one's goals, or automatically constrained by emotionally salient stimuli. Notably, the neural correlates of these dynamic thought dimensions are unknown.

AIMS

We examined the electrophysiological signatures of several dimensions of thought: task-related thoughts, freely moving thoughts, deliberately constrained thoughts and automatically constrained thoughts.

METHODS

We recorded EEG activity from 24 participants while they performed an attention task and occasionally answered novel thought sampling questions about the nature of their thoughts.



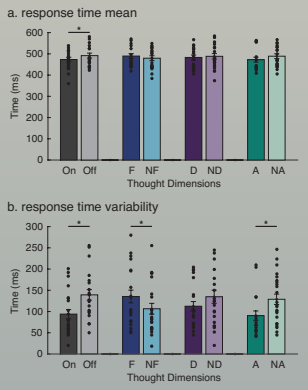
The attention task simply required participants to respond to whether arrows presented at fixation pointed to the left or right.

Occasionally, participants are interrupted to answer questions about their thoughts occurring within the last 10-15 seconds preceding the probe. They were asked the following questions:

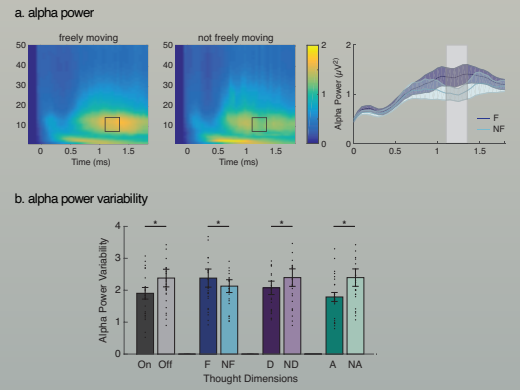
Q1) Were your thoughts related to the task?
Q2) Were your thoughts freely moving?
Q3) Were your thoughts deliberately constrained?
Q4) Were your thoughts automatically constrained?

RESULTS

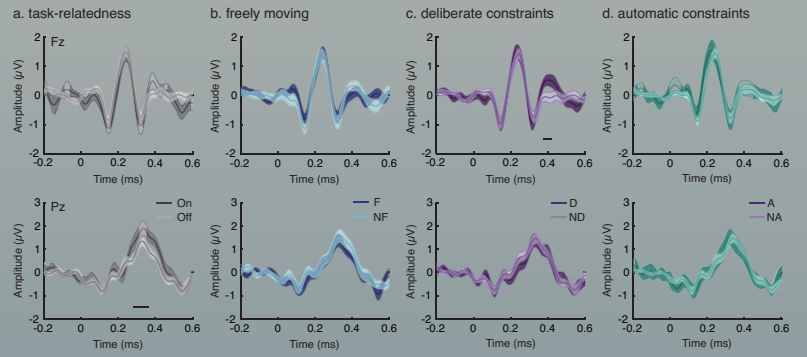
Reaction Time



Alpha Power (0.6s to 1.8s)



Stimulus-Evoked P3 ERPs (0-0.6s)



CONCLUSION

These results indicate distinct electrophysiological patterns associated with conceptually different dimensions of task-unrelated and dynamic thoughts. Our findings provide support for the notion that task-unrelated thoughts are orthogonal to dynamic thoughts.