

## **Are free will and moral responsibility real or illusory? On the causal role of consciousness in decision-making, a combined EEG and intracranial study”**

### **ABSTRACT:**

#### **Background**

The onset of the readiness potential (RP) - a key neural correlate of upcoming action - was repeatedly found to precede subjects' reports of having made an internal decision. This has been taken by some as evidence against a causal role for consciousness in human decision-making and thus as a denial of free-will. Yet those studies focused on purposeless, unreasoned, arbitrary decisions, bereft of consequences. It remains unknown to what degree these specific neural precursors of action generalize to deliberate decisions, which are more ecological and relevant to real life, and certainly pertain more to the realm of moral responsibility.

#### **Aims**

We aimed to test whether arbitrary and deliberate decision-making share the same neural mechanisms. In particular, we wanted to test whether the RP is similar between arbitrary and deliberate decisions.

#### **Method**

We directly compared the neural correlates of deliberate and arbitrary decision-making during a \$1000-donation task to non-profit organizations using EEG.

#### **Results**

While we found the expected RPs for arbitrary decisions, they were strikingly absent for deliberate ones.

#### **Conclusions**

Our results are congruent with the RP representing the accumulation of noisy, random fluctuations, which drive arbitrary - but not deliberate - decisions. The absence of RPs in deliberate decisions challenges the generalizability of studies that argue for no causal role for consciousness in decision making from arbitrary to deliberate, real-life decisions.

#### **Keywords**

Volition, Decision-making, EEG, Deliberate decisions, Arbitrary decisions

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