

Transcutaneous vagus nerve stimulation facilitates invigoration of effort

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Introduction

- **Anhedonia**: prevalent symptom in mental disorders such as schizophrenia and major depression¹
- Defined as **'inability to experience pleasure'**: no clear distinction between *wanting* (incentive salience) and *liking* (consummatory pleasure)¹
- Alternative view: **motivational deficit to work for reward**
- Reward processing and homeostatic regulation modulated by signaling of **vagus nerve** afferents to the nucleus tractus solitarii (NTS) and the forebrain²

Transcutaneous Vagus Nerve Stimulation (tVNS):

- Non-invasive approach to manipulate signaling of the auricular branch of the vagus nerve
- Application in the treatment of Major Depression³

Research question: How are perceived costs and benefits modulated by tVNS?

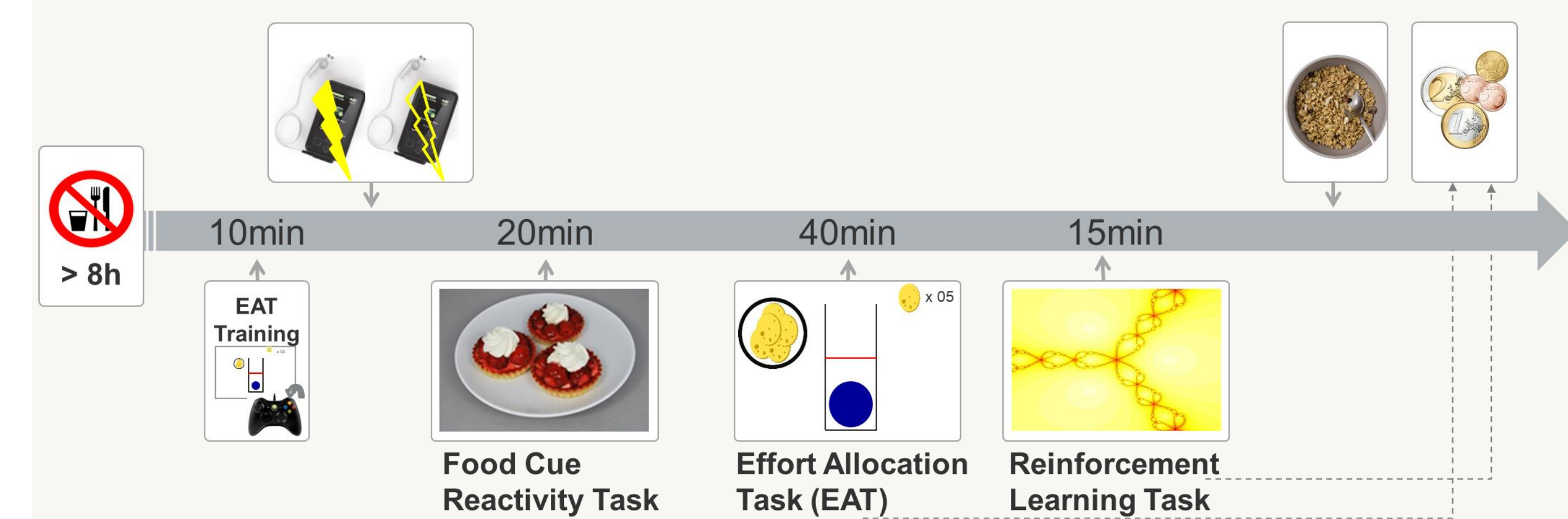
Methods

Sample: N = 41 healthy participants (26 female; M_{age} = 25.3 years; M_{BMI} = 23.0 ± 2.9; 17.93 - 30.9 kg/m²)

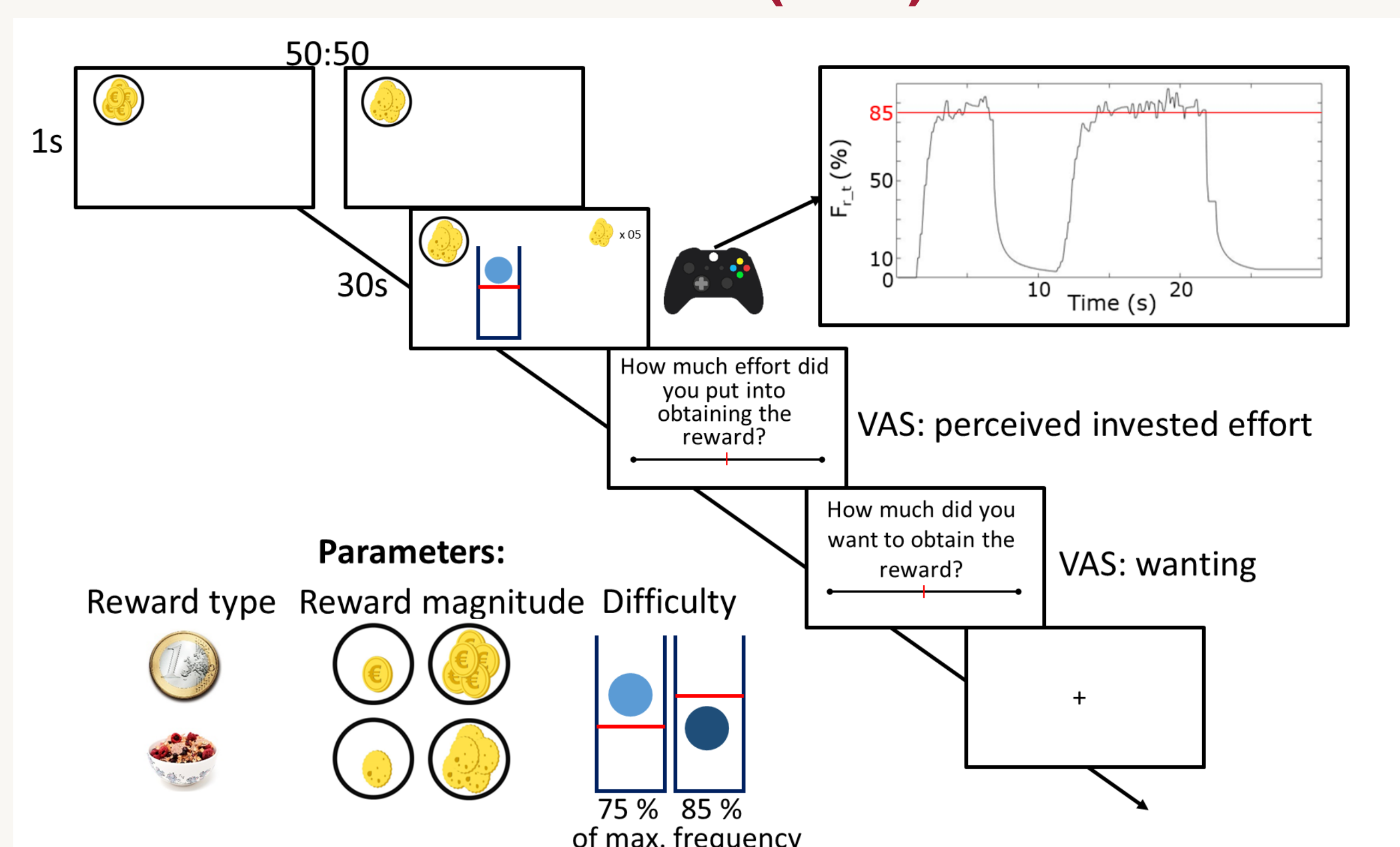
Procedure: 2 morning sessions after overnight fasting

- Application of tVNS/sham stimulation during tasks
- State ratings (VAS: hunger, satiety, and mood) before/after tasks

Session protocol: 2 sessions single-blind randomized cross-over

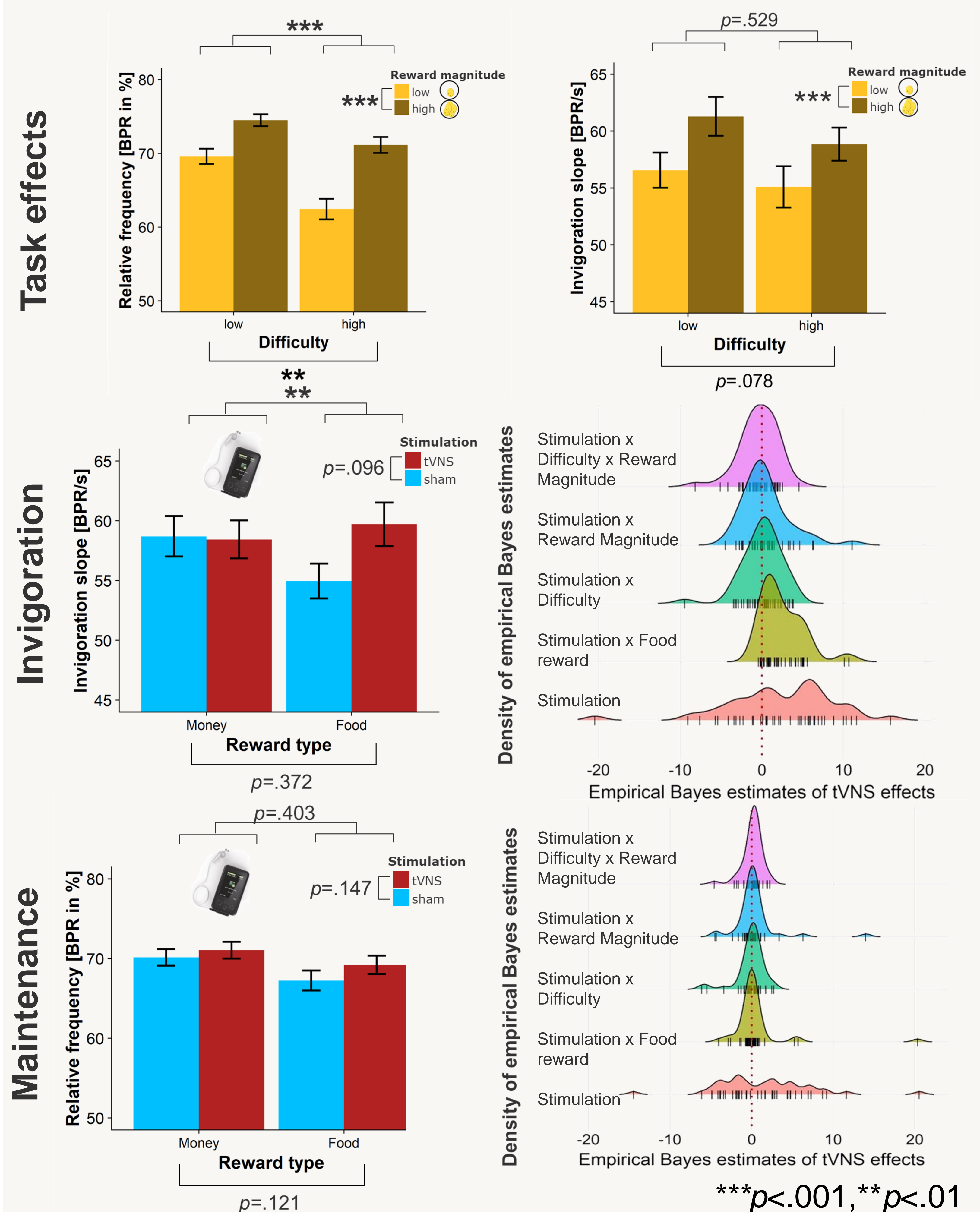


The Effort Allocation task (EAT):



Results

Analysis: 2-level hierarchical models for task / tVNS effects



Discussion

- **EAT**: a suitable task to study effort based decision making over time
- **tVNS** increases invigoration, but not maintenance of work specifically for food rewards
- **Conclusion**
 - Anti-depressant effects of tVNS by enhancing incentive salience conferred by rewards → potential tool to treat motivational disorders and obesity
 - Invigoration might be shaped by vagal inputs modulating the dopaminergic NTS circuits that influence homeostasis
- **Further research objectives:**
 - Identification of underlying physiological and neural mechanisms using EGG, REE & fMRI

References

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