

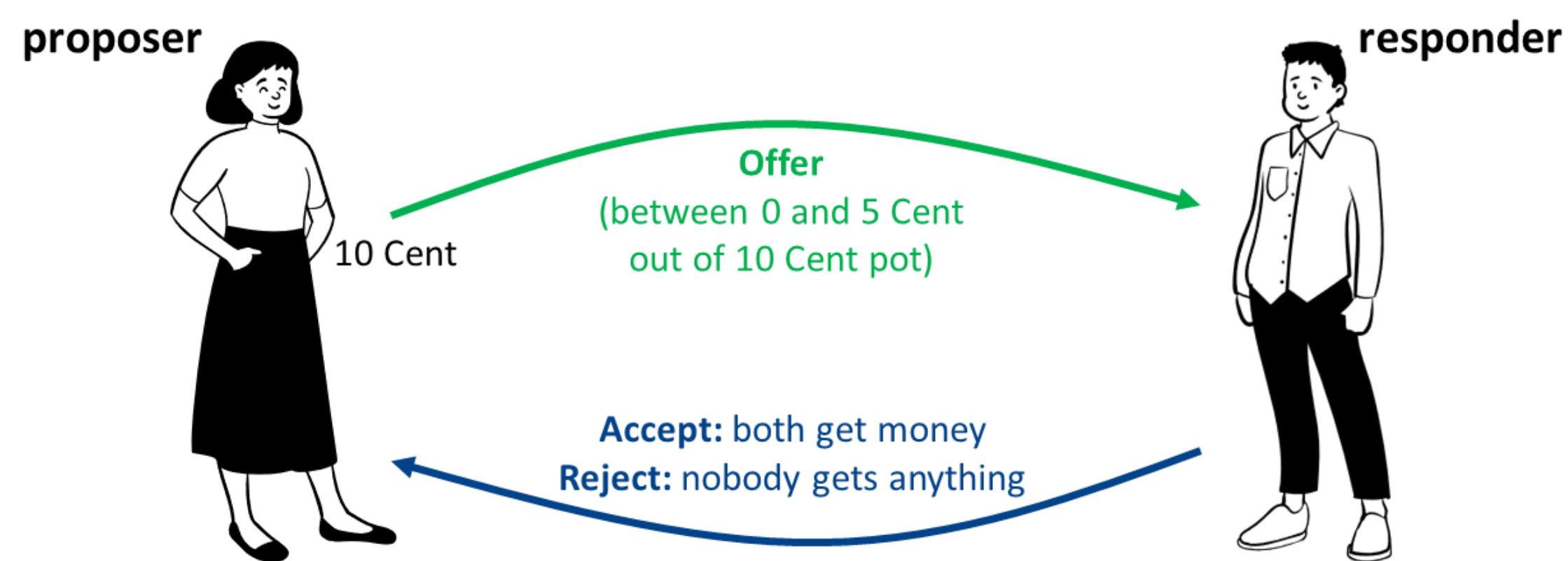
# Altered Behavior and Electrophysiology in the Ultimatum Game in Individuals with Elevated Depressive Symptoms

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## Introduction

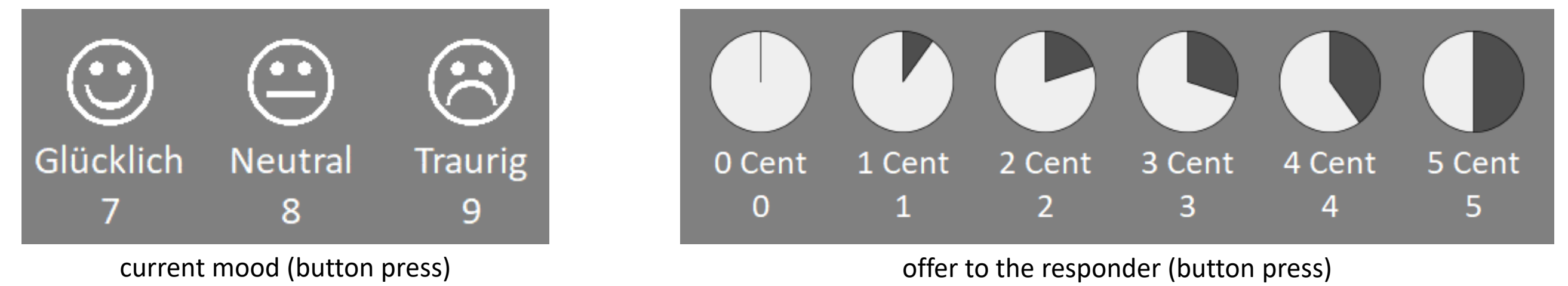
- Affect (be it short-term or longer-lasting, e.g., in the form of depressive symptoms) may be associated with alterations in social bargaining behavior [1-3]
- The ultimatum game is an important paradigm to study such behavior:



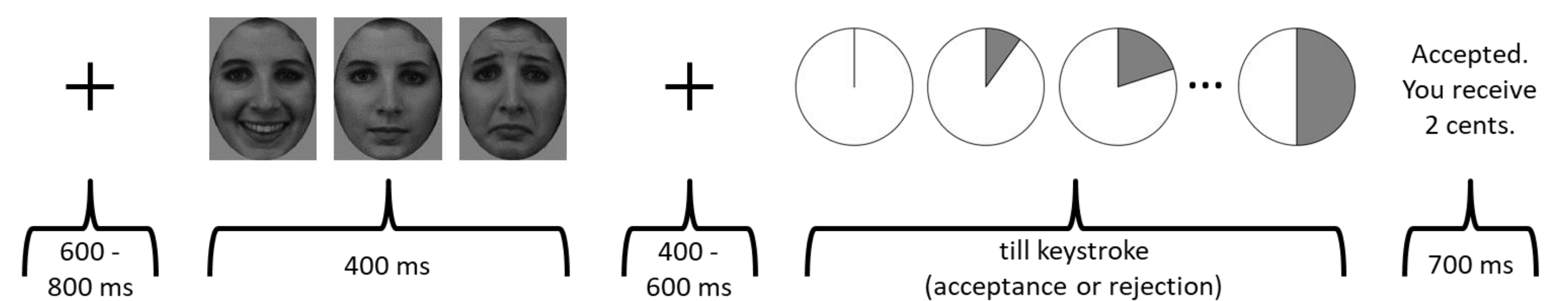
- Our goal:** Investigating associations of behavior (as proposer and responder) with depressive symptoms, as well as emotional expressions of game partners

## Methods

- First, 8 trials as proposer:



- Then, 144 trials as responder:



- Measurement of depressive symptoms via the *Allgemeine Depressionsskala* (ADS; [4]), the German version of the *Center for Epidemiological Studies Depression Scale* (CES-D; [5])

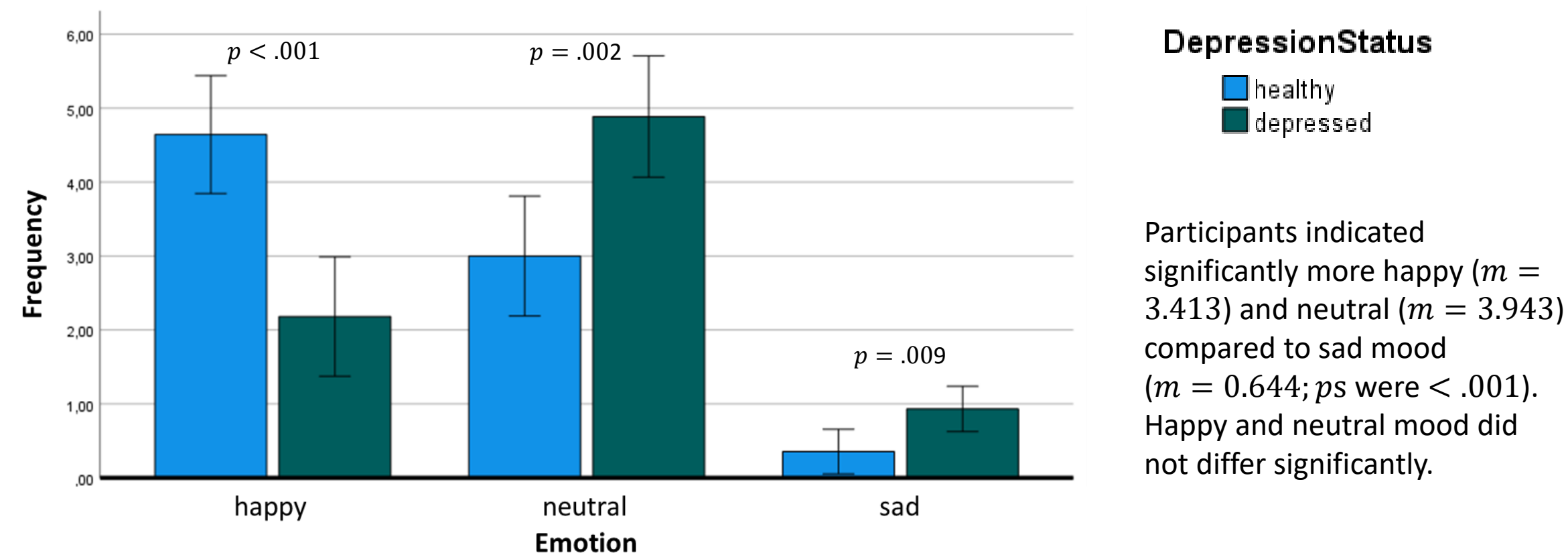
## Results

- A total of 89 participants were included

	Healthy group	Depression group
N (female/male)	45 (34/11)	44 (33/11)
Age mean (SD) in years	30.42 (11.66)	27.16 (10.87)
Age range	18 - 63	18 - 60
ADS mean (SD)	4.86 (2.22)	32.65 (6.55)
ADS range	0.5 - 9.5	23.0 - 49.5

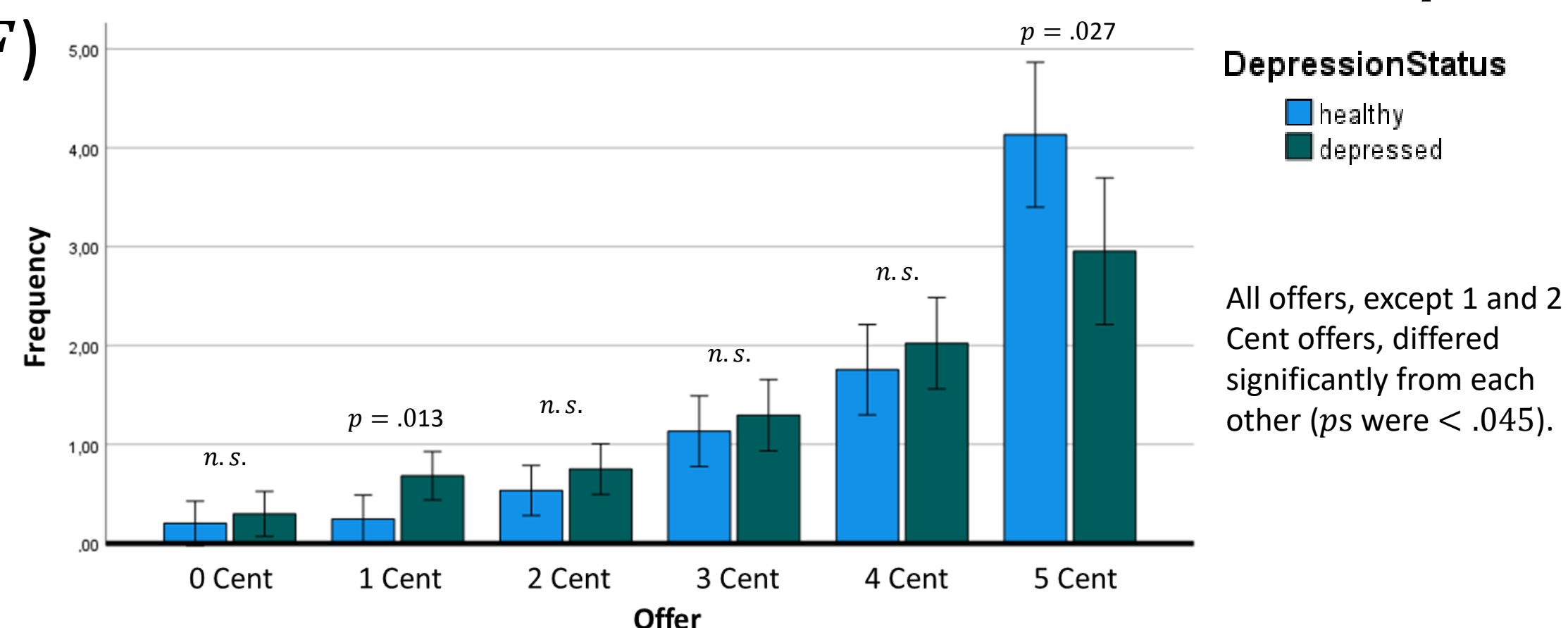
- Proposer emotion:**

- ME Emotion** ( $F_{2;174} = 35.371; p < .001; \eta_p^2 = .289; HF$ )
- INT Emotion\*DepressionStatus** ( $F_{2;174} = 14.019; p < .001; \eta_p^2 = .139; HF$ )



- Proposer offer:** Mean offer in healthy group (4.05 Cent) higher than in depression group (3.62 Cent;  $t_{87} = 2.231; p = .028$ ); Moreover:

- ME Offer** ( $F_{5;435} = 56.842; p < .001; \eta_p^2 = .395; HF$ )
- INT Offer\*DepressionStatus** ( $F_{5;435} = 3.233; p = .036; \eta_p^2 = .036; HF$ )

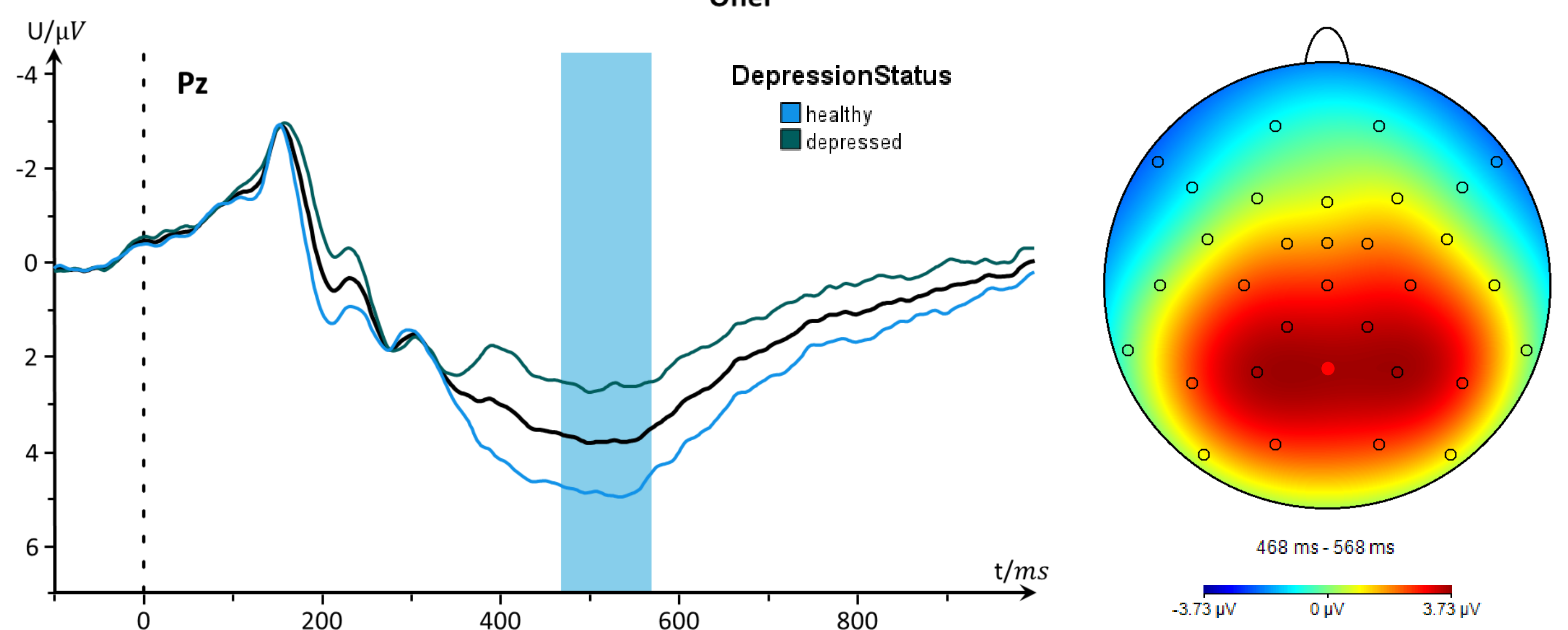
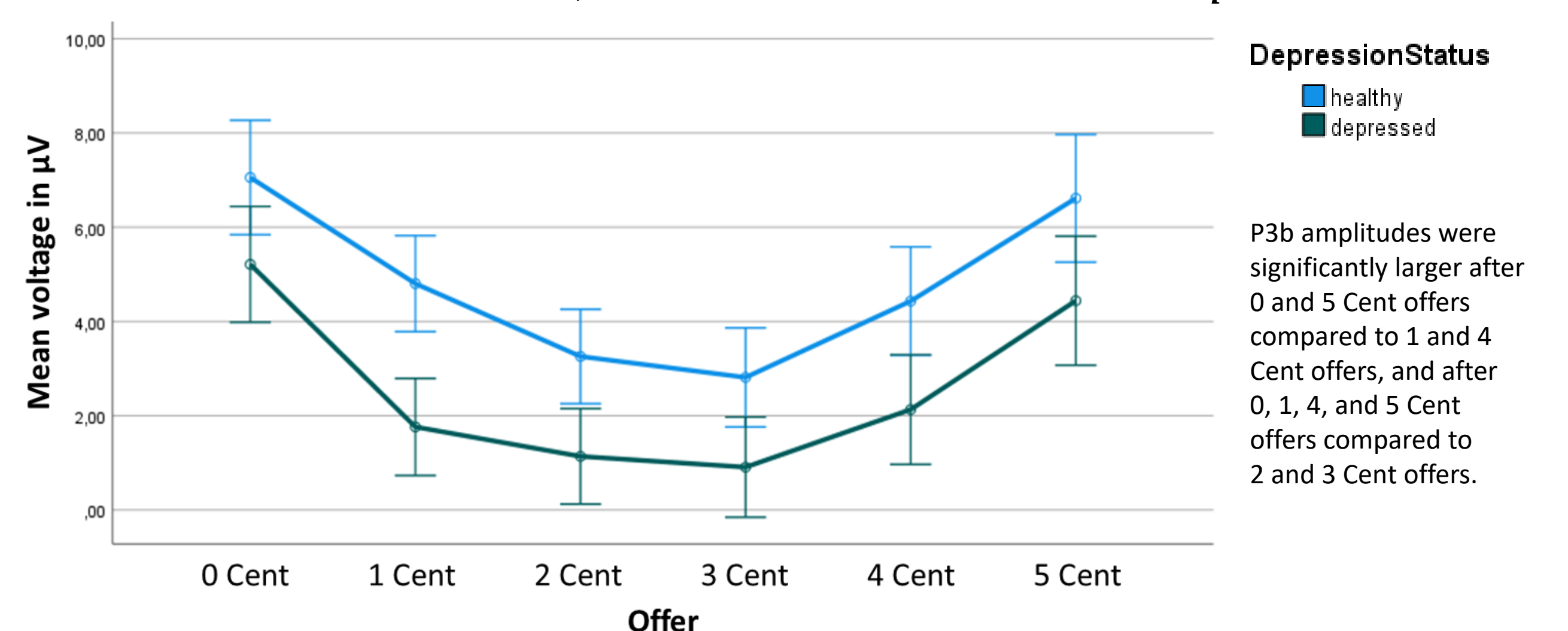


- Responder acceptance rates:**

- ME Offer** ( $F_{5;435} = 201.991; p < .001; \eta_p^2 = .699; HF$ ): Higher acceptance rates for fairer offers (17.1% acceptance rate for 0 Cent offers, 95.0% acceptance rate for 5 Cent offers)
- ME Emotion** ( $F_{2;174} = 5.646; p = .004; \eta_p^2 = .061$ ): Higher acceptance rates after happy faces (71.8%) compared to neutral faces (67.9%;  $p = .029$ ) and sad faces (66.0%;  $p = .001$ )
- No significant depression effects

- Responder P3b to the offer** (Pz, 468-568 ms, Linked Mastoids):

- ME Offer** ( $F_{5;435} = 51.241; p < .001; \eta_p^2 = .371; HF$ )
- ME DepressionStatus** ( $F_{1;87} = 10.691; p = .002; \eta_p^2 = .109$ )



## Discussion

- Individuals with high depressive symptoms indicated worse state affect and offered less money. However, responder behavior was not significantly different from healthy participants (contrary to [1])
- Responders accepted more offers when the proposer smiled (in line with [2])
- Individuals with high depressive symptoms showed reduced P3b amplitudes, with might be a neural marker of a lowered motivation to engage in the task (cf. [6])

## Literature

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