

Automatic biases of attention towards positive and negative stimuli: the role of individual differences

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Introduction

During search for object categories in real-world scenes, target of search is represented in the multivariate response in object-selective cortex (OSC) (Peelen et al., 2009);

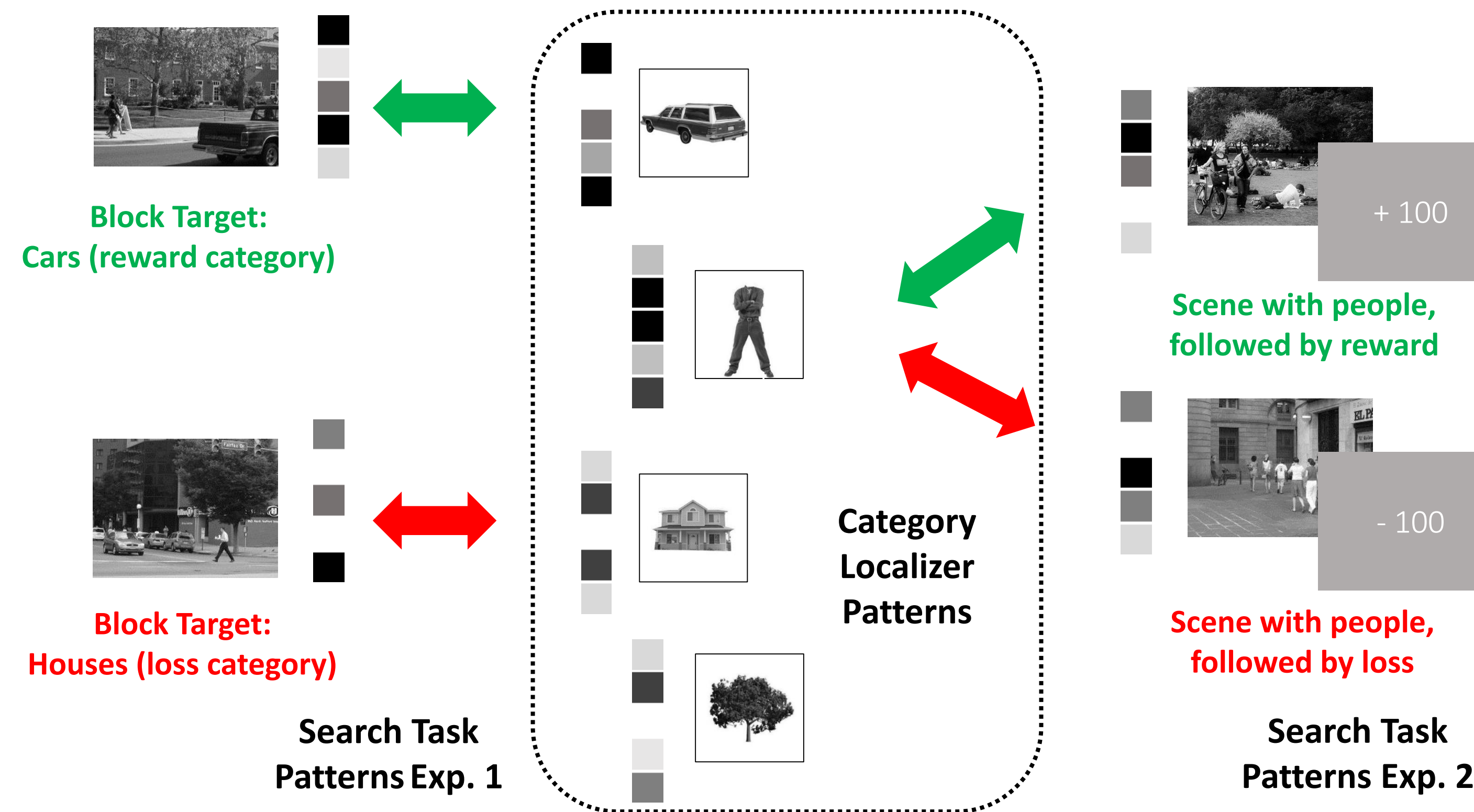
When natural categories are paired with motivational feedback, information about reward-associated distractor is suppressed. Distractor-elicited SN activity predicts strength of this effect (Hickey & Peelen, 2015);

Perceptual bias for stimuli paired with reward also correlates with personality scores (eg. BIS/BAS questionnaire);

➤ Does individual variability also influence representation of stimuli paired with economic loss?

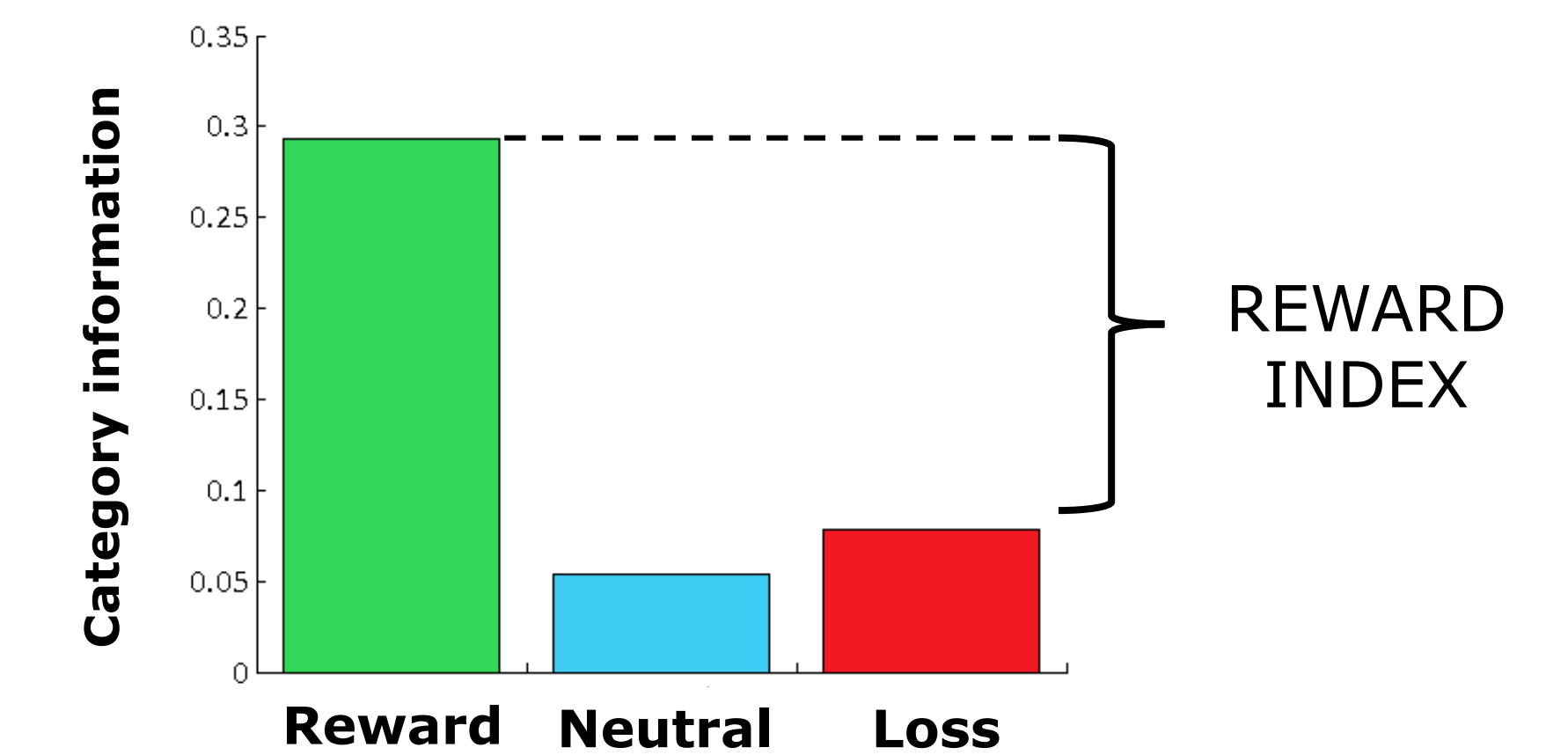
➤ If so, does the perceptual bias for loss-predicting stimuli depend on the same variables which influence sensitivity to reward? Or are these biases independent from each other?

MVPA analysis



Correlation analysis

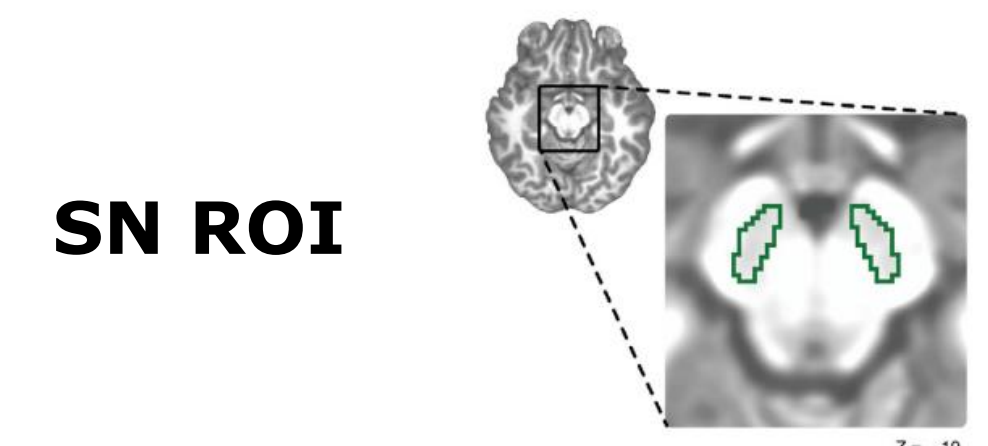
For each subject, we evaluated the prioritization of rewarding stimuli with respect to punishing ones (REWARD INDEX);



Reward Index was then correlated across individuals with:

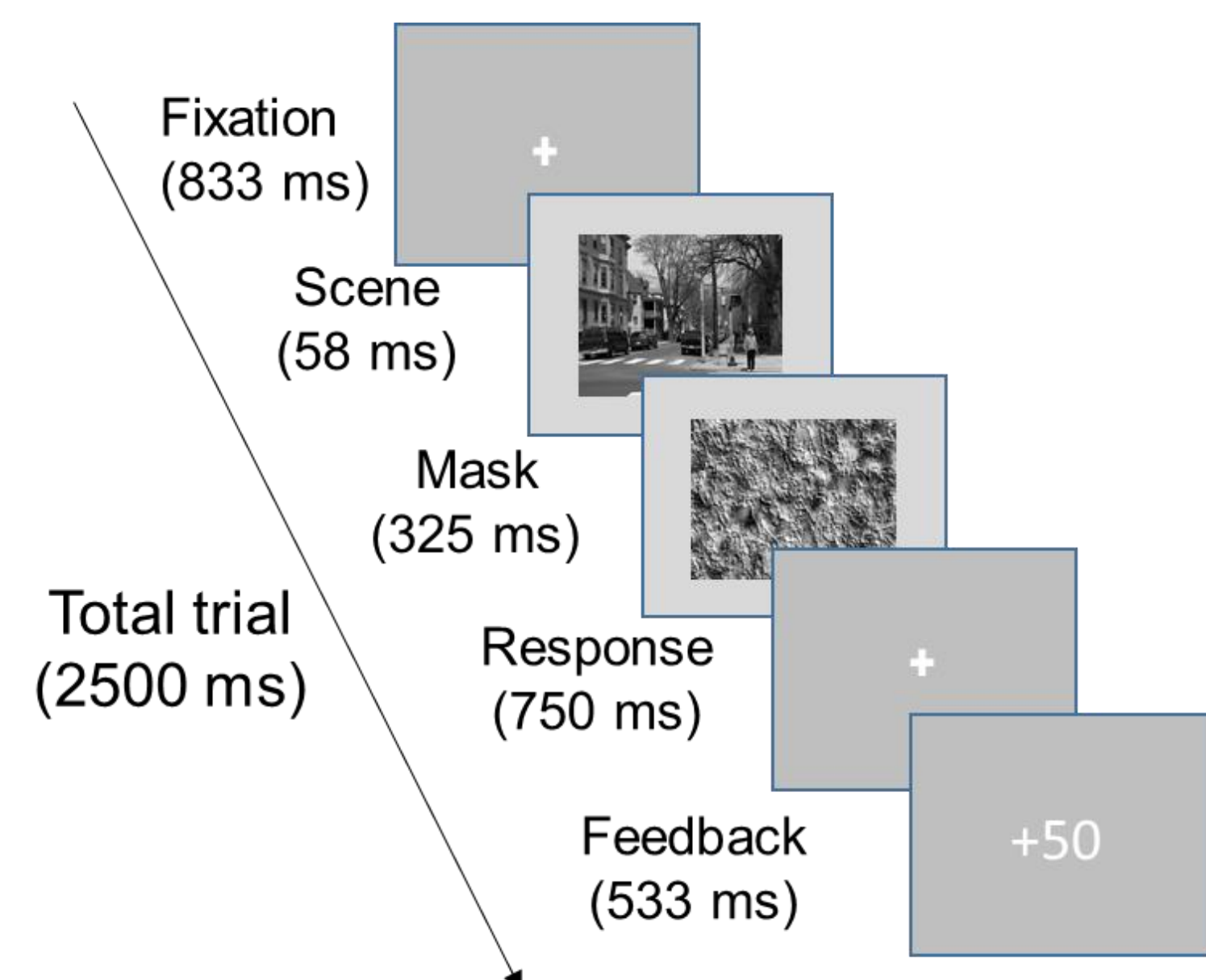
A) individual univariate activity of SN in response to a similar contrast (as a proxy for sensitivity to reward);

B) individual BIS scores (as a proxy for sensitivity to punishment);



To evaluate the independent contribution of these two variables, a multiple linear regression was performed using both measures as predictors;

Task

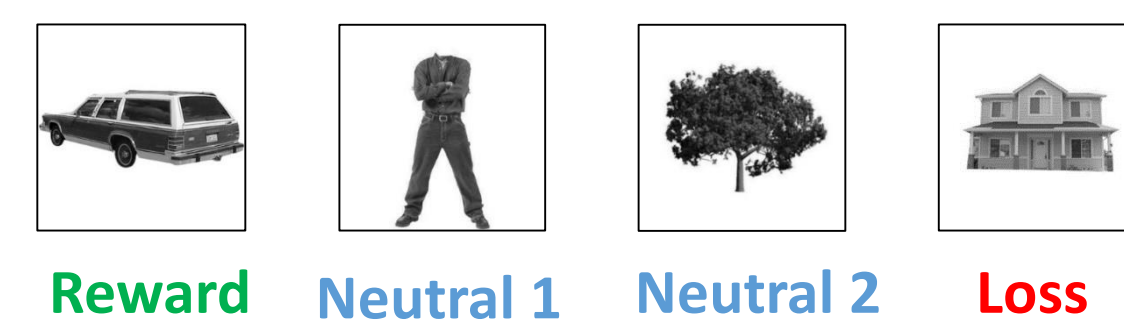


Participants filled out BIS/BAS questionnaires;

BIS: sensitivity to punishment-related cues;

BAS: individual disposition to pursue goals;

Search Categories



Experiment 1. Consistent schedule

- Four relevant categories, with target category changing from block to block, and other categories always present in scene as distractors;

- Each category received a specific, consistent type of feedback (counterbalanced across participants): 1 category was paired with gain, 1 with loss, 2 with neutral feedback (low reward);

Experiment 2. Inconsistent schedule

- Two relevant categories, only one of which present in each scene, acting as targets for the whole experiment;

- Random feedback schedule, no consistent mapping between category and motivational condition;

	Reward	Neutral	Loss
Correct response	+150	+1	-50
Incorrect response	+50	-1	-150

Payoff Matrix

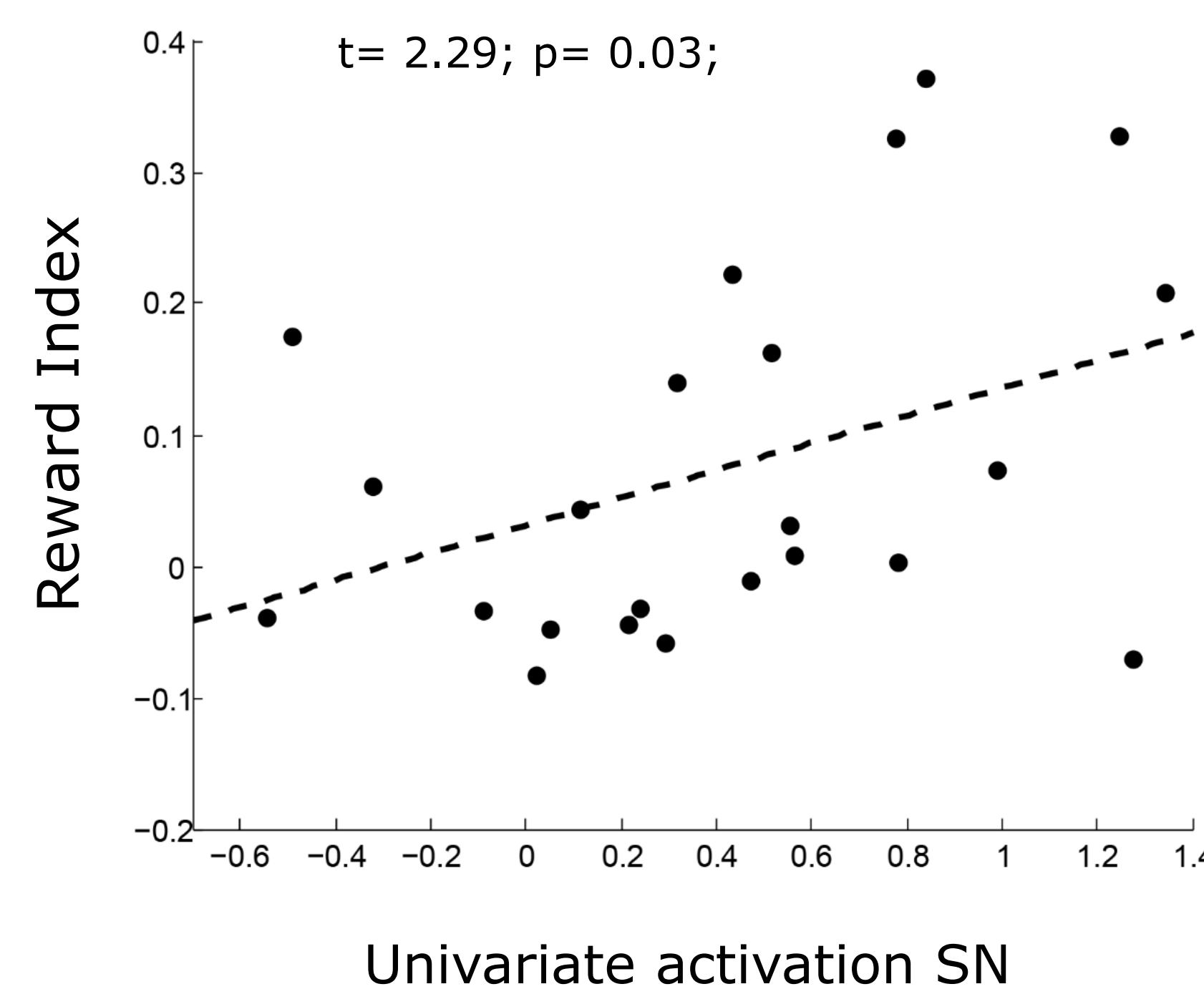
Search Categories

	Reward	Neutral	Loss
Correct response	+100	+1	-100
Incorrect response	0	0	-200

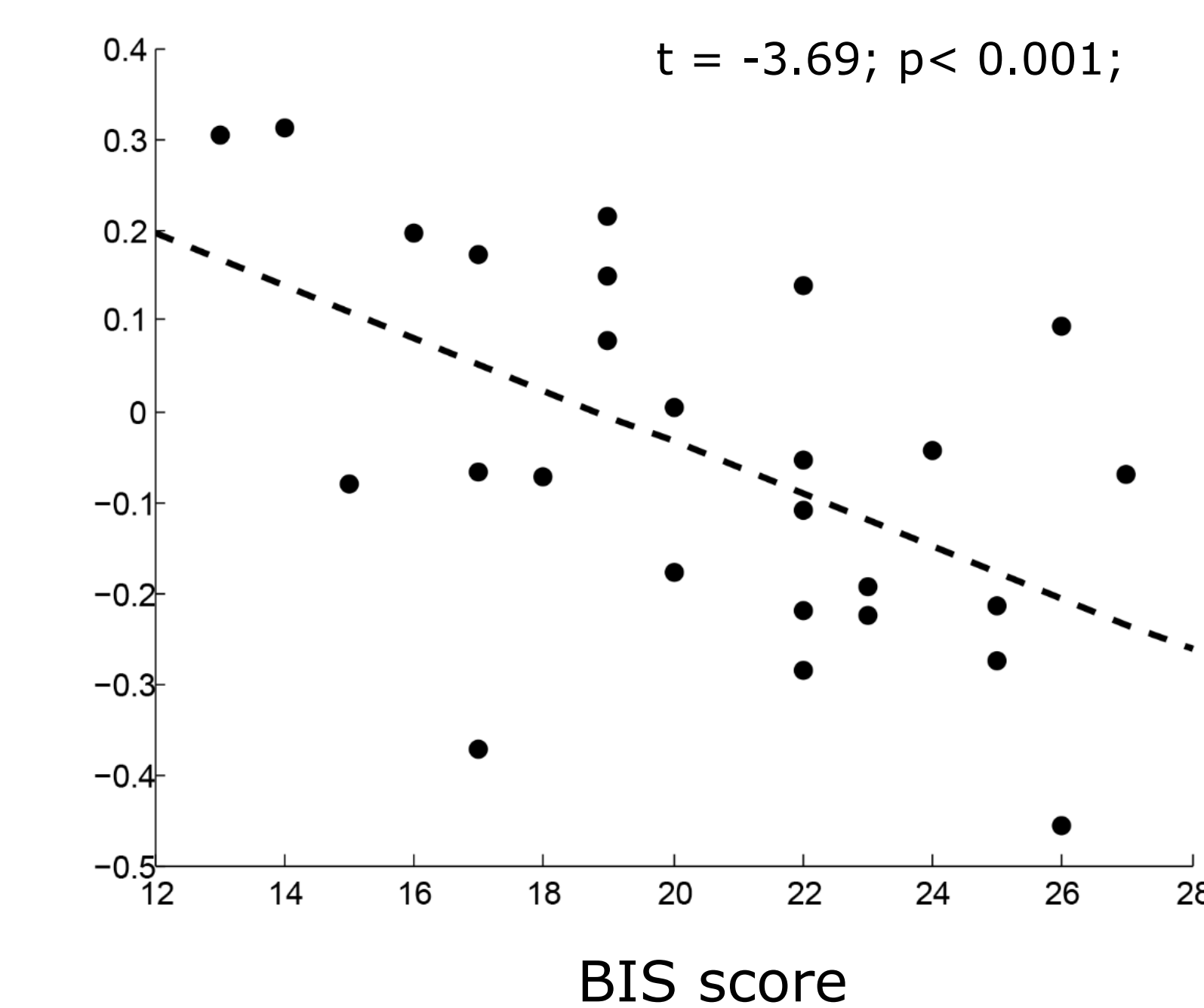
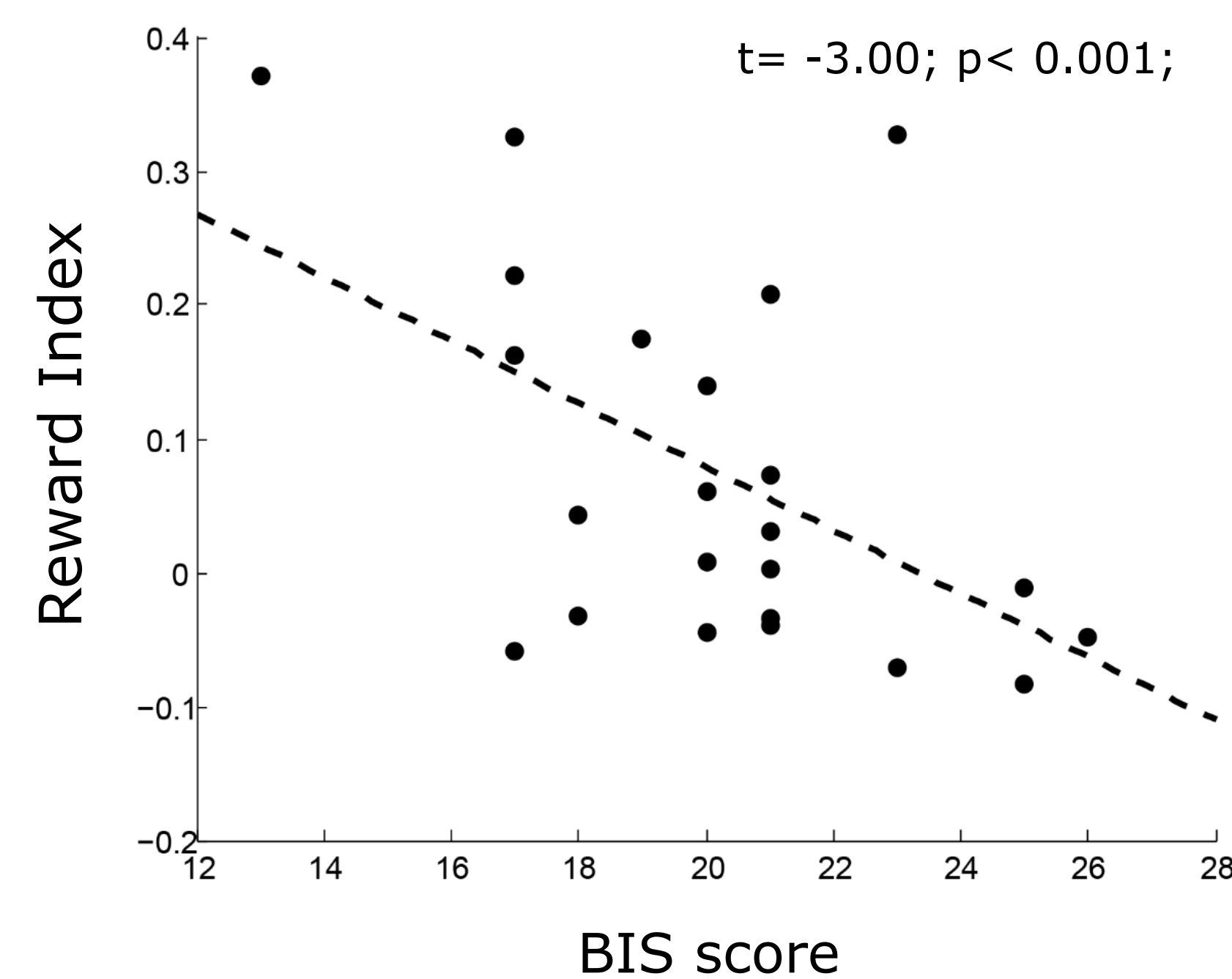
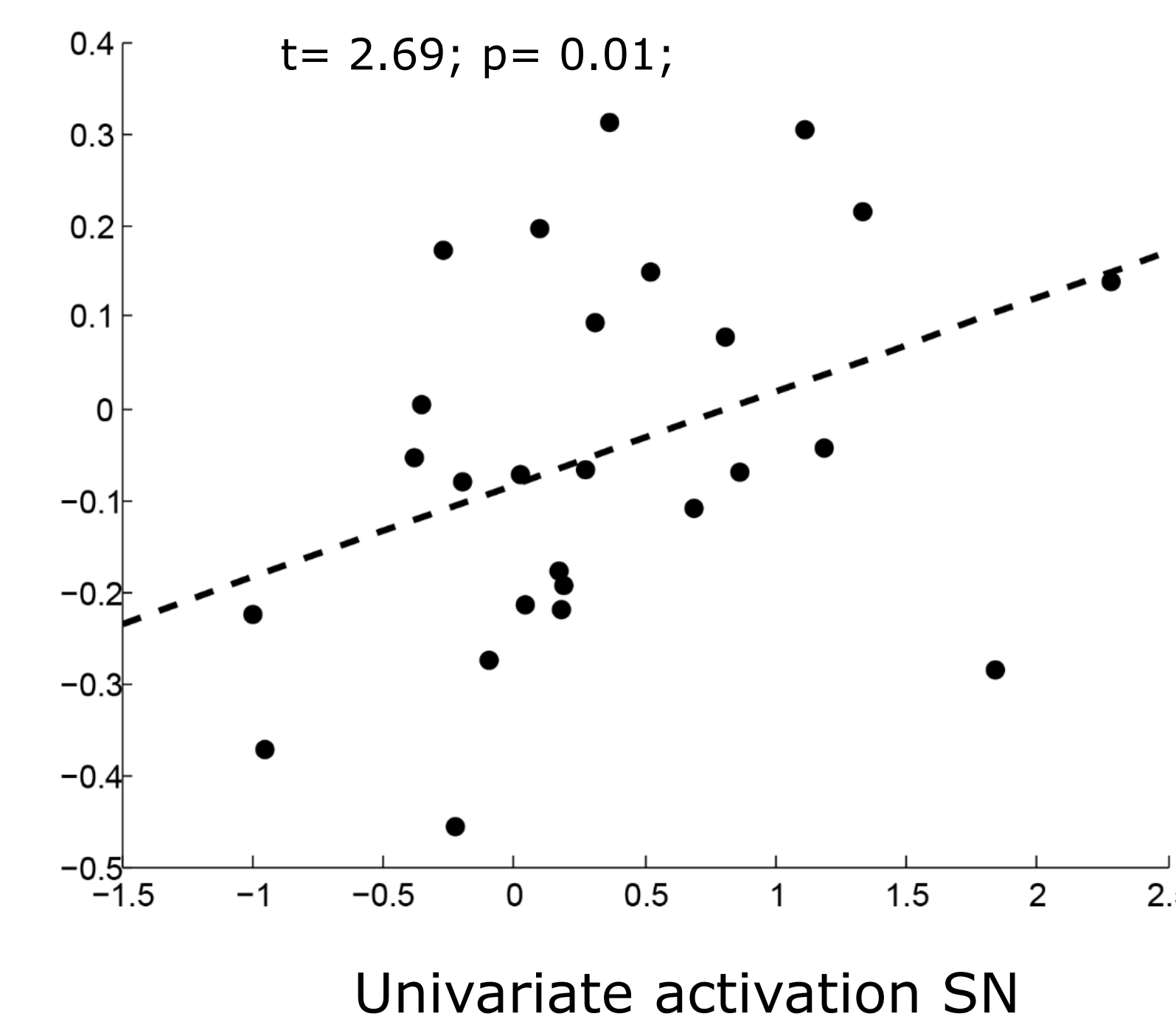
Payoff Matrix

Results

Experiment 1



Experiment 2



Conclusions

- Univariate activation of SN directly correlates with prioritization of positive stimuli with respect to negative ones;
- BIS scores directly correlate with prioritization of negative stimuli with respect to positive ones;
- These two measures are unrelated, and they independently predict the degree of representation of differently motivated categories in OSC;