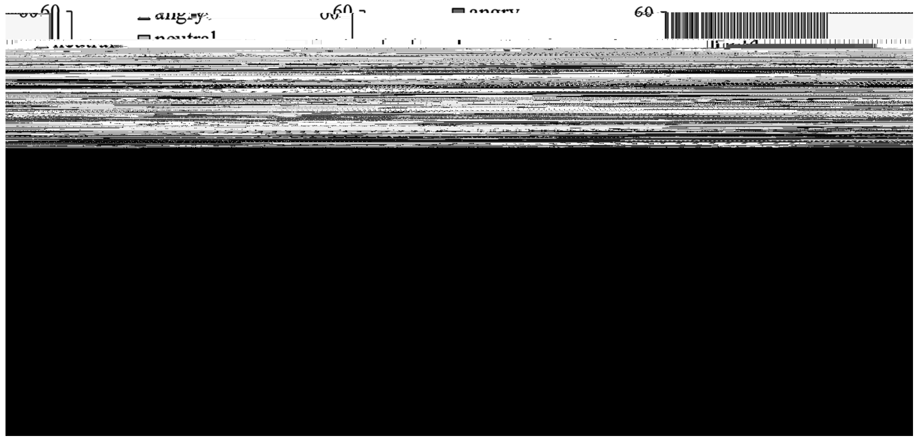
stimuli. Specifically, variation in the BAS in healthy participants predicts the activation of neural regions implicated in aggression when participants view facial signals of aggression in others.

Although one's internal and sustained motivational traits affect emotional processing, we recently conducted a study that investigated the effect of trial-by-trial changes in monetary incentives on the processing of emotional faces using the cue–target paradigm (Wei and Kang 2014), which was in line with recent evidences demonstrating the role of reward in facilitating task performance (Chelazzi et al. 2013; Chiew and Braver 2011; Padmala and Pessoa 2011; Pessoa and Engelmann 2010; Savine and Braver 2010; van den Berg et al. 2014; Veling and Aarts 2010). Rewards, including monetary incentives, have been used to increase the motivational engagement of participants performing cognitive tasks (Chelazzi et al. 2013; Pessoa 2014). In Wei and Kang (2014), a cue indicating the reward condition of each trial (incentive vs. non-incentive) was presented at the center of the screen, followed by the presentation of a picture of an emotional face at the center of the screen. Participants were asked to discriminate the emotional expression of the target face. The results revealed that the reward effects (i.e., RTs in non-incentive conditions versus those in incentive conditions) were larger for emotional faces than for neutral faces and were regulated by the task relevance of the emotionality of the target face. The results demonstrated that reward expectation may facilitate the representation and identification of emotional faces, as compared to neutral faces.

One possible explanation for the ability of monetary incentives to influence emotional processing, as described above, is that the incentive cues may increase the motivational state of participants and thereby increase attentional resources toward task-relevant stimuli (Chelazzi et al. 2013; Padmala and Pessoa 2011). If this is the case, the interaction between reward and emotion may depend on the available attentional resources, especially the resources directed to the target location. However, the incentive cue may increase perceptual sensitivity to emotional stimuli because of the rapid communication between reward and emotion circuits in the brain. In this scenario, it is possible that the interaction between reward and emotion is independent of attention. Indeed, brain structures involved in both emotion and reward (e.g., insula, VTA, NAc, mPFC) tend to be located separately from the fronto-parietal attentional network.

In the present study, we sought to examine whether the interaction between reward and emotion is modulated by



Reward effects (i.e., reaction times in non-incentive conditions minus those in incentive conditions) and standard errors, with respect to cue validity and target emotion for each experiment

Experiment 2b). The mean RTs and response error rates in each experimental condition are reported in Table 1, and the reward effects between corresponding incentive and non-incentive conditions are depicted in Fig. 2 for each experiment.

An analysis of variance (ANOVA) was conducted on the RTs, with trial type (incentive vs. non-incentive), cue validity (valid vs. invalid), and target facial emotion (angry vs. neutral) as within-participant factors. The results revealed a main effect of trial type, $F(1, 20) = 18.14$, $p < .001$, with faster RTs to incentive trials than to non-incentive trials (575 vs. 596 ms), a main effect of cue validity, $F(1, 20) = 205.79$, $p < .001$, with faster RTs in the valid condition than in the invalid condition (560 vs. 611 ms), and a main effect of emotion, $F(1, 20) = 5.27$, $p < .05$, with faster RTs for angry targets than for neutral targets (574 vs. 597 ms). The emotion factor interacted with trial type, $F(1, 20) = 10.62$, $p < .005$. Pairwise comparisons showed that the reward effect (RTs in non-incentive trials minus RTs in incentive trials) was significantly larger for angry targets than for neutral targets, $p < .05$, irrespective of cue validity. The emotion factor also interacted with cue validity, $F(1, 20) = 11.97$, $p < .005$. Pairwise comparisons showed that the cue validity effect (RTs in invalid trials minus RTs in valid trials) was significantly smaller for angry targets than for neutral targets, $t(20) = 3.63$, $p < .005$, irrespective of incentive condition. Further tests showed that the RTs for angry targets did not differ from the RTs for neutral targets in the valid conditions (553 vs. 568 ms), $t(20) = 1.36$, $p > .10$, but the RTs for angry targets were significantly shorter than those for neutral targets in the invalid conditions (595 vs. 627 ms), $t(20) = 3.16$, $p < .01$. No other effects reached statistical significance.

The same ANOVA on error rates revealed a main effect of target facial expression, $F(1, 20) = 15.80$, $p < .005$, with more errors being committed for the angry face than for the neutral face (12.9 vs. 6.9 %). The interaction between trial type and emotion also was significant, $F(1, 20) = 6.74$, $p < .05$. Pairwise comparisons showed that more errors were committed for angry targets than for neutral targets in the non-incentive condition (14.8 vs. 5.9 %), $t(20) = 5.52$, $p < .001$. However, this difference did not reach significance in the incentive condition (10.9 vs. 7.9 %), $t(20) = 1.42$, $p > .1$. No other effects reached statistical significance.

The same ANOVA conducted on RTs revealed a main effect of trial type, $F(1, 20) = 28.12$, $p < .001$, with faster RTs for incentive than for non-incentive trials (553 vs. 578 ms), as well as a main effect of cue validity, $F(1, 20) = 6.05$, $p < .05$, with longer RTs at the cued location than at the un-cued location (569 vs. 562 ms), indicating the presence of the IOR effect. The main effect of emotion was marginally significant, $F(1, 20) = 3.30$, $p < .08$, with faster RTs for the angry targets than for the neutral targets (557 vs. 574 ms). Moreover, trial type significantly interacted with emotion, $F(1, 20) = 11.67$, $p < .005$. Pairwise comparisons showed that the reward effect was significantly larger for angry targets than for neutral targets (37 vs. 11 ms), $t(20) = 3.42$, $p < .005$. No other effects reached statistical significance.

Analysis of the error rates revealed a main effect of emotion, $F(1, 20) = 4.77$, $p < .05$, with larger error rates for angry faces than for neutral faces (11.6 vs. 7.8 %). Additionally, the interaction between trial type and emotion was significant, $F(1, 20) = 4.59$, $p < .05$. Pairwise comparisons showed that more errors were committed for the angry faces than for neutral faces in the non-incentive condition (12.7 vs. 7.1 %, $t(20) = 3.43$, $p < .005$), but the error rates did not differ between the angry and neutral faces in the incentive condition (10.4 vs. 8.6 %), $t(20) < 1$.

The same ANOVA conducted on the RTs revealed a main effect of trial type, $F(1, 20) = 19.30$, $p < .001$, with faster RTs for incentive trials than for non-incentive trials (582 vs. 612 ms), a main effect of cue validity, $F(1, 20) = 14.15$, $p < .01$, with longer RTs at the cued location than at the uncued location (603 vs. 590 ms), indicating the presence of the IOR effect, as well as a main effect of target emotion, *F*

ventral tegmental area (SN/VTA, Price and Amaral 1981). The current results further suggest two new findings. On the one hand, this rapid communication between reward