

Effects of Incentive Type, Valence, and Intensity on Psychophysiology and Performance

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50-WORD ABSTRACT

How do motivation and personality affect performance and psychophysiology? The current study provided incentives (performance-dependent rewards and penalties, either cash or pictures) while participants engaged in a Sternberg-type working memory task. All incentive types were effective drivers of performance improvement and personality differences correlated with heart rate during incentive feedback.

SUPPLEMENTARY SUMMARY

How do incentives affect performance and psychophysiology, and what role do individual differences play? To address these questions, this study provided incentives (performance-dependent rewards and penalties, cash or pictures from the International Affective Picture System, IAPS) while participants engaged in a Sternberg-type working memory task. Participants were presented with five words, a short delay, followed by a probe word, which was either part of the original set (target, 50%) or new (nontarget, 50%). Participants' heart rate was monitored while they were doing the task, and they also filled out personality questionnaires, the Behavioral Inhibition/Activation System (BIS/BAS) (Carver & White, 1994), and the Generalized Reward and Penalty Expectancy Scale (GRAPES) (Ball & Zuckerman, 1990).

In Experiment 1 (N = 19), participants performed a baseline block (no incentive), followed by reward and penalty blocks, which were counterbalanced across participants. Each incentive block had two types of incentive – cash and IAPS pictures, high or low intensity. Participants were cued as to the type and intensity of the incentive before each trial. Incentive

blocks consisted of 25% low cash (+/- 15 cents), 25% high cash (+/- 45 cents), 25% low picture (rated 6 – 6.5 for reward, 3 – 3.5 for penalty on a 9 point pleasantness scale), and 25% high picture (rated 7 – 7.5 for reward, 2.5 – 3 for penalty).

Experiment 1 results showed that reward and penalty incentives were equally effective at driving down RTs without a significant increase in errors. Cash incentives were more effective than IAPS pictures, complementing the finding that participants rated cash as more motivating than IAPS pictures. A follow-up experiment was run to find out whether IAPS pictures were motivating per se, or were benefiting from close proximity to cash trials.

Experiment 2 (N = 20), featured a baseline block followed by four incentive blocks (reward-cash, reward-picture, penalty-cash, penalty-picture), performed in counterbalanced order. Also included within each incentive block were no-incentive (neutral) trials, to determine whether there were context effects of the incentives. Results showed that participants were significantly faster on both IAPS and cash blocks compared to baseline, which suggests that both types of incentive can produce a generalized performance benefit. The finding that this performance benefit was present even on neutral trials within incentive blocks, suggests that a component of incentive effect on performance might be tonic (or contextual) rather than specific to the incentive value of a particular trial. In addition, subtle differences were found in the RT data for cash incentives. Specifically, neutral trials were significantly slower than low and high cash rewards, whereas neutral and low penalties were equivalently slow, and only high cash penalties showed a significant speed-up. This difference may reflect a high sensitivity in the participants to reward relative to penalty, as even a low reward was able to elicit faster RTs.

Effects of personality were most apparent in relation to the psychophysiological data. BAS assesses individuals' sensitivity to reward, and was significantly positively correlated with

maximum heart acceleration in response to high cash rewards. BIS measures sensitivity to punishment, and was significantly negatively correlated with maximum heart rate deceleration in response to low cash penalties (high cash penalty data was not reliable enough to use for correlation).