

Learning to attend and ignore: Opposing influences of reward learning on attentional capture and suppression

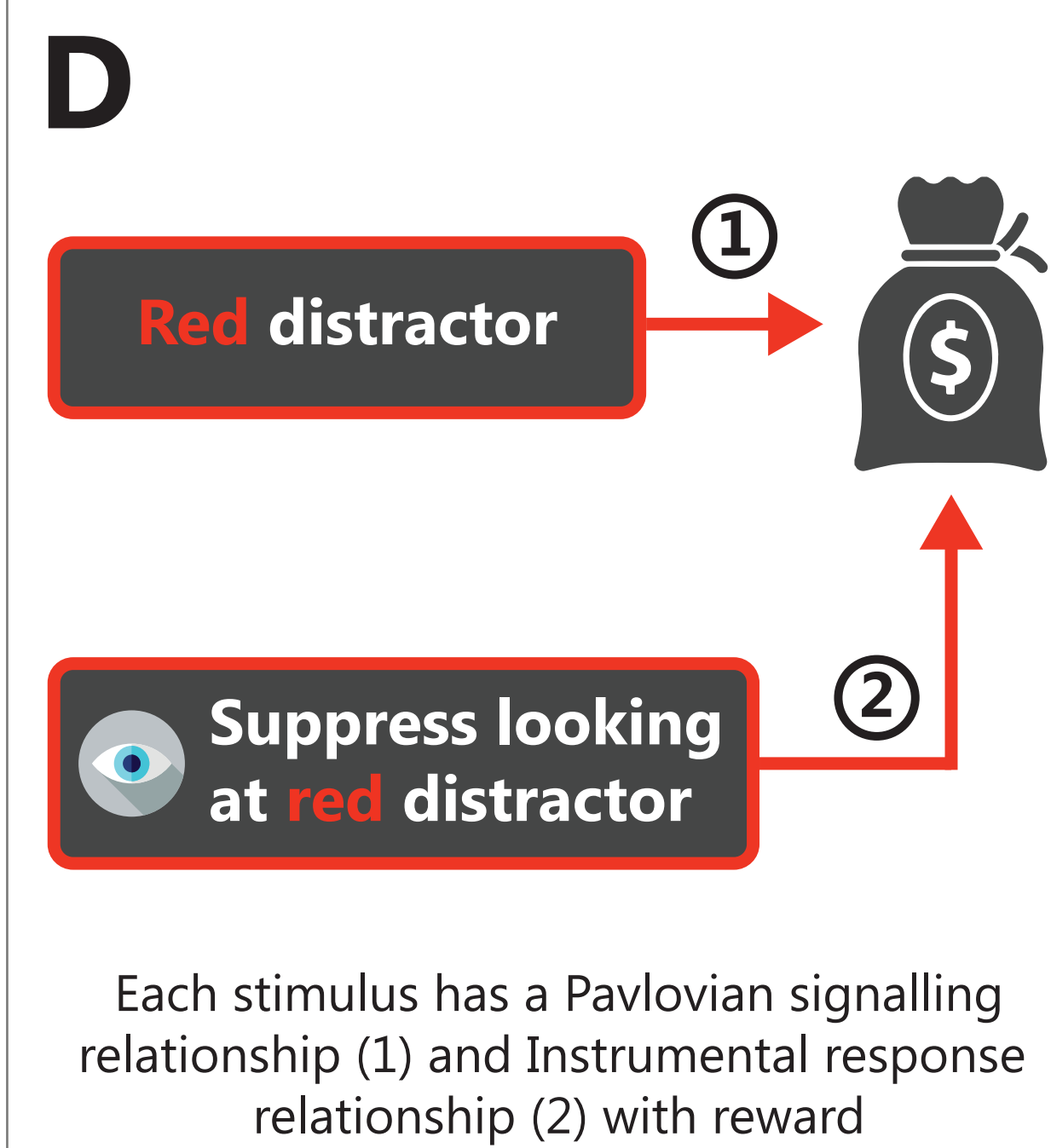
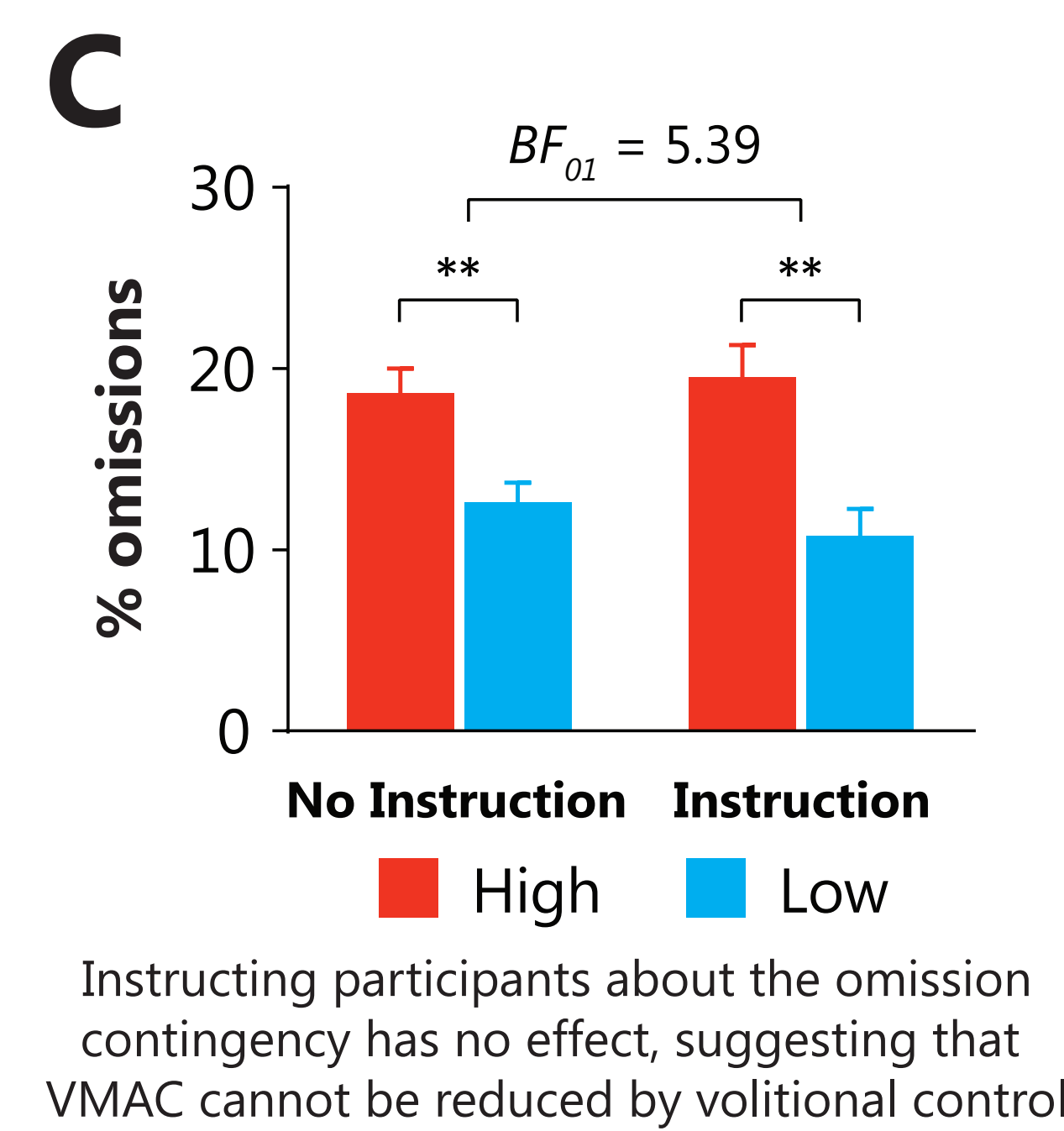
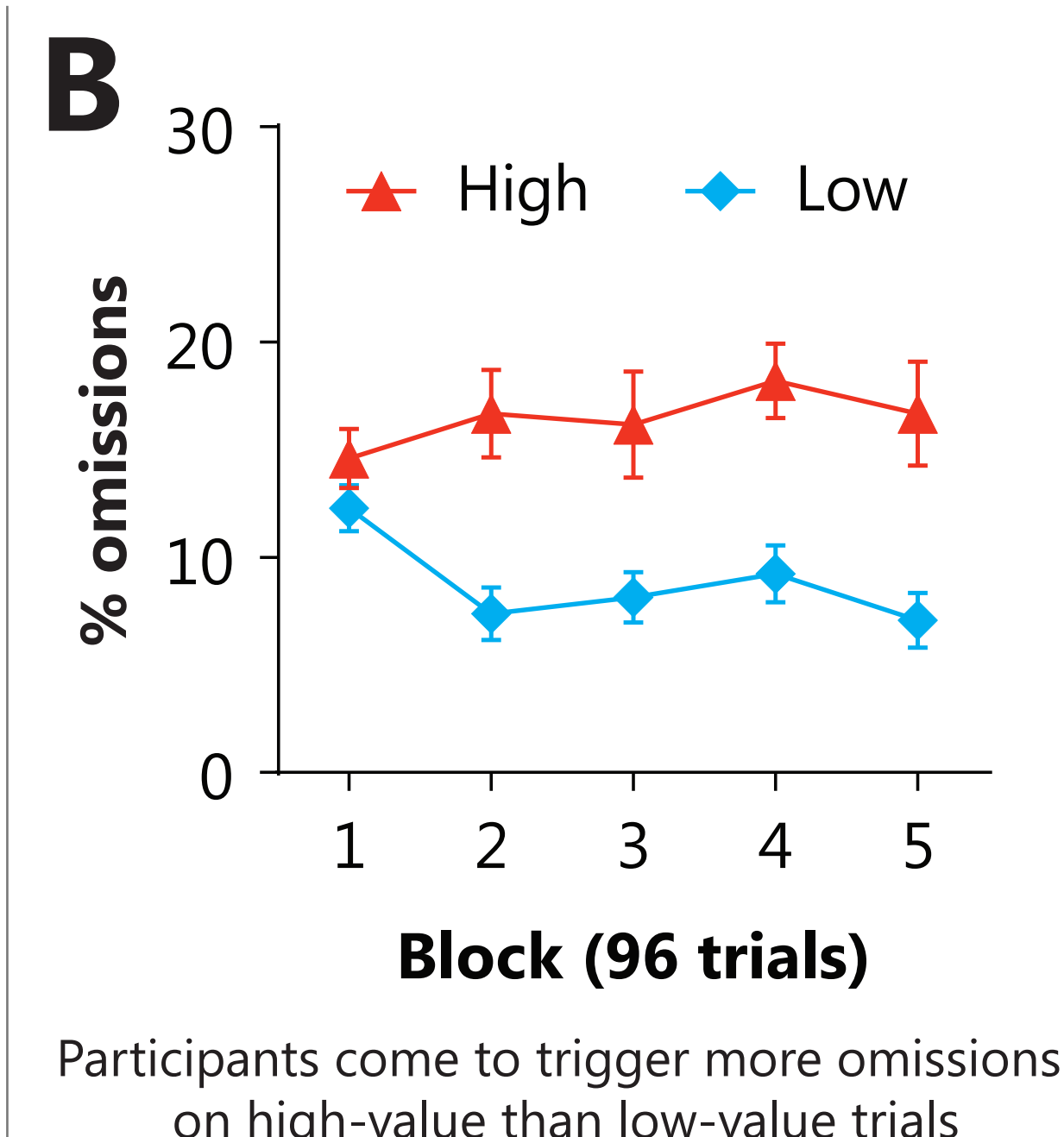
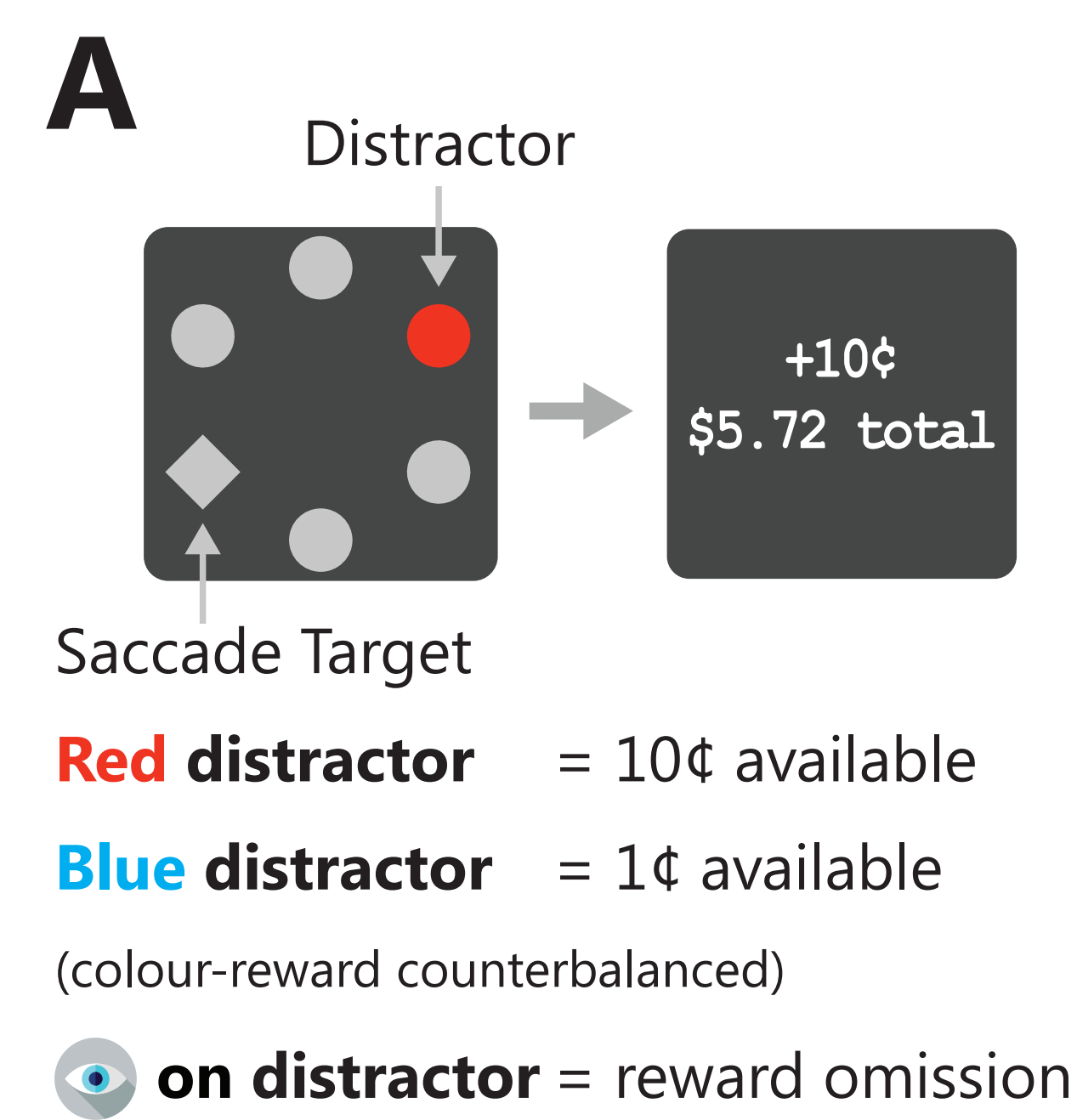
Daniel Pearson¹, Geoffrey Hall^{1,2}, & Mike E. Le Pelley¹

¹School of Psychology, UNSW Australia, Sydney, Australia

²Department of Psychology, York University, York, UK

Background:

Previous studies have shown that stimuli associated with high-value rewards capture attention and eye-gaze more often than stimuli associated with low-value rewards, even when orienting to the reward-associated stimuli is counterproductive (Fig 1, Failing et al., 2015; Le Pelley et al., 2015; Pearson et al., 2015, 2016). This effect has been labelled *Value-Modulated Attentional Capture* (VMAC).

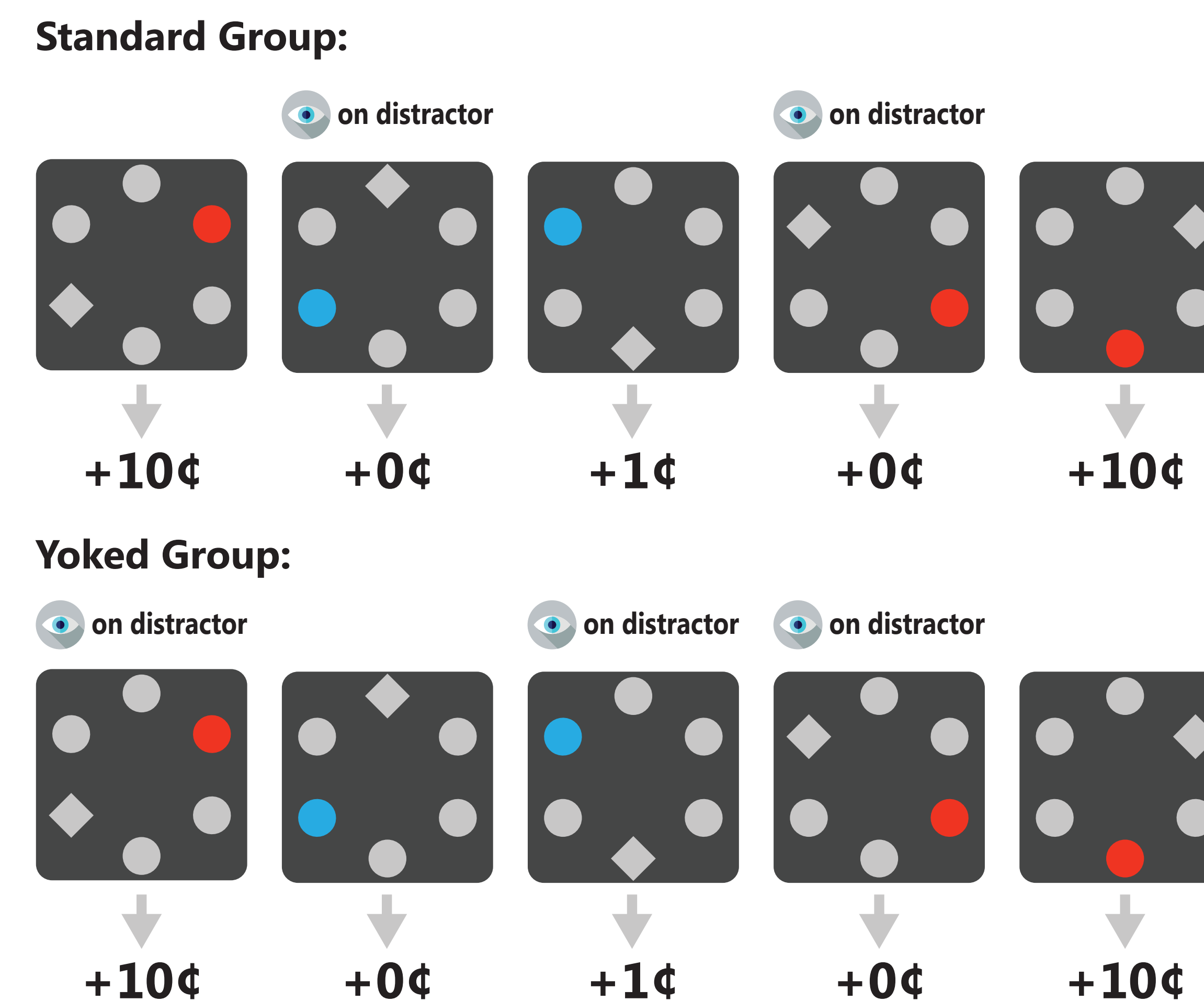


The VMAC task shows that a stimulus' *Pavlovian signalling relationship* with reward increases its attentional priority. However, each stimulus also has an *Instrumental response relationship* with reward: looking at the distractor results in the loss of potential reward. That is, trials on which participants suppress the urge to look at the distractor are rewarded. Moreover, suppressing attention to the distractor results in a larger reward on high-value trials than low-value trials.

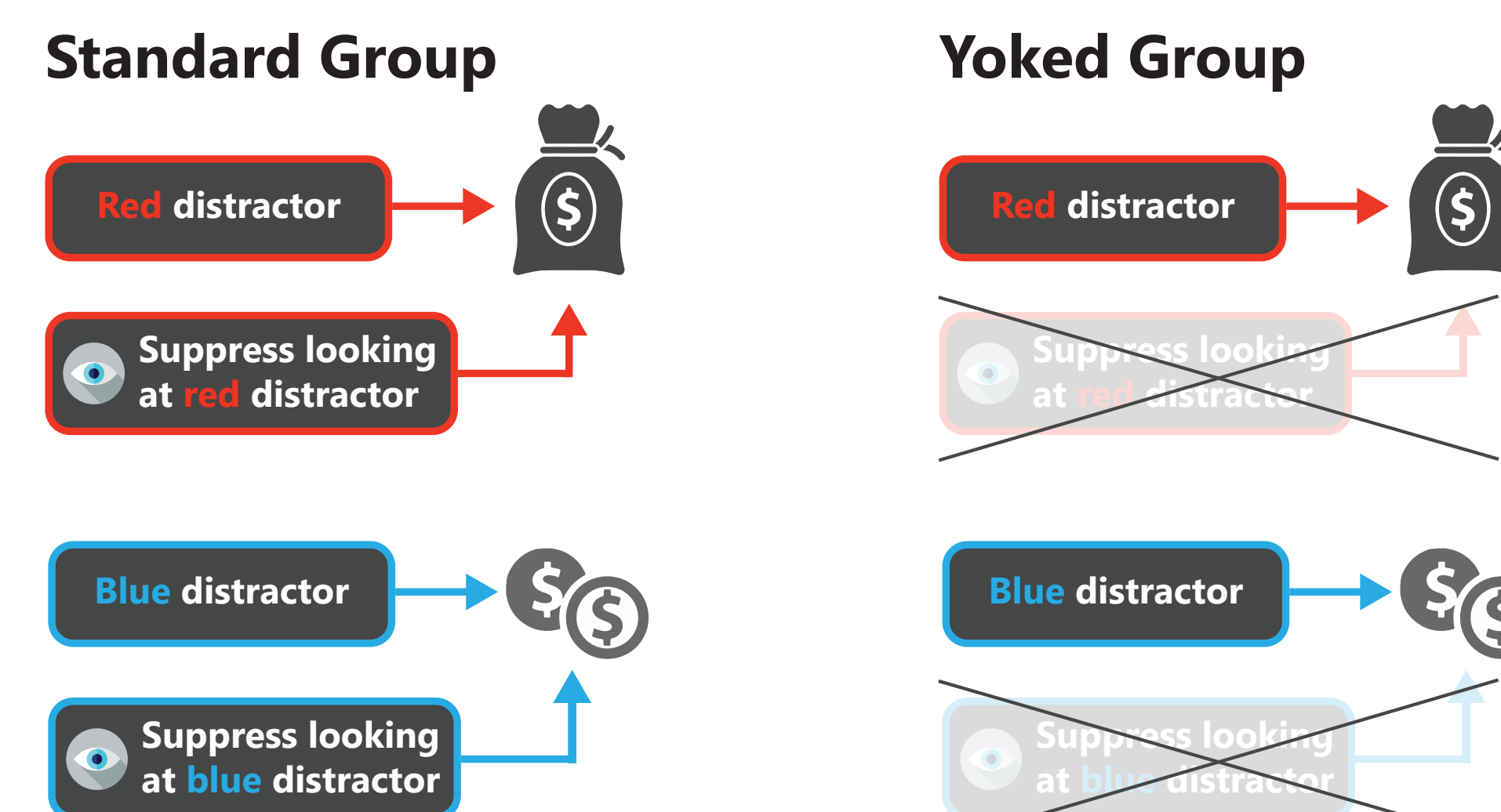
This study investigated whether reward learning has an influence on distractor suppression via the instrumental pathway.

Method:

- 480 trials total (5 blocks of 96 trials).
- N = 96, randomly assigned to two groups (n = 48 per group).
- **Standard Group:** standard VMAC task where gaze on distractor = reward omission.
- **Yoked Group:** each participant matched to one in Standard Group, same sequence of trials and rewards. *BUT* gaze on distractor ≠ reward omission.
- If reward learning influences distractor suppression via the Instrumental response relationship, expect greater VMAC in Yoked Group.



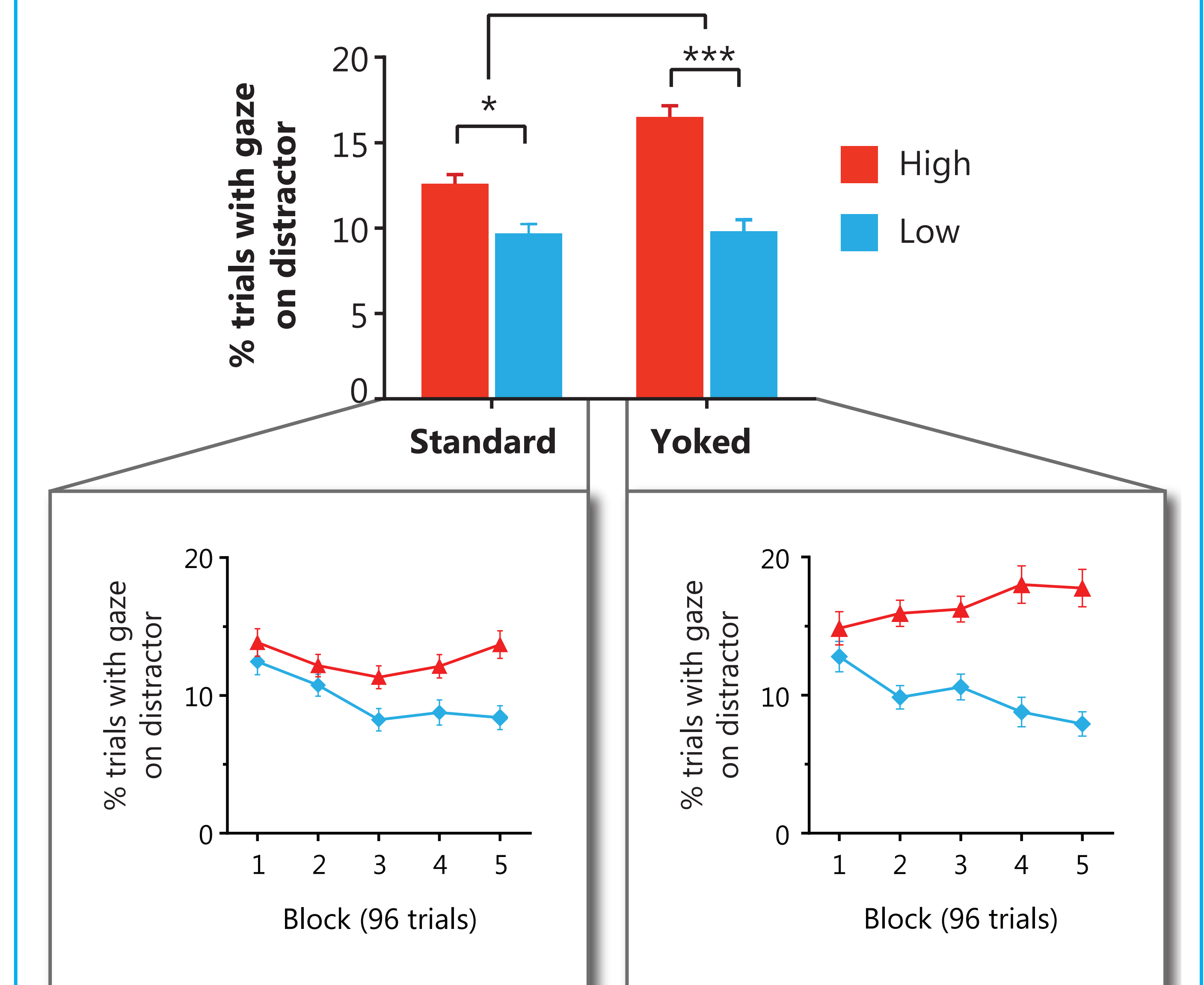
Each Yoked Group participant matched to one in Standard Group. Receive the same sequence of trials and rewards. Looking at distractor *does not* cause omission.



Pavlovian signalling relationships equivalent between the two groups.

No Instrumental response relationships between distractor suppression and reward in the Yoked Group.

Results:



Participants looked at the high-value distractor more often than the low-value distractor (i.e., there was a VMAC effect) in both groups. This effect was smaller in the Standard Group (where the Instrumental relationship between distractor suppression and reward was intact) than in the Yoked Group (no Instrumental relationship between distractor suppression and reward). Error bars show within-subjects SEM. * $p < .05$, *** $p < .001$

Conclusions:

- The relationship between attention and reward learning is *intricate*.
- **Value modulates attentional capture** via a stimulus' Pavlovian signalling relationship with reward.
- **Value modulates attentional suppression** via a stimulus' Instrumental response relationship with reward.
- This suggests a potential role for reward learning in training to overcome maladaptive attentional biases, such as those implicated in addiction (Field & Cox, 2008).

References:

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