

Dynamic feedback valuation impacts learning in a probabilistic two-armed bandit task

Introduction

- Performance feedback aids successful learning¹
- Contextual and personality factors relating to learning goals influence feedback valuation²

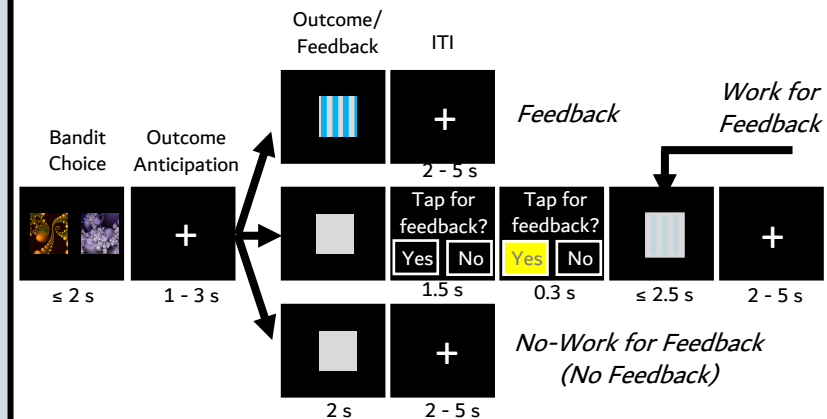
Research questions:

- How much do learners *value* feedback?
- How does feedback valuation influence motivated learning and task performance?

1. van Duijvenvoorde et al., 2008, *Journal of Neuroscience*. 2. VandeWalle et al., 2000, *Journal of Applied Psychology*.

Informative Bandit Task

- (**N = 102**) Subjects were presented with 160 choices between two bandits, ($p_{win} = 0.8$ or 0.6).
- Participants received either veridical feedback, non-informative feedback, or non-informative feedback with the option to work for feedback.
- Working for feedback required pressing the spacebar as many times as possible to reveal the outcome.



Trial type distribution

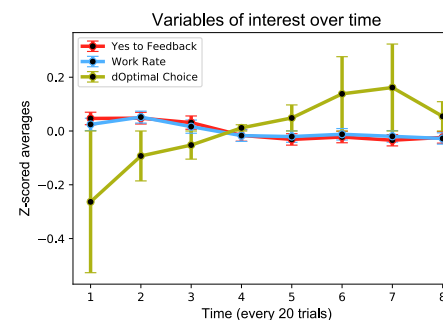
Distribution of feedback outcomes	
Types	Percentage of trials
Veridical	60 %
Non-informative (No work option)	20 %
Non-informative (Work option)	20 %

Analysis methods

To examine the dynamics of performance throughout the task, we calculated 20-trial moving performance averages for each bandit. We then calculated the distance between the two curves, $dOptimal$, reflecting the relative selection of the better compared to the worse bandit.

Increased $dOptimal$ choice suggests subjects are choosing the better bandit more often than the worse bandit.

Feedback valuation reflects information content



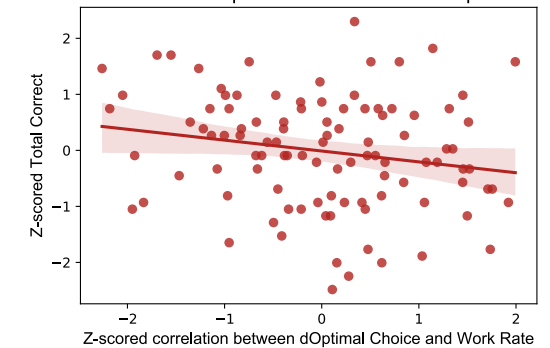
$dOptimal$ choice and yes to feedback were negatively correlated, $r(100) = -.88, p < .01$.

$dOptimal$ choice and work rate were negatively correlated, $r(100) = -.73, p < .05$.

Information valuation predicts overall performance

Performance was calculated by the total number of times a subject selected either fractal and it yielded a reward.

Information valuation predicts overall individual performance



On a single-subject level, we calculated a time series correlation between $dOptimal$ choice and work rate and used the outcome in a linear regression, which significantly predicted overall performance, $F(1, 102) = 3.967, p < .05$.

Discussion

- Information valuation predicts overall performance.
- Feedback valuation changes to reflect its information content.
- Time series correlations show as choice optimality increases, both the decision to work for feedback and work rate decrease.
- Feedback valuation is an important component of motivated learning.