

The effect of outcome delivery presentation on loss aversion in risky decisions

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1. Introduction

How is loss aversion altered in people with gambling problems? Prior literature presents contradictory findings. By one account, problem gamblers may be *less* averse to losses, since gambling inherently entails accepting risky gambles with potential losses (Gelskov *et al.*, 2016; Lorains *et al.*, 2014). However, Giorgetta *et al.* (2014) also found that problem gamblers were *more* loss averse, which may contribute to loss chasing behaviour. In these prior studies, the tasks have varied in whether trial-by-trial outcomes were presented after each choice. The present study tested whether the presence of such feedback influences loss aversion scores in healthy volunteers, as a precursor to planned future studies using this procedure in regular and problem gamblers.

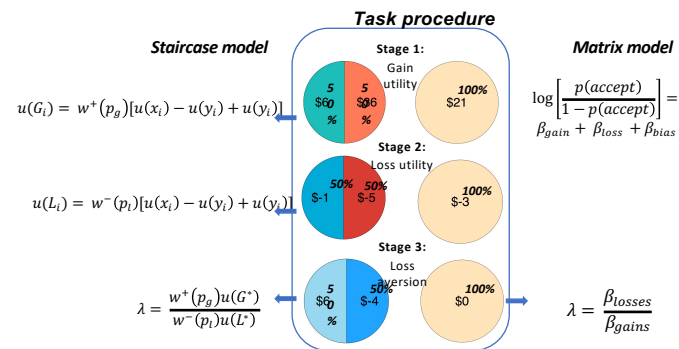
2. Measurement Method

Staircase Method (Abdellaoui *et al.*, 2013)

- Measurement of loss aversion (λ) requires estimating utility functions for gains and losses. $\lambda = 1$ would indicate that gains and losses generate the same utility, and loss aversion is indicated by $\lambda > 1$.
- Individuals are asked to choose between two risky gambles, and one option was adjusted over successive trials to identify each participant's **indifference point**, at which individuals value the two alternatives equally.

Matrix Method (Walasek & Stewart, 2015)

- Individuals are asked to choose between mixed gambles, which were uniquely and randomly sampled from a gain/loss matrix. The method captures a tendency to accept independently of potential gain and loss.



3. Experiment Design

85 undergraduate volunteers were asked to make a series of monetary risky decisions, between a pair of 50-50 gamble options. They were randomly assigned to two conditions:

- Feedback condition:** appetitive (cheer) or aversive (boo) auditory and visual sensory feedback was presented on each trial. The sensory feedback was proportionate to the size of the gain or loss.
- No-feedback condition:** the outcome of each gamble was not revealed, and a blank screen was presented for an equivalent interval.

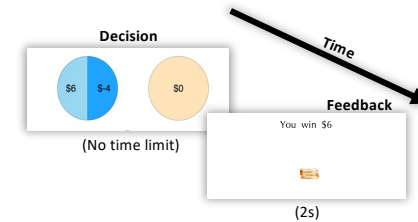


Figure 1: example of trial sequence.

4. Results

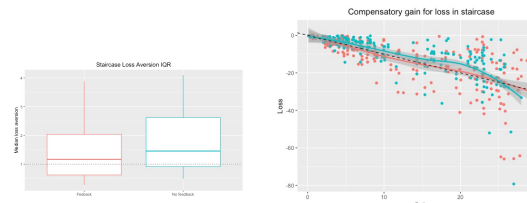


Figure 2: the values of gain and loss at the equal utility.

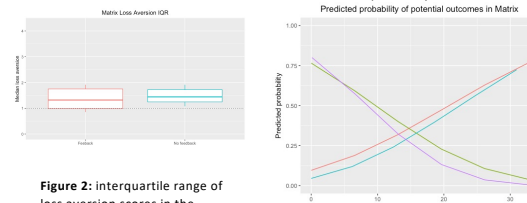


Figure 3: the values of gain and loss at the equal utility.

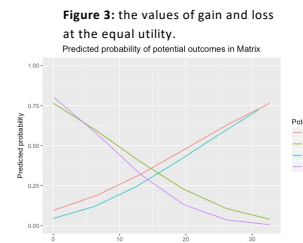


Figure 4: the predicted probabilities of gamble acceptance by the values of gain and loss independently.

Staircase Method

- Relative to the loss-neutral value of 1, reliable loss aversion ($\lambda > 1$) was observed in the no-feedback condition ($z = 2.608$, $p = .009$), but only marginally in the feedback condition ($z = 1.920$, $p = .055$).
- Loss aversion scores did not differ significantly between the no-feedback condition ($median \lambda = 1.46$) and the feedback condition ($median \lambda = 1.17$), $U = 789$, $p = .636$, $r = .051$.

Matrix Method

- The median loss aversion scores were significantly higher than 1 in both no-feedback ($median \lambda = 1.44$, $z = 4.575$, $p < .001$) and feedback conditions ($median \lambda = 1.31$, $z = 3.155$, $p = .002$), and did not differ significantly, $U = 659$, $p = .239$, $r = .128$.
- Loss aversion scores in the staircase and matrix procedures were not reliably correlated with one another ($r = -.017$, $p = .885$).

5. Conclusions & Future Analysis plan

- Loss aversion was reliably observed using the matrix procedure and was also robust with the staircase procedure in the no-feedback condition. Loss aversion scores did not vary significantly with the presence or absence of trial-by-trial feedback using either method. Surprisingly, the scores from the matrix and staircase methods were not correlated. This may be due to different assumptions: the staircase method assumes a non-linear utility function and probability weighting, whereas the matrix method assumes a linear utility and no probability weighting. We are investigating correlations with self-reported risk attitudes to adjudicate whether one method is superior. Future studies will also aim to characterize loss aversion in people with gambling problems.