

Drift Diffusion Modelling

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Abstract

1 Analysis Plan

We will analyse our data by fitting a drift diffusion model (DDM) to it. This allows us to move from characterising each individual's performance in terms of accuracy and reaction time (which may be inter dependant due to speed-accuracy trade-offs) and instead measure drift rate, boundary separation and bias.

Main paper for model is (Ratcliff and McKoon, 2008)?

- Similarly, very long (>10s) were removed. This totalled 12 (0.05%) trials.¹

After applying these criteria, we were left with 23,168 trials from a total of 58 observers.

Accuracy data is shown in Figure 1. The Bayesian $R^2 = 0.13$, 05% HPDI = [0.011, 0.29]. Same something about range restriction.

We now look briefly at the reaction times for correct trials.

1.1 Pre-processing

Before fitting the model to the data, we carried out the following pre-processing steps:

- Data from one participant were removed due to low (<15%) accuracy for target absent trials.
- Data from one participant were removed to low (<55%) accuracy for both target present and absent the red horizontal target condition.
- Very short (<120ms) reaction times were excluded. This resulted in 20 trials (0.09%) being removed. After removing these trials, the shortest remaining reaction time was over 200ms.

1.2 Modelling

The DDM model was fit using R (v x.xxx) and the brms package (v x.xxx) with the model formula given below:

$$rt|dec \sim 0+$$

Before fitting the model, n_D was scaled to (0, 1), and the following priors were used:

More details about fitting.

Before analysing the results, we verified that all $R^2 \hat{>} 1.01$ and $n_{eff} > 500(???)$ for all parameters.

¹Rerun models with these criteria!

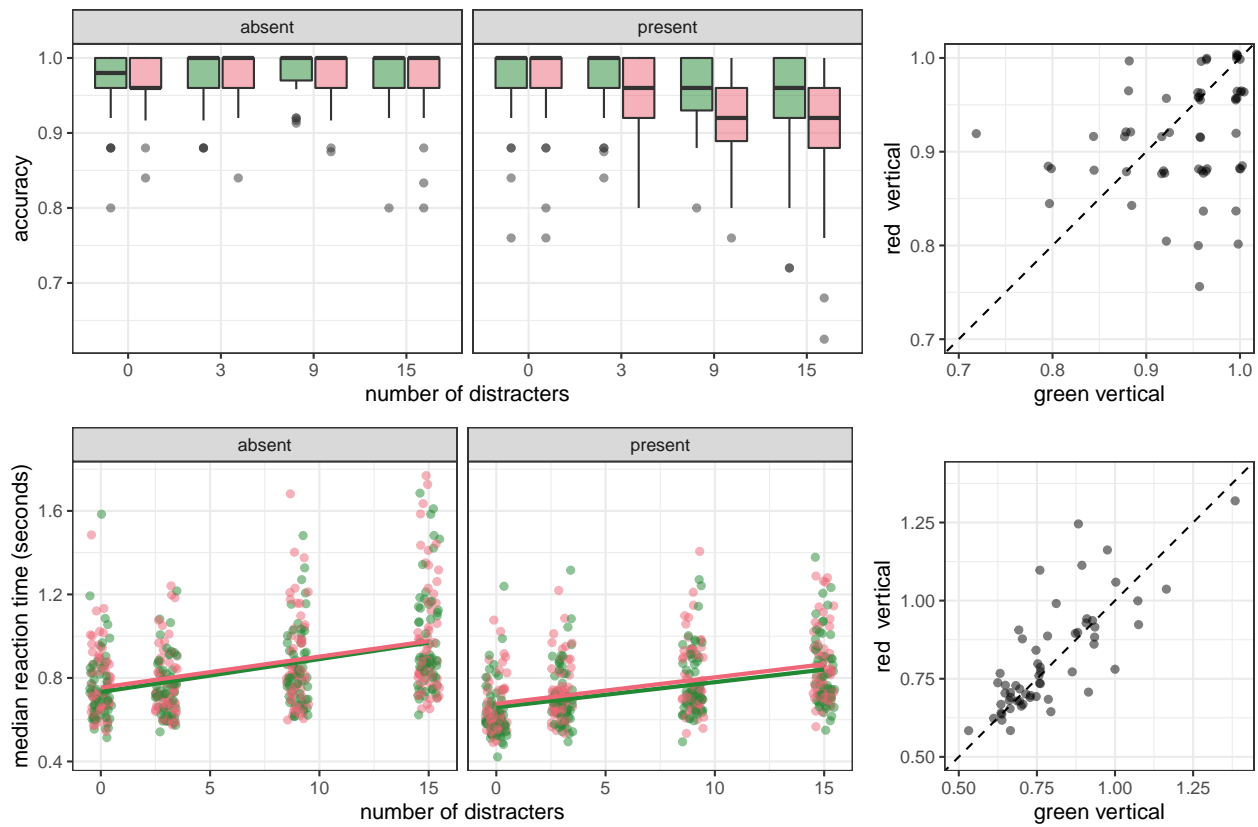


Figure 1: *top*: Accuracy data from experiment. *top right*: Accuracy data across the two condition for target absent trials with 15 distractors. Each dot represents an observer. *bottom*: RT data from experiment. *bottom right*: RT data across the two condition for target absent trials with 15 distractors. Each dot represents an observer.

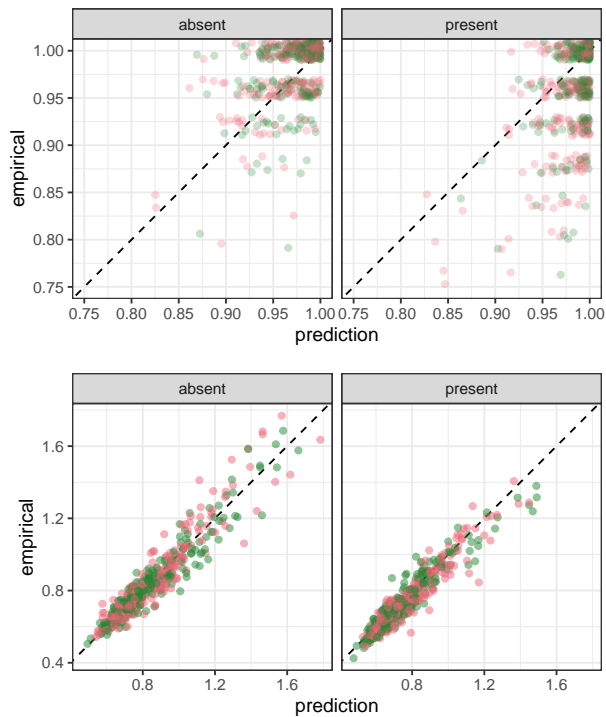


Figure 2: Comparisons between posterior predictions and empirical (*top*) accuracies and (*bottom*) RT data.

2 Results

2.1 Posterior Predictions

First things first, we check how well the model fits the training data.

2.2 Parameter Estimates and Correlation Structure

3 Discussion

4 Author Contributions

5 Acknowledgements

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References

Ratcliff, R. and McKoon, G. (2008). The Diffusion Decision Model: Theory and Data for Two-Choice Decision Tasks. *Neural Computation*, 20(4):873–922.