

Supplementary Material.

Racing Against The Clock: Evidence-Based Vs. Time-Based Decisions

Guy E. Hawkins¹ & Andrew Heathcote²

1: School of Psychology, University of Newcastle, Australia

2: School of Psychology, University of Tasmania, Australia

TRDM Sensitivity to the Fixed Value of τ_T in the Timing Process

In the main text we fixed the onset of the timing process to a fast value ($\tau_T = 50\text{ms}$), and never estimated it from data. Here, we confirm that the particular constant selected for the onset of the timing process does not have a strong influence on the modeling outcomes. We re-estimated the DIC-best TRDM from Part 1 of the main text 4 times, each assuming a different fixed value of the timing onset parameter spaced in 50ms increments: $\tau_T = 100, 150, 200, 250\text{ms}$. This spans a range from slightly slower than the assumed value in the main text (100ms) through to quite slow, in the typical range of non-decision time estimates from the evidence accumulation process (250ms).

Table 1 shows the results of this model comparison. Overall, there is relatively little sensitivity to the fixed value of the timing onset across a reasonably broad range of rapid values, between 50 and 150ms for most of the data sets, and even up to 250ms for some of the data sets. That is, model comparison between the TRDM and the competitor models favors the TRDM across at least 2 of the fixed values of the timing offset that we examined, for all data sets. We take this as evidence that the fixed onset assumed for the timing process is not particularly important in the sense that it does not change the modeling outcomes, at least across a range of reasonably rapid onset times that tend to be smaller than the non-decision time estimate of the evidence accumulation process.

Table 1

DIC-based model comparison for different onset times of the TRDM timing process for the four data sets considered in Part 1 of the main text. Columns identify data sets. Cell entries are zero-referenced to the DIC-preferred model for each data set such that positive values indicate a poorer explanation of the data.

Onset time (τ_T , ms)	Perceptual	Lexical	Explicit	Implicit
50	0	0	7	0
100	172	41	0	10
150	109	318	47	44
200	138	707	73	39
250	412	1,138	105	32

Goodness of Fit to Aggregate Data

Figure 1 shows the goodness of fit of the unbiased and freely estimated guessing variants of the TRDM explored in Part 2 of the main text.

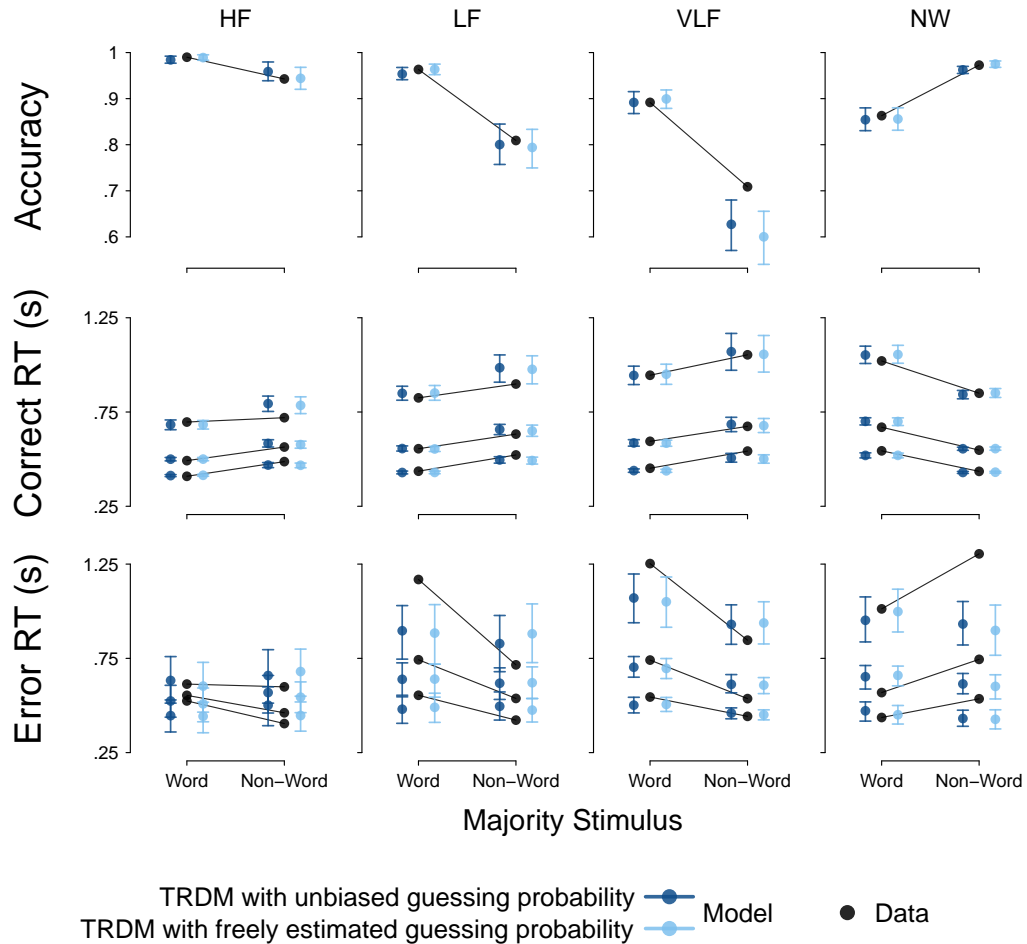


Figure 1. Observed (black) and posterior predictive distribution of the TRDM aggregated over participants in Experiment 2 of Wagenmakers, Ratcliff, Gomez, and McKoon (2008). Shades of blue represent two guessing variants of the TRDM: the TRDM as proposed in Part 1 of the paper is shown in dark blue (labeled “unbiased guessing probability”) alongside a version with a freely estimated guessing probability shown in light blue. Rows represent different statistics: choice accuracy (upper) and correct and error RTs (middle, lower), where vertically placed dots for the latter represent percentiles of the distributions (10^{th} , 50^{th} , 90^{th}). Uncertainty bars represent the standard error of the posterior predictive distribution. The lexical decision data has four columns corresponding to the stimulus manipulation: words with high frequency (HF), low frequency (LF), very low frequency (VLF), and non-words (NW). The x -axis in each panel represents the stimulus bias manipulation: 75% words vs 25% non-words (labeled “Word”) compared to 25% words vs 75% non-words (labeled “Non-Word”).

References

- Wagenmakers, E.-J., Ratcliff, R., Gomez, P., & McKoon, G. (2008). A diffusion model account of criterion shifts in the lexical decision task. *Journal of Memory and Language*, *58*(1), 140–159.