

## SUPPLEMENTARY MATERIAL

# The EZ Diffusion Model Provides a Powerful Test of Simple Empirical Effects

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This document consists of two sections. The first section contains the results of the type 1 error analyses of the four sets of simulations presented in van Ravenzwaaij, Donkin, and Vandekerckhove (2016). The second section compares performance of the EZ model to performance of the simple diffusion model for the first set of simulations.

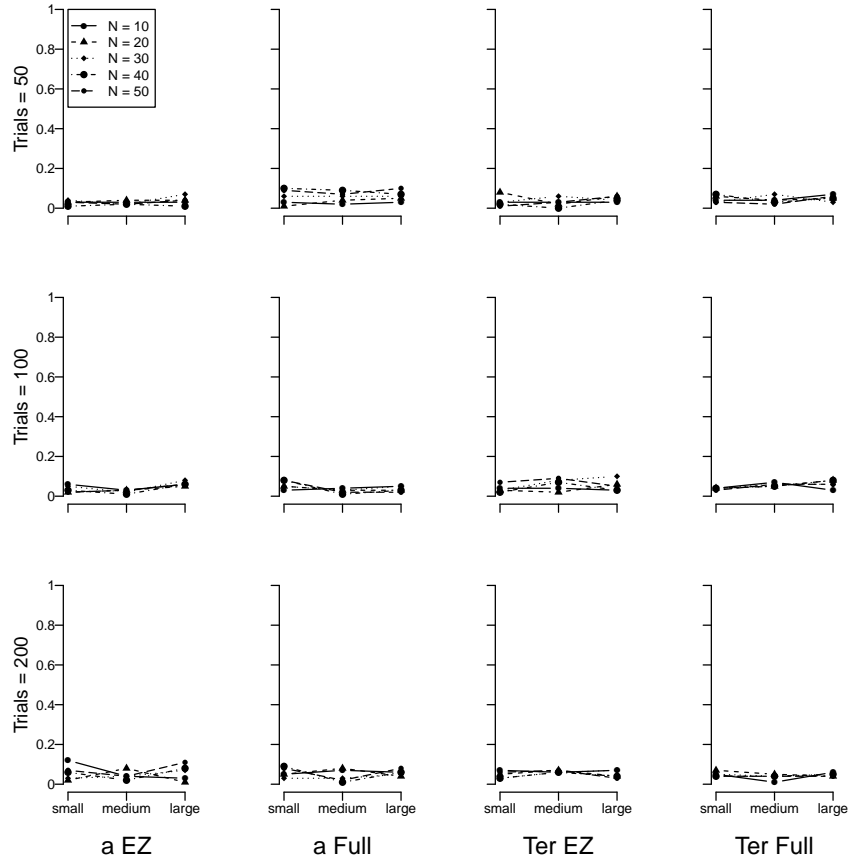
### Type 1 Error Analyses

Details of the four power simulations can be found in van Ravenzwaaij et al. (2016). The paper contains power analyses for the focal parameters (drift rate, boundary separation, non-decision time, and drift rate again, respectively). Here, we present results for the non-focal parameters.

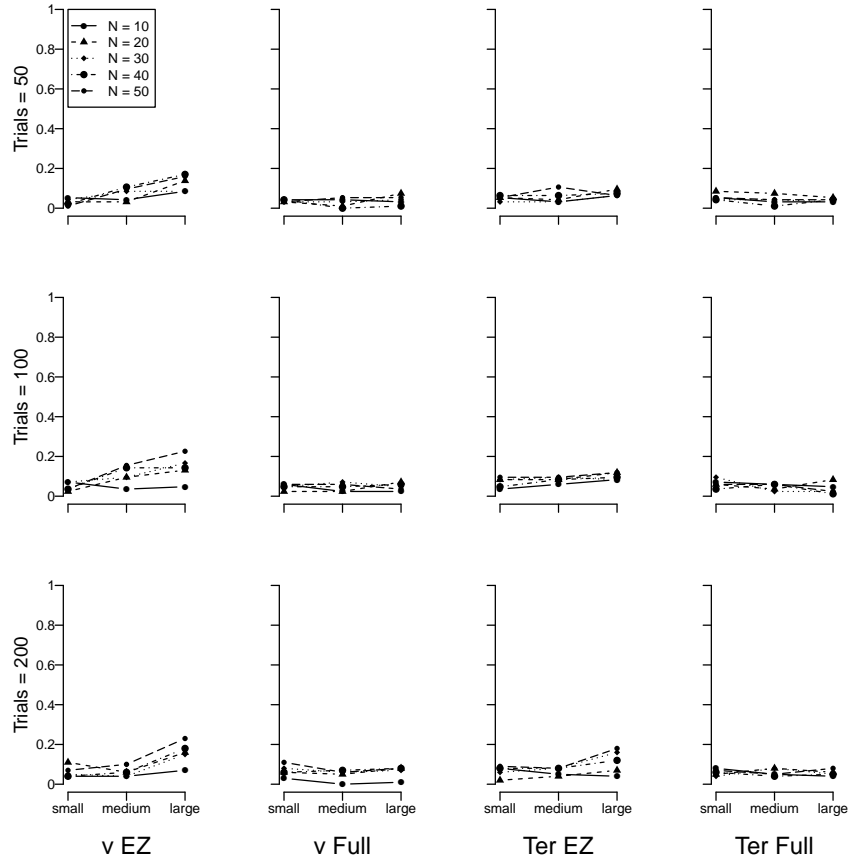
The results of simulation sets 1 to 4 are shown in Figures 1, 2, 3, and 4, respectively. In all plots, the y-axis plots the proportion of 100 simulations for which a  $t$ -test on the non-focal parameter of the two groups yielded a  $p < .05$ . The results for the EZ diffusion model are plotted in the first and third column, and the full diffusion in the second and fourth column. For both models, the type 1 error rate is low.

### EZ Diffusion Versus Simple Diffusion

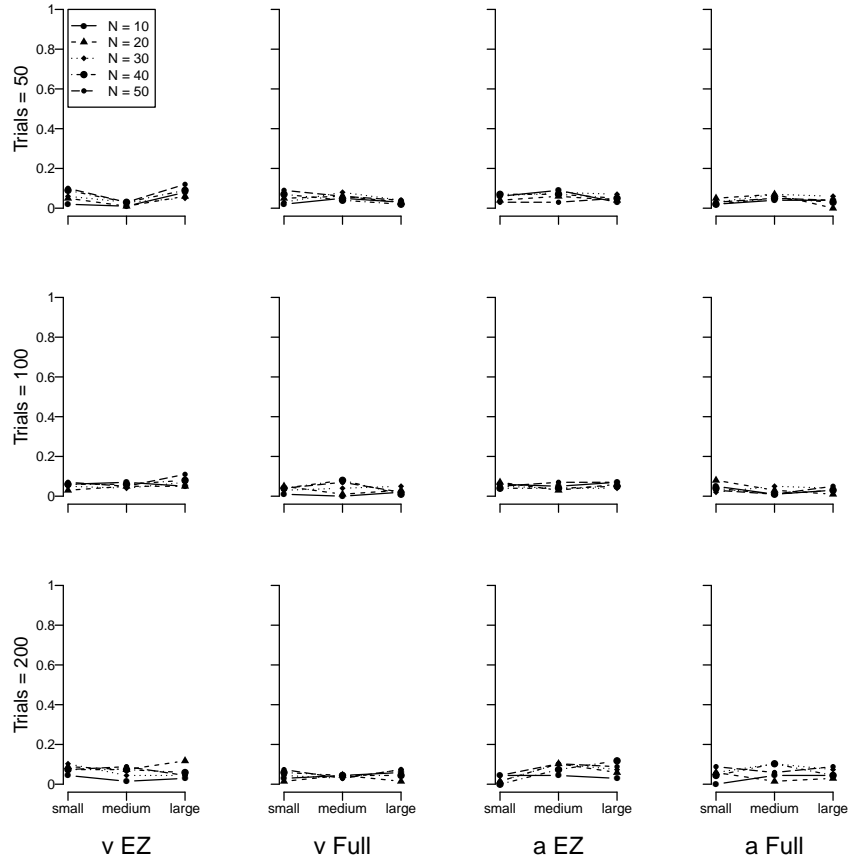
The power results of the drift rate  $\nu$  simulation (set 1) with the simple diffusion model included are shown in Figure 5. The results show that EZ and the simple diffusion model perform comparable, both outperform the full diffusion model.



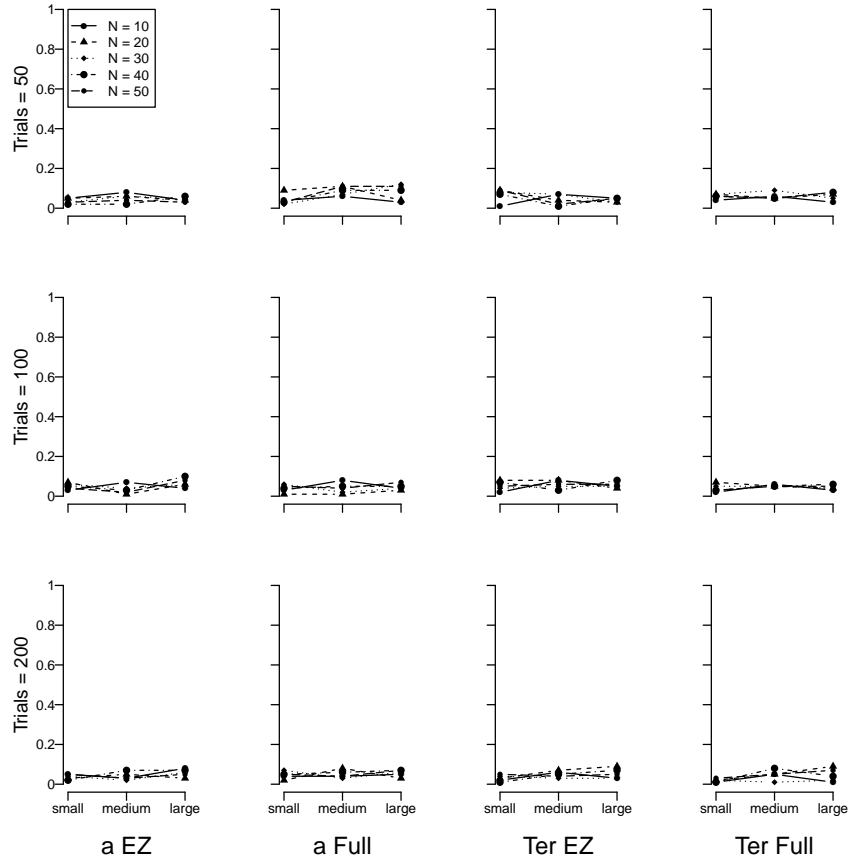
*Figure 1.* Proportion of times a significant between-group effect was detected for a non-focal parameter in simulation set 1. First and third column = EZ diffusion; second and fourth column = full diffusion; left two columns = boundary separation  $a$ ; right two columns = non-decision time  $T_{er}$ . Top row = 50 trials, middle row = 100 trials, bottom row = 200 trials. Different lines indicate different numbers of participants per group.



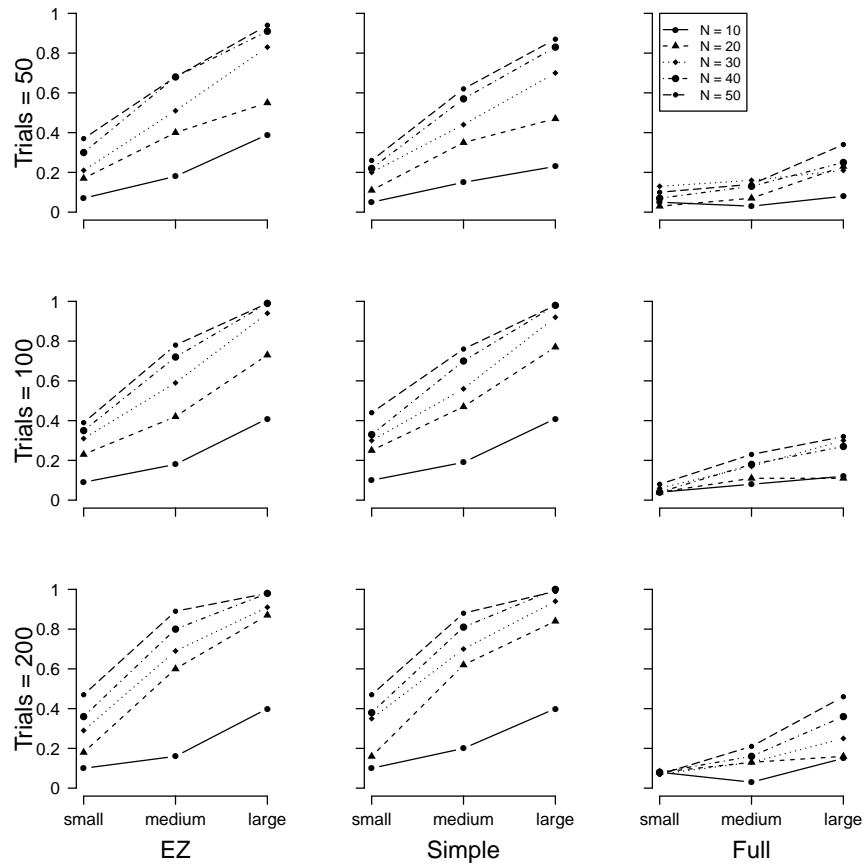
*Figure 2.* Proportion of times a significant between-group effect was detected for a non-focal parameter in simulation set 2. First and third column = EZ diffusion; second and fourth column = full diffusion; left two columns = drift rate  $\nu$ ; right two columns = non-decision time  $T_{er}$ . Top row = 50 trials, middle row = 100 trials, bottom row = 200 trials. Different lines indicate different numbers of participants per group.



*Figure 3.* Proportion of times a significant between-group effect was detected for a non-focal parameter in simulation set 3. First and third column = EZ diffusion; second and fourth column = full diffusion; left two columns = drift rate  $\nu$ ; right two columns = boundary separation  $a$ . Top row = 50 trials, middle row = 100 trials, bottom row = 200 trials. Different lines indicate different numbers of participants per group.



*Figure 4.* Proportion of times a significant between-group effect was detected for a non-focal parameter in simulation set 4. First and third column = EZ diffusion; second and fourth column = full diffusion; left two columns = boundary separation  $a$ ; right two columns = non-decision time  $T_{er}$ . Top row = 50 trials, middle row = 100 trials, bottom row = 200 trials. Different lines indicate different numbers of participants per group.



*Figure 5.* Proportion of times a significant between-group effect was detected with the diffusion model drift rate estimates. Left column = EZ diffusion  $\nu$ ; middle column = simple diffusion  $\nu$ ; right column = full diffusion  $\nu$ . Top row = 50 trials, middle row = 100 trials, bottom row = 200 trials. Different lines indicate different numbers of participants per group.

## References

van Ravenzwaaij, D., Donkin, C., & Vandekerckhove, J. (2016). The EZ Diffusion model provides a powerful test of simple empirical effects. Manuscript submitted for publication.