Individual model

See Figures 1 - 10 for the parameter recovery results using the individual model. Figure 1-4 show the recovery of the go and stop parameters and the corresponding go RT and SSRT distributions as a function of the number of go and stop-signal trials. The go parameters are recovered very well. The stop parameters are recovered adequately as well, but with very few stop–signal trials the posterior standard deviations and the standard errors are quite sizable. Of course, as the number of stop–signal trials increases, the stop parameters are estimated more precisely and the standard error decreases. I ran parameter recoveries using various parameter settings; the results are very similar to the ones reported here.

Figures 5-10 shows changes in the estimated go and stop parameters as a function of changes in the underlying true parameters. For each parameter, the generating parameters were chosen to span a very wide, yet realistic range. The go parameters are recovered very well. The stop parameters are recovered with more uncertainty than the go parameters. Note, however, that the go parameters are estimated using substantially fewer data points than the go parameters.

Hierarchical model

Still running, but preliminary results are ok...

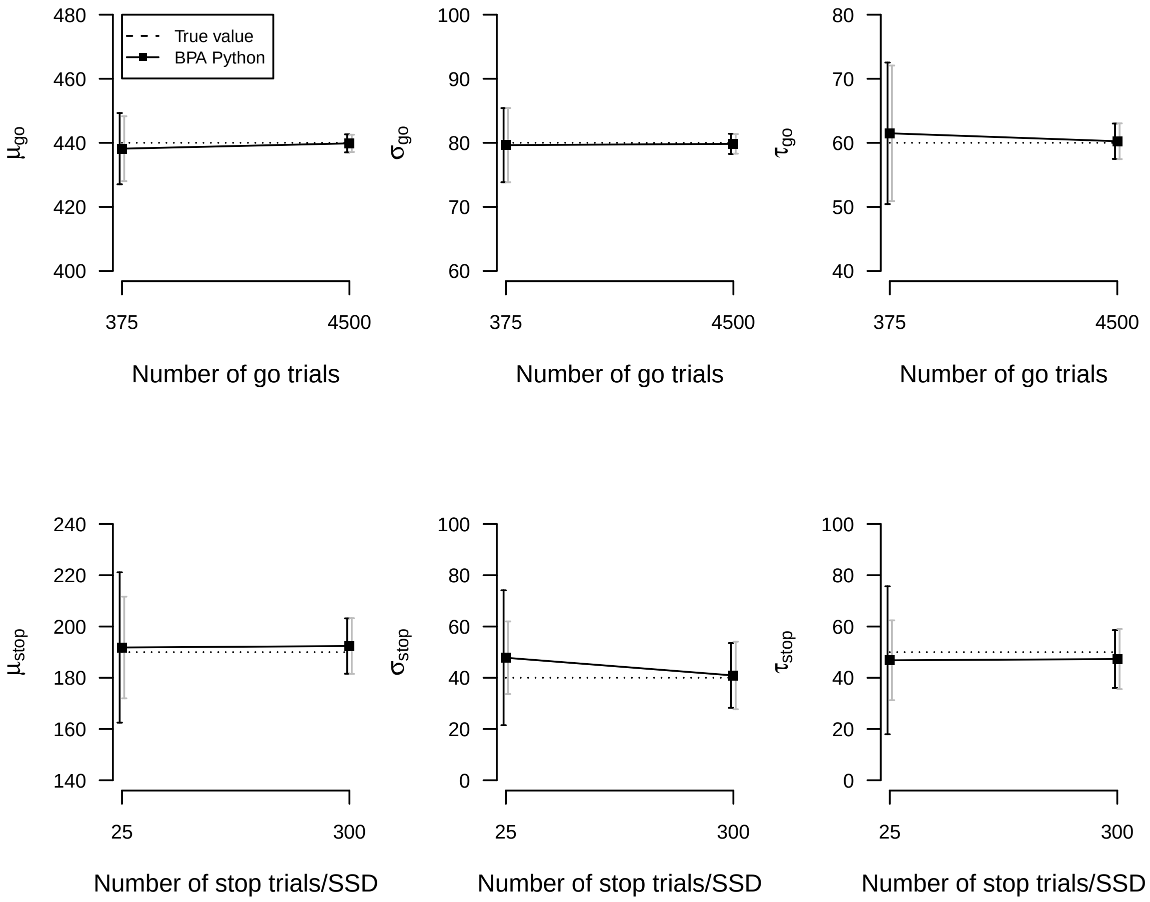

Figure 1. : *Parameter recovery I: Posterior medians of the go and stop parameters.* We conducted two sets of simulations that varied the number of go and stop-signal trials, with 130 synthetic datasets for each set. The estimated μ_{stop}, σ_{stop}, and τ_{stop} parameters were constrained to be equal across the five SSDs. The dashed lines give the true value of the parameters. The black bullets show the mean of the posterior medians of the estimated parameters across the 130 replications. The black vertical lines show the average posterior standard deviation across the replications. The gray vertical lines indicate the size of the standard error across the replications.

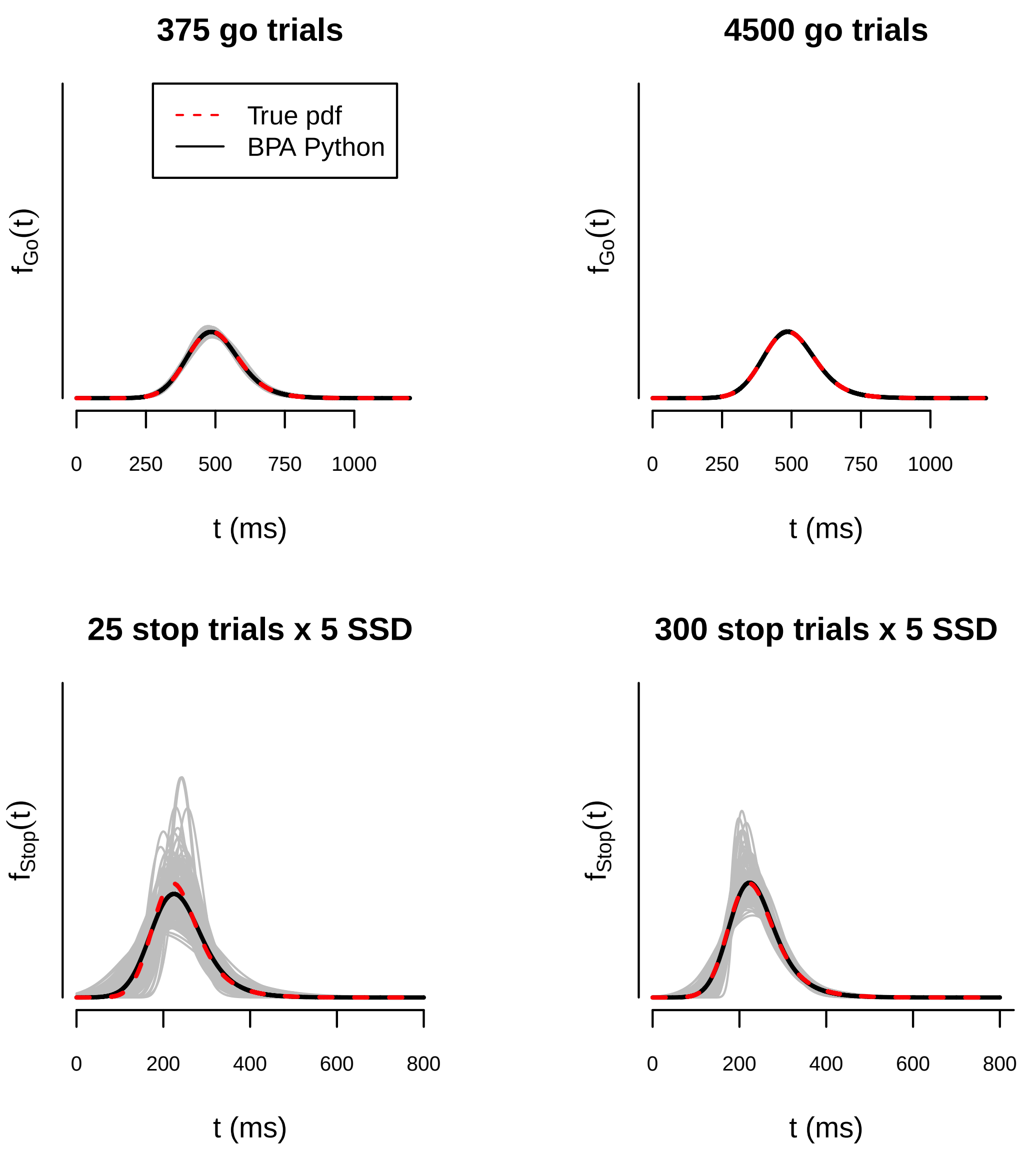

Figure 2. : *Parameter recovery I: Estimated Go RT and SSRT distributions.* We conducted two sets of simulations that varied the number of go and stop-signal trials, with 130 datasets for each set. The estimated μ_{stop}, σ_{stop}, and τ_{stop} parameters were constrained to be equal across the five SSDs. The dashed red lines show the true go RT and true SSRT distribution. The gray lines show the 130 go RT and SSRT distributions based on the posterior medians of the individual replications. The solid black line shows a SSRT distribution based on the mean of the posterior medians of the go and stop parameters across the 130 replications.

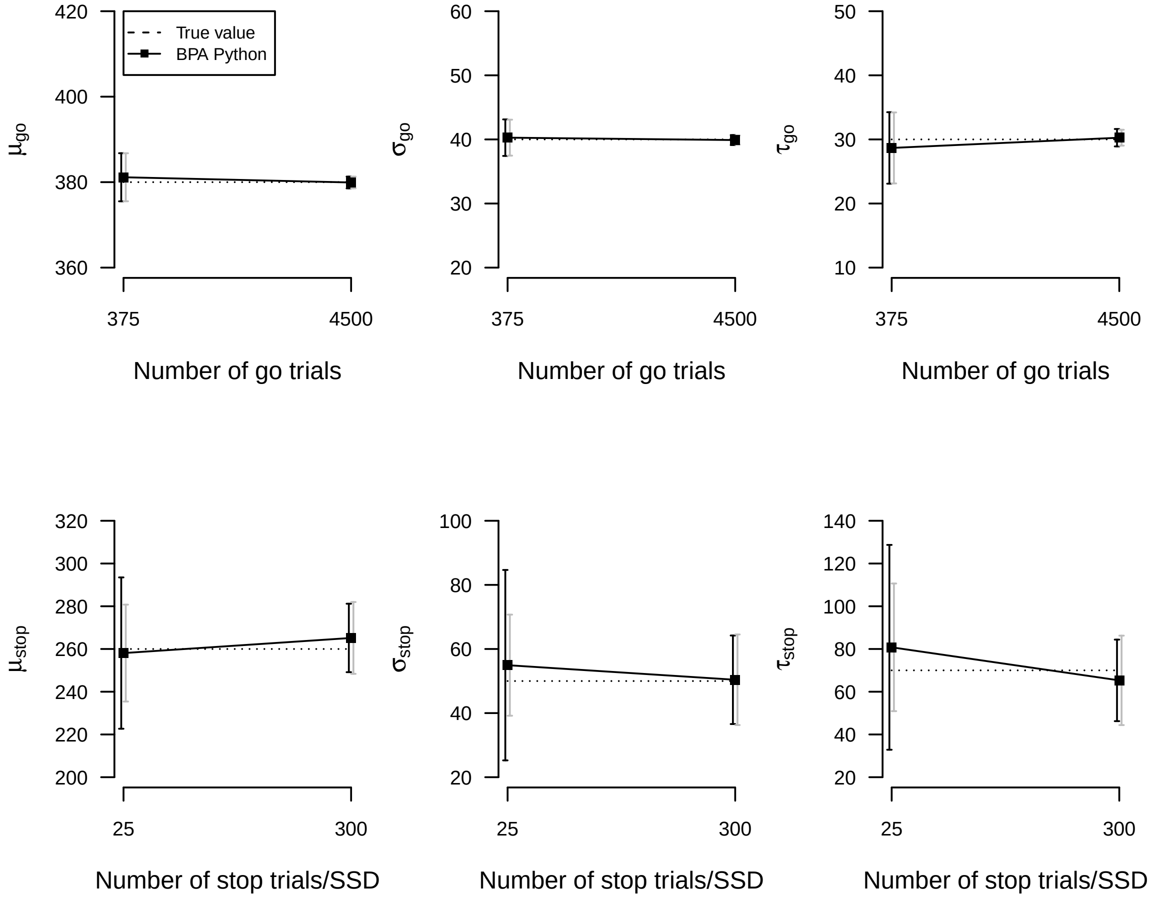

Figure 3. : *Parameter recovery II: Posterior medians of the go and stop parameters.* We conducted two sets of simulations that varied the number of go and stop-signal trials, with 130 synthetic datasets for each set. The estimated μ_{stop}, σ_{stop}, and τ_{stop} parameters were constrained to be equal across the five SSDs. The dashed lines give the true value of the parameters. The black bullets show the mean of the posterior medians of the estimated parameters across the 130 replications. The black vertical lines show the average posterior standard deviation across the replications. The gray vertical lines indicate the size of the standard error across the replications.

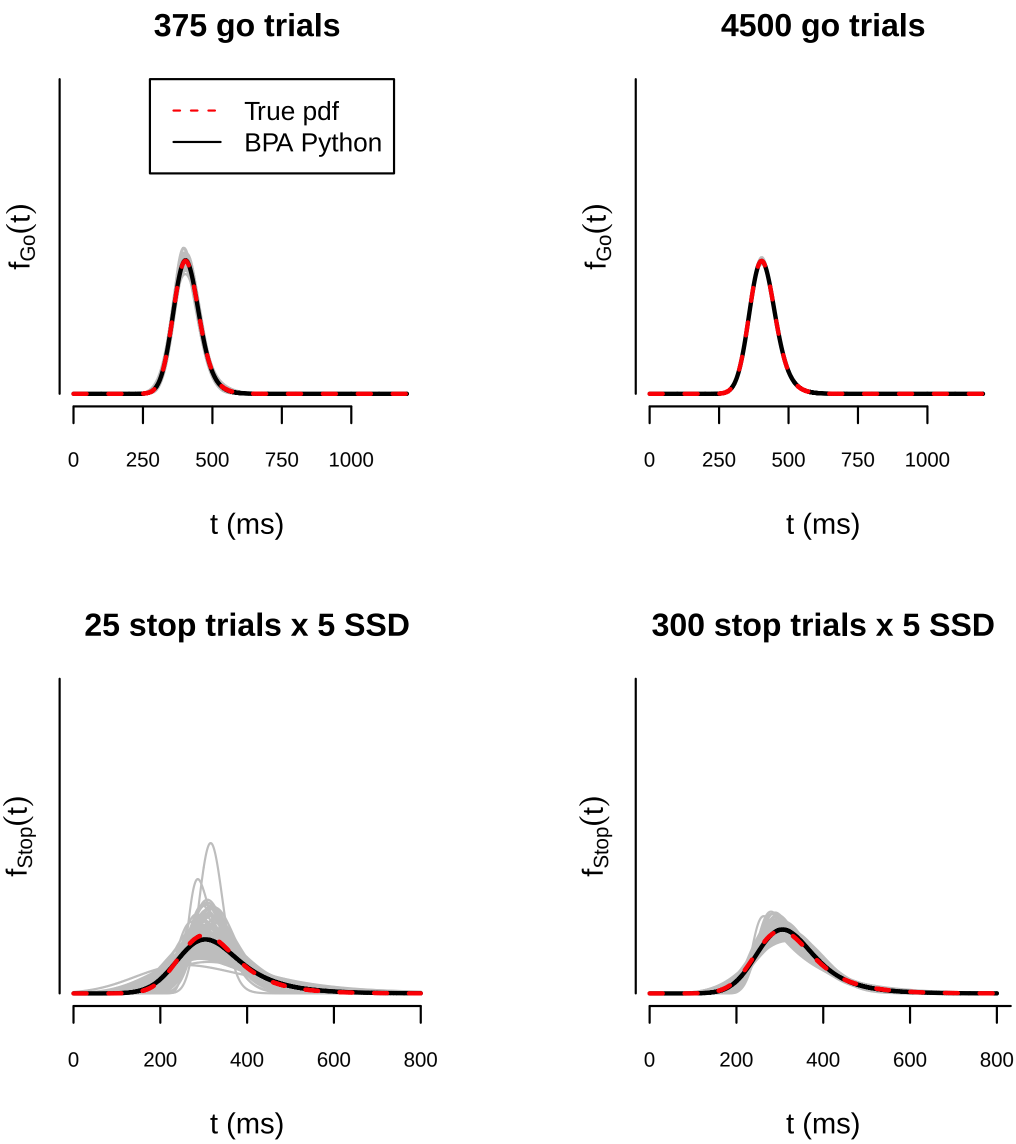

Figure 4. : *Parameter recovery II: Estimated Go RT and SSRT distributions.* We conducted two sets of simulations that varied the number of go and stop-signal trials, with 130 datasets for each set. The estimated μ_{stop}, σ_{stop}, and τ_{stop} parameters were constrained to be equal across the five SSDs. The dashed red lines show the true go RT and true SSRT distribution. The gray lines show the 130 go RT and SSRT distributions based on the posterior medians of the individual replications. The solid black line shows a SSRT distribution based on the mean of the posterior medians of the go and stop parameters across the 130 replications.

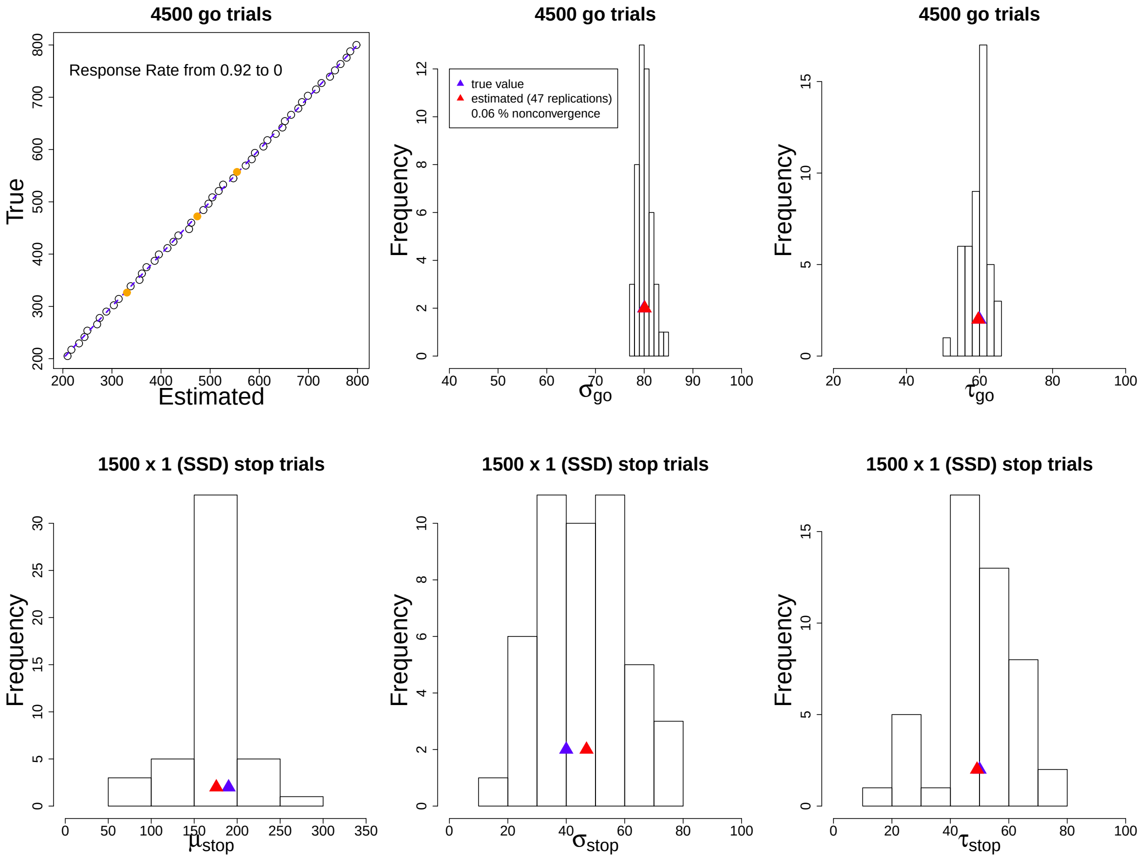

Figure 5. : *Parameter recovery III: Changes in the posterior median of μ_{go} as a function of changes in true μ_{go}.* I varied the value of the generating μ_{go} parameter from very low to very high in 50 equal steps, while keeping the other parameters constant. The orange circles indicate posterior medians from runs that did not converge successfully ($\hat{R} > 1.05$). The histograms show the distribution of the posterior medians of the other five model parameters. Note that the bias for the stop parameter estimates results from extreme parameter values from datasets with response rate $= 0$. If the response rate $= 0$, we don't have any SRRTs, and the stop parameters are empirically unindentified.

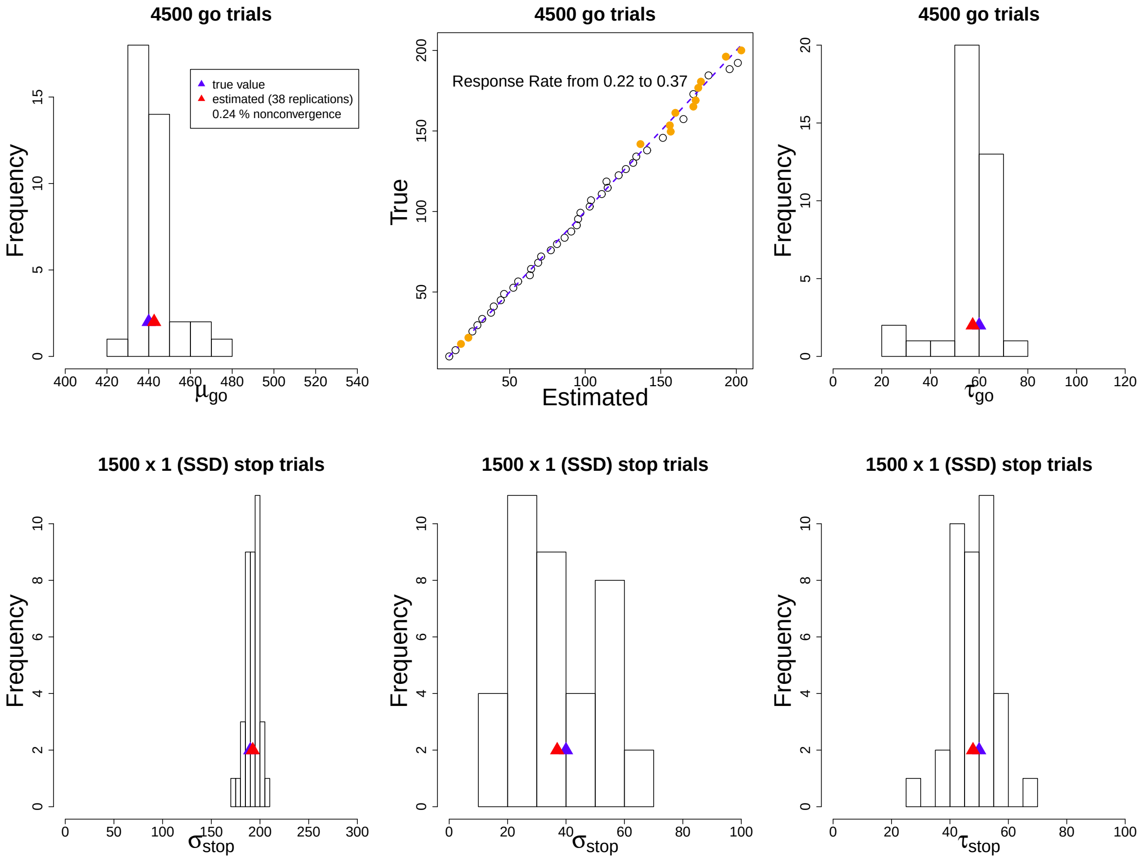

Figure 6. : *Parameter recovery III: Changes in the posterior median of σ_{go} as a function of changes in true σ_{go}.* I varied the value of the generating σ_{go} parameter from very low to very high in 50 equal steps, while keeping the other parameters constant. The orange circles indicate posterior medians from runs where one of the model parameters did not converge successfully ($\hat{R} >= 1.05$). The histograms show the distribution of the posterior medians of the other five model parameters.

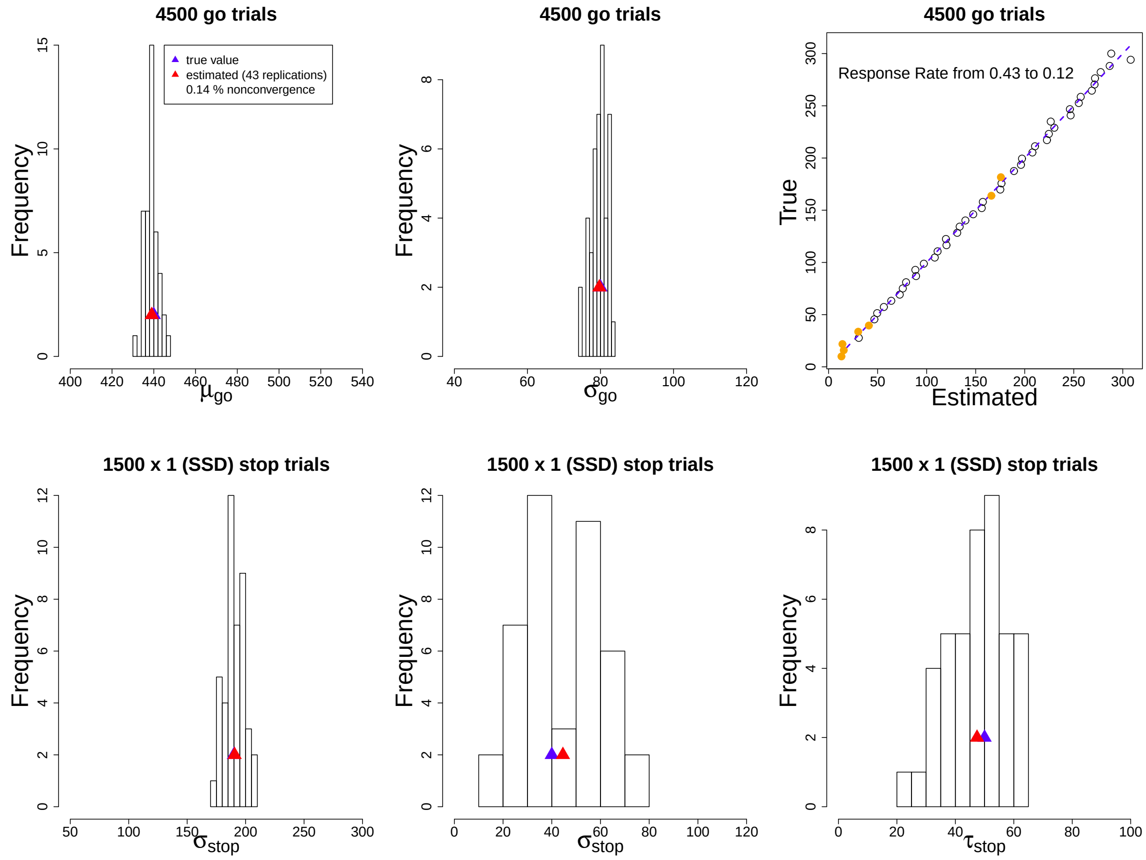

Figure 7. : *Parameter recovery III: Changes in the posterior median of τ_{go} as a function of changes in true τ_{go}.* I varied the value of the generating τ_{go} parameter from very low to very high in 50 equal steps, while keeping the other parameters constant. The orange circles indicate posterior medians from runs where one of the model parameters did not converge successfully ($\hat{R} >= 1.05$). The histograms show the distribution of the posterior medians of the other five model parameters.

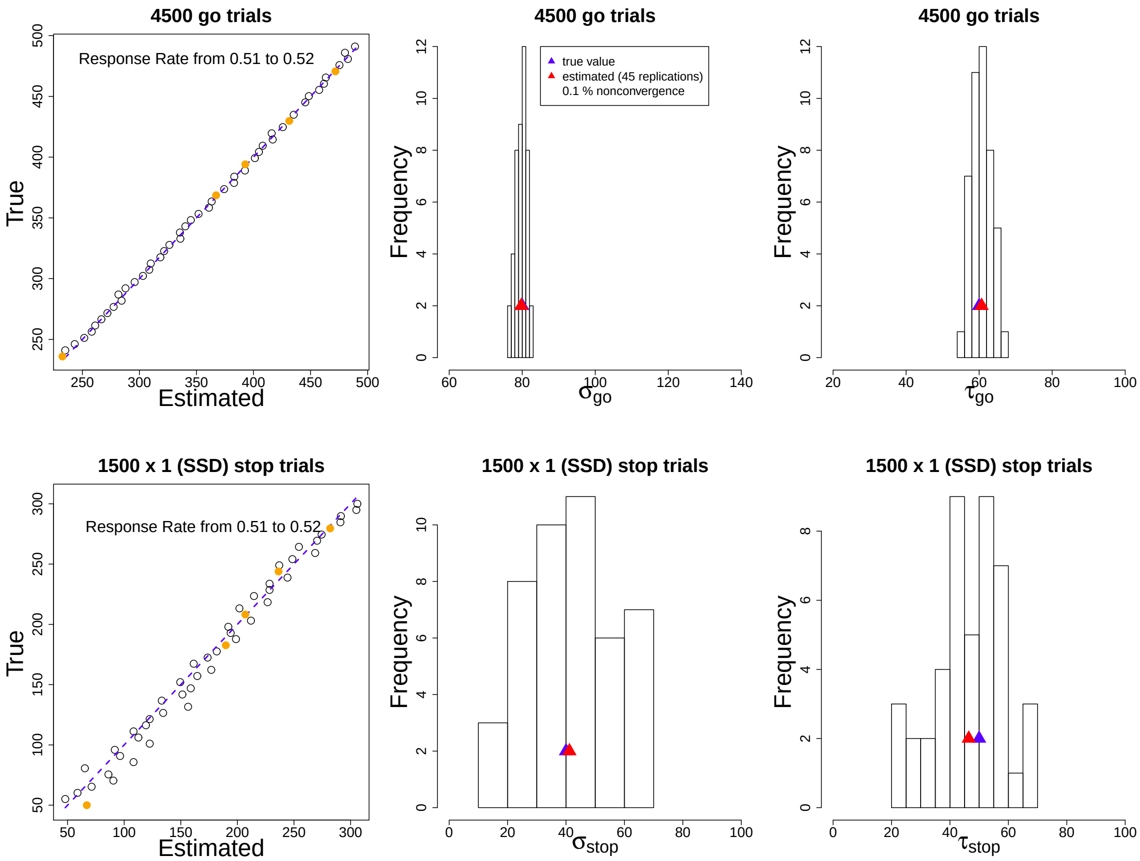

Figure 8. : *Parameter recovery III: Changes in the posterior median of* μ_{go} *and* μ_{stop} *as a function of changes in true* μ_{go} *and* μ_{stop}. I varied the value of the generating μ_{go} and μ_{stop} parameter from very low to very high in 50 equal steps (if μ_{stop} increases, μ_{go} decreases to keep response rate approximately constant), while keeping the other parameters constant. The orange circles indicate posterior medians from runs where one of the model parameters did not converge successfully ($\hat{R} >= 1.05$). The histograms show the distribution of the posterior medians of the other four model parameters.

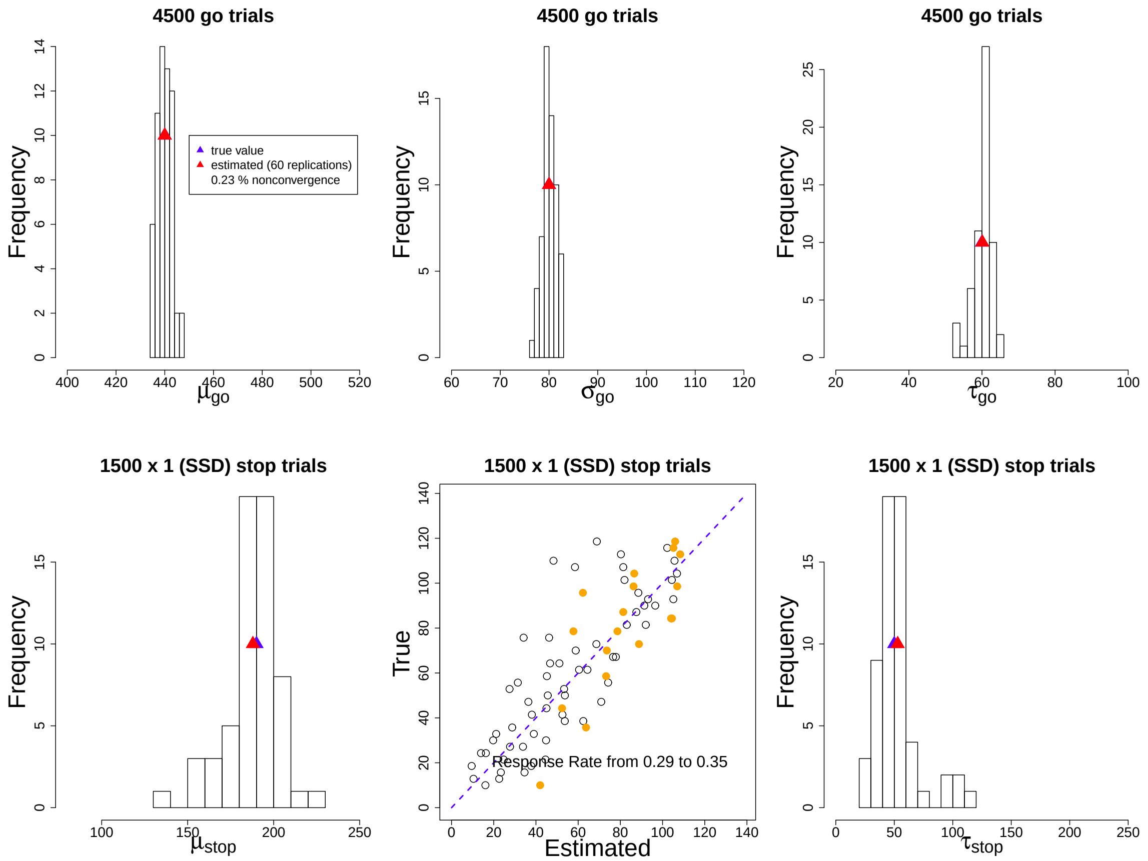

Figure 9. : *Parameter recovery III: Changes in the posterior median of σ_{stop} as a function of changes in true σ_{stop}.* I varied the value of the generating σ_{stop} parameter from very low to very high in 78 equal steps, while keeping the other parameters constant. The orange circles indicate posterior medians from runs where one of the model parameters did not converge successfully ($\hat{R} >= 1.05$). The histograms show the distribution of the posterior medians of the other five model parameters. It looks like convergence can be an issue if σ is relatively high (for σ_{go} as well!) So, we should run longer chains then...

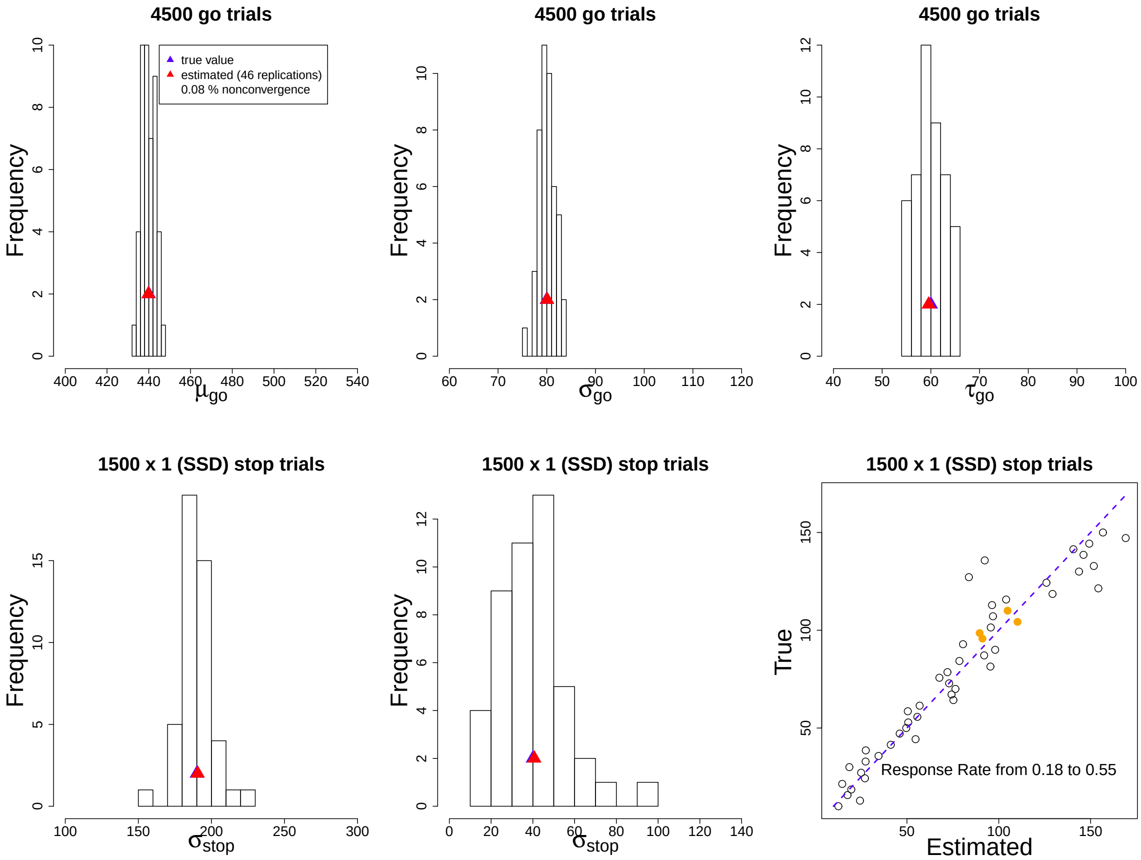

Figure 10. : *Parameter recovery III: Changes in the posterior median of τ_{stop} as a function of changes in true τ_{stop}.* I varied the value of the generating τ_{stop} parameter from very low to very high in 50 equal steps, while keeping the other parameters constant. The orange circles indicate posterior medians from runs where one of the model parameters did not converge successfully ($\hat{R} >= 1.05$). The histograms show the distribution of the posterior medians of the other five model parameters.