Scale Invariance Supplementary Materials
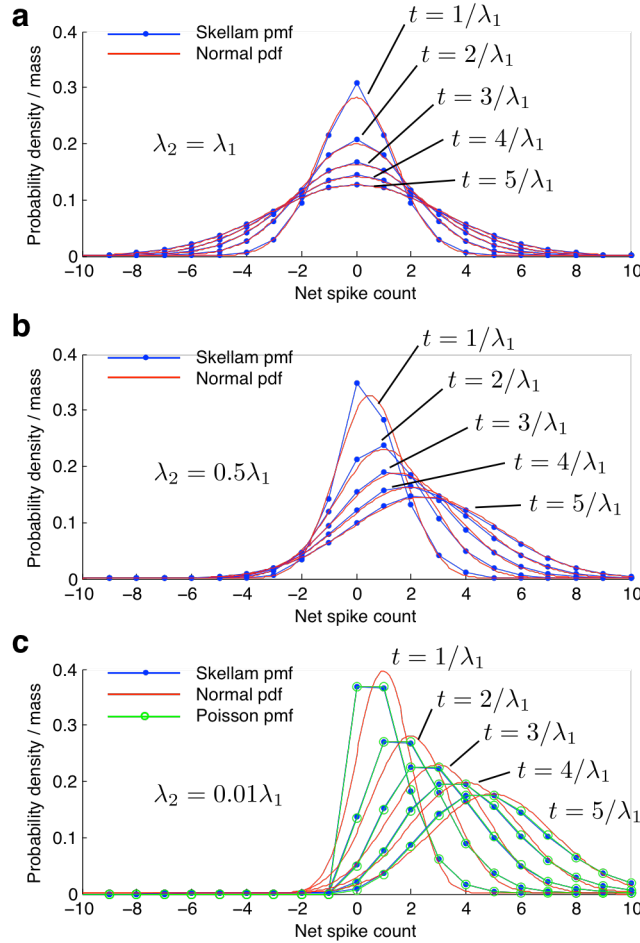

Figure S1. Comparison of Skellam probability mass functions (blue dots connected by linearly interpolated lines) and corresponding normal probability density approximations (red curves). Here the narrowest Skellam pmf describes the net spike count distribution at time t equal to one expected inter-spike time ($1/\lambda_1$) of process 1 in the opponent Poisson process. In order of increasing dispersion, the blue pmfs describe the count at integer multiples of this duration. **A:** The two spike rates in each opponent Poisson process are equal. **B:** The first spike rate is twice the second. **C:** The second spike rate is 0.01 times the first spike rate, making the process approximately purely Poisson. Here the Poisson approximation is shown in green.
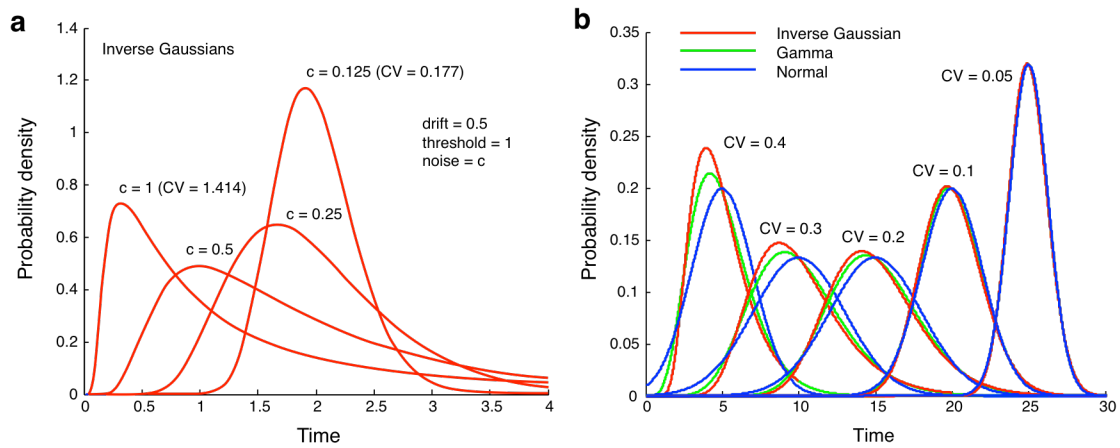
Figure S2. Comparison of inverse Gaussian, gamma and normal distributions at varying levels of CV.
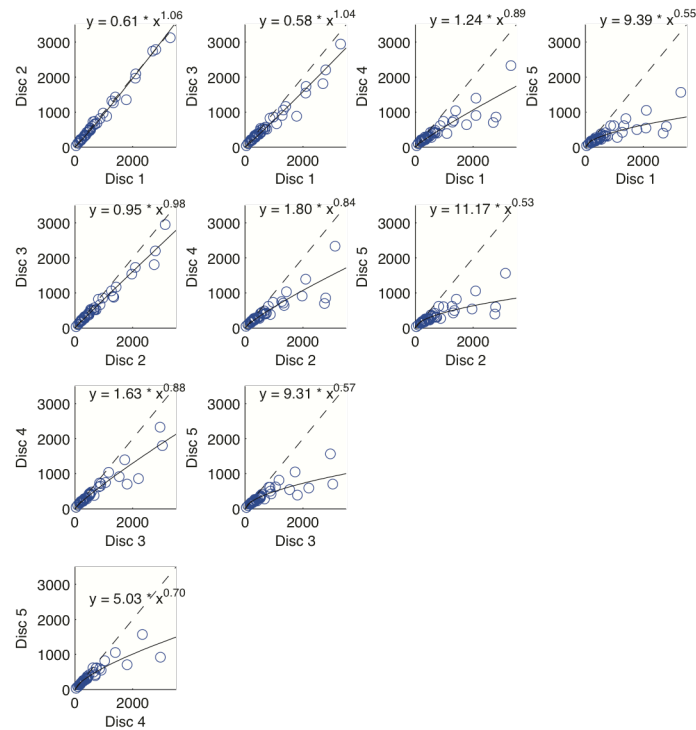
Experiment 1

Figure S3. Quantile-quantile plot of low intensity decision time quantiles at each discriminability level, plotted vs. every other, for Experiment 1.
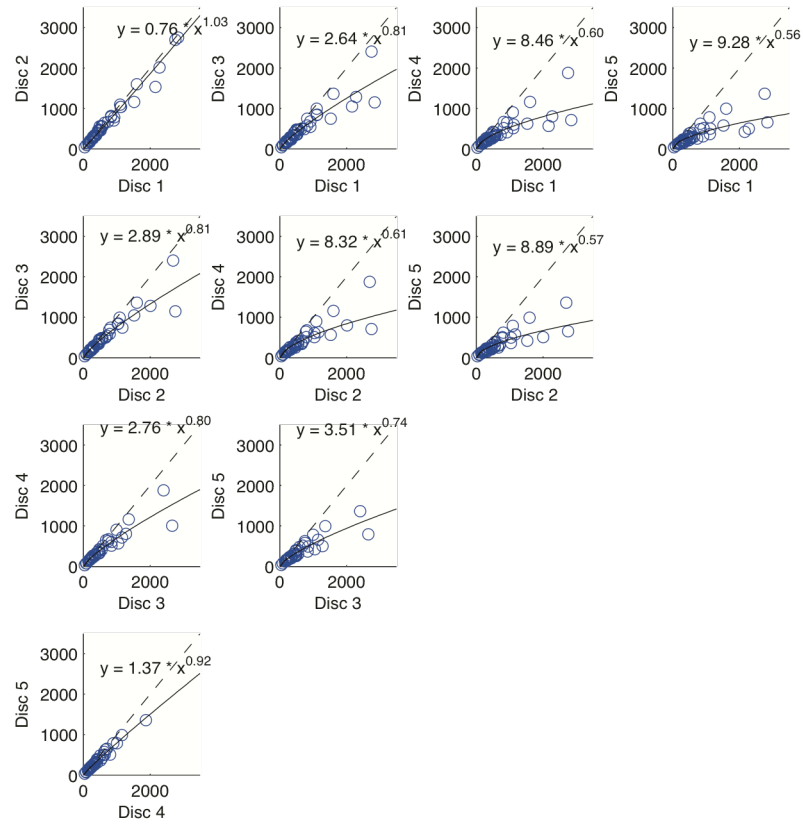
Figure S4. Quantile-quantile plot of high intensity decision time quantiles at each discriminability level, plotted vs. every other, for Experiment 1.
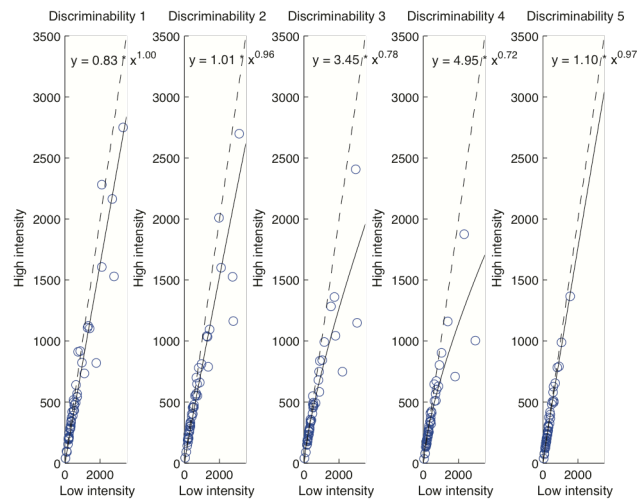

Figure S5. Quantile-quantile plot of high intensity vs. low intensity decision time quantiles, for each discriminability condition of Experiment 1.
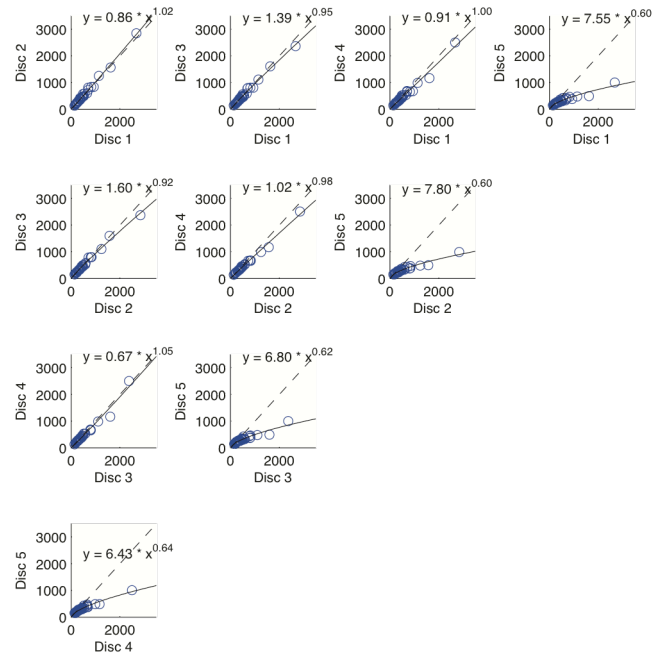
Experiment 2

Figure S6. Quantile-quantile plot of low intensity decision time quantiles at each discriminability level, plotted vs. every other, for Experiment 2.
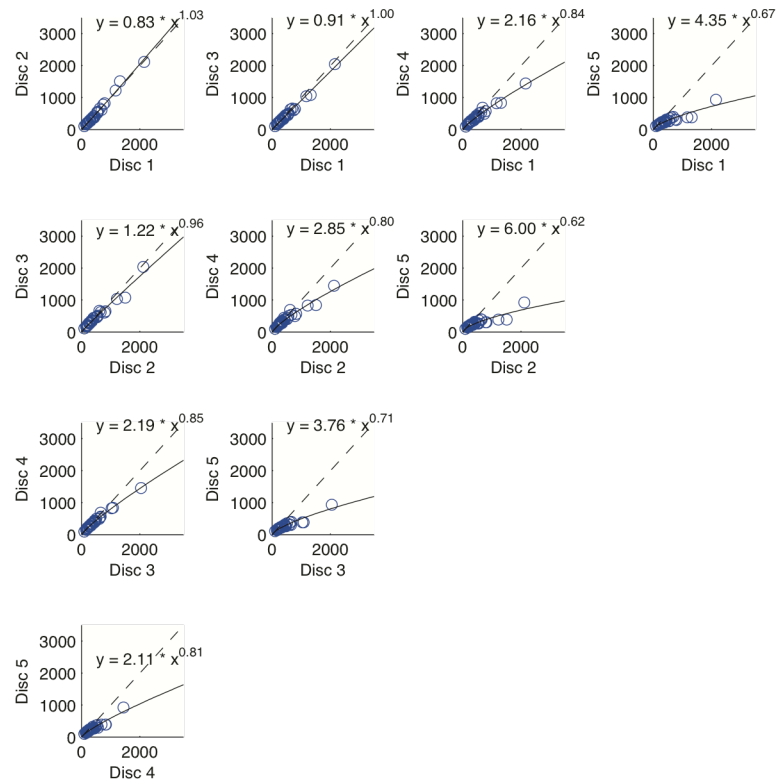

Figure S7. Quantile-quantile plot of high intensity decision time quantiles at each discriminability level, plotted vs. every other, for Experiment 2.
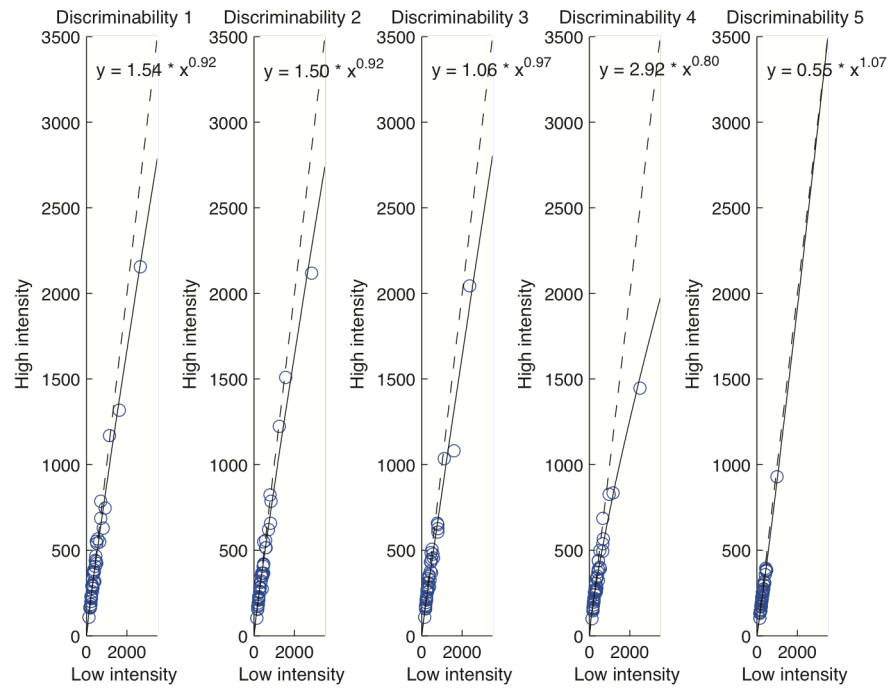
Figure S8. Quantile-quantile plot of high intensity vs. low intensity decision time quantiles, for each discriminability condition of Experiment 2.
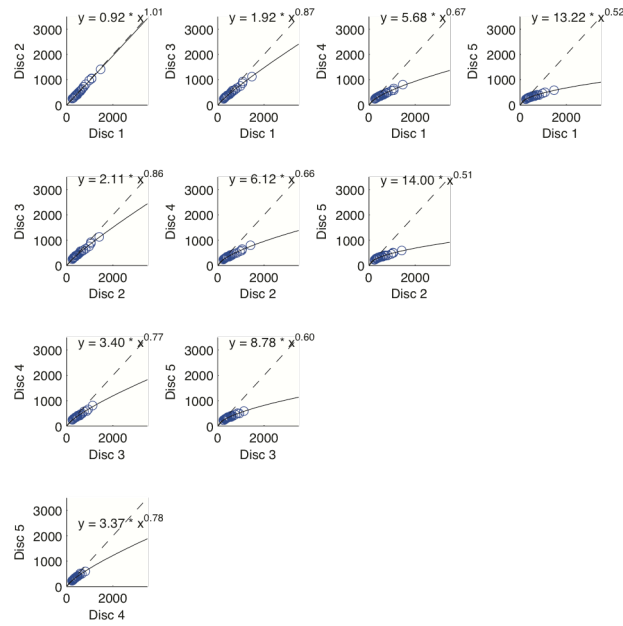
Experiment 3

Figure S9. Quantile-quantile plot of low intensity decision time quantiles at each discriminability level, plotted vs. every other, for Experiment 3.
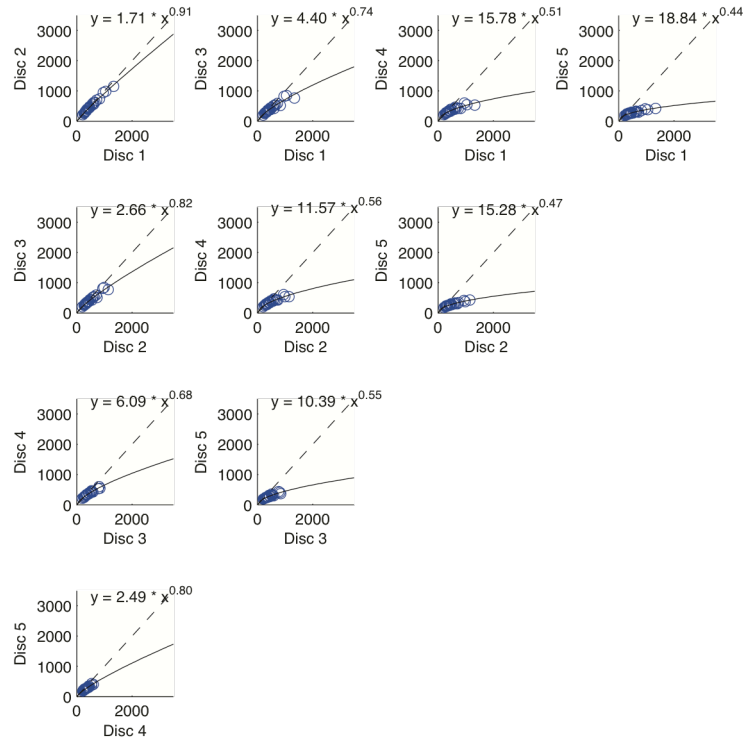

Figure S10. Quantile-quantile plot of high intensity decision time quantiles at each discriminability level, plotted vs. every other, for Experiment 3.
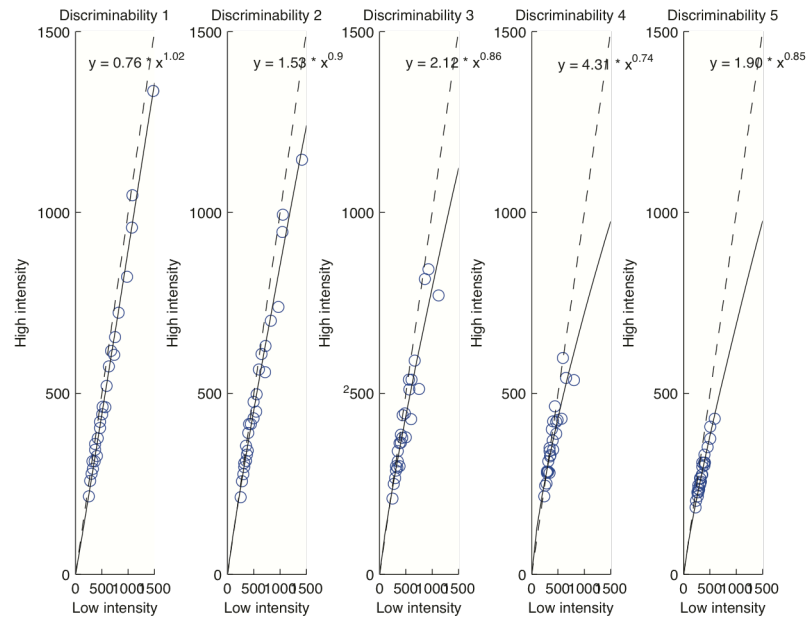
Figure S11. Quantile-quantile plot of high intensity vs. low intensity decision time quantiles, for each discriminability condition of Experiment 3.
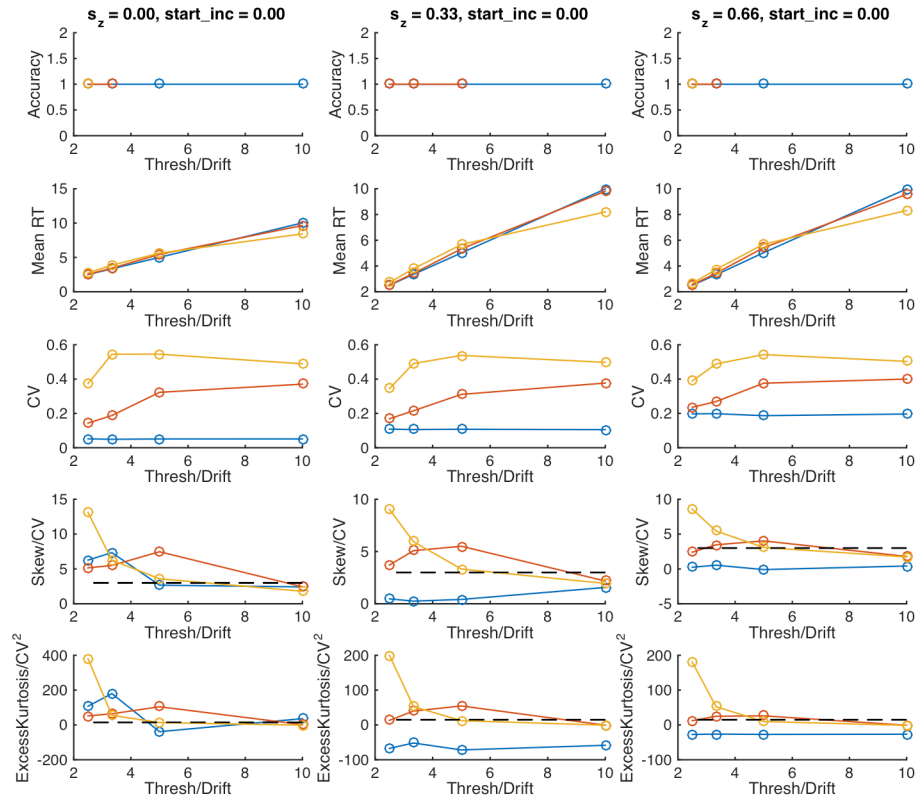
Figure S12. Statistics of an extended form of the timing model, in which drift variability is 0 (blue), medium (red) or high (orange) in each plot; one thousand simulated trials per data point. Each column corresponds to a different level of starting point variability (equivalent to threshold variability; left, 0; middle: medium; right: high). Drift variability can produce a declining ratio of skewness and excess kurtosis to CV, but inflates CVs in a way that is inconsistent with our data from Experiment 4 (and with Weber's law of timing).