Supplemental Materials for "Forming Impressions from Self-Truncated Samples of Traits - Interplay of Thurstonian and Brunswikian Sampling Effects"

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Throughout the simulation procedure presented in the original paper, we had to cut-off several directions and variants of the presented simulation procedure in order to come up with an explicable, brief and convenient result. Here, we want to illustrate the claims made towards the end of the simulation section. We will therefore focus on one parameter at a time and briefly discuss the implications resulting from alternative parameter settings. Certainly, the results presented here will as well represent a relatively narrow window of possible realizations. Yet, we believe that this summary will further emphasize that the two main phenomena discussed in the paper, namely a negative sample-size dependency of judgment strength in self-truncated sampling and Thurstonian regressive shrinkage of this relation for yoked controls, can in fact be overwritten or reversed in specific contexts, but the overall picture clearly supports the assumption that the phenomena are generally robust and meaningful for most contexts (i.e. parameters settings).

True Target Likeability

In our paper we exclusively reported results with a true latent probability of the target producing a "likeable"-observation set to $p(\text{"}likeable\text{"}) = .75$. We will now extend the simulation procedure by varying over the full range of $p(\text{"}likeable\text{"})$ from 0 to 1. Despite we pick specific singular values of $p(\text{"}likeable\text{"})$, we still rely on uniform (so called uninformed) priors. It's important to consider the actual experimental setting applied in the studies: There, participants could not anticipate expected likability of the next target. We will therefore maintain this condition. Simulation runs must therefore not be understood to be sequential trials, but parallel ones. For each level of $p(\text{"}likeable\text{"})$ one can image the virtual participant to be reset in their expectations on the population likability, while stochastic variability is maintained (i.e. each simulated sample is independently drawn from the population). Just like priors, all other parameters were set to the defaults listed in Table 1. Figure 1 summarizes the results of the simulation run with different values of $p(\text{"}likeable\text{"})$, each involving $N = 50'000$ repetitions.

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TABLE 1: Default parameter settings.

Parameter	Default value
$p(\text{"}likeable\text{"})$	.75
t	.40
interval mass	.90
SD for shape parameters α and β	.20
SD_T for threshold t	0
α, β	1

$p(\text{"}likeable\text{"})$ is the latent probability of the target to produce the observation of the trait "likeable", the threshold value is referred to as t, the *interval mass* indicates the integrated probability density included in the highest density interval, SD represents the standard deviation of the normally distributed noise ($\sim N(0, SD)$), α and β are the Beta-distribution shape parameters.

The results clearly show that the correlation between the natural logarithm of sample size $ln(n)$ and impression strength J is negative for the vast majority of $p(\text{"}likeable\text{"})$ values. When $p(\text{"}likeable\text{"})$ approaches .5, the relation disappears, as positive and negative deviations from the center cancel each other out while they are symmetrically distributed for $p = .5$. As impression strength J represents the likeability judgement with reversed sign for $p < .5$, the graph can simply be mirrored at the vertical axis for primarily negative targets.

For all values of p (except for $p = .5$), the negative correlation between sample size and impression strength shows an increase for the simulated yoked controls. For extreme values of p close to 1 or 0, the yoked control correlation coefficients even become positive. As samples become more and more determined by p, as it takes more and more extreme values, deviations from this determination are primarily caused by Thurstonian oscillation. When these random oscillations are removed and re-added, the resulting pattern comes close to random sample truncation, where judgments are conservative towards the (flat) priors at small sample size and they approximate the true target property as the sample is larger.

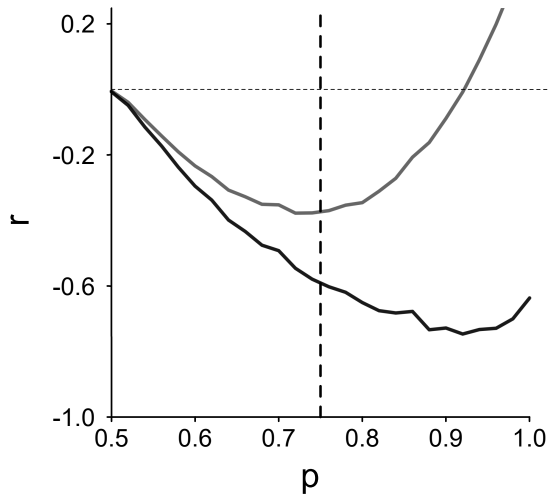


FIGURE 1: Correlation coefficients r between sample size $ln(n)$ and impression strength J for different values of $p(\text{"}likeable\text{"})$. The dark grey curve represents the simulated self-truncated impressions, the light grey curve shows results from simulated yoked controls.The dashed vertical line marks the default p parameter used for the simulation results reported in the article.

Priors

For the simulation results of the article, we constantly relied on uniformly distributed priors (i.e. $Beta(1, 1)$). We will extend those by two series of different priors. The first series lists symmetrically distributed priors, including for example more extreme ones, such as Jeffrey's prior as well as more centralized priors. A second series documents informed priors (i.e. the prior mean equals the true $p(\text{"}likeable\text{"}) = .75$).

Symmetrical Central Priors

This first series of simulations uses central and symmetrical priors with equal shape parameters $\alpha = \beta$ of corresponding Beta-distributions. That means all priors of this series express perfect indecisiveness, yet considerable differences in centrality (ranging from extreme weights on the periphery, i.e. towards $p = 0$ or $p = 1$, to extremely centralized prior density around $p = .5$). Figure 2 shows the overall result for the correlation between (log) sample size $ln(n)$ and impression strength J for several levels of centrality. As the strength of the prior centrality has a strong impact on truncation (late truncation of periphery-emphasizing priors, early truncation for central priors), we adjusted the threshold parameter t to a medium position for each set of priors (ranging from $t = .6$ down to $t = .25$) The influence of the different central priors can be tracked by following the exemplar plots for specific parameter combinations of increasingly centralized priors (Figure 3).

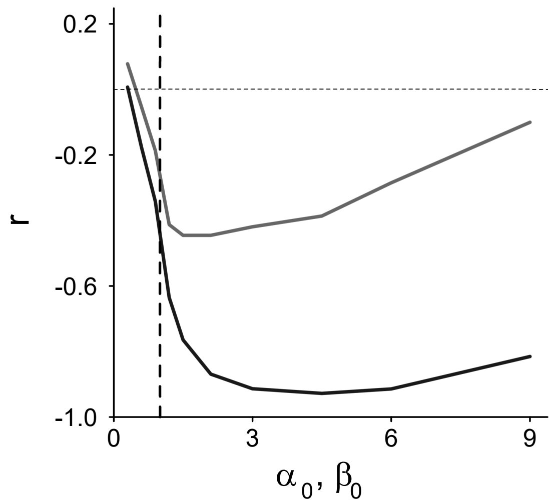


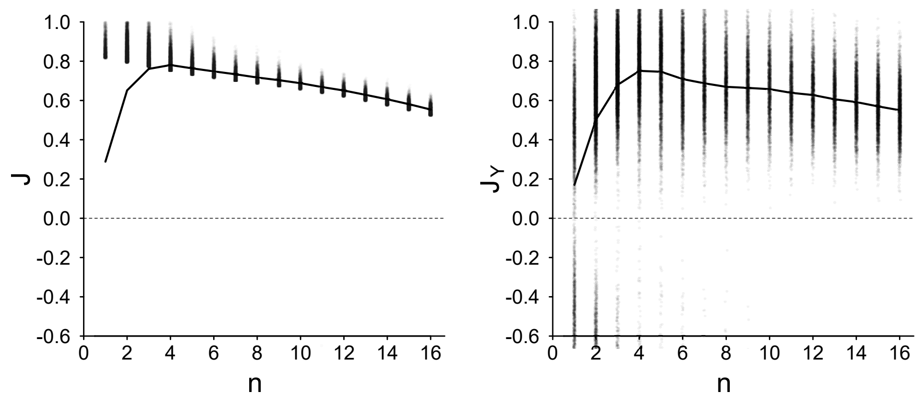
FIGURE 2: Correlation coefficients r between sample size $ln(n)$ and impression strength J for different symmetrical priors (beta-distribution shape parameters α_0 and β_0 are marked on the horizontal axis; $\alpha_0 = \beta_0$). The dark grey curve represents the simulated self-truncated impressions, the light grey curve shows results of simulated yoked controls. The dashed vertical line marks the default parameter setting $\alpha_0 = \beta_0 = 1$, which was also used for the simulations reported in the article.

Informed Priors

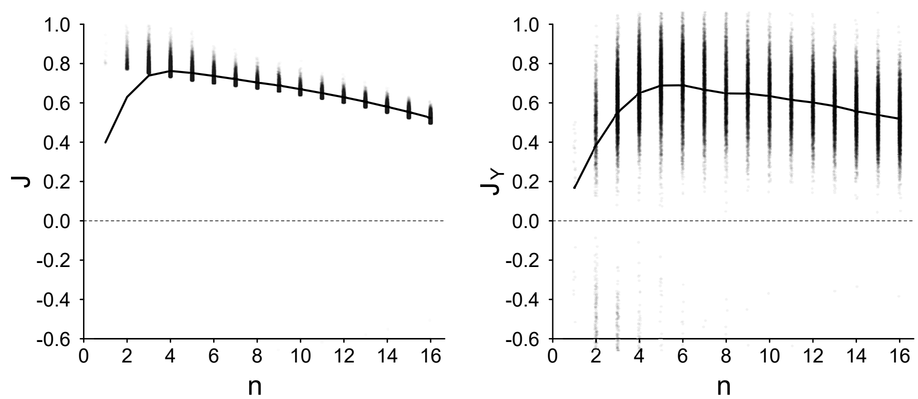
In the second series of changing the priors, we only relied on correctly informed priors. We exclusively applied priors with means of exactly the latent true parameter $p(\text{"}likeable\text{"})$, in this exemplar case $p = .75$ (i.e. priors that match the equation $M_0 = \frac{\alpha_0}{\alpha_0+\beta_0} = .75$). Yet, these priors are varied considerably in how much they are informed: we tested instances of rather flat up to extremely well informed priors (see Figure 4).

Results of this second wave of simulations on priors demonstrates that how strong the informed priors concentrate (i.e. the higher values of the shape parameters are) determines mainly the moment of truncation, but not much of the resulting pattern and the relation between sample size and impression strength. In order to control for differences in truncation, we adjusted the threshold parameter t to an intermediate value for each given prior. That is, the more informed the prior, the more conservative t is set. This adjustment allows for observing sample size dependent judgment patterns without distortions created by different truncation tendencies. Figure 5 however shows the described patterns in more detail, this time threshold t is not adjusted to demonstrate both shifts in truncation and the overall pattern.

(a) $\alpha_0 = \beta_0 = 0.5$



(b) $\alpha_0 = \beta_0 = 1$



(c) $\alpha_0 = \beta_0 = 6$

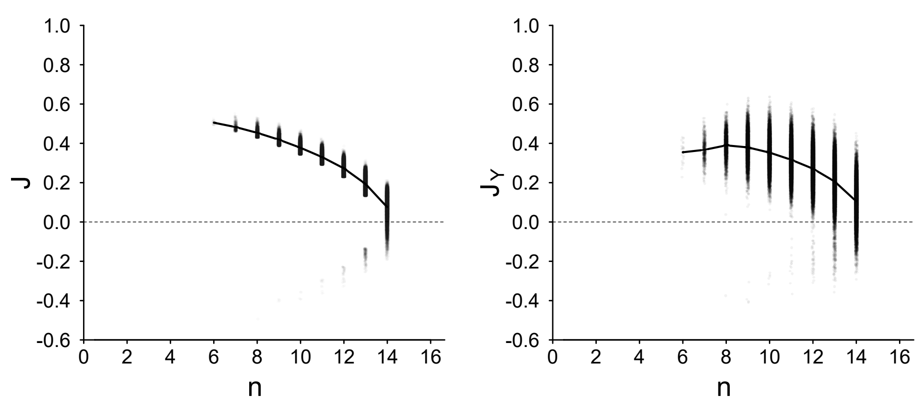


FIGURE 3: Simulated individual judgments (impression strength) plotted by sample size. The plots on the left show self-truncated sampling, plots on the right yoked controls. For each row, a differently centralized symmetrical prior is applied; prior shape parameters are indicated by the sub-figure headings. In order to demonstrate the shift in sample size caused by narrower priors (deviating from adjusted thresholds in Figure 2) the threshold value was fixed to $t = .32$. Each plot is based on $N = 100'000$ simulated trials.

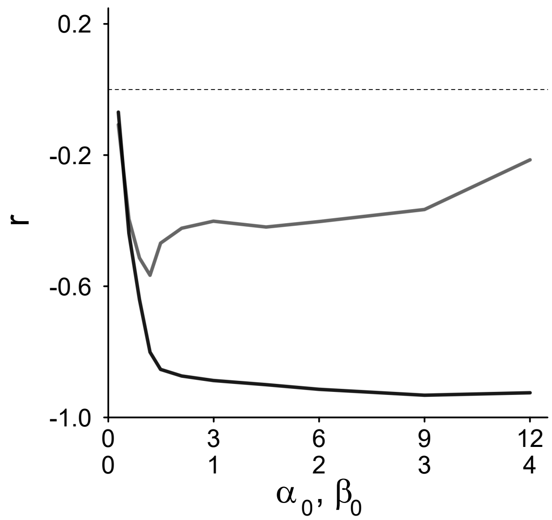


FIGURE 4: Correlation coefficients *r* between (log) sample size $ln(n)$ and impression strength J for different levels of correctly informed priors (beta-distribution shape parameters α_0 and β_0 are marked on the horizontal axis; $\frac{\alpha_0}{\alpha_0+\beta_0} = .75$). The dark grey curve represents the simulated self-truncated impressions, the light grey curve shows results of simulated yoked controls.

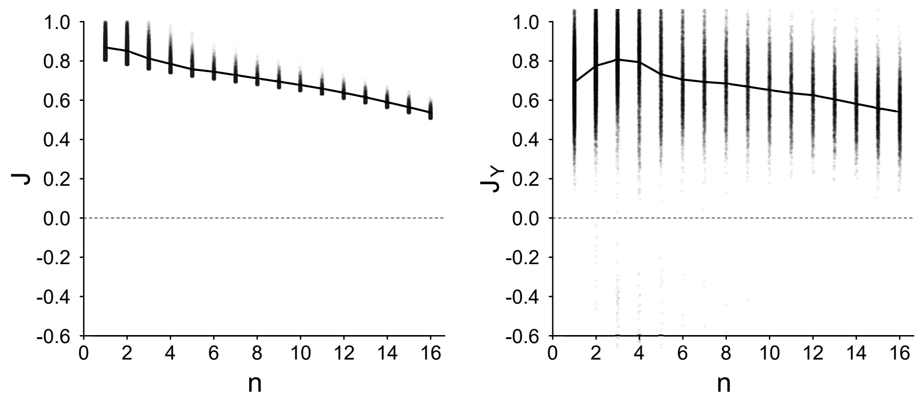
Thurstonian Oscillation

Extent of Thurstonian Oscillation

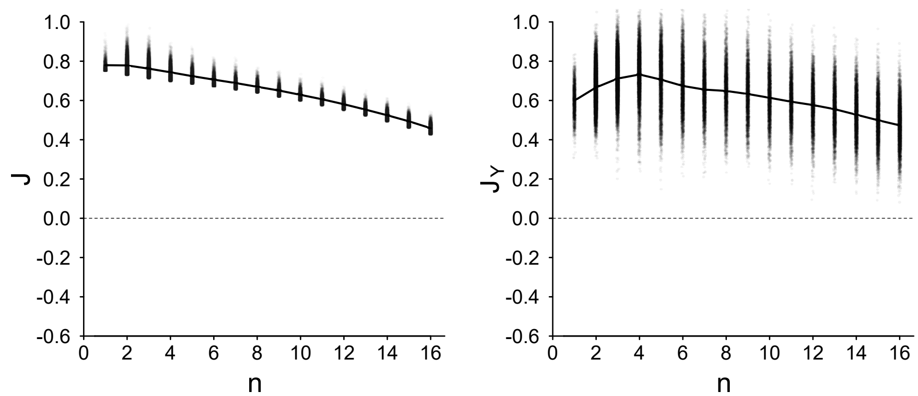
We set the default standard deviation of Thurstonian sampling to $SD = .2$, which represents an intermediate position between too less impact of Thurstonian sampling on judgments and obscuring the whole pattern by too much noise. The impact of less and more noise on the correlation between sample size and impression judgment strength is shown in Figure 6, and patterns in more detail in Figure 7.

In order to understand the impact of increased noise, we must consider the sample size dependent pattern in random (i.e. externally determined) truncation: The default uniform priors cause a small sample conservativeness (trend towards neutral estimates, which obviously contrasts with the self-truncation patterns here), and approximation towards the true $p(\text{"}likeable\text{"})$ for larger samples. Larger noise levels allow this pattern to show through, especially for yoked controls. Samples are at some times truncated at small size by mere chance, even though the mixed actual evidence would have typically led to a neutral attitude that would not have caused stopping would noise have been absent. Similarly, other actually clear-cut samples are prolonged due to overly conflicting impressions (also caused by mere noise).

(a) $\alpha_0 = 1.2, \beta_0 = 0.4$



(b) $\alpha_0 = 3, \beta_0 = 1$



(c) $\alpha_0 = 6, \beta_0 = 2$

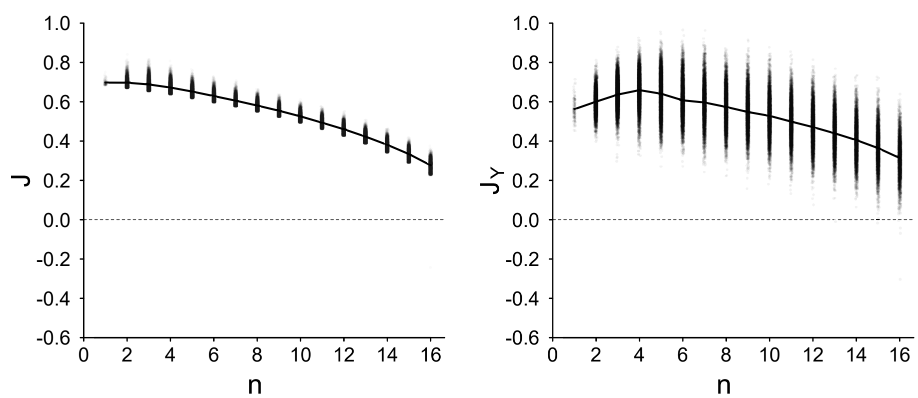


Figure 5: Simulated individual judgments (impression strength) plotted by sample size. The plots on the left show self-truncated sampling, plots on the right yoked controls. For each row, a different correctly informed prior is applied; prior shape parameters are indicated by the sub-figure headings. The threshold value was fixed to $t = .32$; Each plot is based on $N = 100'000$ simulated trials.

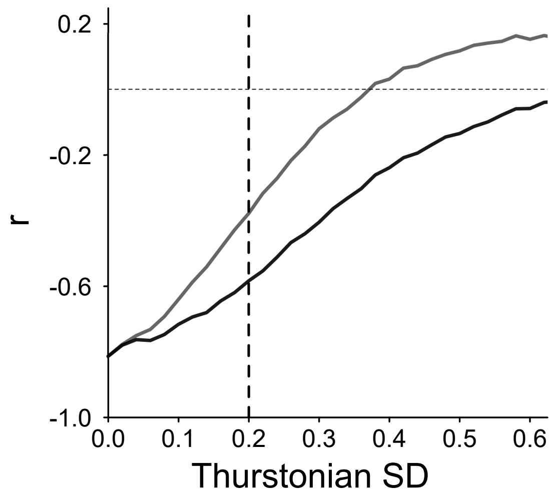


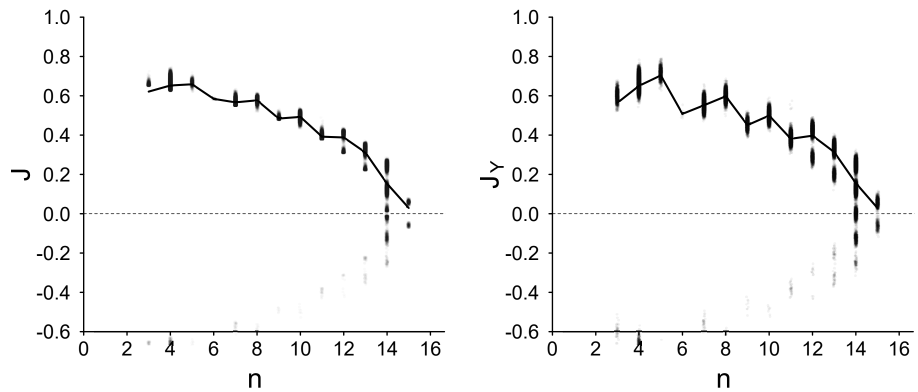
FIGURE 6: Correlation coefficients r between (log) sample size $ln(n)$ and impression strength J for different intensities of Thurstonian oscillation (the horizontal axis marks the Thurstonain oscillation SD). The dark grey curve represents the simulated self-truncated impressions, the light grey curve shows results of simulated yoked controls. The dashed vertical line marks the default $SD = .2$.

Thurstonian Oscillation of the Truncation Threshold

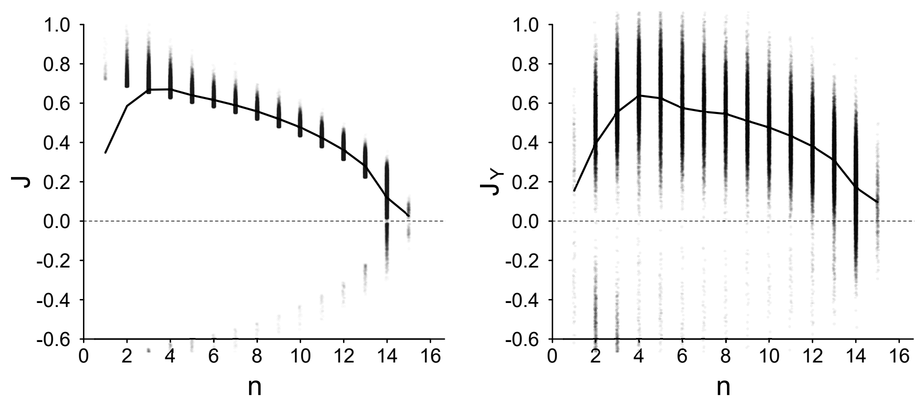
So far, we only modeled Thurstonian oscillation as a property of processing the input information. In a similar fashion, we can also imagine the decision threshold t for sample truncation to be subject to Thurstonian fluctuation. We therefore added different levels of normally distributed noise to the threshold ($\sim N(0, SD_T)$). Since we must assume the threshold value at one instance to depend on the previous state, we simulate the threshold by a common initial value of t, which is recursively updated by adding normally distributed noise. Throughout this section of simulations, we systematically examined the amount of noise added to the threshold value t at each sample size: The standard deviation of the noise added to the threshold was systematically increased from 0 (default) up to 80% of the shape parameters' noise standard deviation (i.e. $0 < SD_T < .16$).

Comparable principles hold here for increasing noise, this time added to the threshold t. Similar to increased noise of the posterior shape parameters, samples are at some times truncated at small size by an actually too loose threshold, or other actually conflict-free samples are prolonged due to overly high thresholds (both caused by mere noise). In sum, this additional source of Thurstonian oscillation clearly impacts the effect size of the relation between sample size and judgment strength, however the difference between self-truncated and simulated yoked control trials remains clearly visible for any used level of SD_T. Results are summarized by Figure 8 and exemplar settings are shown in Figure 9.

(a) SD = .04



(b) SD = .20



(c) SD = .50

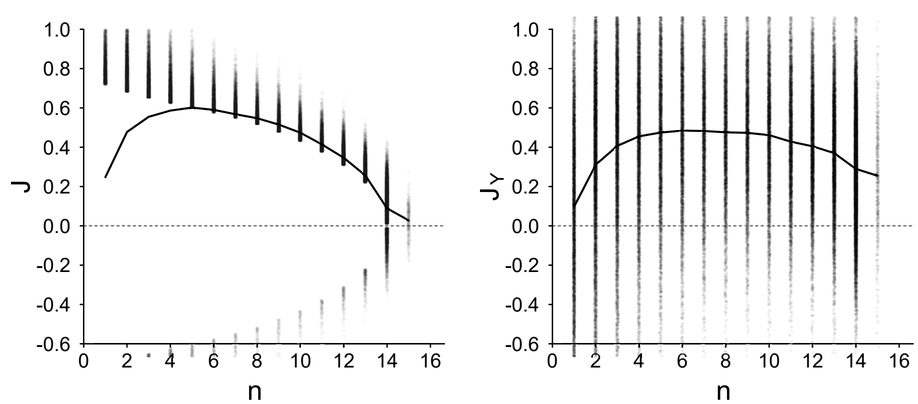


FIGURE 7: Simulated individual judgments (impression strength) plotted by sample size. The plots on the left show self-truncated sampling, plots on the right yoked controls. For each row, a different level of Thurstonian sampling is applied, that is a different standard deviation of step-wise added normally distributed oscillation; Thurstonian standard deviation is indicated by the sub-figure headings. Each plot is based on $N = 100'000$ simulated trials.

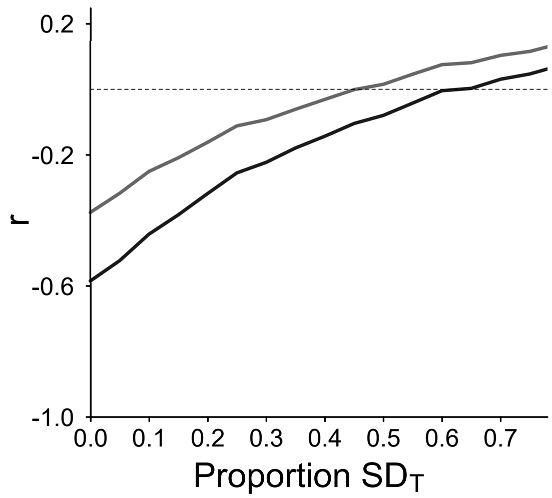


FIGURE 8: Correlation coefficients r between (log) sample size $ln(n)$ and impression strength J for different intensities of Thurstonian oscillation of the truncation threshold t. Thurstonian oscillation of shape parameters α and β is fixed to the default value of $SD = .2$, oscillation of the threshold SD_T is expressed relative to the oscillation SD added to the shape parameters. The dark grey curve represents the simulated self-truncated impressions, the light grey curve shows results of simulated yoked controls.

Dependence of Yoked Control Thurstonian Processes

Up to now we assumed orthogonality in Thurstonian oscillation between simulated self-truncated and yoked control trials. That is, Thurstonian noise was entirely removed from the beta shape parameters and added independently to generate yoked control judgments. In this series of simulations we varied dependence from orthogonality (default) up to identity. Results demonstrate that independence is the maximizing boundary condition with the largest possible shrinkage of the correlation of sample size and impression strength between self-truncated and yoked control samples. This regressive shrinkage becomes smaller and fades out for stronger dependence of Thurstonian processes (see Figures 10 and 11). Obviously, self-truncated patterns are not affected by this kind of dependence, it's just the yoked control judgments that come closer to the original self-truncated judgments as dependence increases.

The results illustrate the hypothesis of differential regression for "self" and "other" yoked controls of Experiment 1. When yoked controls are other participants compared to identical participants in relation to self-truncated sampling, dependence between yoked partners must be expected to be lower. As can be seen from Figure 10, regression is strongly associated with dependence between yoked partners. The simulation also clarifies, that for high levels of dependency, regression effects between yoked pairs become very small.

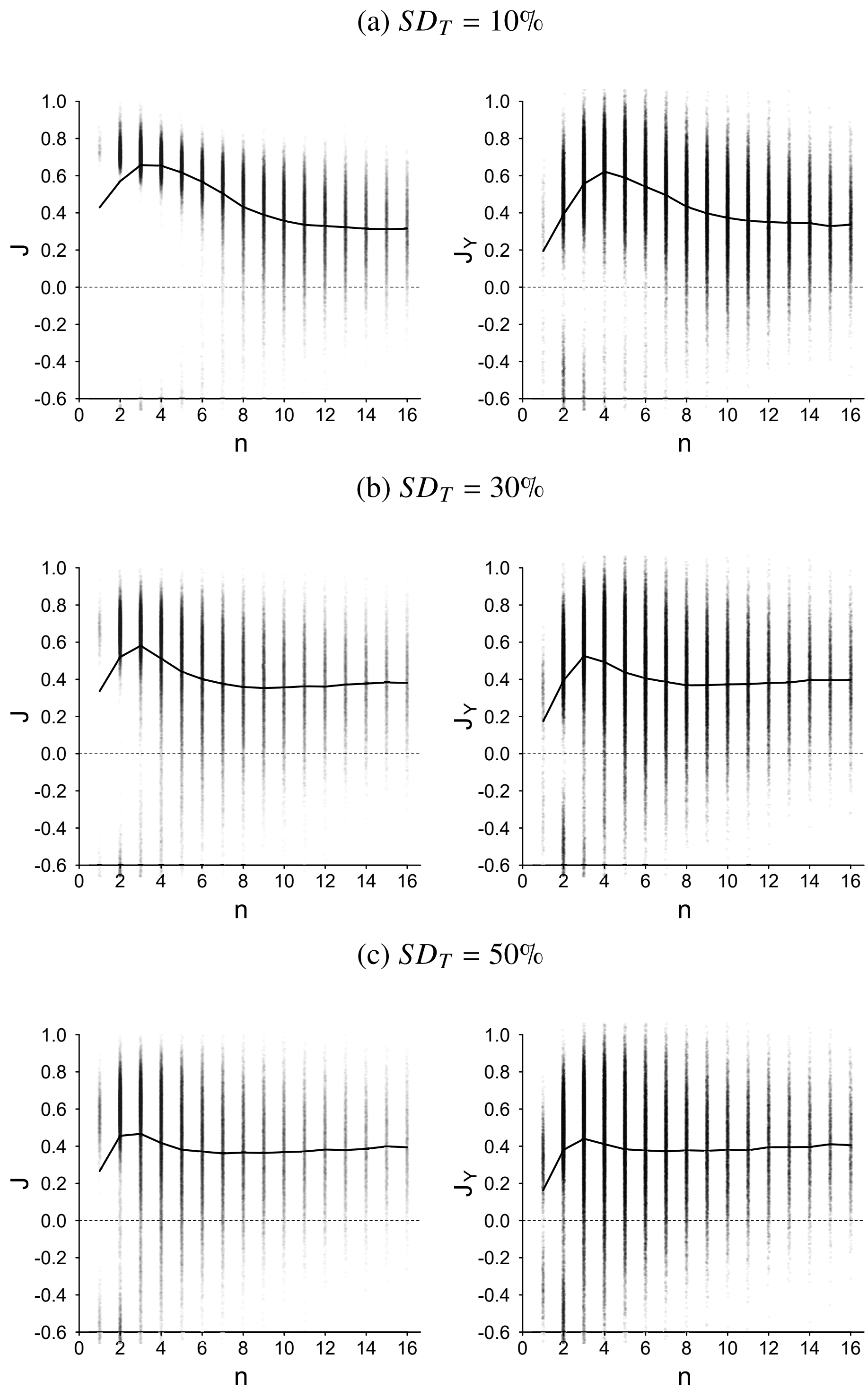


FIGURE 9: Simulated individual judgments (impression strength) plotted by sample size. The plots on the left show self-truncated sampling, plots on the right yoked controls. For each row, a different level of Thurstonian noise of the threshold t is applied, that is a different standard deviation of recursively added normally distributed oscillation; Thurstonian standard deviation is indicated by the sub-figure headings relative to the standard deviation of default Thurstonian noise added to the shape parameters ($SD = .2$). Each plot is based on $N = 100'000$ simulated trials.

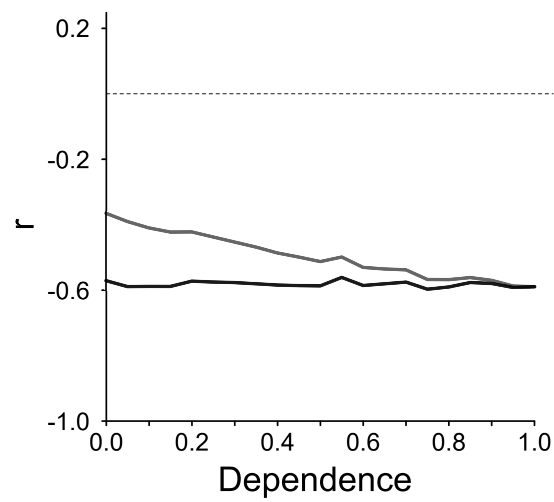


FIGURE 10: Correlation coefficients r between (log) sample size $ln(n)$ and impression strength J for different dependence in Thurstonian oscillation between self-truncated and yoked control processing, ranging from 0 (independence, orthogonality) to 1 (identity). The dark grey curve represents the simulated self-truncated impressions, the light grey curve shows results of simulated yoked controls.

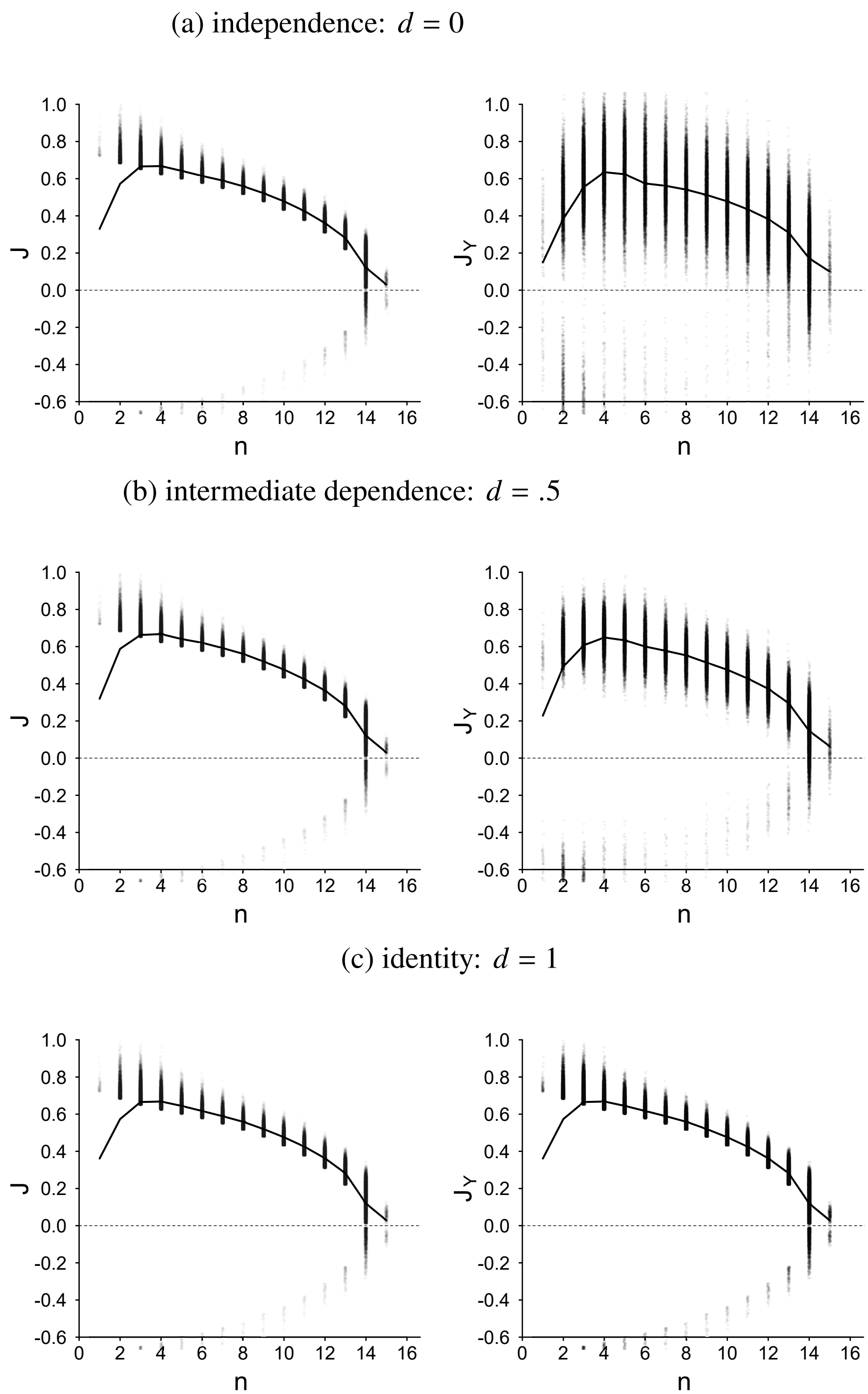


Figure 11: Simulated individual judgments (impression strength) plotted by sample size. The plots on the left show self-truncated sampling, plots on the right yoked controls. For each row, a different level of Thurstonian dependence is applied; Thurstonian dependence is indicated by the sub-figure headings. Note that all self-truncated figures on the left and the bottom yoked controls figure (identity condition) only vary by sampling error - they are basically identical. Each plot is based on $N = 100'000$ simulated trials.