Lab 4 Submission

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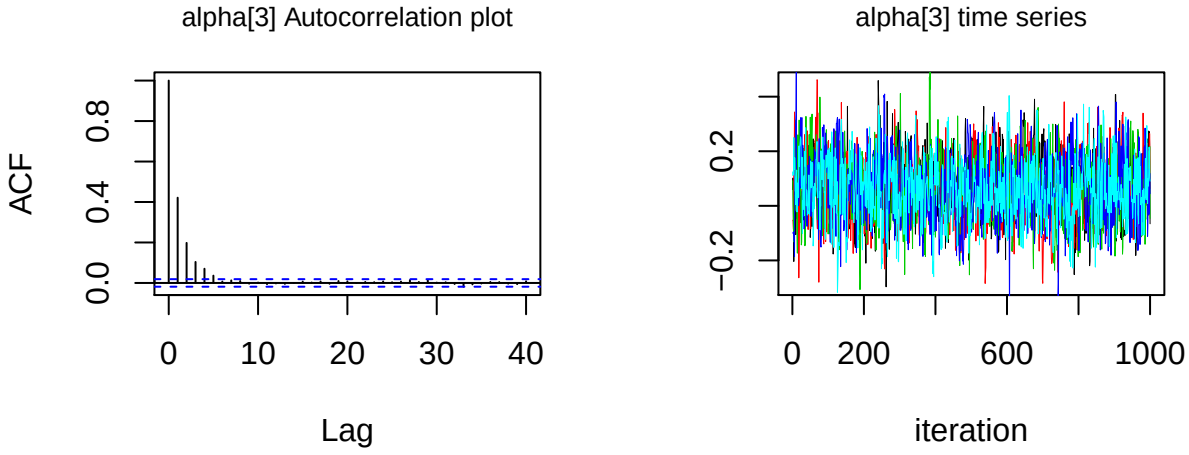
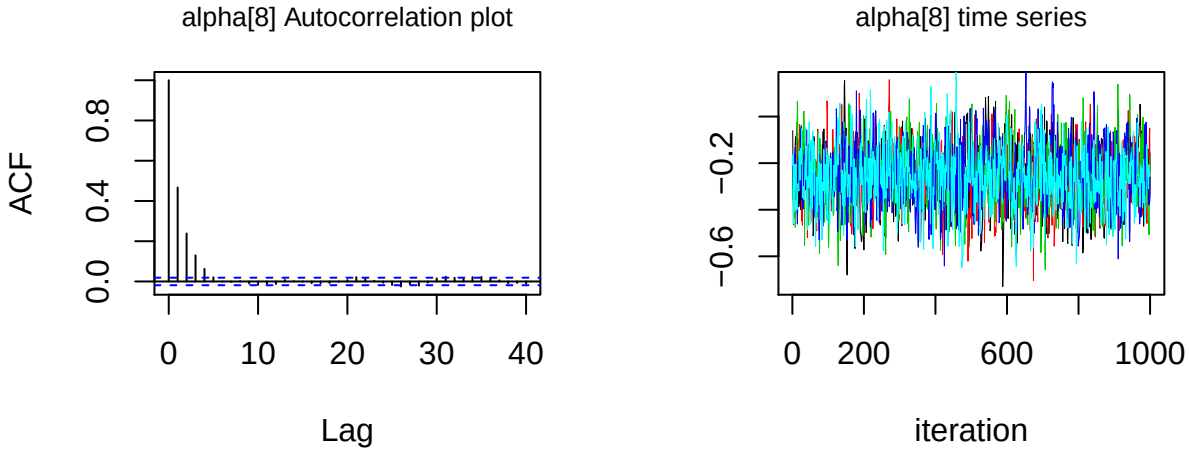
q1: Turn in results from the t-model. Be sure to run sufficient iterations.

a: How is the convergence? Show an illustrative autocorrelation function and time-series plot for two parameters of interest.

We ran the t-model with 11000 reps. Looking at the autocorrelation plots across all parameters suggests that this is sufficient for most of the alphas, but the ACF plots for alpha[1] and alpha[2] might leave something to be desired. Autocorrelation plots and traces for alpha[3] (AA) and alpha[8] (DN) are shown below





b. Turn in a table of results for the fixed effects, the two standard deviations SqrtD and sigma, and the two degrees of freedom parameters.

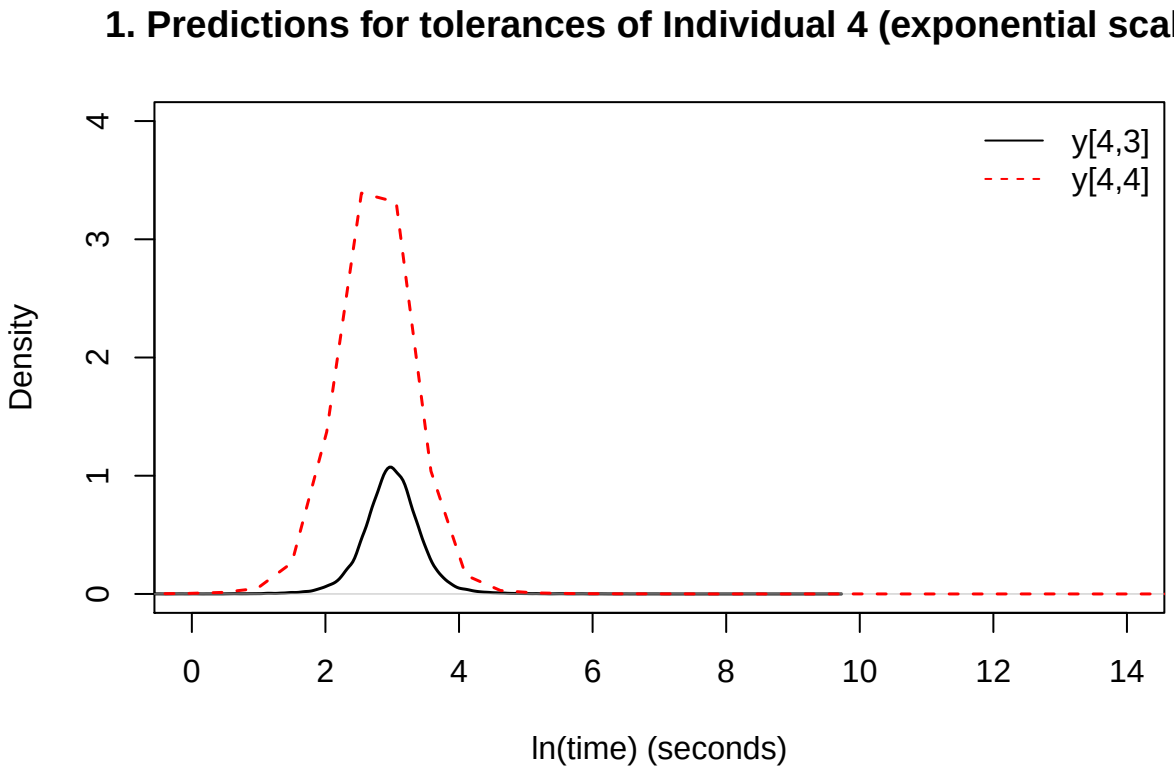
	mean	sd	2.5%	97.5%	P>0
alpha[1]	3.093	0.113	2.875	3.321	1.000
alpha[2]	0.261	0.170	-0.064	0.597	0.943
alpha[3]	0.063	0.116	-0.165	0.291	0.708
alpha[4]	0.111	0.140	-0.169	0.384	0.790
alpha[5]	-0.069	0.114	-0.296	0.152	0.273
alpha[6]	-0.244	0.122	-0.485	-0.003	0.024
alpha[7]	0.212	0.155	-0.081	0.527	0.922
alpha[8]	-0.260	0.126	-0.508	-0.014	0.020
sigma	0.266	0.026	0.219	0.320	1.000
sqrtD	0.529	0.063	0.420	0.663	1.000
df1	3.512	0.883	2.280	5.635	1.000
df2	3.512	0.883	2.280	5.635	1.000

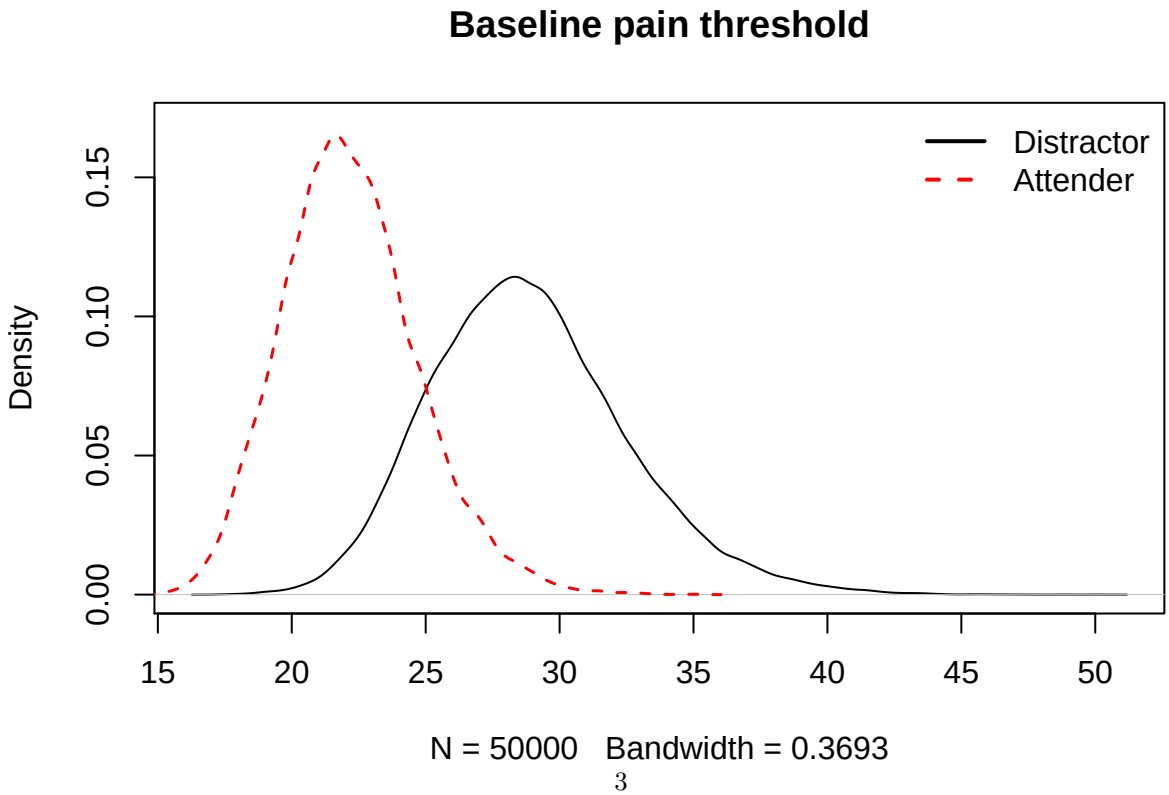
2. Compare the results from the normal model to the results from the t model: What changes are there? In particular, what scientific conclusions change?

On the whole, the means and standard deviations of parameter estimates from the t-model are comprable to those from the normal model, but there are a few important differences.

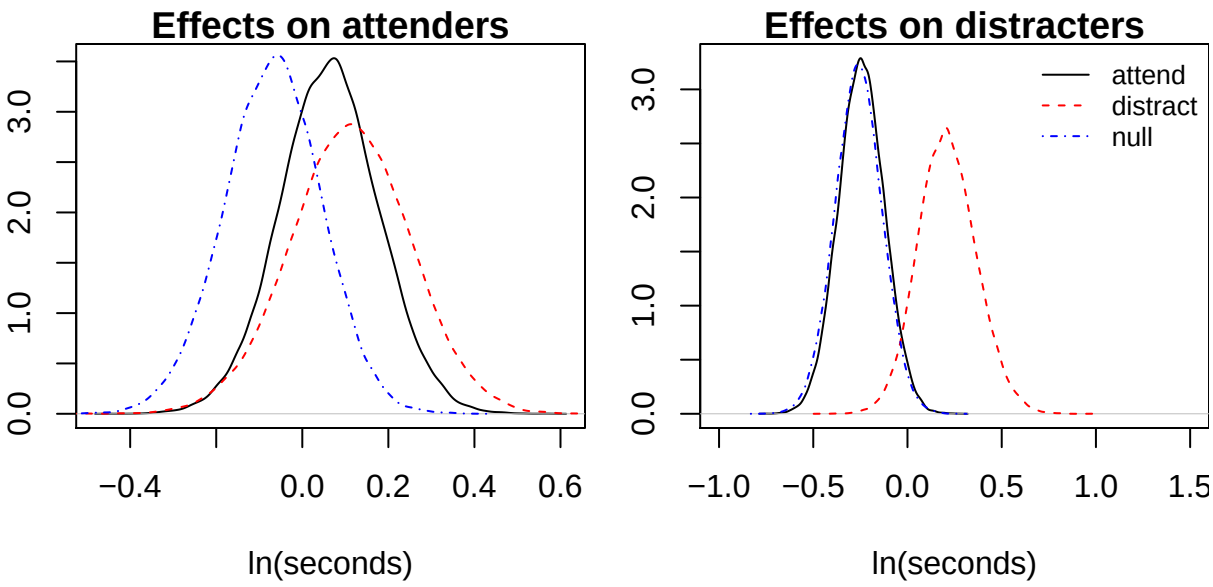
- The mean of alpha[2] has been reduced from 0.329 in the Normal model to 0.26 in the t-model. The standard deviation is largely unchanged. This suggests that the "benefit" of being a distracter is less dramatic than estimated by the normal model
- The mean of alpha[7] has been reduced from 0.39 in the Normal model to 0.21 in the t-model. This suggests that the benefit of teaching distractors to distract may be less dramatic than estimated by the normal model.
- The 95CI of alpha[6] spanned 0 in the normal model, but is completely negative in the t-model. This suggests that teaching distracters to attend strongly reduces their pain tolerance (on this scale)

3. Reproduce figures 1-5 (see below for the normal model figures) for your t model. Label your figures appropriately.

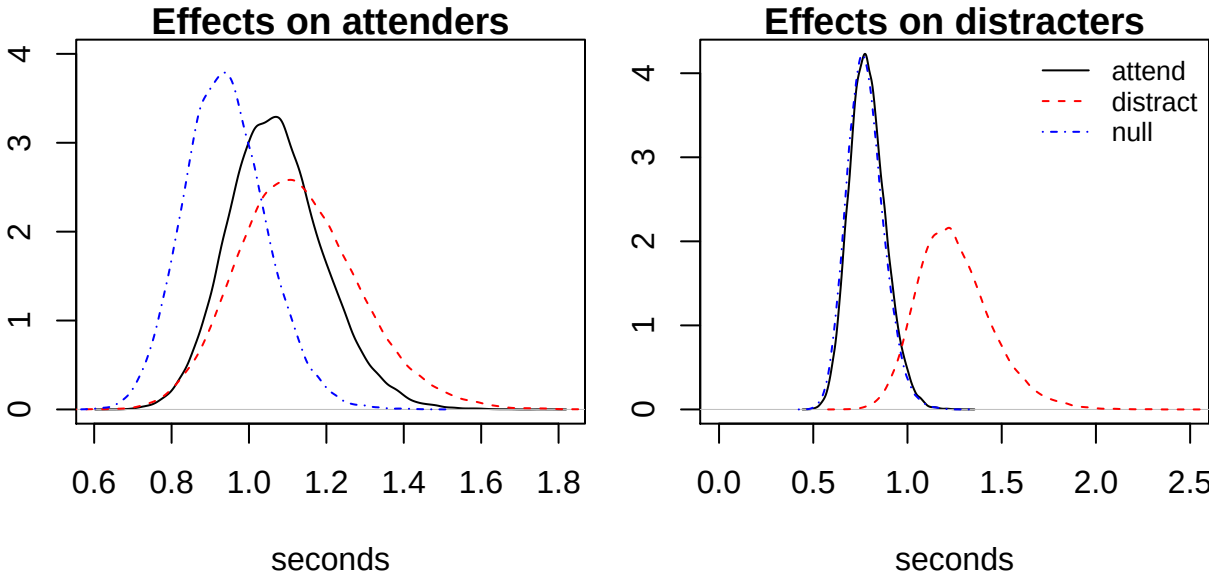




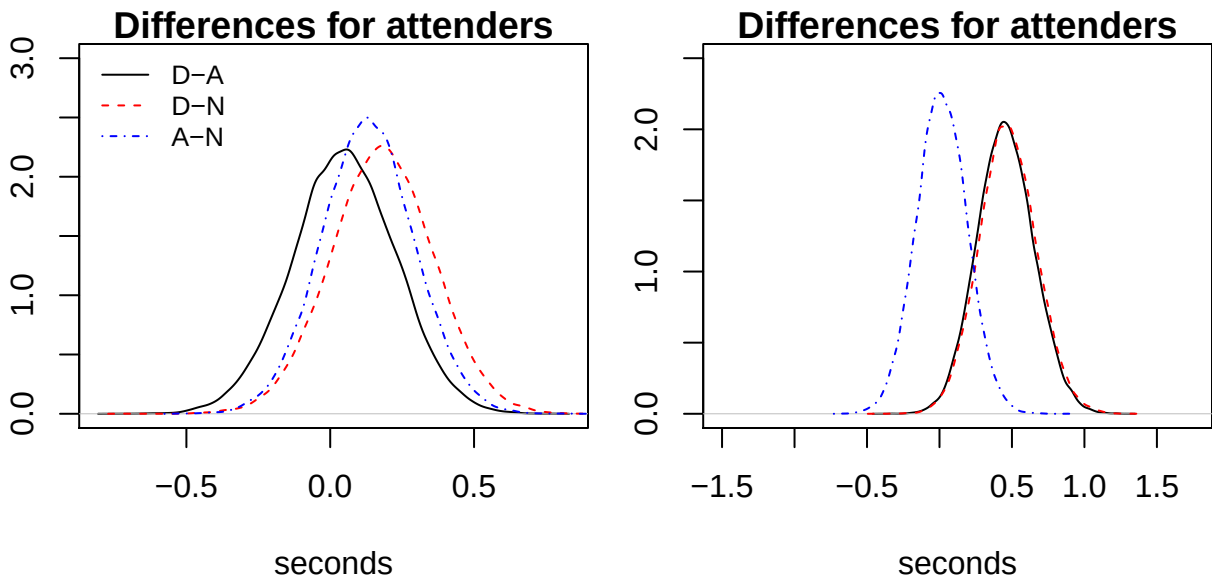
3. Treatment effect by personality (exponential scale)



4. Treatment effect by personality (multiplicative scale)



5. Differences in treatment effect by personality (exponential scale)



4. Invent another prior for the df, and in one sentence explain its properties (ie support, mean, sd or other characteristics) and why it is better than the above prior.

We suggest the prior $df\ 2 + Gamma(\frac{61^2}{230}, \frac{61}{230})$. This prior has a minimum value of 2 (Gamma distribution is bounded at 0, and we add two to all values), a mean of 63 (which is close to n-1 for our dataset), and a standard deviation of 230 (which is the standard deviation of our first uniform prior). This may be a better prior because it pushes the mean towards our known sample size but still allows for a very wide range of dfs.