Computational Modeling - Portfolio 5
Social Cultural Dynamics Bayesian Analysis

The Effects of Inequality on the Ultimatum Game - A Board Game

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Link to Github: https://github.com/Carolinecasey17/ComputationalModels.Portfolio5.git

Define hypotheses/Describe variables

In our analysis we investigated our two hypotheses.

Hypothesis 1: We hypothesise that the amount of points offered will be systematically decreased according to two variables; team condition and between/within group offering.

We hypothesise that participants will offer less money if they have both been on the losing team and are offering to a person not in their own team. We predict there will be an interaction effect between the two.

Hypothesis 2: We hypothesise that the acceptance rate of points offered will be systematically decreased according to two variables; team condition and between/within group offering.

We hypothesise that participants will accept offers from other players less if they have both been on the winning team and are receiving from a person not in their own team. We predict this will be an interaction effect as well.

Running some initial analysis and plots to get idea of data

<u>Amount Offered</u>

Team	Amount Offered
1 (Winning Condition)	47.9
2 (Losing Condition)	46.7

We can see that people in the winning condition offer slightly more than the losing, but not by much.

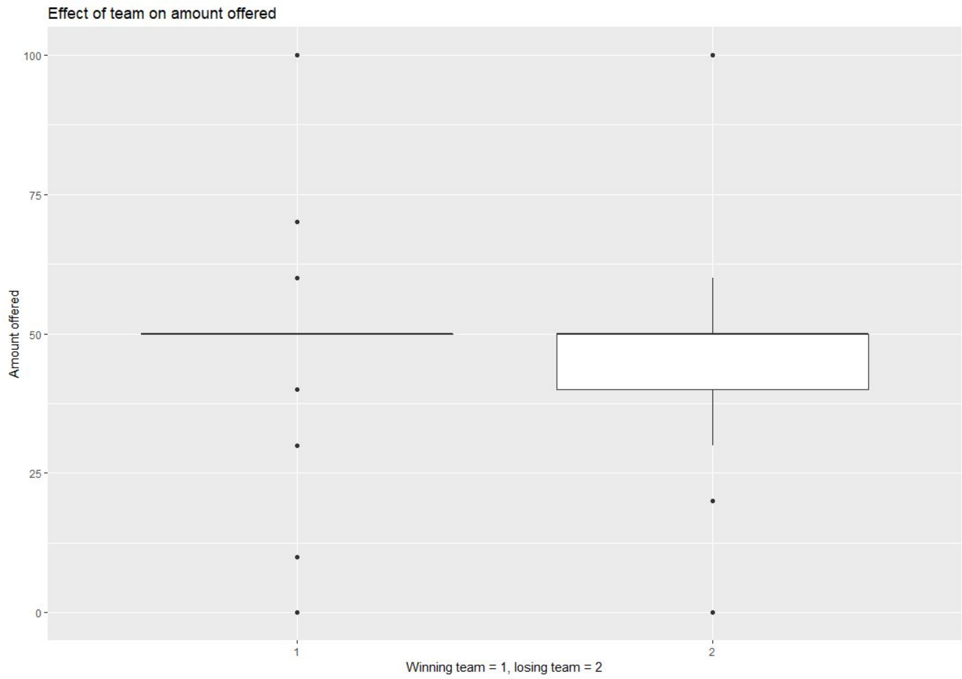

Figure 1 - Boxplot for amount offered across the two conditions

We can see both conditions offer very similar amounts, but that there is more variance in the negative direction for the losing team condition.

Looking at between and within group offering

Between // Within Group	Amount Offered
Within Group	46.1
Between Group	47.9

Here we can see that people offer less within their own teams, which is not what we expected in accordance to our hypothesis.

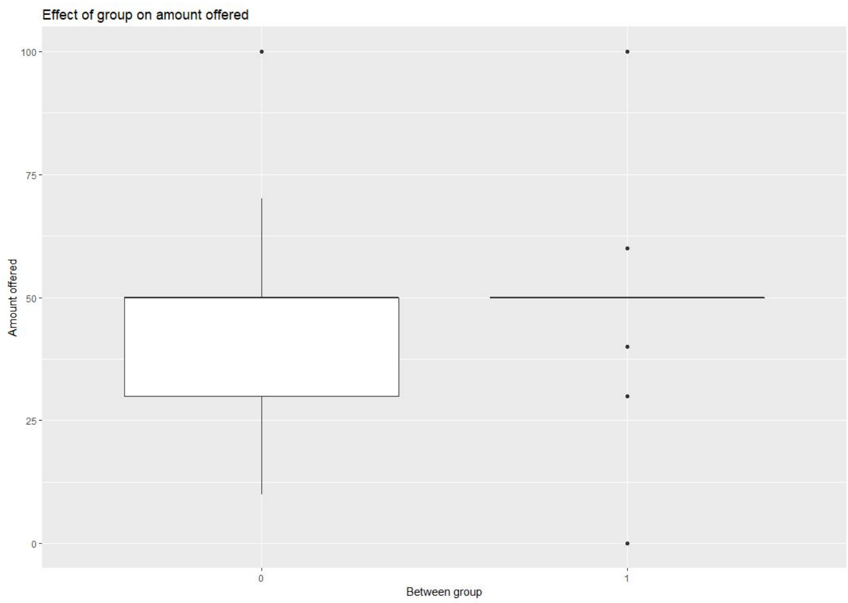

Figure 2 - Difference in amount offered for between & within group

Here we see that people accept at around the same rate, but those accepting within their own group have much more variance in the negative direction.

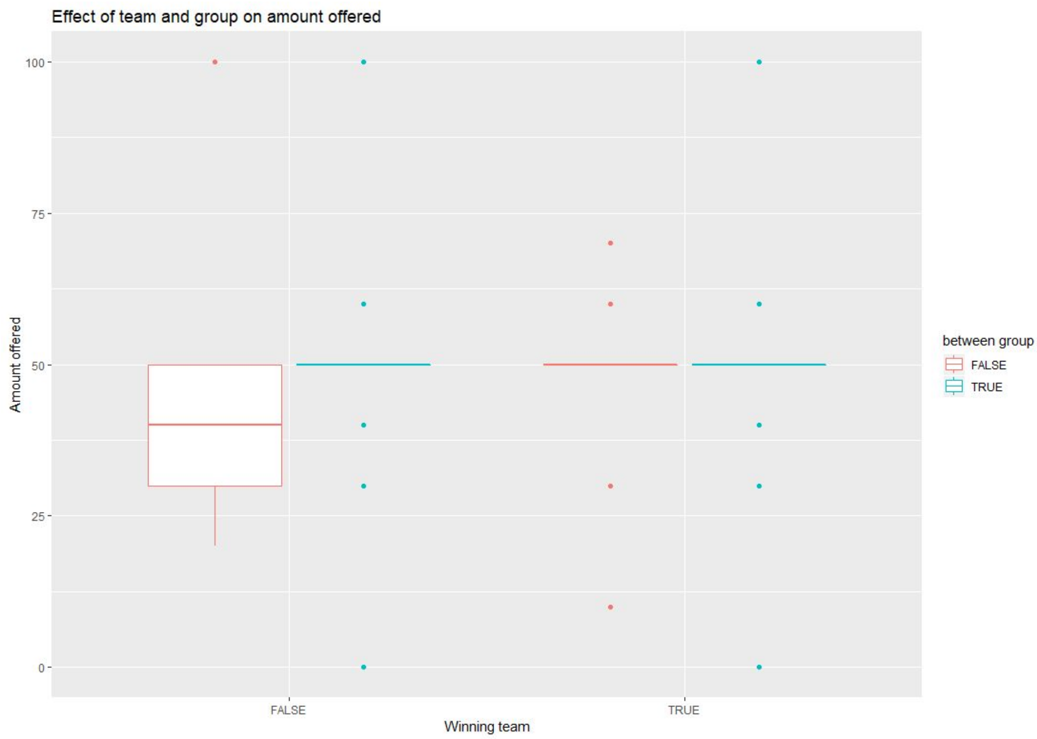

Figure 3 - Graph depicting amount offered depending on whether they are in the winning team (right) or losing (left). Red boxes show for within group offerings, and the blue are for between group offerings.

Acceptance Rate

We can see from the data that 82 of 104 accepted their offers - meaning 78.8% of people accepted. 22 of 104 declined offers to them, corresponding to 21.2%

Comparing who accepted across winning and losing conditions.

Team	Acceptance Rate
1 (Winning Condition)	48.2 % (39)
2 (Losing Condition)	51.8% (43)

We can see that people in the losing condition accept slightly more than the losing condition.

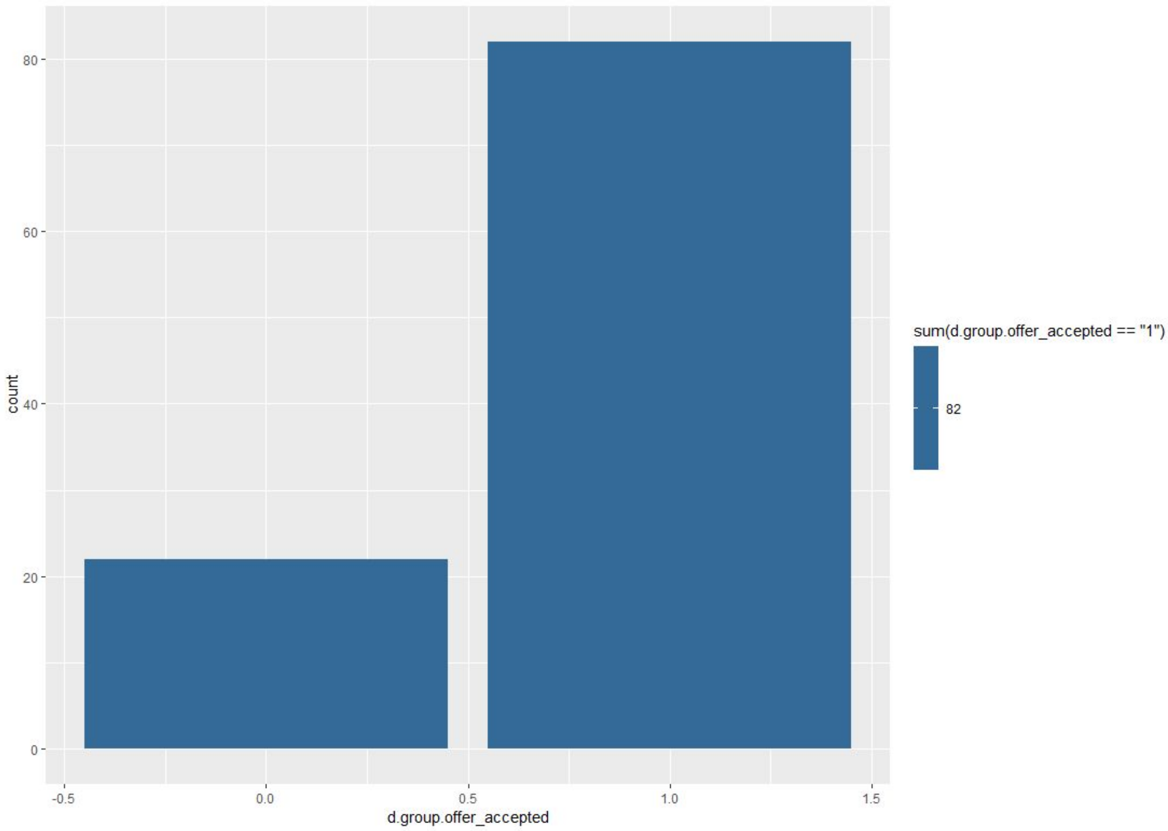

Figure 4 - Decline rate (left) vs Acceptance rate across the data.

Looking at those who have declined across conditions

Team	Decling Rate
1 (Winning Condition)	59% (13)
2 (Losing Condition)	41% (9)

We can see more people in the winning condition decline offers than the losing condition.

Looking at between and within group offering:

Between // Within Group	Acceptance Rate
Within Group	39% (32)
Between Group	61% (50)

We see a lower acceptance rate for people receiving offers from within their own group.

Declination rates for between//within group conditions:

Between // Within Group	Acceptance Rate
Within Group	82% (18)
Between Group	18% (4)

We see a much larger percentile decline offers when they are from within their own group, which is interesting.

Identify your model (outcome, likelihood function, predictors)

Amount Offered

Outcome: Amount of points offered

Likelihood function: Normal distribution.

Predictors: Condition of team (winning or losing team) and in-or-out group offering (between team conditions or within team conditions).

Random effects: Participant differences and Experimental differences, meaning we expect that there are random differences across the experimental rounds dependent on the constellations of groups, location, timing and so on.

Model:

$$AmountOffered \sim Normal(\mu_i, \sigma)$$

$$\mu_i \sim \alpha + \beta_{aB}\, aB_i + \beta_{bB} bB_i + \beta_{aBbB}\, aB_i bB_i$$

Random Effects index - $\beta_{(i = participant\ id\ \&\ experiment\ round)}$

Beta index - aB = Team Condition , bB = Type Group Offer

Acceptance Rate

Outcome: The acceptance rate of the amount of points offered by the proposer.

Likelihood function: Binomial distribution. Here we have processed our model using map2stan, so we can sample directly from our posterior without having to assume the distribution of our posterior is Gaussian.

Predictors: Condition of team (winning or losing team) and in-or-out group offering (between team conditions or within team conditions).

Random effects: Participant differences and Experimental round differences.

Model:

$$AcceptanceRate \sim Binomial(1,\ p_i)$$

$$f(p_i) \sim \alpha + \beta_{aB}\, aB_i + \beta_{bB} bB_i + \beta_{aBbB}\, aB_i bB_i$$

Random Effects index - $\beta_{(i = participant\ id\ \&\ experiment\ round)}$

Beta index - aB = Team Condition , bB = Type Group Offer

Identify sub models for comparison

Our sub-models for amount offered are:

$$AmountOffered \sim Normal(\mu_i,\ \sigma)$$
$$\mu_i \sim \alpha + \beta_{aB}\, aB_i$$

$$AmountOffered \sim Normal(\mu_i,\ \sigma)$$
$$\mu_i \sim \alpha + \beta_{bB} bB_i$$

$$AmountOffered \sim Normal(\mu_i,\ \sigma)$$
$$\mu_i \sim \alpha + \beta_{aB}\, aB_i + \beta_{bB} bB_i$$

Our sub models for acceptance rate are:

$AcceptanceRate \sim Binomial(1,\ p_i)$ $f(p_i) \sim \alpha + \beta_{aB}\, aB_i$
$AcceptanceRate \sim Binomial(1,\ p_i)$ $f(p_i) \sim \alpha + \beta_{bB} bB_i$
$AcceptanceRate \sim Binomial(1,\ p_i)$ $f(p_i) \sim \alpha + \beta_{aB}\, aB_i + \beta_{bB} bB_i$

Define and motivate your priors

From our review of the literature regarding the experiment, we can see there are conflicting results and contentions. Therefore, we really want the data to convince us, if we are to see any effect from this experiment. So we have chosen a reasonably sceptical prior of 0.2 for our variables of interest.

We have kept our random effects, intercept and sigma very standard. The (0,1) covers the whole distribution, which we want included. For sigma, the (0,3) is 3 standard deviations from the mean, which covers most of the distribution (99.7 of it).

They have been defined as the following:

ai(intercept) ~ dnorm(0, 1) ,

aii[random effect 1] ~ dnorm(0 , 1) ,

aiii[random effect 2] ~ dnorm(0, 1),

prior for variable ~ dnorm(0,0.2)

sigma ~ dunif(0 , 3)

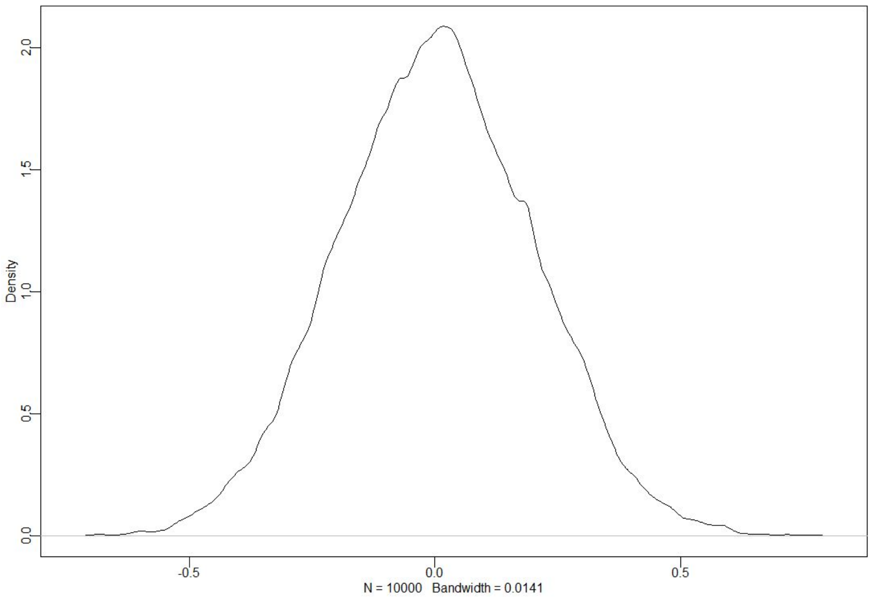

Figure 5 - Distribution plot of our prior

Model Quality for Amount Offered Models

Model 1 - Team Condition Only

$AmountOffered \sim Normal(\mu_i, \sigma)$

$\mu_i \sim \alpha + \beta_{aB}\, aB_i$

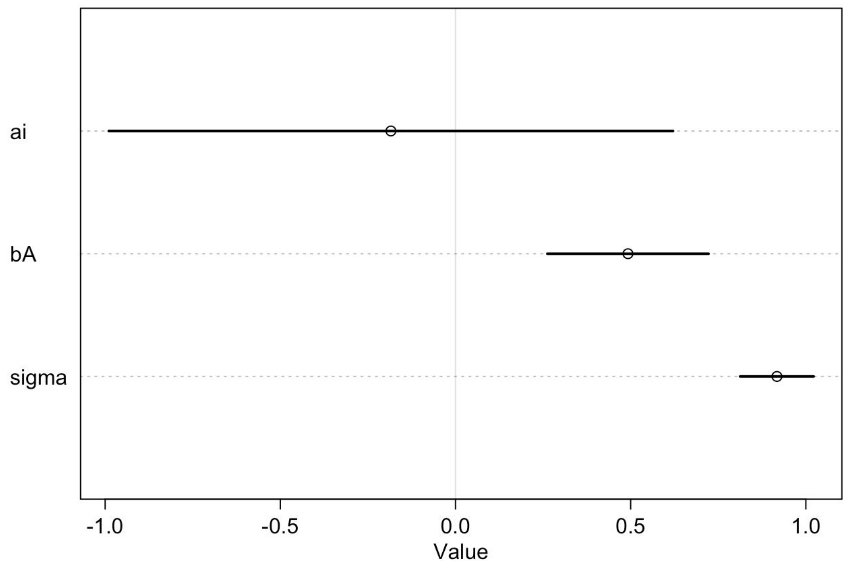

Figure 6 - Precis output of model 1

	Mean	StdDev	Confidence Interval 5.5% - 94.5%
ai	-0.18	0.50	(-0.99) - (0.62)
aB	0.49	0.14	(0.26) - (0.72)
sigma	0.92	0.07	(0.81) - (1.02)

Our data is scaled, making the mean 0. The mean of out intercept is negative (-0.18), meaning that participants posing as the proposer tend to offer less than 50 points to the receiver. However we see that the std. dev. is fairly high, and crosses 0, indicating that people vary a lot in their offers. The model output demonstrates a positive effect of our beta coefficient (0.49, sd = 0.14), indicating that losers of the preceding board game offer more than winners by 0.49 standard deviations from the mean. The high sigma value indicates a high uncertainty of the model.

Model 2 - Type Group Offer Only

$AmountOffered \sim Normal(\mu_i, \sigma)$

$\mu_i \sim \alpha + \beta_{bB} bB_i$

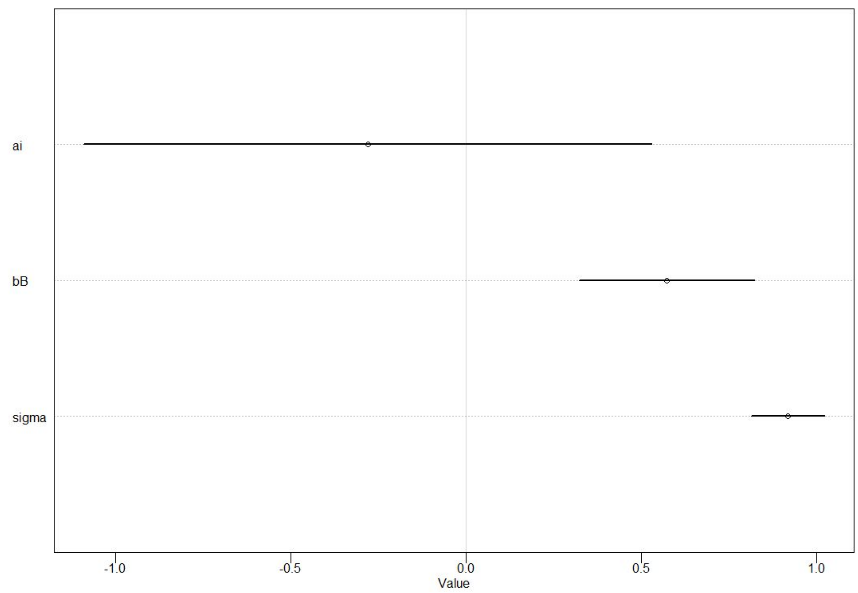

Figure 7 - Precis output plot for model 2

	Mean	StdDev	Confidence Interval 5.5% - 94.5%

ai	-0.28	0.51	(-1.09) - (0.53)
bB	0.57	0.16	(0.32) - (0.82)
sigma	0.92	0.07	(0.81) - (1.02)

The mean of out intercept is negative (-0.28), meaning that participants posing as the proposer tend to offer less than 50 points to the receiver. However we see that the std. dev. is fairly high, and crosses 0, indicating that people vary a lot in their offers. The model output demonstrates a positive effect of our beta coefficient (0.57, sd = 0.16), indicating that those who offer between to one who is not within their own group tend to offer more by 0.57 standard deviations. This is slightly more than the effect we see for winning / losing conditions. The high sigma value indicates a high uncertainty of the model.

Model 3 - Team Condition + Type Group Offer

$AmountOffered \sim Normal(\mu_i, \sigma)$

$\mu_i \sim \alpha + \beta_{aB}\, aB_i + \beta_{bB} bB_i$

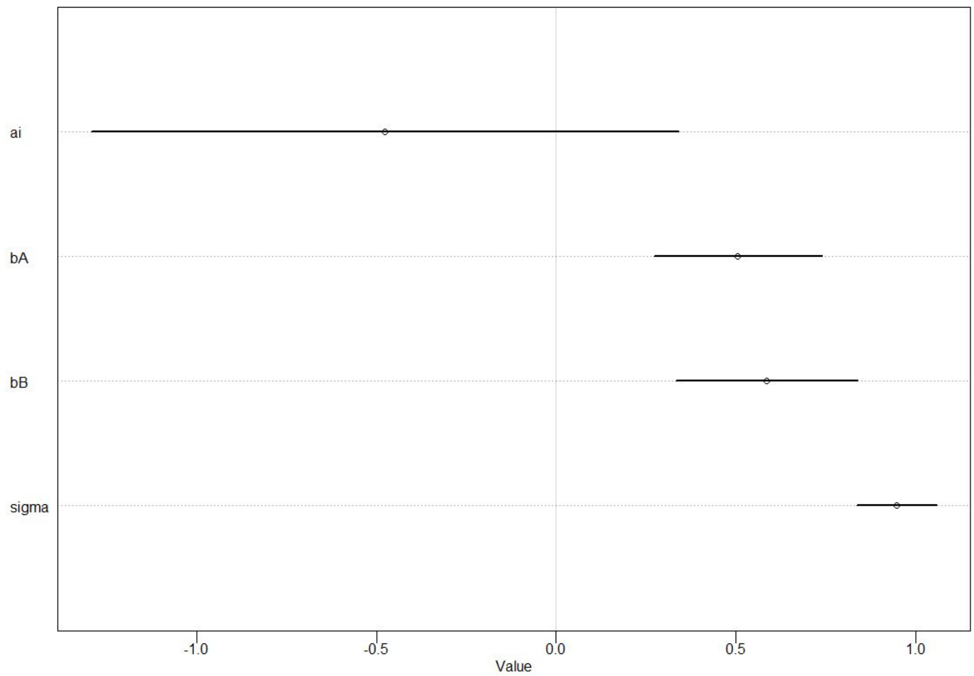

Figure 8 - Precis output plot for model 3

	Mean	StdDev	Confidence Interval 5.5% - 94.5%
ai	-0.48	0.51	(-1.29) - (0.34)

bA	0.51	0.15	(0.27) - (0.74)
bB	0.58	0.16	(0.33) - (0.84)
sigma	0.95	0.07	(0.84) - (1.06)

The mean of out intercept is negative (-0.48), meaning that participants posing as the proposer tend to offer less than 50 points to the receiver. However we see that the std. dev. is fairly high, and crosses 0, indicating that people vary a lot in their offers. The model output demonstrates a positive effect of our beta coefficient (0.58, sd = 0.15), indicating that those who offer between to one who is not within their own group tend to offer more by 0.58 standard deviations. We also see that people who are in the losing team tend to offer more by 0.51 standard deviations (sd = 0.16). When checking the correlation of the variables, we see they correlate by 0.05, which is not much, meaning they do not share much variance, although in a slightly in a positive direction. The high sigma value indicates a high uncertainty of the model.

Model 4 - Team Condition*Type Group Offer

$AmountOffered \sim Normal(\mu_i, \sigma)$

$\mu_i \sim \alpha + \beta_{aB}\, aB_i + \beta_{bB} bB_i + \beta_{aBbB}\, aB_i bB_i$

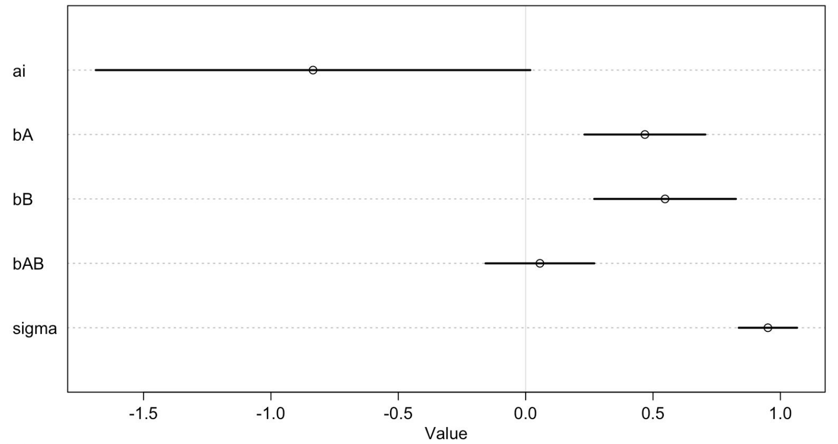

Figure 9 - Precis output plot of model 4

	Mean	StdDev	Confidence Interval 5.5% - 94.5%
ai	-0.50	0.51	(-1.32) - (0.32)
bA	0.41	0.16	(0.16) - (0.66)
bB	0.53	0.16	(0.27) - (0.79)

bAB	0.36	0.16	(0.09) - (0.62)
sigma	0.97	0.07	(0.84) - (1.06)

The mean of out intercept is negative (-0.50), meaning that participants posing as the proposer tend to offer less than 50 points to the receiver. However we see that the std. dev. is fairly high, and crosses 0 (just), indicating that people vary a lot in their offers. The model output demonstrates a positive effect of our beta coefficient bB (0.53, sd = 0.16), indicating that those who offer between to one who is not within their own group tend to offer more by 0.53 standard deviations. We also see that people who are in the losing team tend to offer more by 0.41 standard deviations bA (sd = 0.16). We see the interaction of the two variables decreases the effect of increase in amount offered, as it is only bAB (0.36, sd = 0.16). When checking the correlation of the variables, we see team condition correlates with between group offering by 0.10, and with the interaction effect by -0.27. This shows the interaction pulls this effect in the opposite direction. Between group condition correlates with the interaction effect by -0.14. This goes in the opposite direction to previously when they were not an interaction effect. This is slightly strange, considering both are positive on their own, but somehow react negatively when interacting. The high sigma value indicates a high uncertainty of the model.

WAIC Comparison for Amount Offered Models

In order to find the best performing model, we need an estimate of the models' accuracy. We have chosen to use the Widely Applicable Information Criterion (WAIC) as this allows us to compare the models based on information divergence. The WAIC is calculated by dividing the averages of log-likelihood with the posterior distribution. The WAIC output ranks the models from best to worst and provide a measure of weight, which helps us understand the relative distance between the models.

Hypothesis 1: *Models predicting amount offered*

```
    WAIC pWAIC dWAIC weight    SE   dSE
m1 318.0  20.6   0.0   0.57 30.57    NA
m2 318.7  20.7   0.7   0.41 34.66 10.80
m3 325.3  21.2   7.2   0.02 31.75  6.57
m4 328.5  22.0  10.4   0.00 32.45  7.45
```

Best model: m1, amount offered predicted by team condition.

Amongst the models predicting amount offered, the best performing model, m1, has a WAIC value of 318.0. When we are looking at WAIC values we generally want them to be as small as possible as this value is measure of of the models' average deviance on new samples. Here we can see that all our models are very close, especially m1 & m2, which is not good for getting a clear answer of which model is best. Another noticeable output is the weight estimates of the models. The weight, also known as Akaike Weight, is a number between 0 and 1, and the combined sum of the weights is always 1. The best performing model, m1, has a weight of 0.57, which is also the highest weight . This makes sense, as the weight is the model's estimated probability of making the best predictions on new data, conditional on the investigated models. Although m1 is the best of the four models, the high WAIC value and the relatively low model weight combined with the high SE (30.57) indicate that it may contain a certain amount of information divergence.

The plotted output of the WAIC can be seen below:

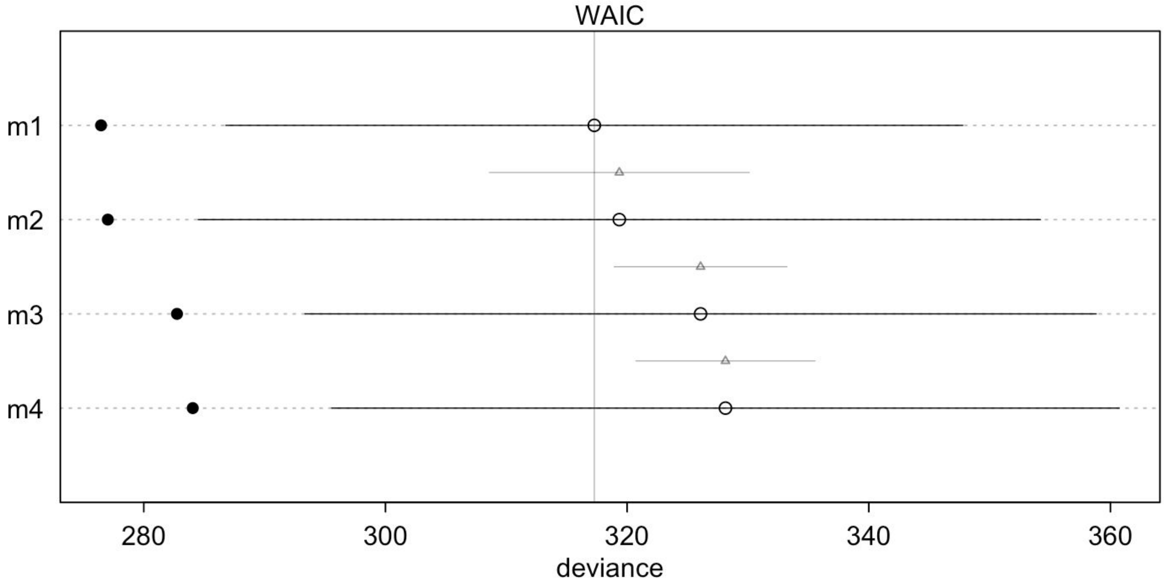

Figure 10 - WAIC plot comparing models for amount offered

The open points with lines represent the WAIC and its SE. The filled points represent the model's in-sample deviance. The triangles represent the SE of the difference between the WAIC of the model just below the triangle and the best model. The triangle's lines represent the std. dev. of this value.

Estimate comparison - Amount Offered Models

Although the output of the WAIC allows us to compare the models based on estimated deviance on new samples, we should also compare the posterior distributions of the parameter estimates of the models, as this could help us understand why WAIC values differ between models. In order to compare the estimates, we combine the MAP estimates in a table and plot it.

Hypothesis 1: *Dotchart plot of models predicting amount offered*

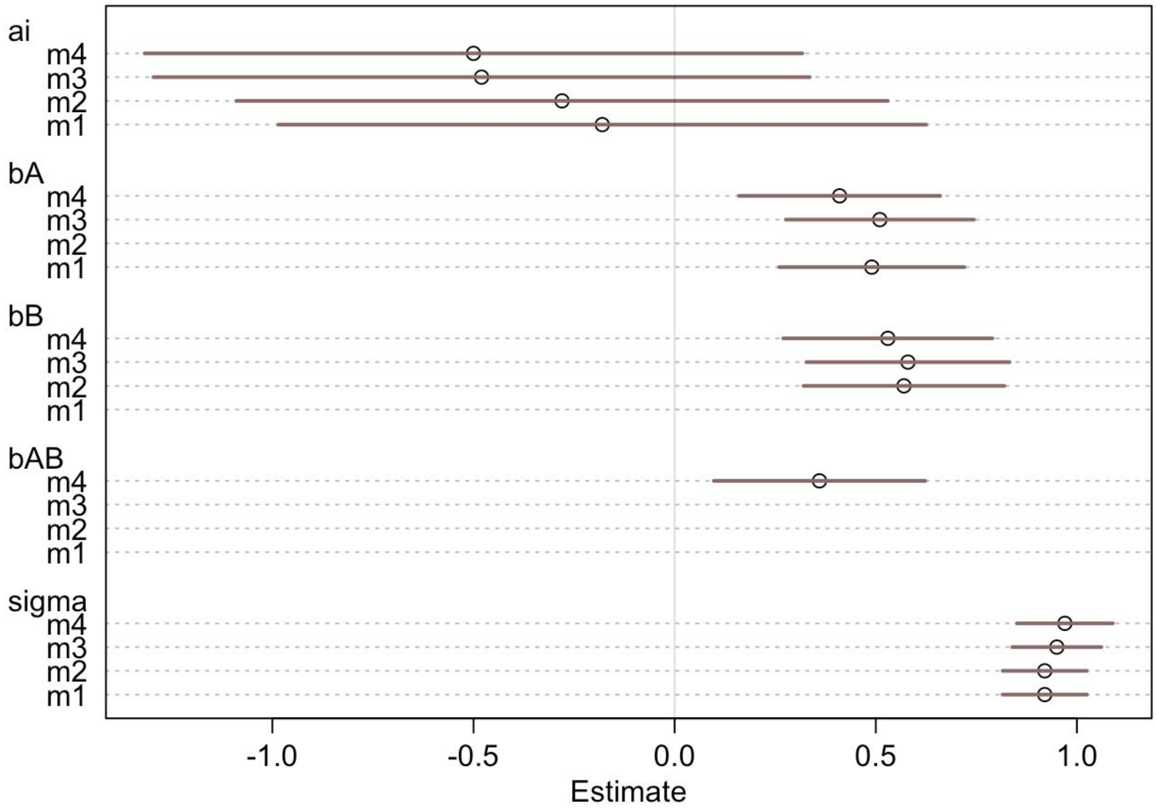

Figure 11 - Estimates comparison for coefficients in WAIC comparisons of model 1 -4.

The plot above displays the estimates of parameters across the four models predicting amount offered. Each point corresponds to a map estimate, while the lines represent an 89% percentile confidence interval. The plot demonstrate that there might be a tendency for the posterior distribution of both beta coefficients, bA (team) and bB (group), to get closer to zero, once used in the same model. As we have established that the two beta coefficients are not very correlated, we don’t consider this to be an effect of covariance. Revisiting the WAIC values, we observe that the models containing both beta coefficients generally have higher WAIC values, indicating a higher information divergence. The sigma estimates suggest a generally high uncertainty in the posterior distributions of the estimates across all models.

Plotting the Posterior against the Data

- Model 1 (Best model for Amount Offered)

Another way to check the quality of the model is to see how well the posterior from the model can be used to predict new data outcomes. The more aligned that observed and predicted results are, the better the model tends to be.

Predictive Posterior Plot

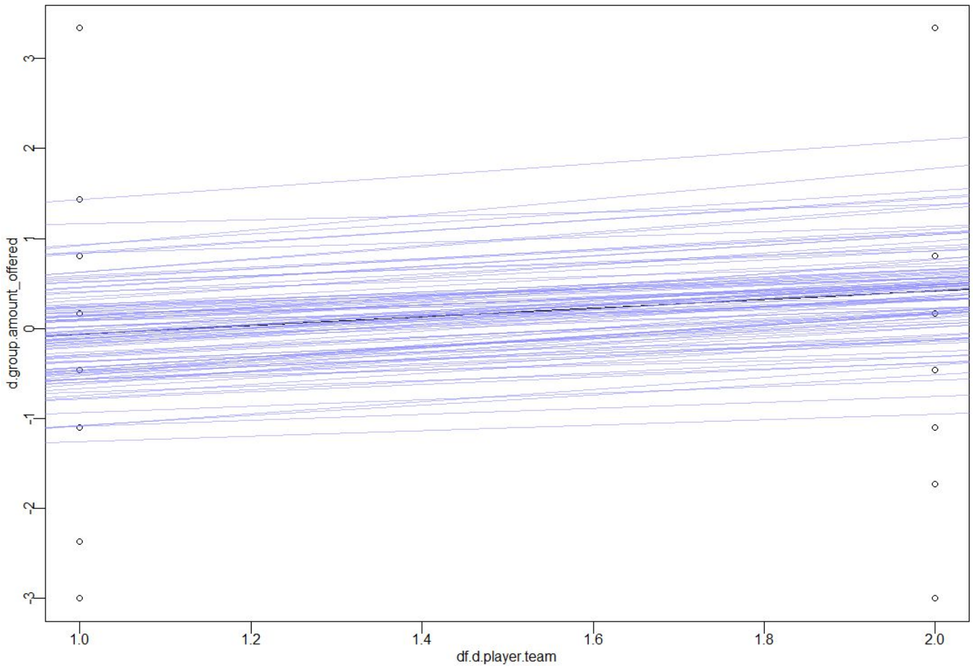

Figure 12 - Mean predictive posterior plot for amount offered (1000 simulations (blue))

We can see that the mean predictive posterior does not match the data very well, as it has a very broad range of deviance. Whilst there appears to be a slight positive slope, the deviance is so broad it could be a flat line. Thus, our model does not seem to be a very good fit to the new data.

Predicted Amount Offered vs Observed Amount Offered Plot

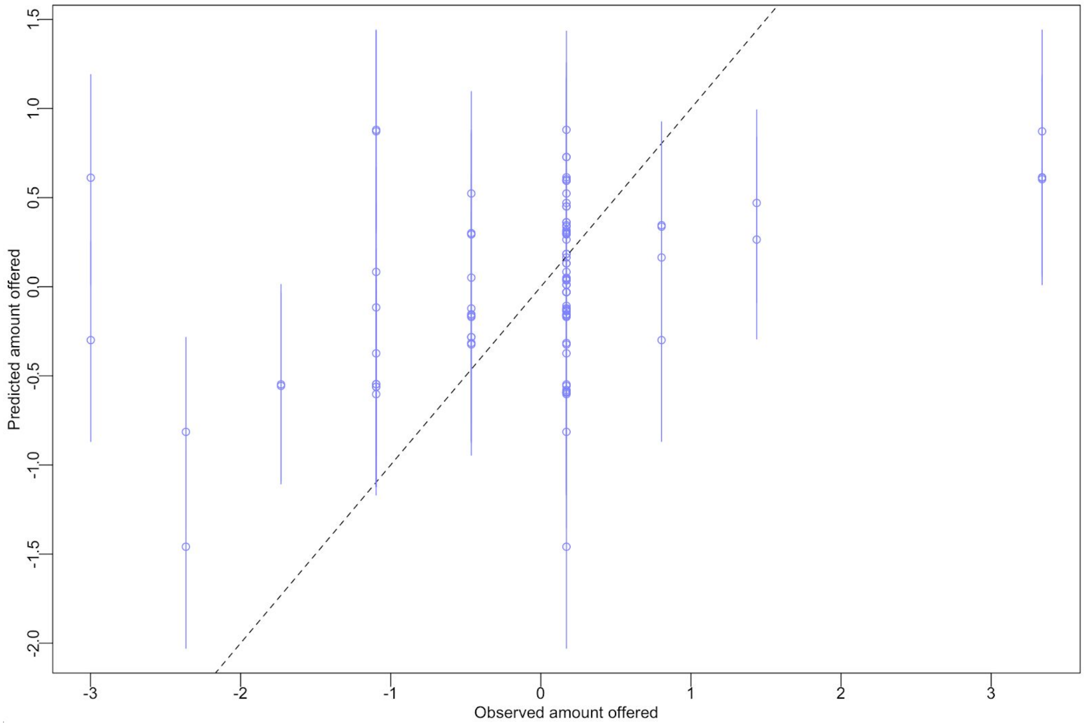

Figure 13- Predicted amount offered (y) vs observed amount offered (x)

Here we can see there is a lot of deviation between the simulated data and the observed data for amount offered, which shows the model does not predict very well. This means we cannot say much from the outcomes we observe in the model, even though it has performed best of the four we compared.

Model Quality for Acceptance Rate Models

Model 5 - Team Condition Only

$$AcceptanceRate \sim Binomial(1, p_i)$$

$$f(p_i) \sim \alpha + \beta_{aB}\, aB_i$$

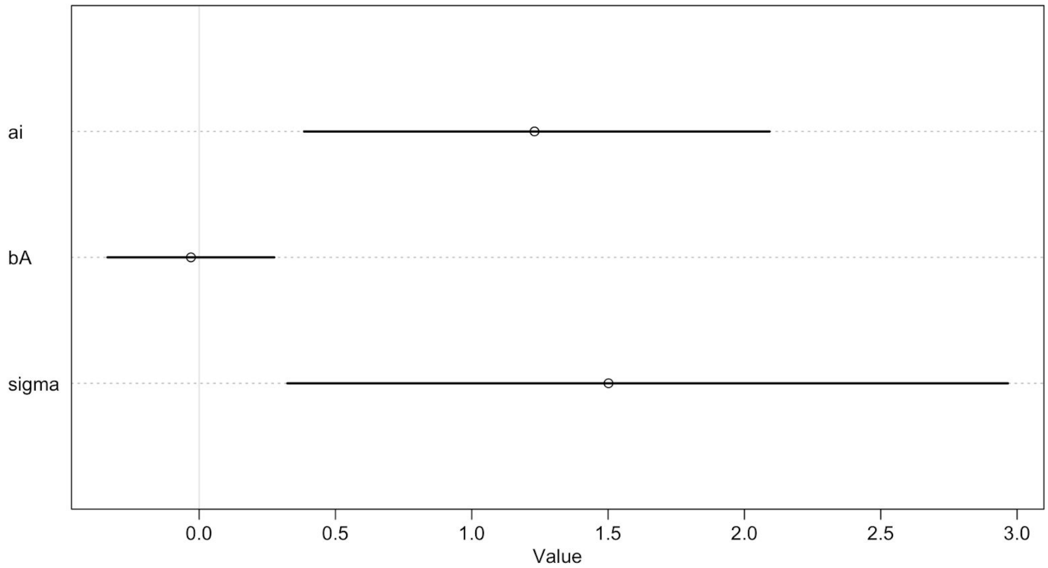

Figure 14 - Precis output plot for model 5

	Mean	StdDev	Confidence Interval 5.5% - 94.5%	n_eff	Rhat
ai	1.22	0.53	(0.41) - (2.07)	5137	1
bA	-0.03	0.19	(-0.34) - (0.27)	6000	1
sigma	1.50	0.88	(0.02) - (2.70)	6000	1

The mean of out intercept is positive (1.22, sd = 0.53), meaning that participants tend to accept offers more than 50% of the time. However, the high sigma value indicates a high uncertainty of the model. The model output demonstrates a slightly negative effect of our beta coefficient (-0.03, sd = 0.19), indicating that losers of the preceding board game accept slightly less often than the winners. When comparing the absolute mean of the intercept (0.77) and absolute difference of the beta (0.76), we see there is only a difference of 0.01 = 1%, which is not much of an effect at all. This also lies within the confidence intervals, so it remains an arbitrary result.

Model 6 - Type of Group Offer Only

$AcceptanceRate \sim Binomial(1,\ p_i)$

$f(p_i) \sim \alpha + \beta_{bB} bB_i$

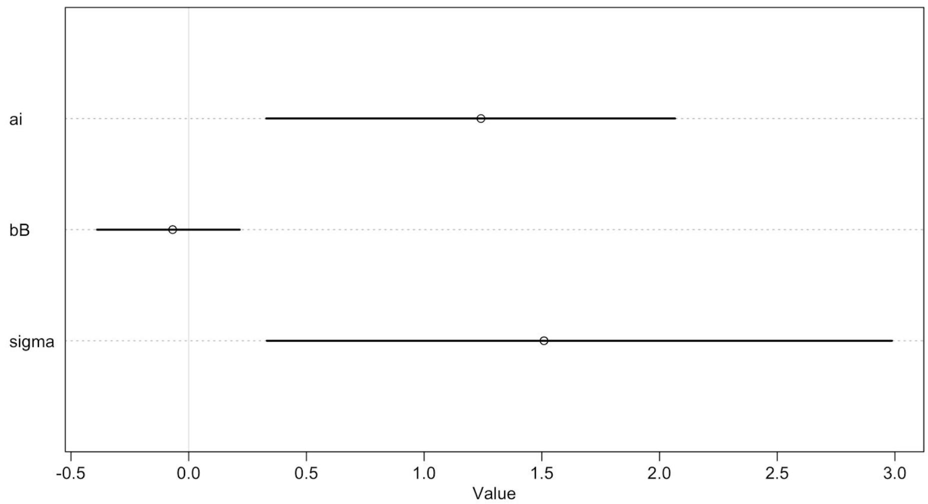

Figure 15 - Precis output plot for model 6

	Mean	StdDev	Confidence Interval 5.5% - 94.5%	n_eff	Rhat
ai	1.25	0.54	(0.33) - (2.07)	5294	1
bB	-0.07	0.19	(-0.39) - (0.22)	6000	1
sigma	1.51	0.86	(0.33) - (2.99)	6000	1

The mean of out intercept is positive (1.25, sd = 0.54), meaning that participants tend to accept offers more than 50% of the time. The model output demonstrates a slightly negative effect of our beta coefficient (-0.07, sd = 0.19), indicating that participants receiving within their own group in the preceding board game accept slightly less than those between groups. However, the high sigma value indicates a high uncertainty of the model. When comparing the absolute mean of the intercept (0.78) and absolute difference of the beta (0.76), we see there is only a difference of 0.02 = 2%, which is not much of an effect. This also lies within the confidence intervals, so it remains an arbitrary result.

Model 7 - Team Condition + Type Group Offer

$AcceptanceRate \sim Binomial(1,\ p_i)$

$f(p_i) \sim \alpha + \beta_{aB}\, aB_i + \beta_{bB} bB_i$

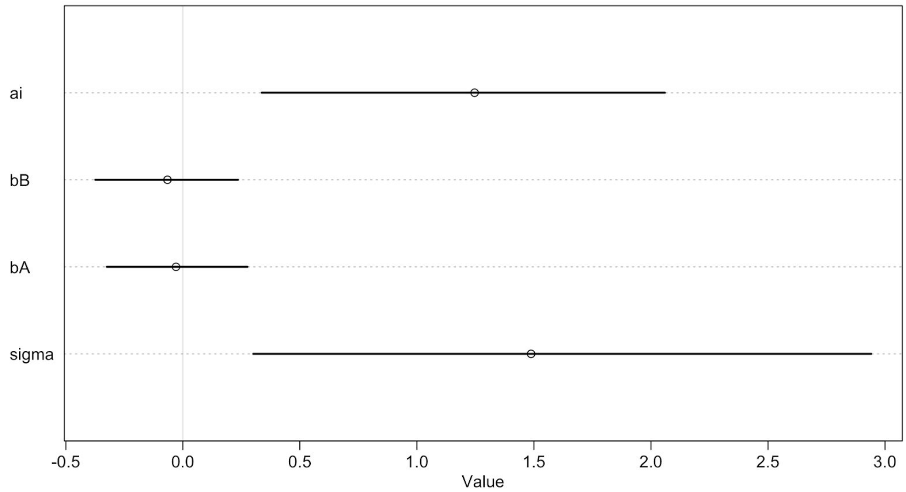

Figure 16 - Precis outcome plot for model 7

	Mean	StdDev	Confidence Interval 5.5% - 94.5%	n_eff	Rhat
ai	1.25	0.55	(0.34) - (2.06)	5137	1
bB	-0.07	0.19	(-0.37) - (0.24)	6000	1
bA	-0.03	0.19	(-0.32) - (0.28)	6000	1
sigma	1.49	0.86	(0.30) - (2.94)	6000	1

The mean of out intercept is positive (1.26, sd = 0.55), meaning that participants tend to accept offers more than 50% of the time. However, the high sigma value indicates a high uncertainty of the model. The model output demonstrates a slightly negative effect of our beta coefficient for team bA (-0.03, sd = 0.19), indicating that participants receiving within their own group in the preceding board game accept slightly less than those between groups.

When comparing the absolute mean of the intercept (0.78) and absolute difference of the beta (0.77), we see there is only a difference of 0.01 = 1%, which is not much of an effect at all. This lies outside the confidence intervals, so it is more reliable.

We also see a slightly negative effect for group type bB (-0.07, sd = 0.19), meaning people tend to accept offers less when they are receiving from someone within their own group from the board game, compared to within. When comparing the absolute mean of the intercept (0.78) and absolute difference of the beta (0.76), we see there is only a difference of 0.02 = 2%, which is not much of an effect at all. This lies outside of the confidence intervals, so is more reliable.

Model 8 - Team Condition*Type Group Offer

$$AcceptanceRate \sim Binomial(1,\ p_i)$$

$$f(p_i) \sim \alpha + \beta_{aB}\, aB_i + \beta_{bB} bB_i + \beta_{aBbB}\, aB_i bB_i$$

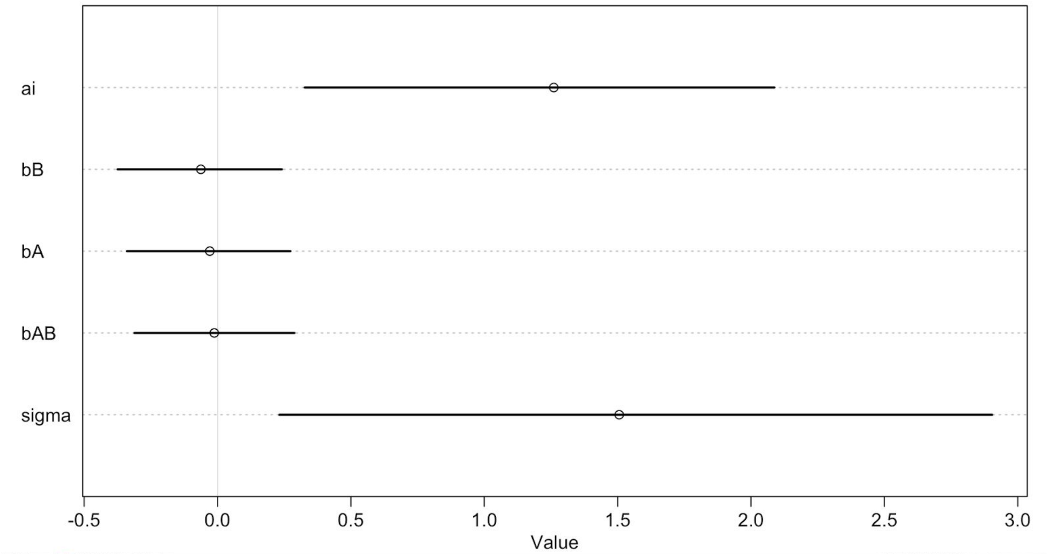

Figure 17 - Precis output plot for model 8

	Mean	StdDev	Confidence Interval 5.5% - 94.5%	n_eff	Rhat
ai	1.26	0.55	(0.33) - (2.09)	4481	1
bB	-0.06	0.19	(-0.37) - (0.24)	6000	1

bA	-0.03	0.19	(-0.34) - (0.27)	6000	1
bAB	-0.01	0.19	(-0.31) - (0.29)	6000	1
sigma	1.51	0.88	(0.23) (2.90)	6000	1

The mean of out intercept is positive (1.26, sd = 0.55), meaning that participants tend to accept offers more than 50% of the time. However, the high sigma value indicates a high uncertainty of the model. The model output demonstrates a slightly negative effect of our beta coefficient for team condition bA (-0.03, sd = 0.19), indicating that participants who lost the preceding board game tend to accept less than if they win. When comparing the absolute mean of the intercept (0.78) and absolute difference of the beta (0.77), we see there is only a difference of 0.01 = 1%, which is not much of an effect at all. This lies outside the confidence intervals, so it is more reliable.

We also see a slightly negative effect for group offer type bB (-0.06, sd = 0.19), meaning people tend to accept offers less when they are receiving from someone within their own group from the board game, compared to within. When comparing the absolute mean of the intercept (0.78) and absolute difference of the beta (0.77), we see there is only a difference of 0.01 = 1%, which is not much of an effect at all. This lies outside of the confidence intervals, so is more reliable.

We also see a slightly negative effect for the interaction between team condition with group offer type (-0.01, sd = 0.19), meaning people tend to accept offers less when they are receiving from someone within their own group from the board game, as well as accepting less when on the losing team, although it is a smaller effect than the variables individually. When comparing the absolute mean of the intercept (0.78) and absolute difference of the beta (0.78), we see there is only a difference of 0, showing no effect at all. This lies outside of the confidence intervals.

WAIC Comparisons for Acceptance Rate Model

- Model 6 (Best Amount Offered Model)

Hypothesis 2: *Models predicting acceptance rate*

	WAIC	pWAIC	dWAIC	weight	SE	dSE
m6	93.4	7.8	0.0	0.29	10.08	NA
m7	93.7	7.9	0.3	0.25	10.18	0.19
m8	93.8	7.9	0.3	0.24	10.17	0.22
m5	93.9	7.9	0.4	0.23	10.16	0.30

Best model: m6, acceptance rate predicted by group condition.

Amongst the models predicting acceptance rate, the best performing model, m6, has a WAIC value of 93.4. As mentioned above, this value is a measure of the model's estimated deviance on new samples. The Akaike Weight of model m6 is 0.29, which is a value containing the probability of making the best predictions on new data in relation to the 3 other models. This is a very low value considering that the sum of the combined weights of the models is 1.

The plot below show the output of the WAIC for the acceptance rate models:

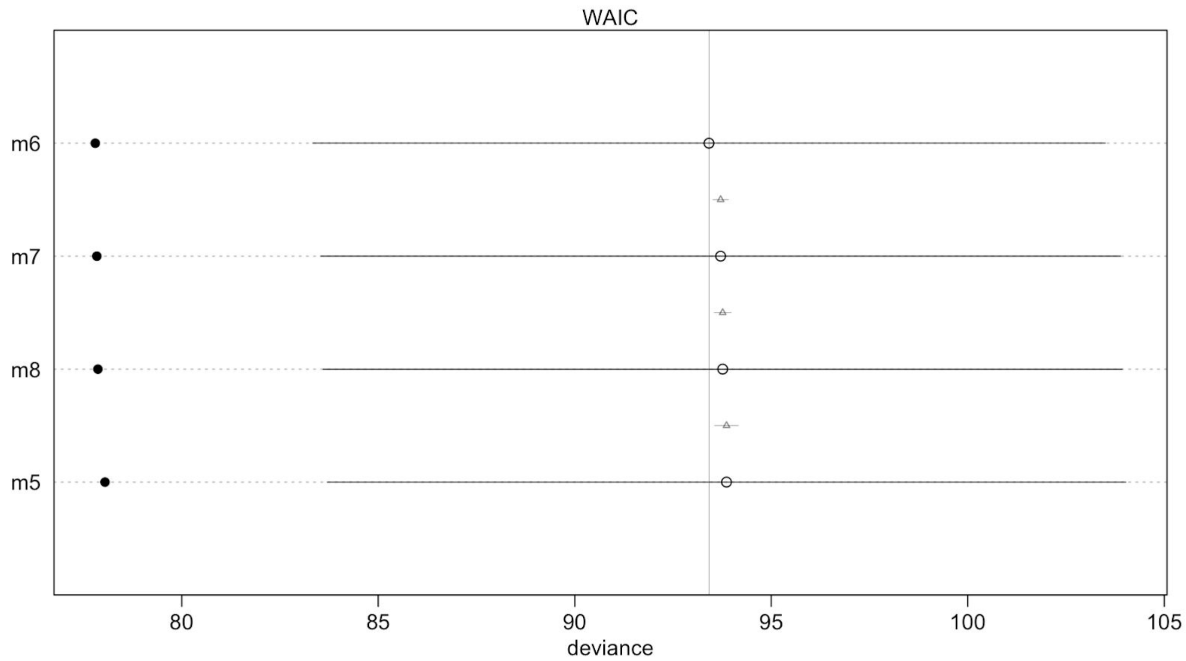

Figure 18 - WAIC comparison plot for models model 5-8 .

Estimate Comparison Acceptance Rate Models

Hypothesis 2: Acceptance rate estimates plot

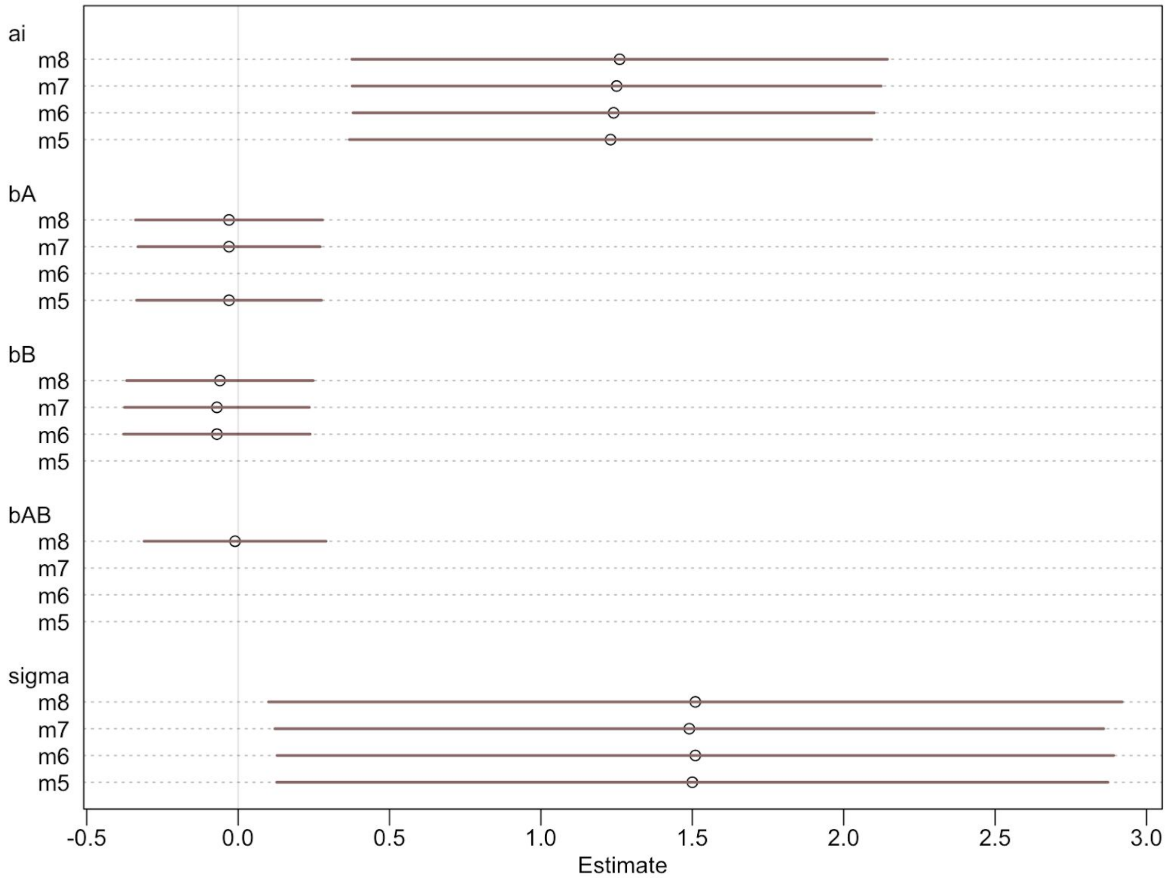

Figure 19 - Estimates comparison of models 5-8 from WAIC comparison

The plot above display the estimates of parameters across the four models predicting acceptance rate. Each point corresponds to a map estimate, while the lines represent an 89% percentile confidence interval. The plot indicates that the posterior distribution of the beta coefficients, team condition (bA) and group condition (bB), remains stable across the models. We see that the estimates are all very close to 0, and don't change much when adding variables. Sigma and intercept have huge spreads for the 89% confidence interval, which shows a lot of variance in the posterior distributions of the estimates.

We also see a very little indication that the estimates of team condition are slightly different than those of group condition. Looking at WAIC values again, all models that contain this parameter value have lower WAIC s than those without it.

Conclusion - What we know now compared to what we knew

We have come across a number of studies that investigated the effect of money priming (especially inequality) on social behaviours in different experimental settings. In particular, we found a study that look upon the social consequences of money priming by means of a monopoly game. As we found this approach interesting, we wanted to see if it was possible to reproduce this effect, only by using another type of "inequality priming" also introduced in form of a board game without monetary incentives. Therefore we had participants in groups of four play a boardgame with highly disproportionate resources. Participants were cooperating in dyads, causing there to be one winning dyad, and one losing dyad in each experimental session. In the assignment we have been operating with a team condition referring to whether participants had been on a winning or losing team, as well as a group type condition referring to whether participants were interacting with a dyad partner, in group, or a participant from an opponent dyad, out group, when they were playing the Ultimatum Game preceding the board game.

Before the onset of the data collection process, we hypothesised to see an effect of the two different conditions, team, and group, on the two outcome variables; amount of points offered by the proposer, and acceptance rate of the receiver. We expected participants to offer less money if they had both been on the losing team and were offering to a an out group participant (hypothesis 1). We further hypothesised participants to accept offers from other players less if they have both been on the winning team and were receiving from a out group participant (hypothesis 2).

When looking at the preliminary results, we saw that the amount of points offered was less when people were on a losing team. However, people tended to offer more to people NOT in their own team, which goes against our hypothesis. For acceptance rate, we saw that people on the winning team accepted less and more declinations than the losing team, as we expected. However, we again see that offering within one's own group shows a lower acceptance rate and higher declination rate.

Based on a WAIC and estimate comparison, we found that the best model for predicting amount offered was model m1 with the beta coefficient team. The model demonstrates a positive effect of team (0.49, sd = 0.14) on amount offered, which partially supports hypothesis 1, that participants from a losing team offer more than winners.

Likewise we completed a WAIC and estimate comparison for the models predicting acceptance rate and found the best model to be model m6 with the beta coefficient group. The model demonstrates a negative effect of group (-0.03, sd = 0.16), which debunks hypothesis 2 that participants receiving from an out group participant would accept less. However, we note that the effect of the beta coefficient is rather small.

Based on the analysis of our models, we can conclude that there is no strong effect of either beta coefficients, and even less so when used as an interaction. Both interaction models performed poorly, also debunking our hypotheses. Our best model for amount offered suggest that there may be a modest effect of team, although the model seems to encompass a high uncertainty. Furthermore, our predictive posterior plots revealed a large amount of uncertainty in the predictive ability of our best model, meaning it cannot predict very accurately for new data.

Meanwhile, our best model for acceptance rate indicates a very very minor negative effect of offering to your own team-mate, but this model also had much uncertainty and is also uncertain in the WAIC comparison, so cannot say too much either, despite indicating a result opposite to our hypothesis. Although, some literature indicates that we tend to demand more in interactions where we identify more with the other participant, while having lower demands in interactions where we dissociate ourselves with the other participant. So this may explain this interesting result.

Overall, we conclude not much can be inferred from the experimental results, although we see some indications supporting the effect of team condition, whereas we see interesting opposing trends for our variable of group type offering. In future analysis we should attempt to collect a lot more data, which could hopefully provide more robust results and better predictive power.