BSE662 FINAL REPORT

Team: The Philosophers

INTRODUCTION & METHODS

In our experiment, we had to test the expression and transfer of valence associated with social conformity. In our project, we have added two extensions that aim to change the parameters provided to the participant before and during the gambling phase. Hence, in total, our final experiment consists of three different experiments, which were all designed using PsychoPy.

Replication -
The aim of this experiment was to see whether the participants conformed or dissented with a group of random people selecting a particular slot in the case of gambling. The final objective was to check how many participants went against the higher expected value in the cases when the difference in the reward probabilities of the 2 slots was large (0.6), small (0.3), or there was no difference in the expected values.
This experiment was divided into two phases:

1. Pre-training phase: This phase consists of six rounds with 10 trials each. The aim of this phase is to tell participants the probability of a slot. In each round, a single slot is shown for 10 trials, and in each trial, it either shows " REWARD" or "NO REWARD". The participants have to guess the probability of the slot based on these trials, and then after the round is completed, they are asked to type probability, with an error margin of 0.2 allowed.
2. Gambling Phase: This phase consisted of 60 trials with all the possible combinations of the six slots. Now, in each trial, the participants are shown two slots, and below each slot, the number of people who chose that slot is shown. Now, the participants have to choose a slot, but the result of each trial is not shown

to them until the last trial. After the last trial, the final result is shown, which represents the hypothetical amount earned by the participant.

Extension 1: Loss Domain

The aim of this extension was to test the participants in a scenario where instead of earning the reward, they would lose a certain hypothetical amount they would have been given in the beginning.
In our experiment, we gave them a hypothetical amount of 60 dollars since it had 60 trials,so the maximum amount they could earn was 60. Now, in the gambling phase, they had to choose between 2 slots such that 1 slot would deduct an amount of 1 dollar from the 60 dollars we had given them and 1 slot would have no impact on the 60 dollars given to the participants in the starting. This would also take into account the loss aversion theory, as ultimately the objective is to see how many participants conform or dissent in the case of large, small, or no differences in the “LOSS” probabilities.

This experiment has two trials:

1. Pre-Training Phase: This phase consists of six rounds with 10 trials each. The aim of this phase is to tell participants the probability of a slot. In each round, a single slot is shown for 10 trials, and in each trial, it either shows “ LOSS” or “NO LOSS”.The participants have to guess the probability of the slot based on these trials, and then after the round is completed, they are asked to type the probability, with an error margin of 0.2 allowed.
2. Gambling Phase: This phase consisted of 60 trials with all the possible combinations of the six slots. Now, in each trial, the participants are shown two slots, and below each slot, the number of people who chose that slot is shown. Now, the participants have to choose a slot, but the result of each trial is not shown to them until the last trial. After the last trial, the final result is shown, which represents the hypothetical amount that they could save from the initial amount of 60 dollars.

Extension 2: Influence of Expert Gamblers

The aim of this extension was to introduce expert gamblers to the experiment. This would help in checking that when expert gamblers are brought into the picture instead of random people as in the original research paper, how would the participants react and whether the rate of conformity as well as dissent increase or decrease, i.e., how many participants went against the higher expected value in the case when the difference in the reward probabilities of the 2 slots was large (0.6), small (0.3), and when there was no difference in the expected values. We replaced the images of people that were shown below each slot in the gambling phase of the replication experiment with an image of an expert gambler below each slot, but with the change that each expert has a rating out of 10, which tells the likability of that expert choosing the right slot, which results in a reward.

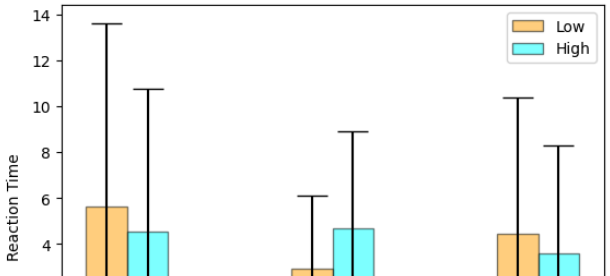
This experiment has three phases:

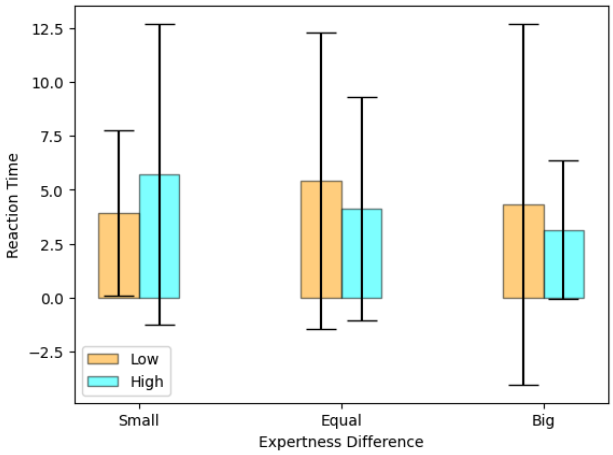
1. Pre-training phase: This is exactly similar to the pre-training phase in the replication experiment.
2. Expert Rating Learning Phase: In this phase, we displayed images along with the rating of each expert one by one. There were a total of six experts, all with different levels of ratings. We then asked the participant to tell us the rating of the experts to make sure they remembered it.
3. Gambling Phase: In this phase, the participants were shown two slots on each trial, and below each slot, an image of an expert was shown. All the possible combinations of the slots and experts were embedded in the experiment to make sure the analysis was exhaustive in nature. The participant had to choose one slot based on the probability and the expert rating. Then, after the last trial, the hypothetical amount they earned was shown.

RESULTS

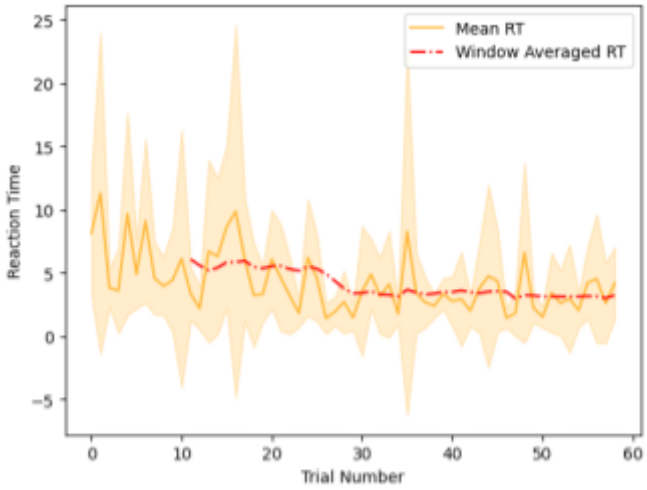
Experiment 2 (Expertness)

Reaction Time Analysis

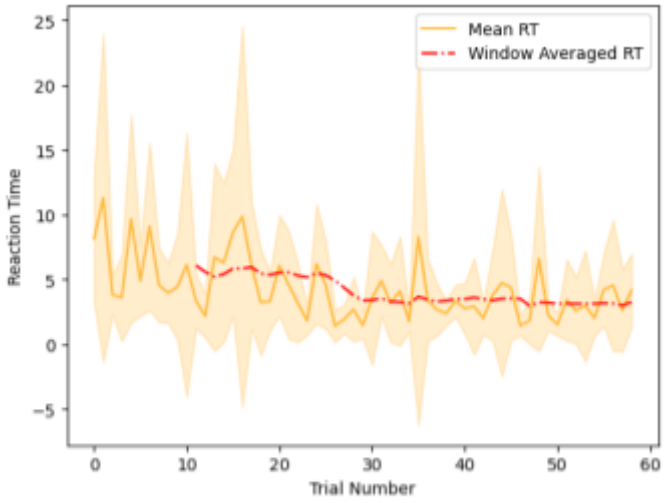




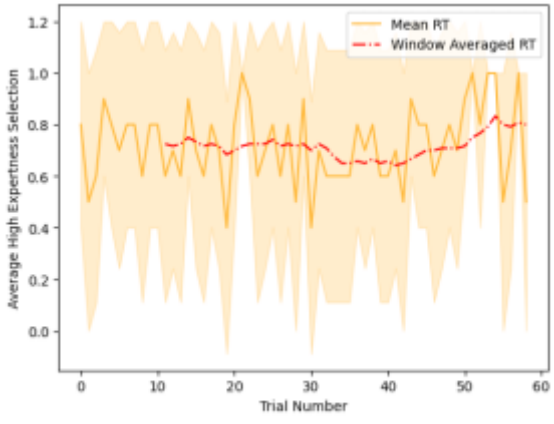
Temporal Analysis



Variation of Average Reaction Time with Trials



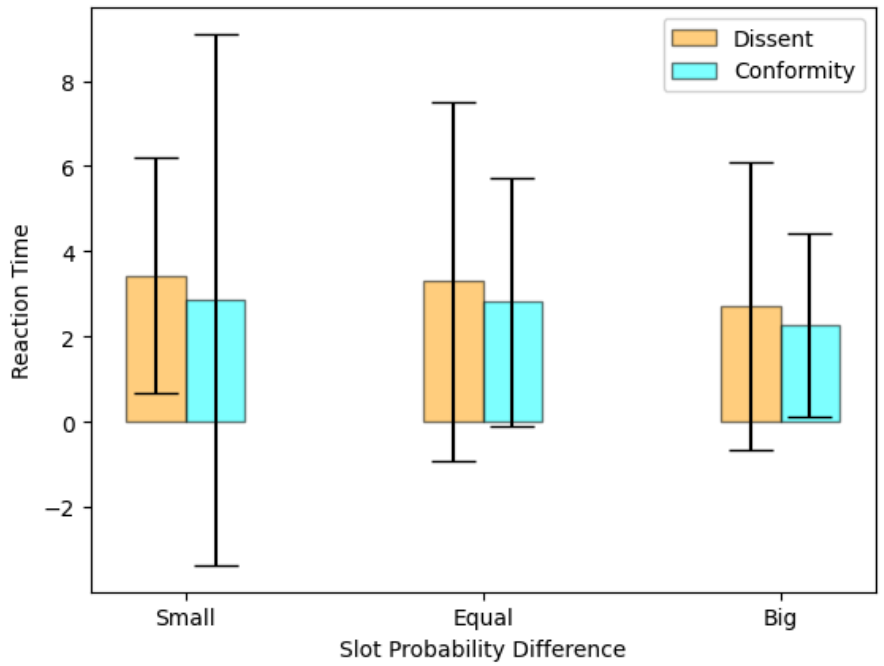
Variation of Reaction Time with Trails when higher expertness was chosen



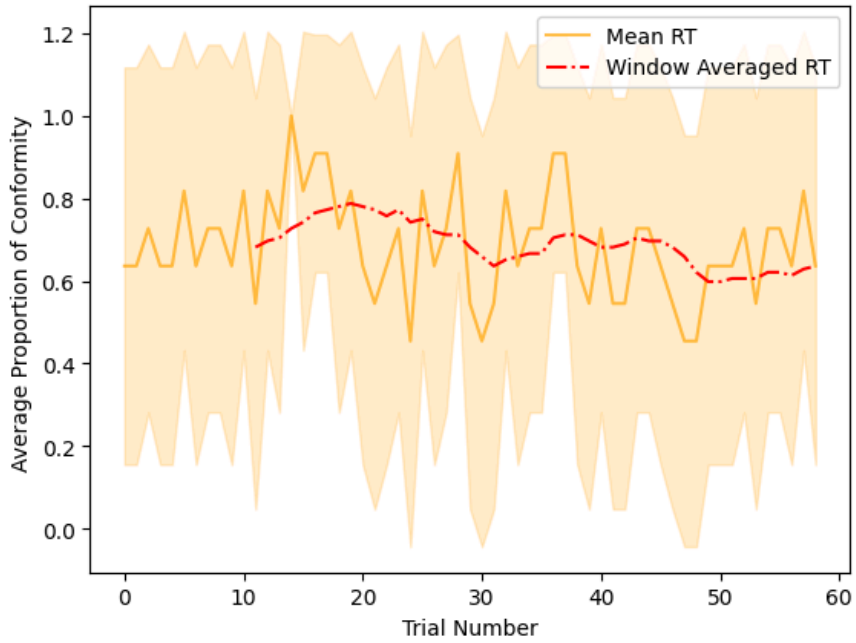
Variation of Average for Expertness with Trials

Experiment 1 (Loss)

Reaction Time Analysis



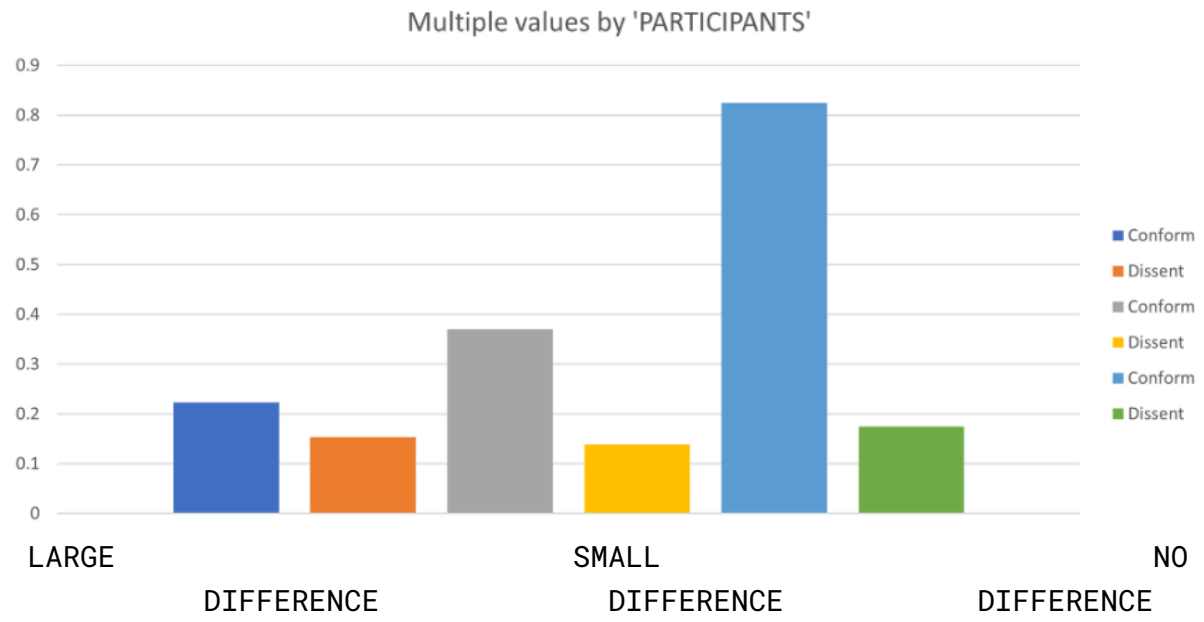
Temporal Analysis



In the RT analysis of both the experiments we observe that the reaction time is small for high expertness and conformity in case of big difference in slot probability and expertness level. In the temporal analysis, we see that the reaction time decreases with time. However, the decrease is not significant because of small reaction times. Major conclusion from the analysis is that the proportion of choice for conformity or high expertise remains constant with time and is considerably very high. We believe that the standard deviation of RT is very high because of fewer participants and that can be improved with more participants. And this will result in better results from the analysis.

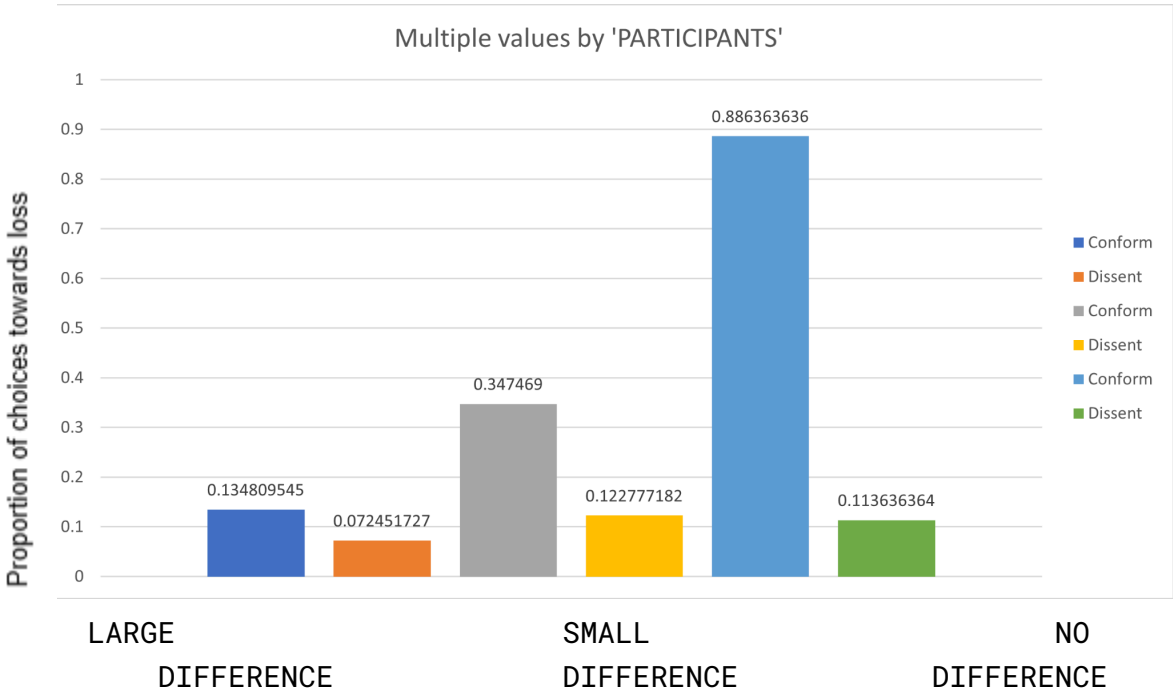
Analysis of replication data:

Following are the bar graphs depicting the mean value of the number of times the participants went against the expected value.



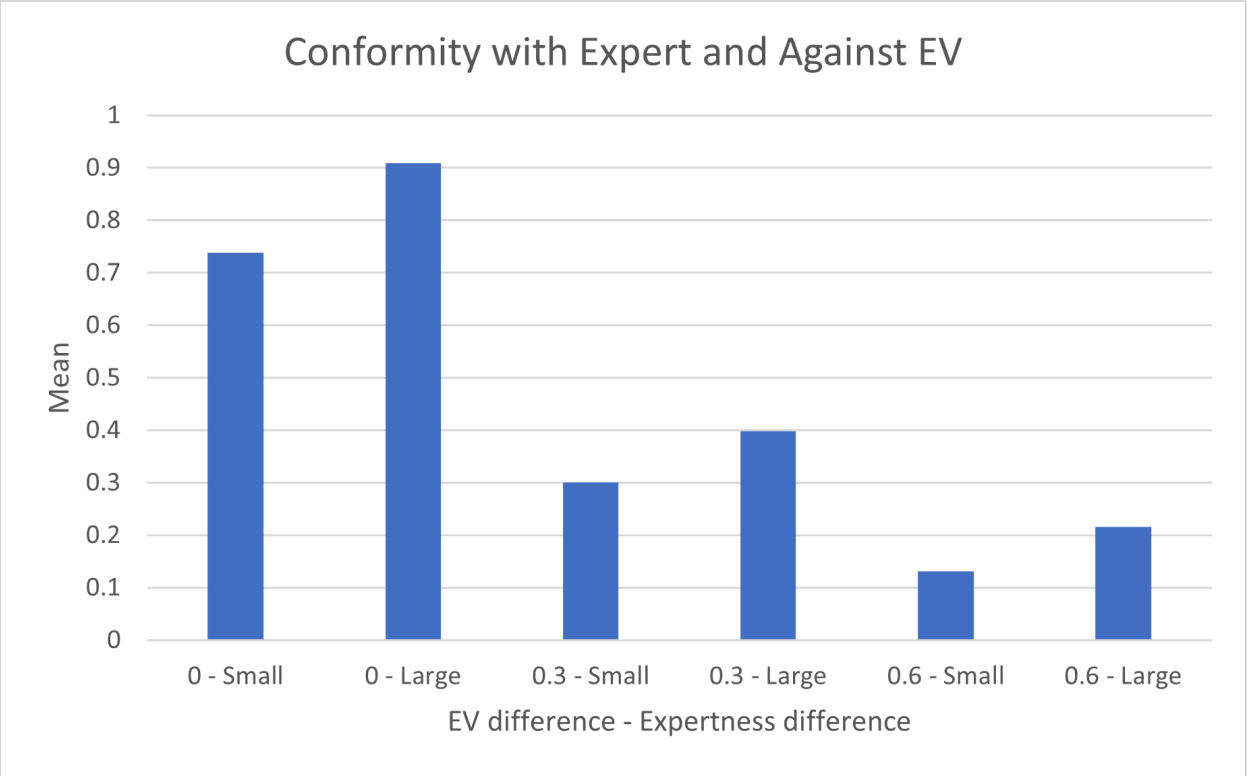
The bar graph clearly shows the effect of conformity; even in the case of a large difference when the probability of one slot was 0.2 and the other was 0.8, participants still showed a preference for the slot with a lower probability against its expected value. Out of 132 such trials, 35 participants showed preference for the slot with a lower probability.

Extension: Loss Domain:



We observe that people tend to conform to group decisions despite facing losses. In cases where one option has a low loss probability compared to cases where the loss probability is high and it is supported by a large group, people often prefer to choose the former option, which is less supported. This could be inferred from the data, where in cases of large differences in conformity, the proportion of choice was 0.134 in the loss domain as compared to 0.22 in cases of replication.

Extension: Influence of Experts

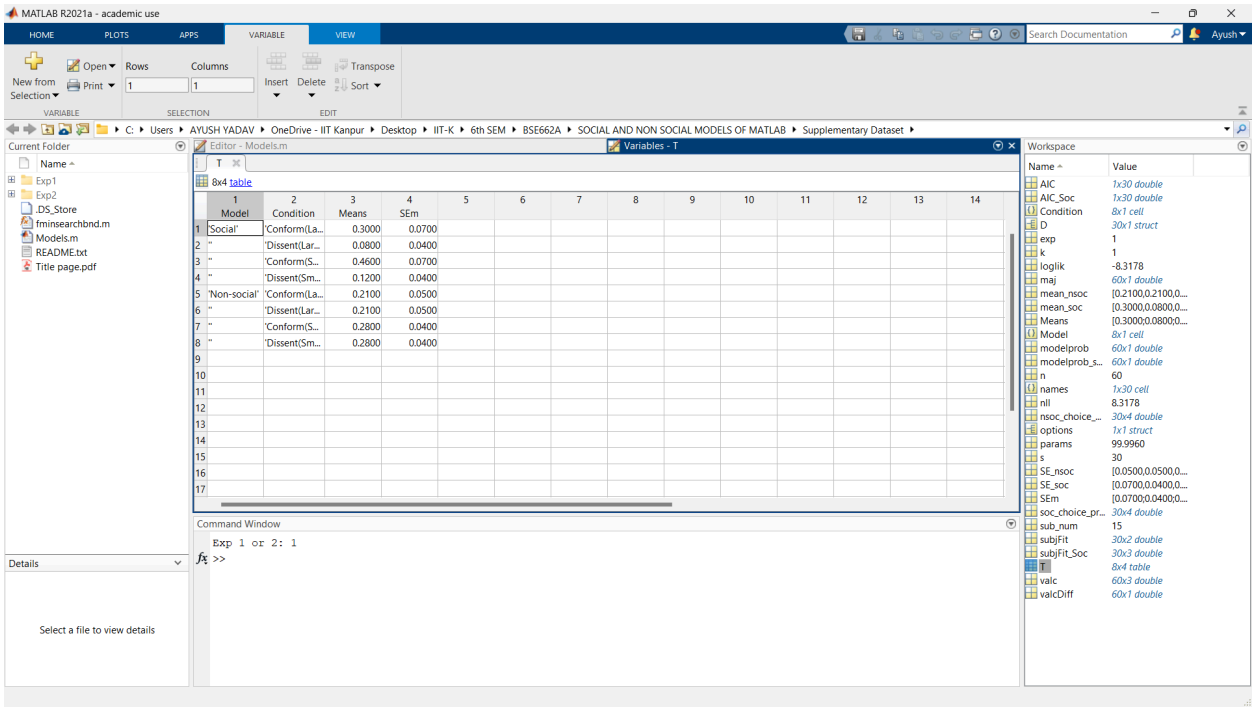


The following graph depicts the decisions of participants influenced by the decisions of experts.
Small and large indicate the difference between the expert levels of the options, while the numeric value shows the difference in the probability of slots.

We can clearly see the effect of experts. When the difference in the level of experts endorsing a particular slot is small, we see an effect similar to conformity, and this effect is much more prominent when the difference in the expert level is high.
We also observed that when the expert with rating 10 appeared, he was chosen more than 80% of the time, which was significantly higher than the effect of the majority seen in replication over different cases, which was around 68%.

Computational Model of Social and Non-Social Models

Matlab code was used to design the social and non-social models to verify our results.



Our results were indeed in line with the social model, as expected.

ANOVA of the replication data

We conducted ANOVAs as well as planned comparisons, employing two-tailed t-tests. We report sizes and their confidence intervals to perform all planned comparisons.

Large difference:
Group 1: Majority difference, better option (large difference =

0.6) is different, Conforming = 1, discerning = 0.
Group 2: Majority and better option are the same (large difference = 0.6), conforming = 1, discerning = 0.

Paired t-test

P value and statistical significance:

The two-tailed P value is less than 0.0001

By conventional criteria, this difference is considered to be extremely statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals -0.64

95% confidence interval of this difference: From -0.73 to -0.54

Intermediate values used in calculations:

t = 13.6761

df = 262

standard error of difference = 0.047

Review your data:

Group	Group One	Group Two
Mean	0.27	0.90
SD	0.44	0.30
SEM	0.04	0.03
N	132	132

Small difference:
Group 1 : Majority difference, better option (large difference = 0.3) is different, Conforming =1, discerning =0
Group 2: Majority and better option same (large difference = 0.3) , Conforming=1, discerning =0

Paired t-test

P value and statistical significance:

The two-tailed P value is less than 0.0001

By conventional criteria, this difference is considered to be extremely statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals -0.40

95% confidence interval of this difference: From -0.50 to -0.31

Intermediate values used in calculations:

t = 8.3776

df = 131

standard error of difference = 0.048

Review your data:

Group	Group One	Group Two
Mean	0.51	0.91
SD	0.50	0.29
SEM	0.04	0.03
N	132	132

ANOVA performed on the proportion of choices favoring the slot option with a lower expected pay-off and the decision associated with it referring to conforming or dissenting along with the size of the difference in pay-offs between options (large or small) as factors, yielded a main effect of social decision. For small difference in payoff we observed ($t(14) = 13.61$, $p < 0.0001$, $d = 0.047$, 95% CI [-0.73,-0.54]) and for large differences in payoff we observed ($t(14) = 8.37$, $p < 0.0001$, $d = 0.048$, 95% CI [-0.5,-0.31])

These observed t values indicate the difference between means of the two groups and the result is found out to be statistically significant which indicates strong evidence against null hypothesis (the slots are chosen at random depending on just reward probability of slots). The difference between large payoffs and low payoffs was that in high payoffs people often conform when the difference in payoff of the slot is small but we see that they also chose to conform when the difference was

large by choosing the slot with less reward probability . Hence, they also conform in the face of conspicuous loss.

Hence, we can say that whenever the probability of reward differs across available options, participants are significantly more likely to choose the option associated with a lower pay-off, whether there is a significant difference in pay-offs between options or not, if the majority of ostensible previous gamblers support that option.

The F-value of 70.87 shows that there was a statistically significant difference between how many people chose each choice. This implies that decisions people made were not entirely arbitrary but rather influenced by factors like the likelihood of receiving a reward and what their friends thought.

We perform the same experiment in the loss domain, where choosing a slot has a probability of loss.

Large difference:
Group 1: Majority difference; better option (large difference = 0.6) is different; conforming = 1, discerning = 0.
Group 2: Majority and better option are the same (large difference = 0.6), conforming = 1, discerning = 0.

Paired t-test

P value and statistical significance:

The two-tailed P value is less than 0.0001

By conventional criteria, this difference is considered to be extremely statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals -0.78

95% confidence interval of this difference: From -0.86 to -0.70

Intermediate values used in calculations:

t = 19.1772

df = 131

standard error of difference = 0.041

Review your data:

Group	Group One	Group Two
Mean	0.17	0.95
SD	0.37	0.22
SEM	0.03	0.02
N	132	132

Small difference:
Group 1 : Majority difference, better option (large difference = 0.3) is different, Conforming =1, discerning =0
Group 2: Majority and better option same (large difference = 0.3) , Conforming=1, discerning =0

Paired t-test

P value and statistical significance:

The two-tailed P value is less than 0.0001

By conventional criteria, this difference is considered to be extremely statistically significant.

Confidence interval:

The mean of Group One minus Group Two equals -0.39

95% confidence interval of this difference: From -0.49 to -0.30

Intermediate values used in calculations:

t = 8.2408

df = 131

standard error of difference = 0.048

Review your data:

Group	Group One	Group Two
Mean	0.52	0.92
SD	0.50	0.28
SEM	0.04	0.02
N	132	132

For small difference in payoff we observed, ($t(14) = 19.1772$, $p < 0.0001$, $d = 0.041$, 95% CI [-0.86,-0.70]) and for large differences in payoff we observed, ($t(14) = 8.24$, $p < 0.0001$, $d = 0.048$, 95% CI [-0.49,-0.30]).
The F-value observed while performing ANOVA is 121.75 which tells us about its high precision. These observed t values indicate that people are likely to conform even in the loss domain.

Hence, even in the loss domain we find that people are ready to suffer more loss if they have a choice of conforming but at very high losses they tend to conform lesser which is the difference obtained from the gain domain

The ANOVA results demonstrate that when people played to avoid losing, the F-value was higher (121.76), indicating that what the majority of people believed had a significant influence. On the other hand, when playing for gains, the F-value was lower (70.65), which means that people were less affected by the majority and more willing to take risks or trust their own instincts. People are more likely to follow social norms or give in to peer pressure when the outcome could be bad, but they are more likely to trust their own judgment or take risks when the result could be good.

Overall, these results show that people may be more likely to go with their gut or take risks when the outcome could be good (e.g., gains), but more likely to follow social norms or give in to peer pressure when the outcome could be bad (e.g., losses).

CONCLUSION:

The results of the replication experiment were similar to those in the research paper, which proved that we had designed our experiment correctly using PsychoPy. The computational model for the social model also proved that we had done our experiment correctly, as the values were matching the results.
For the case of loss domain, we observed a similar trend, but in this case, fewer people went towards choosing an option with a higher expected loss in the case of a high difference between the expected values of the two slots as compared to the original experiment. This was observed for both conformity and dissent cases.
In extension 2 (expert gamblers), we observed a very similar trend to that of the replication experiment in all the cases, as is observed from the graph above. We observe that the effect of experts was similar to that of the majority of previous ostensibly players.
Using ANOVA, the P value was found to be significantly low, which tells us that people are willing to conform even if there is a loss.

We also observe that the proportion of choice for conformity or high expertise remains constant with time and is considerably high. We believe that the standard deviation of reaction time is very high because of fewer participants, and that can be improved with more participants.