Introduction

Hierarchical social structure is prevalent in human societies. One possible explanation for the emergence of hierarchy is that it allows for efficiency when it comes to decision-making. Perret et al. (2020) showed with their simulation models that the existence of a leader can significantly precipitate the process of consensus building. However, leaders can bias the group's decision in their favors leading to a suboptimal decision. Moreover, the aggregation of information from multiple individuals can be generally beneficial. Wisdom of crowds or Jury theorem is a well-known phenomenon where the aggregation of diverse individual decisions leads to better decision because individual errors can counterbalance each other. One study that illustrates this phenomenon is by LeVeck and Narang (2017). In their study, they recruited participants on Amazon Mechanical Turk and sampled participants from political elites to participate in a variant of the ultimatum game that imitates a situation of war bargaining because one wants to avoid a scenario of negotiation breakdown that leads to both parties suffering losses. Their study modified a traditional ultimatum game by including multiple individuals to mimic a democratic decision-making process. However, the study only asked individual participants to submit their vote independently without any interactions with other participants. In real-life scenarios, the collective decision-making process often involves face-to-face interactions and a process of deliberation, which could invoke other social dynamics that affect the information aggregation process. Hence, we plan to conduct an additional experiment that can fill this gap and further investigate the effects of having a leader on collective decision-making.

Method

We'll recruit student participants to engage in a variant of the ultimatum game. The ultimatum game is played by two parties, a proposer and a responder, who bargain over a fixed total amount of monetary units, m . The proposer makes an offer, p , that can range from 0 to 100 indicating the portion of the total amount of monetary units that they intend to keep. The responder makes an independent demand, r , that also ranges from 0 to 100 representing the minimum portion of money they will accept. If $m - p < r$, then neither party will receive any payoff. Otherwise, the proposer will receive the amount they proposed, and the responder will receive the rest.

The experimental procedure will proceed in the following manner: each subject is randomly assigned to either be a proposer or a responder. Independently, each proposer will submit an offer and each responder will submit a demand. We will then randomly assign proposers and responders separately into groups of nine. For each group, we also randomly assign one participant to be a leader who will make a final decision on the offer or the demand. Then we will let each group discuss their offer and demand. After deliberation, we will ask the leader of each group to make a final decision.

Results

To compare the offer and demand aggregated in two different manners, independent aggregation and leader-mediated aggregation, we will calculate a rounded average value of offers or demands made independently by participants prior deliberations. We will then compare these average values with the final values determined by the leader of each group by performing a t-test. In general, if the aggregation happens algorithmically independent of social dynamics during the deliberations, we expect the final value determined by the leader to be very close to the mean values of offers

and demands prior deliberations. We also expect leaders to bias the final decision in a way that it's closer to their own belief of an optimal offer or demand. Thus, we will calculate the differences between the mean values and the leader's own offer or demand prior deliberations as well as the differences between the offer or demand values after deliberations and the leader's own offer and demand prior deliberations. And we will then perform another t-test on these two values of differences. We expect that the differences between the leader's own value and the final value to be smaller compared to the differences between the mean value and the final value. Finally, we'll randomly pair each group of proposers to a group of responders and calculate the success rate of the bargaining, $m - p \geq r$. We expect the mean values of independent offers and demands to have higher success rates than the final values determined by the leaders.

Conclusion

The result of the first analysis that compares the mean value of offers and demands prior deliberations to the final value determined by the leader of each group could illustrate how other social forces taking place during deliberations or real-life interactions can shape the information aggregation process. This has implications for future research to pay attention to ecological validity when conducting study on collective decision-making. Moreover, the result of the other two analyses can show us that even though the aggregation of information from multiple sources are generally beneficial, the existence of individuals who have more influence on the final decision can bias the final decision and deteriorate the quality of decision.

References

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