

Are Accurate Responses Instinctive?

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Question

ANS or Approximate Number System is a cognitive system supporting the estimation of the magnitude of a group without relying on language. This system helps infants, animals etc. in detecting differences in magnitude in groups of objects.

The three main targets of research in this experiment were the various responses that we as participants would provide as the agents with regards to accuracy, reaction time and the amount we would bet on their accurate answer. The study almost involved playing the role of the agent to give a response to compute the various parameters.

To mimic "chance" for the coin trial in the experiment, the results would show discrepancies in accuracy with respect to the other agents. The lack in accuracy is a purposeful effort and is hence referred to here as "intentional inaccuracy". This can be measured by deriving inferences from the results of coin agent compared to that of the adult trial with respect to just accuracy of responses.

Do "intentional" inaccurate decisions take more effort and time rather than those that are accurate? If so, would that mean accurate responses are instinctive? (Here, "instinctive" loosely refers to decisions that do not take more time and effort)

Logic

- Accuracy for coin agent remained the same as adult agent "intentional" inaccurate decisions were not made to replicate chance.
- Accuracy for coin agent is lower than adult agent
 - "Intentional" inaccurate decisions were made to replicate chance
 - Reaction time for coin agent is same as reaction time for adult
 - "Intentional" inaccurate decisions do not take more effort and time
 - Reaction time for coin agent is higher than reaction time for adult
 - "intentional" inaccurate decisions take more time and effort
 - Accurate decisions are instinctive
 - Reaction time for coin agent is lower than reaction time for adult
 - "Intentional" inaccurate decisions take lesser time and effort

Methods

- N=23 students
- Students were given a number task to perform online for course credit.
- The task involved comparing the number of berries in each bowl and reporting which bowl had more berries using an assigned letter on the keyboard as fast as possible.
- The task also provided 6 different agents that the students had to use to depict how those agents would choose between the two amounts of berries.
- The agents were; an adult, a baby, a chick, a coin, a fish and a monkey.
- The ratios of berries between the two bowls varied from 1:1 to 1:3.
- The students were also required to bet a certain number of points ranging from 1-10 on the decision taken after each trial. If they were correct, they keep the points, if not, they lose the points.
- Firstly, a trial round was conducted involving the participant to choose between two different bowls and report the one that had larger number of berries and make a bet on their decision.
- The experiment then began with the participant choosing between two different bowls with berries and betting on their choice.
- The participant was then provided the same scenario but must take decisions as if they were taken by the different agents mentioned above and bet on their choices.

Results

As observed in the following graph between accuracy and agent, the results show that there is a significant difference between coin and adult agents. The accuracy of coin is significantly lower than adult trials.

Consequently, there is a significant difference between the values of reaction time between coin and adult for the graph plotting Reaction Time vs Agent. The reaction time for coin is much higher than than of adults.

Inferences

Accuracy for coin flip is much lower than adult which shows that there was an "intentional" inaccuracy. The reaction time for coin trial was much longer than adult trial and that shows that making an informed inaccurate decision takes longer time and more effort than making an accurate decision.

Limitations

- Small sample size

Future Research

- What can these findings say about heuristics, biases and decision-making?

