

Introduction to Neuroeconomics

Framing zero: Why losing nothing is better than gaining nothing by Marcus Wardley and Max Alberhasky
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Abstract—The framing of zero has a significant impact on judgement and decision-making, which is usually neglected or unacknowledged by many researchers. Although previous study has indicated that zero has a special value, no prior research has particularly explored the framing of zero or "nothing". Continuing the study from the reference paper, 'Across two studies, we investigate the basic processes and show how the framing of zero influences judgement and decision-making when presented with a non English statement but rather with a mathematical statement.

Index Terms—Risk, Loss, Reward, Zero

I. INTRODUCTION

In order to write a research paper on economics, you will need to first select a topic of interest. Once you have selected a topic, you will need to research the topic thoroughly. After researching the topic, you will need to develop a thesis statement and outline for your paper. Finally, you will need to write your research paper and include citations to support your claims.

Following this path we will continue the present studies test and support an explanation of these findings based on the concept of reference points and the affect heuristic. The framing of zero in these decision problems acts as a point of comparison, or reference point, affecting how evaluators feel about the bet. An explanation of these results based on the idea of reference points and the impact heuristic is tested and supported by the current investigations given in the paper. The way in which zero is framed in these decision-making situations serves as a benchmark or reference point, influencing how assessors see the wager. These findings demonstrate the value of framing zero in judgement and decision-making and give light on the mechanisms that underlie this impact.

The present research seeks to fill this gap by examining the framing of zero across three conditions by replicate problem 3 and problem 4 from Tversky and Kahneman (1986) and vary the framing of zero and the framing of the question in a mathematical way. In both the question three and four we find that changing the framing of zero substantially affects the results of these studies.

Second, we show in a simple probability statement that the results obtained from changing the framing of zero can further depend upon the wording of the problem statement, the chosen language and also the mathematical statements as well.

Third, we will discuss the future scope of the research and the problem statement and how, the limitations of this study

are mitigated by the extant research which suggests these factors have little effect on similar decision problems.

II. HYPOTHESIS

Behaviour economics is a new, broad and ever-changing field that covers many different topics. There is a lot to learn about this complex subject. However, by understanding the basics of economics, one can gain a better understanding of how the world works and make more informed decisions in their everyday lives. In our study, we anticipate that, in regard to the finding by Tversky and Kahneman (1986), when zero is framed as a "+" nothing rather than a gain nothing, and is framed as "-" nothing rather than loss nothing, it will have less effect then when it is presented as a linguistic statement. In particular, we argue that, if the amounts used in the bet were simply replaced with mathematical operators such as $+9$ and $-.05$ how would this affect outcomes? and does the lose nothing, win nothing situation will depend upon the amounts and probabilities?

In both Tversky and Kahneman (1986) and Bateman et al., (2007), we contend that the framing of zero is partially responsible for the observed results. We predict that in the context of these decision problems gain nothing has a negative effect ("−") whereas lose nothing has a positive effect("+"). Thus, in problem 3 from Tversky and Kahneman (1986) if the framing of zero is changed to lose nothing a greater proportion of participants will select the risk-seeking option whereas in problem 4 if the framing of zero is changed to gain nothing a greater proportion of participants will select the risk-averse option.

III. EXTENSION OF TVERSKY AND KAHNEMAN (1986)

In study 1A, we replicate problem 3 and 4 from Tversky and Kahneman (1986) and vary the framing of zero. In the original study, the variation of the initial amount has negligible effect on the outcome of the study, we will also ignore the variance of the initial amount. In our study, problem 3 has an expected value of + Rs.5000 and problem 4 has an expected value of - Rs.5000. Instead of using english statement like the original study we will use probability and mathematical operators in the question. We predict that by changing the problem 3 statement to a mathematical one a greater number of participants will select the risk-aversion option (in comparison to the original) and by changing the problem 4 statement we

Table 1
Stimulus Wording and Number Participants Selecting Each Option

Stimulus Wording	Percentage of Participants
Condition 1: Tversky and Kahneman (1986) (N = 128)	
Problem 3: Original	
A. A sure gain of \$100	83%
B. A 50% chance to gain \$200 and a 50% chance to gain nothing	17%
Problem 4: Original	
A. A sure loss of \$100	29%
B. A 50% chance to lose nothing and a 50% chance to lose \$200	71%
Condition 2: Modified Framing of Zero (N = 135)	
Problem 3: Modified	
A. A sure gain of \$100	66%
B. A 50% chance to gain \$200 and a 50% chance to lose nothing	44%
Problem 4: Modified	
A. A sure loss of \$100	50%
B. A 50% chance to gain nothing and a 50% chance to lose \$200	50%

Fig. 1.

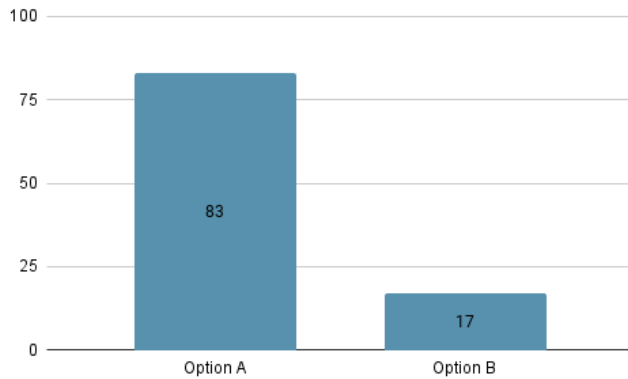


Fig. 2. Condition 1 result for problem 3

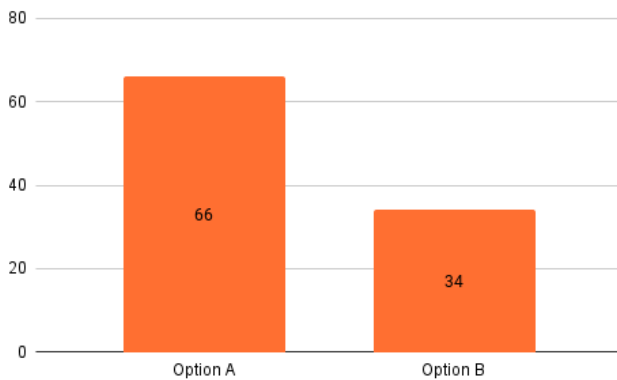


Fig. 3. Condition 2 result for problem 3

predict that a greater number of participants will select the risk seeking option (in comparison to the original).

A. Design and Procedure

The study will employ a three condition between-subjects design. Participants will be randomly assigned to conditions

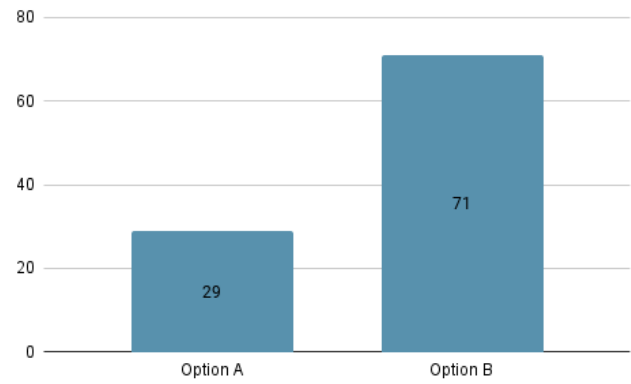


Fig. 4. Condition 1 result for problem 4

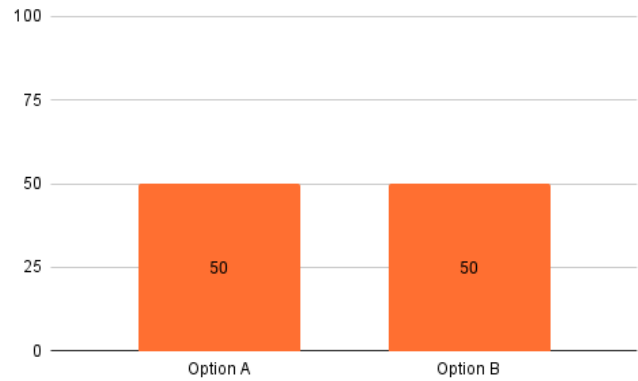


Fig. 5. Condition 2 result for problem 4

and in each condition, participants will face two sets of dichotomous choices presented in random order. In condition 1 the original stimulus from Tversky and Kahneman (1986) problems 3(Hospital Problem) and 4(Monty-Hall Problem) will be utilized. In condition 2, participants will see the version of the problem used in the reference research paper, with question statements in English. In condition 3, a modified version of the stimulus will be utilized by using mathematical operations in the questions instead of English statements. See Table 1 for stimulus wording. Participants will be given the following instructions: “Imagine that you face the following pair of concurrent decisions. First examine both decisions, then indicate the options you prefer.” followed by the conditions.

B. Modified Question Statements

The participants were first asked to answer some distract questions(simple maths problems), this was done for two main reasons. This would help us filter out participants which are not filling the form seriously and are just picking random values.

Our chosen question statements are very similar to the design of Study 1A Problem 3 & 4, but we have changed the framing of the questions and modified the conditions, and the new conditions are given below.

Imagine that you face the following pair of concurrent decisions. First examine both decisions, then indicate the options you prefer.

You have initially Rs.5000 and are now presented with two options :

Condition 1:

A. 100% probability +Rs.1000

B. 50% probability +Rs.2000 or -Rs.0

Condition 2:

A. 100% probability of -Rs.1000

B. 50% probability of +Rs.2000 or +Rs.0

C. Results

Excluding the result with average response time less then 2 seconds (with a variance of 0.57 seconds) from our study to remove any ambiguity in the results. Because the data pool was rather limited, we used unsophisticated statistical analysis to determine whether participants chose a risk-seeking or risk-averse alternative. The study demonstrate a number of key points. First, a slightly more proportion of the population select the risk averse option in problem 3 and and select a risk seeking option in problem 4. These results are in-line with the original problem statements by Tversky and Kahneman (1986). The figure shows that 61% of the participant choose the risk averse option in problem 3 compared to only 29% in the modified statement of the original study. This outcome is still lower than the actual research result, however this may be justified because the data sample size was inadequate and small, with many factors different from a controlled experimental setup. See figure 6 & 7 for the percentage of participants selecting each option. The results indicate that in both the problems 3 & 4, participants selected a the options similar to the original conditions and slightly opposite from the modified conditions of the reference paper, this supporting our claim and predictions.

D. Discussion

The findings of study 1A extend and replicate those of Tversky and Kahneman and show the significance of how zero is framed in the context of a situation involving risky choices. As the majority of participants choose the risk-averse option in problem 3 and the risk-seeking option in problem 4, we duplicate Tversky and Kahneman's first findings in condition 1. problem Issue 3 shows risk aversion in the area of gains and risk-seeking in the realm of losses because problem 3 has an expected value of +Rs. 1000 and problem 4 has an expected value of -Rs.1000. In contrast to the original, significantly more participants chose the risk-seeking option in problem 3 after changing the way zero was framed, and similarly, significantly more participants chose the risk-averse option in problem 4.

IV. STUDY 1B: GAIN FRAME REPLICATION WITH REAL MONEY

We were unable to conduct the tests due to technical and financial restrictions, as studies 2 and 3 required actual money.

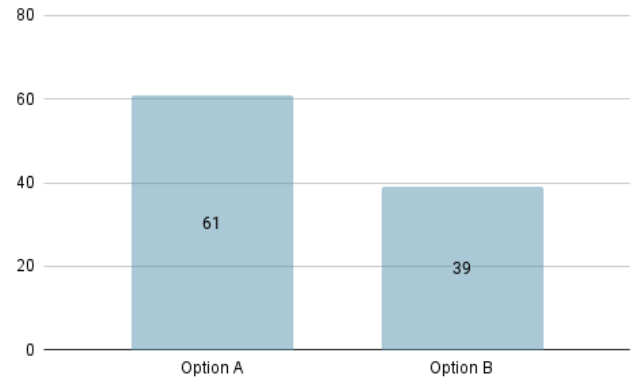


Fig. 6. Condition 3 in problem 3

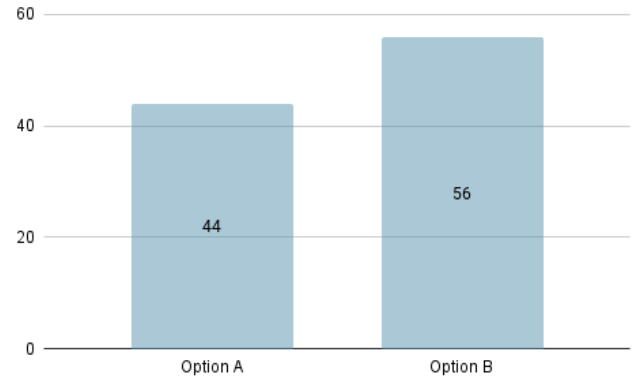


Fig. 7. Condition 3 in problem 4

However, in our investigation, we attempted to replicate the level of bet attractiveness. However, due to a shortage of responses, we chose not to continue the study because the results were not statistically significant from the simple responses. But we predict on a big scale and lab experimental setup, the results of our study will counter the results from the reference paper and provide an insight that the attractiveness of the bet, depends upon the overall gain/loss the gamble presents and the context behind the situation.

V. DEMOGRAPHICS

Twenty two participants (80.3% male, average age 21) from International Institute of Information Technology Hyderabad participated to the study voluntarily, 60.7% OBH Hostel, 30.1% Girls Hostel. The participants were assigned one of the three condition randomly through a random number generator. Across all study only those students who filled the consent form and were of age 20 and above were allowed for the experiment. Lastly, after the experiment, participants provided basic demographic information (age, gender and hostel name)

VI. LIMITATIONS

The sample space is not skew, age group is majorly affecting the study and thus would have results majorly for this age

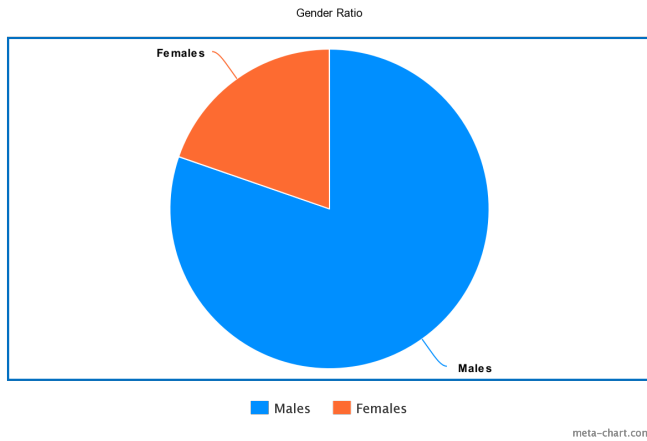


Fig. 8. Gender Distribution of our dataset

group. Gender ratio is not equal too as it has a majority of participants male representing the demographic of the college too. The number of questions also were reduced because no monetary compensation could be made thus reducing number of pivot points. The value of Rupees 1000 might not be equally suitable for all as no normalization for income was made during the experiment. Part 3 of the questionnaire did not have loss domain into account because of the length of the same. Questions would bring out the experimenter expectancy effect when trying to adjust to the Indian scenario. People would not take very risky choices pertaining to crossing the rail track and hanging on rails because of the unknowing psychological thought procedure

VII. ACKNOWLEDGMENT

This report has been based upon the paper titled "Framing zero: Why losing nothing is better than gaining nothing". We would like to thank Prof. Kavita Vemuri, Cognitive Sciences Lab, IIIT- Hyderabad for her constant feedback and support through-out the project. Her inputs and suggestions helped us shape our final study.

VIII. REFERENCES

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