

The framing effect

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ABSTRACT

Tversky and Kahneman's research (1981) on the cognitive bias of the framing effect was able to prove that the way the wording of a situation is framed will have an influence on the decision making strategies of the person to whom the situation has been presented. The study's aim was to investigate the difference between preference given to a treatment for a particular disease by participants to whom the effectiveness of the treatment has been framed positively as compared to the participants to whom effectiveness of the treatment has been framed negatively.

Undergraduate students were used to test the following two experimental hypotheses: In the positive condition, option A will be preferred by participants over option B. In the negative condition, option D will be preferred over option C. The null hypothesis for both conditions was that the difference between the number of people that chose either option will not be significant.

The results showed that 72% of the participants belonging to the positive condition chose Option A. 22% of the participants belonging to the negative condition chose Option C. Technically, options A and C were the same but the participants were influenced by the difference in the words 'save' and 'die'. The experimental hypothesis was thus accepted and the null hypothesis was rejected.

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INTRODUCTION

Cognitive biases are deviations from normative models of cognition. People take mental shortcuts (heuristics) when they have less time to give the problem a thorough outlook. Normative models describe the accepted method of thinking and decision making. They define the way that people should think, rather than the way they actually think. These models assume that the individual is in an ideal state of mind, that they have rationally weighed all their options. Such models lack ecological validity. They are not applicable in real life situations because a person can certainly be irrational. On the other hand, descriptive models of cognition attempt to describe what actually goes on in someone's mind.

The framing effect¹

The framing effect is a heuristic of making a choice under risk. It claims that the decisions we make rely on how our choices are framed through words, settings and/or situations. The theory of the framing effect was developed from Tversky and Kahneman's prospect theory. It claims that losses and gains are perceived in a different manner. People tend to make their decisions based on potential gains rather than potential losses.² For example, when presented with the option of earning either \$100 or tossing a coin and earning \$200 or nothing, they will choose the former option.³

Aim and Prediction

The *aim* of this study was to investigate how people's answers to a problem change depending on whether the problem is framed positively or negatively. It is relevant because it allows us to determine how people can get manipulated and persuaded. For example, this enables politicians to frame their messages to the public in an enticing way or for a salesperson to sell their product using persuasive language.

Variables

The *independent variable* was how the question was framed (positively or negatively) and the *dependent variable* was the participants' answers. The theoretical prediction was that the participants' answers will differ when the situation given to them is framed using different wording/language.

¹ Framing effect - Biases & Heuristics. (2021, January 22). Retrieved from <https://thedecisionlab.com/biases/framing-effect/>

² Chen, J. (2020, August 28). Prospect Theory. Retrieved from <https://www.investopedia.com/terms/p/prospecttheory.asp>

³ Murad, N. (2018, April 11). Prospect Theory: How Users Make Decisions. Retrieved from <https://www.invespcro.com/blog/prospect-theory/>

Hypotheses

The *operationalized research hypothesis* was that there would be a statistically significant difference between the percentages estimated by the participants, i.e., the answers given by participants belonging to the positive condition and the participants belonging to the negative condition.

The *null hypothesis* was that there would not be a statistically significant difference between the percentages estimated by participants in both conditions.

Tversky and Kahneman's original study⁴

307 undergraduate students chosen were used to test the following two experimental hypotheses: In the positive condition, option A will be chosen by a higher number of participants than option B. In the negative condition, option D will be chosen by a higher number of participants than option C. The null hypothesis for both conditions was that the difference between the number of people that chose either option will not be significant.

The students were assigned to either condition, and were asked to find a solution to the following problem:

A country is preparing to deal with the outbreak of a foreign disease that has been predicted to kill 600 people by assembling two alternative treatment plans. The treatments were presented to the participants in the positive condition as follows:

Treatment A: 200 people will live.

Treatment B: There is $\frac{1}{3}$ probability that everyone will live and $\frac{2}{3}$ probability that no one will live.

The treatments were presented to participants in the negative condition as follows:

Treatment C: 400 people will die.

Treatment D: There is $\frac{1}{3}$ probability that nobody will die, and $\frac{2}{3}$ probability that everybody will die.

In the positive condition, 72% of the participants chose treatment A and 28% chose treatment B. In the negative condition, treatment C was chosen by 22% of the participants option D was chosen by 78%. Logically, treatments A and C were the same but the participants were influenced by the difference in the words 'save' and 'die'. The experimental hypothesis was thus accepted and the null hypothesis was rejected.

Modification made by us

When we replicated this experiment, the modification we made was naming the disease in the question as coronavirus, as while we conducted this study, this particular disease had affected the lives of all the participants. Additionally, we removed option B and option D. The link between our investigation and the framing effect was as follows;

⁴ Tversky, A., & Kahneman, D. (1981). Retrieved from https://www.uzh.ch/cmsssl/suz/dam/jcr:fffff-fad3-547b-ffff-ffffe54d58af/10.18_kahneman_tversky_81.pdf

We gave the participants a situation wherein they were asked to estimate what percentage of the affected they believed the treatment would save based on the number of people that were saved (positive condition) and the number of people that died (negative condition) in a clinical trial.⁵

The reason I was intrigued by the framing effect was because it seemed rather simple, but it was able to easily manipulate participants as proved by the original study. It helps illustrate the subjectivity of human cognition. We also covered IB learner profiles during our conduction of this experiment. We learned to become good reflectors when we criticize our own work and better communicators as we collaborated with our peers to allocate responsibilities.

EXPLORATION

Design

The design used in this experiment was *independent measures*. In this design, a different group of participants is used in each condition (positive and negative). Participants were randomly allocated into either group, as their allocation to either condition was not based on a specific criteria. We chose this design to prevent the triggering of demand characteristics, i.e., so that the participants do not guess the true aim of the study.

Sampling

The sampling method used in this experiment was *stratified sampling*, wherein we identified certain characteristics that we wanted the participants to have, then randomly picked participants with said characteristics. We used stratified sampling to eliminate confounding variables such as difficulty in comprehending the problem and participants with dissimilar intellect. The sample was gathered through the circulation of the Informed Consent Form in our class's social groups. Those that were interested were asked to personally contact us.

Choice of participants

The participants were IBDP students (ages 16-17) because their intelligence matched with each other more than it would with students from younger grades. Additionally, we ensured that the participants were fluent in English so that they could understand the problem presented to them without a language barrier.

Controlled variables

The controlled variables of this experiment were the age group of the participants, the number of participants in each condition (ten participants) and the options that were given to participants from which they had to predict the percentage of the population that they thought the treatment would save in both conditions (40%, 50%, 60% and

⁵ The problem presented to participants in each condition can be found in the Informed Consent Forms in the Appendices.

70%). The number of male and female participants were also equal (10). Debriefing and briefing instructions were standardized and read in the same manner for each participant.

Choice of Materials

Material required for the procedure was the technology required to make a phone call and email the Informed Consent Form to participants for the experiment, and a pen and paper to record their answers. We were unable to carry out our investigation in person due to the pandemic.

Procedure

Firstly, we called each participant using our personal cell phones, greeted them and recited the briefing instructions. Once they understood, we asked the participants for their email address and sent the consent form to them, pertaining to the condition they were sorted in (positive or negative). We provided them with as much time as they needed to give their answer. Once they were ready with their answer, we recorded their response in a paper. We then recited our debriefing instructions, wished them and ended the phone conversation.

Ethical considerations

The ethical considerations that applied to this experiment were debriefing and anonymity. The participant was provided with all the information about the experiment after it was conducted, and their names were kept confidential.

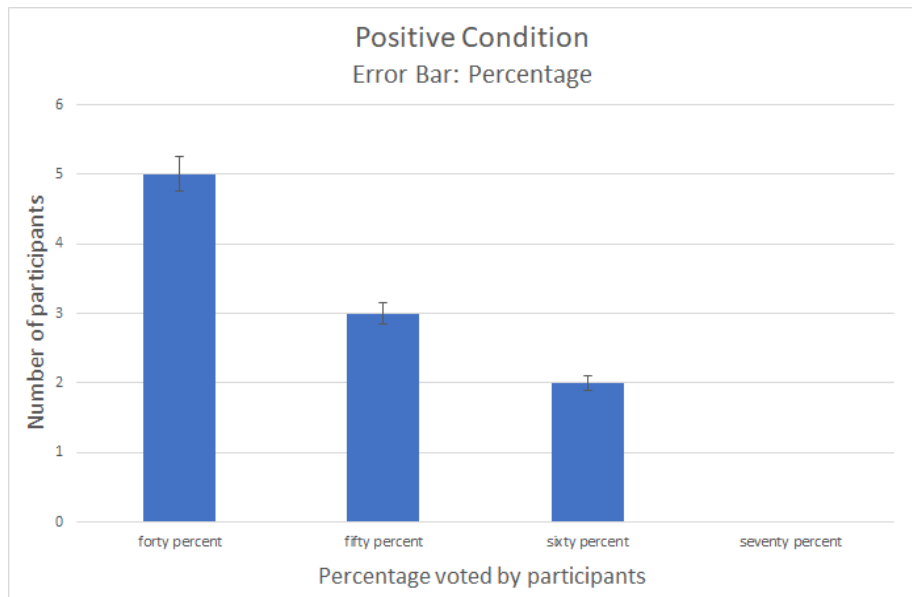
ANALYSIS

Descriptive Statistics

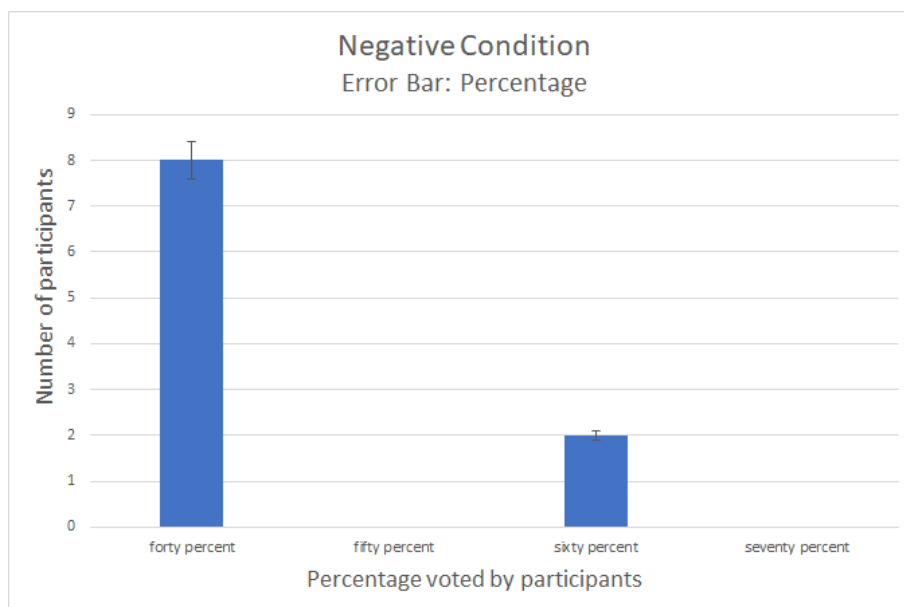
Table 1: Measures of central tendency calculated for results acquired in terms of the percentages chosen by the participants

	Positive condition	Negative condition
Mean	47	44
Median	45	40
Mode	40	40
Standard Deviation	7.8	8

Graph 1: Bar chart depicting number of participants in the positive condition that selected each answer



Graph 2: Bar chart depicting number of participants in the negative condition that selected each answer



It can be observed from the data above that no participant in either group chose the option of 70%, and that no participant in the negative condition chose 50%. However, we can see that overall participants in the positive condition were more confident about the success of the trial than participants in the negative condition were, since a lower

number of participants chose the least optimistic answer in the positive condition; 40%. Even though it was obvious that the trial was unable to save the lives of 400 people, it was not stated, therefore the participants might have focused on the information that was right in front of them, which was that the trial was able to save 200 lives.

Inferential Statistics

The level of measurement of our dependent variable, or the type of dependent variable were ordinal level variables. Therefore, a Mann-Whitney U test⁶ was conducted. Despite the results of the descriptive statistics leaning towards the conclusion that the difference between the percentages estimated by the participants was significant between the two groups, the results of the inferential statistics showed otherwise. The table critical value⁷ for a one-tailed U test at $p = 0.05$ for $n_1 = 10$ and $n_2 = 10$ was 27, and the lowest of the two U values obtained was 38.

Since $38 > 27$, we rejected the research hypothesis and accepted the null hypothesis.

EVALUATION

The *aim* of this study was to investigate how people's answers to a problem change depending on whether the problem is framed positively or negatively, and the hypothesis was that there would be a statistically significant difference between the percentages estimated by the participants, i.e., the answers given by participants belonging to the positive condition and the participants belonging to the negative condition.

However, the test we used showed that there was not a statistically significant difference between the participants' opinions in both conditions. This implies that our results do not support the theory of the framing effect nor the findings of the original study. However, this might have occurred due to the fact that our sample size of 20 was relatively small. The original study used 307 participants.

Design

The experimental design used in this study was independent measures. A *strength* of using independent measures was that each participant performed to their full ability, as they were not tired by participating in multiple conditions. A *limitation* of this design was participant variability. We as researchers could not control the difference between the way of thinking of participants in both groups. A *modification* that could've been made

⁶ The test was manually conducted, therefore the table containing the calculations can be found in Appendices.

⁷ Appendix 1: Statistical Tables. (2008, April 21). Retrieved from <https://onlinelibrary.wiley.com/doi/pdf/10.1002/9780470776124.app1>

was to ask each potential participant to take the Myers-Briggs Type Indicator (MBTI)⁸ personality test. We could have selected all participants from the same personality type to mitigate the effect of this confounding variable and improve the study's internal validity. However, it is impossible for two people's way of thinking to be exactly the same. Therefore, some subjectivity would have remained.

Sampling Method

The sampling method used was stratified sampling. A *strength* of using this method was that it was cost effective. The participants did not demand money for their contribution as they were our friends. A *limitation* of this method was the lack of generalizability. We cannot generalise the findings of the study to adults as it was only carried out on teenagers. Adults are more experienced, thus it might be harder for them to get manipulated. A *modification* that could've been made was using an equal number of adults and teenagers in each condition which would have improved the study's population validity and removed the over-representation of teenagers in the experiment as it could have led to sampling bias.

Procedure

The procedure of the study was clear-cut, and it was conducted over a phone call. A *strength* of using a phone call was the convenience that it provided. We were able to individually contact each participant, eliminating the need to gather participants, which would have been time consuming. A *limitation* was that we were unknown to the environment that the participant inhabited during the experiment, i.e., whether it was noisy or quiet. A disturbing environment could have resulted in the participant's lack of concentration. A *modification* we could have made was carrying out the procedure over video call instead of a phone call, which would have enabled us to ensure that the room they are sitting in was free from distractions.

CONCLUSION

We concluded that the framing effect has limited influence on decision making since our inferential statistics showed a statistically insignificant result. This may have been due to the fact that participants could have caught on with the logic of the experiment and given a diplomatic answer. This can be proved by the fact that 7/20 participants in both conditions gave answers within a range of 50-60 percent.

Some areas of further research could include exploring the effect of conformity on the decision making strategies of participants. Another suggestion could be replicating the experiment by adding a personal element to the situation. Perhaps those affected by the disease could be loved ones? Participants may not be as willing to take a risk.

⁸ MBTI® personality types. (n.d.). Retrieved from <https://eu.themyersbriggs.com/en/tools/MBTI/MBTI-personality-Types>

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APPENDICES

Informed Consent Form

The following passage will give you enough information that will allow you to decide whether you wish to participate in this experiment. If you do decide to participate, bear in mind that you will be allowed to withdraw from the experiment any time you'd like should you feel uncomfortable in any way. You will be allowed to do so without any additional penalty.

In this study, we will ask you to answer the question at the bottom of this page. All information that you give will remain confidential and your name will not be associated with the study when it is published. Your participation in this study will require approximately 5 minutes. At the end of the study, you are free to request for the results of the experiment from the researcher and ask any questions regarding the experiment that you might have. If you have any further questions concerning this study, you may contact us via email.

Please indicate with your signature on the space below that you understand your rights and agree to participate in the experiment.

Signature of Participant

A hospital in Switzerland has concocted a treatment for the coronavirus. Out of the 600 covid patients that had participated in the clinical trial, 200 patients tested covid negative after treatment. Based on the information you have, what percentage of the world's coronavirus affected population do you think the treatment will be able to cure?

1. 40%
2. 50%
3. 60%
4. 70%

Informed Consent Form

The following passage will give you enough information that will allow you to decide whether you wish to participate in this experiment. If you do decide to participate, bear in mind that you will be allowed to withdraw from the experiment any time you'd like should you feel uncomfortable in any way. You will be allowed to do so without any additional penalty.

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Please indicate with your signature on the space below that you understand your rights and agree to participate in the experiment.

Signature of Participant

A hospital in Switzerland has concocted a treatment for the coronavirus. Out of the 600 covid patients that had participated in the clinical trial, 400 patients tested covid positive after treatment. Based on the information you have, what percentage of the world's coronavirus affected population do you think the treatment will be able to cure?

1. 40%
2. 50%
3. 60%
4. 70%

Raw Data Table:

Participant	Positive	Participant	Negative
1	40%	1	40%
2	40%	2	40%
3	40%	3	40%
4	40%	4	40%
5	40%	5	40%
6	50%	6	40%
7	50%	7	40%
8	50%	8	40%
9	60%	9	60%
10	60%	10	60%

Inferential Statistics (Mann-Whitney U Test):

Mann-Whitney U Test Calculator

The value of U is 38.

You'll notice below that we have calculated a critical value for U based on alpha level and whether your hypothesis is one or two tailed. We have also calculated a value for Z and its associated p -value. Results in blue reach significance. Results in red do not.

Sample 1	Sample 2
0.4	0.4
0.4	0.4
0.4	0.4
0.4	0.4
0.4	0.4
0.5	0.4
0.5	0.4
0.5	0.4
0.6	0.6
0.6	0.6

The U -value is 38. The critical value of U at $p < .05$ is 27. Therefore, the result is *not* significant at $p < .05$.

The z -score is 0.86932. The p -value is .19215. The result is *not* significant at $p < .05$.

IA Proposal:

Original Study: The Framing Effect [Kahneman and Tversky - (1981)]

Aim: The aim is to investigate how the decisions made by the people are influenced when the situation given to them is framed differently. Our main focus was to discover how a slight change in the words of a question can lead to change in the decision for a particular situation.

Variables:-

Independent Variable: Framing of the questions.

Dependent Variable: Participants' answers received by the researcher(s).

Controlled Variable: The age of the participants (ranging between 16-20 years) and the number of participants (The research is conducted on 20 individuals).

Hypothesis: The participants with the positive condition situation choose a higher percentage value than the negative condition.

Sample: Convenience Sampling

Procedure:

1. Phone each participant.
2. Recite briefing instructions.
3. E-mail the participant the consent form with the question.
4. Wait for participants to answer the question.
5. Once they've answered, recite debriefing instructions and end the call.

Material:

- A working mobile phone/laptop
- Pen & paper to record the results (used by the researcher(s))

Briefing and Debriefing rules:

Briefing:

Good evening! Thank you for volunteering to participate in our experiment. I will be mailing you a document that will contain the informed consent form for our experiment. The form will also have a question at the end of it, for which you will not require any information beforehand. All you have to do is verbally give me your answer. You may take as much time as you require to answer.

Debriefing:

For participants in the negative condition:

The question you just answered was designed to test a psychological phenomenon called the framing effect. In your condition, we mentioned the number of people that would die if they were given the treatment, that means your question was framed negatively. In the other condition, we will be stating the number of people that would live when given the treatment, which means their question was framed positively. That is all we can tell you for now without giving too much away. If you would like further information on the study in regards to the results, feel free to contact us. Thank you!

For participants in the positive condition:

The question you just answered was designed to test a psychological phenomenon called the framing effect. In your condition, we mentioned the number of people that would live if they were given the treatment, that means your question was framed positively. In the other condition, we will be stating the number of people that would die when given the treatment, which means their question was framed negatively. That is all we can tell you for now without giving too much away. If you would like further information on the study in regards to the results, feel free to contact us. Thank you!