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## Effects of Personality Traits on the Truncation of Decision-Making Tasks

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EFFECTS OF PERSONALITY TRAITS  
ON THE TRUNCATION OF  
DECISION-MAKING  
TASKS

by

HOA HUYNH

Presented to the Faculty of the Honors College of  
The University of Texas at Arlington in Partial Fulfillment  
of the Requirements  
for the Degree of

HONORS BACHELOR OF SCIENCE IN PSYCHOLOGY

THE UNIVERSITY OF TEXAS AT ARLINGTON

May 2022

## ACKNOWLEDGMENTS

I cannot express enough gratitude for Dr. Daniel Levine and Dr. Amandeep Singh Dhaliwal. It is crazy how after enrolling in an ordinary Research and Design Statistics class, I would ultimately end up in Dr. Daniel Levine's Cognition Lab and performing my Senior Project along with your research.

I could not have completed or followed through with this huge project without the help of either of you. From Dr. Daniel Levine's foundation and guidance of the project to Dr. Amandeep Dhaliwal's facilitation through the process, none would have been possible to complete.

Once more, I would like to extend thanks and gratitude to these wonderful Professors who not only helped me finish a large project but taught me many useful skills along the way.

February 16, 2022

## ABSTRACT

### EFFECTS OF PERSONALITY TRAITS ON THE TRUNCATION OF DECISION-MAKING TASKS

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The University of Texas at Arlington, 2022

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The Asian Disease Problem or ADP is a hypothetical situation with a framing bias or effect created by Tversky and Kahneman. By utilizing the ADP, we want to observe whether certain personality traits like numeracy (NUM), need for cognition (NC), and need for cognitive closure (NCC) affect participant base decision making. This decision may be based on information that is presented to them or information that has been “mentally filled in” by implications. We used an online survey to gather our data through Amazon MTurk. The survey consisted of demographic questions, personality scales, and the decision tasks that were divided into six conditions with one condition for each participant. We found significant results confirming the framing effects of Tversky and Kahneman, however, only within the gain frame. There were also significant results confirming the truncation effect

of Reyna and Brainerd, but only within the gain frame. There were also significant results for participants who scored high in NUM and made risky decisions in the positive frame. Contrary to our hypothesis, NUM and NC did not interact with the truncation effects. We believe some of the results may be due to the onset of the Coronavirus pandemic, whereas the original ADP was purely a hypothetical situation.

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## CHAPTER 1

### INTRODUCTION

#### 1.1 Background

The concept of the framing effect has been well established for more than 40 years by Daniel Kahneman and Amos Tversky. The power of the framing effect shows how phrasing a sentence could impact an individual's perception of the object or their own decisions. An excellent example of the framing effect is a study performed by Loftus and Palmer (1974) on car accidents. They experimented with how participants would recall information based on a car accident video shown to them a week prior using key words such as collided, bumped, contacted, hit, or smash. The two questions they asked were how fast a vehicle was going when they "said verb" with the other vehicle and if they saw any broken glass. Words such as collided or smash were associated with high speeds and broken glass, while bumped or contacted was associated with low speeds and no broken glass. Tversky and Kahneman describe decisions' framing in terms of gains or losses. Individuals would perceive losses on a larger value than gains even if they are of the same values. This would translate some of their original results as individuals becoming risk-seekers when faced with a negative or loss frame and becoming risk averse when faced with a positive or gain frame. Additionally, the framing effect can also be augmented or ineffective based on what is known as truncation. Truncation is the removal or shortening of information which will be further explained in this paper.

## 1.2 Purpose

The applications of the framing effect are many. That is why in this paper, we sought to identify any variables that may influence the decisions individuals make based on some key characteristics we believe may have over the framing effect. We identify these three scales we use as personality traits. Numeracy (NUM) is described as an individual's ability to manipulate and understand mathematical concepts (Schwartz, Woloshin, Black, & Welch, 1997). The need for cognition (NC) is a measurement of an individual's enjoyment of complex thinking (Cacioppo & Petty, 1982). The need for cognitive closure (NCC) is a measurement of an individual's dislike for ambiguity and close-mindedness. (Roets & Hiel, 2011).

### *1.2.1 Thesis*

We want to know if these certain personality traits affect the tendency of decision-makers to base their decisions on information presented to them additionally if they also mentally "fill in" information by implications. So, we hypothesize that individuals whose personality traits promote cognitive exploration (NUM & NC) will be able to mitigate truncation in the framing effect by mentally filling in that information that is not given to them. On the contrary, we also hypothesize individuals whose personality traits dislike ambiguity and confusion (NCC) would be more susceptible to truncation in the framing effect.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Framing Effect: Prospect Theory

In the prospect theory, individuals perceive gains and losses differently (Tversky & Kahneman, 1981). This means even if these gains and losses are equal in value, individuals will hold their worth differently from the other. This theory is relevant to this research because, the framing effect was found through prospect theory. Tversky & Kahneman (1981) created a hypothetical situation called the Asian Disease Problem (ADP). Participants of the study were asked to imagine a scenario where the U.S.A. is preparing for an outbreak of an Asian disease that is expected to kill 600 people. However, the participants are given a choice to choose between two alternative programs that may combat this disease: Program A versus Program B (labeled as the gain frame) or Program C versus Program D (labeled as the loss frame).

If Program A is adopted, 200 people will be saved.

If Program B is adopted, there is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved.

If Program C is adopted, 400 people will die.

If Program D is adopted, there is a one-third probability that no one will die and a two-thirds probability that 600 people will die.

They found that when participants are faced with a situation that is framed positively (gain frame), they tend to be more risk-averse. In this case, it was Program A, the certain option. Additionally, when participants are faced with a situation that is framed

negatively (loss frame), they tend to be more risk-seeking. This option was Program D, which is an uncertain option. This is known as the framing effect. In the gain frame, when framed positively, this gives the participant the tendency to choose an option that is the safest. When framed negatively, the loss frame gives the participant the tendency to gamble if they believe they were already faced with such losses. The framing or structure of these programs alters their decision-making entirely despite all the options having equal values.

## 2.2 Truncation: Fuzzy-Trace Theory

The fuzzy-trace theory, or FTT is defined as how individuals receive and retrieve information in mental representations (Broniatowski & Reyna, 2018). Mental representations can be divided into two levels: verbatim and gist. Verbatim representation can be described as precise information and numerical values that are encoded simultaneously as gist representations which are described as the core meaning pulled from the information presented (Broniatowski & Reyna, 2018). This describes how some decision-makers, such as experts, base their decisions. This is critical to this research because Reyna & Brainerd (1991) brings a whole new perspective on how decision-makers in the ADP base their decisions on. Going by the FTT in the ADP, participants not only encode the conditions verbatim but also in parallel to the gist representation as well which is viewed as:

Program A: Some people will be saved.

Program B: Some people will be saved, or no one will be saved.

Program C: Some people will die.

Program D: Nobody will die, or some people will die.

After breaking it down to its gist representations, they truncated Program B, and Program D into what they labeled as a nonzero complement (NZC) truncated and zero

complement (ZC) truncated for each of the programs. This means that they removed parts of the information given to observe any overall changes it had on the framing effect.

Table 2.1: Truncation Effects

Zero-complement truncated framing problems				
Gain Frame	200 people will be saved	some chance that some are saved	more chance that fewer are saved	200 are saved
	there is a 1/3 probability that 600 people will be saved	some chance that some are saved	less chance that more are saved	200 are saved
Loss Frame	400 people will die	some chance that some die	more chance that fewer die	400 die
	there is a 2/3 probability that 600 people will die	some chance that some die	less chance that more die	400 die
Nonzero-complement truncated framing problems				
Gain Frame	<b>200 people will be saved</b>	<b>some chance that some are saved</b>	<b>more chance that fewer are saved</b>	200 are saved
	there is a 2/3 probability that no people will be saved	some chance that none are saved	some chance that none are saved	200 are saved
Loss Frame	400 people will die	some chance that some die	more chance that fewer die	400 die
	<b>there is a 1/3 probability that nobody will die</b>	<b>some chance that none die</b>	<b>some chance that none die</b>	400 die

When the ZC is truncated from the ADP, the participant’s gist representation of the programs would be interpreted as some versus some. However, when the NZC is truncated from the ADP, the participant’s gist representation of the programs would become interpreted as some versus none. This is significant because their results showed that there is almost no framing effect when the ZC is truncated because of their gist representation of some versus some. While, when the NZC is truncated, there is an exaggerated framing effect because of their gist representation of some versus none. This means when removing the option of some probability of an “x” amount of people being saved or “x” amount of dying weighed against the option of some people dying or some people being saved, participants will even be more likely to select the “some” option in the gain frame or the “none” option in the loss frame.

## CHAPTER 3

### METHODOLOGY

#### 3.1 Survey

We recruited 486 participants from Amazon MTurk and completed an online study using the QuestionPro platform. In this survey, we had a demographic question section, an NC scale (Cacioppo & Petty 1982), an NCC scale (Roets & Van Hiel, 2011), and a NUM health-risk assessment questionnaire (Schwartz et al., 1997). The performance on the NUM scale assesses an individual's numeric ability to understand health-risk information. Participants were then randomly assigned to one of the six decision-making conditions, where they were to choose either Program A versus Program B, in the gain frame, or if under the loss frame, Program C versus Program D. The six decision-making conditions consist of the standard ADP questions, the zero-complement truncated, and the non-zero complement truncated both in the gain and loss frames making. After participants finished their decision-making question condition, they were then led to the next section of the survey, where they were debriefed on the experiment. When they finished reading the debrief, they were to put their Amazon MTurk ID in a box for payment.

Table 3.1: Decision-Task Conditions

	Gain Frame		Loss Frame	
	Program A	Program B	Program C	Program D
Standard Frame	200 people will be saved.	There is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved.	400 people will die.	There is a one-third probability that nobody will die and a two-thirds probability that 600 people will die.
Zero Complement Removed	200 people will be saved.	There is a one-third probability that 600 people will be saved.	400 people will die.	There is a two-thirds probability that 600 people will die.
Non-Zero Complement Removed	200 people will be saved.	There is a two-thirds probability that no people will be saved.	400 people will die.	There is a one-third probability that nobody will die.



## CHAPTER 4

### RESULTS

Results for the demographics begin with a 63.2% male sample with an average age of 36 years. Many of the participants had a bachelor's degree or higher (90.5%), and 63.6% earned between \$25,000 to \$75,000 per year.

Table 4.1: Personality-Traits Correlation

Measure	1	2	3
1. Need for Cognition	-		
2. Need for Cognitive Closure	-.252**	-	
3. Numeracy Performance	.120**	-.156**	-
**. Correlation is significant at the 0.01 level (2-tailed)			

Table 4.1 shows correlations for personality traits. NC and NUM are .120 positively correlated. NC and NCC are -.252 negatively correlated. NCC and NUM are -.156 negatively correlated. As the preference for certainty increases, there is a decline in numeric performance. As the preference for certainty increases, there is also a decline in the tendency to engage in thinking. People that enjoy the process of thinking tend to perform better on these numeric tasks.

Figure 4.1: Multiple Regression Model of Selected Personality-Traits

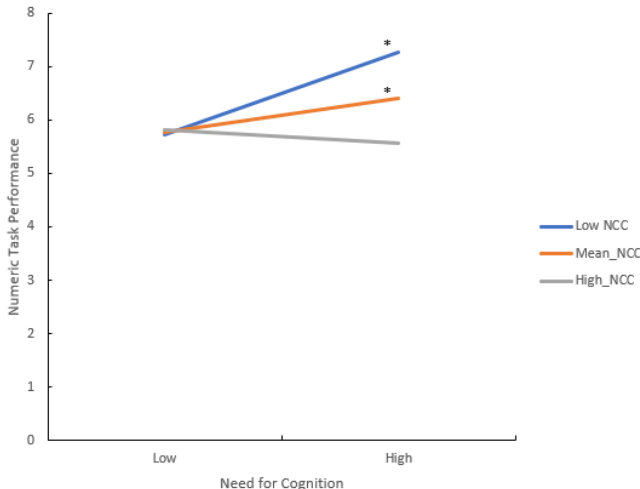


Figure 4.1 shows a multiple regression model tested to determine whether NC and NCC would predict numeric performance. Results indicated that together NC, NCC, and the interaction term accounted for 6.1% of the variance in the numeric task performance  $F(3, 482) = 10.41, p < .001$ . There was a significant main effect of NC,  $b = .64, SE = .31, t(482) = 2.08, p < .04$ , meaning as enjoyment from complex thinking increased, numeric performance also increased. There was also a significant main effect of NCC,  $b = -.56, SE = .21, t(482) = -2.63, p = .009$ , such that as the preference for certainty increased, the ability to perform numeric tasks decreased. Additionally, There was a significant interaction between NC and NCC,  $b = -1.22, SE = .31, t(482) = -3.91, p < .001, sr^2 = .03$ . Further analysis shows that NC was a significant predictor of numeric performance at low levels of NCC,  $b = 1.25, SE = .35, t(482) = 3.56, p < .001$ . The participants with an average NC who prefer a high degree of uncertainty (a low NCC score) tend to perform better on a numeric task. However, for the participants that prefer a high degree of certainty (those with a high NCC score), NC did not predict numeric performance.

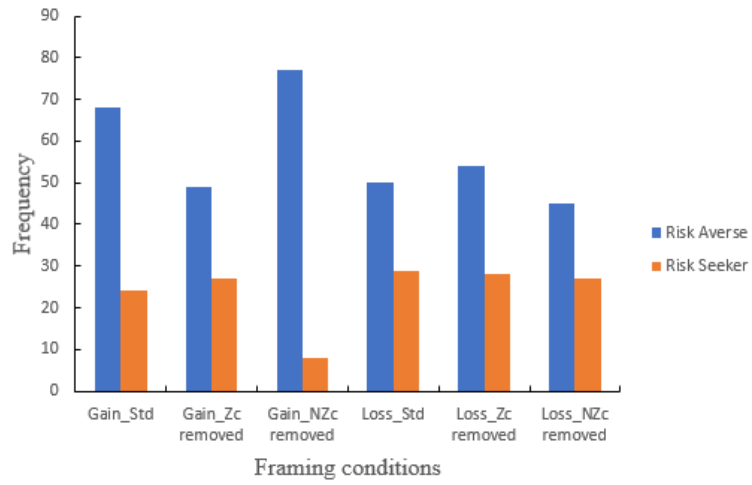
Additionally, a logistic regression was performed to examine whether framing and numeric ability predicted whether people made riskier decisions. There was a statistical significance for the predictors,  $\chi^2(3, N = 486) = 47.02, p < .00$ , showing the usefulness of the predictors. There was a main effect of framing such that gain framing led to risk-averse decisions; participants in the gain frame were .60 times more likely to select the risk-averse option,  $b = -.51, SE = .22, p = .02$ . NUM's main effect was that individuals with high numeric ability were 2.25 times more likely to select the risk-seeking option,  $b = .81, SE = .16, p < .001$ . However, there was no significance in the interaction effect between framing and NUM, suggesting that numericity may or may not defend against framing effects.

Next, we performed another logistic regression to observe whether truncated options and numeric ability were able to predict if the participants made riskier decisions. The predictors were statistically significant to use,  $\chi^2(5, N = 486) = 46.79, p < .001$ . Results indicated a main effect of truncation only with participants presented with the NZC removed option. They were .57 times more likely to select risk-averse option,  $b = -.57, SE = .27, p = .04$ . There was also a main effect of NUM such that individuals who scored high on numeric ability were 2.05 times more likely to select the riskier option,  $b = .72, SE = .19, p < .001$ . However, there were no interaction effects between the truncated options and NUM.

Another test was performed to find if there was an interaction effect between framing and truncated options, such that participants presented with the gain framed NZC removed option led to fewer riskier decisions. There was a significance in the interaction,  $b = -1.66, SE = .46, p < .001$ , these participants were also .19 times more likely to select

the risk-averse decision. No other condition, however, was significant in predicting risk preferences. There was also no interaction found between all six conditions and NUM.

Figure 4.2: Bar Graph Risk Preferences



## CHAPTER 5

### DISCUSSION

The relations we found between NC, NCC, and NUM follow intuitive expectations. People who enjoy the process of complex thinking will tend to have a better ability to understand and manipulate mathematical concepts than those who view thinking as effortful. Additionally, the tendency to quickly select certainty, disregarding any detailed implications, may interfere with the ability of cautious thoughts about the ambiguities of a situation. The tendency for the participants to select risk-averse options in the gain frames was originally discovered by Tversky and Kahneman (1981) and has been replicated many times in past experiments. However, the tendency for the participants to select risk-averse options appeared in the gain frame and the loss frame as well.

Contrary to replicated results, participants typically would be more risk-seeking in the loss frame (Tversky & Kahneman, 1981). A possibility to the results found in this experiment is that the hypothetical situation of an ADP was not relevant at the time of past replicated experiments. However, because of recent events, such as the Coronavirus, we believe it may have made an impact on participants' decision-making. How the current epidemic has taken an emotional toll on this generation may influence participants in the loss frame to continue avoiding gambles or risk-seeking behavior and continue to select risk-averse or safe choices. Our experiment has also replicated results from the findings of Reyna and Brainerd (2001) on the effects of truncation. The tendency toward greater risk aversion in the gain frame with the NZC being removed is consistent with past results.

The framing effect becomes exaggerated within truncation when the NZC is removed. Another one of our interesting findings is that we had an unexpected higher incidence of risk-seeking behavior among highly numerate individuals. A possibility of this event may simply be that highly numerate people have developed a greater tolerance for uncertainty in numerical representations.

### 5.1 Conclusion

Aside from replicating past experiments like Tversky and Kahneman's framing effect or Brainerd and Reyna's truncation, we understand that an individual's ability to understand and perceive health risks presented in this experiment in numeric terms requires a degree of complex thinking. Additionally, this study shows that people that tend to enjoy complex thought and have a greater tolerance for ambiguity tend to be best at evaluating health risks. We would like to explore more personality trait options like OCEAN for future direction. OCEAN is an acronym that measures five of the predominant personality traits in individuals: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. We believe traits like openness may be a variable that affects a participant primed in information, such as taking a health-risk assessment questionnaire before the conditions.

## REFERENCES

- Broniatowski, D. A., & Reyna, V. F. (2018). A formal model of fuzzy-trace theory: Variations on framing effects and the Allais paradox. *Decision (Washington, D.C.)*, 5(4), 205–252.
- Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology*, 42(1), 116–131.
- Loftus, E. F., & Palmer, J. C. (1974). Reconstruction of automobile destruction: An example of the interaction between language and memory. *Journal of verbal learning and verbal behavior*, 13(5), 585-589.
- Reyna, V. F., & Brainerd, C. J. (1991). Fuzzy-trace theory and framing effects in choice: Gist extraction, truncation, and conversion. *Journal of Behavioral Decision Making*, 4(4), 249-262.
- Roets, A. & Hiel, A.V. (2011). Item selection and validation of a brief, 15-item version of the Need for Closure Scale. *Personality and Individual Differences*, 50(1), 90-94.
- Schwartz, L. M., Woloshin, S., Black, W. C., & Welch, H. G. (1997). The role of numeracy in understanding the benefit of screening mammography. *Annals of internal medicine*, 127(11), 966–972.
- Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science (New York, N.Y.)*, 211(4481), 453–458.

## BIOGRAPHICAL INFORMATION

Psychology has always been a prime interest since high school. The project that started it all was researching V.S. Ramachandran's Phantom Limb Pain Syndrome. Reading the history, symptoms, care, and neural mechanisms sparked an interest. One can learn many things in college, such as amazing psychology topics like neurodegenerative disorders and their impairment of our cognitive abilities. These neural pathways erode like the nigrostriatal pathway concentration of dopamine lessens, or how protein amyloid plaques and neurofibrillary tangles build up could be evident in Alzheimer's. Being in the Honors College also enhanced this experience of learning. Many of the projects completed in the Honors College were research papers on certain topics that were more than not controversial. A favorable topic done recently may have been researching the validity of Chronic Traumatic Encephalopathy or CTE, a relatively new disease caused by sub-concussive or concussive blows to the head. It was controversial in the sense that symptoms were similar to other diseases like Alzheimer's, and methodology can only be gathered post-mortem.

Additionally, researching truncation over framing effects in different conditions was enjoyable. The experiment originates from Tversky and Kahneman's Asian Disease Problem framing effect. This has been building the background of an unforeseen portfolio. Hopefully, in the future, a Master's degree and, even better, a Ph.D. will be in the picture for research in the neurocognitive field as this has become a favorable passion that will always give a sense of learning new topics every time.