Numeracy and Decision Making

Joselyn Hathaway[1], Dr. Michael Serra[2]

Elizabeth City State University[1], Texas Tech University[2]

Research Questions

- What is numeracy?
- What role does numeracy play in society and every day life?
- Do certain manipulations affect a persons' numeracy?
- How is numeracy part of decision making?

Introduction

- Numeracy can be defined as the ability to process basic probability and numerical concepts
- Focuses on probability, chance, and decision making
- Important to understand mathematical concepts when making real world decisions

Methodology

- Based on four previous studies by Ellen Peters (et. al.) focused on a series of questions measuring a persons level of numeracy
- Questions were based on the Lipkus scale and the Berlin Scale
- Scales consisted of questions that were based on probability, chance, quantitative representation, judgment, and rating
- Decision-making tasks included attribute framing, risk representation, affective information, and affect and betting
- Study surveys were made on Qualtrics and made available to the participants through MTURK, an online surveying system

Research Participants

- 222 total participants (Zscore/excluded participants=12)
- 61.5% females
- 37.6% males
- Varied ages from 18 and older
- Minimum education- high school
- Maximum education- doctoral

Study 1

In this study, participants rated the performance of a students test grades. The rating scale ran from "very poor" to "very good". They were either given the percent correct or incorrect of the students test scores. The charts represent the mean value of the participants' judgment and their reaction times.
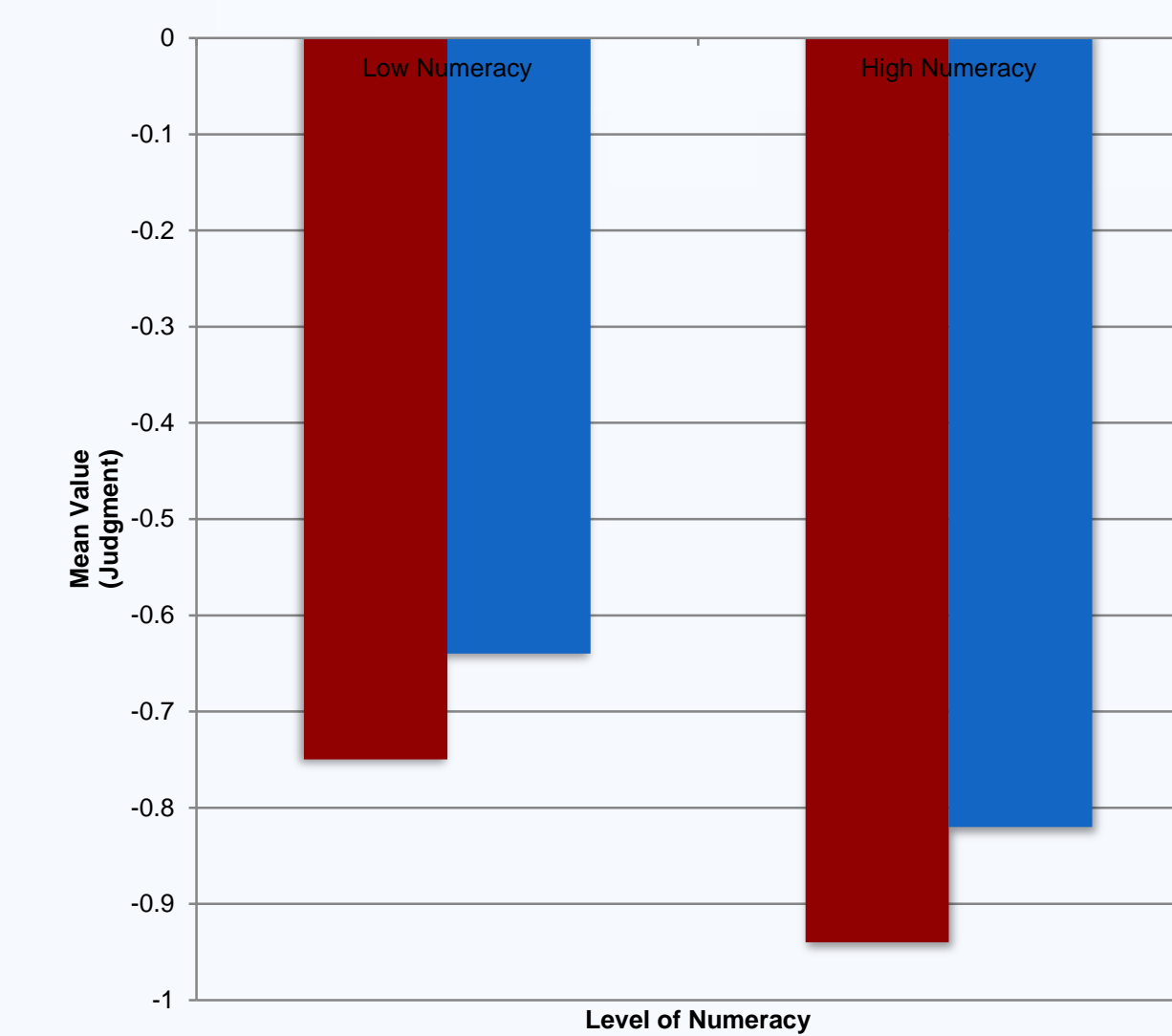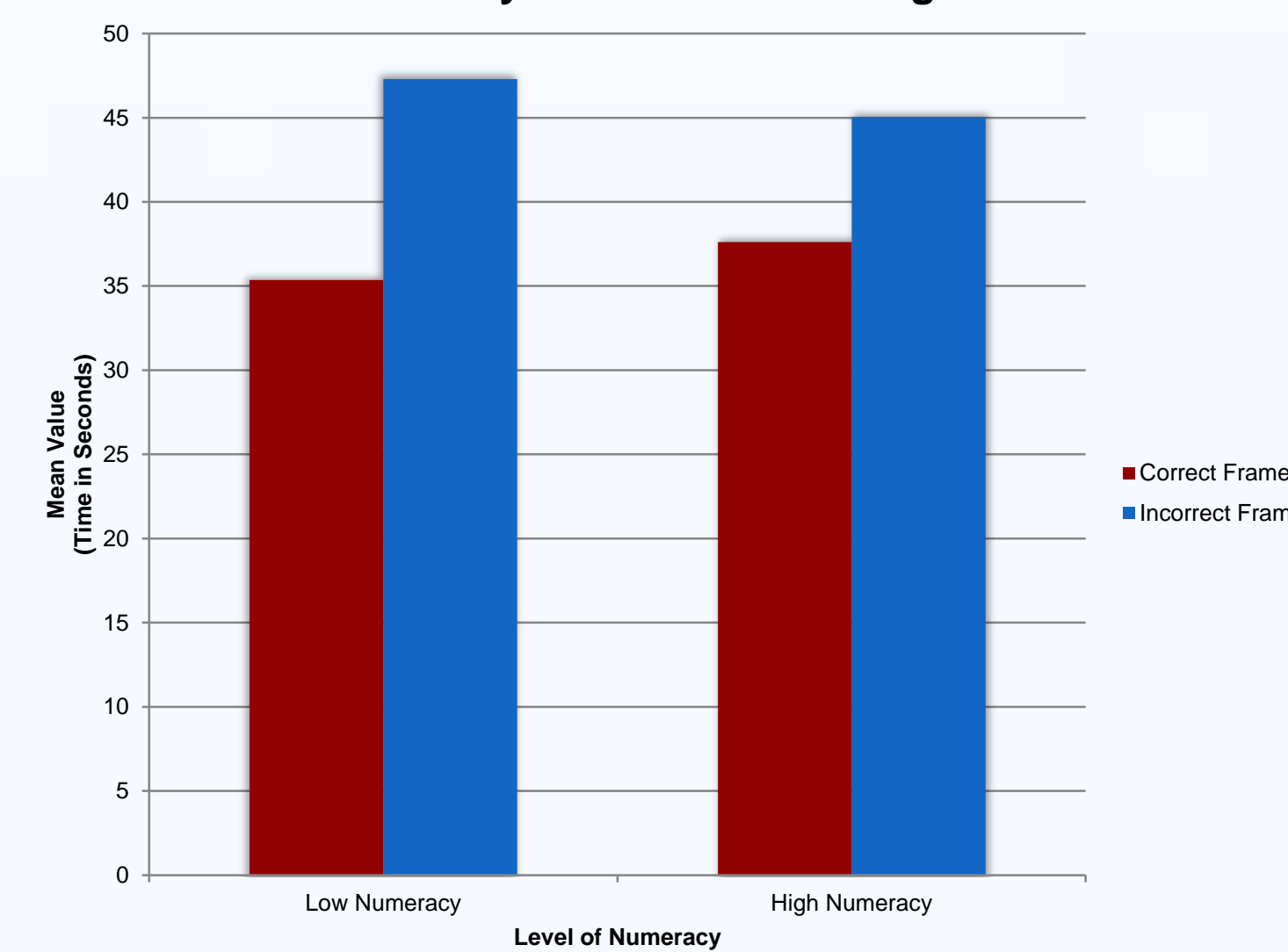
Result:
High numerate participants rated the students' grades significantly lower than did the low numerate people.
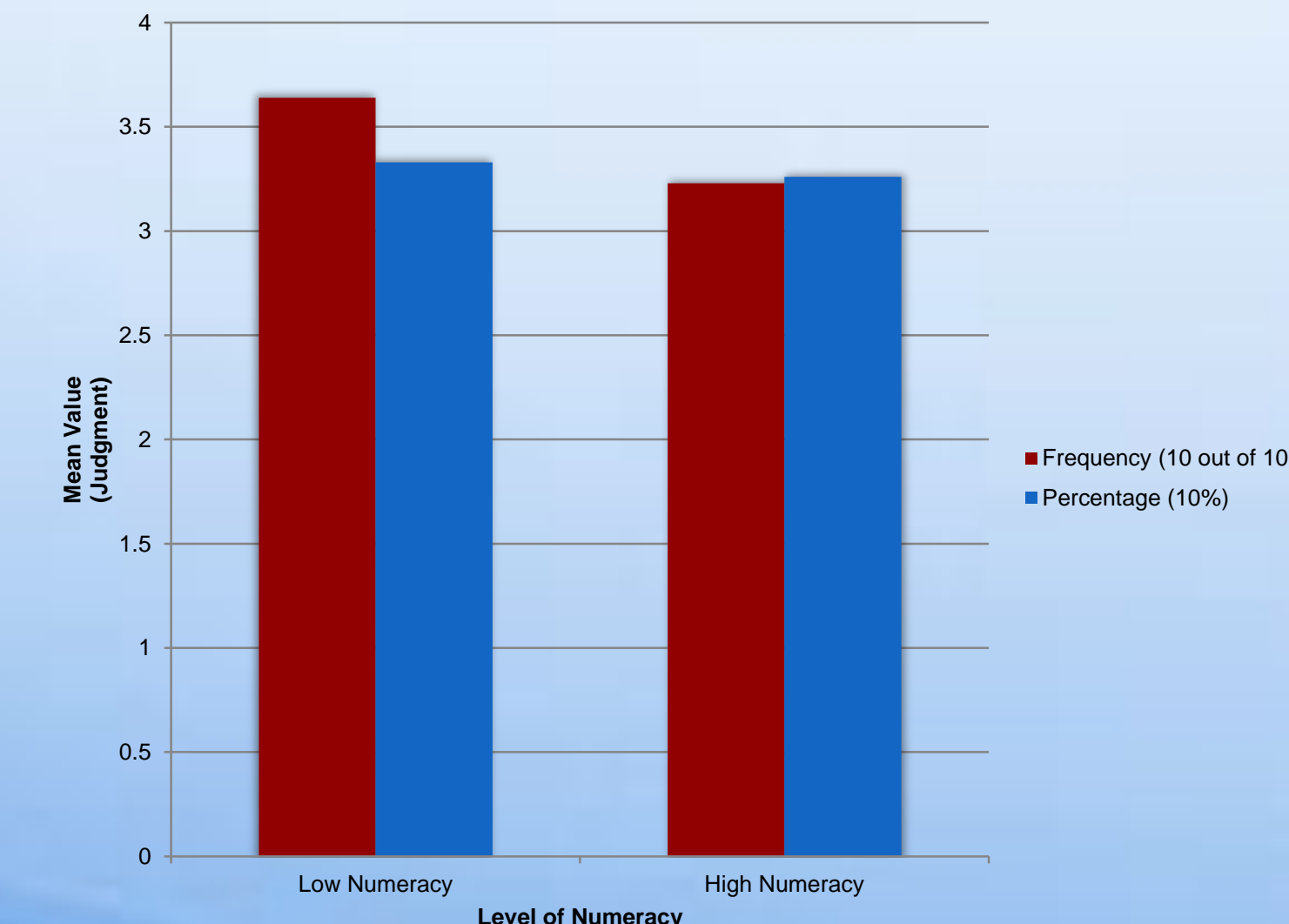
Study 2

In this study, participants were given a vignette of a mental health patient that was being discharged. After reading the vi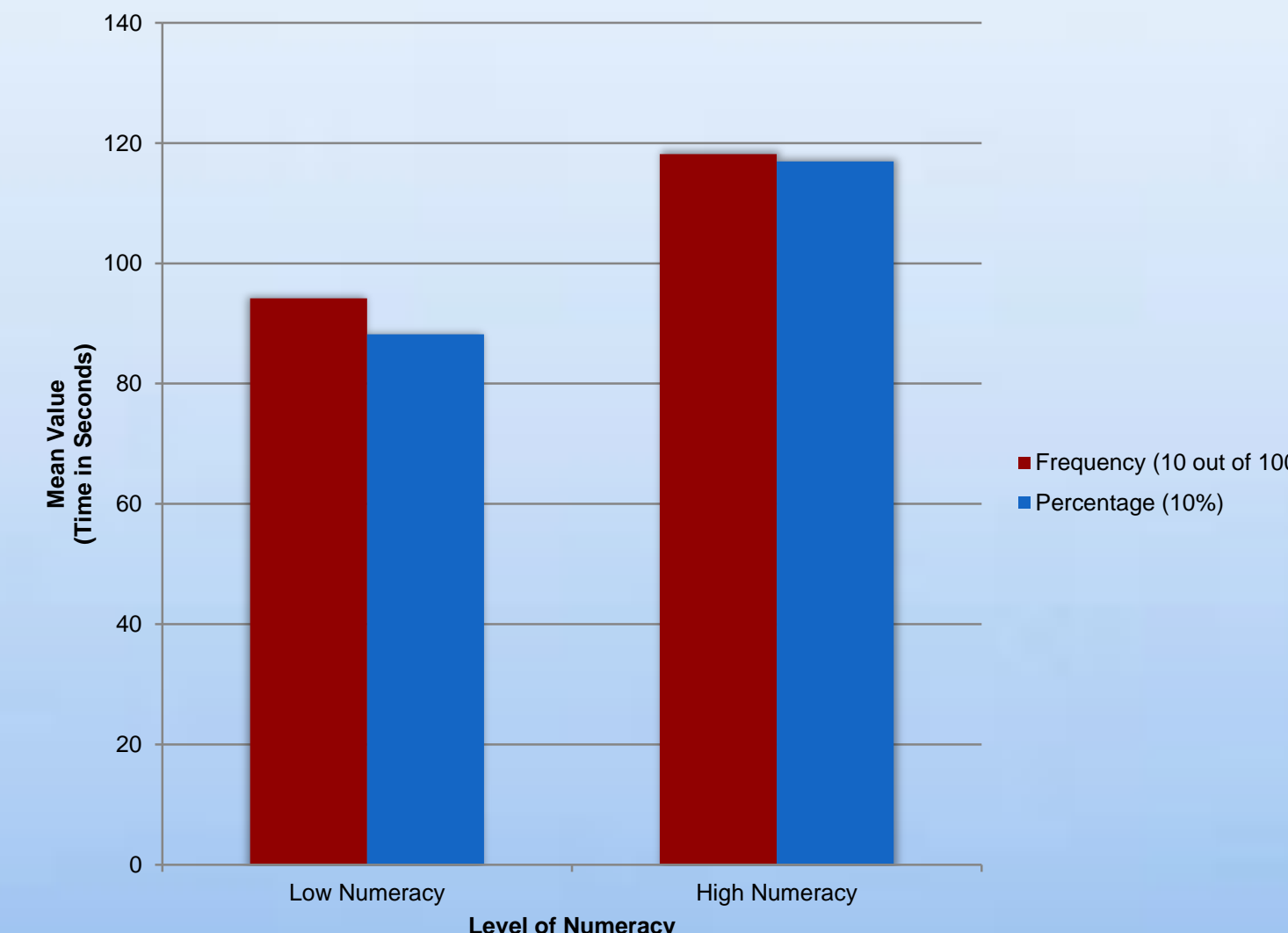gnette, the participants had to rate the level of risk of the patient committing an act of violence given a scale that ran from "very low risk" to "very high risk". The participants were either given the level of risk as a percent or a frequency. The charts represent the mean value of the participants' judgment and their reaction times.

Result:
High and low numerate participants perceived an equivalent risk of violence.

Study 3

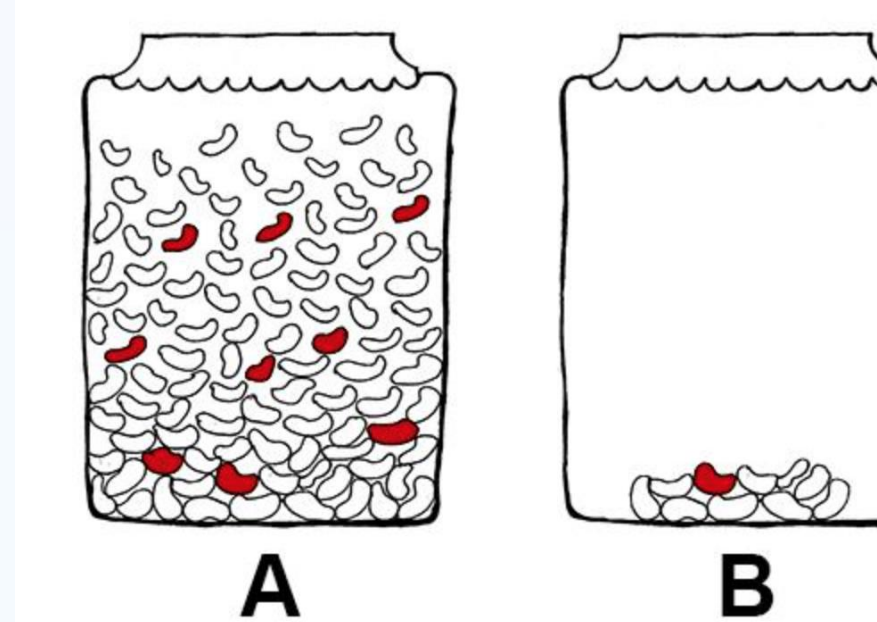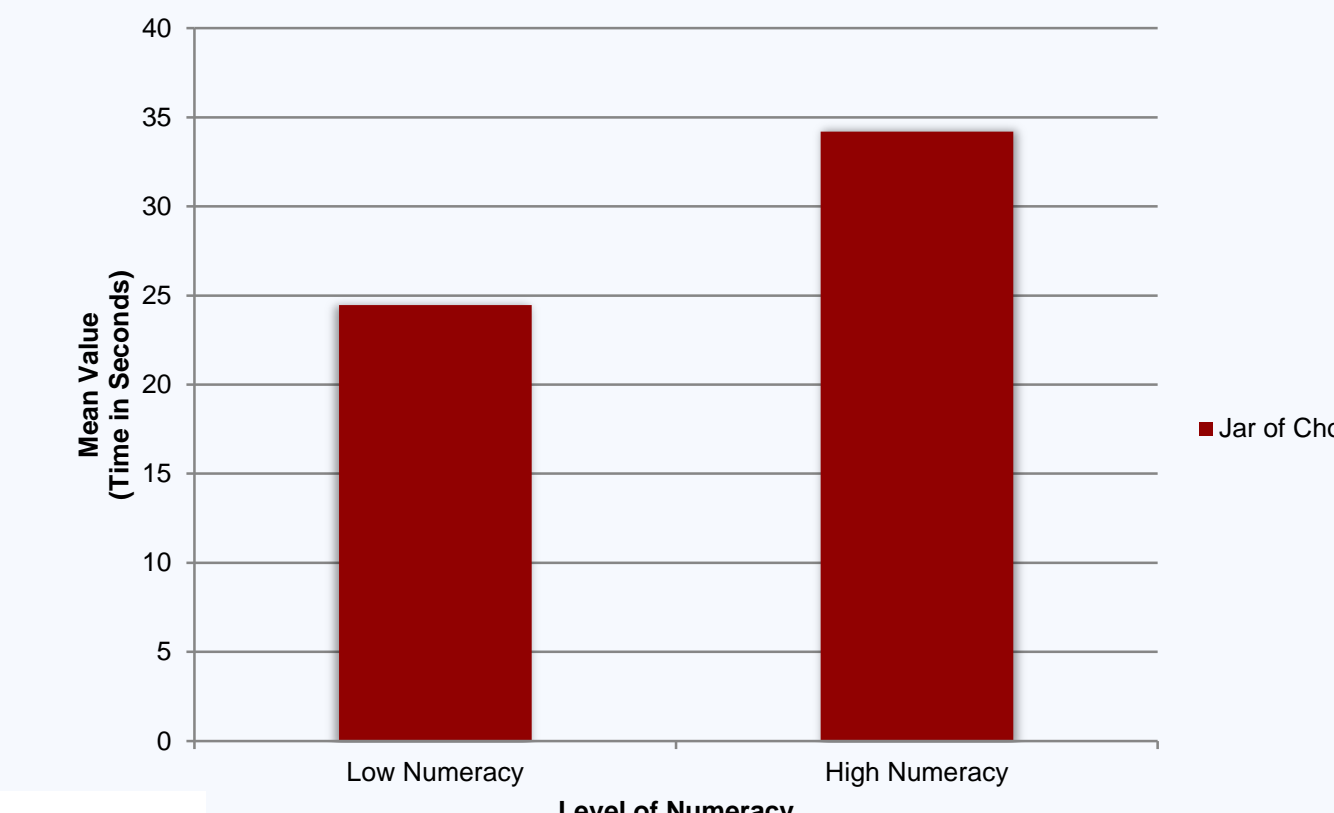In this study, participants were given two jars of jellybeans. Jar A had 9 red jellybeans out of 100 and jar B had 1 red jellybean out of 10. The participants had to choose which jar they believed had the higher chance of them picking a red jellybean. The charts represent the mean value of the participants' judgment and their reaction times.
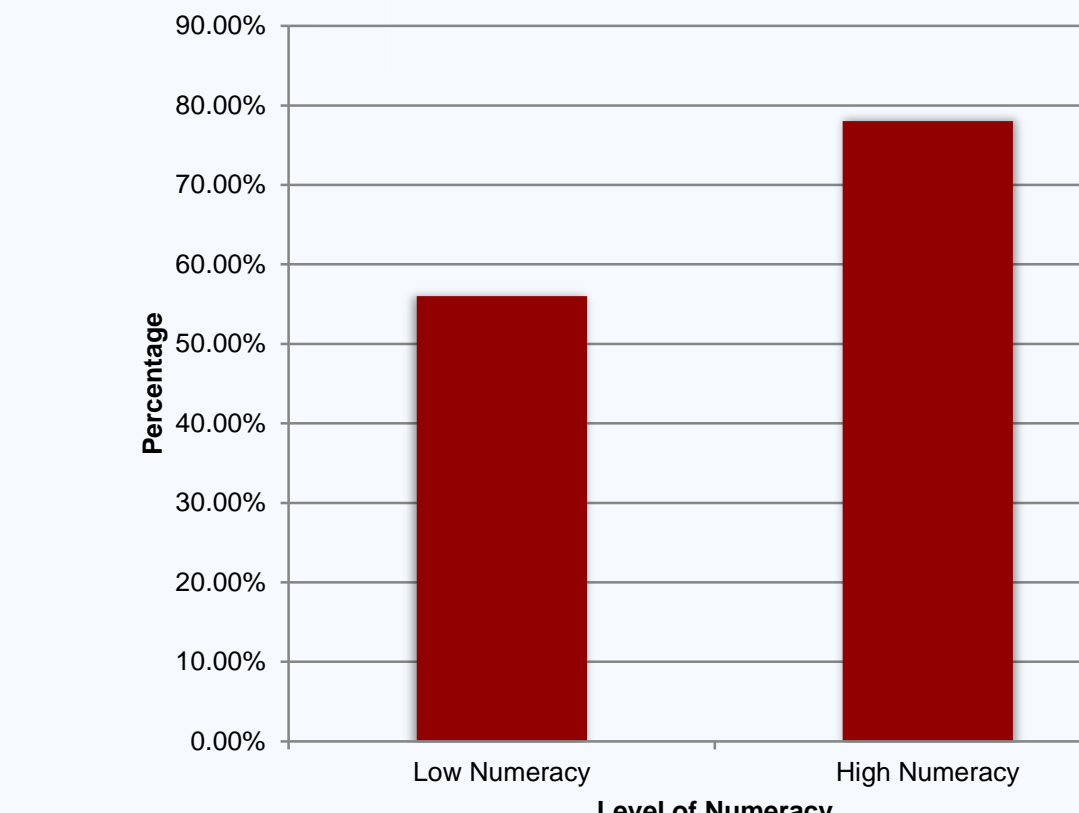
Result:
High numerate participants were more likely to choose the jar with fewer jelly beans (greater chance of winning) than were the low numerate participants.
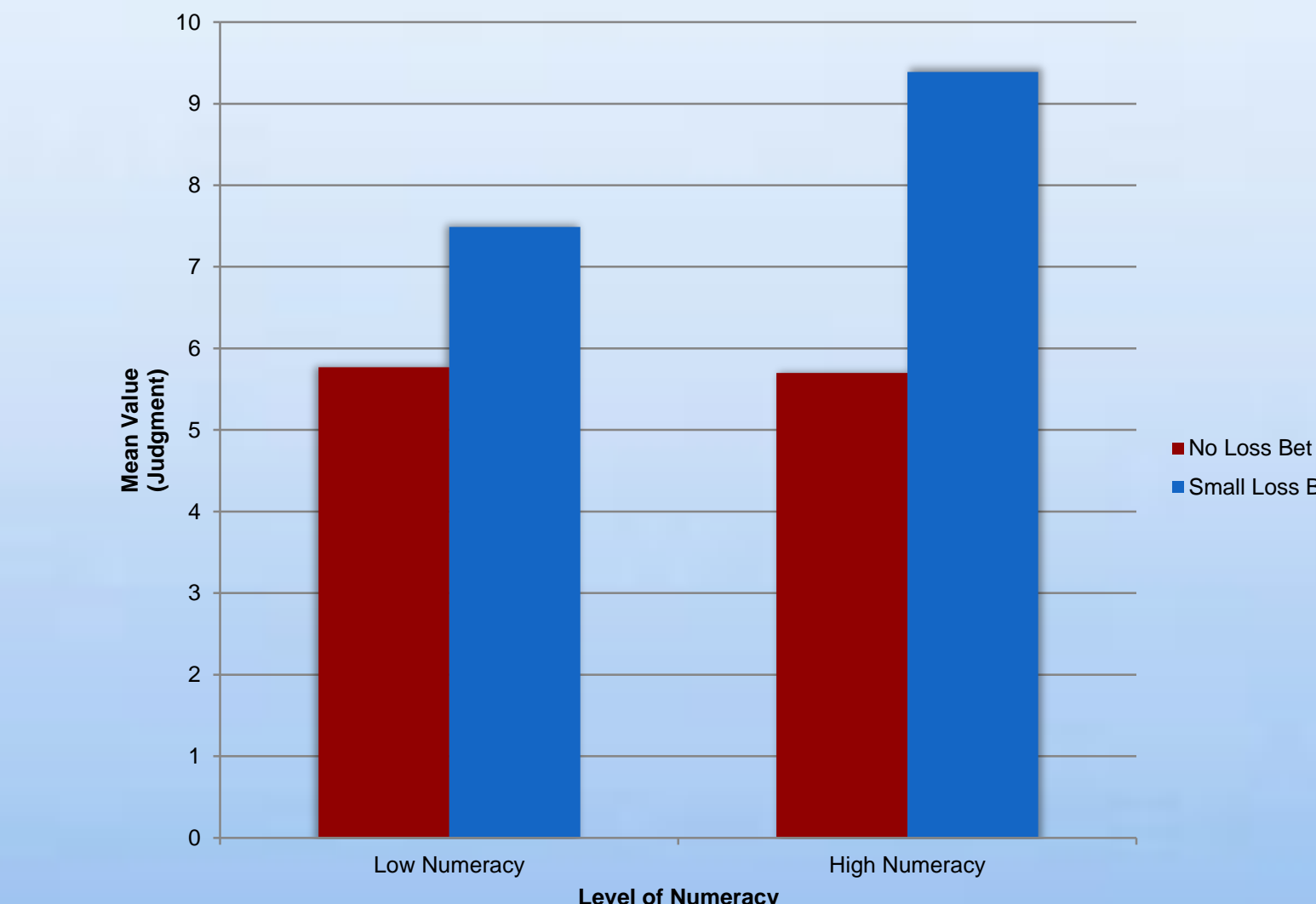
Study 4

In this study, participants were either given a no loss or small loss bet. The no loss bet presented to the participants was that they had a 7/36 chance to win $9 or 29/36 chance to win nothing. The small loss bet presented to the participants was that they had a 7/36 chance to win $9 or 29/36 chance to lose $0.05. Given one of the bets, the participants had to rate the attractiveness of the bet on a scale from "0- not attractive at all" to "20- extremely attractive". The charts represent the mean value of the participants' judgment and their reaction times.
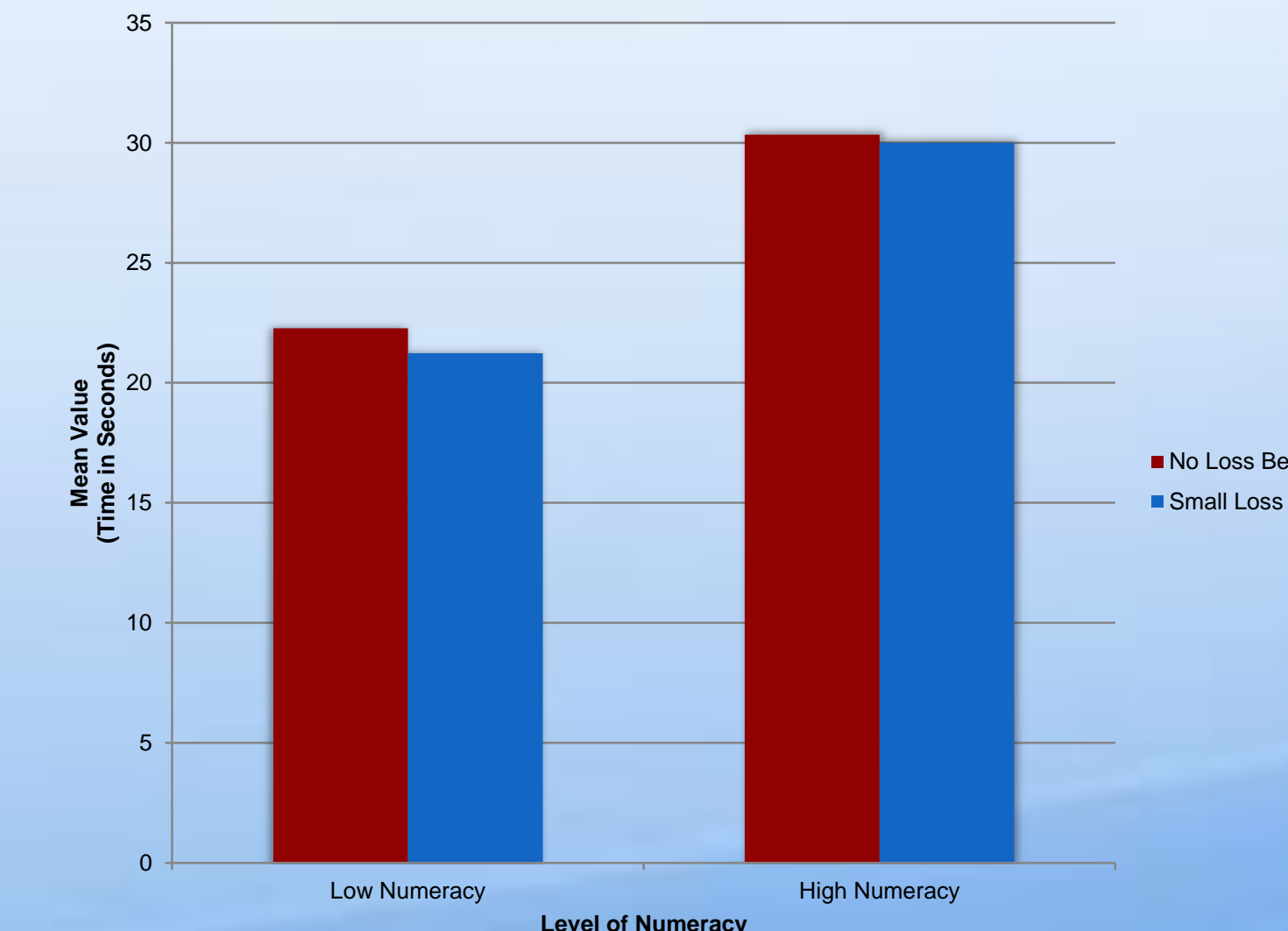
Result:
High and low numerate participants perceived equal attractiveness of the bets. Participants rated a bet involving a small potential loss as more attractive than a bet involving no chance of a loss.

Conclusion

- Our expectations that there would be an interaction between the participants numeracy and the manipulations of the questions were not met in the data and results
- We suspect that the response times for study two are significantly larger due to the participants having to read the vignette or taking a break
- Individuals level of numeracy affects their judgment and decision making

Future Work

- Researching how loss averse a person is based on their emotion(s) during a loss situation
- Use various loss aversion scale to measure loss aversion
- Collect data from a new study on loss aversion

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