EFFECTS OF EMOTION AND SOCIAL DESIRABILITY ON INTUITIVE, GIST-BASED DECISIONS

by

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Abstract

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People often make what appear to be inconsistent, irrational choice preference shifts from sure-to-risky (or from risky-to-sure) options depending on how the choices are framed—this is a form of decision bias called the framing effect. Given numerically identical outcome options, a consistent preference for risky choices or for sure choices is viewed in decision theory as a rational choice. Fuzzy Trace Theory suggests that framing effects are the result of gist processes. However, social desirability characteristics of the choices and individuals' concern for social approval could explain framing effects. The current study compared susceptibility to the framing effect in three groups: 176 pre-college adults, 223 post-college adults, and 50 firefighters. Age ranged from 18 to over 56 years, with 60% of the sample female. It examined the effects of emotion

on, and the amount of information presented explicitly in, choices, as well as possible relationships between the social desirability characteristics of the decision task items, susceptibility to the framing effect, and need for social approval (concern for social desirability). High, neutral, and low emotion manipulation conditions were expected to increase and decrease gist and verbatim processing and thereby affect susceptibility to the framing effect. However, the emotion induction procedure was not effective, and no significant differences were found between groups. Results for the three truncation versions were significant. As expected, the least amount of framing effect was seen in the non-zero-complement version, whereas the highest amount was seen in the zero-complement version, with the complete version in the middle. This provided support for the Fuzzy Trace processing view of the framing effect. A separate social desirability rating study showed significant results at the decision choice item level; however, contrary to expectation, individuals high in need for social approval were not more susceptible to the framing effect. The real strength of this research was that it is the first study to examine the social desirability characteristics of a set of decision items commonly used to measure framing effects. More research is needed to determine if there are causal relationships between social desirability characteristics choice items and framing effects.

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Chapter 1

As citizens, we rely upon a host of civil servants to protect our interests and our persons. US intelligence agents make risky decisions that have important national security implications. In 2002, part of the intelligence community falsely reported that Saddam Hussein had weapons of mass destruction and was an imminent threat; this report was used to justify the US-led invasion of Iraq (Rosen, 2015). As this example illustrates, intelligence mistakes do happen, and they can have profound consequences both at home and abroad. The Iraq War (2003 - 2011) came at the expense of nearly 4,500 American lives, over 30,000 men and women injured, and has been estimated to cost $1.06 trillion (Amadeo, 2017). The series of events that led to such a disastrous intelligence failure are surely complicated and involved many people, but this example eloquently speaks to the urgent need to better understand how people who serve the public interests make decisions.

Framing Effect

Kahneman and Tversky (1979) have illustrated how peoples' inconsistency in their choices and preferences calls human rationality into serious question. They proposed Prospect Theory as a challenge to and critique of Expected Utility Theory, a behavioral economics view of human choices which posits that people make decisions based upon the

perceived utility (or expected value) of an option or outcome, the idea being that we make choices based upon what will most benefit us. Kahneman and Tversky argued that Expected Utility Theory does not adequately account for inconsistent or seemingly irrational choice behavior. They suggested that value is assigned, not to likely outcome assets, but to gains and losses associated with the choices—or prospects—with exact probabilities being basically ignored and replaced by decision weights. For example, they showed that people tend to underweight the value of uncertain choices and overweight choices with low (vs high) probabilities; this certainty effect contributes to risk-avoidance when sure gains are involved and to risk-seeking in response to sure losses.

Furthermore, they found that people ignored shared aspects of choices—the isolation effect. For example, if you are considering two options for lunch, both of which include fries, you might ignore the shared characteristic (fries) and focus on a contrast between the meals to make your choice. Inconsistent preferences, that is, shifting your preference for sure or risky choices when numerically equivalent choices are presented as a gain or a loss is referred to as the framing effect. Our risk preference should really be consistent in the face of numerically equivalent outcomes; shifting from a risky choice to a safe choice when a problem has been

presented in terms of lives saved or lives lost is considered irrational (Kahneman & Tversky, 1979). None of this is to suggest that people always do these things, these are just recognized patterns of behavior that

Fuzzy Trace Theory

Fuzzy Trace Theory is an influential memory and information processing model that posits verbatim (detail-oriented) and gist (meaning-oriented) representations are encoded into memory and are later retrieved simultaneously and independently (Brainerd & Reyna, 1990). A central tenet of Fuzzy Trace Theory is that people have a tendency toward a "fuzzy" processing preference, meaning that we tend to reason using the vaguest representations permissible—bottom-line gist information—to find a solution and that we move to finer distinctions only if necessary (Brainerd & Reyna, 1990). This simply means that we tend to rely on getting the gist of things rather than taking needless time processing all the details of a situation before making a decision. Our memories contain precise, detailed verbatim information, and bottom-line gist information which are thought to provide multiple reasoning paths with which to find solutions. Verbatim memory traces are limited because they are exogenous, that is, they arise from external information, whereas gist memory traces are endogenous, meaning that they exist only in relation to other internal knowledge (Brainerd & Reyna, 1992).

In the context of risky-choice problems, verbatim impressions involve a focus on exact quantities, risk-benefit ratios, and the probabilities of outcomes, whereas gist impressions represent abstract qualitative impressions regarding bottom-line meaning. Gist representations integrate internal and external perceptions; therefore, they provide a broader, more systemic response that is based upon previous experience. For instance, if you were offered a deal that seems too good to be true and the verbatim details appear to supportive of accepting the deal, a gut-level feeling of distrust (gist) could save you from being duped.

According to Fuzzy Trace Theory, reasoning relies most on qualitative patterns in information rather than on verbatim quantities. Advanced decision-making involves reliance on intuition—qualitative thinking characterized as fluid, ranging, and gist-based (Reyna & Brainerd, 1991). Fuzzy Trace Theory views the development of experience-based intuition to be a consequence of gist processing. Reyna, Chick, Corbin, and Hsia (2014) have described it as the “ironical output of cognitively advanced mechanisms of meaning making.” They showed that U. S. intelligence agents’ use of intuitive gist-processing led to more irrational inconsistencies in their decisions, as well as overconfidence in their choices. While that sounds concerning, agents were simply more susceptible to the framing effect compared to college students and post-

college adults. They treated problems with numerically equivalent outcomes differently when presented differently—framed in terms of lives saved or framed in terms of lives lost. Agents took more risks (chose the risky option) with human lives when outcomes were presented as losses than when they were presented as gains (Reyna et al., 2014). Intelligence agents have training and experience considering risks that specifically involve life and death scenarios. Therefore, if their gut-level responses to life and death choice scenarios indicate there are meaningful differences, perhaps we should trust that there is more to these scenarios than numerical equivalence.

Numerical equivalence is a matter of details. Details can hold two choices with different frames in a state of numerical equivalence; however, when we simplify complicated information, automatic judgments are made regarding which details will be discarded. Simplifying numerically equivalent choices involves discarding some of the very details that make them equivalent, although the frame of a choice is retained because it is part of the structure of the choice. Boiling choices down to their bottom-line gist involves retaining the frame and discarding details. For example, in the dread-disease problem there are 600 lives at stake (Figure 1). The choice set is as follows: Choice A—200 people saved for sure (400 die is

implied), or Choice B—1/3 probability 600 people saved and 2/3 probability no one saved.

Preamble: Imagine that the United States is preparing for the outbreak of an unusual disease, which is expected to kill 600 people. Please indicate which option you prefer.

	Complete (Standard) Condition	Nonzero-Complement-Present Condition	Zero-Complement-Present Condition
Gain Frame	A: 200 people saved for sure B: 1/3 probability 600 people saved and 2/3 probability no one saved	A: 200 people saved for sure B: 1/3 probability 600 people saved	A: 200 people saved for sure B: 2/3 probability no one saved
Loss Frame	A: 400 people die for sure B: 2/3 probability 600 people die and 1/3 probability no one dies	A: 400 people die for sure B: 2/3 probability 600 people die	A: 400 people die for sure B: 1/3 probability no one dies
FTT Prediction	Framing effect	No framing effect	Accentuated framing effect

Figure 1. Example of the risky-choice problems, with FTT predictions for framing effects (Reyna, Chick, Corbin, and Hsia, 2014). Each choice problem will be presented in three truncation conditions, in two (gain and loss) frames. The choice options are equivalent in all problems. For example, with a total of 600 people, 200 lives saved is equivalent to 400 dying. Likewise, the expected value of 1/3 probability of 600 people being saved (1/3 of 600=200 saved) is equal to the expected value of 2/3 probability of 600 people dying (2/3 of 600=400 die). Used with permission.

Fuzzy Trace Theory argues, and indeed has shown, that these choices are encoded by people qualitatively—as some saved (choice A), all saved (choice B1), and none saved (choice B2). People tend to ignore many quantitative details, such as probability fractions. Further, Fuzzy Trace Theory argues that the concept of all collapses logically into the category some, producing what they describe as a simple some-none choice dichotomy (Reyna & Brainerd, 1991; Reyna et al., 2014). Ignoring the quantitative details, the bottom-line gist for the choices above are save

some people for sure or a chance to save some people or save no one (Reyna & Brainerd, 1991; Reyna et al., 2014). However, keep in mind that people are looking for contrasts that will allow them to make a decision, so they tend to cancel out common elements in choices.

In this case, if you remove the common element in the second choice—save some people—we're left with a some-none choice between saving some people for sure or taking a risk of saving no one. Conversely, in a loss frame, the some-none choice is between losing some lives for sure and taking a chance of no one dying. What kind of monster would risk losing lives when they could have saved lives for sure? Equally, it would be hard to explain why a good person might choose the option to lose lives for sure when they had a chance to save lives. And when broken down to this gist-level, the choices can clearly no longer be viewed as numerically equivalent. This processing breakdown shows how gist-based categorical distinctions logically account for the preference shift from safe to risky or risky to safe choices described by the framing effect (Reyna & Brainerd, 1991; Reyna et al., 2014).

Even though the outcomes were numerically equivalent in all cases to begin with, gist processing leads to a real—and rational— preference shift from the sure option in a gain frame to the risky option in a loss frame. This suggests that any general preference for sure or risky options

is delicate enough to be trumped by other factors. And it challenges the view of the framing effect as an irrational response to numerically equivalent information. It also illustrates how heavy reliance on gist processing, while it may be quick and efficient, alters and distorts information. FTT assumes the framing effect preference shift is reflective of a general value for human life, along the lines of valuing money. It makes no effort to explain what specifically makes one choice more valuable than another or what makes that value shift depending upon frame.

As mentioned above, and in accord with Prospect Theory, Reyna and Brainerd (1991) found that people simplified framing problems by mentally streamlining redundant aspects of choices. They also found that people's choices changed depending upon the type of explicit information included in decision problem choices. They created two truncated versions (zero-complement present and non-zero-complement present) variations of the B choices (risky) in the standard choice set detailed above. The authors showed that presenting only the zero-complement (no one saved or no one dies) in choice B emphasized the some-none categorical contrast, which increased the framing effect. On the other hand, presenting only the non-zero-complement (people saved, or people die) in the risky choice reduced the some-none categorical contrast and

eliminated the framing effect (Reyna & Brainerd, 1991). Altogether, these findings provided compelling evidence that gist-based processing accounts for the framing effect, but it is important to understand what are the gist-based, bottom-line meanings that are associated with these task items that shift preferences.

Deliberation

Rather than being dismissed as emotional and automatic, our gut-level responses could be valued as the integrated expression of our deepest wisdom, at least in some circumstances. It is generally held that an analytical approach to decision-making yields optimal decisions; however, analysis and deliberation has been shown to undermine decisions by interrupting automatic behaviors. Dijkstra, Van Der Pligt, and Van Kleef (2013) compared the decisions of novices (individuals with low knowledge and low experience), intermediates (individuals with modest knowledge and relatively more experience), and experts (individuals with high knowledge and high experience), finding that the use of deliberation and intuition influenced each group differently. Experts were able to use deliberation and intuition equally well to make good decisions, whereas novice decisions tended to be poor regardless of strategy. Intermediate decisions benefitted from the use of intuition but not deliberation. This may

be why students look back over their tests and reflect that they should not have deliberated on and then changed exam answers.

In a study that examined qualitative judgments of jelly, Wilson and Schooler (1991) found that students' intuitive responses to the jelly they sampled tended to be in line with expert assessments of the jelly, whereas ratings of students who deliberated were not. Brainerd and Reyna (1992) have argued that our most vital memories are not those that preserve detailed information perfectly; they are the gist representations accessed as we receive detailed information from the environment. Indeed, the view of intuitive decision-making as advanced is being embraced by many fields—firefighting communities, branches of the military, and the business community (Klein, 2003).

Intuition

Reliance upon intuition is quick and easy. Even experts are likely to default to intuitive judgments; however, not all intuitions are equal. Kahneman and Klein (2009) have made an important distinction between heuristic-based (simple mental short-cuts) and skilled (experience-based) intuition. They refer to the overconfidence professionals often exhibit, even when handling problems with which they have no skill, as the fractionation of expertise. According to them, skilled intuitions can only develop in an environment with sufficient regular and valid cues, opportunities to

practice, and quality feedback. Kahneman and Klein (2009) pointed out that after experience with enough sick infants, pediatric nurses may come to recognize early, subtle signs of disease (sometimes before blood tests reveal infection) because the cues they receive are both regular and valid, that is, illnesses tend to follow a predictable course and the infants do not fake.

Similarly, experienced fireground commanders have dealt with enough fires—which provide regular and valid cues—that they are able to recognize the nature of a situation at any fire scene (Kahneman & Klein, 2009). And while human behavior is unpredictable and provides both irregular and often invalid cues—we regularly lie, fake, hide, and obfuscate—one might expect that firefighters couldn't develop skilled intuitions based on such inconsistent cues and feedback. However, their exposure to human behavior is so frequent and intense that firefighters are very hard to fool. With enough experience, there are identifiable patterns even within crisis-related human behavior. For example, firefighters have at least three different techniques for determining if a person is truly unconscious or if they are faking. Putting out structure fires and dealing with people in crisis situations involves regular and valid feedback; therefore, firefighters develop skilled rather than simply heuristic-based intuition.

However, although some professions are conducive to the development of skilled intuition, others (finance or psychotherapy) may not provide the necessary opportunities (Kahneman & Klein, 2009). People who work in professions that deal with unpredictable cues, complex, interconnected systems and outcomes, and inconsistent feedback, tend to develop heuristic-based intuitions but not necessarily skilled intuitions. And even expert use of intuition can have disastrous results. For example, a 20%-40% discrepancy has been found between antemortem diagnoses and autopsy findings, and in about one-third of those cases, lives could have been saved had the correct diagnosis been identified earlier (Croskerry, 2009). This suggests that the contribution of diagnosis error to patient morbidity and mortality is significant. So clearly, it would be a mistake to say that intuitive decisions are always the best.

Kahneman and Klein (2009) have argued that intelligence agents, though knowledgeable about specific international conflicts, receive delayed, sparse, and ambiguous feedback regarding their failures, therefore they are not likely to develop skilled intuition. They also predicted agents would likely be overconfident, a suggestion clearly in line with the overconfidence of intelligence agents mentioned above (Reyna, et al., 2014).

Emotion

The framing effect has been associated with amygdalar activity, suggesting that emotion plays an important role in mediating decision bias. In research examining the neurobiological basis of the framing effect, De Martino, Kumaran, Seymour, and Dolan (2006) found that decreased susceptibility to the framing effect was associated with activation of brain areas responsible for rational thought, the orbital and medial prefrontal cortex (OMPFC). However, strong reciprocal connections between the amygdala and the OMPFC suggest that rational thought involves the evaluation and integration of both analytical and emotional information. Indeed, Pessoa (2008) has argued that dynamic networks of brain areas are required for the occurrence of complex cognitive-emotional behaviors.

Feelings provide important environmental feedback. Feelings signaling a problematic, uncertain environment promote systemic analysis, and attention to detail, whereas feelings that signal a predictable, problem-free situation foster abstract, meaning- and pattern-based, heuristic processing (Schwarz & Clore, 2007). Good moods, as indicators of a problem-free environment, have been shown to promote a global focus (a wide, gist-oriented view); bad moods, as indicators of a problematic environment, promote a local focus (a precise, detail-oriented view) (Huntsinger, Clore, & Bar-Anan, 2010).

Research examining the effects of emotion on gist and verbatim processing has largely examined emotional stimuli, with mixed results. In terms of remember-know memory distinctions (verbatim detail memory vs bottom-line gist memory), verbatim details associated with negative stimuli tend to be remembered more easily than positive stimuli, which tend to be understood, or known, at a gist level rather than remembered in detail (Ochsner, 2000). Gong, Xiao, and Wang (2016) found that negative stimuli facilitated verbatim processing, whereas both negative and positive stimuli facilitated gist processes.

However, Brainerd, Stein, Silveira, Rohenkohl, and Reyna (2008) showed that efforts to remember negative word lists enhanced gist processing and reduced the ability to use verbatim detail to suppress memory errors, whereas positive information had an almost protective effect on memory for details. Their process-level explanation was that the perceived meaning resemblance between true items and false items was increased for negative valence events/memories. Negative valence material enhanced the familiarity of the semantic content of critical distractors. This suggests that our memory for negative information is particularly faulty, compared to positive and neutral information. This could be the result of resistance to negative information, an emotional

mechanism that triggers our fuzzy preference defensively to protect ourselves from bad or disruptive news.

Our responses to unique external stimuli can differ greatly from moment to moment and may have less bearing on our overall decision-making than do our internal mood states. Rivers, Reyna, and Mills (2008) have suggested that emotional intelligence recognizes and incorporates emotional information in the decision process to improve decisions. They showed that gist integrates both stimulus valence and our discrete emotional state; therefore, our interpretation (the gist) of information involves processing its valence and our own feelings. It then directs our behaviors in accord with the resultant blended valence.

Further, they argued that emotional states influence whether processing is gist-based or verbatim-based, and that discrete emotions like anger predispose us to process the gist of a situation before completely processing verbatim information. Emotion modifies cognitions and physiological responses to direct an immediate behavioral response; anger, a negative emotion associated with certainty and high arousal, reduces how thoroughly we process information (Rivers, et al., 2008). When we are angry we are more prone to gist processing and tend to rely on stereotypic or heuristic cures.

Discrete emotional states associated with certainty (anger) encourages more gist processing, which increases reliance upon heuristics, biases, and intuitive thinking, whereas states associated with uncertainty (sadness) discourages gist processing (Rivers, et al., 2008). Estrada (2010) showed that negative mood states increased verbatim processing, as evidenced by a reverse framing effect (preference for sure choice in loss frame and gamble choice in the gain frame), whereas neutral and positive mood states enhanced gist processing (the standard framing effect). Likewise, Storbeek and Clore (2005) showed that a low/sad mood was associated with increased task accuracy, whereas a high/happy mood was associated with gist processing. Other dimensions of emotion, certainty and arousal, for example, are known to also influence how we process information; however, this research only examined the influence of valence (high, neutral, and low).

Equally, it is important to note that emotion-based decision making is not the same as gist-based decision making; these things are often confused. Gist-based processing can be triggered by emotion, but gist is developed through experience, through the recognition of patterns. The Recognition-Primed (Naturalistic) Decision Model (RPDM; Klein, Calderwood, & Clinton-Cirocco, 1988) also places intuition at the center of important decisions. According to RPDM, we use intuition to recognize

patterns between a current dilemma and past experiences to help us decide how to respond, and we employ analytical processes to verify that our intuition is appropriate to the current situation. Strong emotions can easily disrupt the accuracy of our intuitions and influence which past experiences are brought up, for example.

Right or Real Choices

Fuzzy Trace Theory describes a process by which people simplify information in choices until they have identified an adequate contrast between the two to make a choice. The theory articulates the simplification process brilliantly but in these decision problems human life is viewed as a commodity, like money and jobs. Fuzzy Trace Theory makes no effort to explain why lives, money, and jobs in imaginary choice scenarios are valuable from a social perspective. Equally, the framing effect simply describes a phenomenon, a counter-intuitive choice pattern. Framing effects are found in decision problems that involve jobs, acres of land, human lives, fish lives, or money. Neither Fuzzy Trace nor Framing Effect theories ventures into questions regarding social forces which may motivate the preference shift from sure choices in a gain frame and risky choices in a loss frame.

Research has shown that people tend to be socially self-conscious, and organize their behavior based on what they think/feel others will

expect is appropriate given the circumstances (Phillips & Clancy, 1972; Fleming & Zizzo, 2011). Consider the social implications of taking a chance of saving no one or allowing some people to die for sure. How would you justify such a choice to your mother, or in front of your church? How would you explain such a choice to your children? We do not make decisions in a vacuum. When we make decisions, social concerns are often part of our judgments (Crowne & Marlowe, 1964).

Concerns about social judgment may be just as important in the case of financial decisions. Let us consider a scenario in which money is at stake and the choices are between winning $30 for sure or a 2/3 probability of winning 45 dollars and 1/3 probability of winning nothing. From a fuzzy trace, some-none choice perspective, the choices in a gain frame would be qualitatively reduced to win some money for sure or take a risk of winning no money. In a loss frame, the choices would be to lose some money for sure or take a risk of losing nothing. What kind of idiot would miss a chance to make money for sure? What reasonable person would choose the option to lose money for sure when they had a chance to lose none? Again, how would you explain such choices to your best friend or spouse? Self-conscious social concerns often direct our choices whether we're aware of them or not.

Social Desirability Response Bias

It is easy to dismissively think that only a psychopath would be callous enough to take chances with other people's lives or only an idiot would willingly choose to lose money, which points to the fact that these decision problems have what seem to be clear right and wrong answers. The thought of taking a chance of letting people die just feels wrong but nobody has examined precisely why. A well-known problem within survey research is Social Desirability Response Bias (Crowne & Marlowe, 1960), wherein respondents are inclined to provide answers that they think would garner social approval, as opposed to evoking social censure. Even when respondents answer anonymously, they often give what they think are socially correct answers rather than honest, but socially unpopular, answers.

Too often, survey respondents give the right (i.e., most socially desirable) but not the real answer. Most people do not feel comfortable admitting that they have exposed their sexual partners to disease, cheated on their taxes, or committed a violent crime, for example; however, social desirability concerns are a problem for surveys regardless of topic. The fact that people are concerned with looking good and giving right answers is such a problem for survey research that it is viewed as a source of predictable error that undermines validity (King & Bruner, 2000).

Surprisingly, no extant decision research has examined how social desirability issues may contribute to the preference shift referred to as the framing effect. It may be that people who score high on social desirability shift their preference for sure or risky options based on how socially desirable the choices are. Given that the choices in framing effect tasks are numerically equivalent in gain and loss frames, people are left to find a meaningful distinction or contrast that makes one choice seem better than the other. Desirability cues (moral or financial) are likely to be more socially compelling than subtle feelings of comfort or discomfort when faced with sure and risky options.

Current Study

Firefighters routinely make important, risky decisions that affect many civilian lives; however, they interact with citizens much more regularly, more directly, and often under more personal (emergency) circumstances than intelligence agents do. By the nature of their calls, firefighters routinely respond to negative situations—accidents, structure fires, and medical emergencies. Firefighters deal with the excitement/arousal created by getting emergency calls at all hours of the day (fire, emergency, non-emergency) as well as the burden of empathy for the people they encounter on-scene. Beyond that, they must also cope

with their own emotional lives while at work for one or more shifts in a row (each shift generally being 24 hours).

With so many sources of emotional influence, the effects of emotion on firefighters' decisions constitute an important topic for study. Given the strong fuzzy processing preference most people have (described by Fuzzy Trace Theory) and the gist-enhancing feedback they receive on the job, firefighters are likely to rely heavily on gist processes to handle emergencies even though there are strong hierarchical command structures, regular training, and clear protocols in place. A better understanding of the effects of emotion on firefighter decisions could provide a basis to improve training for firefighters that will help them identify their own decision biases and breakdowns.

Two studies were conducted in the present investigation. The first study examined the effects of emotion on the decisions of three groups (firefighters, pre-college adults, and post-college adults) as well as relationships between social desirability issues—both at an individual differences level and at a choice item level, and based on the research findings above, several hypotheses were proposed. First, a negative mood prime was predicted to increase verbatim processing and result in reduced framing effect compared to a neutral or positive mood prime. In contrast, a positive mood prime was expected to increase gist processing and result

in the highest amount of framing effect. Secondly, the amount of information expressed explicitly in the decision problem choices was expected to affect susceptibility to the framing effects. In the neutral emotion condition, when complete information was provided, standard framing effects were expected.

Further, the zero-complement present version (no one saved, or no one dies only) was expected to increase framing effects, whereas the non-zero-complement present version (people saved or people die only) was expected to eliminate them. This pattern of findings would provide support for the Fuzzy Trace Theory processing explanation of the framing effect. Third, given that gist-based processing develops with experience, it was predicted that firefighters would be more susceptible to the framing effect than pre-college adults or post-college adults. And fourthly, high levels of concern for social approval (Social Desirability Response Bias) were expected to be associated with more susceptibility to the framing effect.

The purpose of the second study was to collect independent rater assessments of the decision task choice items in terms of the socially desirable (or undesirable) characteristics of each sure and risky choice in the task. No specific hypotheses were proposed for this exploratory rating project.

Chapter 2

Study 1

The main study examined the effects of emotion on intuitive decisions in three groups—firefighters, pre-college adults (high school/some college, 18-25 years old), and post-college adults (bachelor's degree).

Method

Subject Recruitment

A power analysis using the G*power software and employing a main effect size of Cohen's d = 0.31 (Cohen, 2008), based upon a meta-analysis of framing effect research, indicated that a sample size of at least 111 participants would be required for sufficient power (Kuhberger, 1998; Faul, Erdfelder, Buchner, & Lang, 2009). A minimum of 120 participants was sought for each of the three sample groups so there would be 40 participants in each emotional condition.

Pre-and post-college adults were recruited using the Amazon Mechanical Turk survey website. Several approaches were used to recruit firefighters. A direct email invitation containing a link to the online survey was sent to fire chiefs in the following fire departments in Texas: Fort Worth, Denison, Big Spring, Crowley, Cleburne, Burleson, Lake Travis, Weatherford, and Plano. Details and invitation links were posted in the

Texas Fire Chiefs Association weekly (electronic) newsletter and in the Daily Dispatch, a daily online newsletter for firefighters. The Daily Dispatch invitation to participate ran in the announcement section for two weeks. An invitation to participate was also posted on Facebook and was shared by Fire Department International.

Amazon Mechanical Turk participants were paid between $0.50 and $3.00 for their participation. Firefighters were offered an opportunity to be entered into a drawing for a $100 gift card as thanks for their participation. All participants provided informed consent before beginning the study and were allowed to end their participation at any time without penalty. This research was approved by the University of Texas at Arlington Institutional Review Board before commencement.

Participants

For study 1, participants ranged in age from 18-56+ (M=28.7), were 60% female, and largely Caucasian (73.5%); see Table 1 for a complete list of demographic frequencies.

Table 1

Study 1. Demographic Frequencies.

	Frequency	%
Group		
Pre-College Adults	176	39.2
Post-College Adults	223	49.7
Firefighters	50	11.1
	N=449	
Age		
18-25	204	45
26-25	108	24
36-45	61	14
46-55	40	9
56+	36	8
Gender		
Male	179	39.9
Female	270	60.1
Ethnicity		
Caucasian	330	73.5
African American	50	11.1
Hispanic	25	5.6
Asian	16	3.6
Native American	5	1.1
Middle Eastern	3	0.6
Mixed	20	4.5
Education		
High School	46	10.2
Some College	160	35.6
Bachelor's Degree	152	33.9
Some Grad School	24	5.4
Graduate Degree	67	14.9

Materials

The study was created using the online survey engine Qualtrics©. This study involved a 25-item guided meditation, mood induction procedure, 60 sure/risky choice-problems, and confidence ratings. Participants also filled out two social desirability scales, a sensation seeking scale, and a brief demographics questionnaire.

Mood Induction and Assessment

Velten Mood Induction Short: This study used a valence mood induction procedure to induce three mood conditions (high/happy, low/sad, and non-emotion). These induction procedures are based on the Velten Mood Induction Procedure (Velten, 1968). This short, updated version includes 25 statements for each emotion condition (Seibert & Ellis, 199l). High- and low-valence mood statements proceed as a self-referencing, guided meditation, whereas the neutral statements are statements of fact (Appendix A). Examples of high-valence mood statements are: “The world is full of opportunity and I'm taking advantage of it,” and “I know if I try I can make things turn out fine.” Examples of low-valence mood induction statements are: “I feel a little down today,” and “Things are harder than I expected.” Neutral-valence mood induction statements are neither self-referencing nor emotionally suggestive, for example: “There are sixty minutes in one hour,” and “A neuron fires rapidly.” Instructions were

revised slightly to fit the current study design and the wording of mood statements were revised slightly to reflect general life instead of the college student experience.

Emotion Induction Check: To determine if the mood induction procedures were effective, participants filled out the happy and sad subscales of the Discrete Emotions Questionnaire (Harmon-Jones, Bastian, & Harmon-Jones, 2016) before the mood induction procedure and after the choice task, see Appendix B. They filled it out a third time if they choose to run through the high mood induction procedure to improve their mood before exiting the study. These checks provided a starting baseline and a mood induction assessment, as well as a final mood check for anyone who wanted to improve their mood before exiting the study.

Decision Problems and Confidence Ratings.

Subjects were instructed that part of the risky option would sometimes have to be inferred because it would not always be explicitly stated. They were then tested to make sure they understood the instructions; see Appendix C for the complete set of instructions as well as the instruction check questions. Each instruction test question provided clarification if answered incorrectly. Participants were also given a chance to re-read the instructions and repeat the test questions if they needed

further clarification. The survey would not continue until the instruction test questions were answered correctly.

The decision problems contained numerically equivalent choices presented with varying amounts of explicit information (Appendix D). Each subject received 30 gain-frame and 30 loss-frame problems that were equally divided among the three truncated versions: complete information, zero-complement information present (no one saved/no one dies), and non-zero-complement information present (people saved/people die). The following examples demonstrate the different information provided in each truncated version (gain frame):

Complete Information Version

a) 200 people will be saved for sure (400 die is implied).
b) 1/3 probability that 600 people will be saved and a 2/3 probability no one will be saved.

Non-Zero-Complement Present Version

a) 200 people will be saved for sure (400 die is implied).
b) 1/3 probability that 600 people will be saved (2/3 probability no one will be saved implied but NOT stated explicitly)

Zero-Complement Present Version

a) 200 people will be saved for sure (400 die is implied), or
b) 2/3 probability no one will be saved (1/3 probability that 600 people will be saved implied but NOT stated explicitly)

After each choice problem, participants were asked to rate (on a 5-point Likert scale) how confident they felt about their choice (Appendix E) to allow for comparisons across groups.

Social Desirability

Social desirability was assessed at an individual difference tendencies level. The Marlowe–Crowne Social Desirability Scale (Crowne & Marlowe, 1960) was used to assess participants' level of concern for social approval. The MC-SDS is a 33-item assessment of Social Desirability Response Bias (Appendix F). However, given that this scale has been criticized for failing to pick up on some subtle social desirability indicators, the 17-item Stöber Social Desirability Scale (Stöber, 2001) was added as a back-up measure (Appendix G).

Sensation Seeking Scale

Additionally, given that firefighters are known to run toward dangerous situations that most people are inclined to escape or avoid, it was important to measure, and if necessary control for, the tendency to seek out thrilling or dangerous situations. The Short UPPS-P Impulsive Behavior Scale (Cyders, Littlefield, Coffee, & Karyadi, 2014) views impulsivity as a multi-faceted and multi-dimensional construct, comprising five impulsive personality traits. This study used the sensation seeking

subscale that examines the tendency to seek out novel and thrilling experiences (Appendix H).

Demographics Questions

All participants were asked about their gender, age, ethnicity, and highest level of education. Firefighters were also asked about the location (city, state) and type of their service (volunteer and/or career), their current rank, years of experience in the fire service, and approximate number of fires attended.

Procedures

Once participants clicked on the link to the survey, they were taken directly to the informed consent document at the beginning of the survey. No deception was used in this study; therefore, the emotion induction procedure was explained clearly and thoroughly. The mood induction procedure involved active engagement. For the induction to work, participants had to agree to lean into the mood statements and try to actively take on the mood. Anyone with concerns about the possibility of receiving the low mood induction were encouraged to opt out. If they chose not to participate, they were directed to an exit screen. If they chose to participate, they moved on to the survey.

Participants began by filling out the Discrete Emotions Questionnaire (DEQ) that was used to obtain a mood baseline. Next, they

were randomly assigned to one of the three emotional conditions—happy mood, sad mood, or neutral mood. In each emotion induction condition, participants were asked to read and internalize either mood-boosting, mood-lowering, or mood-neutral statements. After the emotion induction procedure, participants were presented with a series of 60 decisions, during which they were asked to choose between a sure option (A) and a risky option (B). As was presented in Reyna, et al. (2014), participants were informed that sometimes part of the choice options were not explicitly stated, that they had to assume or infer that the missing part is simply the complement of the presented part. They were then tested to make sure they understood this instruction. The survey would not continue until correct answers were entered for each instruction-check question. There was also an option to re-read the instructions.

For each decision problem, participants were asked to choose the option they would prefer in real life. After each choice, they were also asked to rate how confident they were in their choice, on a scale ranging from 1 (not at all) to 5 (completely). Once they had completed the choice problems, participants filled out the DEQ again for a mood induction efficacy check. Finally, they filled out the social desirability and sensation seeking scales, along with the demographics questions.

After completing the study, as part of the debriefing process, all subjects were given the option to run through the complete happy mood induction procedure to restore or improve their mood before exiting the study. Finally, the debriefing statement was presented, and thanks were offered for participation. Amazon Mechanical Turk participants were given a code to enter so they could get credit for their participation. Firefighters were given the opportunity to enter a drawing for a $100 gift card. Participants who wished to be entered into the drawing clicked on a link to a separate survey where they could enter contact information without it being linked to their study responses.

Results

Data Screening

Prior to hypothesis testing, the data were screened for outliers and to ensure that all the necessary assumptions were met. All plausible outliers were retained. Inspection of histograms and Q-Q plots indicated normal distributions; however, Shapiro-Wilk tests were significant, suggesting unequal variance. The two continuous emotion check variables were slightly negatively skewed. Four continuous variables (social desirability, sensation seeking, choices and signed confidence) were slightly positively skewed. Although the variables' distributions were improved with square-root and square-root-reflection transformations,

analyses with and without the transformed variables did not substantially change the results of the analyses. Therefore, the untransformed variables were used in all analyses in the interest of interpretability; however, a more stringent alpha level ($p < .025$) was used to determine significant results.

Emotion Induction

Three mood checks were performed during the experiment. Time-1 served as a baseline and Time-2 was measured right after completion of the decision task to see if the mood induction procedure was effective. A third mood check was taken only for individuals who chose to run through the high-mood induction procedure as a means of improving or restoring the moods of anyone who completed the low mood induction procedure. This measure was added so that anyone who was assigned to the low-mood induction procedure would have to check a box indicating that their mood was fine or run through the high-mood induction procedure to improve their mood. Everyone was offered the chance to run through the high-mood induction before they exited the study and there was no clear pattern of people who chose to do the high-mood induction procedure and the third emotion check. The 80 people who made this choice came from all assigned mood induction groups. Mood-check variables ranged from -4 to 4, with a negative score indicating low mood and a positive score

indicating a happy mood. Overall, mood started out happy at Time-1 (*M*=1.38, *SD*=1.51), dropped at Time-2 (*M*=0.97, *SD*=1.62), and ended happier than it started at Time-3 (*M*=1.47, *SD*=1.54).

Only Time-1 and Time-2 mood checks were used for further analyses to determine emotion induction efficacy. A 3 (group) x 3 (mood) x 2 (time) mixed analysis of variance using a Bonferroni correction was conducted comparing Time-1 and Time-2 mood checks for emotion condition and group to determine if the emotion induction procedure was effective. There was a significant main effect for mood (Time-1 to Time-2), $F(1,440)=30.01$, $p<.001$, $\eta^2=.06$, with a medium effect size. Mood accounted for 6% of the variance. This effect suggested that mood did differ significantly within groups across the two mood checks. Pairwise comparisons indicated that mood did not differ significantly for firefighters from Time-1 (*M*=2.28, *SD*=0.91), to Time-2 (*M*=2.03, *SD*=1.17), whereas pre-college adults, Time-1 (*M*=1.11, *SD*=1.57), (*M*=0.74, *SD*=1.59), and post-college adults (*M*=1.41, *SD*=1.52), (*M*=0.291, *SD*=1.64), did differ significantly. All moods went down, but only pre- and post-college adults did so significantly. There was also a significant between-subjects effect for group, $F(2,440)=14.65$, $p<.001$, $\eta^2=.06$. Firefighters (*M*=2.15, *SD*=1.41), had significantly happier moods than pre-college (*M*=0.93, *SD*=1.42), and post-college (*M*=1.16, *SD*=1.42) adults in both mood

checks (Figure 2). There were no significant interaction effects. Unfortunately, mood did not differ significantly by emotion condition (high, neutral, low) which indicated that the induction procedure likely did not work as planned. Given these findings, the emotion manipulation was not expected to produce significant results in terms of participant choices.

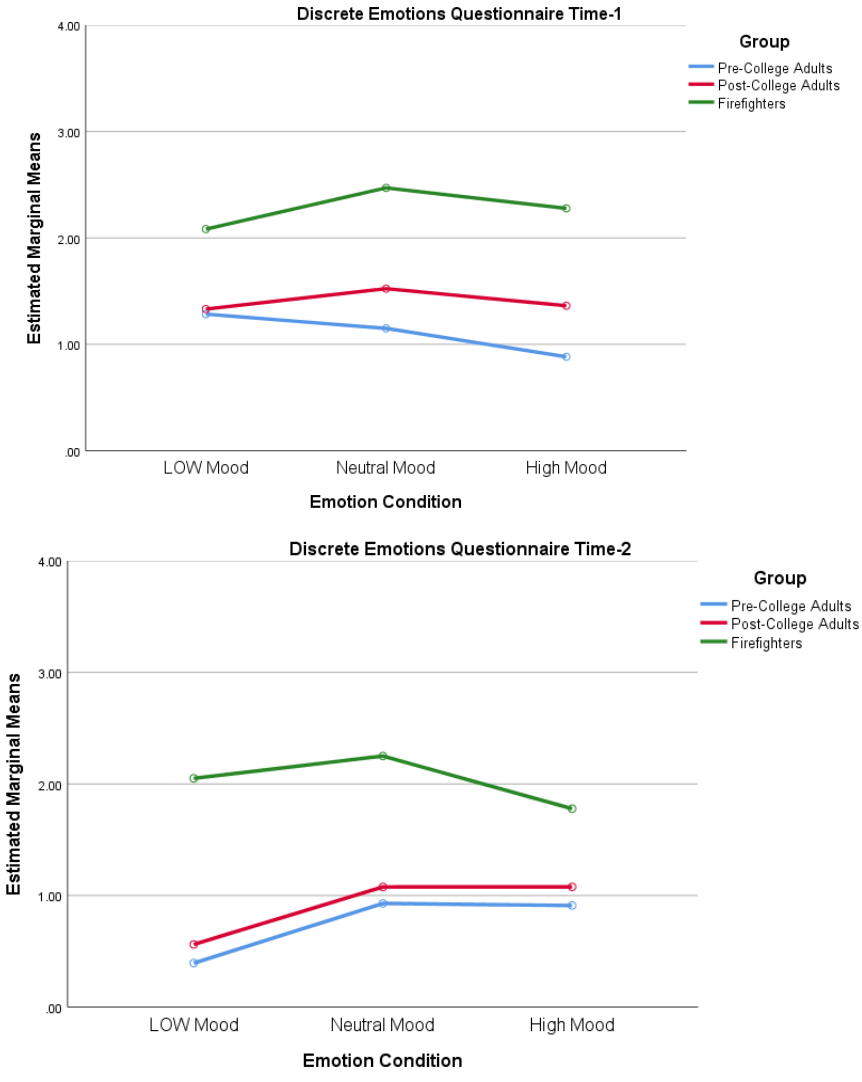

Figure 2. Comparison of Mood Checks 1 and 2 x Group. Mood did differ significantly between groups. Firefighters had significantly happier moods than pre- and post-college adults in both mood checks but there was no significant main effect by emotion condition, which means the emotion induction procedure did not work.

Social Desirability and Sensation Seeking

Social desirability, and sensation seeking scores were both continuous variables, with higher scores reflecting more need for social approval or sensation seeking. Sensation seeking ratings were coded from -2 to 2, with high negative scores indicating low sensation seeking and high positive scores indicating high sensation seeking tendencies. A multivariate analysis of variance was conducted to see if need for social approval and sensation seeking tendencies differed between groups (pre-college adults, post-college adults, firefighters). There were significant main effects for group, Wilks' Lambda=0.89, $F(4, 2686)=40.04$, $p<.001$. The Marlowe-Crowne measure of social desirability, $F(2,1344)=14.54$, $p<.001$, $\eta^2 =.02$, and sensation seeking, $F(2,1344)=54.42$, $p<.001$, $\eta^2 =.09$, both differed significantly across groups, with small and medium effect sizes, respectively. This suggested that social desirability accounted for 2% and sensation seeking accounted for 9% of the variance. However, no significant differences were found between groups for the Stöber Social Desirability Scale, which made it a potential candidate for being used as a covariate.

Pairwise comparisons using a Bonferroni correction indicated significant differences in all groups' need for social approval. Firefighters (M=18.22, SD=5.40) had the highest need for social approval scores. Pre-college adults (M=15.26, SD=6.28) had the least, with post-college adults (M=16.23, SD=5.98) in the middle. Firefighters (M=0.81, SD=0.82) also scored significantly higher on sensation seeking than pre-college adults (M=-0.05, SD=0.96) and post-college adults (M=-0.12, SD=0.87); however, pre-college and post-college adults did not differ significantly in sensation seeking tendencies.

Correlational analyses (two-tailed) were used to examine if there were relationships between social desirability or sensation seeking scores and the two framing bias variables (proportion of risky choice and framing bias choice), as well as three confidence variables (signed confidence, unsigned confidence, and framing bias confidence). Results indicated a significant relationship only between need for social approval and unsigned confidence (r=0.10, p<.001), which suggests no relationship between need for social approval and any of the choice bias measures. Sensation seeking was also significantly related to confidence measures—signed confidence (r=0.10, p<.001) and unsigned confidence (r=0.10, p<.001). It was also related to proportion of risky choices (r=0.17, p<.001); however, when broken down by group, the significant relationship

between sensation seeking and proportion of risky choices was only evident for post-college adults. Given the small number of firefighters in the sample, the study was likely underpowered to detect relationships among them.

Given that scores on the Stöber Social Desirability Scale (need for social approval) did not differ significantly, this variable was examined as a potential covariate. A homogeneity of regression test indicated that regression slopes did not differ significantly, which indicated this social desirability variable met the necessary assumptions to be used as a covariate. A multivariate analysis of covariance was conducted to determine if there were statistically significant differences between groups on proportion of risky choices and framing bias choices after controlling for need for social approval. Proportion of risky choices differed significantly between groups, $F(2, 1344)=68.58$, $p<.001$, $\eta^2 =.09$ without the covariate; when need for approval was added as a covariate very little changed, $F(2, 1343)=68.43$, $p<.001$, $\eta^2 =.09$. However, without using social desirability as a covariate, groups did not differ significantly in terms of framing bias choices $F(2, 1344)=0.49$, $p=.61$ and adding need for approval as a covariate changed nothing, $F(2, 1343)=0.49$, $p=.61$.

Proportion of Risky Choices & Confidence

Proportion of risky choices, a framing bias measure, ranged from 0 (100% sure choices) to 1 (100% risky choices), with scores at the midpoint indicating preference switching (framing bias). Signed-confidence ratings ranged from -5 to 5, with risky options scaled as negative and sure choices being scaled as positive; this measure indicated more consistent preference choices for sure or risky choices at the ends and framing bias at the midpoint. Confidence (unsigned) ratings ranged from 1 to 5, with higher scores reflecting more confidence.

A 3 (emotion condition) x 3 (truncation version) x 3 (group) factorial multivariate analysis of variance (ANOVA) was conducted for three dependent variables— choices (proportion of risky choices), signed confidence (confidence in sure or risky choices), and (unsigned) confidence. Using a critical α of 0.025, there were significant main effects for group, Wilks' Lambda = 0.81, $F(6, 2636)=49.60$, $p< .001$, $\eta^2=.10$, with a medium effect size, but not for emotion condition or truncation version. Group accounted for 10% of the variance. Significant main effects were found for group and proportion of risky choices, $F(2, 1320)=67.42$, $p< .001$, $\eta^2=.09$. Post hoc tests indicated significant differences between all groups. Preference for risky choices was highest for firefighters (M=0.67, SD=0.26) and lowest for post-college adults (M=0.39, SD=0.28), with the

pre-college adults falling in the middle (*M*=0.46, *SD*=0.25). Given that this variable is simply the proportion of risky choices, these numbers must be put into perspective. To assist in interpretation, mean values were divided into thirds with extreme end values (below 0.33 and above 0.67) considered to be a consistent preference for choices. High or low mean scores refer to a consistent preference for sure or risky choices. Mean scores around 0.5 (50/50 preference) therefore reflected susceptibility to the framing effect (or possibly a reverse framing effect). High mean scores for firefighters reflect a strong preference for risky choices and the least amount of susceptibility to the framing effect. Mid-range scores for pre-college and post-college adults indicated these groups were both more susceptible to the framing effect than firefighters generally. Pre-college adults were the most susceptible to framing bias; see Figure 3. There were no significant interaction effects.

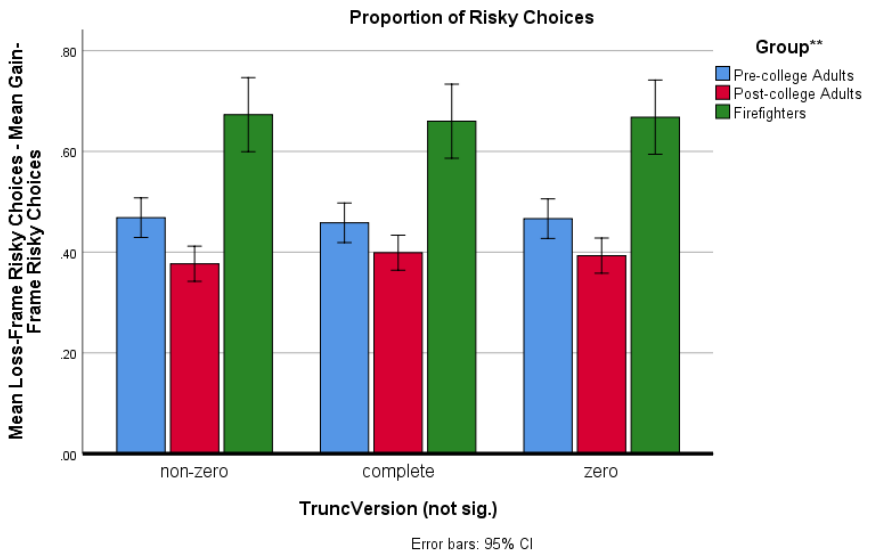

Figure 3. Susceptibility to the Framing Effect for Group and Version. Groups differed significantly across both measures, but truncation versions did not. Firefighters had a high preference for risky choices and were more confident in their choices than the other groups.

Significant main effects were found for group and signed confidence, $F(2, 1344)=83.27$, $p< .001$, $\eta^2=.11$, with a medium effect size. Group accounted for 11% of the variance. Signed confidence (confidence coupled with preference) differed significantly across all groups. Firefighters reported significantly more confidence (M=-1.52, SD=2.36) than pre- and post-college adults and showed a preference for risky choices. Pre-college adults (M=0.31, SD=1.82) and post-college adults (M=-0.86, SD=2.10) both felt less confident than firefighters and tended to prefer sure choices. Pre-college adults had the least confidence in their choices. Significant main effects were also found for group and

confidence, $F(2, 1320)=35.43$, $p< .001$, $\eta^2 =.07$. Confidence was highest for firefighters (M=4.08, SD=0.89), in the middle for post-college adults (M=3.48, SD=0.84), with the pre-college adults falling in the middle (M=3.32, SD=0.87); all comparisons were significant. There were no significant interaction effects. These effects are all from the original multivariate analysis of variance.

Framing Bias Choice & Confidence

Susceptibility to the framing effect (framing bias choice) was determined by subtracting the proportion of risky choices in the gain frame from the proportion of risky choices in the loss frame. This continuous dependent variable—choices—could vary from -1.0 (all risky choices in the gain frame/no risky choices in the loss frame—choices opposite the framing effect) to 1.0 (all risky choices in the loss frame/no risky choices in the gain frame—reflecting the standard framing effect). Framing bias confidence ranged from -10 (maximum confidence in choices opposite the framing effect) to 10 (maximum confidence in choices consistent with the framing effect).

A 3 (emotion condition) x 3 (truncation version) x 3 (group) multivariate analysis of variance was conducted for two dependent variables— framing bias choice and framing bias confidence. Using a critical α of .025, there was a significant main effect for truncation version,

Wilks' Lambda = 0.86, $F(4, 2686)=53.64$, $p< .001$, $\eta^2 =.07$, with a medium effect size, but not for emotion condition or group. Truncation accounted for 7% of the variance. Using a critical α of .025, framing bias choice had significant differences across truncation versions $F(2, 1344)=52.28$, $p< .001$, $\eta^2 =.12$, and framing bias confidence also had significant differences across versions, $F(2, 1344)=44.50$, $p< .001$, $\eta^2 =.11$.

Pairwise comparisons using a Bonferroni correction indicated significant differences between all truncation version levels for both framing bias choice and confidence. As predicted by Fuzzy Trace Theory, framing bias was significantly higher in the zero-complement (M=0.33, SD=0.36) and complete versions (M=0.25, SD=0.26) than in the non-zero-complement version, which showed the lowest framing bias (M=0.06, SD=0.28). Framing bias confidence was also highest in the zero-complement (M=2.45, SD=2.67) and complete versions (M=1.60, SD=1.91) than the non-zero-complement version (M=0.57, SD=2.02), which also had the lowest confidence; see Figure 4. There were no significant interaction effects. These effects are all from the original multivariate analysis of variance.

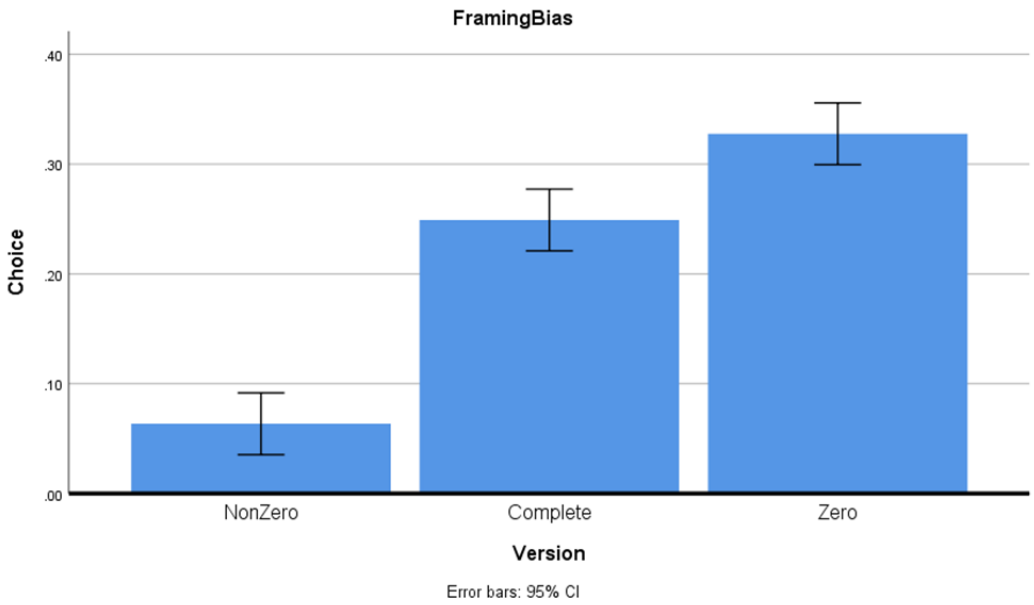

Figure 4. Framing Bias Choice by Truncation Version. As predicted by FTT, framing bias choices were significantly higher in the zero-complement and complete versions than in the non-zero-complement version, which showed the lowest framing bias.

Percentage of Socially Desirable Choices

Another variable was created to reflect the percentage of choices participants made that matched social desirability patterns based on ratings from Study 2 for each sure and risky option. Correlational analyses were conducted to see if percentage of SD choices was correlated with either measure of need for approval; it was not. Two multivariate analyses of variance were conducted to compare groups and framing bias measures (proportion of risky choices and framing bias choices) with and without percentage of SD choices as a covariate. Percentage of SD choices was not a significant covariate.

A 3 (emotion) x 3 (version) x 3 (group) x 3 (SD levels) univariate analysis of variance was conducted for the dependent variable percentage of socially desirable choices. Significant main effects were found for version but not for group or emotion condition or levels of need for approval. Using a critical α of .025, percentage of socially desirable choices showed significant differences across truncation versions, $F(2, 1272)=18.41$, $p< .001$, $\eta^2=.03$, and accounted for 3% of the variance. Percentage of SD responses was highest in the zero-complement version ($M=0.66$, $SD=0.16$) but did not differ significantly from the complete ($M=0.63$, $SD=0.13$) version. Percentage of SD responses was lowest in the non-zero-complete version ($M=-0.08$, $SD=0.14$), which was significantly different from the other versions, see Figure 5. No significant interaction effects were found.

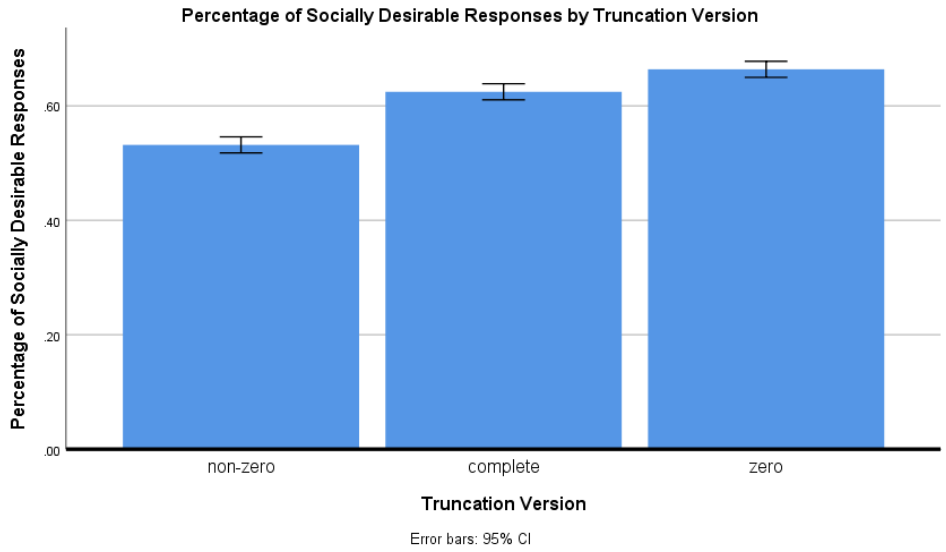

Figure 5. Percentage of Socially Desirable Choices by Truncation Version. There were significant differences between non-zero and the other two versions but not between complete and zero versions. The pattern of individual's percentage of socially desirable responses mirrors framing effect patterns for truncations predicted by Fuzzy Trace Theory.

Discussion

Emotion Induction

The fact that reported moods did not differ from Time-1 to Time-2 created concern about whether the emotion manipulation would prove successful. And, indeed, across all further analyses there was no evidence that the emotion manipulation was effective, which decimated one of the central lines of inquiry in the current study. Moods did differ significantly between groups. Unfortunately for one important line of predictions for the overall study, mood did not differ according to emotion condition. There was actually a small boost in mood for everyone in the Time-3 mood check, regardless of condition, which could have suggested that everyone was simply happier when the decision task was over.

Sensation Seeking & Social Desirability

Firefighters had the highest need for social approval and sensation seeking tendencies. Pre-college adults had the least need for approval and pre- and post-college adults did not differ in terms of sensation seeking. However, even though firefighters reported the highest sensation

seeking tendencies and need for approval, neither measure was related to susceptibility to framing effects—

firefighters were the least susceptible to framing effects.

Proportion of Risky Choices & Confidence

Fuzzy Trace Theory has shown a developmental reversal—a phenomenon in which younger or less experienced individuals demonstrate less decision bias or fewer mistakes than older or more experienced individuals—across a host of studies; therefore, pre-college adults were expected to be the least susceptible to the framing effect and firefighters were predicted be the most susceptible to the framing effect. However, contrary to prediction, firefighters were the least susceptible to the framing effect and pre-college adults were most susceptible to the framing effect in this study. The two confidence measures (signed and unsigned) indicated that firefighters had the highest confidence, both generally and specifically in their risky choices. Pre-college adults had the least confidence generally and in their preference for sure choices. Post-college adults' confidence was in the middle generally and in their preference for sure choices. This pattern is exactly the opposite of what was expected. Given that susceptibility to the framing effect is being used as a proxy for gist processing in this research, pre-college adults were

expected to be the least susceptible to the framing effect due to higher verbatim processing at their age, which is literally a developmental issue.

Framing Bias Choice & Confidence

There were no significant differences in framing bias choice and confidence for group but there were for truncation version. The point of presenting three different truncation versions of the choices was to see if this study could replicate previous Fuzzy Trace Theory findings. Reyna, et al. (2014) showed how varying the information in the risky choices in this decision task up- and down-regulated framing effects, which supports the processing explanation for framing effects. The current result patterns, at least, were consistent with Fuzzy Trace Theory, in that, framing bias and confidence were highest in the zero-complement version, high in the complete version, and at nearly zero for the non-zero-complement version (Figure 4). As predicted by Fuzzy Trace Theory, increasing the categorical contrasts by removing complementary information in the truncation versions increased framing bias in the zero-complement version and decreased it in the non-zero-complete version, both relative to the complete version.

Percentage of Socially Desirable Choices

The percentage of choices participants made that matched social desirability patterns based on ratings from Study 2 (below) for each sure

and risky option again reflected no significant relationships between choices and need for social approval personality measures and it did not prove to be a significant covariate. However, significant main effects were found for version, with the highest amount found in the zero-complement version, the lowest in the non-zero-complete version, with the complete version in the middle. Percentage of socially desirable responses matched framing effect patterns perfectly. Additionally, on average, respondents choose the more socially desirable response option significantly more often than chance—61% of the time, suggesting an overall sample bias toward more socially desirable response options.

Chapter 3

Study 2

For the second study, a group of people were recruited to rate the social desirability of each of the decision options in the choice task for Study 1. Thirteen University of Texas at Arlington psychology department graduate students and recent graduates and 45 Amazon Mechanical Turk workers were recruited to rate the level of social desirability of each of the A and B choices in the 60 decision scenarios.

Method

Subject Recruitment

A total of 58 individuals rated 120 A and B choice items for social desirability. Workers were recruited and compensated through the Amazon Mechanical Turk website. A direct email invitation containing a link to the online survey was sent out to graduate students in the Psychology Department. A link to the survey was also posted on a Facebook forum for UTA psychology graduate students (past and present).

Amazon Mechanical Turk participants were paid $1.00 for their participation. Graduate students were offered an opportunity to be entered into a drawing for a $50 gift card. All participants provided informed consent before beginning the study and were allowed to end their

participation at any time without penalty. This research was approved by the University of Texas at Arlington Institutional Review Board before it commenced.

Participants

The only demographic information that was gathered for this rating study was highest level of education completed, in the graduate student sample, all 13 participants had either some graduate work or a graduate degree. Adding the worker sample was an afterthought. Once it was clear that a goal of 20 graduate students was unlikely to be reached, an Amazon Mechanical Turk sample was added. Therefore, the only demographic question asked matched the known information for the graduate student sample. In the worker sample, 23 participants had bachelor's degrees, 10 had graduate degrees, and 12 had finished high school or some college. It is interesting to note that only 9 out of the original 13 graduate raters ended up being included in first factor; only four UTA graduate rater responses were excluded from the rating averages. In total, education in the main factor involved 12 raters with graduate degrees, 3 with bachelor's degrees, and 5 with either high school or some college.

Materials

Participants were asked to rate each sure and risky choice (A and B) being used in the main study in terms of its social desirability. See Appendix D for the complete list of the decision scenarios and Appendix J for how the choices were presented in the rating task. In terms of demographics questions, worker participants were asked if they were robots to combat against bots and to list their highest level of education completed. Graduate student participants were not asked any demographic questions.

Procedures

Once participants clicked on the link to the survey, they were taken directly to the informed consent document at the beginning of the survey. If they chose not to participate, they were directed to an exit screen. If they chose to participate, they moved on to the survey. Workers were asked if they were robots (to screen out bots). All participants began by reading rating task instructions (Appendix I) and moved on to the rating task. At the end, workers were asked to list their highest level of education completed. Finally, the debriefing statement was presented (Appendix I), and thanks were offered for participation. Amazon Mechanical Turk participants were given a code to enter so they could get credit for participation. Graduate students were given the opportunity to enter a

drawing for a $50 gift card. Participants who wished to be entered into the drawing clicked on a link to a separate survey where they could enter contact information without it being linked to their study responses.

Results

SPSS was used to analyze the data. Prior to hypothesis testing, all data were screened for plausible and missing values, as well as for outliers. All plausible values were retained. Missing values were dealt with by a mean value replacement. Missing data were less than 5%, so they were considered missing at random (Tabachnick & Fidell, 2007). Where possible, data were analyzed pair-wise. The dependent variable—ratings—was screened to ensure that assumptions of independence, normality, and equality were met. Inspection of Q-Q plots, box plots, skew and kurtosis all indicated normal distribution. Normality and homogeneity of variance assumptions were assessed with a Levene's test; the equality of variances test was not significant ($p = 0.20$). SPSS-25 was used to analyze data. The minimum amount of data for factor analysis was satisfied, with a final sample size of 120 observations for each rater (using pairwise deletion), providing a ratio of over 12 cases per variable.

Exploratory Factor Analysis

Factorability of 58 rater responses was examined. Criteria for factorability involved inter-rater correlations, sampling adequacy, and

sphericity. High levels of correlations were observed between many of the rater responses, suggesting reasonable factorability. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity both measure the strength of relationships among the variables. A Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.75, which was above the commonly recommended minimum value of 0.60. Bartlett's test of sphericity, which examined whether a set of variables was adequately related for factor analysis, was significant, $\chi 2$ (666) = 2287.11, p = .000. All communalities were above 0.30, which also indicated that the items shared some common variance (Table 2).

Table 2

Study 2 Factors. Eigenvalues, factor loadings, and communalities.

Factors		
1	***2***	**3**
	Eigenvalues	
17.19	**4.39**	**3.33**
	Variance	
33.70%	**8.62%**	**6.52%**

Factor 1	
Raters (highest to lowest)	
R31	0.89
R48	0.89
R30	0.86
R28	0.85
R42	0.85
R41	0.79
R44	0.79
R4	0.77
R50	0.76
R16	0.75
R51	0.74
R40	0.73
R47	0.69
R49	0.68
R23	0.66
R27	0.65
R18	0.61
R43	0.55
R25	0.51
R5	0.57
R3	0.57

Communalities		
Raters	Initial	Extraction
R3	0.91	0.90
R4	0.88	0.82
R5	0.94	0.95
R16	0.75	0.68
R18	0.73	0.69
R23	0.84	0.77
R27	0.80	0.76
R28	0.91	1.00
R30	0.92	0.88
R31	0.89	0.83
R40	0.81	0.71
R41	0.92	0.94
R42	0.85	0.81
R43	0.71	0.63
R44	0.88	0.81
R47	0.85	0.83
R48	0.95	0.96
R49	0.81	0.77
R50	0.89	0.84
R51	0.82	0.72
R25	0.72	0.65

Note: Extraction Method: Maximum Likelihood. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 15 iterations. Factor loadings < .5 were suppressed.

An exploratory factor analysis (maximum likelihood with a varimax rotation) was performed on rater responses to determine if rater responses loaded on one or more factors. This analysis identified a subset of raters with a high level of consistency in their ratings. Thirteen factors with eigenvalues greater than 1 were extracted that collectively accounted for 76% of the total factor variance. A visual inspection of the factor break point (scree test) suggested a max of three factors; however, 21 raters loaded onto the first factor which accounted for the largest amount of the variance (33.70%), see Table 2. None of the other 12 factors with eigenvalues greater than 1 accounted for a substantial amount of variance.

Reliability analyses showed that raters who loaded onto the first factor exhibited a high level of consistency for social desirability ratings (Cronbach's alpha = 0.97). The removal of any rater would have either lowered or left the alpha unchanged; therefore, no raters were removed. Inclusion of the entire group as a consensus rating would have reduced the reliability alpha; therefore, the ratings from the 21 individuals that loaded onto the first factor were averaged together and were used to establish each item's social desirability score. Overall, these analyses indicated that a single factor underlay the social desirability ratings of the decision task choices, and that this factor was internally consistent. Social

desirability ratings were coded from -2 to 2 (-2, -1, 0, 1, 2), with positive numbers indicating social desirability and negative numbers indicating social un-desirability.

A 2 (frame) x 3 (version) x 2 (choice) factorial ANOVA was conducted to determine the effects of these predictors on social desirability ratings. Significant main effects were found for all three predictors. Using a critical α of .05, significant main effects were found for frame, $F(1, 108)=997.54$, $p< .001$, $\eta^2=.90$, truncation version, $F(2, 108)=3.22$, $p=.04$, $\eta^2=.06$, and A/B choices, $F(1, 108)=17.88$, $p< .001$, $\eta^2=.14$.

Pairwise comparisons with a Bonferroni correction indicated significant differences between the levels of each of the independent factors. In terms of frame, the gain frame was rated as highly socially desirable ($M=0.53$, $SD=0.88$), whereas the loss frame was rated as being highly socially undesirable ($M=-0.94$, $SD=0.63$), with a large effect size. Frame alone accounted for 90% of the variance. Social desirability ratings differed significantly only between complete and zero-complement truncation versions, see Figure 6.

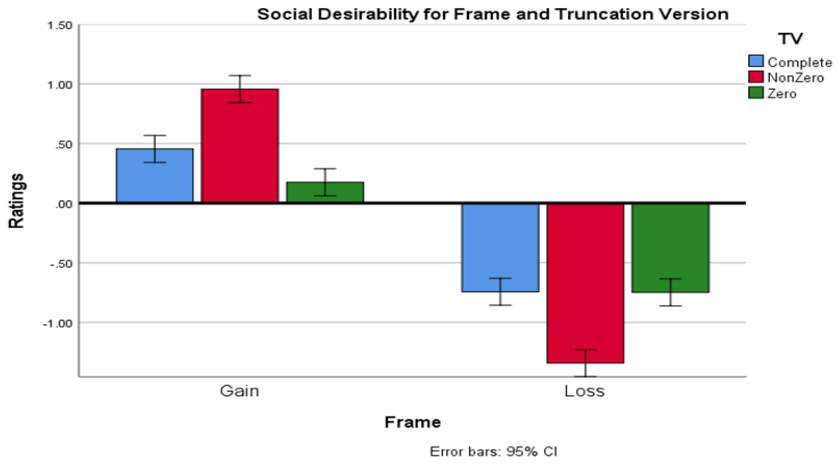

Figure 6. Social Desirability Ratings (frame x version). Social desirability ratings for the gain frame indicated high social desirability in a gain frame and high social undesirability in a loss frame.

The zero-complement version had the highest ratings of social un-desirability (*M*=-0.29, *SD*=0.25) and the complete version had the lowest ratings of social un-desirability (*M*=-0.14, *SD*=0.25). Ratings for the non-zero-complement version (*M*=-0.19, *SD*=0.25) fell in the middle and were not significantly different than either of the other versions. Means that were close to zero indicated neither-nor social desirability answers; therefore, these findings suggested that complete and non-zero-complement versions were rated as socially neutral, whereas options in the zero-complement version was rated as significantly more socially undesirable than the other versions. In terms of choices, both sure and risky options were rated as being at least slightly socially undesirable, with

risky choices rated as significantly more socially undesirable (*M*=-0.31, *SD*=0.26) than sure choices (*M*=-0.11, *SD*=0.26). Truncation version and choices both had medium effect sizes, meaning that truncation version accounted for 6% of the variance, and A/B choices accounted for 14% of the total variance.

Significant two-way interaction effects were found for frame and version, $F(2, 108)=81.15$, $p< .001$, $\eta^2=.60$, frame and choice, $F(1, 108)=557.02$, $p< .001$, $\eta^2=.84$, as well as version and choice, $F(2, 108)=6.43$, $p=.002$, $\eta^2=.11$. In relation to frame and truncation version, pairwise comparisons indicated significant differences across all levels. Interaction effects accounted for 60% (frame x version), 84% (frame x choice), and 11% (version x choice) of the total variance. In the gain frame, significant differences were found between all truncation versions. Social desirability ratings were highest for the non-zero-complement truncation version (*M*=0.96, *SD*=0.44), lowest in the zero-complement version (*M*=0.18, *SD*=0.44), with the complete version in the middle (*M*=0.45, *SD*=0.44). Social un-desirability ratings were found in the loss frame for all truncation versions. Significant differences were also found for the loss frame; social un-desirability ratings were highest in the non-zero-complement version (*M*=-1.34, *SD*=0.44), lowest in the complete

version (*M*=-0.74, *SD*=0.44), with the zero-complement version in between (*M*=-0.75, *SD*=0.44).

In relation to frame and choices, pairwise comparisons indicated significant differences across all levels. Sure choices in the gain frame were rated as highly socially desirable (*M*=1.19, *SD*=0.36) and highly socially undesirable in the loss frame (*M*=-1.42, *SD*=0.36). Risky choices in the gain frame (*M*=-0.17, *SD*=0.36) were rated as neutral in terms of social desirability and slightly socially undesirable in the loss frame (*M*=-0.47, *SD*=0.36). All comparisons were significant. In relation to sure and risky choices in the truncation versions, pairwise comparisons indicated significant differences in social desirability ratings for choices. Risky choices in the zero-complement version (*M*=-0.51, *SD*=0.44) had the highest social undesirability ratings, the complete version (*M*=-0.17, *SD*=0.44) was in the middle, and the non-zero-complement version (*M*=-0.25, *SD*=0.44) had the lowest ratings of social undesirability. Sure choices were rated as socially neutral in the zero-complement version (*M*=-0.51, *SD*=0.44), only slightly socially undesirable in both complete (*M*=-0.17, *SD*=0.44) and non-zero-complement (*M*=-0.25, *SD*=0.44) versions. All comparisons were significant.

A significant three-way interaction effect was found for frame, version, and choice, $F(2, 108)=98.50$, $p< .001$, $\eta^2=.65$), with a large effect

size, which accounted for 65% of the total variance. Pairwise comparisons showed that in a gain frame, sure choices were rated as being highly socially desirable regardless of truncation version, whereas risky choices were rated as being socially neutral in the complete version, slightly socially undesirable in the non-zero-complement version, and highly socially undesirable in the zero-complement version (Figure 7). In a loss frame, sure choices were rated as being highly socially undesirable regardless of version. Risky choices were rated as being socially neutral in the zero-complement-version, slightly socially undesirable in the complete version, and highly socially undesirable in the non-zero-complement version (Figure 7.), see Table 3 for list of specific means and standard deviations. All comparisons were significant.

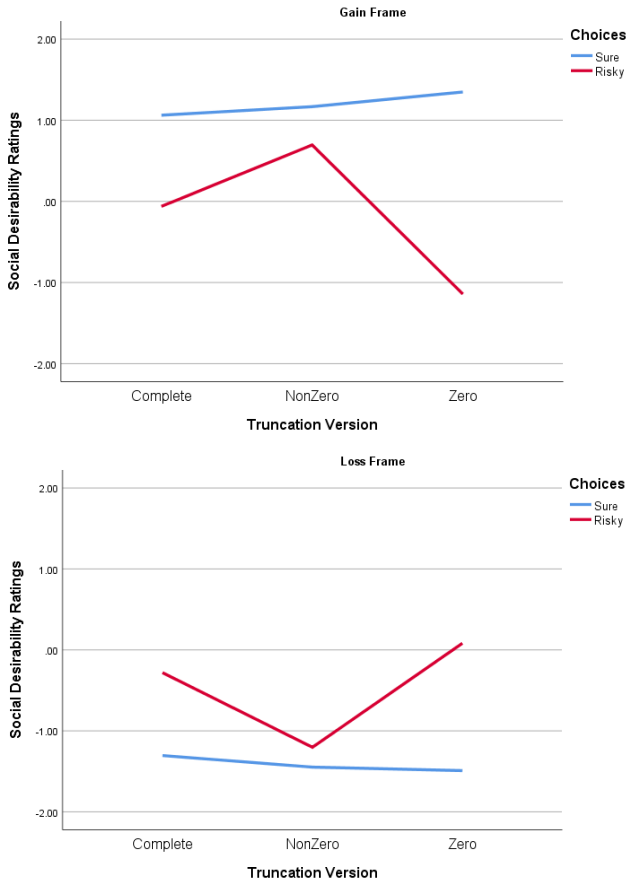

Figure 7. Social Desirability Ratings for Choices, Frame, and Version. Sure choices in a gain frame were rated as highly socially desirable regardless of truncation version and risky choices were rated as being neutral in the complete, slightly socially undesirable in the non-zero-complement, and highly socially undesirable in the zero-complement versions. Sure choices in a loss frame were rated as highly socially undesirable, also regardless of version, whereas risky choices were rated neutral in the zero-complement, slightly socially undesirable in the complete, and highly socially undesirable in the non-zero-complement versions. All comparisons were significant.

Table 3

Three-way Interaction Effects for Social Desirability Ratings

Frame	Version	Choice	*M*	SD
Gain	Complete	a	0.99*	0.24
		b	-0.08*	0.39
	Non-zero	a	1.18*	0.34
		b	0.73*	0.27
	Zero	a	1.36*	0.19
		b	-1.01*	0.24
Loss	Complete	a	-1.23*	0.17
		b	-0.26*	0.30
	Non-zero	a	-1.46*	0.22
		b	-1.23*	0.2
	Zero	a	-1.50*	0.2
		b	0.00*	0.21

Discussion

Given that social desirability is culturally determined, high rater agreement was to be expected among U.S. citizens. A few individuals with foreign IP addresses slipped into the worker sample (subject requirements for the assignments are essentially requests) and the exploratory factor analysis loaded them each onto their own factors entirely. It is no surprise that the main factor ratings showed high agreement; however, it is interesting to note that the entire group of raters (n = 51) showed generally

high agreement on the social desirability of the items (Cronbach's alpha = 0.94). The other two potential factors extracted both produced reliability alphas that were lower than that of the entire group (Factor 2 = 0.88 and Factor 3 = 0.63). This could reflect two different interpretations of the instructions in the rating task, or it could reflect different sensibilities regarding social desirability characteristics.

Extreme social desirability ratings were seen for sure choices in both frames—highly desirable in the gain frame and highly undesirable in the loss frame. This outcome was observed regardless of which truncation version had been presented, which makes sense given that the sure option was not varied across truncation versions of the choices. The wording of the sure choices was the same across all versions (i.e., saved for sure in a gain frame or die for sure in a loss frame). Truncation versions differed only in terms of what information was presented in the risky option. The effect size for frame was huge, accounting for 90% of the variance. The extreme values for sure choices could easily overrule any impact of risky choices specifically (Figure 7).

Further, social desirability ratings for the truncation versions were significantly different in complete and zero-complement versions but not in the non-zero-complement version. Fuzzy Trace Theory has shown that the non-zero-complement truncation version emphasizes the equivalence

between choices, thereby essentially eliminating the framing effect. A lack of significant social desirability for the non-zero-complement version could be in line with this down-regulation effect for the framing effect. Social desirability issues for the risky choice do not appear to have much impact when compared to the main effect of frame on sure choices. In the complete truncation version, risky choices were rated as socially neutral in both gain and loss frames. In the non-zero-complement version, ratings for risky choices mirrored the pattern of ratings for the sure choice but weren't as strong. In this case, risky choices were also rated as socially desirable in a gain frame and socially undesirable in a loss frame. In contrast, in the zero-complement version, risky choices were rated highly negative in the gain frame and neutral in the loss frame.

The clearest picture of social desirability dynamics in these decision choices is demonstrated in the three-way interaction between frame, version, and choice, which accounted for 65% of the variance in social desirability ratings. In a gain frame, sure choices were highly desirable regardless of truncation version, whereas risky choices were rated as socially neutral in the complete version, slightly socially undesirable in the non-zero-complement version, and highly socially undesirable in the zero-complement version (Figure 1). High social desirability for the sure option (in a gain frame) would have more motivational force than the lower level

neutral and undesirable ratings associated with risky choices across truncations. Simply put, in a gain frame, you would have to be willing to risk social censure to choose the risky option.

Similarly, in a loss frame, sure choices were highly undesirable regardless of version, whereas, risky choices were rated as socially neutral in the zero-complement version, slightly socially undesirable in the complete version, and highly socially undesirable in the non-zero-complement version. Once again, high social undesirability for the sure option (in a loss frame) would have more motivational pull than the lower level neutral and undesirable ratings associated with risky choices across truncations. In a loss frame, you would have to be willing to risk social censure to choose the sure option. Whatever the influence of version over risky choices, sure choices had the higher social desirability and undesirability ratings.

Chapter 4

General Discussion

Emotion Induction

There could be any number of reasons why a mood induction procedure developed in the late 1960's did not work for this study. However, first and foremost, everyone rushed. Nearly 14% of MTurk workers and 27.5% of firefighters took less than 10 minutes to complete the entire study. With 25 statements in each condition that had to be read once, read once out loud, and internalized, if participants only spent 30 seconds on each statement, it should have taken at least 12 minutes to complete the emotion induction alone. In hindsight, this might have served as a justification to exclude participants. However, excluding participants for speed would have further eroded the disappointingly small firefighter sample. And given that this research examined intuitive responses, it would have resulted in the loss of many quick choice responses.

Furthermore, a mood induction procedure that requires approximately 12 minutes of sustained attention and focus without in-lab control may be a lot to ask of a generation that can barely put their phones down. A 2012 study showed that 73% of Americans would feel panic if they were separated from their smartphones for very long (White, 2012).

The problem is so prevalent it has been proposed that the (dysfunctional) fear of being away from one's phone (nomophobia) be added to the next version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) (Bragazzi & Del Puente, 2014). In this digital age, it is becoming more difficult to hold peoples' sustained attention.

On one hand, Amazon Mechanical Turk workers are a known satisficing sample (regardless of level of education); this is at least partly due to the incentive structure (Hamby & Taylor, 2016). The best way to maximize profits is to do as many assignments as possible. For some assignments, speed may have no factor in determining the quality of work but in this study the emotion induction procedure required real buy-in and attention. The worker sample was collected despite these potential problems in hopes of getting a large sample and partly in response to a shortage of participants in the UTA psychology research subject pool. It was risky to attempt an emotion induction procedure with an online task in a home environment and it didn't pay off.

On the other hand, firefighters were largely recruited through their city email systems which are generally only accessible on-site, at their station. Their non-completion or drop-out points indicated no consistent pattern, which suggested that they were being interrupted by emergency calls and simply not returning. Non-completion patterns for workers were

consistent. Most people dropped out at the instruction check, which required them to answer questions to check if they understood the instructions. They could not continue without successfully answering these questions and this was where workers tended to end their participation. Surprisingly, a higher number of firefighters completed the entire survey in less than 10 minutes than did the workers in a known satisficing sample, so there were problems with everyone hurrying.

A wider explanation for why the emotion induction procedure didn't work in this study could be related to the replication crisis reported by the Open Science Collaboration (2015). Researchers all over the world made a coordinated effort to replicate 100 well-respected psychological studies, from three high-ranking journals. This effort produced only a 36% success rate (overall) compared to the original studies which reported a 97% success rate, with effect sizes in the replication studies proving to be half the magnitude originally reported. There could feasibly be a replicability problem for the Velten mood induction procedure, but especially when used outside of a controlled lab setting. The guided meditation aspect of this procedure is likely too demanding for an online study.

Framing Effects

In terms of the framing effect, both a consistent preference for sure or risky choices, which is considered rational in decision research, and a

predictably shifting preference depending upon frame (irrational-framing effect) reflect subtle forms of choice bias. When broken down into proportion of risky choices in each frame, a consistent preference for sure or risky choices would involve 100% (sure or risky) choices across both frames, whereas a perfect framing effect would involve zero risky choices in a gain frame and 100% risky choices in a loss frame. A 50/50 split would indicate zero choice bias and would therefore facilitate optimal decision making that is responsive to the options available.

Pre-college adults chose the risky option 36% of the time in a gain frame and 57% in a loss frame, suggesting a slight bias toward sure choices in a gain frame (64%) but less bias in a loss frame. Post-college adults chose the risky option 29% of the time in a gain frame and 49% in a loss frame, suggesting a bias toward sure options in a gain frame (71%) and nearly zero bias in a loss frame. For pre- and post-college adults, it may be that information presented in terms of what they stand to gain could invoke their preference for sure choices given their bias toward sure choices in a gain frame. In contrast, information presented in terms of what could be lost may summon a more considered response because these groups were closer to 50% in the loss frame.

In general, firefighters were the least susceptible to framing effects and they preferred risky options. Firefighters chose the risky option 78% of

the time in a loss frame and 55% of the time in a gain frame. Firefighters are biased toward risky decisions generally, but this is especially true in a loss frame. In a positive light, this is certainly in-line with a profession that involves running toward dangerous situations. Firefighters do not have the sort of hypothetical distance most of us have from the sort of decision problems presented in this study. Taking risks in the face of potential losses is a fundamental part of the terms of their profession. Individual differences such as the tendency to take risks in the face of potential losses are probably what draw men and women to the fire service in the first place. With training and experience, that may be what allows them to do a job that most people would not seriously consider because the work involves face-to-face experience with some truly frightening and traumatic moments.

Taken in another light, imagine the difference in responses firefighters might have to important medical treatment information depending upon how that information is presented. If presented in terms of what they could gain by a line of treatment, they are likely to make an optimized decision. However, if presented in terms of what they stand to lose, they may be likely to jump at a risky option. This information could have important implications both at personal and professional levels.

Social Desirability

Overall, the social desirability ratings of choice items that were used in the main study appeared to expose underlying social motivational forces between predictor variables related to the framing effect. Social desirability ratings for frame shows that sure choices alone could account for the preference shift described by the framing effect. In a gain frame, the sure choice is highly socially desirable; therefore, choosing the risky option could potentially trigger social disapproval. In a loss frame, the sure choice is now highly socially undesirable; therefore, choosing the sure option would risk social disapproval. This effect is so strong, it raises the question of why some people fail to shift their preference. This social pressure pattern mirrors the preference shift described by the framing effect perfectly. Social desirability characteristics of the sure choices of decision tasks that measure the framing effect may be driving the so-called irrational preference shift from sure choices in a gain frame to risky choices in a loss frame.

The percentage of choices participants made that matched social desirability patterns based on ratings from Study 2 (below) for each sure and risky option again reflected no significant relationships between choices and need for social approval personality measures and it did not prove to be a significant covariate. However, significant main effects were

found for version, with the highest amount found in the zero-complement version, the lowest in the non-zero-complete version, with the complete version in the middle. Percentage of socially desirable responses matched framing effect patterns perfectly. Additionally, on average, respondents choose the more socially desirable response option significantly more often than chance—61% of the time, suggesting an overall sample bias toward more socially desirable response options.

However, the fact that need for social approval scores were not related to behavior in this study does not necessarily undermine the likelihood that social desirability has an important influence on choices in these decision tasks. Fleming and Zizzo (2011) showed that people may have equal awareness of what constitutes the most socially desirable answer but still differ in their willingness to adjust behavior toward social compliance. Their research identified a dissociation between people's stated intent (giving socially desirable answers) and their actual pro-social behavior. High need for approval individuals were simply better at identifying and giving right answers, which suggests that social desirability response bias (SDRB) may be an image maintenance measure rather than one that accurately predicts behavior.

Predictions Based on Social Desirability

Ultimately there is something about the gain and loss frame that dominates choices in numerically equivalent decision problems. Without including frame, choice and version showed a pattern wherein raters viewed the choices in the complete and non-zero-complement versions quite similarly and saw more contrast between the choices in the zero-complement version (see Figure 8); however, none of these comparisons were significantly different from each other. Frame is clearly king.

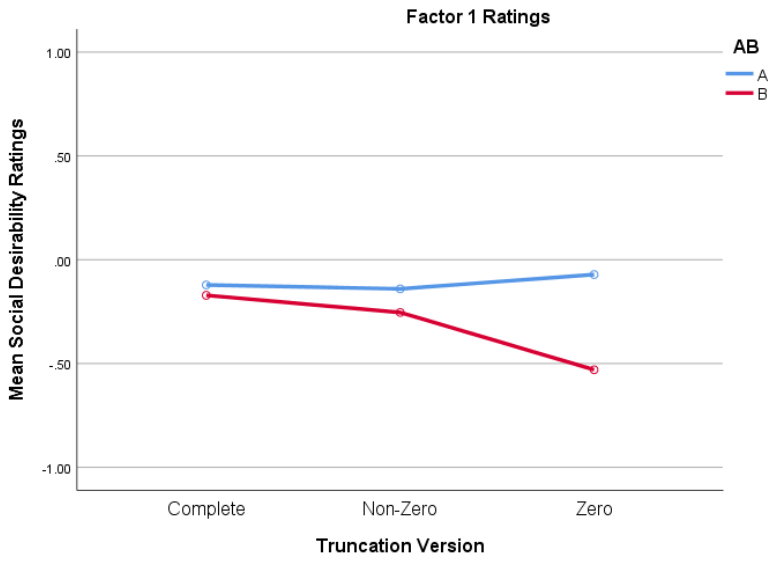

Figure 8. Social Desirability Ratings Without Frame (choice x truncation). No significant differences were found in these comparisons.

This research identified strong social desirability cues related to what is certain (the sure choice) in each frame (gain or loss), which means that attendance to sure or risky options likely has an important influence

on choices. Heavy verbatim processing tendencies are associated with less susceptibility to the framing effect; more attention to details increases awareness of the numerical equivalence between choices and frames. Fuzzy Trace Theory has shown that most people tend to recruit gist processes spontaneously and then attend to more verbatim detail only if necessary (Reyna & Brainerd, 1991; Brainerd & Reyna, 1992). Social awareness is essentially an understanding of the gist of often unspoken social rules and expectations. Heavy verbatim processors, such as people with high-functioning autism, have been shown to be able to process gist if prompted but tend to spontaneously recruit verbatim information instead. High verbatim processing could be driving consistent (sure or risky) choices through a disconnect with the social desirability characteristics in these decision tasks, especially those reflected in the sure option.

High verbatim processors may pay more attention to risky choices due to the need to make sense of the probabilities, and in the process miss out entirely on the social pressures associated with the sure choices. On the other hand, heavy gist processors are likely to simplify the choices, as Fuzzy Trace Theory has eloquently described; they may attend more to the sure choices along with the associated social pressures. If this were the case, one would expect to see different patterns of choices depending on whether an individual is a high-verbatim or high-gist processor. If high-

gist processors attend to more socially meaningful options (sure choices), one would expect strong framing effects regardless of truncation version, which was the case in this study. And, if high-verbatim processors attend more to risky choices, they should be more influenced by risky choice contrasts.

One would expect a consistent preference for sure or risky choices in the complete version and no framing effects. It is not immediately obvious how this dynamic might steer choices in the zero-complement version. It is also possible that we might see a general preference for the risky option. It may be that eye-tracking software could illuminate how people approach these decision problems and which information they focus on before making choices, for example. Table 4 shows some predictions, as well as directions for future research.

Table 4

Predictions for the Framing Effect (frame x version x choice):

		Gain		Loss		Predictions
Complete	→	Sure = (+)	↓	Sure = (-)	→	***FE***
	→	Risky = (0)	↓	Risky = (0)	→	***None***
		Sure	→	*Risky*	→	***FE***
Non-zero	→	Sure = (+)	↓	Sure = (-)	→	***FE***
	→	Risky = (+)	↓	Risky = (-)	→	***No FE or RFE***
		?	→	*?*	→	***None***
Zero	→	Sure = (+)	↓	Sure = (-)	→	***FE***
	→	Risky = (-)	↓	Risky = (0)	→	***?***
		Sure	→	*Risky*	→	***Stronger FE***

Note: Predictions, based on social concerns, can be made depending on where respondents are focused. High-gist processors are predicted to focus on sure options, whereas high-verbatim processors are predicted to focus on the risky options, regardless of frame.

Limitations & Future Research

The most obvious limitation for this research is that the emotion induction manipulation did not work, which shut down one of the central lines of inquiry. There are several design issues that should be addressed for future research. At a survey level, it may be that the emotion induction manipulation should have a forced time delay for each guided meditation statement in the procedure. That might keep participants from clicking

through the statements too quickly. Another issue is that Amazon Mechanical Turk respondents are known to speed through their assignments, so a different sample might be attentive to the emotion induction procedure that was used. It has also been reported that emotion induction procedures like the Velten are simply less effective at inducing emotion than are autobiographical recall induction procedures (Jallais & Gilet, 2010).

An autobiographical induction procedure might have been more appropriate for this study; however, concerns about what sort of traumas such an approach might bring up for firefighters—given some of the horrors they face in the line of duty—led to the use of the Velten emotion induction procedure as a matter of standardization and control. Moreover, to truly control the environment and encourage sustained attention for such a subtle emotion induction procedure, this research would have been better served as an in-lab study. For an online study of this nature, it might have been better to use an autobiographical emotion induction approach. With the failure of this Velten-style emotion induction manipulation, questions regarding the effects of emotion on the intuitive decisions remain unanswered. Future research should examine these questions using a more effective emotion manipulation.

The current study measured social desirability tendencies (need for approval) for individuals making choices in the main decision task in Study 1, and in Study 2, it measured an independent group's ratings of social desirability for the choice items. The social desirability rating study produced intriguing results. With such strong social desirability ratings at the item level, one would have expected clear relationships to be found between the rating patterns, choice patterns, and need for social approval tendencies. People who had high need for social approval were expected to show more susceptibility to framing effects than those with low need for approval; however, that is not the pattern that was found. Even when need for social approval scores were broken into levels of need for approval (high, average, and low), high need for approval was still not associated with more socially desirable responses. Neither of the two self-report measures for need for social approval were related to choices in this task.

Of the three groups, firefighters were both the least susceptible to the framing effect and the most concerned about social desirability. At this point, firefighters' preference for risky choices is so strong that it is not clear if they tend to be heavy gist processors or not; that may have to be determined using a different gist-related task because their preference for risky choices was clearly active in this task. It could also be that firefighters are heavy verbatim processors. If this were the case, it would

be a unique group with a surprisingly high need for social approval, which could be related to their general hero status in our culture. Hero status involves a high level of public scrutiny, so it may be that firefighters have a more highly developed sense of social desirability than the rest of us.

Fire commanders must weigh several levels of social desirability issues before they make important decisions. They must consider what civilians want on the surface, which is not to be needlessly inconvenienced, and what they most deeply want—to be safe from harm. A firefighter told me about times his crew entered restaurants full of people who refused to leave their dinners even though there was a fire in the kitchen. Firefighters walk this difficult social desirability line every day so a keen sense of need for social approval is probably inevitable. And it seems likely that they have a unique, potentially paternalistic, view of social desirability as a result. Future research should examine these issues.

This study was originally focused on firefighter decisions, but that sample ended up being the smallest sample. The largest number of participants were Amazon Mechanical Turk workers. Unexpectedly, the youngest and least experienced group (18-25 years, without a bachelor's degree) was the most susceptible to framing effects in this study, which suggested that they were the highest gist-processors. These findings

contradicted a host of Fuzzy Trace research findings that suggest that gist-based processing is developed by experience (Reyna & Brainerd, 1991; Brainerd & Reyna, 1992; Reyna, et al., 2008; Reyna et al., 2014). It may be that younger, inexperienced Amazon Mechanical Turk workers are a unique group with especially high gist-processing tendencies, compared to their contemporaries. Future research should examine verbatim and gist processing tendencies of Mechanical Turk workers at different age levels.

The central strength of this research was that it is the first study to examine the social desirability characteristics of a set of decision items commonly used to measure framing effects, which is used as a proxy for gist-processing tendencies. The statistical analysis approach to the data in the main study were aimed at replicating and extending the intelligence agent study (Reyna, et al., 2014). It could be that a different statistical approach would be able to capture a better view of these relationships. Future research should examine these relationships more closely to determine if there could be a causal relationship between the preference shift described by the framing effect and social desirability characteristics of the choice items presented in framing effect decision tasks.

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Appendix A

Emotion Induction

Appendix A

Emotion Induction

Instructions

Neutral Group

Please read each of the following statements to yourself and then read it aloud.

Sad and Happy Groups

In this part of the experiment, you will be reading a series of statements. Collectively these statements are meant to induce a mood state. In order to participate fully and successfully, you must be willing to feel and experience each statement as it would apply to you personally. When you read each statement, please allow yourself to respond as though the statement had been your own original thought. At first, you might feel like resisting the mood but try to go with the feeling. Don't try to stop it. Your participation may allow you to learn something valuable about yourself—that you can control your moods. If you can talk yourself into a mood, you should also be able to talk yourself out of one as well. Therefore, please try your best to experience the mood suggested. Try to feel and make each statement your own. Experience the mood suggested and don't try to stop it. If possible, visualize a scene in which you have had such a feeling or thought. Please read each of the following statements to yourself and then read it aloud.

Mood Induction Items

High Mood Induction

1. Doing what I'm doing makes my dreams more possible.
2. The world is full of opportunity and I'm taking advantage of it.
3. I know if I try I can make things turn out fine.
4. I bet things will go well for the rest of the day.
5. When I have the right attitude, nothing can depress me.
6. Most people like me.
7. I've got some good friends.
8. I can make things happen.
9. My parents brag about me to their friends.
10. I know I can get the things I want in life.

11. My future is so bright, I can do anything.
12. I feel creative and capable.
13. Nothing can bum me out now.
14. Things look totally awesome.
15. The relationships I have now are the best I've ever had.
16. It doesn't get any better than this.
17. I can make any situation turn out right.
18. I feel completely aware.
19. I'm in charge of my life and I like it that way.
20. Life is a blast, I can't remember when I felt so good.
21. I'm going to have it all!
22. When it comes right down to it, I'm just too cool.
23. I know I can do it; I'm going to seize the day!
24. I'm energized.
25. It's great to be alive!

Low Mood Induction Items

1. I feel a little down today.
2. Things are harder than I expected.
3. Everyone else seems to have more fun.
4. Sometimes I feel so guilty that I can't sleep.
5. I wish I could be myself, but nobody likes me when I am.
6. Today is one of those days when everything I do is wrong.
7. I doubt that I'll ever make a contribution in the world.
8. I feel like my life's in a rut that I'm never going to get out of.
9. My mistakes haunt me; I've made so many.
10. Life is such a heavy burden.
11. I'm tired of trying.
12. Even when I give my best effort, it just doesn't seem to be good enough.
13. Nobody understands me or even tries to.
14. I don't think things are ever going to get better.
15. I feel worthless.
16. What's the point of trying?
17. My family and friends don't know who I really am.
18. When I talk no one really listens.
19. I feel cheated by life.
20. Why should I try when I can't make a difference anyway?
21. Sometimes I feel really guilty about the way I've treated some people.
22. Every time I turn around, something else has gone wrong.
23. I'm completely alone.

24. There is no hope.
25. I feel I am being suffocated by the weight of my past mistakes.

Neutral Mood Induction Items

1. There are sixty minutes in one hour.
2. A neuron fires rapidly.
3. New Mexico is in the United States.
4. Apples are harvested in the Fall.
5. Basket weaving was invented before pottery making.
6. Some baseball bats are made from the wood of the ash tree.
7. The Shakers invented the circular saw.
8. It snows in Idaho.
9. Perennials bloom every year.
10. Arizona has both deserts and pine covered mountains.
11. You have to take the ferry to get to the island.
12. Santa Fe is the capital of New Mexico.
13. Elephants carried the supplies.
14. The Pacific Ocean has fish.
15. Most high schools have a band.
16. The rug was made according to an old Navajo pattern.
17. Some think that electricity is the safest form of power.
18. Most oil paintings are done on canvas.
19. Many buildings in Washington were made of marble.
20. Corn is sometimes called maize.
21. An orange is a citrus fruit.
22. Some say that lady bugs are good for the garden.
23. New York City is in New York State.
24. Diamonds really can cut glass.
25. Some chimps have been taught to use sign language.

Appendix B

Emotion Check

Appendix B

Emotion Check

Discrete Emotions Questionnaire

Please indicate your response using the scale provided. While participating in this study, to what extent did you experience these emotions?

Sadness (S)
Grief (S)
Emptiness (S)
Loneliness (S)

Happiness (H)
Satisfaction (H)
Liking (H)
Enjoyment (H)

1	2	3	4	5	6
Not at all	Slightly	Somewhat	Moderately	Quite a bit	Very much

Appendix C

Task Instructions

Appendix C

Task Instructions

Instructions

You will be reading problem scenarios and making decisions. You will be asked to indicate your preference between two options. Please answer as you would if you were making real-life decisions and try to go with your gut response. Please note that the probabilities and numbers presented in each scenario are exact. If a choice involves 10 dollars or lives for sure, it is certain to be 10 exactly--it cannot be 9, 11, or any other amount. The choice of a probability means the chance of an event occurring will be exactly the probability indicated. Here is an example scenario:

> A boat with 1,000 people is lost in the middle of the ocean. There is not enough food left on the boat for everyone to survive. The captain suggested two rescue programs:
>
> A: 500 people saved for sure.
>
> B: ½ probability no one saved.

For option A, 500 is the exact number of people that will be saved for sure, meaning absolutely certain. There is no chance that more or fewer than 500 people will be saved. For option B, there is exactly a 1/2 probability (50% chance) that NO people will be saved. And, although not explicitly stated, that means there is also a 1/2 (50% chance) that ALL lives could be saved. There is a chance that ALL the people will either be saved or not saved; there is no other possible outcome. Treat each decision as a completely separate choice and base each answer on how you feel at that moment. Please try not to skip any questions or leave any answers out. There are no “right” or “wrong” answers.

All probabilities and outcomes in Option B will always add up to 100%, whether both parts are stated or not. A ½ probability (50% chance) that everyone will be saved means there is ALSO a ½ probability (50% chance) that nobody will be saved. If there were a 3/5 probability that nobody will be saved, then (stated or not) there would ALSO be a 2/5 probability everyone will be saved (5/5 = 100%). If there were a 60% probability that nobody is saved, then there would ALSO be a 40% probability everyone is saved,

whether stated or not. Probabilities will always add up to 100% probability or chance.
Let's see if you understand.

Instruction Check
Here is an example to make sure you understand the instructions: A massive oil spill in the ocean is expected to kill 500 turtles. There are 2 conservation programs to choose from:

A: 300 turtles die for sure OR B: 3/5 probability 500 turtles die.

1. For option A, could 400 turtles die? Y or **N**
2. For option A, could 200 turtles die? Y or **N**
3. For option B, what is the probability that 500 turtles die?
    - At least 3/5 or higher?
    - 3/5 or less?
    - **3/5 exactly**?
4. Although not stated explicitly, what does option B imply?
    - 2/5 probability that 800 turtles die?
    - **2/5 probability that no turtles die**?
    - 3/5 probability that 300 turtles die?

Appendix D

Decision Problems

Appendix D

Decision Problems

(based on Reyna, Chick, Corbin, & Hsia, 2014)

Decision problems have choice options that vary in terms of the amount of information explicitly provided: complete information, zero-complement present, and a non-zero-complement present.

Gain Frame: (C=complete, NZC=non-zero-complement present, ZC=zero-complement present)

1. C1 Gain. Imagine the U.S. is preparing for the outbreak of an unusual dread disease, which is expected to kill 600 people. There are 2 options:
   A: 200 people saved for sure.
   B: 1/3 probability 600 people saved and 2/3 probability no one saved.
2. NZC1 Gain. Imagine the U.S. is preparing for the outbreak of an unusual dread disease, which is expected to kill 600 people. There are 2 options:
   A: 200 people saved for sure.
   B: 1/3 probability 600 people saved.
3. ZC1 Gain. Imagine the U.S. is preparing for the outbreak of an unusual dread disease, which is expected to kill 600 people. There are 2 options:
   A: 200 people saved for sure.
   B: 2/3 probability no one saved.

4. C6 Gain. Imagine that a new strain of AIDS is expected to kill 1,500 people this year. You have a choice between 2 drug trials:
   A: 600 people saved for sure.
   B: 40% chance 1,500 people saved and 60% chance no one saved.
5. NZC6 Gain. Imagine that a new strain of AIDS is expected to kill 1,500 people this year. You have a choice between 2 drug trials:
   A: 600 people saved for sure.
   B: 40% chance 1,500 people saved.

6. ZC6 Gain. Imagine that a new strain of AIDS is expected to kill 1,500 people this year. You have a choice between 2 drug trials:
   A: 600 people saved for sure.
   B: 60% chance no one saved.

7. C4 Gain. 1,000 people are expected to die from a disease. You have a choice between 2 programs to combat the disease:
   A: 300 people saved for sure.
   B: 30% chance 1,000 people saved and 70% chance no one saved.
8. NZC4 Gain. 1,000 people are expected to die from a disease. You have a choice between 2 programs to combat the disease:
   A: 300 people saved for sure.
   B: 30% chance 1,000 people saved.
9. ZC4 Gain. 1,000 people are expected to die from a disease. You have a choice between 2 programs to combat the disease:
   A: 300 people saved for sure.
   B: 70% chance no one saved.

10. C7 Gain. A large car manufacturer is in serious economic difficulty, and 12,000 jobs are at stake. You must choose between 2 programs to help save the jobs:
    A: 4,200 jobs saved for sure.
    B: 35% chance 12,000 jobs saved and 65% chance no jobs saved.
11. NZC7 Gain. A large car manufacturer is in serious economic difficulty, and 12,000 jobs are at stake. You must choose between 2 programs to help save the jobs:
    A: 4,200 jobs saved for sure.
    B: 35% chance 12,000 jobs saved.
12. ZC7 Gain. A large car manufacturer is in serious economic difficulty, and 12,000 jobs are at stake. You must choose between 2 programs to help save the jobs:
    A: 4,200 jobs saved for sure.
    B: 65% chance no jobs saved.

13. C8 Gain. Pollution is destroying a 10,000-acre rainforest. You have a choice between 2 conservation programs:
    A: 4,000 acres saved for sure.
    B: 2/5 probability 10,000 acres saved and 3/5 probability no acres saved.

14. NZC8 Gain. Pollution is destroying a 10,000-acre rainforest. You have a choice between 2 conservation programs:
    A: 4,000 acres saved for sure.
    B: 2/5 probability 10,000 acres saved.
15. ZC8 Gain. Pollution is destroying a 10,000-acre rainforest. You have a choice between 2 conservation programs:
    A: 4,000 acres saved for sure.
    B: 3/5 probability no acres saved.

16. C2 Gain. Imagine you are on a game show and have accumulated 1,000 dollars that is now at stake. You have 2 choices:
    A: Win 250 dollars for sure.
    B: A 25% chance you win 1,000 dollars and a 75% chance you win nothing.
17. NZC2 Gain. Imagine you are on a game show and have accumulated 1,000 dollars that is now at stake. You have 2 choices:
    A: Win 250 dollars for sure.
    B: 25% chance you win 1,000 dollars.
18. ZC2 Gain. Imagine you are on a game show and have accumulated 1,000 dollars that is now at stake. You have 2 choices:
    A: Win 250 dollars for sure.
    B: 75% chance you win nothing

19. C3 Gain. You agree to test a new casino game in which 45 dollars is at stake. There are 2 options:
    A: Win 30 dollars for sure.
    B: 2/3 probability you win 45 dollars and 1/3 probability you win nothing.
20. NZC3 Gain. You agree to test a new casino game in which 45 dollars is at stake. There are 2 options:
    A: Win 30 dollars for sure.
    B: 2/3 probability you win 45 dollars.
21. ZC3 Gain. You agree to test a new casino game in which 45 dollars is at stake. There are 2 options:
    A: Win 30 dollars for sure.
    B: 1/3 probability you win nothing.

22. C5 Gain. You are playing a game where you have a chance to win or lose money, with 20 dollars at stake. There are 2 options:
    A: Win 5 dollars for sure.

B: 1/4 probability you win 20 dollars and 3/4 probability you win nothing.

23. NZC5 Gain. You are playing a game where you have a chance to win or lose money, with 20 dollars at stake. There are 2 options:
    A: Win 5 dollars for sure.
    B: 1/4 probability you win 20 dollars.
24. ZC5 Gain. You are playing a game where you have a chance to win or lose money, with 20 dollars at stake. There are 2 options:
    A: Win 5 dollars for sure.
    B: 3/4 probability you win nothing.

25. C9 Gain. Imagine you are on a game show where you earn money by correctly answering questions. You have 500 dollars at stake and have one question remaining. There are 2 options:
    A: Win 200 dollars for sure.
    B: A 2/5 probability of winning 500 dollars and 3/5 probability of winning nothing.
26. NZC9 Gain. Imagine you are on a game show where you earn money by correctly answering questions. You have 500 dollars at stake and have one question remaining. There are 2 options:
    A: Win 200 dollars for sure.
    B: A 2/5 probability of winning 500 dollars.
27. ZC9 Gain. Imagine you are on a game show where you earn money by correctly answering questions. You have 500 dollars at stake and have one question remaining. There are 2 options:
    A: Win 200 dollars for sure.
    B: A 3/5 probability of winning nothing.

28. C10 Gain. Imagine you are on a trip to Las Vegas. As part of the casino's welcome program, the concierge offers you 2 options with 160 dollars at stake:
    A: Win 40 dollars for sure.
    B: 1/4 probability you win 160 dollars and 3/4 probability you win nothing.
29. NZC10 Gain. Imagine you are on a trip to Las Vegas. As part of the casino's welcome program, the concierge offers you 2 options with 160 dollars at stake:
    A: Win 40 dollars for sure.
    B: 1/4 probability you win 160 dollars.

30. ZC10 Gain. Imagine you are on a trip to Las Vegas. As part of the casino's welcome program, the concierge offers you 2 options with 160 dollars at stake:
    A: Win 40 dollars for sure.
    B: 3/4 probability you win nothing.

Loss Frame: (C=complete, NZC=non-zero-complement present, ZC=zero-complement present)

1. C1 Loss. Imagine a tsunami is expected to hit a major city and kill 1,200 people. Government officials have asked you to decide between 2 evacuation programs:
   A: 600 people die for sure.
   B: 1/2 probability 1,200 people die and 1/2 probability no one dies.
2. NZC1 Loss. Imagine a tsunami is expected to hit a major city and kill 1,200 people. Government officials have asked you to decide between 2 evacuation programs:
   A: 600 people die for sure.
   B: 1/2 probability 1,200 people die.
3. ZC1 Loss. Imagine a tsunami is expected to hit a major city and kill 1,200 people. Government officials have asked you to decide between 2 evacuation programs:
   A: 600 people die for sure.
   B: 1/2 probability no one dies.

4. C9 Loss. A hurricane is expected to hit a major city and kill 2,000 people. City planners have proposed 2 evacuation procedures:
   A: 1,500 people die for sure.
   B: 3/4 probability 2,000 people die and 1/4 probability no one dies.
5. NZC9 Loss. A hurricane is expected to hit a major city and kill 2,000 people. City planners have proposed 2 evacuation procedures:
   A: 1,500 people die for sure.
   B: 3/4 probability 2,000 people die.
6. ZC9 Loss. A hurricane is expected to hit a major city and kill 2,000 people. City planners have proposed 2 evacuation procedures:
   A: 1,500 people die for sure.
   B: 1/4 probability no one dies.

7. C10 Loss. Spinach products contaminated with a deadly strain of E. coli are expected to kill 900 people. You have a choice between 2 programs to combat the disease:
   A: 600 people die for sure.
   B: 2/3 probability 900 people die and 1/3 probability no one dies.
8. NZC10 Loss. Spinach products contaminated with a deadly strain of E. coli are expected to kill 900 people. You have a choice between 2 programs to combat the disease:
   A: 600 people die for sure.
   B: 2/3 probability 900 people die.
9. ZC10 Loss. Spinach products contaminated with a deadly strain of E. coli are expected to kill 900 people. You have a choice between 2 programs to combat the disease:
   A: 600 people die for sure.
   B: 1/3 probability no one dies.
10. C2 Loss. A lake that draws tourists to a town is expected to dry up, resulting in 3,000 jobs lost. You must choose between 2 resource management programs:
    A: 2,000 people lose their jobs for sure.
    B: 2/3 probability 3,000 people lose their jobs and 1/3 probability no one loses their job.
11. NZC2 Loss. A lake that draws tourists to a town is expected to dry up, resulting in 3,000 jobs lost. You must choose between 2 resource management programs:
    A: 2,000 people lose their jobs for sure.
    B: 2/3 probability 3,000 people lose their jobs.
12. ZC2 Loss. A lake that draws tourists to a town is expected to dry up, resulting in 3,000 jobs lost. You must choose between 2 resource management programs:
    A: 2,000 people lose their jobs for sure.
    B: 1/3 probability no one loses their jobs.

13. C3 Loss. Poor waste management is expected to kill 300 species of fish in a large lake. You must choose between 2 conservation programs:
    A: 175 species die out for sure.
    B: 7/12 probability 300 species die out and 5/12 probability no species die out.
14. NZC3 Loss. Poor waste management is expected to kill 300 species of fish in a large lake. You must choose between 2 conservation programs:

A: 175 species die out for sure.
B: 7/12 probability 300 species die out.

15. ZC3 Loss. Poor waste management is expected to kill 300 species of fish in a large lake. You must choose between 2 conservation programs:
A: 175 species die out for sure.
B: 5/12 probability no species die out.

16. C4 Loss. As part of a consumer behavior study, you are given a chance to play a game with 75 dollars at stake. There are 2 options:
A: Lose 45 dollars for sure.
B: 3/5 probability you lose 75 dollars and 2/5 probability you lose nothing.
17. NZC4 Loss. As part of a consumer behavior study, you are given a chance to play a game with 75 dollars at stake. There are 2 options:
A: Lose 45 dollars for sure.
B: 3/5 probability you lose 75 dollars.
18. ZC4 Loss. As part of a consumer behavior study, you are given a chance to play a game with 75 dollars at stake. There are 2 options:
A: Lose 45 dollars for sure.
B: 2/5 probability you lose nothing.

19. C5 Loss. While walking down the street, you run into a friend who gets you to play a game for money, with 80 dollars at stake. There are 2 options:
A: Lose 50 dollars for sure.
B: 5/8 probability you lose 80 dollars and 3/8 probability you lose nothing.
20. NZC5 Loss. While walking down the street, you run into a friend who gets you to play a game for money, with 80 dollars at stake. There are 2 options:
A: Lose 50 dollars for sure.
B: 5/8 probability you lose 80 dollars.
21. ZC5 Loss. While walking down the street, you run into a friend who gets you to play a game for money, with 80 dollars at stake. There are 2 options:
A: Lose 50 dollars for sure.
B: 3/8 probability you lose nothing.

22. C6 Loss. You are playing a slot machine with 2 levers. 40 dollars is at stake. The 2 levers are:
    A: Lose 30 dollars for sure.
    B: 75% chance you lose 40 dollars and 25% chance you lose nothing.
23. NZC6 Loss. You are playing a slot machine with 2 levers. 40 dollars is at stake. The 2 levers are:
    A: Lose 30 dollars for sure.
    B: 75% chance you lose 40 dollars.
24. ZC6 Loss. You are playing a slot machine with 2 levers. 40 dollars is at stake. The 2 levers are:
    A: Lose 30 dollars for sure.
    B: 25% chance you lose nothing.

25. C7 Loss. While walking the boardwalk of Atlantic City, you decide to play a casino game where 400 dollars is at stake. The dealer gives you 2 options:
    A: Lose 200 dollars for sure.
    B: 50% chance you lose 400 dollars and 50% chance you lose nothing.
26. NZC7 Loss. While walking the boardwalk of Atlantic City, you decide to play a casino game where 400 dollars is at stake. The dealer gives you 2 options:
    A: Lose 200 dollars for sure.
    B: 50% chance you lose 400 dollars.
27. ZC7 Loss. While walking the boardwalk of Atlantic City, you decide to play a casino game where 400 dollars is at stake. The dealer gives you 2 options:
    A: Lose 200 dollars for sure.
    B: 50% chance you lose nothing.

28. C8 Loss. You are playing a computer game that lets you gamble for money. 300 dollars is on the line. There are 2 options:
    A: Lose 240 dollars for sure.
    B: 4/5 probability you lose 300 dollars and 1/5 probability you lose nothing.
29. NZC8 Loss. You are playing a computer game that lets you gamble for money. 300 dollars is on the line. There are 2 options:
    A: Lose 240 dollars for sure.
    B: 4/5 probability you lose 300 dollars.

30. ZC8 Loss. You are playing a computer game that lets you gamble for money. 300 dollars is on the line. There are 2 options:
    A: Lose 240 dollars for sure.
    B: 1/5 probability you lose nothing.

Appendix E

Confidence Rating

Appendix E

Confidence Rating

Please rate how confident you feel about the choice you just made.

Not at all		Somewhat		Completely
1	2	3	4	5

Appendix F

Social Desirability (MCSD)

Appendix F

The Marlowe-Crowne Social Desirability Scale

1. Before voting I thoroughly investigate the qualifications of all the candidates. (T)
2. I never hesitate to go out of my way to help someone in trouble. (T)
3. It is sometimes hard for me to go on with my work if I am not encouraged. (F)
4. I have never intensely disliked anyone. (T)
5. On occasion I have had doubts about my ability to succeed in life. (F)
6. I sometimes feel resentful when I don't get my way. (F)
7. I am always careful about my manner of dress. (T)
8. My table manners at home are as good as when I eat out in a restaurant. (T)
9. If I could get into a movie without paying and be sure I was not seen I would probably do it. (F)
10. On a few occasions, I have given up doing something because I thought too little of my ability. (F)
11. I like to gossip at times. (F)
12. There have been times I felt like rebelling against people in authority even though I knew they were right. (F)
13. No matter who I'm talking to, I'm always a good listener. (T)
14. I can remember "playing sick" to get out of something. (F)
15. There have been occasions when I took advantage of someone. (F)
16. I'm always willing to admit it when I make a mistake. (T)
17. I always try to practice what I preach. (T)
18. I don't find it particularly difficult to get along with loud mouthed, obnoxious people. (T)
19. I sometimes try to get even rather than forgive and forget. (F)
20. When I don't know something I don't at all mind admitting it. (T)
21. I am always courteous, even to people who are disagreeable. (T)
22. At times I have really insisted on having things my own way. (F)
23. There have been occasions when I felt like smashing things. (F)
24. I would never think of letting someone else be punished for my wrongdoings. (T)
25. I never resent being asked to return a favor. (T)
26. I have never been irked when people expressed ideas very different from my own. (T)
27. I never make a long trip without checking the safety of my car. (T)

28. There have been times when I was quite jealous of the good fortune of others. (F)
29. I have almost never felt the urge to tell someone off. (T)
30. I am sometimes irritated by people who ask favors of me. (F)
31. I have never felt that I was punished without cause. (T)
32. I sometimes think when people have a misfortune they only got what they deserved. (F)
33. I have never deliberately said something that hurt someone's feelings. (T)

Appendix G

Social Desirability (SDS-17)

Appendix G

The Social Desirability Scale (SDS-17)

Instruction
Below you will find a list of statements. Please read each statement carefully and decide
if that statement describes you or not. If it describes you, check the word "true"; if not,
check the word "false".

Items
1. I sometimes litter.
2. I always admit my mistakes openly and face the potential negative consequences.
3. In traffic I am always polite and considerate of others.
4. I have tried illegal drugs (for example, marijuana, cocaine, etc.).
5. I always accept others' opinions, even when they don't agree with my own.
6. I take out my bad moods on others now and then.
7. There has been an occasion when I took advantage of someone else.
8. In conversations I always listen attentively and let others finish their sentences.
9. I never hesitate to help someone in case of emergency.
10. When I have made a promise, I keep it--no ifs, ands or buts.
11. I occasionally speak badly of others behind their back.
12. I would never live off other people.
13. I always stay friendly and courteous with other people, even when I am stressed out.
14. During arguments I always stay objective and matter-of-fact.
15. There has been at least one occasion when I failed to return an item that I borrowed.
16. I always eat a healthy diet.
17. Sometimes I only help because I expect something in return.

Notes: Answer categories are "true" (1) and "false" (0). Items 1, 4, 6, 7, 11, 15, and 17 are
reverse keyed. Item 4 was deleted from the final version of the SDS-17.
Item 4 is a filler item and will not be used for scoring.

Appendix H

Sensation Seeking

Appendix H

Sensation Seeking

Impulsive Behavior Scale Short (Cyders, Littlefield, Coffed, & Karyadi, 2014)

Sensation Seeking Subscale

Below are a number of statements that describe ways in which people act and think. For each
statement, please indicate how much you agree or disagree with the statement.

Strongly Disagree	Disagree	Neither/Nor	Agree	Strongly Agree
1	2	3	4	5

1. I quite enjoy taking risks.
2. I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.
3. I would like to learn to fly an airplane.
4. I would enjoy the sensation of skiing very fast down a high mountain slope.

Appendix I

Rating Instructions/Debriefing

Appendix I

Item Rating Task Details

Instructions

Social Desirability Response Bias

Social Desirability Response Bias (SDRB) refers to the tendency of survey respondents to answer questions in a manner that is likely to garner social approval rather than being completely honest. Respondents tend to underestimate behaviors that are viewed by society as "bad" and overestimate "good" behaviors. For example, people tend to underestimate their drug and alcohol use but overestimate how much they exercise. This form of response bias creates error in self-report research related to controversial issues such as sex, crime, and violence. However, it also influences responses on survey items that don't have such obvious social judgment implications.

You are being asked to read through 60 decision problems and rate the A and B choices for their level of social desirability. Please indicate whether you think a choice is socially desirable or undesirable--meaning it would likely garner social approval or disapproval.

Rate each choice individually. Don't overthink the choices or try to justify your answers. Trust your instincts and go with your first impression. There are no right or wrong answers.

Debriefing Statement

This rating project is part of my dissertation project examining the effects of emotion on the framing effect. People have a tendency to prefer either sure or risky choices. However, when numerically equivalent choices are presented in terms of gain or losses people's preference shifts. People prefer a sure choice when lives or money can be saved but a risky choice when lives or money might be lost.

Fuzzy Trace Theory's gist-processing explanation suggests people simplify choices down to their bottom-line meaning. Stripped of verbatim detail, gain and loss frames appear to reverse sure or risky choice preferences. Gist processing describes how numerically equivalent

choices come to be viewed as different, but it does not explain precisely why. Within decision research human lives are viewed as a commodity, something with inherent value--like money.

Nobody has examined these decision problem choices for their social desirability characteristics or whether social desirability may affect the preference shift seen in the framing effect. Your ratings will allow me to examine possible relationships between social desirability response bias and the framing effect that have, to date, been neglected.

Appendix J

Rating Task

Appendix J

Social Desirability Item Rating Task

All 60 decision problems listed in Appendix D were presented to raters in the item-rating task, in Study 2. All were formatted in the following manner:

1. Imagine the U.S. is preparing for the outbreak of an unusual dread disease, which is expected to kill 600 people. There are 2 options:

   A: 200 people saved for sure.

   B: 1/3 probability 600 people saved and 2/3 probability no one saved.

How socially desirable would it be to choose option A? Choose *one* of the following:

a. very socially undesirable
b. somewhat socially undesirable
c. neither undesirable nor desirable
d. somewhat socially desirable
e. very socially desirable

How socially desirable would it be to choose option B? Choose *one* of the following:

a. very socially undesirable
b. somewhat socially undesirable
c. neither undesirable nor desirable
d. somewhat socially desirable
e. very socially desirable

Biographical Information

Wyn E. Taylor completed an associate degree at Tarrant County College and later earned her B.S in psychology at Texas Wesleyan University. She began her graduate work in a memory and learning lab for an fMRI study, recruiting, screening, and running participants. Next, she worked at the Center for Healthy Living and Longevity, a research and exercise intervention--focused on fall prevention for older adults--in the UTA kinesiology department, performing physiological and psychological testing, as well as supervising other graduate and undergraduate research assistants. Ultimately, she built a sought after cognitive psychology lab that studies the effects of emotions on decision-making, among other things. Through her ongoing interdisciplinary collaborative research work, she has developed skills and knowledge in many areas of psychological, physiological, and psychometric research. She also has a deep affinity for teaching and mentoring students. She has studied the decisions of firefighters and is the co-founder of a corporate team building curriculum and activity (Firefighter Team Building Experience). She has studied the effects of emotion on intuitive decisions, selective attention mechanisms, gist-processing, and optimization tendencies. She is currently examining the effects of social desirability concerns on decisions. Wyn has a PhD in experimental psychology from the University of Texas at Arlington.