Contextual Effects of Goals, Stimuli, Performance, and Complexity on Cognitive Decision Biases

by

Jonathan Aycan

A thesis
presented to the University of Waterloo
in fulfillment of the
thesis requirement for the degree of
Master of Applied Science
in
Management Sciences

Waterloo, Ontario, Canada, 2010

Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Existing research investigating human judgment and decision making describes patterns of systematic biases in the way people process information and make decisions. Framing effects, for example, demonstrate that logically equivalent alternatives presented in divergent linguistic frames can lead to systematically different choice outcomes; in general, people demonstrate a preference for risk-averse behaviour when information is framed positively and risk-seeking behaviour when information is framed negatively. Similarly, the status quo bias describes a tendency for decision makers to maintain current or previous decisions when confronted with the availability of new options, demonstrating that people possess a predisposition to continue with established behaviour. This research proposes that the goals a decision maker adopts and the hedonic tone of the stimulus being evaluated influence whether framing effects are observed; similarly, the past performance of the status quo and complexity of available options influence whether participants exhibit a preference for the status quo. Using a survey-based experimental methodology, the aforementioned propositions are investigated by systematically manipulating characteristics of decision problems in order to reveal the mechanisms which influence the emergence of framing effects and the status quo bias. The results demonstrate that when positive goals or stimuli are emphasized, usual framing effects are observed; that is, participants demonstrate a preference for risk-averse behaviour in the positive frame and risk-seeking behaviour in the negative frame. Conversely, when negative goals or stimuli are emphasized, participants fail to demonstrate the expected shift in risk-preference. Past performance and complexity of the available alternatives are also shown to influence preference for the status quo; specifically, participants demonstrate greater preference for the status quo when past performance is strong compared to when it is weak, and when the number of available options is low compared to when it is high. The findings of this research improve our understanding of how contextual factors influence shifts in preference and the emergence of decision making biases; moreover, the current research demonstrates the need for future research to consider the influence of situational and contextual factors when investigating decision making in particular and human behaviour in general.

Acknowledgements

First and foremost, I must thank my supervisor, Rob Duimering, for his inspiration, encouragement, and patience over the past two years. Together we've enjoyed many thought-provoking conversations through which I have learnt to view the world in new and exciting ways. I would also like to express my appreciation to the readers of my thesis, Selcuk Onay and Derek Koehler, for their time and willingness to share their knowledge and expertise; both have offered invaluable insight which has improved this thesis in meaningful ways. I am also grateful to the teachers who helped to define my graduate experience; specifically, thanks to Scott Jeffrey for introducing me to the judgment and decision making literature, and also to Frank Safayeni, Randy Harris, and Paul Thagard for teaching me the importance of interdisciplinary studies. I must also express my appreciation to the undergraduate students who participated in the surveys which made this research possible, and to the instructors who allowed me access to those students; specifically, thanks to the aforementioned Scott Jeffrey and Selcuk Onay, and also to Clifford Blake and Shahed Alam. Last, but not least, I express my gratitude to my family for always supporting the decisions I make and the life paths I follow, and to my partner Lin Chen for providing me with the energy to pursue the things that usually only exist in dreams.

Table of Contents

List of Figures

List of Tables

Chapter 1
Introduction

Throughout our lives we are continually involved with decision making, the cognitive process of selecting a choice or action amongst a variety of alternatives. The choices we make are shaped by our beliefs, our values, our past experiences, and other aspects of our internal selves; moreover, the unique situations we find ourselves in contain countless elements and artefacts likely to influence the objects and events we perceive, the way we process information, and ultimately how we value and choose amongst the options available to us. Decisions are not selected in a vacuum, nor are they evaluated and selected independently of the others we are faced with; conversely, choices made one moment influence the situations and possibilities that follow. Some choices are routine and come naturally to us, such as whether to drink coffee or tea or which shoes to wear in the morning, while others require deep thought and contemplation, such as deciding whether or not to switch careers or move to a new city. Much of what leads us to make decisions depends on our observations of past choices; that is, the actions we have previously chosen—or witnessed others select—that have proven satisfactory (Gilboa & Schmeidler, 1995). If a person drinks coffee every morning of their adult lives, and is able to recalls pleasurable experiences on most such occasions, then opting to drink coffee again today is a choice requiring minimal thought. Conversely, most people have limited experience deciding whether to accept a job in a new industry or in a new city, and so careful consideration must occur while evaluating the potential rewards and risks; that is, decision makers must contemplate whether it is preferable to accept a fairly riskless outcome—for example, by maintaining the status quo—or to instead attempt to achieve a more desirable outcome at the risk of a relatively less desirable outcome. In other words, when making decisions, we must determine the level of risk we are willing to adopt.

It is fascinating to consider that we are equipped with the cognitive capacity to accurately process the immeasurable number of choice situations that face us each day. Assisting us with this task are *cognitive heuristics*—efficient information processing "rules of thumb" which allow us to make quick judgments and provide us with the ability to rapidly perceive our environment and quickly determine action despite the limited resources of our brains (Pólya, 1956). Heuristics allow us to process our everyday surroundings without fully perceiving all of the information available to us, thus permitting us to focus on the most highly salient cues which guide our thoughts and allow us to arrive at

judgments and decisions (Kahneman & Tversky, 1973; Tversky & Kahneman, 1973, 1982a, 1982b). Existing research has demonstrated that cognitive heuristics play an important role in our ability to make decisions (Kahneman, 2003); research has also shown that heuristics lead to *cognitive biases*—patterns of deviation in judgment which lead us astray from accurate perceptions of our environment and optimal outcomes in decision making (Tversky & Kahneman, 1974). Examples of biased thinking include the *framing effect*, which demonstrates that presenting the same information in different ways may lead people to arrive at divergent decisions (Kahneman & Tversky, 1984; Meyerowitz & Chaiken, 1987; Tversky & Kahneman, 1981, 1986), and the *status quo bias*, which demonstrates that people tend to opt for the continuation of established behaviour rather than shifting to new behaviour (Kahneman, Knetsch, & Thaler, 1991; Samuelson & Zeckhauser, 1988). While much research has demonstrated that we suffer from consistent and predictable biases in our thinking, follow-up studies often reveal results somewhat divergent or weaker than the expectations set by established theories (Kuhberger, 1998). Inconsistency amongst existing research findings raises the question of whether current theories are representative of all situations and contexts and thus whether results can be accurately generalized as fundamentals of human thought.

One way to explain inconsistent research findings is to acknowledge the existence of structural differences amongst the studied problems; that is, most decision problems investigated in the literature contain similarities in design, whereas problems that fail to replicate the expected finding exhibit structural differences in composition or content (Kuhberger, 1998; Sher & McKenzie, 2006). If research confirming existing theories has been based on problems of high structural similarity, and if problems of different structures lead to divergent results, then the conclusions drawn by existing research may be limited and the findings should not be generalized as fundamental traits of human decision making and behaviour. In their critical review of the framing literature, Levin, Schneider & Gaeth (1998) acknowledge that most decision studies focus on outcomes at stake which are of positive hedonic tone, while few studies investigating decision making when outcomes are of negative hedonic tone; that is, problems usually discuss stimuli having positive connotation in our minds—such as human lives, jobs, money, and other desirable assets. Moreover, it has been acknowledged that while affect is recognized as an important element in many behavioural theories, the concept has not been recognized by most models of human judgment and decision making (Slovic, Finucane, Peters, & MacGregor, 2007). Similarly, the majority of decision scenarios imply that the goal is to increase the commodity and that past performance has been strong. The lack of

consideration of negative stimuli, goals, and performance is a critical oversight by the literature, as existing research itself concludes that people more prone to risk-taking behaviour when content is described negatively (Kahneman & Tversky, 1979); specifically, existing research describing framing effects concludes that when outcomes are defined positively people tend to demonstrate risk-averse behaviour, whereas when outcomes are defined negatively people tend to demonstrate a tendency towards risk-seeking. Since the human mind is limited in its ability to perceive, process, and remember information (Miller, 1956), it is also natural that the complexity of a decision scenario might influence preferences.

This thesis claims that contextual and situational factors—often controlled, but usually not systematically varied in decision research—can significantly influence the choice of decision makers, and thus the existence of framing effects and the status quo bias. In other words, this research investigates the impact of contextual and situational factors on generally accepted cognitive biases. More specifically, this thesis proposes that the hedonic valence of elements within decision problems influence how we think about and evaluate decision problems. It is expected that the consistency of goals and the desirability of the problem stimulus influence the existence and direction of framing effects. Additionally, it is expected that past performance and problem complexity influence preference for the status quo alternative. By investigating how decision making is influenced when problems focus on items having differing hedonic appeal, we can improve our understanding of how cognitive heuristics are applied by decision makers and when cognitive biases are most likely to emerge in decision making; such knowledge will allow us to improve the psychological accuracy of our models of human judgment and decision making in situations involving risk and uncertainty.

This thesis begins by summarizing the literature on judgment and decision making, and continues with a discussion of a number of situational and contextual factors which might influence the way in which we process information and make decisions. Various hypotheses are proposed to investigate the influence of situational and contextual factors on framing effects and the status quo bias. A research methodology is then outlined which allows the propositions to be empirically tested and the results of the conducted studies to be analyzed. Lastly, the major conclusions and limitations of this thesis are discussed along with suggestions for future research.

Chapter 2
Judgment and Decision Making

The literature on judgment decision making includes contributions from a variety of disciplines including mathematics, economics, psychology, health studies, linguistics, management, business, and other applied areas (Kuhberger, 1998; Levin et al., 1998). Most notably, there exist two perspectives through which decision making is commonly investigated: how decisions should be made versus how people actually make decisions in everyday situations. Normative research is concerned with determining the optimal outcomes to be selected in decision scenarios under the assumption that consistency with established economic principles is to be maintained. Research discussing economically optimal choice is highly valuable when alternatives are to be evaluated in precisely defined scenarios which permit adequate time for detailed analysis to occur; for example, normative approaches are useful when an engineer uses objectively measured input variables—such as load and distance—to determine the ideal span of a bridge. Conversely, descriptive research seeks to explain how people actually make decisions in their daily lives; for example, to help predict whether that same engineer will choose to buy a ticket for a lottery. While normative models determine the optimal outcomes in objective or highly structured situations, descriptive models focus on the subjective preferences decision makers demonstrate in actual behaviour. The present research follows the descriptive approach to investigate individual decision making behaviour in uncertain situations; specifically, the studies that follow investigate existing models of decision making to explain how the context of a scenario might influence the preferences of individuals in situations involving risk and uncertainty.

The current section summarizes the fundamental ways in which we process information—that is, through intuitive and complex judgment—and attempts to explain when we are most likely to apply each type of processing. *Expected utility theory*, a basic normative model of decision making defining optimal economic choice in scenarios involving uncertainty, is then described. Next, the seminal work on cognitive heuristics and biases is introduced to explain why, in practice, we do not necessarily make decisions in a purely economic sense. Our perceptual dependence on *reference points* is then described followed by an introduction to *prospect theory*—a descriptive model of human decision making which attempts to improve upon expected utility theory. Lastly, examples of framing effects and the status quo bias are presented.

2.1 Intuitive and Complex Judgment

Much of actual human information processing and decision making lacks the precision that formal mathematical models describe. While some human decision making involves complex and calculated structured analysis, the majority of our decision making relies on intuitive judgment; that is, our decisions tend to be derived from "a complex set of interrelated cognitive, affective, and somatic processes, in which there is no apparent intrusion of deliberate, rational thought" (Hodgkinson, Langan-Fox, & Sadler-Smith, 2008). Whereas structured decision making usually relies on processes of sequential steps to determine an optimal course of action, intuitive decision making is best described as instinctive and subconscious in nature. Since intuitive decisions are achieved rapidly and without conscious consideration, processing information intuitively increases the reliance we place on our basic perceptual processes and limits our ability to perceive all aspects of our situation and environments. That is, when making decisions intuitively, we lack adequate time to fully analyze the situation; as a result, only the most highly salient elements of our environment are perceived and considered prior to reaching a judgment and taking action (Kahneman, 2003).

In order to process incomplete information, we apply *cognitive heuristics*—simple and efficient strategies which allow us to rapidly make near-optimal judgments using readily accessible information (Pólya, 1956). Of course, when incomplete information is used to make decisions the possibility of systematic errors or biases arising in our thinking is greatly increased. In fact, when situations are complex and nontrivial it has been demonstrated that all decision makers—including those who might be considered expert data analysts, such as those with formal training in statistics and economics—suffer from systematic errors in judgment (Tversky & Kahneman, 1974). That being said, an expert in a particular field does possess an ability to make intuitive judgments and decisions that differ from those of amateurs. By incorporating proficient knowledge with established processing abilities, expert decision makers are able to perceive and process the information contained within their environments in a way that is more efficient than others. The effectiveness of an expert's intuitive decision making processes results largely from his or her ability to recognize salient environmental cues and match them to existing knowledge derived from past experiences (Kahneman, 2003). Through the collection of knowledge over time, decision makers develop the ability to make rapid decisions without verbalization or conscious awareness of the decision making process. In fact, expert decision makers are often unable to explain why an intuitive decision has been made. For example, it has been shown that chess grandmasters know the move they are going to

make so quickly after seeing a game board that it is not possible for their selection to have resulted from analysis of the possible moves; moreover, when asked why they have made their chosen move, they are unable to provide a reason (H. Simon, 1983, p. 133). Intuitive decision making ability thus appears to result from a combination of ability to recognize environmental patterns subconsciously and experiences stored in memory (Frantz, 2003).

It would thus appear natural for us to rely on intuitive judgment for tasks that are familiar or routine in our daily lives. If a situation is common to us then we are likely to make sound judgments without deep consideration or even conscious thought; for example, there is little risk and minimal chance of regret in choosing to drink a cup of coffee in the morning if past experiences dictate that we do so on most mornings and we are able to recall satisfaction from doing so. On the other hand, there are obvious risks and a significant chance of regret when making more complicated and less familiar decisions, such as whether to switch careers. When making routine decisions we thus rely on our abilities to make decisions intuitively; meanwhile, when making more complicated decisions, we tend to follow a structured decision making process consisting of deliberative thought and more thorough analysis (Kahneman, 2003).

Understanding that there exist two core categories of decision making processes that are complementary in nature raises the question of whether we naturally apply each process in an optimal manner. While intuitive decision making is necessary for us to quickly and efficiently act in everyday situations, it also leads to the possibility of errors in judgment that occur due to misperception of the situation or simply due to us not noticing options divergent from the routine. A key purpose of studying decision making is to obtain knowledge that allows us to benefit from the efficiencies of our intuition while correcting for the errors and biases to which we are commonly susceptible (Tversky & Kahneman, 1982b). In order to establish a groundwork upon which we can further investigate decision making, it is necessary to discuss rationality in a strictly economical sense and to understand why we deviate from optimal economic outcomes when actually making decisions.

2.2 Rational Economic Decision Making

Expected utility theory, founded in the fields of economics and mathematical decision theory, is the dominant normative model of rational economic decision making under risk and uncertainty (Savage, 1954; von Neumann & Morgenstern, 1944). In economic theory, *utility* is an abstract concept

representing the relative value, based on a sum of satisfaction or benefit, an individual gains by consuming a good or service. Utility can thus be used to compare the relative satisfaction obtainable from different options. The *expected utility* of a set of uncertain outcomes is determined by calculating the probability-weighted sum of the possible values of utility. When choosing amongst risky or uncertain options, expected utility theory proposes that decision makers compute and compare the expected values of the available alternatives, and rational decision makers are said to select the alternative having highest expected value. While expected utility theory acknowledges that decision makers differ in their preferences by allowing for each to possess unique utility functions, the model does make other assumptions which limit the practical accuracy of the model's predictions; specifically, the model assumes that decision makers seek to recognize all possible alternatives available to them, have complete information of the potential outcomes, and consistently prefer the alternative having the highest economic payoff. In practice, these assumptions do not always hold true and the calculated preferences suggested by expected utility theory often fail to predict decisions actually made.

According to economic theory, decisions deviating from the predictions of expected utility theory are considered irrational since the preferences do not align with the option having highest economic value. A common explanation for this result is that decision makers lack complete knowledge of all possible alternatives due to either an omission of information contained within the scenario or limited abilities to perceive and evaluate the information that is present. In other words, people might select an irrational alternative due to the presentation of options rather than based on the likelihood of experiencing the actual costs and rewards being considered; that is, perception of information can be more important than the actual existence of such information. It is thus possible for identical underlying information to be presented in ways that highlight different elements of the scenario, resulting in decision alternatives being perceived and valued in ways that deviate from perfect rationality. Similarly, the preferences of an individual may not be rational according to economic axioms, thus leading to choices that are incongruent with rationality in an economic sense. If presentation of information and preferences of individuals influence perception and evaluation of alternatives, then it cannot be assumed that decision makers calculate values of expected utility with perfect accuracy according to predefined axioms of economic theory; it thus becomes necessary to further investigate the underlying causes of such shifts away from economically rational preference.

2.3 Cognitive Heuristics and Biases

Whereas economic models, such as expected utility theory, seek optimality when describing preferred outcomes, the existence of intuition suggests that human decision makers may not. Due to the limited perceptual and cognitive resources we possess to understand and evaluate the elements of our environments, it is usually impossible to examine all possible options prior to proceeding with an action. In reality, we tend to perceive only those elements that are most salient to us, and consider only those alternatives which are most accessible. Humans thus sacrifice some level of rationality in order to accelerate information processing and decision making. Conceptually, decision makers are said to demonstrate *bounded rationality* in that we behave rationally within the parameters of simplified models that capture the critical features of a problem scenario (H. A. Simon, 1957). We are also considered to be *satisficing* in that we accept satisfactory solutions rather than seek optimal ones; that is, we tend to accept the first alternative that comes to mind that satisfactorily meets our needs rather than applying additional effort or resources to seek outcomes that are optimal. Bounded rationality and satisficing help to explain the divergence between actual human decision making and rational economic models of choice. Allowing us to act on the basis of incomplete information are c*ognitive heuristics*, basic rules that permit us to process the information we perceive quickly; that is, they allow us to determine hypothetical solutions without performing full calculations of expected values of the alternatives. By applying cognitive heuristics we are able to quickly make decisions, arrive at judgments, and solve problems when faced with complex situations and incomplete information. Examples of fundamental psychological heuristics include representativeness, availability, and anchoring and adjustment (Tversky & Kahneman, 1974).

Representativeness describes a phenomenon by which people judge the likelihood of a hypothesis being true by considering how much it resembles available data existing in memory (Kahneman & Tversky, 1973). That is, when an event is highly representative of salient experiences, the probability of that event being associated with the experience is judged to be higher. Conversely, if an event is dissimilar to experiences existing in memory, then the probability of the event being associated with existing experiences is judged to be lower. *Stereotyping* is an example of representativeness in which it is assumed that all members of a group are considered to be definable by an easily distinguishable set of characteristics, leading to inaccurate assumptions about members of that set.

The *availability* heuristic suggests that people base predictions of the frequency or probability of an event based on how easily instances or associations come to mind (Tversky & Kahneman, 1973, 1974, 1982a). Experience teaches us that instances of common events are recalled more quickly and easily than uncommon events; similarly, recent experiences are recalled more quickly and easily than distant experiences. When accessing memory, people thus judge events that are recalled quickly as being more probable. Moreover, events that are particularly vivid or emotionally impactful to a person are likely to be heavily weighted when judging the likelihood of an event occurring. A decision maker is thus likely to judge the probability of an event occurring by assessing how often such an event has occurred in his or her past experience, or how emotionally salient that event was. As a result, people tend to overestimate the likelihood of recent, memorable, or vivid events.

Lastly, *anchoring and adjustment* explains that people often place excessive reliance on one trait or element of information over others when making decisions (Chapman & Johnson, 1999); that is, decision makers often demonstrate a tendency to establish an initial approximation based on a starting reference point, and make adjustments to achieve a final answer. As a result, the characteristic acting as a reference point will often be overweighted compared to other available attributes of information. The effect of anchors is often pervasive enough that irrelevant or uninformative starting points—such as random numbers, or other unrelated information—can systematically influence a decision maker's judgments.

Cognitive heuristics are thus experienced-based techniques that permit people to make decisions and solve problems in an efficient way. Heuristics are applied with the expectation of achieving a reasonable solution which satisfactorily meets the needs of the decision maker. The use of cognitive heuristics to process information efficiently leads to the emergence of *cognitive biases*—instances of evolved mental behaviour describing tendencies for people to make errors in judgment or decisions due to underlying cognitive factors (Tversky & Kahneman, 1974). While structured decision making may suffer from biased judgments through the negative influence of cognitive heuristics, intuitive decision making tends to be more greatly affected due to the rapid and impulsive nature of such judgments. Since intuitive decision making occurs quickly, there exists minimal opportunity to correct for errors that are made subconsciously. Conversely, when analyzing a situation in detail, there exists opportunities to discern and correct when information is initially judged incorrectly.

2.4 Reference Dependence of Choice

Existing research has established that our perceptions are *reference dependent*; that is, the attributes we perceive in a situation are dependent on the context in which they are observed (Kahneman, 2003). It is logical to assume that $100 of cash would be comparatively more valuable to someone with no money than to someone who has lots of money; it thus follows that the utility obtained from a good is dependent on the current state of affairs. Utility theory, however, is a reference independent model in that it assumes that utility is not related to the current state of wealth, thus contradicting this basic principle of perception. To elucidate this observation, consider the decision scenario presented in Figure 2.1, in which a choice between two alternatives is presented to participants in two contrasting frames

Figure 2.1 Reference dependence of choice

Gains Frame [N = 100]:
In addition to whatever you own, you have been given $1000. Choose between:

A) 50% chance of winning $1000 [16 percent]
B) guaranteed gain of $500 [84 percent]

Losses Frame [N = 100]:
In addition to whatever you own, you have been given $2000. Choose between:

A) 50% chance of losing $1000 [69 percent]
B) guaranteed loss of $500 [31 percent]

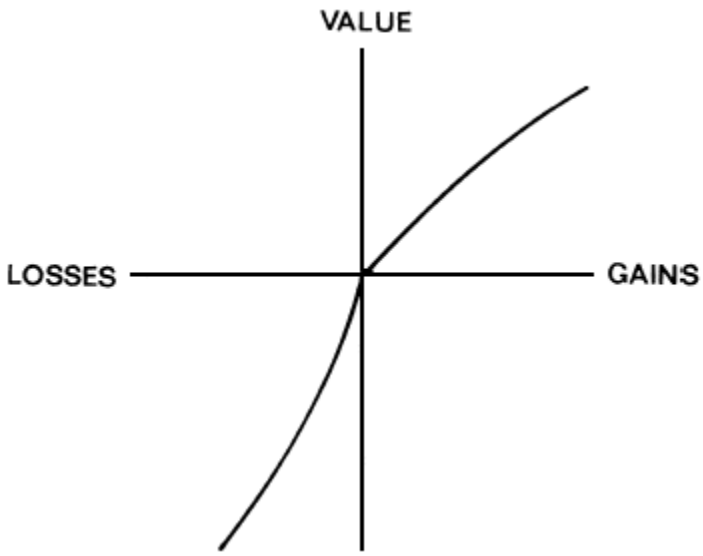
Source: Kahneman & Tversky (1979)

In the first scenario, participants are awarded an initial bonus of $1000 and then asked to choose between a 50% chance of winning an additional $1000, or a guaranteed gain of $500. Note that both alternatives have an expected value of $1500, and yet the majority of participants select the guaranteed gain. In the second scenario, participants are awarded an initial bonus of $2000 and then asked to choose between a 50% chance of losing $1000 and a guaranteed loss of $500. Again, both alternatives have an expected value of $1500, and yet in this case the majority of participants select the gamble. This example clearly demonstrates inconsistency with utility theory, as participants exhibit a preference for risk aversion when evaluating positive prospects and a preference for risk-seeking when evaluating negative prospects.

The existence of cognitive heuristics and biases demonstrate that it is not always appropriate to apply normative models of decision making, such as expected utility theory, to explain how people actually

make decisions. By defining the evaluation of alternatives from a strictly economical perspective, expected utility theory fails to acknowledge the situations in which human evaluation does not align with economic axioms (Tversky, 1975). In order to evolve expected utility theory into the descriptive realm, prospect theory was developed as a psychologically realistic alternative able to model human decision making while accounting for various cognitive heuristics and biases (Kahneman & Tversky, 1979; Tversky & Kahneman, 1981); that is, the theory attempts to describe how people actually make decisions given our reference dependent perceptions and the existence of systematic biases in our thinking. Prospect theory differs from expected utility theory in that it evaluates outcomes relative to a reference point rather than in absolute terms; the theory suggests that people's value functions are asymmetrical with respect to the reference point, causing gains and losses to be evaluated differently. The value function described by prospect theory, shown in Figure 2.2, is concave on the positive side and convex on the negative side, with outcomes perceived as being above the reference point evaluated as gains and outcomes perceived as being below the reference point evaluated as losses. The value function is thus s-shaped, with losses having a relatively larger impact compared to gains of equivalent magnitude. Evaluations are thus dependent on the outcome's position relative to a specified starting point.

Figure 2.2 Prospect theory value function



Source: Kahneman & Tversky (1979)

In accordance with prospect theory, when evaluating gains and losses having equal magnitude, people are predicted to demonstrate risk-averse behaviour on the positive side and risk-seeking behaviour on the negative side; this follows since the relative importance of additional gains is less valuable than additional losses are hurtful. Consider a situation in which a decision maker must select between a positive sure-thing and a positive risky-choice. Since both options are perceived to be positive relative to the reference point, they are evaluated on the concave region of the value function. The risky-choice option offers an opportunity for higher gains at the expense of returning to the zero reference point; however, since the curve becomes flatter further up the curve, additional gains become relatively less valuable. Respondents thus lock in gains by selecting the sure-thing option because the possibility of not obtaining guaranteed gains is more harmful than the potential additional gains are valuable. Conversely, consider a situation in which a decision maker must select between a negative sure-thing and a negative risky-choice. Since both options are negative relative to the reference point, they are evaluated on the convex region of the value function. The risky-choice option offers a chance to avoid a negative outcome at the expense of a possibly larger negative outcome; however, since the curve is initially very steep and becomes flatter, the possibility of avoiding the initial losses is more valuable than the additional losses are harmful, and so the majority of respondents opt to take a risk by selecting the risky-choice option.

2.5 Framing Effects

Framing effects exemplify the results modelled by prospect theory by demonstrating that the formulation of a decision scenario can alter a decision maker's interpretation of the available alternatives; in other words, framing effects reveal that logically equivalent options can lead to differing preferences in choice, with preferences between options shifting or reversing when information is presented in different ways. In their review of the literature, Levin et al. (1998) define three broad categories of framing effects: attribute framing, goal framing, and risky-choice framing. Each of the three types of framing effects demonstrates that the way in which a problem is framed can influence the perceived attractiveness of the available alternatives, and the preferences of the decision maker.

Attribute framing effects, perhaps the simplest form of framing effects, are demonstrated by highlighting either the positive or negative characteristics of an object or event. Through framing the valence of a problem attribute, the information contained within a decision scenario is presented in

such a way that it accentuates either the attractive or aversive qualities of an object or event. Such framing manipulations may apply to either the description of the decision scenario itself or the potential alternatives. Attribute framing problems usually manipulate the perceived valence of a single attribute within a decision scenario, such as by asking a decision maker to either accept an event or reject an event, or by phrasing a gamble in terms of a potential gain or a potential loss. For example, one study of attribute framing showed that perception of the quality of ground beef depends on whether the beef is labelled as "75% lean" or "25% fat." Participants rated the product as better tasting and less greasy when it was described positively—in terms of leanness—compared to when it was described negatively—in terms of fattiness (Levin & Gaeth, 1988). In general, attribute framing problems demonstrate that people are more likely to evaluate a situation favourably when it is described in positive terms rather than when it is described in negative terms (Levin et al., 1986; Levin, Snyder, & Chapman, 1988).

Goal framing effects demonstrate that decision making is influenced by the implicit goals that a decision maker adopts; a goal framing problem might instruct the decision maker to maximize or minimize a commodity, therefore focusing attention on the desirability of seeing gains or avoiding losses. In both cases the content of the problem remains identical; however, the phrasing of the goal is manipulated such that emphasis is placed on either the positive or the negative. For example, the positive frame of a problem might state that "studying for an exam increases performance" while the negative frame might state that "not studying for an exam decreases performance." In this case, the positive frame focuses the decision maker's attention on obtaining the positive outcome of strong performance, whereas the negative frame focuses attention on avoiding the negative outcome of weak performance. In general, the results of goal manipulations show that people tend to be more highly motivated to avoid a loss than to obtain a gain; that is, when a problem is described in terms of negative outcomes, participants are more highly motivated to make decisions and take actions that actively seek to avoid losses, as doing so reduces the likelihood of experiencing undesirable outcomes (Meyerowitz & Chaiken, 1987)

Risky-choice framing effects exemplify the tendency of decisions makers to prefer risk-averse options when alternatives are presented in the domain of gains, and risk-seeking options when alternatives are presented in terms of losses (Tversky & Kahneman, 1981); that is, whether the options in a decision scenario emphasize the positive or negative aspects of the problem influences a decision maker's

willingness to take risk. Of the various framing biases, the risky-choice framing effect is perhaps most prevalent in the literature, and will thus be discussed in the greatest detail. A classic example of the risky-choice framing effect is Tversky & Kahneman's Asian Disease problem (Tversky & Kahneman, 1981). The results of the Asian disease problem demonstrate that decision makers have inconsistent preferences when identical decision scenarios are presented using different phrasings of logically equivalent alternatives. In the positive frame, the problem was presented in terms of the number of lives saved, thus highlighting the desirable aspects of the alternatives; a separate group of participants were presented with an identical decision scenario and a logically equivalent pair of outcomes presented in a negative frame. In each case a pair of alternatives was thus presented which included a risk-averse option and a risk-seeking option having equal expected value; it was found that the preferences of participants were dependent on whether the available alternatives are described in positive terms or negative terms. The complete problem and original results are presented in Figure 2.3.

Figure 2.3 Asian disease problem: a classic risky-choice framing problem

Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume the exact scientific estimate of the consequences of the programs are as follows:

> Positive Frame [N = 152]:
> *If Program A is adopted, 200 people will be saved. [72 percent]*
> *If Program B is adopted, there is a 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved. [28 percent]*
>
> Negative Frame [N = 155]:
> *If Program C is adopted, 400 people will die. [22 percent]*
> *If Program D is adopted, there is a 1/3 probability that nobody will die, and 2/3 probability that 600 people will die. [78 percent]*

Which of the two programs would you favour?

Source: Tversky & Kahneman (1981)

Most problems exemplifying framing effects contain alternatives which have equivalent expected values. Moreover, the sure-thing and risky-choice options in the positive frame are usually equivalent to the sure-thing and risky-choice options in the negative frame. In the Asian disease problem, for example, the scenario specifies that 600 lives are at risk. In the positive frame the sure-thing option clearly states that "200 people will survive" implying that the remaining 400 people will die. In the negative frame, the sure-thing option specifies that "400 people will die" implying that the remaining

200 people will survive. Similarly, in the positive frame the risky-choice option specifies a 1/3 probability that 600 people will be saved and a 2/3 probability that no people will be saved—resulting in an expected value of 200 lives saved. Meanwhile, in the negative frame, the risky-choice option specifies a 1/3 probability that no people will die and a 2/3 probability that 600 people will die—resulting in an expected value of 400 people dying. There thus exists equivalence between the options within each frame and also across frames. Despite the logical equivalence amongst choice options, respondents demonstrate a preference for the risk-averse option in the positive frame and the risk-seeking option in the negative frame—resulting in a visible framing effect, or shift in preferences across frames.

While Tversky & Kahneman do not explicitly express why the Asian disease problem is an important decision scenario to be investigated, the conclusions of the study have been widely accepted and the results generalized across contexts and disciplines. Admittedly, there are limited methodological means through which appropriate subject matter and scenario formats can be determined, and it is difficult to find practical scenarios which can be generalized across all situations. For this reason, studying decision making and establishing generalized conclusions is an inherently challenging and somewhat subjective task. That being said, the seminal findings of Tversky & Kahneman do reveal that logically identical presentations of the same information can result in vastly different outcomes, contradicting the preferences predicted by expected utility theory; that is, manipulations in the wording of choice outcomes can cause decision makers to demonstrate a reversals in preference. Furthermore, the findings raise the possibility that decision makers remain unaware of the influence of framing on preference. The results of the Asian disease problem are practically significant in that they demonstrate that decisions made by others can be influenced through strategic presentation of the underlying information; the findings are thus highly important in fields as diverse as consumer marketing, business negotiation, health care, dispute resolution, and others.

Much research has expanded upon the foundational results defining the risky-choice framing effect. Social cues have been shown to influence priorities when making decisions; for example, research has shown that when the number of kin at risk is manipulated in the Asian disease problem, the preference for the risk-seeking alternative became more dominant as the number of kin in the endangered group increases (Wang, Simons, & Bredart, 2001). Similarly, when variations of the Asian disease problem were asked in which the focus was extraterrestrial lives as opposed to human

lives, a framing effect was observed only in the human case but not in the extraterrestrial case, thus suggesting that framing effects exemplify the existence of a social dilemma that is context dependent. Existing research also demonstrates that the size of the potential payoff influences choice in risky-choice problems, with participants more likely to opt for the sure-thing alternative when payoffs are larger compared to when they are smaller (Kuhberger, Schulte-Mecklenbeck, & Perner, 2002; Zhang & Miao, 2008). It has also been shown that some research designs are more effective than others, with scenarios describing disease or financial considerations producing stronger results than scenarios discussing other issues (Kuhberger, 1998). While numerous factors have been shown to influence the likelihood of observing framing effects, there exists strong evidence supporting a general tendency for people to prefer relatively risk-averse decisions when outcomes are framed in positive terms, and a relative tendency towards risk-taking when outcomes are framed in negative terms (Kuhberger, 1998; Levin et al., 1998). The majority of findings contained within the literature have, however, been somewhat weaker than those found initially.

2.6 Status Quo Bias

The *status quo bias* describes the tendency for decision makers to select the status quo alternative when confronted with the availability of new alternatives (Samuelson & Zeckhauser, 1988); that is, decision makers exhibit a tendency towards continuing established behaviour rather than shifting to new behaviour. In general, decision makers are likely to follow customary procedures and policies, purchase familiar products, continue in the same job, and maintain existing financial investments. In the judgment and decision making literature, the status quo bias has typically been investigated through decision scenarios in which a set of predefined alternatives are available with one option being defined as the default, or status quo, option. Across a range of decision scenarios, participants demonstrate a strong preference for the status quo option over the other available alternatives. The status quo bias likely exists due to both economic and psychological reasons. Decision makers might choose the status quo alternative for rational reasons, such as a desire to avoid perceived costs of switching away from the existing option; switching costs could include financial expenses associated with buying and selling products or investments, or non-financial costs such as the time required to gain familiarity with alternative options. Psychological commitment to the status quo option might also play a role in discouraging decision makers from moving towards a new option.

In general, people also demonstrate a desire to maintain cognitive consistency; that is, we behave in ways that maximizes the internal consistency of our cognitive structures and maintains that consistency through time (Newcomb, 1968, p. xv). Cognitive dissonance theory suggests that people prefer for their cognitions to be psychologically aligned (Festinger, 1957; Festinger & Carlsmith, 1959); if two cognitions are dissonant with one another, such as saying one thing but believing another, or shifting away from a decision previously made, psychological tension will be experienced and there will be motivation to reduce the dissonance. Another example of cognitive consistency is coherence theory, which suggests that we construct interpretations of our perceptions in ways that provide the most coherent account of what we want to understand; therefore, we perceive objects and events in ways that allow the information available to us to fit our interpretations better than alternate interpretations (Thagard, 2000; Thagard & Verbeurgt, 1998). Cognitive consistency also explains that people who communicate regularly with one another tend to think similarly (Shiller, 2005, p. 157). In situations of uncertainty, people tend to conform to the norms that exist within the social structure; that is, we assume that others are acting sensibly and adjust our beliefs to match those of the people around us (Locher, 2002, pp. 25-30). In other words, we not only seek coherence in our own thoughts and actions, but also strive to perceive the world in ways that are coherent with the views of others.

Broadly speaking, we tend to value the same things that others around us do, which implies having needs that are comparable to those of others in our social groups. In determining ways to satisfy those needs, we are likely to acquire goals and means from others as we observe others achieve their goals; specifically, the theory of conformism states that a subject who has neither the ability nor expertise to make decisions will leave decision making to the group and its hierarchy (Asch, 1955, 1956). For example, in the Asch conformity experiments (Asch, 1955, 1956), participants were asked questions about a set of lines after a group of confederates gave incorrect answers. It was found that most participants gave incorrect answers that conform to the responses of the majority. Similarly, in the Milgram experiment (Milgram, 1963, 1974), participants were instructed by an authority figure to perform acts that conflicted with their personal conscience. It was found that when instructed by a person in a position of authority to perform actions, participants were willing to perform actions that they otherwise would not have done. In many cases, the status quo alternative provided to a decision maker is not self-selected but is rather the result of the choice of another decision maker at a previous instance in time. In both the Asch and Milgram experiments, a tendency towards conformity suggests

that a person's desire for coherence with the opinions of others can actually cause a shift towards uniform behaviour, and thus a shift towards the existing status quo alternative. An alternative interpretation of the status quo bias would thus be that it summarizes the basic human tendency towards thoughts and actions that are coherent with the current and past actions of others.

In the case of a status quo alternative, decision makers are guaranteed an outcome that, in most cases, offers familiar results and is thus perceived as certain. In contrast, alternative options are often unfamiliar to the decision maker and are likely perceived as being relatively uncertain. In order to avoid uncertainty, decision makers demonstrate a bias towards the status quo alternative. That is, decision makers demonstrate a preference for the status quo since they perceive the disadvantages of shifting away from it as looming larger than the potential advantages obtainable through the alternatives (Kahneman et al., 1991). For example, when purchasing a cereal at the grocery store it is very easy for a shopper to buy the same brand as he or she always does, because doing so is relatively riskless if experience dictates that such a selection has been satisfactory in the past. Conversely, opting to move away from the status quo and select a different brand requires the adoption of greater risk since the decision maker can no longer guarantee that the product will be enjoyed. While the new cereal may offer many benefits, and may in fact be preferred by the decision maker if he or she gives it a try, the perceived risks involved in making the switch will often prevail, thus preventing the shopper from tying the new alternative.

Chapter 3
Contextual Influence on Decision Making

Through the amalgamation of research on psychological decision making and economic theory, prospect theory provides a descriptive model of decision making which improves the psychological realism of previous economic models. That is not to say, however, that the psychological findings prospect theory incorporates are perfect portrayals of actual human behaviour. If generally accepted biases in our thinking, such as framing effects and the status quo bias, do not appear as consistently in actual behaviour as existing research might lead us to believe, then there continues to be opportunity to further develop models of human judgment and decision making under risk and uncertainty.

Existing definitions of psychological biases largely omit explanations of how situational and contextual cues might influence how decision makers interpret and act upon information contained within decision scenarios. While the anchoring and adjustment heuristic clearly demonstrates a tendency for decision makers to establish initial approximations based on starting reference points contained within a scenario, this conclusion has not been widely acknowledged as a general tendency of human behaviour with regards to specific preference and decision making. The status quo bias does, of course, demonstrate an example of information contained within the decision scenario influencing choice outcome; that is, the status quo bias demonstrates that our values and beliefs are not necessarily retrieved from memory, but may instead be constructed from environmental cues during the decision making process. In making decisions, we thus rely not only on our internal memory but also our perceptions of our environments. It is thus highly plausible that other information contained within our environment, besides the status quo, also have meaningful impact on our perceptions and our evaluations of the available alternatives.

It is important to recognize that we perceive the world by creating representations of our environment through our limited perceptual abilities; that is, through our perceptions we build models of reality which influence what we believe to be true. By definition, a model is a simplified description of a system, and therefore certain details must be excluded. Our perceptual system relies on our use of cognitive heuristics to simplify a complex environment, and the heuristics we apply influence the elements of the world that we perceive. Since our information processing abilities are limited (Miller, 1956), it is unrealistic to assume that we are able to perceive everything, and so it is safe to assume

that our brains make simplifying assumptions while processing information and perceiving our environments (Koffka, 1935/1963, pp. 171-174). The elements of our environments that we do perceive become an integrated part of our knowledge and are likely to influence our perceptual and cognitive processes. Through perception of aspects of our environments as well as the behaviour of others, our values and goals influence how we value objects and events and thus have meaningful impact on the decisions we make. Therefore, while problem framing and the status quo alternative influence choice, so to do other elements of the environment which are highly salient and significantly influence the beliefs we derive from a scenario.

Prospect theory is tremendously successful in describing results that are consistent with framing effects; that being said, in accounting for some of the biased outcomes that result from our use of heuristics, the model must make assumptions which may be overly constraining and restrict its ability to apply in all situations. For example, prospect theory does not consider the influence of motivational and social factors on the valuation of alternatives. Moreover, prospect theory assumes that value functions are always s-shaped and therefore that certain relationships always exist between gains and losses without concern for the nature of the underlying commodity; that is, the theory does not explicitly acknowledge that items having different valence might be valued in different ways. Consideration of situational and contextual aspects of decision scenarios is thus outside the realm of existing theory and limits the real-world reliability of the descriptive model. The ideas presented in this section explain a variety of ways in which situational and contextual aspects of a decision scenario might influence the choice of a decision maker. The theory discusses how the goals defined within a scenario and the hedonic tone of a problem's stimuli might influence the emergence of framing effects; then, in a somewhat distinct but related discussion, the theory discusses the influence of past performance and the complexity of a problem on a decision maker's preference for the status quo alternative.

3.1 Goals and Motivation

Deci & Ryan (2000) define human needs as innate, organismic necessities essential for ongoing psychological growth, integrity, and well-being. In order to satisfy our needs, we possess motivation, derived through either internal or external sources, which activates goal-oriented behaviour. Factors influencing motivation include the basic human desire to minimize pain and maximize pleasure, the natural desire to avoid mortality, and a social desire to behaviour altruistically. Intrinsic motivation

arises through rewards inherent to a task or activity itself, while extrinsic motivation emerges due to a desire to achieve something outside of oneself. We are likely to become intrinsically motivated to perform a task if we can control the amount of effort we put in, have some control over the results, and are naturally interested in the topic, whereas we are likely to become extrinsically motivated if we possess a desire to obtain an external reward or avoid punishment. In order to perform tasks in a way that allow us to satisfy our needs, the goals we possess motivate our behaviour by directing attention, regulating effort, increasing persistence, and encouraging strategic planning (Locke & Latham, 1990). In the case of multiple potential courses of action, goals direct attention by indicating how much effort should be focused on various elements of a task. When obstacles exist, goals encourage us to persist by acting as a reminder as to why short-term efforts are being exerted. Goals also encourage us to create strategies and action plans that provide us with a means through which we can achieve the things we desire. It is important to recognize that goals are established and decisions made within the context of a larger society which influence our values and the resources available to us. Social structures represent systems of rules, social norms, and sanctions which define the situations in which we live our lives (Bandura, 2001; Giddens, 1984). When goals are aligned with those of others within the structure of the social system, we have additional resources available which may help us satisfy our needs (Earley, 1994); there thus exists motivation for us to set and maintain goals that are similar to those of others within our social groups.

In the Asian disease problem, participants are assumed to possess an existing goal to save as many lives as possible. The positive frame contains options described in terms of saving lives, an outcome that is congruent with the decision maker's goals; conversely, the negative frame describes options in terms of people dying; an outcome that conflicts with the decision maker's goals. Desirable goals can thus be considered to have positive valence while undesirable goals can be considered to have negative valence. The results illustrated by risky-choice framing problems reveal that when options have positive valence, participants demonstrate a preference for risk-aversion; whereas when choices have negative valence, participants demonstrate a preference for risk-seeking (Tversky & Kahneman, 1981). Heath, Larrick, & Wu (1999) claim that goals serve as reference points which influence motivation and influence how outcomes are valued. Moreover, McElroy & Seta (2007) have demonstrated that by explicitly manipulating goals within a decision task, the perceived valence of the alternatives is influenced, which impacts the likelihood and direction of framing effects being observed. To test this proposition, the authors described a situation, portrayed in Figure 3.1, in which

an athlete's goal is to either increase, decrease, or maintain his or her weight. For each scenario, participants were asked to make a choice between alternatives presented in either a positive or negative frame.

Figure 3.1 Athlete weight problem: a risky-choice framing problem with explicit goals

Imagine that you are an athlete with the goal of (decreasing; increasing; maintaining) your weight as much as possible. Because of your sport, at this juncture in the season, (the lower your weight the better you can perform; the higher your weight the better you can perform; your current weight is where you can perform best).

Positive Frame:
If Program A is adopted, 20 pounds will be gained.
If Program B is adopted, there is a one-third probability that 60 pounds will be gained and a two-thirds probability that no pounds will be gained.

Negative Frame:
If Program C is adopted, 40 pounds will be lost.
If Program D is adopted, there is a one-third probability that no pounds will be lost and a two-thirds probability that 60 pounds will be lost.

Which of the two programs would you favour?

Source: McElroy & Seta (2007)

In the athlete weight problem, goals have been explicitly defined and assigned to the participants. In the case where the goal is to increase weight, the alternatives presented in the positive frame are aligned with the decision maker's goal and so the frame possesses positive valence; in contrast, the options in the negative frame oppose the goal and so the frame has negative valence. Conversely, in the case where the goal is to decrease weight, the positive frame opposes the goal and the frame thus has negative valence, while the negative frame is aligned with the goal and so the frame has positive valence. In summary, when goals are consistent with the available options the frame has positive valence, and when goals are inconsistent with the available options the frame has negative valence. Results of the study demonstrate that when the goal is to increase weight, a standard risky-choice framing effect consistent with existing literature is observed; that is, respondents demonstrate a tendency towards risk-aversion in the positive frame and risk-seeking in the negative frame. Conversely, when the goal is to decrease weight, respondents demonstrate a preference for risk-seeking in the positive frame and risk-aversion in the negative frame; in other words, a framing effect opposite to that commonly found in the literature is observed. Lastly, when the goal is to maintain weight, the goal lacks consistency with any of the outcomes, and no framing effect is observed. That

is, neither a gain nor a loss of weight supports the goal; therefore, the framing of the problem does not significantly influence the choices of respondents. The findings of McElroy & Seta are significant in that they demonstrate the importance of goals on decision making, especially with respect to risky-choice framing problems. The results of the problem, summarized in Table 3.1, demonstrate that the goals of a decision maker determine the valence of the frame and thus the likelihood and direction of the resulting framing effect.

Table 3.1 Summary of framing effects in athlete weight problem

Goal	Frame	Valence	Conclusion
Increase	Positive	Positive	Framing effect
	Negative	Negative	
Decrease	Positive	Negative	Reverse framing effect
	Negative	Positive	
Maintain	Positive	Ambiguous	No framing effect
	Negative	Ambiguous	

To further clarity the results, consider that when the scenario defines a goal to increase weight, the positive frame describe outcomes that are inherently desirable for the decision maker; meanwhile, the negative frame describe outcomes that are inherently undesirable. The outcomes within the positive frame are thus positively aligned with the subject's goal, while the outcomes contained in the negative frame are negatively aligned with the goal. The interpretation of positive and negative frames is thus straightforward. Conversely, consider the scenario in which the goal is to decrease weight. Now the alternatives described within the positive frame are actually undesirable for the decision maker, and thus inherently negative in nature; meanwhile, the alternatives described in the negative frame are actually desirable to the decision maker, and thus inherently positive in nature. In this case, the positive frame actually opposes the goal; consequentially, the frame is actually associated with a negative connotation. In fact, the positive frame could be considered negative, and the negative frame considered positive. If this interpretation is accepted, then what we actually observe when the goal is to decrease weight is a regular framing effect—no different from results already existing throughout the literature.

One oversight of the McElroy & Seta study is that outcomes described within the positive frame are not logically equivalent to outcomes described within the negative frame; that is, the weight problem does not demonstrate a framing effect equivalent to that found in the Asian disease problem. The reason for the inconsistency is that the described scenario does not explicitly specify how much

weight is ‘at risk’, and there is thus no available benchmark to which participants can immediately compare the available options. In the positive frame, the sure-thing option specifies that 20 pounds will be gained, whereas in the negative frame the sure-thing option specifies that 40 pounds will be lost—but these alternatives are not consistent since the decision scenario does not specify that 60 pounds are at risk. Similarly, in the positive frame the risky-choice option specifies a 1/3 probability that 60 pounds will be gained and a 2/3 probability that no pounds will be gained—resulting in an expected value of 20 pounds gained. In the negative frame, however, the risky-choice option specifies a 1/3 probability that 60 pounds will be lost and a 2/3 probability that no pounds will be lost—resulting in an expected value of 40 pounds lost. The problem thus exhibits logical equivalence between the two options within the positive frame—since both have an expected value of 20 pounds gained—and logical equivalence between the two options within the negative frame—since both options have an expected value of 40 pounds lost. However, there is inequality between the expected value of options in the positive frame and the expected value of options in the negative frame, and so the different framings cannot be considered to be logically equivalent. The results demonstrated by McElroy & Seta are thus not technically framing effects according to existing definitions. Despite the aforementioned omission, the findings of McElroy & Seta do provide initial evidence that goals might influence preferences for risk and valuation of uncertain alternatives by decision makers; moreover, the results demonstrate that the existence and direction of framing effects may be dependent on a decision maker’s goals. In general, the study demonstrates that a goal to increase a commodity might promote a preference for risk-aversion in the positive frame and risk-seeking in the negative frame—a finding that is analogous with the expectations of the framing effect literature. In contrast, a goal to decrease a commodity might promote a preference for risk-seeking in the positive frame and risk-aversion in the negative frame—a finding consistent with the literature, assuming that one acknowledges that the valences of the frames have been reversed.

The complexity involved with interpreting the weight problem demonstrates the limitations of the language used by existing literature to describe risky-choice framing problems. We have thus revealed an additional difficulty with the results of the weight problem in specific, and the greater literature as a whole. Whether an alternative should be considered positive or negative is dependent on the goals of a decision maker. The weight problem demonstrates that goals determine the attractiveness of alternatives from the perspective of a decision maker; the problem also demonstrates the need for language used within the literature to be more clearly defined if we wish to improve our

understanding of framing effects. An alternate way to explain the results is to say that participants demonstrate a tendency towards risk-aversion when outcomes are aligned with inherent goals, and a tendency towards risk-seeking when outcomes oppose goals. In other words, explicitly or implicitly defined goals influence a decision maker's perception of problem elements, thus determining the likelihood and direction of framing effect. Goals thus influence whether problem elements are perceived to be positive or negative. McElroy & Seta opted to label frames as positive and negative in a way that maintains consistency with the literature, even though doing so meant the labels are somewhat contrary to logic. Consistency with existing literature allows for a straightforward understanding and comparison of the results by those already familiar with similar problems. In existing literature outcomes are described as being positively framed if the outcomes discuss increasing a commodity, while outcomes are described as being negatively framed if the outcomes discuss decreasing a commodity. In describing the current theory of this thesis, existing language is maintained while acknowledging that the hedonic valence of an outcome is a fundamentally different thing. Outcomes are of positive hedonic valence, or inherently desirable, if they describe results in a way that is consistent with a decision maker's goals, while outcomes are said to be of negative hedonic valence, or inherently undesirable, if they describe results in a way that is inconsistent with a decision maker's goals.

In summary, the findings of the McElroy & Seta study are interesting, but somewhat restricted by language and a lack of logical equivalence amongst alternatives. The ability to generalize the findings is also limited since their conclusions result from investigating just one problem of high structural similarity to the Asian disease problem. In order to generalize the relationship between goals and problem framing, there is a need to conduct further studies using clarified language under a diversity of decision scenarios. The present research manipulates goals within various decision scenarios in order to investigate the relationship between the goals explicitly defined for a decision maker and the valence of a problem frame; that is, this research claims that when the goal is to increase a desirable commodity, the usual framing effect appears; when the goal is to decrease a desirable commodity, a reverse framing effect appears; and when there is ambiguity in the direction of a goal, no framing effect is evident.

It is therefore expected that participants will demonstrate a preference for risk-aversion when outcomes are consistent with goals and a preference for risk-seeking when outcomes are inconsistent

with goals; in other words, when goals are positive in nature, a regular framing consistent with existing literature will be demonstrated.

> ***<u>Hypothesis 1a</u>: When goals are to increase the stimulus, preferences of participants demonstrate a framing effect with greater preference for risk-aversion in the positive frame, and greater preference for risk-seeking in the negative frame***

Conversely, when goals are negative, the hedonic valences of the frames are reversed. Participants are thus expected to demonstrate a preference for risk-seeking in the positive frame and risk-aversion in the negative frame; in other words, when goals are negative in nature, a reversed framing effect will be demonstrated.

> ***<u>Hypothesis 1b</u>: When goals are to decrease the stimulus, preferences of participants demonstrate a reversed framing effect with greater preference for risk-seeking in the positive frame, and greater preference for risk-aversion in the negative frame***

Lastly, when goals are not aligned with outcomes, decision makers lack a clear indication of which outcomes are more or less desirable and thus demonstrate uncertainty in their preferences.

> ***<u>Hypothesis 1c</u>: When goals are not clearly defined, preferences of participants do not demonstrate a framing effect***

3.2 Hedonic Tone of Stimulus

Framing effects demonstrate that the valence through which problem content is described influences our perception and evaluation of the contained information; that is, the framing of a problem effects how we process information and ultimately our preferences in selecting amongst available options. Moreover, the previous section claims that goals play a critical role in influencing how we perceive the valence of information and the way in which equivalent information is perceived across different variants of a decision scenario. The influence of goals on framing effects thus demonstrates that information doesn't exist independently; rather, it is context dependent and is influenced by the manner in which it is presented. Whether desirable or undesirable elements are accentuated thus impacts our perceptions of problems, our evaluations of the available alternatives, and our willingness to take risks.

Slovic et al. (2007) have provided a theoretical framework supporting the idea that our affective impressions of a subject guide our judgment and decision making, explaining that we are influenced at a subconscious level without concern for the objective facts of the situation; that is, affective judgments, such as emotions and feelings, influence decision making in an intuitive manner through automatic processing that occurs without mindful thought. In fact, it has been shown that people tend to prefer gambles that, on average, provide them with the greatest emotional satisfaction and that affective factors, rather than economic utilities, play a significant role in determining preferences (Mellers, Schwartz, & Ritov, 1999). That is, subjective emotional pleasure associated with outcomes, rather than just objective economic considerations, influence our judgment and decision making. Our processing of information is thus directed not only by fact, but also the underlying desirability of the subject at hand; attribute framing, of course, provides evidence to support this view. While risky-choice framing and attribute framing have been separately defined by the literature, the interaction between the two types of framing effects has not been closely studied. In fact, nearly all studies of the risky-choice framing effect have focused on problems containing stimuli that are desirable to the decision maker; that is, the focus of most research has been on such items as human lives, financial investments, and other desirable things (Levin et al., 1998). Rarely have items of negative hedonic tone—such as murders, cockroaches, or debt—been explored. In other words, existing research studying framing effects has not adequately investigated how perception of stimuli having negative hedonic tone might be valued differently from stimuli having positive hedonic value. Consider a variation of the Asian disease problem, outlined in Figure 3.2, in which the subject is inherently negative; that is, the subject is rodent lives rather than human lives.

Figure 3.2 Rodent problem: a risky-choice framing problem containing negative stimuli

Imagine that the government is preparing for the outbreak of an unusual disease which is spread by rodents. On average, for every surviving rodent, one person will die of infection. It is estimated that there are 600 diseased rodents in a certain region, thus putting 600 human lives at risk. Two alternative programs to combat the disease have been proposed. Assume that the estimates of the consequences of the programs are as follows:

> Positive Frame:
> *If Program A is adopted, 200 diseased rodents will survive.*
> *If Program B is adopted, there is a 1/3 probability that 600 diseased rodents will survive, and a 2/3 probability that no diseased rodents will survive.*
>
> Negative Frame:
> *If Program C is adopted, 400 diseased rodents will die.*
> *If Program D is adopted, there is a 1/3 probability that no diseased rodents will die, and a 2/3 probability that 600 diseased rodents will die.*

Which of the two programs would you favour?

Source: Adapted from Tversky & Kahneman (1981)

In the case of the rodent problem, the positive frame refers to an increase in the problem stimulus, while the negative frame refers to a decrease. In the positive frame, participants can secure an outcome guaranteeing that 200 rodents will survive, or they may take a chance and instead pursue a 2/3 probability that no rodents will survive at the risk of a 1/3 chance that 600 rodents will survive. Since the problem context defines rodents as being undesirable, our understanding of affect would suggest that respondents are likely to prefer avoiding the guarantee that 200 rodents will survive, and are instead likely to demonstrate a preference for the risky-choice. Such a prediction is consistent with prospect theory, since participants would prefer the risky-choice when they have a choice between guaranteed undesirable outcome and a chance at a less undesirable outcome, although at the expense of a possible worse outcome. That is, according to the value function of prospect theory, the curve on the negative side of the reference point is initially very steep and becomes flatter; that is, the possibility of avoiding the initial rodents is more valuable than the additional rodents are harmful. Prospect theory thus predicts that participants will opt for the risk-seeking alternative in the positive frame—since the negative valence of the stimulus results in the alternatives being interpreted on the negative side of the value function.

Conversely, in the negative frame participants can secure an outcome guaranteeing that 400 rodents will die, or they may take a chance and instead pursue a 2/3 probability that 600 rodents will die, at

the risk of a 1/3 chance that no rodents will die. In this case, a guarantee that 400 rodents will die is assumed to be somewhat desirable; therefore, outcomes should be evaluated on the positive side of the utility function. That is, from the perspective of the decision maker, both options are technically positive relative to the reference point and should be evaluated on the concave region of the value function. The risky-choice option thus offers an opportunity to eliminate more rodents at the possible expense of eliminating none; however, since the curve becomes flatter further up the curve, eliminating additional rodents becomes relatively less valuable. As a result, prospect theory predicts that respondents will prefer to lock in success by selecting the sure-thing option since the possibility of losing guaranteed gains is more harmful than the additional possible gains are valuable. That is, prospect theory predicts that decision makers will demonstrate a preference for the sure-thing option in order to secure the elimination of 400 rodents.

While the literature has clearly demonstrated that a framing effect is observed when innocent lives are at risk, it is unclear if the same result will hold when those lives are associated with stimuli of negative connotation—such as rebels or debt. Following from the hypotheses derived from the logic of goal consistency outlined in the previous section, it is natural to predict that reversing the valence of the problem stimulus should result in a reversal of the observed framing effect; that is, by reversing the valence of the primary stimulus the positive frame becomes negative and the negative frame becomes positive—leading to a reversal of results.

It is thus proposed that when the primary stimulus of a decision problem is of positive hedonic value, participants will demonstrate a preference for risk-averse behaviour in the positive frame and risk-seeking behaviour in the negative frame; in other words, when hedonic tone of a problem's primary stimulus is positive, a framing effect consistent with prospect theory and existing literature is observed.

> ***<u>Hypothesis 2a</u>: When the hedonic value of a problem's primary stimulus is positive, participants demonstrate a framing effect with greater preference for risk-aversion in the positive frame, and greater preference for risk-seeking in the negative frame***

Conversely, when a problem's primary stimulus is negative, participants will demonstrate a comparative preference for risk-seeking behaviour in the positive frame and risk-aversive behaviour

in the negative frame; in other words, when hedonic tone of a problem's primary stimulus is negative, a reversed framing effect is observed.

> ***Hypothesis 2b*: When the hedonic value of a problem's primary stimulus is negative, participants demonstrate a framing effect with greater preference for risk-seeking in the positive frame, and greater preference for risk-aversion in the negative frame**

3.3 Past Performance

Existing research clearly demonstrates that the presentation of a decision scenario influences the risk preference of a decision maker; that is, logically equivalent options presented in contrasting frames can lead to divergent preferences. Moreover, the previously explained hypotheses claim that valence of goals and problem stimuli influence the likelihood and direction of framing effects. This section explains that situational factors are likely to influence not only framing effects, but also the status quo bias.

People learn and acquire knowledge by observing others within the context of social interactions and experiences (Bandura, 2001); that is, we learn new behaviour through observational learning, or by observing and replicating behaviours executed by others. If we observe another person being rewarded for performing an action in a social situation, then we develop motivation to perform similar actions ourselves. Similarly, if we observe another person being punished for an action, we develop motivation against performing similar actions. Accordingly, people tend to behave in ways that are analogous with the behaviour of others within their social groups. The specific situations we find ourselves in and the people we interact with thus determine the knowledge we acquire throughout our lives. Recent advancements in neuroscience explain how we learn from the behaviour of others; mirror neurons, which discharge when a person performs or observes a particular action, are believed to be the mechanism through which we learn and imitate the actions of others. By observing the actions of others, neurons representing that action are activated; that is, visual information of observed actions are translated into knowledge (Rizzolatt & Craighero, 2004). In other words, neurons fire in the observer's brain as if the observer were the one performing the action. By mimicking the behaviour of others and internalizing their actions in our own mind, we can simulate the processes through which they perform actions, allowing us to understand why they are performing those actions and why they might choose to continue—or discontinue—such actions (Sommerville & Decety, 2006). For example, perceiving whether or not past performance was

satisfactorily desirable would be a key element in deciding whether one should continue with similar actions or approach the scenario through an alternative approach.

It has been previously explained that the status quo bias describes a tendency for decision makers to maintain current choice when confronted with the availability of new options (Samuelson & Zeckhauser, 1988). Typically, the status quo bias has been demonstrated through decision scenarios in which there are a set of available alternatives, with one option defined as the status quo. It has been shown with relative consistency that participants exhibit a preference for the status quo option over the other available alternatives. Existing research has not, however, fully accounted for the situations and contexts under which this general tendency may not hold true. Past performance is an example of a situational variable which might influence the likelihood of a decision maker continuing with the status quo alternative (Odean, 1998, 1999). Evaluating the past success of following the status quo, or alternatively the performance others have demonstrated by pursuing similar courses of action, is an important factor influencing whether the status quo alternative is selected amongst a variety of alternatives. The present theory acknowledges that by recognizing past successes, we are able to make meaningful and successful decisions; in other words, it is through observing successful behaviour that we learn to pursue actions that are aligned with our goals. By evaluating our own successes and the successes of others we are able to mimic the mechanisms through which success and satisfaction can be obtained; that is, by observing past successes we are able to imitate decisions and actions that lead to satisfying our goals. It is thus natural that past performance will influence the likelihood of a decision maker selecting the status quo from amongst a variety of alternatives.

> ***Hypothesis 3*: Preference for the status quo is positively correlated with past performance; that is, as performance increases, participants demonstrate greater preference for the status quo, and as performance decreases, participants demonstrate reduced preference for the status quo**

3.4 Problem Complexity

While observable elements of decision scenarios, such as past performance, might influence the likelihood of a decision maker selecting the status quo alternative, the perceived complexity of a problem is also likely to influence a decision maker's preferences for the status quo alternative at a subconscious level. The complexity of a decision scenario can most obviously be varied by manipulating the difficulty of perceiving relevant information described within the scenario; that is,

by increasing the difficulty of interpreting the description of the decision scenario or by increasing the number of alternatives to be selected amongst. Since we are limited in our abilities to perceive, process, and remember information (Miller, 1956) , our ability to distinguish amongst such information decreases as the number of elements within a scenario increases. While sequential decision making may not be as highly constrained by such limitations, intuitive decision making quickly becomes disadvantaged as it becomes increasingly difficult for us to evaluate a large quantity of information in a methodological manner due to an abundance of information requiring consideration.

An important consideration for rational decision makers is whether the selected course of action is likely to lead to positive results; in quantifiable problems, a rational option would be one having positive expected value, whereas an irrational option would have negative expected value. It is thus natural that rational decision makers should prefer alternatives having positive expected value over alternatives having negative expected value. Of course, it is not always the case that the status quo alternative is a rational choice. It is therefore expected that participants will demonstrate greater preference for the status quo when it is rational compared to when it is irrational.

> ***Hypothesis 4a: Participants demonstrate greater preference for the status quo when the status quo alternative has positive expected value compared to when the status quo alternative has negative expected value***

The number of alternatives to be chosen amongst is also likely to influence a decision maker's preference for the status quo. Assuming that the status quo is rational, a decision maker is more likely to select the status quo when there are two options compared to when there are eight options. That is, since additional alternatives introduce a greater variety of potential outcomes, participants will demonstrate reduced preference for the status quo as the complexity of a decision scenario increases through an increase in the number of available alternatives.

> ***Hypothesis 4b: When the status quo alternative has positive expected value, participants demonstrate reduced preference for the status quo as the number of available alternatives increases***

If a decision maker does not possess the ability, patience, or resources to consider all the decision alternatives, then the decision maker will rely on social cues to assist with making judgments; that is, the existence of a status quo will act as a signal of such a choice being rational. It is thus proposed that as the complexity of a decision scenario increases through an increase in the number of available alternatives, participants will demonstrate reduced rationality.

***Hypothesis 4c*: As the number of available alternatives increases, participants demonstrate reduced preference towards outcomes having positive expected value**

Chapter 4
Research Method

In order to investigate the influence of goals, hedonic tone, past performance, and complexity on framing effects and the status quo bias, the current research investigated numerous decision scenarios under a variety of situational manipulations. This section explains the process through which the various decision scenarios were developed, followed by a summary of the survey structure and deployment procedure. Lastly, this chapter will discuss the resulting data sets which permit testing of the previously defined theory and hypotheses.

4.1 Questionnaire Design

As is typical in research investigating cognitive biases, data to support the proposed hypotheses was collected using a survey-based experimental methodology. Due to the large number of factors being studied, a relatively large sample size was required which made laboratory-based testing infeasible. Fortunately, past research has demonstrated that the results of decision making studies conducted using survey-based approaches are consistent with individual testing in laboratory environments (Wang et al., 2001). Moreover, existing research has demonstrated that real and hypothetical decisions result in similar choices and are a legitimate means of studying real-world behaviour and uncovering meaningful trends in human decision making (Kuhberger et al., 2002; Wiseman & Levin, 1996). In this research, popular decision problems were selected from the literature and modified to investigate the influence of various situational factors on decision making. The described problems were thus derived from established and well-accepted research. Manipulations were applied to the existing problems in a way that attempted to maintain consistency amongst problem frames, while also creating distinctions which allowed for the influence of various factors to be investigated; that is, manipulations generated differences in the goals explicitly described for the decision maker, the hedonic tone of the problem stimulus, the past performance of the status quo, and the complexity of the problem scenario. All studies used between-subject designs in which participants were presented with only one scenario for each problem.

Data were collected by electronically distributing study questionnaires to participants. Participants were invited to participate in the online study through an e-mail invitation; those who opted to participate were presented with a series of scenarios consisting of imagined situations and asked to

make decisions amongst predefined choice alternatives. Two such studies occurred, Study I was the initial questionnaire which might be considered an exploratory study. Study II was a revised and expanded questionnaire consisting of a greater number of decision scenarios. While the results of Study I were meaningful, additional data were sought through Study II to strengthen findings through a greater variety of questions in some cases, and an expanded sample size in other cases.

Study I consisted of eight questions. Five questions focused on framing effects, with three explicitly manipulating the goals of the decision maker and two manipulating the hedonic valence of the problem's primary stimulus. An additional two questions focus on the status quo bias, with one manipulating past performance, and one manipulating the number of available alternatives. The final question focused on willingness to pay, which is not a focus of the current research and will not be further discussed in this thesis. The questions contained in Study I are summarized in Table 4.1, and the complete set of questions is presented in Appendix D.

Table 4.1 Summary of Study I questionnaire

#	Problem	Type	Manipulation	Description
1	Athlete Weight	FE	Goal	increase vs. decrease vs. maintain weight
2	Dots	FE	Goal	increase red dots vs. increase blue dots
3	Company Performance	FE	Goal	improve vs. maintain performance
4	Disease Outbreak	FE	Stimulus	save human lives vs. save rodent lives
5	Medical Treatment	FE	Stimulus	patient survival vs. disease-free
6	Portfolio Selection	SQ	Performance	neutral vs. strong vs. weak performance
7	Tokens	SQ	Complexity	number of available alternatives varied
8	Beverage Purchase	WTP	Stimulus	quality of vendor

Legend: FE = Framing Effect, SQ = Status Quo, WTP = Willingness-to-Pay

Study II consisted of thirteen questions. Six questions focused on framing effects, with two manipulating the goals of the decision maker and four manipulating the hedonic tone of the problem's primary stimulus. An additional three questions focused on the status quo bias, with two questions manipulating past performance and one manipulating the complexity of available alternatives. The final four questions focused on willingness to pay and are not discussed further. The questions contained in Study II are summarized in Table 4.2, and the complete set of questions is presented in Appendix E.

Table 4.2 Summary of Study II questionnaire

#	Subject Matter	Type	Manipulation	Description
1	Points	FE	Goal	increase vs. decrease vs. maintain points
2	Widgets	FE	Goal	maximize vs. minimize widgets
3	Disease Outbreak	FE	Stimulus	save human lives vs. save rodent lives
4	Sinking Ship	FE	Stimulus	save tourists vs. save pirates
5	Building Invasion	FE	Stimulus	save residents vs. save rebels
6	Medical Treatments	FE	Stimulus	patient survival vs. disease-free
7	Portfolio Selection	SQ	Performance	neutral vs. strong vs. weak performance
8	Business Strategy	SQ	Performance	strong vs. weak performance
9	Tokens	SQ	Complexity	number of available alternatives varied
10	Beverage Purchase	WTP	Stimulus	quality of vendor
11	Event Ticket Purchase	WTP	Stimulus	reputability of seller
12	Ring Purchase	WTP	Suspicion	warned vs. not warned of suspicious behaviour
13	Speaker Purchase	WTP	Suspicion	warned vs. not warned of suspicious behaviour

Legend: FE = Framing Effect, SQ = Status Quo, WTP = Willingness-to-Pay

4.1.1 Goal Manipulation

Goal manipulation questions explicitly defined the goal of the decision maker within the provided scenario, thus attempting to influence the participant's perceptions of the elements contained within the scenario and the process through which available alternatives were evaluated. By modifying problem scenarios through the manipulation of goals, decision makers were provided with motivation to differently evaluate the alternatives provided in the positive and negative frames. In total, five problems investigated the influence of goals on the framing effect—three in the first study and two in the second.

Table 4.3 Summary of goal manipulation problems

Study	Problem	Manipulation
I (q1)	Athlete Weight	increase vs. decrease vs. maintain weight
II (q1)	Points	increase vs. decrease vs. maintain points
I (q2)	Dots	increase red dots vs. increase blue dots
II (q2)	Widgets	maximize vs. minimize widgets
I (q3)	Company Performance	improve vs. maintain performance

In the athlete weight problem, previously described in Figure 3.1, evaluations of weight were manipulated by informing participants that the goal was to increase, decrease, or maintain weight. The purpose of including this problem in Study I was to attempt to replicate the study originally conducted by McElroy & Seta (2007) which strongly concluded that the goals of a decision maker

influence the likelihood and direction of a framing effect. The problem used a 3 x 2 (increase vs. decrease vs. maintain goal; positive vs. negative frame) factorial design.

In Study II, a modified version of the athlete weight problem was presented to participants such that the scenario instructed participants to imagine that they were playing a game in which the goal was to either increase, decrease, or maintain their current point level; by changing the subject of the problem from weight to points the problem allowed the same hypotheses to be tested under a different (and somewhat generalized) context. The purpose of the points problem was to determine if similar findings would result under less emotionally charged circumstances, thus strengthening the ability to generalize the interaction between goals and framing effect. The problem used a 3 x 2 (increase vs. decrease vs. maintain goal; positive vs. negative frame) factorial design identical to that of the athlete weight problem.

The dots problem, asked in Study I, was intended to provide further evidence of the influence of goals on decision making by outlining a scenario in which the decision maker was playing a game with a goal of either increasing the number of red dots or increasing the number of blue dots. Positive outcomes were aligned with being desirable for red, while negative outcomes were aligned with being desirable for blue. The problem used a 2 x 2 (increase red vs. increase blue goal; positive vs. negative frame) factorial design.

In Study II, the widgets problem reworked the wording of the dots problem in order to improve clarity of the scenario. Rather than discussing dots of differing colours (which proved to be confusing and difficult to analyze), the problem discussed widgets remaining or disappearing; the revised problem was thus more logically aligned with the Asian disease problem—in which human lives either persisted or perished. The problem used a 2 x 2 (increase vs. decrease dots; positive vs. negative frame) factorial design consistent with the dots problem, except that the goal was to increase or decrease dots rather than to increase dots of different colours.

The company performance problem, derived from a similar study conducted by McNeil, Pauker, Sox, & Tversky (1982), deviated from all other goal manipulation problems in that it was not a risky-choice framing problem; instead, it was an attribute framing problem focusing on a choice between consulting firms in which the two options were not technically equivalent. Options in the positive

frame were described in terms of the likelihood of achieving positive results, whereas options in the negative term were described in terms of the likelihood of achieving negative results. The problem was further manipulated by providing participants with a goal to either increase performance or maintain performance. The problem used a 2 x 2 (increase vs. maintain performance; positive vs. negative frame) factorial design consistent with the previous goal manipulation problems. While the company performance problem was distinct in underlying structure, the focus was consistent to the previous problems in that it attempted to test for an interaction between goals and the existence of a framing effect.

4.1.2 Stimulus Manipulation

By modifying problem scenarios through the manipulation of the hedonic tone of the primary stimulus, the current research sought to confirm that regular framing effects would be evident when the primary stimulus of a problem was desirable, and that framing effects would be reversed when the primary stimulus was undesirable. In total, six problems investigated the influence of hedonic valence of the problem stimulus on framing effects—two in Study I, followed by replications of those questions along with two new questions in Study II. All of the hedonic tone manipulation problems used 2 x 2 (positive vs. negative stimulus; positive vs. negative frame) factorial designs.

Table 4.4 Summary of stimulus manipulation problems

Study	Problem	Manipulation
I (q4)	Disease Outbreak	save human lives vs. save rodent lives
II (q3)	Disease Outbreak (revised)	save human lives vs. save rodent lives
II (q4)	Sinking Ship	save tourists vs. save pirates
II (q5)	Building Invasion	save residents vs. save rebels
I (q5)	Medical Treatment	patient survival vs. disease-free
II (q6)	Medical Treatment (replication)	patient survival vs. disease-free

The disease outbreak problem replicated a problem similar to the Asian disease problem in the positive stimulus case and introduced a manipulation to the original problem, described in Figure 3.1, in the negative stimulus case. In the latter case the stimuli of human lives was replaced with rodent lives, thus requiring participants to make a decision regarding a comparatively undesirable stimulus. This investigation contrasts with existing research which tends to ask questions about items focusing on desirable items. The problem was first investigated in Study I and a revised version of the problem was investigated in Study II.

The sinking ship and building invasion problems, both investigated in Study II, were somewhat analogous to the disease outbreak problem. In the positive subject case, the sinking ship problem describes a situation in which a cruise ship has hit a sunken barge and the lives of tourists are at risk (Jou, Shanteau, & Harris, 1996; A. F. Simon, Fagley, & Halleran, 2004); meanwhile, in the negative subject case, the problem describes a similar situation in which a pirate ship has hit a sunken barge and the lives of pirates are at risk. Similarly, the building invasion problem describes a scenario in which rebels are terrorizing the lives of innocent residents. In the positive subject case, the problem focuses on the lives of the residents; meanwhile, in the negative subject case, the problem focuses on the lives of the rebels. That is, some participants were provided with a scenario describing a situation in which the lives of innocent residents were at risk, while others were provided with a similar scenario describing a situation in which the lives of violent rebels were at risk. As usual, in each case, participants were asked to make a decision between sure-thing and risky-choice options framed either positively or negatively. By comparing responses to similar questions with the hedonic tone of the subject matter being manipulated, the present research investigated the influence of hedonic tone on framing effects.

The medical treatment problem deviated from all other hedonic tone manipulation problems in that it was not a risky-choice framing problem; instead, it was an attribute framing problem focusing on a choice between medical treatments which were not technically equivalent (McNeil et al., 1982). In the original study, outcomes in the positive frame were described in terms of the likelihood of survival, whereas outcomes in the negative frame were described in terms of the likelihood of death. The version of the problem presented in the current research used the regular survival and mortality language in the positive stimulus case; that is, the problem was considered positive since the problem focused on the stimulus of a human life. Meanwhile, in the negative stimulus case, the problem shifted the language from survival to ‘cancer-free’ and death to ‘cancer-returns’; that is, the problem shifted the focus from human life to the existence of cancer. In the positive stimulus case the problem thus focused on the positive element of human life, whereas in the negative stimulus case the problem focused on the negative element of cancer. This problem was first presented to participants in Study I and an identical question was replicated in Study II. While the medical treatment problem was distinct in underlying structure, the focus was consistent with the previously described problems in that it tested for an interaction between stimulus valence and the existence of a framing effect.

4.1.3 Performance Manipulation

Two problems investigated the influence of past performance on selection of the status quo, one asking participants to select a strategy for a financial portfolio and another asking participants to select a corporate strategy; in both cases participants were provided with a status quo alternative and information describing past performance.

The portfolio selection problem was derived from the seminal work on the status quo bias by Samuelson & Zeckhauser (1988). The original problem described a situation in which participants were told that they had inherited a large sum of money from a relative and were asked how they would prefer to invest that money; a separate group of participants were provided with a similar situation in which a portfolio of cash and securities was inherited from a relative, and were then asked how they would choose to invest that money—the default option being to continue with the current arrangement. The original research demonstrated that participants provided with a status quo tended to prefer maintaining the current decision rather than shifting to an alternative. In the current research the problem was modified so that past performance was defined. The problem was thus similar to the original, the difference being the addition of information describing the performance of the status quo alternative; more precisely, participants were provided with information regarding performance of the status quo in recent years relative to the market. The problem used a 3 x 4 design, with performance varied across three levels (strong vs. weak vs. neutral) and the status quo alternative varied across the four alternatives.

The business strategy problem, loosely based on the portfolio selection problem, described a situation in which a company president is asked to choose amongst corporate strategies. Participants are told that past performance has either been relatively strong or weak relative to the market, and then asked to make a decision amongst possible strategies; with some participants informed of one of the alternatives being the status quo, and others not informed of a status quo. The problem used a 2 x 4 design (strong vs. weak performance; with the status quo alternative varied amongst the three alternatives as well as a no status quo case).

4.1.4 Complexity Manipulation

One problem manipulated complexity by varying the number of alternatives available to the decision maker. Specifically, a rendition of the financial performance problem was created in which

participants were asked to maximize the number of tokens. For each scenario, half of the available alternatives were rational (that is, had an expected value that was positive) while the remaining alternatives were irrational (that is, had an expected value that was negative). Each participant was presented with a single version of the problem in which the number of available alternatives was predefined (being 2, 4, 6, or 8). By varying the number of alternatives, results of the problem can be analyzed to investigate the relationship between problem complexity and selection of the status quo alternative, and also the relationship between problem complexity and selection of rational outcomes. The problem thus consisted of scenarios for each of four complexity levels, and for each complexity level there was a case for each potential status quo. The problem thus consisted of twenty cases in total (2 + 4 + 6 + 8, respectively, for each level of complexity).

4.2 Study Delivery

Survey questionnaires were delivered online using the Sensus Web online interviewing system. The online implementation of the survey was tested on a small group of graduate students at the University of Waterloo. No technical problems were encountered, although minor changes were made to the implementation in order to improve clarity prior to releasing the study to the main study population. The conducted studies received full ethics clearance through the Office of Research Ethics at the University of Waterloo, after which data were collected during the 2009 calendar year. Undergraduate students enrolled in second- and third-year Management Sciences courses at the University of Waterloo were invited to participate in an online survey for course credit. Data collection occurred over three periods, thus allowing a data sample to be collected that is of relatively large size compared to other previously published survey-based studies investigating cognitive biases.

Individuals were invited to participate through automatically generated personalized e-mails, presented in Appendix A, and in-class announcements. All studies began with an introductory welcome letter, presented in Appendix B. Students were first asked to consent to participation in the study, and then requested to provide preliminary background information including gender, academic term, academic faculty, and number of courses taken in disciplines related to the current research, as described in Appendix C. Once the initial questionnaire was completed, respondents were presented with the study questions. For each participant, the survey software presented the questions in a random order; moreover, for each question participants were randomly assigned to a scenario and the provided alternatives were also displayed in a random order. Due to the random-generation of survey

components, it can be assumed that the possibility of any question- or answer-order effects has been eliminated.

4.3 Data Samples

Two data samples were collected over a period of three academic terms at the University of Waterloo. During the three periods, students enrolled in a total of five second- and third-year undergraduate management sciences courses were invited to participate in the research study for course credit. An initial exploratory survey, referred to as Study I, was distributed to the first two groups of students to obtain an initial data set which was used to help refine and focus the research direction. After the initial data set was finalized, an expanded survey, referred to as Study II, was distributed to an additional three groups of students in order to collect a second larger data set.

Data for Study I was collected over two time periods. The initial sample consisted of 195 responses collected from a third-year management sciences course during the Winter 2009 academic term. Due to a technical problem with the survey delivery software, participants were not assigned evenly to problem scenarios thus making analysis of the data ineffective. In order to fill voids in the data, an additional 42 responses were collected from a second-year management sciences course during the Spring 2009 academic term. In total, 262 students were invited to participate (216 in the first group and 46 in the second); the final sample consisted of 237 responses, resulting in a participation rate of 90.5%.

Data for Study II was also collected over two time periods. The initial sample was collected from a second-year management sciences course during the Spring 2009 academic term. The remainder of the sample was collected from second- and third-year management sciences courses during the Fall 2009 academic term. Data were collected over two time periods in order to permit a large data set to be obtained; this was particularly necessary for the problems investigating the status quo bias since those problems consisted of a substantial number of cases to be compared. In total, 654 students were invited to participate (241 in the first group and 413 in the second); the final data set consisted of 569 responses (210 in the first group and 359 in the second), resulting in a participation rate of 87.0%.

4.4 Standards of Analysis

The goal and stimulus manipulation problems consist primarily of risky-choice framing problems; the purpose of analyzing the results was to determine whether framing effects were evident for goals and stimuli having different valences. In the literature, there exist two predominant methods used to describe the strength of the risky-choice framing effect which has been observed. For the Asian disease problem, Tversky's & Kahneman (1981) demonstrated what has been labelled a choice reversal. A choice reversal is said to occur when there is a statistically significant preference for one option in the positive frame and a statistically significant preference for the other option in the negative frame; that is, in the positive frame the preference for the risk-averse option is significantly greater than 50% and in the negative frame the preference for that same option is significantly less than 50%.

The majority of follow-up studies have failed to replicate the existence of choice reversals in risky-choice framing problems; in fact it has been said that the more a study differs from the original problem, the less likely a choice reversal will be observed (Kuhberger, 1998). Many follow-up studies have, however, demonstrated a somewhat weaker result. In studies where a full choice reversal is not observed, there is often still a relative tendency towards risk aversion in the positive frame and a relative tendency towards risk-seeking in the negative frame. This shift in preference can be evaluated by testing for statistical significant difference between preferences in the positive frame compared to the negative frame. This choice shift is thus a slightly weaker—but still statistically significant—result compared to a choice reversal. In this research, statistical tests will seek to demonstrate that participants have demonstrated a choice shift across frames.

Hypotheses 1a, 1b, 2a, and 2b will be evaluated by testing for the existence of a statistically significant shift in preferences between positive and negative problem frames, whereas Hypothesis 1c will be supported if no such shift is evident. While a lack of statistical significance cannot decisively prove a claim, it does provide evidence that framing effects have not appeared in those situations, which is supportive of Hypothesis 1c. Analysis for all problems will be conducted using chi-squared analysis; the tests will compare the frequency of outcomes in the positive and negative frames in order to investigate the likelihood that the values depart from what would be expected by chance alone.

Hypothesis 3 will be investigated by testing for a statistically significant difference in preference between the status quo alternative and the other alternatives by comparing preferences between the strong and weak performance cases, with greater preference towards the status quo when past performance is strong compared to when past performance is weak.

Hypothesis 4a will be investigated by testing for a statistically significant difference in preference for the status quo between the rational and irrational status quo cases, with greater preference towards the status quo when that option is rational compared to when the status quo is irrational. Meanwhile, Hypothesis 4b will be investigated by testing for a statistically significant difference in preference for a rational status quo when the number of alternatives is low compared to when the number of alternatives is high. Lastly, Hypothesis 4c will be investigated by testing for a statistically significant difference in preference for rational options as the number of alternatives varies, with greater preference towards rational options when the number of alternatives is low compared to when the number of alternatives is high.

Chapter 5
Analysis and Results

The current section summarizes and discusses the data collected through the previously described survey-based studies. The results are used to investigate the influence of goals, problem stimuli, past performance, and problem complexity on the cognitive biases demonstrated by decision makers.

5.1 Goal Manipulation

Across the two studies, data were collected for a variety of problems investigating the influence of goals on decision making. Results will be discussed for problems focusing on the following problem scenarios: athlete weight, points, dots, widgets, and company performance. In all cases goals were described to either increase, decrease, or maintain the quantity of the primary element within the problem.

5.1.1 Athlete Weight: Increase vs. Decrease vs. Maintain

The athlete weight problem was a replication of the original study by McElroy & Seta (2007), and was presented to participants in Study I. The problem consisted of three cases—one for each goal of increase, decrease, and maintain weight.

Table 5.1 Goal effect: athlete weight

Goal	Framing	Certain choice	Risky choice	χ^2	p
Increase	Positive	31 (79.5%)	8 (20.5%)	15.815	< 0.0001
	Negative	13 (32.5%)	27 (67.5%)		
Decrease	Positive	13 (32.5%)	27 (67.5%)	12.872	0.0003
	Negative	30 (75.0%)	10 (25.0%)		
Maintain	Positive	16 (41.0%)	23 (59.0%)	0.009	0.9234
	Negative	16 (42.1%)	22 (57.9%)		

Results of the athlete weight problem proved to be consistent with those of the original study. In the increase weight case, 79.5% of participants chose the risk-averse choice in the positive frame while only 32.5% chose risk-aversion in the negative frame ($\chi^2[1, N = 79] = 15.815$, $p < 0.0001$). Conversely, in the decrease weight case only 32.5% of participants chose the risk-averse choice in the positive frame while 75.0% chose risk-aversion in the negative frame ($\chi^2[1, N = 80] = 12.872$, $p = 0.0003$). A significant framing effect was thus demonstrated in the increase weight case while a

significant reversed framing effect was observed in the decrease weight case. In the maintain weight case, no framing effect was observed with 41.0% of respondents preferring risk-aversion in the positive frame and 42.1% preferring risk-aversion in the negative frame (χ^2[1, N = 77] = 0.009, p = 0.9234). The athlete weight problem thus provides preliminary evidence in support of Hypotheses 1a, 1b, and 1c.

5.1.2 Points: Increase vs. Decrease vs. Maintain

The points problem was derived from the weight problem and, once again, included three cases—to increase, decrease, or maintain the number of points. The problem was presented to participants in Study II with the goal of investigating whether results equivalent to those of the athlete weight problem would be replicated when the stimulus was generalized to an item of lower practical importance to participants.

Table 5.2 Goal effect: points

Goal	Framing	Certain choice	Risky choice	χ^2	P
Increase	Positive	58 (55.8%)	46 (44.2%)	10.509	0.0012
	Negative	28 (31.5%)	61 (68.5%)		
Decrease	Positive	30 (35.3%)	55 (64.7%)	0.652	0.4195
	Negative	43 (42.2%)	59 (57.8%)		
Maintain	Positive	37 (38.9%)	58 (61.1%)	2.956	0.0856
	Negative	24 (26.1%)	69 (73.9%)		

Results of the points program were somewhat weaker than for the athlete weight problem. In the increase points case, 55.8% of participants chose the risk-averse choice in the positive frame while 31.5% chose risk-aversion in the negative frame (χ^2[1, N = 193] = 10.509, p = 0.0012). In the decrease points case only 35.3% of participants chose the risk-averse choice in the positive frame while 42.2% chose risk-aversion in the negative frame (χ^2[1, N = 187] = 0.652, p = 0.4195). A framing effect was thus demonstrated in the increase points case, while there was no evidence of a framing effect in the decrease points case. In the maintain points case, a weak framing effect was observed with 38.9% of respondents preferring risk-aversion in the positive frame and 26.1% preferring risk-aversion in the negative frame (χ^2[1, N = 187] = 2.956, p = 0.0856). The points problem thus provides evidence in support of Hypothesis 1a, but no evidence in support of Hypotheses 1b and 1c.

5.1.3 Dots: Red vs. Blue

The dots problem was presented to participants in Study I. The problem consisted of two cases having opposite goals; in one case the goal was to maximize the number of red dots and in the other case the goal was to maximize the number of blue dots. Since the outcomes were consistent across both goal cases, it was expected that a regular framing effect would be observed in one case and a reverse framing effect in the other case.

Table 5.3 Goal effect: dots

Goal	Framing	Treatment A	Treatment B	χ^2	p
Maximize red	Positive	33 (57.9%)	24 (42.1%)	0.001	0.9794
	Negative	33 (55.9%)	26 (44.1%)		
Maximize blue	Positive	23 (39.7%)	35 (60.3%)	8.424	0.0037
	Negative	42 (67.7%)	20 (32.3%)		

Results of the dots problem were somewhat ambiguous. In the maximize red dots case, 57.9% of participants chose the risk-averse choice in the positive frame while 55.9% chose risk-aversion in the negative frame ($\chi^2[1, N = 116] = 0.001$, $p = 0.9794$). In the maximize blue dots case, 39.7% chose risk-aversion in the positive frame while 67.7% chose risk-aversion in the negative frame ($\chi^2[1, N = 120] = 8.424$, $p = 0.0037$). There was thus no evidence of a framing effect in the case where the goal was to maximize red dots, while there was evidence of a framing effect in the case where the goal was to maximize blue dots. The complex nature of this problem, which consisted of two different stimuli and goals that focused on differing stimuli, led to this inherent difficulty in interpreting the results. In general, these results were somewhat unexpected, and no simple explanation could be derived to explain why the framing effect appeared when the goal was to increase red dots but not when the goal was to increase blue dots.

5.1.4 Widgets: Maximize vs. Minimize

The widgets problem was derived from the dots problem, and was presented to participants in Study II. The problem attempted to correct the confusing nature of the dots problem by having the different goals focus on a single stimulus, thus allowing for more straightforward analysis and comparison of the results. Two cases were presented to participants, one having a goal to maximize the number of widgets and the other having a goal to minimize the number of widgets.

Table 5.4 Goal effect: widgets

Goal	Framing	Certain choice	Risky choice	χ^2	p
Maximize	Positive	78 (54.9%)	64 (45.1%)	8.510	0.0035
	Negative	50 (36.8%)	86 (63.2%)		
Minimize	Positive	49 (36.8%)	84 (63.2%)	0.053	0.8178
	Negative	61 (38.9%)	96 (61.1%)		

In the maximize widgets case, 54.9% of participants demonstrated a preference for the risk-averse choice in the positive frame while 36.8% of participants chose risk-aversion in the negative frame (χ^2[1, N = 278] = 8.510, p = 0.0035). In the minimize widgets case, 36.8% of participants chose the risk-averse choice in the positive frame while 38.9% of participants chose risk-aversion in the negative frame (χ^2[1, N = 290] = 0.053, p = 0.8178). There was thus strong evidence of a framing effect in the increase widgets case, while there was no evidence of a framing effect in the decrease widgets case. The widgets problem thus provides evidence in support of Hypothesis 1a, but no evidence in support of Hypotheses 1b.

5.1.5 Company Performance: Improve vs. Maintain

The company performance problem asked participants to choose between two consulting firms, while defining the goal as to either increase or maintain performance of the company.

Table 5.5 Goal effect: company performance

Goal	Framing	Firm A	Firm B	χ^2	p
Improve	Positive	18 (31.6%)	39 (68.4%)	4.624	0.0315
	Negative	8 (13.3%)	52 (86.7%)		
Maintain	Positive	8 (14.3%)	48 (85.7%)	0.064	0.8000
	Negative	8 (12.7%)	55 (87.3%)		

In the improve performance case, 31.6% of participants demonstrated a preference for Firm A in the positive frame while 13.3% of participants demonstrated a preference for Firm A in the negative frame (χ^2[1, N = 117] = 4.624, p = 0.0315). In the maintain performance case, preference for Firm A was 14.3% in the positive frame and 12.7% in the negative frame (χ^2[1, N = 119] = 0.064, p = 0.8000). Results thus demonstrated evidence of a framing effect in the improve performance case but no evidence of a framing effect in the maintain performance case. The company performance problem thus provides evidence in support of Hypotheses 1a and 1c.

5.2 Stimulus Manipulation

Across the two studies, data were collected for a variety of problems investigating the influence of stimulus valence on decision making. For each question, cases were presented to participants where the primary stimulus was likely to be perceived as having positive hedonic tone or negative hedonic tone. Problems discussed the following pairs of problem stimuli: people vs. rodents; tourists vs. pirates; residents vs. rebels; and survival vs. disease.

5.2.1 Disease Outbreak: People vs. Rodents

The disease outbreak problem consisted of two versions of a similar decision scenario, one in which the stimulus was people, and the other in which the stimulus was rodents.

Table 5.6 Stimulus effect: disease outbreak

Subject	Framing	Certain choice	Risky Choice	χ^2	p
People	Positive	36 (62.1%)	22 (37.9%)	11.746	0.0006
	Negative	17 (28.8%)	42 (71.2%)		
Rodents	Positive	16 (27.1%)	43 (72.9%)	0.290	0.5903
	Negative	20 (33.3%)	40 (66.7%)		

Results from Study I demonstrated that when the problem focused on people, 62.1% of participants opted for risk-aversion in the positive frame while 28.8% preferred risk-aversion in the negative frame ($\chi^2[1, N = 117] = 11.746$, $p = 0.0006$). When the problem focused on rodents, 27.1% of participants preferred risk-aversion in the positive frame while 33.3% of participants preferred risk-aversion in the negative frame ($\chi^2[1, N = 119] = 0.290$, $p = 0.5903$). The disease outbreak problem thus provided very strong evidence in support of Hypothesis 2a, but no evidence in support of Hypothesis 2b.

Table 5.7 Stimulus effect: disease outbreak (revised)

Subject	Framing	Certain choice	Risky Choice	χ^2	p
People	Positive	76 (51.7%)	71 (48.3%)	4.194	0.0406
	Negative	52 (38.8%)	82 (61.2%)		
Rodents	Positive	61 (44.5%)	76 (55.5%)	0.644	0.4222
	Negative	73 (50.0%)	73 (50.0%)		

The disease outbreak problem was slightly reworded in Study II in order to improve consistency across the two cases. Results from Study II demonstrated that when the problem focused on people,

51.7% of participants opted for risk-aversion in the positive frame while 38.8% of participants preferred risk-aversion in the negative frame (χ^2[1, N = 281] = 4.194, p = 0.0406). When the problem focused on rodents, 44.5% of participants preferred risk-aversion in the positive frame while 50.0% of participants preferred risk-aversion in the negative frame (χ^2[1, N = 283] = 0.644, p = 0.4222). The revised disease outbreak problem provided further evidence in support of Hypotheses 2a, but no evidence in support of Hypothesis 2b.

5.2.2 Sinking Ship: Tourists vs. Pirates

The sinking ship problem, presented in Study II, consisted of a similar design to the disease outbreak problem. It consisted of two versions of a similar decision scenario, one in which the outcomes focused on the lives of tourists and the other in which the outcomes focused on the lives of pirates.

Table 5.8 Stimulus effect: sinking ship

Subject	Framing	Certain choice	Risky choice	χ^2	p
Tourists	Positive	62 (43.4%)	81 (56.6%)	3.321	0.0684
	Negative	45 (32.1%)	95 (67.9%)		
Pirates	Positive	66 (44.0%)	84 (56.0%)	0.040	0.8407
	Negative	56 (42.1%)	77 (57.9%)		

Results demonstrated that when the problem focused on tourists, 43.4% of participants opted for risk-aversion in the positive frame while 32.1% preferred risk-aversion in the negative frame (χ^2[1, N = 283] = 3.321, p = 0.0684). When the problem focused on pirates, 44.0% of participants preferred risk-aversion in the positive frame while 42.1% of participants preferred risk-aversion in the negative frame (χ^2[1, N = 283] = 0.040, p = 0.8407). The problem thus provided weak evidence in support of Hypothesis 2a, but no evidence in support of Hypothesis 2b.

5.2.3 Building Invasion: Residents vs. Rebels

The building invasion problem, presented in Study II, also consisted of a similar design to both the disease outbreak and sinking ship problems. The problem again consisted of two versions of a similar decision problem, one in which the available outcomes focused on the lives of residents and the other in which the outcomes focused on the lives of rebels.

Table 5.9 Stimulus effect: building invasion

Subject	Framing	Certain choice	Risky choice	χ^2	p
Residents	Positive	61 (46.4%)	70 (53.4%)	7.009	0.0081
	Negative	44 (30.3%)	101 (69.7%)		
Rebels	Positive	65 (44.5%)	81 (55.5%)	0.375	0.5404
	Negative	58 (40.3%)	86 (59.7%)		

Results demonstrated that when the problem focused on residents, 46.4% of participants opted for risk-aversion in the positive frame while 30.3% preferred risk-aversion in the negative frame (χ^2[1, N = 276] = 7.009, p = 0.0081). When the problem focused on rebels, 44.5% of participants preferred risk-aversion in the positive frame while 40.3% of participants preferred risk-aversion in the negative frame (χ^2[1, N = 290] = 0.375, p = 0.5404). The problem thus provided strong evidence in support of Hypothesis 2a, but no evidence in support of Hypothesis 2b.

5.2.4 Medical Treatments: Survival vs. Disease

The medical treatments problem asked participants to choose between two medical treatments, while describing the outcomes in terms of survival or mortality (in the positive stimulus case), and cancer-free or cancer-returns (in the negative stimulus case).

Table 5.10 Stimulus effect: medical treatments

Subject	Framing	Treatment A	Treatment B	χ^2	p
Survival	Positive	35 (57.4%)	26 (42.6%)	6.489	0.0109
	Negative	20 (32.8%)	41 (67.2%)		
Disease	Positive	17 (29.3%)	41 (70.7%)	1.720	0.1897
	Negative	24 (42.9%)	32 (57.1%)		

In Study I, the results demonstrated that in the survival case, 57.4% of participants demonstrated a preference for Treatment A in the positive frame while 32.8% of participants demonstrated a preference for Treatment A in the negative frame (χ^2[1, N = 122] = 6.489, p = 0.0109). In the disease case, preference for Treatment A was 29.3% in the positive frame and 42.9% in the negative frame (χ^2[1, N = 114] = 1.720, p = 0.1897). Results thus demonstrated evidence of a framing effect in the survival case but no evidence of a framing effect in the disease case, thus providing evidence in support of Hypothesis 2a but no evidence in support of Hypothesis 2b.

Table 5.11 Stimulus effect: medical treatments (replication)

Subject	Framing	Treatment A	Treatment B	χ^2	p
Survival	Positive	78 (54.2%)	66 (45.8%)	26.404	< 0.0001
	Negative	38 (24.5%)	117 (75.5%)		
Disease	Positive	41 (31.5%)	89 (68.5%)	0.720	0.3961
	Negative	51 (37.2%)	86 (62.8%)		

The medical treatments problem was replicated in Study II. In the survival case, 54.2% of participants preferred Treatment A in the positive frame and 24.5% of participants preferred Treatment A in the negative frame ($\chi^2[1, N = 299] = 26.404$, $p < 0.0001$). In the disease case, preference for Treatment A was 31.5% in the positive frame and 37.2% in the negative frame ($\chi^2[1, N = 267] = 0.720$, $p = 0.3961$). Results again confirmed strong evidence of a framing effect in the survival case but no evidence of a framing effect in the disease case, thus providing very strong evidence in support of Hypothesis 2a but no support for Hypothesis 2b.

5.3 Performance Manipulation

Two problems manipulated past performance: the portfolio selection problem and the business strategy problem. Both were problem scenarios consisting of a series of options, one of which was a defined status quo.

5.3.1 Portfolio Selection

The portfolio selection problem consisted of thirteen cases; one describing a scenario in which performance and status quo were not defined, and one for each combination of status quo and past performance level. The basic case consisting of no manipulations was not central to the analysis, but was useful as a baseline to which the various manipulations could be immediately compared. Table 5.12 broadly summarizes the results of the thirteen cases of the portfolio selection problem.

Table 5.12 Portfolio selection: summary of preferences

Performance	Status quo	Company A	B	C	D	Total	χ^2	p
Undefined	None	22 (25.9%)	15 (17.6%)	34 (40.0%)	14 (16.5%)	86		
Strong	A	**29 (42.6%)**	14 (20.6%)	19 (27.9%)	6 (8.8%)	68	25.437	0.0025
	B	21 (29.6%)	**30 (42.3%)**	12 (16.9%)	8 (11.3%)	71		
	C	20 (30.8%)	13 (20.0%)	**22 (33.8%)**	10 (15.4%)	65		
	D	15 (23.8%)	16 (25.4%)	12 (19.0%)	**20 (31.7%)**	63		
Neutral	A	**29 (42.0%)**	22 (31.9%)	11 (15.9%)	7 (10.1%)	69	13.015	0.1619
	B	21 (33.3%)	**17 (27.0%)**	17 (27.0%)	8 (12.7%)	63		
	C	16 (26.2%)	18 (29.5%)	**19 (31.1%)**	8 (13.1%)	61		
	D	13 (19.7%)	19 (28.8%)	17 (25.8%)	**17 (25.8%)**	66		
Poor	A	**14 (23.3%)**	20 (33.3%)	17 (28.3%)	9 (15.0%)	60	5.526	0.7863
	B	19 (24.7%)	**29 (37.7%)**	20 (26.0%)	9 (11.7%)	77		
	C	23 (33.3%)	18 (26.1%)	**17 (24.6%)**	11 (15.9%)	69		
	D	14 (20.0%)	22 (31.4%)	18 (25.7%)	**16 (22.9%)**	70		

Notes: (1) bold entries define the status quo alternative
(2) p-values test for a difference in preference within each of the performance scenarios

In the strong performance scenario, there was strong evidence of a difference in preferences amongst the various status quo cases ($\chi^2[9, N = 267] = 25.437$, $p = 0.0025$). In the neutral case, there was very weak evidence of difference amongst options ($\chi^2[9, N = 259] = 13.015$, $p = 0.1619$). Meanwhile, in the poor performance case, there was no evidence of a difference amongst cases ($\chi^2[9, N = 276] = 5.526$, $p = 0.7863$). Initial analysis of the data thus suggests that past performance influenced the preferences of decision makers. That is, when past performance was strong, participants demonstrated a significant difference in preferences amongst status quo cases; conversely, when past performance was poor, participants demonstrated no difference in preferences amongst status quo cases. The results thus suggest that performance influenced the preferences participants demonstrated for the status quo, with participants demonstrating greater differences in preferences when performance was strong compared to when performance was poor. Comparing across performance cases, it is worth noting that preference for the status quo was consistently higher when performance was strong compared to when performance was poor.

Table 5.13 Portfolio selection: influence of status quo on preferences

Status quo	Portfolio A	B	C	D	Total	χ^2	P
None	22 (25.9%)	15 (17.6%)	34 (40.0%)	14 (16.5%)	86		
A	**72 (36.5%)**	56 (28.4%)	47 (23.9%)	22 (11.2%)	197	9.813	0.0202
B	61 (31.0%)	**76 (38.6%)**	49 (24.9%)	25 (12.7%)	211	12.335	0.0063
C	59 (29.9%)	49 (24.9%)	**58 (29.4%)**	29 (14.7%)	195	3.013	0.3896
D	42 (21.3%)	57 (28.9%)	47 (23.9%)	**53 (26.9%)**	199	10.072	0.0180

Notes: (1) bold entries define the status quo alternative
(2) p-values test for a difference in preference between status quo and no status quo cases

Table 5.13 provides a summary of the results combined across performance cases; that is, cases consisting of the same status quo were combined. In this analysis, the three performance cases (strong, neutral, and poor) were considered as three strata, or independent populations; when combined, the three cases represent all possible levels of performance and can thus be analyzed as a single sample in order to draw generalized conclusions from the data. The chi-square analysis described in the table compares the preferences of decision makers when a status quo case is compared to the 'no status quo' case; in three of the four cases a status quo effect was observed with comparatively greater preference for the status quo alternative compared to the no status quo case. Moreover, chi-square analysis comparing preferences across the four status quo cases concludes that there is very significantly likelihood ($\chi^2[9, N = 802] = 31.519$; $p = 0.0002$) that participants demonstrated a difference in preferences across the status quo cases. The analysis demonstrates that, when the performance manipulations were removed from consideration, a regular status quo effect equivalent to the findings of existing literature was demonstrated by study participants.

Table 5.14 Portfolio selection: influence of performance on preference for status quo

Performance	Status quo	Non-SQ	Total	χ^2	p
Strong	101 (37.8%)	166 (62.2%)	267	6.157	0.0460
Neutral	82 (31.7%)	177 (68.3%)	259		
Poor	76 (27.5%)	200 (72.5%)	276		

Table 5.14 compares preferences for the status quo with preference for non-status quo alternatives across the three performance scenarios; that is, data were aggregated in a way that allowed immediate comparison of the preferences for or against the status quo. Participants demonstrated a statistically significant difference in preference amongst the three cases ($\chi^2[2, N = 802] = 6.157$, $p = 0.04602$); in particular, there exists a significant difference in preferences between the strong and poor

performance cases (χ^2[1, N = 543] = 6.082, p = 0.01366). Results of the portfolio selection problem thus provide evidence in support of Hypothesis 3; that is, the analysis demonstrates that past performance was positively correlated with selection of the status quo alternative, with participants demonstrating greater preference for the status quo alternative when past performance was strong compared to when past performance was poor.

5.3.2 Business Strategy

The business strategy problem was a somewhat simplified performance manipulation problem, consisting of two performance levels and three potential alternatives.

Table 5.15 Business strategy: summary of preferences

Performance	Status quo	Strategy A	B	C	Total	χ^2	P
Strong	None	33 (49.3%)	17 (25.4%)	17 (24.4%)	67		
	A	**37 (50.0%)**	25 (33.8%)	12 (16.2%)	74	5.871	0.2090
	B	28 (40.0%)	**35 (50.0%)**	7 (10.0%)	70		
	C	24 (35.3%)	29 (31.6%)	**15 (22.1%)**	68		
Weak	None	29 (42.6%)	24 (35.3%)	15 (22.1%)	68		
	A	**28 (35.0%)**	30 (37.5%)	22 (27.5%)	80	3.187	0.5270
	B	17 (24.3%)	**37 (52.9%)**	16 (22.9%)	70		
	C	21 (30.0%)	34 (48.6%)	**15 (21.4%)**	70		

Note: p-values test for a difference in preference between status quo cases

Table 5.15 summarizes the basic findings; the chi-square analysis described in the table compares the three status quo cases within each of the two performance level; the no status quo cases were thus omitted from the analysis. Neither the strong nor weak performance cases demonstrated a significant difference in preferences as the status quo was systematically manipulated.

Table 5.16 Business strategy: influence of status quo on preferences

Status quo	Strategy A	B	C	Total	χ^2	p
None	62 (45.9%)	41 (30.4%)	32 (23.7%)	135		
A	**65 (42.2%)**	55 (35.7%)	34 (22.1%)	154	0.645	0.7243
B	45 (32.1%)	**72 (51.4%)**	23 (16.4%)	140	11.397	0.0034
C	45 (32.6%)	63 (45.7%)	**30 (21.7%)**	138	6.595	0.0370

Note: p-values test for a difference in preference between status quo and no status quo cases

Table 5.16 aggregates the results across performance levels by combining cases in which the status quo was equivalent. The chi-square analysis described in the table compares each status quo case

against the no status quo case. In two of the three cases, a difference in preferences existed between status quo and no status quo cases; however, in just one of the two cases was that difference due to increased preference for the status quo alternative. Overall, there is minimal evidence of a difference in preferences across the three status quo cases ($\chi^2[4, N = 432] = 7.267$; $p = 0.1224$). In general, it appears that the status quo effect was not evident in this problem.

Table 5.17 Business strategy: influence of performance on preference for status quo

Performance	Status quo	Non-SQ	Total	χ^2	p
Strong	87 (41.0%)	125 (59.0%)	212	0.807	0.3689
Weak	80 (36.4%)	140 (63.6%)	220		

Table 5.17 compares preferences for the status quo with preference for non-status quo alternatives across the two performance scenarios, thus allowing immediate comparison of preference for or against the status quo. There was no evidence of a difference in preference for the status quo when performance was strong compared to when performance was weak ($\chi^2[1, N = 432] = 0.807$; $p = 0.3689$). Analysis of the business strategy problem thus provides no evidence of a difference in preference for the status quo as performance was varied, and thus no support for Hypothesis 3. While there was no evidence of performance influencing preferences, there was also a lack of evidence supporting the basic status quo effect commonly accepted by existing research. There is little purpose of investigating the influence of past performance on the status quo effect when the status quo effect itself has not been found to influence preferences within the problem scenario.

5.4 Complexity Manipulation

The complexity problem consisted of twenty cases; for each level of complexity, there existed a case where each available alternative was described as the status quo. Table 5.18 contains an aggregation of the data describing the number of times decision makers chose the status quo alternative or one of the other alternatives; the table also categorizes the results by whether or not the presented status quo was an economically rational alternative.

Table 5.18 Complexity: influence of status quo rationality on preference for status quo

# Alternatives	Rational SQ		Irrational SQ			
	Status quo	Non-SQ	Status quo	Non-SQ	χ^2	P
2	78 (79.6%) [a]	20 (20.4%)	28 (26.4%)	78 (73.6%)	55.576	< 0.0001
4	30 (32.3%) [a]	63 (67.7%)	13 (13.1%)	86 (86.9%)	9.023	0.0027
6	11 (17.5%) [b]	52 (82.5%)	16 (21.6%)	58 (78.4%)	0.156	0.6930
8	12 (15.6%) [b]	65 (84.4%)	12 (14.6%)	70 (85.4%)	0.028	0.8672

Notes: (1) conditions with different subscripts were significantly different from each other
(2) p-value test for a difference in preference between rational and irrational status quo cases

Participants demonstrated a strong preference for the status quo in only one of the eight cases; specifically, 79.6% of participants preferred the status quo when that option was the only rational choice. In all other cases a minority of participants continued with the status quo alternative, with more participants opting to switch than to maintain the current selection. Comparing rational and irrational status quos, participants demonstrated significantly greater preference for a rational status quo over an irrational status quo in both the 2-alterantive ($\chi^2[1, N = 204] = 55.576$; $p < 0.0001$) and 4-alternative cases ($\chi^2[1, N = 192] = 9.023$; $p = 0.0027$); meanwhile, participants demonstrated no difference in preferences for the status quo in both the 6-alternative ($\chi^2[1, N = 137] = 0.156$; $p = 0.6930$) and 8-alternative cases ($\chi^2[1, N = 159] = 0.028$; $p = 0.8672$). In general, participants thus demonstrated a strong preference for a rational status quo compared to an irrational status quo in the 2- and 4-alternative cases, but not in the 6- and 8-alternative cases. The results provide support for Hypothesis 4a when the number of alternatives is low, but not as the number of alternatives increases. Moreover, when the status quo is rational, participants demonstrated comparatively greater preference for the status quo when the number of alternatives is low compared to when the number of alternatives is high, thus supporting Hypothesis 4b.

Table 5.19 Complexity: influence of number of alternatives on rational choice

	Choice				
# Alternatives	Rational	Irrational	Total	χ^2	p
2	156 (76.5%) [a]	48 (23.5%)	204	27.798	< 0.0001
4	132 (68.8%) [a]	60 (31.3%)	192		
6	69 (50.4%) [b]	68 (49.6%)	137		
8	92 (57.9%) [b]	67 (42.1%)	159		

Note: conditions with different subscripts were significantly different from each other

Table 5.19 aggregates the data by combing across rational and irrational status quo cases; that is, the aggregated data ignores the influence of the status quo and simply compares preferences for rational

outcomes as the number of alternatives increases. The results of the analysis demonstrate a very significant difference in preferences for rational options as the number of alternatives is varied ($\chi^2 = 27.798$; $p < 0.0001$); that is, participants demonstrated greater rationality when the number of alternatives was low compared to when the number of alternatives was high, thus providing evidence in support of Hypothesis 4c.

Chapter 6
Discussion and Conclusion

The current chapter begins by summarizing the major findings of this thesis while discussing limitations and opportunities for future research. Conclusions are then discussed while highlighting the importance of the findings in the context of the judgment and decision making literature.

6.1 Discussion of Results

The research pursued by this thesis manipulated contextual factors within structured decision scenarios; specifically, the research systematically manipulated goals, stimuli, past performance, and problem complexity in order to study the influence of contextual factors on decision making. In this section the major findings of the conducted studies are summarized and discussed.

6.1.1 Goal Manipulation

Five problems investigated the interaction between goals and framing effects; that is, five problems sought to reveal a relationship between the goals defined within a decision scenario and the emergence of framing effects. This research sought to show that when goals are consistent with available outcomes participants demonstrate a preference for risk-aversion, and when goals are inconsistent with available outcomes participants demonstrate a preference for risk-seeking. In other words, framing effects are observed across positive and negative frames if clear goals exist to increase or decrease the item of interest within a decision problem. Conversely, when goals do not support available outcomes, no framing effect is expected since participants lack a clear direction to support their choice between available alternatives. Table 6.1 summarizes the p-values resulting from the chi-square analysis in each of the positive, negative, and neutral goal cases for each of the problem scenarios. The p-values described in the table demonstrate the likelihood of there being a significant difference in preferences between the positive and negative frames for each combination of problem and goal. Note that results of the dots problem have been excluded from the table since the complex nature of the underlying problem did not permit classification into the three goal categories; the structure of the problem thus did not allow straightforward analysis of the defined hypotheses.

Table 6.1 Summary of framing effect significance under goal manipulation

		p-value for each goal		
Problem	**Study**	**Positive**	**Negative**	**Neutral**
Weight	1	**< 0.0001**	**0.0003**	0.9234
Points	2	**0.0012**	0.4195	0.0856
Dots	1	complex problem structure		
Widgets	2	**0.0035**	0.8178	n/a
Company Performance	1	**0.0315**	n/a	0.8000

Notes: (1) p-values test likelihood of a difference in preferences between problem frames
(2) bold entries are statistically significant at .05 level

In the positive goal cases the results provide very strong support for Hypothesis 1a which claims that, when goals are positive, a framing effect will be observed with participants demonstrating a preference for risk-aversion in the positive frame and a preference for risk-seeking in the negative frame. Participants demonstrated consistent preferences for risk-aversion in the positive frame and risk-seeking in the negative frame, resulting in significant framing effects consistent with the hypothesis in all four problems.

Hypothesis 1b claims that, when goals are negative, a reversed framing effect will be observed with participants demonstrating a preference for risk-seeking in the positive frame and a preference for risk-aversion in the negative frame. Three of the problems contained negative goal cases and only one such problem (the weight problem) demonstrated a significant reversed framing effect, while two problems (the points and widgets problems) provided no evidence of framing effects. The results thus demonstrate very weak evidence in support of Hypothesis 1b.

Hypothesis 1c claims that, when goals are not aligned with outcomes, a framing effect will not be evident. Three of the four problems contained neutral goal cases, and two such problems (the weight problem and the company problem) demonstrated no evidence of a framing effect while one problem (the points problem) demonstrated weak evidence of a framing effect. The results thus demonstrate relatively strong evidence in support of Hypothesis 1c.

The current investigation of goal manipulations was intended to replicate the results previously established by McElroy & Seta (2007) in their study of the athlete weight problem. Direct replication of the athlete weight problem did demonstrate strong results consistent with the original findings, while results of the company problem (which, notably, did not include a negative goal case) also

demonstrated similar, albeit slightly weaker, results. The results of the other two goal manipulation problems (points and widgets) failed to reveal similar conclusions; specifically, in neither problem did a negative goal result in a reversed framing effect. The findings demonstrate that, even when problems are structurally similarly, the specific wording and content of the scenarios can have a significant influence on the decisions made by participants.

It is important to acknowledge that the athlete weight and company problems studied highly salient scenarios which are likely natural for participants to imagine, while the stimuli of points and widgets may be somewhat less susceptible to goal manipulation. Consider that weight and company performance are highly tangible concepts having real-world meaning and ramifications for participants; conversely, points and widgets are less tangible concepts likely having low salience and meaning to study participants. To further elaborate, it is likely easy for participants to imagine scenarios in which they might want to increase, decrease, or maintain weight; similarly, it is easy for participants to imagine scenarios in which the goal of a company is to increase or maintain performance. With regards to the points problem, it is natural for participants to imagine scenarios in which they would want to increase points; however, decreasing or maintaining points are much less natural goals. That is, in nearly all real-world situations participants would want to increase points, while there are far fewer situations in which other point-related goals would exist. Meanwhile, widgets are abstract items meant to exemplify generic objects, and are thus likely to be interpreted by participants in a similar way as points; not surprisingly, the results of the widgets problem were consistent with those of the points problem. In previous research, Hsee & Rottenstreich (2004) acknowledge that it is the combination of quantitative and subjective valuations of stimuli which allows decision makers to determine value. In fact, they demonstrate that participants are willing to donate more money to save endangered animals when the animals were represented through a pictorial representation of pandas compared to when they were represented by dots. An affect-rich representation thus elicited a stronger degree of emotional response than an affect-poor representation.

In summary, the results of the goal manipulation problem appear to have been influenced by the stimuli being discussed. In problems where the stimuli were of high salience (specifically, the athlete weight and company performance problems), Hypotheses 1a, 1b, and 1c were supported; conversely, in problems where stimuli were likely less salient to participants (specifically, points and widgets),

Hypothesis 1a was supported while Hypotheses 1b and 1c were not. The results thus suggest that when stimuli are highly meaningful to participants, goals influence the likelihood and direction of framing effects; conversely, when stimuli lack meaning to participants, framing effects are only likely to occur when goals are positive, and not when goals are negative or neutral. Goals thus have meaningful impact only when stimuli are highly salient, while the impact of goals diminishes when the content described within a decision scenario is neutral in nature. The observed importance of the stimulus within the goal manipulation problems is particularly interesting considering that the second set of hypotheses of the current research investigate the influence of problem stimulus directly by manipulated the hedonic valence associated with the primary stimulus of decision problems.

6.1.2 Stimulus Manipulation

Six problems investigated the interaction between hedonic tone of problem stimuli and framing effects; notably, two problems from Study I were revised or replicated in Study II, thus resulting in four entirely unique problems across the two studies. This research sought to demonstrate that when the hedonic tone of a problem's primary stimulus is positive, a regular framing effect is observed—as is commonly exhibited throughout existing literature. Conversely, this research sought to demonstrate that when hedonic tone of the problem stimuli is negative, a reversed framing effect is observed—an idea that is novel to the literature. Table 6.2 summarizes the resulting p-values in each of the positive and negative subject cases for each of the problem scenarios. The p-values described in the table demonstrate the likelihood of there being a significant difference in preferences between the positive and negative frame for each of the combinations of problem and subject valence.

Table 6.2 Summary of framing effect significance under stimulus manipulation

		p-value for each subject	
Problem	**Study**	**Positive**	**Negative**
Disease Outbreak: people vs. rodents	1	**0.0006**	0.5903
Disease Outbreak: people vs. rodents (revised)	2	**0.0406**	0.4222
Sinking Ship: tourists vs. pirates	2	0.0684	0.8407
Building Invasion: residents vs. rebels	2	**0.0081**	0.5404
Medical Treatment: survival vs. disease	1	**0.0109**	0.1897
Medical Treatment: survival vs. disease (replication)	2	< **0.0001**	0.3961

Notes: (1) p-values test likelihood of a difference in preferences between problem frames
(2) bold entries are statistically significant at .05 level

Hypothesis 2a claimed that when the hedonic value of the stimulus is positive, as is typical in existing literature, a regular framing effect is expected, while Hypothesis 2b claimed that when the hedonic

value of the stimulus is negative, a reversed framing effect is expected. In the positive stimulus cases, the results of all six problems demonstrated a significant framing effect consistent with expectations and consistent with existing literature (five at the .05 level, and one at the .10 level); thus providing very strong evidence in support of Hypothesis 2a.

Conversely, in the negative stimulus cases, none of the six problems demonstrated a framing effect; results thus provided no evidence in support of Hypothesis 2b. While it is well-accepted that framing effects exist when the focus of the scenario is positive (Kuhberger, 1998), existing research has not studied situations in which the outcomes at stake are of negative hedonic tone (Levin et al., 1998). The findings of the current research provide very strong evidence that when the outcome at stake is negative, framing effects do not appear.

In order to explain why framing effects are evident when the problem stimulus is positive but not when the problem stimulus is negative, it is important to consider why the literature explain framing effects exist at all; that is, why do participants demonstrate a preference for risk-aversion when outcomes are perceived to be desirable and risk-seeking when outcomes are perceived to be undesirable? According to prospect theory, when decision makers must choose between sure-thing and risky-choice outcomes that are positive, they tend to prefer to secure guaranteed gains rather than risk them for a chance at even greater gains. Conversely, when decision makers have a choice between sure-thing and risky-choice outcomes that are negative, they prefer to take risks in hopes of avoiding losses, even though doing so introduces a chance of experiencing even greater losses; that is, the shape of the value function proposed by prospect theory suggests decision makers are risk-averse when considering positive outcomes and risk-seeking when considering negative outcomes. When discussing desirable stimuli, prospect theory thus provides clear guidance as to the preferences we would expect to observe by decision makers; however, prospect theory is silent with respect to the shape of the value function when discussing undesirable stimuli.

Consistent with Hypothesis 2b, it is natural to assume that when considering negative stimuli, all outcomes should be reversed; however, the results of this research suggest that this prediction does not represent reality. The prospect theory value function predicts risk-seeking in the negative frame because decision makers prefer to take chances to avoid losses; that is, when discussing negative outcomes decision makers possess an inherent goal to minimize pain, and they thus prefer alternatives

which allow the possibility of experiencing zero pain. In the Asian disease problem, for example, participants take risks in hopes of achieving an outcome in which no life is lost and thus no pain is experienced (Tversky & Kahneman, 1981). In the case of the current research, human behaviour in the negative stimuli cases was not aligned with the predictions of prospect theory; that is, in the rodents case of the disease outbreak problem, the result that emerged demonstrated that the possibility of eliminating all rodents was even more desirable than guaranteeing the elimination of some rodents, and so the predictions of prospect theory do not hold. One logical possibility is that the negative affect associated with the negative stimuli overpowered the positive influence of the framing effect. For example, in the case of the rodents problem, it is possible that the only acceptable outcome was for all rodents to be eliminated, with anything less being unacceptable to the decision maker.

Existing research has also argued that perceptions of risk are related to the degree to which a hazard evokes feelings of dread (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978; Slovic, 1987; Slovic et al., 2007); that is, while the guaranteed loss of human lives may be objectively worse than the existence of some rodents, it is not necessarily the case that the emotions that follow from hearing about these events are consistent. Hearing about the deaths of people may evoke negative feelings; however, the thought of rodents spreading disease may be even more terrifying for an individual. The risk perceived due to the rodents may thus be greater than the risk perceived due to human deaths. It is well-accepted that events viewed as relatively desirable tend to be perceived as high value and low risk, whereas events viewed as relatively undesirable tend to be perceived as low value and high risk (Ganzach, 2000). If items of negative hedonic tone, such as rodents or pirates, elicit greater degrees of fear, then participants would be expected to demonstrate greater risk-taking when such items are the focus of a decision. In fact, Rottenstreich & Hsee (2001) claim that the shape of prospect theory's value function is related to affective experience rather than simply psychological responses; that is, affect-rich outcomes evoke greater degrees of hope and fear than affect-poor outcomes, thus impacting willingness to take risk and resulting in a value function that is comparatively more s-shaped.

One additional aspect requiring attention when studying the influence of stimuli hedonic tone on decision making is that manipulating the stimuli may actually modify the underlying content of the decision scenario. That is, while the positive and negative frames of a problem are logically equivalent, a question asking about rodent lives is inherently different from a similar question asking

about human lives. For this reason, the statistical analysis in this research did not directly compare preferences between different variations of the same problem; instead, analysis occurred only between equivalent frames within the same scenario. When comparing results across subject frames a focus was placed on general trends rather than individual results. In order to respect this difference, an effort was made to ensure that scenarios to be compared were as consistent with one another as possible. Problem scenarios were thus derived from established and well-accepted research, and attempts were made to apply manipulations in a consistent manner; that being said, due to the limitations of language it was not always possible to do so with perfect accuracy.

6.1.3 Performance Manipulation

Two problems, discussing portfolio selection and business strategy decisions, investigated the interaction between past performance and preference for the status quo. This research sought to demonstrate that preference for the status quo is positively correlated with past performance; it was thus anticipated that as past performance increased so to would preference for the status quo alternative. Results of the portfolio selection problem provided evidence in support of Hypothesis 3; that is, the analysis demonstrated that past performance was positively correlated with selection of the status quo alternative, with participants demonstrating increased preference for the status quo alternative as past performance increased. The business strategy problem did not demonstrate evidence supporting a bias toward the status quo alternative whatsoever, therefore the relationship between performance and preference for the status quo could not be meaningfully investigated.

In a practical sense, observations of past performance are surely to impact preferences. It has been previously demonstrated in laboratory-based studies that participants are more likely to shift their portfolio allocation following a period of poorer performance than following a period of better performance (Moore, Kurtzberg, Fox, & Bazerman, 1999). Conversely, analysis of market data has demonstrated that investors are more likely to sell their winning stocks and hold onto their losing stocks (Odean, 1998). Moreover, when making purchase decisions, investors are more likely to buy securities which have recently experienced abnormally strong or abnormally poor performance, likely because those are the ones which attract attention amongst the diversity of options available within the market (Odean, 1999). While existing laboratory and market studies have demonstrated the impact of performance on decision making, the current research intended to investigate the influence of past performance on status quo problems within the judgment and decision making literature. The

current research demonstrates that by manipulating the description of past performance within the portfolio selection problem, preference for the status quo was influenced.

The business strategy problem was designed to be similar to the portfolio selection problem; the intention was for the problem to be manipulated in such a way that it was not substantially different in structure, while allowing the hypothesis to be tested within a new context. While the results of the business strategy problem were unable to demonstrate that past performance influenced preference for the status quo, they were able to reveal that the status quo bias itself may not be so clearly understood. That is, while decision makers often demonstrate a bias towards the status quo alternative, it is not always the case that such a result holds true. While the status quo bias unequivocally emerges in many real-world and experimental scenarios, it is certainly not evident in all situations, and cannot necessarily be assumed to be a fundamental law of human thought across all situations and contexts. Further research is thus necessary to investigate the situations in which preference for the status quo is and is not influenced by performance.

6.1.4 Complexity Manipulation

One problem investigated the interaction between complexity and the status quo bias. Hypothesis 4a claims that preference for the status quo should be greater when the status quo alternative has positive expected value compared to when it has negative expected value. Meanwhile, Hypothesis 4b claims that when the status quo alternative is rational, preference for the status quo should decrease as the number of available alternatives increases. The complexity problem provided strong evidence in support of Hypotheses 4a and 4b since preference for a status quo having positive expected value was high only when the number of alternatives was low; conversely, as the number of alternatives increased, preference for the status quo decreased. Lastly, Hypothesis 4c claims that as the number of available alternatives increases, participants should demonstrate reduced preference for outcomes having positive expected value. The complexity problem provided very strong evidence in support of Hypothesis 4c, as demonstrated by the decrease in preference towards options having positive expected value as the number of alternatives increased.

It is of minimal surprise that complexity influences preference for the status quo and preference for rational outcomes. Previous research has demonstrated that when decision makers must choose amongst a large number of potential alternatives, attention is drawn towards those options that stand

out in some way (Odean, 1999). As the number of alternatives increases, it becomes less likely that decision makers will be able to evaluate all potential alternatives and therefore the likelihood of behaving irrationally increases; similarly, as the number of alternatives increases so does the number of potential options which may shift a decision maker's attention away from the status quo. The purpose of the current study was to demonstrate the influence of complexity on decision making in survey-based experiments.

While the question provided to participants was straightforward and the available alternatives could be evaluated and compared in a systematic way, the behaviour demonstrated by participants deviated from rationality and from the predictions of existing literature studying the status quo bias. By varying the number of options the current study manipulated complexity in an obvious way, and the results demonstrated that such manipulations had a significant impact on preference for both the status quo and rational alternatives. Future research investigating decision making might manipulate complexity of the underlying problems in more subtle ways, and such factors might influence the likelihood and strength of the resulting conclusions. In future research, it might be interesting to further investigate the influence of problem complexity on preference for the status quo and on rational behaviour by manipulating the number of alternatives as well as the complexity of the problem scenario itself. It might also be interesting to consider how problem complexity influences the likelihood of observing framing effects and other decision biases.

6.2 Conclusion

The goal of this thesis has been to investigate the influence of situational and contextual factors on the emergence of established decision biases. More specifically, the current research investigates the influence of goals, problem stimuli, past performance, and problem complexity on the emergence of framing effects and the status quo bias. Various decision scenarios were studied, with each consisting of numerous cases in which the aforementioned factors were systematically manipulated. Problems were investigated using a survey-based experimental methodology in which participants were presented with a series of decision scenarios and asked to make a choice amongst pre-existing alternatives in each case. All studies used between-subject designs and each participant was presented with only one case for each decision scenario. Analysis of the results occurred by aggregating the responses of participants and comparing the responses of participants across different manipulations of the same scenario. The results of the current research demonstrate that when the

hedonic valence of core elements and contextual background of decision problems are manipulated in systematic manners, existing biases do not necessarily emerge in the expected ways. By evaluating how human decision making is influenced when problem scenarios are subject to various situational and contextual manipulations, this research contributes to our understanding of cognitive biases and suggests that there continues to exist opportunity to further develop established models of human decision making. The current findings suggest that additional research must be conducted to refine our understanding of cognitive heuristics and biases in divergent situations and contexts.

The results of the current research raise into question the ability of current theories to generalize to all decision scenarios. The goal of this thesis has been to demonstrate that future research studying judgment and decision making must pay particular attention to the importance of situation and contexts on decision making. While maintaining consistency across frames is critical, so too is ensuring that those factors held constant across frames do not influence decision makers and effect broader trends of decision making. Ensuring that contextual factors do not have unanticipated and uncontrolled systematic influence on decision makers' perceptions and evaluations of decision alternatives is thus an important consideration in studying cognition. In general, the current research suggests that there exist situations in which framing effects and the status quo bias do not necessarily hold. Specifically, goals influence the direction of framing effects, but only if the subject under discussion is highly salient to the decision maker. Moreover, framing effects emerge only in situations in which the stimuli under consideration has positive hedonic valence; when participants are asked to make decisions within scenarios focusing on stimuli having negative hedonic valence, framing effects fail to appear. Future research must further investigate these findings under a robust series of scenarios; if these contextual effects, and perhaps others, hold true then existing models of human decision making, such as prospect theory, require further consideration. The current research has also revealed that the status quo bias is influenced by past performance and the complexity of the decision scenario. Future research must consider how the past experiences of the decision maker and information contained within the decision scenario might influence decision makers' evaluation of and preference amongst available alternatives; moreover, in situations where the problem scenario is complex, researchers must consider whether highly salient information contained within the scenario might act to influence decision makers in unanticipated ways.

A core purpose of studying decision making is to improve our ability to make decisions by providing us with the knowledge to correct for the errors in judgment that result from the trust we naturally place on our intuition. Throughout our lives we continually make decisions, and the choices we make determine the opportunities that await us in the moments that follow; specifically, the decisions we make determine the future situations we find ourselves in, and impact the options we have to select amongst. The current research has demonstrated that those situations play an important role in shaping our lives; specifically, the goals we set, the issues we must deal with, the performance we observe, and the complexities that confront us are all factors that influence the way we process information and the decisions that lead us from one moment to the next. This thesis was pursued to encourage greater emphasis on context and situation when studying human decision making, and the hope is that it sets the context for future research investigating human judgment and decision making.

References

Asch, S. E. (1955). Opinions and social pressure. *Scientific American, 193,* 31-35.

Asch, S. E. (1956). Studies of independence and conformity: A minority of one against a unanimous majority. *Psychological Monographs, 70*(Whole no. 416).

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology, 52,* 1-26.

Chapman, G. B., & Johnson, E. J. (1999). Anchoring, activation, and the construction of values. *Organizational Behavior and Human Decision Processes, 79*(2), 115-153.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227-268.

Earley, C. P. (1994). Self or group? Cultural effects of training on self-efficacy and performance. *Administrative Science Quarterly, 39*(1), 89-117.

Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford: Stanford University Press.

Festinger, L., & Carlsmith, J. M. (1959). Cognitive consequences of forced compliance. *Journal of Abnormal and Social Psychology, 58*(2), 203-210.

Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S., & Combs, B. (1978). How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits *Policy Sciences, 9*(2), 127-152.

Frantz, R. (2003). Herbert Simon. Artificial intelligence as a framework for understanding intuition. *Journal of Economic Psychology, 24*(2), 265-277.

Ganzach, Y. (2000). Judging risk and return of financial assets. *Organizational Behavior and Human Decision Processes, 83*(2), 353-370.

Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*. Cambridge: Polity Press.

Gilboa, I., & Schmeidler, D. (1995). Case-based decision theory. *Quarterly Journal of Economics, 110*(3), 605-639.

Heath, C., Larrick, R. P., & Wu, G. (1999). Goals as reference points. *Cognitive Psychology, 38*(1), 79-109.

Hodgkinson, G. P., Langan-Fox, J., & Sadler-Smith, E. (2008). Intuition: A fundamental bridging construct in the behavioural sciences. *British Journal of Psychology, 99,* 1-27.

Hsee, C. K., & Rottenstreich, Y. (2004). Music, pandas, and muggers: On the affective psychology of value. *Journal of Experimental Psychology-General, 133*(1), 23-30.

Jou, J. W., Shanteau, J., & Harris, R. J. (1996). An information processing view of framing effects: The role of causal schemas in decision making. *Memory & Cognition, 24*(1), 1-15.

Kahneman, D. (2003). A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist, 58*(9), 697-720.

Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991). Anomalies: The endowment effect, loss aversion, and status quo bias. *Journal of Economic Perspectives, 5*(1), 193-206.

Kahneman, D., & Tversky, A. (1973). On the psychology of prediction. *Psychological Review, 80*(4), 237-251.

Kahneman, D., & Tversky, A. (1979). Prospect theory: Analysis of decision under risk. *Econometrica, 47*(2), 263-291.

Kahneman, D., & Tversky, A. (1984). Choices, values, and frames. *American Psychologist, 39*(4), 341-350.

Koffka, K. (1935/1963). *Principles of gestalt psychology*. New York: Harcourt.

Kuhberger, A. (1998). The influence of framing on risky decisions: A meta-analysis. *Organizational Behavior and Human Decision Processes, 75*(1), 23-55.

Kuhberger, A., Schulte-Mecklenbeck, M., & Perner, J. (2002). Framing decisions: Hypothetical and real. *Organizational Behavior and Human Decision Processes, 89*(2), 1162-1175.

Levin, I. P., & Gaeth, G. J. (1988). How consumers are affected by the framing of attribute information before and after consuming the product. *Journal of Consumer Research, 15*(3), 374-378.

Levin, I. P., Johnson, R. D., Deldin, P. J., Carstens, L. M., Cressey, L. J., & Davis, C. R. (1986). Framing effects in decisions with completely and incompletely described alternatives. *Organizational Behavior and Human Decision Processes, 38*(1), 48-64.

Levin, I. P., Schneider, S. L., & Gaeth, G. J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational Behavior and Human Decision Processes, 76*(2), 149-188.

Levin, I. P., Snyder, M. A., & Chapman, D. P. (1988). The interaction of experimental and situational factors and gender in a simulated risky decision-making task. *Journal of Psychology, 122*(2), 173-181.

Locher, D. A. (2002). *Collective behavior*. Upper Saddle River, N.J.: Prentice Hall.

Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance* Englewood Cliffs, N.J.: Prentice Hall

McElroy, T., & Seta, J. J. (2007). Framing the frame: How task goals determine the likelihood and direction of framing effects. *Judgment and Decision Making Journal, 2*(4), 251-256.

McNeil, B. J., Pauker, S. G., Sox, H. C., & Tversky, A. (1982). On the elicitation of preferences for alternative therapies. *New England Journal of Medicine, 306*(21), 1259-1262.

Mellers, B., Schwartz, A., & Ritov, I. (1999). Emotion-based choice. *Journal of Experimental Psychology-General, 128*(3), 332-345.

Meyerowitz, B. E., & Chaiken, S. (1987). The effect of message framing on breast self-examination attitudes, intentions, and behavior. *Journal of Personality and Social Psychology, 52*(3), 500-510.

Milgram, S. (1963). Behavioral study of obedience. *Journal of Abnormal and Social Psychology, 67,* 371–378.

Milgram, S. (1974). *Obedience to authority: An experimental view*. New York: Harper & Row.

Miller, G. A. (1956). The magical number seven, plus or minus two: some limits on our capacity for processing information. *Psychological Review, 63*(2), 81-97.

Moore, D. A., Kurtzberg, T. R., Fox, C. R., & Bazerman, M. H. (1999). Positive illusions and forecasting errors in mutual fund investment decisions. *Organizational Behavior and Human Decision Processes, 79*(2), 95-114.

Newcomb, T. M. (1968). Introduction. In R. P. Abelson, E. Aronson, W. J. McGuire, T. M. Newcomb, M. J. Rosenberg & P. H. Tannenbaum (Eds.), *Theories of Cognitive Consistency: A Sourcebook* (pp. xv-xvii). Chicago: Rand McNally.

Odean, T. (1998). Are investors reluctant to realize their losses? *Journal of Finance, 53*(5), 1775-1798.

Odean, T. (1999). Do investors trade too much? *American Economic Review, 89*(5), 1279-1298.

Pólya, G. (1956). *How to Solve It*. Garden City, New York: Doubleday.

Rizzolatt, G., & Craighero, L. (2004). The mirror-neuron system. *Annual Review of Neuroscience, 27,* 169-192.

Rottenstreich, Y., & Hsee, C. K. (2001). Money, kisses, and electric shocks: On the affective psychology of risk. *Psychological Science, 12*(3), 185-190.

Samuelson, W., & Zeckhauser, R. (1988). Status quo bias in decision making. *Journal of Risk and Uncertainty, 1*(1), 7-59.

Savage, L. J. (1954). *The foundations of statistics*. New York: John Wiley and Sons.

Sher, S., & McKenzie, C. R. M. (2006). Information leakage from logically equivalent frames. *Cognition, 101*(3), 467-494.

Shiller, R. J. (2005). *Irrational Exuberance*. Princeton, NJ: Princeton University Press.

Simon, A. F., Fagley, N. S., & Halleran, J. G. (2004). Decision framing: Moderating effects of individual differences and cognitive processing. *Journal of Behavioral Decision Making, 17*(2), 77-93.

Simon, H. (1983). *Reason in human affairs*. Stanford, CA: Stanford UniversityPress.

Simon, H. A. (1957). *Models of man*. New York: John Wiley and Sons.

Slovic, P. (1987). Perception of risk. *Science, 236*(4799), 280-285.

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2007). The affect heuristic. *European Journal of Operational Research, 177*(3), 1333-1352.

Sommerville, J. A., & Decety, J. (2006). Weaving the fabric of social interaction: Articulating developmental psychology and cognitive neuroscience in the domain of motor cognition. *Psychonomic Bulletin & Review, 13*(2), 179-200.

Thagard, P. (2000). *Coherence in thought and action*. Cambridge, Mass.: MIT Press.

Thagard, P., & Verbeurgt, K. (1998). Coherence and Constraint Satisfaction. *Cognitive Science, 22*(1), 1-24.

Tversky, A. (1975). A critique of expected utility theory: Descriptive and normative considerations. *Erkenntnis, 9*(2), 163-173.

Tversky, A., & Kahneman, D. (1973). Availability: a heuristic for judging frequency and probability. *Cognitive Psychology, 5*(2), 207-232.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science, 185*(4157), 1124-1131.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 211*(4481), 453-458.

Tversky, A., & Kahneman, D. (1982a). Availability: A heuristic for judging frequency and probability. In D. Kahneman, P. Slovic & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 164-178). Cambridge: Cambridge University Press.

Tversky, A., & Kahneman, D. (1982b). Judgments of and by representativeness. In D. Kahneman, P. Slovic & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 84-98). Cambridge: Cambridge University Press.

Tversky, A., & Kahneman, D. (1986). Rational Choice and the Framing of Decisions. *Journal of Business, 59*(4), S251-S278.

von Neumann, J., & Morgenstern, O. (1944). *Theory of games and economic behavior*. Princeton, NJ: Princeton University Press.

Wang, X. T., Simons, F., & Bredart, S. (2001). Social cues and verbal framing in risky choice. *Journal of Behavioral Decision Making, 14*(1), 1-15.

Wiseman, D. B., & Levin, I. P. (1996). Comparing risky decision making under conditions of real and hypothetical consequences. *Organizational Behavior and Human Decision Processes, 66*(3), 241-250.

Zhang, Y., & Miao, D. (2008). Social cues and framing effects in risky decisions among Chinese military students. *Asian Journal of Social Psychology, 11*(3), 241-246.

Appendix A

Invitation/Recruitment Message

You are invited to participate in a research study

Hello %FirstName%,

You are invited to participate in a multiple-choice web-survey that concerns how people judge decision scenarios involving uncertain possibilities or events. The survey will require approximately 20 minutes of your time. Complete responses will be compensated with a bonus 1% bonus mark added to your %CourseCode% final grade.

We request that you complete the survey prior to %CompletionDate%. To access the survey, click on the following URL: %URL%.

Note that the above address is associated with your unique Student ID number, thus ensuring that your bonus marks are correctly recorded upon completing the survey.

I would like to assure you that this study has been reviewed and received ethics clearance through the Office of Research Ethics at the University of Waterloo. However, the final decision about participation is yours. If you have any comments or concerns resulting from your participation in this study, please contact Dr. Susan Sykes at this office at 519-888-4567 Ext. 36005 or ssykes@uwaterloo.ca.

Thank you for your interest in our research and for your assistance with this project.

Regards,

Jonathan Aycan
Department of Management Sciences, University of Waterloo
jaaycan@uwaterloo.ca

Appendix B

Information Letter and Consent Form

Welcome to the study!

Principal Investigator:
Dr. Rob Duimering
Department of Management Sciences, University of Waterloo
rduimering@uwaterloo.ca

Student Investigator:
Jonathan Aycan
Department of Management Sciences, University of Waterloo
jaaycan@uwaterloo.ca

You are invited to participate in a study that concerns how people make decisions in scenarios involving uncertain possibilities or events.

As a participant in this study, you will be asked to make decisions in a series of unique situations. The questions focus on scenarios such as a disease outbreak, allocation of cash investments, willingness to purchase, and game strategy. In addition, you will be asked to provide some background information about yourself such as academic term and gender.

Participation in this study is voluntary, and will take approximately 20 minutes of your time. By volunteering for this study, you will learn about research in psychology and management sciences in general and the topic of this study in particular. In addition, you will receive a 1% bonus mark in your management sciences 211 or 311 course. There are no personal benefits to participation. All information you provide is considered completely confidential; indeed, your name will not be included or in any other way associated with the data collected in the study. Furthermore, because the interest of this study is in the average responses of the entire group of participants, you will not be identified individually in any way in any written reports of this research. Data collected during this study will be retained indefinitely, in a locked office in the CPH building to which only researchers associated with this study have access. There are no known or anticipated risks associated to participation in this study.

I would like to assure you that this study has been reviewed and received ethics clearance through the Office of Research Ethics at the University of Waterloo. However, the final decision about participation is yours. If you have any comments or concerns resulting from your participation in this study, please contact Dr. Susan Sykes at this office at 519-888-4567 Ext. 36005 or ssykes@uwaterloo.ca.

Thank you for your interest in our research and for your assistance with this project.

Consent Form

I agree to participate in a study being conducted by Jonathan Aycan and Dr. Rob Duimering of the Department of Management Sciences. I have made this decision based on the information I have read in the Information-Consent Letter and have had the opportunity to receive any additional details I wanted about the study.

I understand that this project has been reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Waterloo, and that I may contact this office if I have any concerns or comments resulting from my involvement in the study.

I also agree to answer the questions of this study to the best of my ability, understanding that those participants who answer the questions honestly will be awarded a 1% bonus mark.

□ **I agree**
□ **I do not agree**

Instructions

On the following pages, please indicate your choice for each of the decision questions. Read each question carefully, and answer each individually without considering the information presented in any of the preceding questions.

Note that if you must stop the survey, you will be able to resume at any time. To return to the survey simply follow the original link to continue where you left off.

Appendix C

Background Information Questionnaire

Thank you for agreeing to participate in our study. Please provide some background information about yourself before we begin.

What is your gender?

□ **Male**
□ **Female**

What is your academic term?

□ **1A**
□ **1B**
□ **2A**
□ **2B**
□ **3A**
□ **3B**
□ **4A**
□ **4B**
□ **Other**

Which faculty are you in?

□ **Applied Health Sciences**
□ **Arts**
□ **Engineering**
□ **Environment**
□ **Mathematics**
□ **Science**

Have you ever taken a course on statistics and/or probability, and if so, how many courses?

None	**1**	**2**	**3**	**4**	**5 or more**
□	□	□	□	□	□

Have you ever taken an economics course, and if so, how many courses?

None	**1**	**2**	**3**	**4**	**5 or more**
□	□	□	□	□	□

Are you currently enrolled in MSCI 211 or MSCI 311?

□ **MSCI 211**
□ **MSCI 311**

Prior to the current term, have you taken MSCI 211 (Organizational Behaviour)?

□ **Yes**
□ **No**

Have you taken MSCI 452 (Decision Making Under Uncertainty)?

□ **Yes**
□ **No**

Have you ever taken a psychology course (excluding MSCI 211 and MSCI 452), and if so, how many courses?

□ **Yes**
□ **No**

Have you ever taken a psychology course (excluding MSCI 211 and MSCI 452), and if so, how many courses?

None	**1**	**2**	**3**	**4**	**5 or more**
□	□	□	□	□	□

Appendix D

Study I Questions

Question 1: Athlete Weight

Goal: increase weight
Imagine that you are an athlete with the goal of increasing your weight as much as possible. In your sport, the higher your weight the better you can perform. You have to begin a specialized training program and you must choose between the following two options.

Goal: decrease weight
Imagine that you are an athlete with the goal of decreasing your weight as much as possible. In your sport, the lower your weight the better you can perform. You have to begin a specialized training program and you must choose between the following two options.

Goal: maintain weight
Imagine that you are an athlete with the goal of maintaining your weight as much as possible. In your sport, you current weight is where you can perform best. You have to begin a specialized training program and you must choose between the following two options.

> Positive Frame:
> If Program A is adopted, 20 pounds will be gained.
> If Program B is adopted, there is a 1/3 probability that 60 pounds will be gained and a 2/3 probability that no pounds will be gained.
>
> Negative Frame:
> If Program A is adopted, 40 pounds will be lost.
> If Program B is adopted, there is a 1/3 probability that no pounds will be lost, and a 2/3 probability that 60 pounds will be lost.

Question 2: Dots

Goal: maximize red
Imagine you are playing a game in which your goal is to maximize the number of red dots.

Goal: maximize blue
Imagine you are playing a game in which your goal is to maximize the number of blue dots.

You are preparing for an event which is expected to cause up to 40 red dots to turn blue. Two alternative strategies to prepare for the event have been proposed. Assume that the exact estimate of the consequences of the strategies are as follows:

> Positive Frame:
> If Strategy A is adopted, 10 red dots will remain red.
> If Strategy B is adopted, there is a 1/4 probability that 40 red dots will remain red, and a 3/4 probability that no red dots will remain red.
>
> Negative Frame:
> If Strategy C is adopted, 30 red dots will turn blue.
> If Strategy D is adopted, there is a 1/4 probability that no red dots will turn blue, and a 3/4 probability that 40 red dots will turn blue.

Which of the two programs would you favour?

Question 3: Company Performance

Goal: improve performance
Imagine you are the president of a company. In order to improve performance, you have decided to hire a consulting firm to help guide your organization.

Goal: maintain performance
Imagine you are the president of a company. In order to ensure performance does not deteriorate, you have decided to hire a consulting firm to help guide your organization.

Which of the following two consulting firms would you prefer?

Positive Frame:
Firm A: Of 100 clients of firm A, 34 have positive results in the first month, 68 have positive results at the end of the first year, and 90 have positive results at the end of five years.

Firm B: Of 100 clients of firm B, 22 have positive results in the first month, 77 have positive results at the end of one year, and all have positive results at the end of five years.

Negative Frame:
Firm A: Of 100 clients of firm A, 66 have negative results in the first month, 32 have negative results at the end of the first year, and 10 have negative results at the end of five years.

Firm B: Of 100 clients of firm B, 78 have negative results in the first month, 23 have negative results at the end of one year, and none have negative results at the end of five years.

Question 4: Disease Outbreak

Stimulus: People
Imagine that the government is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:

> Positive Frame:
> If Program A is adopted, 200 people will survive.
> If Program B is adopted, there is a 1/3 probability that 600 people will survive, and a 2/3 probability that no people will survive.
>
> Negative Frame:
> If Program C is adopted, 400 people will die.
> If Program D is adopted, there is a 1/3 probability that no people will die, and a 2/3 probability that 600 people will die.

Stimulus: Rodents
Imagine that the government is preparing for the outbreak of an unusual Asian disease, which is spread by rodents. There are 600 diseased rodents in a certain region. Two alternative programs to kill the diseased rodents have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:

> Positive Frame:
> If Program A is adopted, 200 diseased rodents will survive.
> If Program B is adopted, there is a 1/3 probability that 600 diseased rodents will survive, and a 2/3 probability that no diseased rodents will survive.
>
> Negative Frame:
> If Program C is adopted, 400 diseased rodents will die.
> If Program D is adopted, there is a 1/3 probability that no diseased rodents will die, and a 2/3 probability that 600 diseased rodents will die.

Which of the two programs would you favour?

Question 5: Medical Treatment

Imagine you are a doctor treating an elderly patient. The patient has lived a good life; however, due to a series of major health problems, her quality of life has deteriorated in recent years. She has now been diagnosed with lung cancer.

Which of the following two treatment options would you recommend?

Stimulus: survival

Positive Frame:

Treatment A: Of 100 people having treatment A, 90 will survive treatment, 68 will be alive after one year, and 34 will be alive after five years.

Treatment B: Of 100 people having treatment B, all will survive treatment, 77 will be alive after one year, and 22 will be alive after five years.

Negative Frame:

Treatment A: Of 100 people having treatment A, 10 will die during treatment, 32 will have died by the end of one year, and 66 will have died by the end of five years.

Treatment B: Of 100 people having treatment B, none will die during treatment, 23 will have died by the end of one year, and 78 will have died by the end of five years.

Stimulus: disease

Positive Frame:

Treatment A: Of 100 people having treatment A, 90 will be cancer-free after the treatment period, 68 will be cancer-free after one year, and 34 will be cancer-free after five years.

Treatment B: Of 100 people having treatment B, all will be cancer-free after the treatment period, 77 will be cancer-free after one year, and 22 will be cancer-free after five years.

Negative Frame:

Treatment A: Of 100 people having treatment A, 10 will have seen the cancer return during treatment, 32 will have seen the cancer return by the end of one year, and 66 will have seen the cancer return by the end of five years.

Treatment B: Of 100 people having treatment B, none will have seen the cancer return during treatment, 23 will have seen the cancer return by the end of one year, and 78 will have seen the cancer return by the end of five years.

Question 6: Portfolio Selection

Scenario: neutral
You are a serious reader of the financial pages but until recently have had few funds to invest. That is when you inherited a large sum of money from your great uncle. You are considering different portfolios. Your choices are (check one):

a. Invest in moderate-risk Company A. Over a year's time, the stock has .5 chance of increasing 30% in value, a .2 chance of being unchanged, and a .3 chance of declining 20% in value
b. Invest in high-risk Company B. Over a year's time, the stock has a .4 chance of doubling in value, a .3 chance of being unchanged, and a .3 chance of declining 40% in value.
c. Invest in treasury bills. Over a year's time, these will yield a nearly certain return of 9%.
d. Invest in municipal bonds. Over a year's time, they will yield a tax-free return of 6%.

Scenario: status quo
You are a serious reader of the financial pages but until recently have had few funds to invest. That is when you inherited a portfolio of cash and securities from your great uncle. A significant portion of this portfolio is invested in moderate-risk Company A.

Neutral Performance:
[no performance indication]

Positive Performance:
Financial statements indicate that the portfolio has performed strongly relative to the market in recent years.

Negative Performance:
Financial statements indicate that the portfolio has performed poorly relative to the market in recent years.

You are deliberating whether to leave the portfolio intact or to change it by investing in other securities. (The tax and broker commission consequences of any changes are insignificant.) Your choices are (check one):

a. Retain the investment in moderate-risk Company A. Over a year's time, the stock has .5 chance of increasing 30% in value, a .2 chance of being unchanged, and a .3 chance of declining 20% in value
b. Invest in high-risk Company B. Over a year's time, the stock has a .4 chance of doubling in value, a .3 chance of being unchanged, and a .3 chance of declining 40% in value.
c. Invest in treasury bills. Over a year's time, these will yield a nearly certain return of 9%.
d. Invest in municipal bonds. Over a year's time, they will yield a tax-free return of 6%.

Question 7: Tokens *(2-alterantives)*

Scenario: neutral
Imagine you are playing a game in which your goal is to maximize the number of red [blue] tokens. You are considering different strategies. Your choices are (check one):

a. Pursue Strategy A. There is a 50% chance that 60 blue tokens will turn red, a 20% chance that the number of blue and red tokens will remain the same, and a 30% chance that 40 red tokens will turn blue.
b. Pursue Strategy B. There is a 50% chance that 60 red tokens will turn blue, a 20% chance that the number of blue and red tokens will remain the same, and a 30% chance that 40 blue tokens will turn red.

Scenario: status quo
Imagine you are playing a game in which your goal is to maximize the number of red [blue] tokens. You are considering different strategies.

Neutral Frame:
The last time you played the game you used moderate-risk strategy A

Positive Frame:
The last time you played the game you used moderate-risk strategy A and were successful in the game.

Negative Frame:
The last time you played the game you used moderate-risk strategy A and were not successful in the game.

You are deliberating whether to maintain the current approach or to change it by pursuing another strategy. Your choices are (check one):

a. Continue with Strategy A. There is a 50% chance that 60 blue tokens will turn red, a 20% chance that the number of blue and red tokens will remain the same, and a 30% chance that 40 red tokens will turn blue.
b. Pursue Strategy B. There is a 50% chance that 60 red tokens will turn blue, a 20% chance that the number of blue and red tokens will remain the same, and a 30% chance that 40 blue tokens will turn red.

Question 8: Beverage Purchase

You are lying on the beach on a hot day. For the past hour you have been thinking about how much you would enjoy a nice cold bottle of your favourite beverage. A companion gets up to go make a phone call and offers to bring back a bottle of the beverage from the only nearby place where it is sold, [a resort hotel/an upscale resort hotel/a run-down resort hotel] (a grocery store/an upscale grocery store/a run-down grocery store). He says that it might be expensive and so asks how much you would be willing to pay for it. He says he will buy the beverage if it costs as much or less than the price you state, but if it costs more than the price you state he will not buy it. You trust your friend, and there is no chance of bargaining with the [bartender] (store owner). What price do you state?

$ _____

Appendix E

Study II Questions

Question 1: Points

Goal: increase points
Imagine that you are playing a game with the goal of increasing your points as much as possible. In the game, the higher your points, the better your score. You have to select a strategy and you must choose between the following two options.

Goal: decrease points
Imagine that you are playing a game with the goal of decreasing your points as much as possible. In the game, the lower your points, the better your score. You have to select a strategy and you must choose between the following two options.

Goal: maintain points
Imagine that you are playing a game with the goal of maintaining your points at the current level as much as possible. In the game, your current point level is ideal; that is, neither decreases nor increases are desirable. You have to select a strategy and you must choose between the following two options.

> Positive Frame:
> If Strategy A is adopted, 20 points will be gained.
> If Strategy B is adopted, there is a 1/3 probability that 60 points will be gained and a 2/3 probability that no points will be gained.
>
> Negative Frame:
> If Strategy A is adopted, 40 points will be lost.
> If Strategy B is adopted, there is a 1/3 probability that no points will be lost, and a 2/3 probability that 60 points will be lost.

Which of the two strategies would you favour?

Question 2: Widgets

Goal: maximize widgets
Imagine you are playing a game in which your goal is to maximize the number of widgets; that is, a greater number of widgets implies better performance.

Goal: minimize widgets
Imagine you are playing a game in which your goal is to minimize the number of widgets; that is, a fewer number of widgets implies better performance.

You are preparing for an event which is expected to cause up to 40 widgets to disappear. Two alternative strategies to prepare for the event have been proposed. Assume that the exact estimate of the consequences of the strategies are as follows:

> Positive Frame:
> If Strategy A is adopted, 10 widgets will remain.
> If Strategy B is adopted, there is a 1/4 probability that 40 widgets will remain, and a 3/4 probability that no widgets will remain.
>
> Negative Frame:
> If Strategy C is adopted, 30 widgets will disappear.
> If Strategy D is adopted, there is a 1/4 probability that no widgets will disappear, and a 3/4 probability that 40 widgets will disappear.

Which of the two strategies would you favour?

Question 3: Disease Outbreak *(revised from Study I)*

Imagine that the government is preparing for the outbreak of an unusual disease which is spread by rodents. On average, for every surviving rodent, one person will die of infection. It is estimated that there are 600 diseased rodents in a certain region, thus putting 600 human lives at risk. Two alternative programs to combat the disease have been proposed. Assume that the estimates of the consequences of the programs are as follows:

Stimulus: people

Positive Frame:
If Program A is adopted, 200 people will survive.
If Program B is adopted, there is a 1/3 probability that 600 people will survive, and a 2/3 probability that no people will survive.

Negative Frame:
If Program C is adopted, 400 people will die.
If Program D is adopted, there is a 1/3 probability that no people will die, and a 2/3 probability that 600 people will die.

Stimulus: rodents

Positive Frame:
If Program A is adopted, 200 diseased rodents will survive.
If Program B is adopted, there is a 1/3 probability that 600 diseased rodents will survive, and a 2/3 probability that no diseased rodents will survive.

Negative Frame:
If Program C is adopted, 400 diseased rodents will die.
If Program D is adopted, there is a 1/3 probability that no diseased rodents will die, and a 2/3 probability that 600 diseased rodents will die.

Which of the two programs would you favour?

Question 4: Sinking Ship

Stimulus: tourists
Tourists have increasingly been travelling the seas and vacationing on luxury cruise ships. Imagine that a cruise ship hits a sunken barge and is sinking in the middle of the ocean. There are 60 tourists on the ship, and their lives are in danger. Two options are proposed. Assume that the exact estimates of the consequences of the options are as follows:

Positive Frame:
If Option A is adopted, 20 tourists will be saved.
If Option B is adopted, there is a 1/3 chance that 60 tourists will be saved and a 2/3 chance that none will be saved.

Negative Frame:
If Option A is adopted, 40 tourists will die.
If Option B is adopted, there is a 1/3 chance that no tourists will die, and a 2/3 chance that 60 passengers will die.

Stimulus: pirates
Pirates have increasingly been travelling the seas and robbing unsuspecting shipping vessels. Imagine that a pirate ship hits a sunken barge and is sinking in the middle of the ocean. There are 60 pirates on the ship, and their lives are in danger. Two options are proposed. Assume that the exact estimates of the consequences of the options are as follows:

Positive Frame:
If Option A is adopted, 20 pirates will be saved.
If Option B is adopted, there is a 1/3 chance that 60 pirates will be saved and a 2/3 chance that none will be saved.

Negative Frame:
If Option A is adopted, 40 pirates will die
If Option B is adopted, there is a 1/3 chance that no pirates will die, and a 2/3 chance that 60 pirates will die.

Which of the two options would you favour?

Question 5: Building Invasion

Stimulus: residents
Rebels have recently been terrorizing innocent civilians in acts of civil disobedience. Imagine that rebels have entered a residential building and are holding families hostage. There are 90 residents inside the building, and their lives are being threatened by the rebels. Two options are proposed to save the residents:

> Positive Frame:
> If Option A is adopted, 30 residents will survive.
> If Option B is adopted, there is a 1/3 chance that 90 residents will survive and a 2/3 chance that none will survive.
>
> Negative Frame:
> If Option A is adopted, 60 residents will die.
> If Option B is adopted, there is a 1/3 chance that no residents will die, and a 2/3 chance that 90 residents will die.

Stimulus: rebels
Rebels have recently been terrorizing innocent civilians in acts of civil disobedience. Imagine that rebels have entered a residential building and are holding families hostage. There are 90 rebels in the building, and they are threatening the lives of the residents. Two options are proposed to combat the rebels:

> Positive Frame:
> If Option A is adopted, 30 rebels will survive.
> If Option B is adopted, there is a 1/3 chance that 90 rebels will survive and a 2/3 chance that none will survive.
>
> Negative Frame:
> If Option A is adopted, 60 rebels will die.
> If Option B is adopted, there is a 1/3 chance that no rebels will die, and a 2/3 chance that 90 rebels will die.

Which of the two options would you favour?

Question 6: Medical Treatment *(same as Study I)*

Imagine you are a doctor treating an elderly patient. Due to a series of major health problems, the patient's quality of life has deteriorated in recent years. She has now been diagnosed with lung cancer.

Which of the following two treatment options would you recommend?

Stimulus: survival

Positive Frame:
Treatment A: Of 100 people having treatment A, 90 will survive treatment, 68 will be alive after one year, and 34 will be alive after five years.

Treatment B: Of 100 people having treatment B, all will survive treatment, 77 will be alive after one year, and 22 will be alive after five years.

Negative Frame:
Treatment A: Of 100 people having treatment A, 10 will die during treatment, 32 will have died by the end of one year, and 66 will have died by the end of five years.

Treatment B: Of 100 people having treatment B, none will die during treatment, 23 will have died by the end of one year, and 78 will have died by the end of five years.

Stimulus: disease

Positive Frame:
Treatment A: Of 100 people having treatment A, 90 will be cancer-free after the treatment period, 68 will be cancer-free after one year, and 34 will be cancer-free after five years.

Treatment B: Of 100 people having treatment B, all will be cancer-free after the treatment period, 77 will be cancer-free after one year, and 22 will be cancer-free after five years.

Negative Frame:
Treatment A: Of 100 people having treatment A, 10 will have seen the cancer return during treatment, 32 will have seen the cancer return by the end of one year, and 66 will have seen the cancer return by the end of five years.

Treatment B: Of 100 people having treatment B, none will have seen the cancer return during treatment, 23 will have seen the cancer return by the end of one year, and 78 will have seen the cancer return by the end of five years.

Question 7: Portfolio Selection *(same as Study I)*

Scenario: neutral
You are a serious reader of the financial pages but until recently have had few funds to invest. That is when you inherited a large sum of money from your great uncle. You are considering different portfolios. Your choices are (check one):

a. Invest in moderate-risk Company A. Over a year's time, the stock has .5 chance of increasing 30% in value, a .2 chance of being unchanged, and a .3 chance of declining 20% in value
b. Invest in high-risk Company B. Over a year's time, the stock has a .4 chance of doubling in value, a .3 chance of being unchanged, and a .3 chance of declining 40% in value.
c. Invest in treasury bills. Over a year's time, these will yield a nearly certain return of 9%.
d. Invest in municipal bonds. Over a year's time, they will yield a tax-free return of 6%.

Scenario: status quo
You are a serious reader of the financial pages but until recently have had few funds to invest. That is when you inherited a portfolio of cash and securities from your great uncle. A significant portion of this portfolio is invested in moderate-risk Company A.

Neutral Frame:
[no performance indication]

Positive Frame:
Financial statements indicate that the portfolio has performed strongly relative to the market in recent years.

Negative Frame:
Financial statements indicate that the portfolio has performed poorly relative to the market in recent years.

You are deliberating whether to leave the portfolio intact or to change it by investing in other securities. (The tax and broker commission consequences of any changes are insignificant.) Your choices are (check one):

a. Retain the investment in moderate-risk Company A. Over a year's time, the stock has .5 chance of increasing 30% in value, a .2 chance of being unchanged, and a .3 chance of declining 20% in value
b. Invest in high-risk Company B. Over a year's time, the stock has a .4 chance of doubling in value, a .3 chance of being unchanged, and a .3 chance of declining 40% in value.
c. Invest in treasury bills. Over a year's time, these will yield a nearly certain return of 9%.
d. Invest in municipal bonds. Over a year's time, they will yield a tax-free return of 6%.

Question 8: Business Strategy

Scenario: neutral
Imagine you are the president of a company. In order to increase your company's value, you are considering various business strategies to guide the organization.

> Positive Performance:
> Recent annual reports indicate that the company has performed strongly relative to the market.
>
> Negative Performance:
> Recent annual reports indicate that the company has performed poorly relative to the market.

Which of the following strategies would you prefer?

a. Pursue moderate-risk Strategy A. Over a year's time, the company has a 50% chance of increasing 30% in value, a 20% chance of being unchanged, and a 30% chance of declining 20% in value
b. Pursue high-risk Strategy B. Over a year's time, the company has a 40% chance of doubling in value, a 30% chance of being unchanged, and a 30% chance of declining 40% in value.
c. Pursue low-risk Strategy C. Over a year's time, the company will nearly certainly increase 9% in value.

Scenario: status quo
Imagine you are the president of a company. In order to increase your company's value, you are considering various business strategies to guide the organization.

Your company is currently following Strategy A.

> Positive Performance:
> Recent annual reports indicate that, while following Strategy A, the company performed strongly relative to the market.
>
> Negative Performance:
> Recent annual reports indicate that, while following Strategy A, the company performed poorly relative to the market.

Which of the following strategies would you prefer?

a. Continue with moderate-risk Strategy A. Over a year's time, the company has a 50% chance of increasing 30% in value, a 20% chance of being unchanged, and a 30% chance of declining 20% in value
b. Pursue high-risk Strategy B. Over a year's time, the company has a 40% chance of doubling in value, a 30% chance of being unchanged, and a 30% chance of declining 40% in value.
c. Pursue low-risk Strategy C. Over a year's time, the company will nearly certainly increase 9% in value.

Question 9: Tokens *(4-alternatives; note: there were also 6- and 8-alterantive versions)*

Scenario: neutral
Imagine you are playing a game in which your goal is to maximize the number of red [blue] tokens. You are considering different strategies. Your choices are (check one):

a. Pursue moderate-risk strategy A. There is a 50% chance that 60 blue tokens will turn red, a 20% chance that the number of blue and red tokens will remain the same, and a 30% chance that 40 red tokens will turn blue.
b. Pursue high-risk strategy B. There is a 40% chance that 200 blue tokens will turn red, a 30% chance that the number of blue and red tokens will remain the same, and a 30% chance that 80 red tokens will turn blue.
c. Pursue moderate-risk strategy C. There is a 50% chance that 60 red tokens will turn blue, a 20% chance that the number of blue and red tokens will remain the same, and a 30% chance that 40 blue tokens will turn red.
d. Pursue high-risk strategy D. There is a 40% chance that 200 red tokens will turn blue, a 30% chance that the number of blue and red tokens will remain the same, and a 30% chance that 80 blue tokens will turn red.

Scenario: status quo
Imagine you are playing a game in which your goal is to maximize the number of red [blue] tokens. You are considering different strategies.

> Neutral Frame:
> The last time you played the game you used moderate-risk strategy A
>
> Positive Frame:
> The last time you played the game you used moderate-risk strategy A and were successful in the game.
>
> Negative Frame:
> The last time you played the game you used moderate-risk strategy A and were not successful in the game.

You are deliberating whether to maintain the current approach or to change it by pursuing another strategy. Your choices are (check one):

a. Continue with moderate-risk strategy A. There is a 50% chance that 60 blue tokens will turn red, a 20% chance that the number of blue and red tokens will remain the same, and a 30% chance that 40 red tokens will turn blue.
b. Pursue high-risk strategy B. There is a 40% chance that 200 blue tokens will turn red, a 30% chance that the number of blue and red tokens will remain the same, and a 30% chance that 80 red tokens will turn blue.
c. Pursue moderate-risk strategy C. There is a 50% chance that 60 red tokens will turn blue, a 20% chance that the number of blue and red tokens will remain the same, and a 30% chance that 40 blue tokens will turn red.
d. Pursue high-risk strategy D. There is a 40% chance that 200 red tokens will turn blue, a 30% chance that the number of blue and red tokens will remain the same, and a 30% chance that 80 blue tokens will turn red.

Question 10: Beverage Purchase ***(revised from Study I)***

You are lying on the beach on a hot day. For the past hour you have been thinking about how much you would enjoy a nice cold bottle of your favourite beverage. A companion gets up to go make a phone call and offers to bring back a bottle of the beverage from the only nearby place where it is sold, [a resort hotel/an upscale resort hotel/a run-down resort hotel] (a grocery store/an upscale grocery store/a run-down grocery store). He says that it might be expensive and so asks how much you would be willing to pay for it. He says he will buy the beverage if it costs as much or less than the price you state, but if it costs more than the price you state he will not buy it. You trust your friend, and there is no chance of bargaining with the [bartender] (store owner). Last week you bought the same beverage for $5.

What price do you state (in Canadian dollars)?

$ _____

Question 11: Event Tickets Purchase

You have just learned that your favourite band is coming to town for a concert. The cost of a ticket is $20. Before you are able to purchase a ticket, you discover that the show has sold out. There are, however, tickets available through a respectable [suspicious] charity auction that is reselling tickets [scalper who is reselling tickets]. Since the show is next week, this will be your only opportunity to purchase a ticket.

Positive Frame:
Through a respectable online marketplace that is reselling tickets for charity
Through a respectable online marketplace that is reselling tickets for profit

Negative Frame:
Through a suspicious online marketplace that is reselling tickets for charity
Through a suspicious online marketplace that is reselling tickets for profit

Neutral Frame:
Through an online marketplace that is reselling tickets for charity
Through an online marketplace that is reselling tickets for profit

Since the show is next week, this will be your only opportunity to purchase a ticket.

What is the maximum amount you are willing to pay?

$ _____

Question 12: Ring Purchase

As you walk through Paris taking photographs, you pass a person on the street who suddenly bends down a few steps behind you and picks up what appears to be a gold ring. As he looks at what he has found, he notices you watching, and asks if you've lost a ring, to which you respond that you have not.

At this point the person points out the hallmark which says '18k' on the inside of the ring. The person then says that he has no use for the ring, and has no way to find the rightful owner. He then asks you if you would like to purchase the ring from him.

Neutral:
[no warning]

Warning:
You have recently heard of situations in which people sell low-quality merchandise for higher amounts. While the ring looks to be high-quality, you have no way to determine if it is authentic.

Basic Approach:
How much are you willing to pay for the ring (in Canadian dollars)? (If you are not willing to buy the ring, then enter "0")

$ _____

Descriptive Approach:
Assuming that you are willing to buy the ring, what price do you think you would be willing to pay (in Canadian dollars)?

$ _____

Do you think you would be willing to buy the ring in this situation?

Yes/No

Why or why not?

Question 13: Speaker Purchase

You are walking through a parking lot by the mall when a commercial van, displaying a company logo on its side, pulls up next to you. There are two individuals inside. The driver informs you that he and his colleague work for a company that installs home audio systems. They have just returned from a supplier's warehouse with an order of speakers that are to be installed for a client and, through a mistake of an operator at the warehouse, they were mistakenly provided with 10 speakers instead of the 8 that were purchased.

They inform you that if they return to their workplace with all 10 speakers then it is unlikely that their boss will allow them to keep the extra speakers. Consequently, they are eager to dispose of the speakers quickly and are willing to sell them to you for well below retail prices. They show you a receipt clearly indicating that the speakers cost $1200 each, and that 8 speakers were purchased from the supplier. They also show you a brochure containing the specifications for the product, which appear quite impressive.

Neutral:
[no warning]

Warning:
You have recently heard of situations in which people sell low-quality merchandise for higher amounts. While the speakers look to be high-quality, you have no way to determine if they are authentic.

Basic Approach:
How much are you willing to pay for a pair of speakers (in Canadian dollars)? (If you are not willing to buy the speakers, then enter "0")

$ _____

Descriptive Approach:
Assuming that you are willing to buy a pair of speakers, what price do you think you would be willing to pay in total for both (in Canadian dollars)?

$ _____

Do you think you would be willing to buy the speakers in this situation?

Yes/No

Why or why not?