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Cognition and Commerce: The Impact of Intuitive Judgment and Rational Analysis on Business Decisions

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COGNITION AND COMMERCE: THE IMPACT OF INTUITIVE JUDGEMENT AND RATIONAL ANALYSIS ON BUSINESS DECISIONS

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Abstract

Decision makers who evaluate complex alternatives in real-world decision-making contexts are susceptible to cognitive biases, which can influence judgments, and may result in irrational decisions. Engaging in deliberate, systematic evaluation may reduce the extent to which biases pervade rational judgments (Kahneman, 2011). Previous studies have demonstrated that the deliberate consideration of multiple alternatives is an effective strategy to reduce biases (Lord, Lepper, & Preston, 1984). However, there is limited research on the effects of deliberate analysis on judgments in business decision-making. The present study examines whether the extent of deliberate analysis would elicit differences in the degree to which judgments changed across the decision-making process. Undergraduate students (N = 32) evaluated high- and low-risk hypothetical business scenarios involving decisions between two choice alternatives. Perceived behavioural intentions to pursue the decisions were assessed at two points: after reading the scenario, and after deliberate analysis of the pros and cons for one, or both alternatives. The results suggest that engaging in comparative analysis, as opposed to selective analysis of a single alternative, causes significantly larger changes in initial intuitive evaluations; this strategy is particularly effective in situations concerning high risk. The practical importance of these results for multifaceted business decision-making in assessed, particularly with regard to the use of deliberate comparative analysis as a strategy to decrease risk aversion.

Keywords: decision making, deliberate thought, business judgment, cognitive bias

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Table of Contents

Page

CERTIFICATE OF EXAMINATION ……..... ii

Abstract ……..……... iii

Acknowledgements ……..……… iv

Table of Contents …….. v

Introduction ……..…….. 1

Method ……..……. 10

Participants …… 10

Materials ……. 11

Procedure …… 14

Results ……... 17

Discussion ……... 21

References …….. 33

Appendices

Appendix A ……. 36

Appendix B ……. 38

Appendix C ……. 42

Appendix D ……. 45

Appendix E ……. 49

Appendix F ……. 50

Curriculum Vitae ……. 51

Introduction

In a complex social world, human beings rely extensively on decision-making and its underlying cognitive processes to make sense of information and decide between various alternatives. Given that decision making guides our actions, and ultimately influences the direction of our lives, it is not surprising that this topic has received significant attention in fields such as cognition, neuropsychology and social psychology. Psychological research has provided evidence that decision-making processes can be improved through factors such as a) practice with a task, and b) improved abilities to evaluate the probabilities associated with various outcomes (Arkes, 1986; Nisbett, Krantz, Jepson, & Kunda, 1983). However, these strategies may not be practical in many real world decision-making contexts, such as when situations are complex or novel (constraining our ability to employ extensive practice), or when interacting situational factors are present (constraining our ability to accurately evaluate probabilities). These conditions, which are characteristic of the decisions individuals face in the business world, suggest that further exploration of alternative strategies to improve decision-making processes is warranted.

Research by Amos Tversky and Daniel Kahneman has contributed significantly to the present conceptualization of cognition and decision-making. The premise of this research suggested that thoughts and decisions result from two interacting systems; System 1 thinking is automatic, rapid and driven by instinct, while System 2 thinking is deliberate, analytical, based on evidence, and controlled (Kahneman, 2011). System 1 thinking relies on automatic shortcuts, or *heuristics*, which facilitate the efficient processing of incoming information. However, using heuristics often leads to *cognitive biases*, which are systematic errors in predictions and judgments (Kahneman, 2011). Given that automatic thinking primarily occurs outside of

conscious awareness, biases from System 1 can permeate deliberate thought, and may ultimately lead to decision-making that is not rational. *Rational decision-making* (System 2) is characterized by decisions made following careful consideration of relevant information and an accurate weighing of costs relative to benefits (Milkman, Chugh, & Bazerman, 2008).

Extensive research has furthered the work of Tversky and Kahneman, and suggested that cognitive biases influence decision-making. Biases lead to predictable decisions which are not rational, a trend that has been found in both novices and experts, and is present in every aspect of our lives (Lichtenstein, Slovic, Fischhoff, Layman, & Combs, 1978; Rabin, & Thaler, 2001; Kermer, Driver-Linn, Wilson, & Gilbert, 2006). Awareness of biases in decision-making does not appear to be the solution to eliminating violations of rational choice. Evidence has suggested that among individuals who were explicitly aware of biases, systematic errors in judgment persisted (Fischoff, 1982; Bazerman, & Moore, 2009). The present study accepted that biases are unavoidable, and instead, focused on how certain factors (such as the decision-making process and the level of risk associated with a decision) can influence the judgments that stem from automatic System 1 thought and deliberate System 2 thought.

Risk and Uncertainty in Decision-Making Situations

Despite the cross-domain influence of biases, important distinctions have been made between decisions made in business contexts versus other decision-making situations. Decision-making studies that have investigated risk-taking propensity have predominantly used situations in which decision alternatives are outlined with exact probabilities of occurrence (Kahneman, & Tversky, 1973). In these scenarios, risk is associated with recurring events where the relative frequency of past outcomes is explicitly provided and can be used to predict the probability that certain outcomes will occur in the future. For example, decision makers in these studies are often

faced with a choice to pursue a gamble or to accept a riskless transaction where they are guaranteed a specific amount of money. For the gamble, the probability of various outcomes are well defined and quantitatively described, typically as monetary values (e.g., choice between an 85% chance of winning $1,000/15% chance of winning nothing or winning a guaranteed $800, Khaneman, & Tversky, 1984).

In a business context, risk is more accurately described as *uncertainty*, as it is the result of unique events where the likelihood of outcomes can only be subjectively estimated (Knight, 1921; Macko, & Tyska, 2009). For example, one inherent risk that influences the outcome of business choices is the state of the economy, which is affected by complex factors such as the political climate, interest rates, consumer spending and capital investment. When evaluating choices, a decision maker can estimate – based on trends or expert reports - how the economy may affect their decision in the future, but this risk cannot be objectively quantified or predicted with certainty. Kahneman and Tversky (1984) suggested that choices based on uncertainty, such as whether or not to take an umbrella, must be made in the absence of advance knowledge of consequences, which are determined by uncertain events, such as the weather. They argued that deciding how to act in situations of uncertainty is comparable to accepting a gamble where different outcomes may occur at different probabilities (Kahneman, & Tversky, 1984). Choices of how to act in business situations require that decision makers accurately weigh risks and benefits in order to subjectively evaluate uncertainty and select the optimal alternative. Under these conditions, a rational evaluation of decision alternatives through controlled System 2 thought is a necessary prerequisite for rational decisions.

To suggest that risk taking in a gambling context, in which the decision maker has no control over outcomes, translates to a propensity to take risks in business is not a fair

comparison. Research on decision-making and risk taking in a business context must replicate elements characteristic of business decisions, namely, the uncertainty associated with outcomes, and the fact that risk does not stem from a single source. Replicating elements of naturalistic decision-making contexts can also enable the study of more complex decision-making and risk-evaluation processes. For example, the deliberate analysis of alternatives is relevant to complex real world decision-making contexts, and represents an area of study that cannot be explored using the traditional decision-making and risk-taking gamble paradigms.

Research investigating the actual decisions business people make to pursue or reject new product opportunities suggested that products with greater downsides and situational uncertainties were more likely to be rejected (More, 1982). However, in business, increased risk is not necessarily a negative thing, particularly if there is the potential for benefits that outweigh these risks, or if the risks can be mitigated. Charan (2001) suggested that failure to execute, and a tendency to avoid risk were significant factors that contributed to corporate underperformance. This suggests that an important factor to consider when evaluating judgments of decision choices is how likely an individual is to pursue (i.e., execute) their decision choice. One factor that may influence intention to execute decision choices is an individual's willingness to take risk in a business context. Whether or not an individual is comfortable with risk depends on factors such as an individual's self-confidence (Chen, Greene, & Crick, 1998). Additionally, a decision-maker's perception of the risks associated with various alternatives could be influenced by norms or by previous experiences in similar situations (Macko, & Tyska, 2009). These studies contributed to an understanding of the distinctions between chance or gambling decisions and business decisions; decisions concerning chance were heavily influenced by evaluations of

probabilities, and conversely, decisions concerning business choices were influenced by self-perceptions and past experiences.

Deliberate Analysis of Decision Alternatives

Adding to the contributions in the area of business decision-making, the current study attempted to explore an area that lacks sufficient evidence by examining how perceptions of risk and judgments of decision choices could be altered through deliberate analysis. A decision maker's confidence in the decision choice and willingness to execute their choice may be increased by deliberate analysis. However, Kahneman (2011) suggested that people do not naturally engage System 2, despite the fact that deliberate thought is necessary for evaluating and managing risks. Research on decision-making processes structured to engage System 2 thought has provided evidence that this is a promising mechanism to decrease biased judgments.

Lord, Lepper and Preston (1984) showed that encouraging participants to consider-the-opposite (i.e. consider evidence inconsistent with initial judgments) was an effective strategy for debiasing evaluations of information. Their study specifically assessed social judgments towards evidence for both sides of the capital punishment debate (anti vs. pro) and compared difference scores between initial judgments (System 1), and judgments following deliberate analysis (System 2). Participants were encouraged to consider the opposite sides of an argument through two separate strategies: some participants were explicitly instructed to consider various outcomes in a hypothetical scenario (the cognitive strategy was altered), while others were indirectly exposed to a paper with information illustrating the other side of a situation (the salience of information on alternate possibilities was increased). The results indicated that when explicit instructions were made to deliberately consider-the-opposite side of an argument, evaluations (i.e., how convincing evidence for both sides of the arguments was) were not influenced by

initial attitudes (Lord et al., 1984). These results can be interpreted according to the two types of thought; altering evaluation strategies by engaging System 2 to deliberately assess the pros and cons of both sides of an argument effectively reduced biases. This debiasing was achieved through decreased reliance on initial judgments (System 1) and increased reliance on System 2. Changes in initial evaluations, as indicated by the difference scores, suggested that final judgments were more rational.

Other studies have found that consider-the-opposite strategies effectively reduced judgmental biases such as overconfidence in the correctness of a chosen alternative, the anchoring effect, and hindsight bias (Koriat, Lichtenstein, & Fischoff, 1980; Mussweiler, Strack, & Pfeiffer, 2000; Davies, 1992). The overarching implication of these studies is that encouraging decision makers to examine evidence impartially and consider the strengths and weaknesses of both sides of an argument is effective for decreasing biases, and thus, improving rationality, by causing initial judgments to change after more thorough analysis (Lord, Lepper, & Preston, 1984). Bazerman and Moore (2009) suggested that the "consider the opposite" strategy effectively counteracts the *confirmation bias*, which is a tendency to pay attention and interpret information in a way that supports existing points of view, while ignoring contradictory information. It is important to examine whether the implications of the aforementioned studies extend into other domains, such as decision-making in a business context.

Current Research

The present study attempted to answer the following research question: is willingness to pursue (i.e. implement) a decision influenced by a) the extent to which a situation is deliberately analysed and b) the level of uncertainty or risk associated with outcomes? Ultimately, the goal of assessing these factors in relation to business decision making was to identify practical solutions,

grounded in empirical evidence, that may increase the likelihood that decisions are made based on a rational understanding of the situation. Previous research has suggested that in order to counteract a natural reliance on implicit judgments, organizations should implement checks and balances, such as having multiple decision makers involved in a decision (Klein, 2008; Kahneman, Lovallo, & Sibony, 2011). Altering the decision-making strategy may be another effective way to decrease reliance on initial judgments.

The current study utilized hypothetical scenarios to describe decision-making contexts that were indicative of real-world business situations, characterized by uncertainty and multifaceted decisions. Overall, this study intended to explore how decision-makers' judgments of decisions concerning different risk levels were influenced by rapid intuitive judgments, and how these judgments interacted to influence subsequent deliberate judgments.

To test whether deliberate System 2 analysis can effectively decrease biased judgments, as reflected in changes to evaluations, the present study manipulated the decision-making strategy. Participants generated confirmatory pros and cons that related to the decision choice either in isolation, or in addition to generating disconfirmatory pros and cons that related to the alternate choice. This design was based on the previously reviewed studies in which judgments were effectively debiased when the alternative side of an argument was deliberately considered, and when arguments for and against initial judgments were listed (Lord et al., 1984; Griffin, Dunning, & Ross, 1990). Having participants list pros and cons of only their chosen alternative engaged System 2 to consider the alternative they had intuitively favoured, and thus the confirmation bias may have still pervaded final judgments. Therefore, it was hypothesized that judgments between the intuitive and deliberate phases would change slightly in the selective condition. It was hypothesized that reliance on intuitive judgments would be counteracted more

extensively by deliberate engagement in a comparative analysis of the risks and benefits associated with multiple alternatives; for the comparative analysis a greater change between intuitive and deliberate judgments was expected. Deliberate System 2 analysis of both alternatives may have decreased the likelihood that biases (which are inherent in automatic and intuitive thinking) permeated deliberate thought, and subsequently led to irrational decision-making.

Decision-makers may have engaged in System 2 thinking more extensively when the outcomes of multiple alternatives were analysed. Having participants list pros and cons of their chosen alternative *and* the other alternative may have increased the accessibility of the often neglected disconfirming evidence which is important for debiasing to occur. By deliberately analyzing only one alternative, there may have been a higher likelihood that confirmation bias impeded rational decision-making since the evidence considered was solely for the supported alternative. This would likely lead to a lower propensity to change initial judgments. Consequently, it was hypothesized that engaging System 2 thought for only one alternative may have caused individuals to rely more heavily on their intuitive judgments. This may have led to an illusion of rational decision-making in which decision-makers believed they rationally analysed the situation, when in fact, initial intuitive judgments were simply reaffirmed, and they did not actually change their initially evaluations drastically. This prediction that an illusion of rationality may occur is further supported by research which found that participants who deliberately considered one sided evidence still perceived their decision-making strategy to be unbiased (Lord, Ross, & Lepper, 1979; Lord, Lepper, & Preston, 1984). While both conditions were hypothesized to change judgments of likelihood to pursue the choice after deliberate judgments, the important distinction is that the decision-making strategy is more rational in the

comparative condition, as thorough analysis enables exploration of the entire decision choice set. In the selective analysis of only the intuitively favoured alternative, the illusion of rationality may promote a sense of rationality, despite the fact that their evaluation of the situation was not grounded in a rational decision-making strategy, and their initial judgments did not change significantly.

Additionally, it was important to consider how the decision-making process influenced judgments across scenarios with different levels of risk associated with the outcomes. Naturalistic decision-making situations vary in terms of the magnitude of potential outcomes associated with choosing one course of action over another. For example, there is higher perceived risk if a potential decision consequence is bankruptcy, versus loss of a small number of customers to a competitor. Thus, the decisions that senior organizational leaders are faced with have associated risks and rewards which can be either large, in that they are detrimental to the organizations success, or small, in that they only influence a particular unit or product line. Investigating how judgments that resulted from intuitive and deliberate thinking differed in high- versus low-risk situations was important in order for findings to be generalized across decision-making situations that concerned different levels of risk.

Situations with different risk levels may have changed the extent to which an individual relied on intuitive versus deliberate judgments to make a decision. It was hypothesized that individuals would be more reliant on their initial intuitive judgments when a decision concerned a higher perceived level of risk, and thus, would be less likely to change their initial intention to pursue their decision following deliberate analysis. This hypothesis was grounded in a natural tendency to avoid risk. It was hypothesized that in high-risk situations, more extensive deliberate decision-making (through a comparative analysis of outcomes) would have less of an ability to

elicit changes in initial intuitive judgments with regard to how likely an individual was to pursue their decision, as compared to situations that were associated with less risk.

These hypotheses were based on research that suggested risks (potential losses) are more salient than benefits (potential gains) (Kahneman, & Tversky, 1979). Classic experiments on loss aversion have provided extensive support of an irrational tendency for people to avoid risk; losses and gains of the same dollar amount are not evaluated equally, with the former being seen as more aversive than the latter is attractive (Kahneman, & Tversky, 1984). This loss aversion tendency is also prevalent when decision makers evaluate choices to pursue an alternative option or maintain the status quo. In these situations, the advantages of an alternative option are evaluated as gains, whereas the disadvantages are evaluated as losses (Kahneman, & Tversky, 1984). In line with the theory of loss aversion, since losses loom larger than gains, decision makers are biased to prefer maintaining the current status quo even if the gains and losses are of equal weight (Kahneman, & Tversky, 1984). Thus, in situations where the risk and potential loss associated with a decision was greater, it was expected that participants would be less inclined to pursue the alternative, and less willing to change their judgments following deliberate System 2 analysis due to an innate tendency to perceive risk as aversive.

Method

Participants

Participants included 32 undergraduate students (20 females and 12 males) from Huron University College who ranged in age from 18 to 23 years (M = 19.47, SD = 1.44 years). The selective and comparative analysis conditions were comprised of 17 and 15 participants, respectively. Participants were English speakers who were not required to have any formal educational experience with business courses. The participants were from a variety of programs,

with the majority of participants (53.1%) in Psychology, 25.0% in Business and 21.9% in other programs. Twenty-nine of the participants were recruited online through the Huron Psychology SONA System, a research participant pool facilitated by the Psychology Department at Huron University College. These students were enrolled in an introductory psychology course at Huron College and compensation was provided in the form of a partial course credit to satisfy the laboratory component of the course. Compensation was not contingent on the completion of study, and was granted when an individual signed up for a time slot, arrived at the study, and read the consent form. Additionally, two students enrolled in a second-year course on Cognitive Psychology voluntarily participated, and were not compensated.

Materials

The materials consisted of questions on general demographic characteristics, a role description, two hypothetical scenarios, questions which pertained to the perceived risks, rewards, rationality of decision-making and likelihood to pursue the decision, and multiple-choice questions used for a comprehension check. Stimuli were typed and presented on a Windows desktop computer monitor, through the online survey software program Qualtircs. A standard computer mouse and keyboard were also used.

The role description was a short passage (70-words) written by the researcher, which outlined the hypothetical role of a Chief Executive Office (CEO) that participants were to assume for both scenarios. The role description outlined that the goal of the CEO was to make decisions that were in the best interests of the overall company.

Two written passages, approximately 300-words in length each, described independent hypothetical business scenarios that the participant (in their assumed role as CEO) was facing in two different organizations. The hypothetical business decision scenarios were constructed by

the researcher using the format of managerial scenarios created by Tyszka and Zaleskiewicz (2006) in a study on risk assessment in naturalistic decision situations. The scenarios described the overall decision to be made between two alternatives, the economic situation, current performance of the company, and overall risks and benefits of pursuing each of the alternatives. The situations were ambiguous as there were multiple risks and benefits associated with each of the two options. Consequently, there was no clear correct decision, as is the case in most real-world business decisions that CEO's are faced with.

Specifically, Scenario 1 depicted a company that had not performed well in the previous year, in which the CEO was facing a decision with two alternatives: whether or not to take out a bank loan. The risk level for Scenario 1 was high, as one of the stated outcomes of taking out the loan was potential bankruptcy if the economic situation worsened. Conversely, Scenario 2 depicted a low-risk situation, as the company was described as being in a good economic position. The CEO had to decide between two alternatives: whether or not to design and create a new product. Thus, in both scenarios, the alternatives were related to pursing either a new course of action or maintaining the status quo, however, response options were specific in that they pertained to the decision at hand in the respective scenario. Participants were also presented with printed versions of the role description and two hypothetical scenarios to refer to throughout the study. Appendix A provides the instructions, role description and scenarios as they were presented to participants.

The questions that pertained to the scenarios were used to measure participants' intuitive and deliberate judgements on various dimensions related to their decisions. To measure which of the two alternatives the CEO should purse, two response choices per scenario were provided: *take out a bank loan* or *do not take out a bank loan* for Scenario 1, and *design and create a new*

product or *do not design and create a new product* for Scenario 2. Additional questions asked about how likely participants were to pursue their decision choice, what level of risk was associated with their decision, what level of reward was associated with their decision, and how rational they believed their decision was. Responses to these questions were measured on 10-point scales with a sliding response indicator that was accurate to one decimal place. Lower scores indicated a lower likelihood of pursing the chosen option, or, lower levels of risk, reward, or rationality (1.0 = *very unlikely*, or, *no risk,* or, *no reward,* or, *not rational at all* and 10.0= *very likely*, or, *substantial risk*, or, *substantial reward,* or, *very rational*).

The materials used to facilitate deliberate analysis included a question asking participants to list the pros and cons of their chosen alternative followed by 20 boxes for the individual pros and cons to be recorded. The extent of deliberate analysis was manipulated by asking participants in the comparative condition to list the pros and cons of both their chosen alternative followed by the pros and cons of the other alternative. Listing reasons for and against various alternatives is a means of structuring the decision-making process that has been effectively used in previous research studies to reduce biased judgements (Koriat, Lichtenstein, & Fischoff, 1980).

Six multiple-choice questions (three per scenario) with three response options per question were used to measure comprehension levels of the hypothetical scenarios. The specific questions are provided in Appendix E. The questions assessed recognition of basic facts presented in each scenario and, thus, were easy to answer if participants carefully read the scenarios. The threshold for adequate comprehension was set at four out of six correct responses.

Procedure

Participants completed the study between 8 a.m. and 4 p.m. on weekdays between December 2016 and March 2017 in a psychology testing room at Huron University College. Testing was conducted individually or in groups of two to three participants, however, in all cases, the study was completed independently with no opportunity to interact with other participants. In order to ensure that participants were able to concentrate, the testing room was quiet and the door to the testing room was closed. Privacy screens separated each of the cubicles so that participants were unable to observe the screens of the other participants in the room. Pre-scheduled session timeslots were 50-minutes each, with a total study duration of approximately 20-minutes for the selective condition, and 30-minutes for the comparative condition. The slight variations in test duration in each condition were due to differences in reading speed. The study utilized a 2 X 2 mixed-factorial design, with one between-subjects independent variable (extent of rational analysis: comparative vs. selective analysis of alternatives) and one within-subjects independent variable (risk level: high- vs. low-risk level) Prior to commencing the study, participants were presented with a printed consent form that outlined the procedure.

The online survey was pre-loaded on the computer screen prior to each testing session. Prior to beginning the survey, participants were provided with verbal instructions to use the keyboard to type their responses, and the mouse to progress through the questions in the study. Participants were provided with printed copies of the role description and scenarios and instructed that this information could be referred to when completing the study.

After beginning the study, participants responded to demographic questions on their gender, age, program of study, and year of academic study. Participants were provided with written instructions that they would be required to answer multiple-choice questions later in the

study based on the content of the hypothetical scenarios. The purpose of this was to ensure that responses reflected a thorough understanding of the scenario details and to increase participants' motivation to carefully read the material.

Participants read the role description followed by one of the scenario descriptions. Schwarz, Hippler and Noelle-Neumann (1992) suggested that the order of presentation for questions in a survey can affect preferences since individuals tend to rely on previous judgment when making consequent decisions. Therefore, the order in which the two scenarios was presented was counter-balanced, with half of the participants receiving the low-risk scenario first, and half of the participants receiving the high-risk scenario first. The procedure was identical for both scenarios. At no point in the study could a participant go back to review or change previous responses. Time spent on each page, response latency and number of clicks on the response scale were recorded by Qualtrics experimental software, however, this data was not visible to participants.

In the intuitive judgment phase, participants were presented with questions pertaining to their decision, including which option they thought was in the best interests of the company to pursue as CEO, how likely they were to pursue that decision, perceived level of risk and reward, and how rational they believed their decision was (see Appendix B). They were instructed to respond to each question as quickly as possible to ensure that responses reflected automatic judgments. Each page displayed a countdown timer from 15-seconds, after which point the page automatically proceeded to the next question. This time pressure further ensured that responses reflected automatic processing.

Participants were randomly assigned to one of two conditions for the extent of rational analysis (*selective analysis* vs. *comparative analysis*). Participants were asked to deliberately

assess the pros and cons of their chosen alternative in the selective condition, or both their chosen alternative and the other alternative in the comparative condition (see Appendix C). The purpose of this exercise was to facilitate deliberate processing, thus engaging System 2. Participants were given 3-minutes to generate pros and cons which were typed in a list format. They were asked to indicate whether each response was a *Pro* or *Con* prior to typing their specific response. There was no requirement for how many pros and cons participants were required to generate. A total of 20 boxes were provided, more than could be filled in the allotted time. In the comparative condition, the identical procedure was repeated for the second alternative, thus, further engaging System 2 thought and ensuring that both alternatives were rationally analysed. After the 3- minutes had elapsed, participants were presented with a waiting screen, which displayed a countdown timer from 60-seconds. They were instructed to reflect on their analysis and were unable to progress to the next stage until the countdown ended. The waiting period was included in order to decrease the likelihood that participants in the comparative condition would be susceptible to the recency effect, and base their responses to the deliberate judgment questions on their deliberate analysis of the most recently completed alternative.

In the deliberate judgment stage, participants responded to the identical questions which were asked in the intuitive judgment phase. There was no time limit, and participants could advance through the questions at their desired pace (see Appendix D).

In the final phase, the comprehension check, the printed role description and scenarios were removed so that responses would reflect whether previous decisions and judgments were made based on an accurate understanding of the scenarios. The prior knowledge of this phase was intended to increase participants' motivation to thoroughly read the information, and thus

enable them to effectively engage in a rational analysis of the pros and cons and respond to questions based on the content of the scenarios. Upon completion of the study, a debriefing statement was provided which outlined the purpose and hypotheses of the study.

Results

Preliminary Analyses

Participants' responses to the comprehension check questions were assessed to ensure that participants adequately understood of the scenario information and risk level. No participants were omitted on the basis of inadequate performance, as the mean comprehension check score was 95.86% (*SD* = 10.38).

Prior to data analysis, the responses from the deliberate analysis phase were assessed to ensure that participants provided pros and cons that pertained to the scenarios; this further ensured that participants had carefully read and understood the descriptions. One participant was removed from the sample as they simply typed a list that stated *pro* or *con,* but failed to provide descriptions of what the pros and cons were. The researcher was unable to determine whether this participant had engaged in a deliberate analysis of the alternatives, and thus, a final sample of 32 participants was used for the purposes of data analysis. Generated pros and cons commonly referred to themes such as the risks or benefits associated with various fluctuations in the economy, the potential to pursue other endeavors if a decision proved to be successful, the threats or opportunities to related to customers or competitors, and the overall benefits or risks of the alternative under consideration. Examples of responses from this phase are provided in Appendix F to further demonstrate the extent to which participants deliberately analysed the decisions at hand. The pros and cons analysis were converted into raw scores for the number of

pros and cons participants associated with the alternative they thought was in the best interest of the company (selective and comparative groups) and the other alternative (comparative group).

Design of Primary Analyses

A 2 X 2 mixed-factorial analysis of variance (ANOVA) was conducted to determine whether there were significant differences in judgments of perceived likelihood to pursue the decision between the intuitive and deliberate judgment phases. The between subjects factor was extent of rational analysis (selective, comparative) and the within subjects factors was level of risk (high-risk, low-risk). The interaction was also assessed to determine whether the impact of comparative or selective deliberate analysis on changes in likelihood to pursue the decision depended on risk level.

Scores for the dependent variable ranged from – 10 to + 10, with raw scores of judgments of likelihood to pursue for the status quo option (do not pursue the bank loan/do not create the new product) converted to negative scores and scores for pursuing the bank loan or creating the product kept as positive scores. The purpose of creating one scale was to enable difference scores to be calculated across all participants, including the three participants in the high-risk condition who changed their responses for which decision they favoured between the two phases (e.g., stated they would take out the loan in the intuitive phase and then changed it to not taking out the loan in the deliberate phase). Difference scores were calculated by taking the absolute value of the rating for likelihood to pursue the choice in the deliberate phase minus the likelihood to pursue the choice in the intuitive phase. The absolute value was taken due to the fact that the variable of interest was the magnitude of change between evaluations, regardless of the direction of the judgment shift.

Main Effects and Interactions

The results revealed a significant main effect for extent of rational analysis, F (1, 30) = 4.69, p = .038, partial η^2 = .14 (Figure 1). Participants in the comparative condition who analysed pros and cons for both alternatives (M = 1.91, SE = .46) changed their judgments of the likelihood to purse their decisions more than those in the selective condition who analysed pros and cons of only one alternative (M = .54, SE = .44). There a marginally significant main effect for risk level, Greenhouse- Geisser adjusted F (1.00, 30.00) = 2.93, p = .09. Difference scores between intuitive and deliberate judgments of likelihood to pursue the decision were not significantly different when risk level was low (M = .66, SD = .68), as compared to risk was high (M = 1.70, SD = 3.72).

There was a marginally significant interaction between level of risk and extent of rational analysis, F (1, 30) = 2.75, p = .10, which indicated that the impact of risk level on changes in likelihood to pursue the decision did not depend on the extent of rational analysis (selective vs. comparative).

Multiple Linear Regressions

Two multiple linear regressions (high-risk scenario, low-risk scenario) were conducted to determine whether changes in judgments of likelihood to pursue the decision between intuitive and deliberate phases (the dependent variable) could be predicted by various judgments in the intuitive and deliberate phases. The absolute value of difference scores was used as the dependent variable. The predictor variables were level of risk, level of reward, perceived rationality, number of pros (for the choice and alternative) and number of cons (for the choice and alternative). Overall, neither the high- or low-risk regressions were significant when the

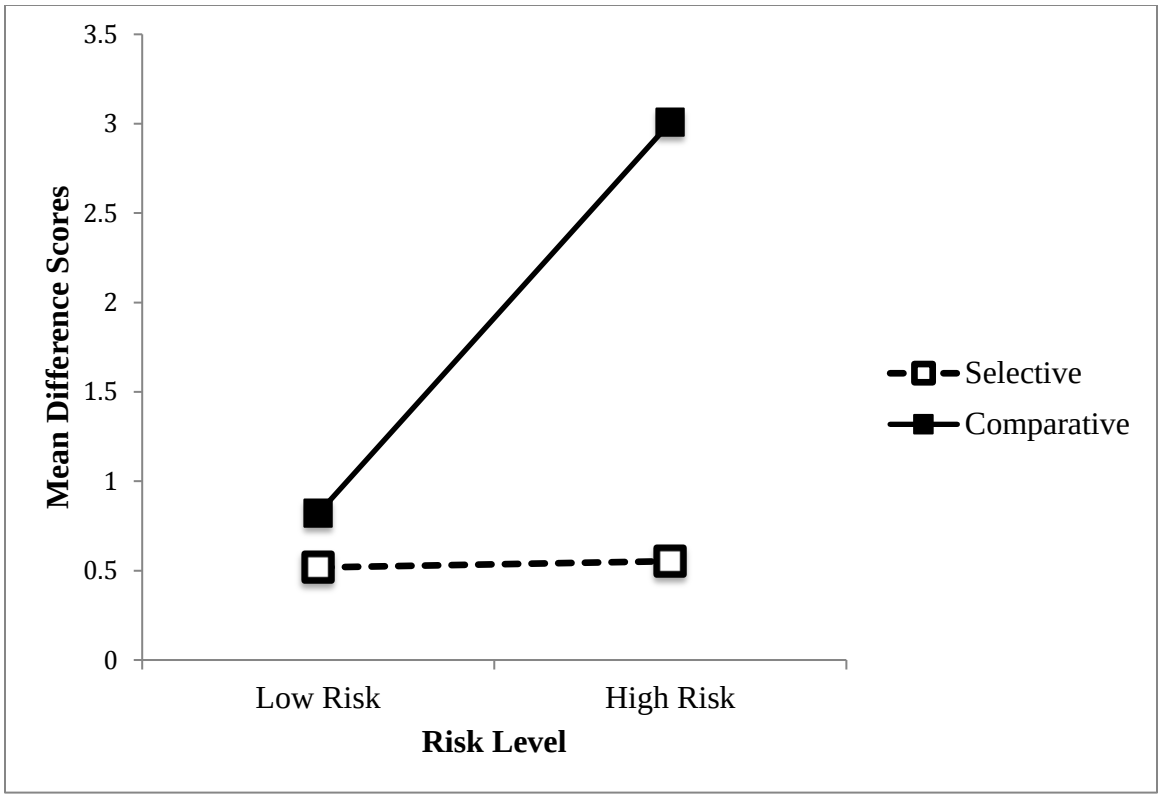

Figure 1. Line graph of mean difference scores representing judgments of likelihood to pursue the decision in the intuitive phase subtracted from the judgments of likelihood to pursue the decision in the deliberate phase for comparative and selective analysis in high- and low-risk scenarios. A significant difference was found between changes in judgments for the comparative and selective analysis conditions. A marginally significant main effect was found for risk level, and a marginally significant interaction was found for risk level and extent of rational analysis.

predictors were taken together. The results for the high-risk regression were F (13, 1) = 67.60, p = .095, R^2 = .999. Of the predictors investigated for the high-risk scenario, none of the predictor variables were significant as revealed by the results in Table 1. The overall results for the low-risk regression were F (12, 2) = 5.89, p = .154, R^2 = .97. Of the predictors investigated for the low-risk scenario, intuitive risk level judgments (β = - 2.18, t (2) = - 4.13, p = .054), deliberate reward level judgments (β = 1.98, t (2) = 4.25, p = .051) and deliberate rationality level judgments (β = - 2.60, t (2) = - 4.92, p = .039) were significant. The other predictor variables were not significant predictors of changes in judgments for likelihood to pursue the decision.

A Pearson bivariate correlation revealed a negative relationship in the low-risk scenario between judgments of perceived rationality of decision making (in both the intuitive and deliberate phases) and difference scores for likelihood to pursue the decision. Specifically, there were significant negative relationships between perceived rationality of decision making and difference scores in the intuitive phase, r (13) = -.63, p = .006, and in the deliberate phase, r (13) = - .58, p = .012.

Discussion

The results suggested that the extent of rational analysis an individual engaged in had significant effects on decision-making. These effects were with regard to the changes in perceived behavioural intentions (i.e. judgments of likelihood to pursue the decision) between the intuitive and deliberate phases. The mixed-factorial ANOVA revealed that individuals were more likely to change their judgments following deliberate analysis when they engaged in deliberate analysis of the risks and benefits of both alternatives compared to the selective analysis of only the intuitively favoured alternative. Thus, the experimental hypothesis that selective analysis of only one alternative would lead to less drastic changes in judgments

Table 1

Regression Predicting Changes in Judgments of Likelihood to Pursue the Decision

	Model 1: Low-Risk					Model 2: High-Risk				
Predictor Variable	*B*	*SE*	*β*	*t*	*p*	*B*	*SE*	*β*	*t*	*p*
Likelihood to Pursue (Intuitive)	1.08	.29	8.89	3.77	.06	-1.87	.61	-.46	-3.05	.20
Likelihood to Pursue (Deliberate)	- .95	.26	-8.30	-3.73	.07	-.23	.55	-.06	-.41	.75
Level of Risk (Intuitive)	-1.20	.29	-2.18	-4.13	.05*	2.20	.42	.97	5.22	.12
Level of Risk (Deliberate)	.06	.11	.13	.58	.62	5.28	.86	2.23	6.10	.10
Level of Reward (Intuitive)	-.96	.24	-2.36	-3.97	.06	-3.13	.30	-1.56	-10.64	.06
Level of Reward (Deliberate)	.88	.21	1.98	4.25	.05*	1.22	.24	.43	5.11	.12
Decision Rationality (Intuitive)	.63	.23	.93	2.69	.12	1.25	.34	.54	3.67	.17
Decision Rationality (Deliberate)	-1.55	.32	-2.60	-4.92	.04*	2.25	.53	.59	4.25	.15
Number of Pros (Choice)	1.94	.52	2.91	3.70	.07	-4.32	.85	-1.30	-5.11	.12
Number of Cons (Choice)	.46	.19	.64	2.36	.14	-1.75	.22	-.62	-7.88	.08
Number of Pros (Alternative)	-.25	.24	-.20	-1.06	.40	19.37	3.73	2.23	5.19	.12
Number of Cons (Alternative)	-.12	.21	-.15	-.58	.62	.62	.45	.18	1.38	.40

Note. The predicted variable was the absolute value of difference scores for likelihood to pursue the decision; higher scores indicated a greater change in judgments from intuitive to deliberate phases. Scores for the predictor variables likelihood to pursue, level of risk, level of reward and level of decision rationality ranged from 1 to 10, with higher scores indicating greater perceived risk, reward or rationality.

* $p <$ or = .05.

between the intuitive and deliberate phases as compared to the comparative analysis was supported. These changes were in either direction (i.e. more or less likely to pursue the decision after deliberate analysis). The scenarios contained ambiguous information, which equated to no objectively correct answer. Therefore, the direction of the change was not the focus of the analysis; rather, the variable of interest was whether deliberate analysis could cause individuals to re-evaluate their initial intuitive judgments and subsequently change their judgments following the deliberate analysis of pros and cons.

It was hypothesized that individuals would be more reliant on their initial intuitive judgments when a decision concerned a higher perceived level of risk. This would have been reflected in less of a change in the judgments of likelihood to pursue the decision between the intuitive and deliberate phases. Given that there was no significant main effect for risk level, this hypothesis cannot be supported. Despite the fact that the interaction between risk level and extent of deliberate analysis (comparative vs. selective) was not quite significant, the graphical representation of the results demonstrates that engaging in a comparative or selective analysis of the pros and cons had markedly different effects in the high-risk scenario. Specifically, individuals changed their initial intuitive judgments much more after they had engaged in a comparative analysis of the pros and cons for both alternatives.

This finding contradicts the hypothesis that individuals would be *less* likely to change their perceived intent to pursue their decision choice when the scenario concerned a higher level of risk. Instead, the results actually suggested the opposite, and revealed that when a comparative analysis of the alternatives strategy was used, individuals changed their evaluations much more in the high-risk scenario. Thus, the current study adds to the extensive previous research that suggested comparative analysis of multiple alternatives can promote debiasing of judgments

(Lord, Lepper, & Preston, 1984; Koriat, Lichtenstein, & Fischoff, 1980; Mussweiler, Strack, & Pfeiffer, 2000; Davies, 1992) and extends this finding to decisions concerning business choices. The results also have valuable implications with regard to the existing research on risk aversion. Employing a comparative deliberate analysis strategy to evaluate a decision may help decrease the likelihood that individuals in organizations are influenced by implicit tendencies to be risk aversive. Research has suggested that risks (potential losses) are more salient than benefits (potential gains) and consequently, individuals are more inclined to make decisions that minimize risk and potential losses (Kahneman, & Tversky, 1979). The tendency be averse to situations of high risk may be counteracted by engaging System 2 though extensively though a comparative analysis. The fact that individuals were inclined to change their judgments of likelihood to pursue the decision after a comparative analysis of the high-risk scenario decision set suggests that the deliberate analysis may have resulted in a deeper understanding of the risks that pertained to the situation. This can be inferred by the fact that comparative deliberate analysis caused decision-makers in high-risk situations to more drastically change their initial judgments of behavioural intention to pursue the decision.

This support for deliberate System 2 analysis that is comparative in nature has practical relevance for decision-makers in organizations who face high-risk decisions. Charan (2001) suggested that failure to execute and a tendency to avoid risk are significant factors that contribute to corporate underperformance. One potential way to mitigate this issue is to encourage comparative analysis of all the choice alternatives. This strategy appeared to be a useful for decreasing reliance on initial System 1 judgments and promoting individuals to reconsider their intuitive perceptions of a situation after System 2 was engaged. Given that high-risk scenarios have the potential for greater loss (monetary, reputational etc.) within

organizations, this research has particularly valuable implications in the real world and should be explored in future research.

It was hypothesized that deliberate engagement in the selective analysis of the risks and benefits associated with only one alternative may have caused individuals to be more susceptible to biases, and thus less inclined to change their intuitive intentions to pursue the decision. Selectively analyzing only one alternative does appear to have led to an illusion of rational decision-making in which decision-makers believed they rationally analysed the situation, when in fact, initial intuitive judgments were simply strengthened. The difference scores in the high-risk scenario when System 2 analysis was selective were much lower than when comparative analysis was employed. Lord, Lepper and Preston (1984) found that when participants did not explicitly evaluate both sides of a situation by considering the opposite alternative, they were susceptible to attitude polarization such that deliberately thinking about their initial position caused them to strengthen their initial belief. The fact that intuitive and deliberate judgments of behavioural intention did not drastically change in the selective condition further supports this finding.

Since the underlying decision-making process is biased when only one alternative is considered, deliberate analysis that pertains only to the chosen alternative could have negative implications as judgments could be considered irrational. The results are encouraging as they suggested that participants in the comparative condition who analysed pros and cons for both alternatives were more likely to change their intentions to pursue their decisions compared to those in the selective condition who analysed only their chosen alternative when risk level was high. The consideration of various alternatives forces an individual to assess information that is inconsistent with initial beliefs. This may enable decision makers in organizations to effectively

evaluate the risk associated with a decision choice, and consider the benefits of an alternative they had not intuitively favoured.

One explanation for why considering inconsistent arguments and multiple alternatives can increase rationality is that these strategies increase the accessibility of commonly neglected information and thus, final estimates are based on a knowledge set that is unbiased, which results in unbiased judgments (Mussweiler, Strack, & Pfeiffer, 2000). According to this logic, the information base mediates the relation between deliberate analysis and debasing of judgments. Thus, when the decision involves a high degree of risk encouraging individuals to consider various alternatives in-depth, by assessing the risks and benefits associated with multiple alternatives, appears to facilitate final judgments that diverge from intuitive judgments. This research provides empirical support for the recommendations advocated in business literature which suggest that decision-making may be improved by deliberately analyzing various alternatives (Khaneman, Lovallo, & Sibony, 2011).

Further analysis of the data revealed that with the exception of three participants in the high-risk condition, decisions about which alternative to pursue were consistent across time (i.e. in the intuitive and deliberate conditions). Interestingly, the three participants that changed their decision choices between the two phases were all in the comparative condition and these changes were for choices in the high-risk scenario. This pattern has interesting implications with regard to the effectiveness of using a comparative decision analysis strategy. It appears that deliberate analysis of both alternatives not only caused more pronounced changes in participants' intentions to pursue the decision choice, but that this comparative strategy also enabled some participants to abandon their intuitively favoured options. By encouraging individuals to rationally and systematically consider all alternatives rather than focusing analysis only on the intuitively

favoured alternative, the biases that emerged towards intuitive choices were overcome as reflected in changes in the decision choices for these three participants.

The results obtained in the current study suggest that deliberately analyzing various alternatives in the decision-making process may be one mechanism through which behavioural intention to act on a decision choice can diverge from intuitive judgments. However, further research is required in this area before these results can be generalized to a real-world setting. The most substantial limitation of the current study is inherent in the study of business making decisions in a lab context; the actual situations that people in organizations face are much more complex.

One critique of this study, and any study that attempts to replicate aspects of a business-decision-making context in the lab, is whether hypothetical decision-making is as a valid measure of real word decisions. For example, discrepancies in compensation between the sample and decision-makers in the real world are evident. The current study presented university students with a brief description of a situation and provided them with a course credit as compensation. Conversely, decision-makers in businesses situations often have substantial monetary incentives to make good decisions (e.g., bonuses and/or salaries tied to overall company performance). Despite this limitation, some empirical support has suggested that incentives may not necessarily alter decision-making processes. Tversky and Kahneman (1981) found that when they introduced a monetary incentive, in the form of payoff schedules associated with various alternatives, participants continued to be influenced by cognitive biases and make decisions that were not rational or optimal. This research suggests that the findings from the present study do accurately represent biases that would be carried over to decision-making in the real world.

Additionally, participants in the present study cannot be compared to business decision-makers on the basis of level of understanding of the decision-making situation. The former have only briefly read about a hypothetical situation while the later likely have extensive knowledge on the industry and organization in which they are making decisions. Arkes (1986) suggested that extensive practice with a task, or knowledge of a situation may decrease the likelihood that biases impede decision-making. Therefore, it is unclear whether business decision-makers could employ these types of decision-making strategies to improve decision-making outcomes, or whether they already deliberately analyse evidence for alternatives when facing a decision as a result of extensive practice with making complex decisions.

The regression for the high-risk scenario was not significant and revealed that when taken together, the various predictors did not predict changes in likelihood to pursue the decision. This finding further emphasizes the fact that decision-making processes concerning business situations are inherently complex and influenced by many different factors, particularly when there is a high level of risk involved. Thus, the specific evaluations and number of pros and cons generated did not reliably predict how decision makers would differ in intuitive versus deliberate evaluations of likelihood to pursue their decisions.

With regard to the low-risk regression, the significant predictors of difference scores (i.e., changes in likelihood to pursue the decision between the intuitive and deliberate phases) were intuitive risk level, deliberate reward level and deliberate rationality level. Specifically, higher perceived risk in the intuitive phase predicted lower difference scores. When risk level was intuitively perceived to be higher, individuals may have relied more on automatic intuitive risk perceptions to inform their final judgments and behavioural intentions. Additionally, deliberate reward level was a significant predictor, which suggests that higher perceived levels of reward

resulted in greater shifts in the difference scores. Perhaps the higher reward judgments led to the perception that there was more to be gained, and motivated individuals to change their initial intuitive judgments more extensively or vice versa. The significant coefficient for deliberate decision rationality suggests that greater changes in difference scores predicted lower ratings of perceived rationality. Individuals may have felt uncomfortable when their behavioural intentions in the deliberate stage diverged from the intuitive stage, and thus, they may have inferred that their overall decision-making process was less rational. This interpretation is in line with the notion that individuals prefer when their judgments are consistent across time.

The correlational analysis for the low-risk scenario revealed significant negative correlations between difference scores and judgments of perceived rationality in both the intuitive and deliberate phases. This result suggests that higher perceived levels of rationality were related to a lower tendency to change behavioural intentions between the intuitive and deliberate phases. These individuals may have already been confident with their decisions prior to the deliberate analysis. Individuals who perceived their decision to be rational after intuitive analysis may have been less motivated to engage in careful deliberate analysis, which would account for the lower changes in judgments across the decision-making phases. Conversely, when individuals' perceived the intuitive decision to be less rational, they may have been more influenced by the deliberate pros and cons analysis, and thus, more likely to change their final judgments. The negative relationship between deliberate perceived rationality and the difference scores may suggest that after initial judgments of likelihood to pursue the decision were changed (resulting in higher difference scores) individuals may have perceived the overall decision-making process as less rational. Conversely, when behavioural intentions to pursue the decision

were more consistent over time, and thus difference scores were lower, individuals may have perceived the deliberate decision to be more rational.

The present study evaluated changes in the perceived likelihood to act on a decision, however one limitation is that it did not explore whether these intentions will actually translate into behaviour. The Theory of Planned Behaviour (Ajzen, 1991) identified that attitudes toward the behaviour contribute to behavioural intentions, which directly influence behaviour. Research on attitudes has suggested that stronger evaluative judgments are more likely to predict behaviours (Norman, 1975). The results of the present study do provide some evidence that explicit reports of behavioural intention changed when alternatives were deliberately analysed through comparative evaluation. Further research is required to determine whether increased behavioural intentions to pursue a business decision actually result in higher rates of execution.

Additional research is necessary in order to further support the hypothesis and demonstrate that decision-making strategies which rely on comparative deliberate analysis, and thus engage System 2 thought extensively, cause significant differences in judgments of perceived intention to act on decisions. Decision-making in a business context is inherently complex, and it is important to recognize the many factors that influence organizational outcomes. Coping with this complexity requires individuals to make difficult choices between various alternatives and necessitates that decision-makers accurately understand the outcomes associated with the alternatives they are considering. The present study attempted to provide insight into how business decisions are influenced by the cognitive processes of decision-makers and the levels of risk associated with such decisions. Business decisions cannot be considered in isolation from the human beings that confront them, and therefore these findings provide initial evidence in areas that have practical significance.

Extending previous research on decision-making to a business domain has valuable applications for training and developing business students and leaders to make decisions and effectively recognize sources of biases in the decision-making processes of others. Risk aversion suggests that risk is a barrier to implementation intentions for decisions. The general tendency to avoid risk suggests that in a decision-making context individuals may be predisposed to favour the status quo option in order to avoid potential losses. Khaneman, Lobollo and Sibony (2011) suggest that in organizations, the individuals making recommendations are susceptible to loss aversion which may cause them to be overly cautious and avoid risk. The present study found that in high-risk situations comparative deliberate analysis was particularly effective at promoting changes in behavioural intentions. Deliberate analysis of both alternatives may have encouraged a deeper understanding of the risks, and provided individuals with the opportunity to consider ways to mitigate risks. The measures used in the present study did not enable this to be assessed, however, encouraging a better understanding of risk factors is advantageous for organizations given that risk is a reality that organizations must cope with and manage.

In addition to the direct practical significance for decision makers in organizations, this study is relevant to individuals involved in approving and reviewing the decisions made by others in organizations. Business leaders who delegate decision making to others may find it beneficial to request that the decision-maker provides them with a list of pros and cons assessments for their chosen alternative *and* the foregone alternatives. This would demonstrate that the decision maker had engaged in a comparative analysis of multiple alternatives and considered argument inconsistent information (i.e,, the cons for the chosen alternative). This would facilitate increased confidence that the decision was grounded in a rational process and that they did not simply recommend the option they had intuitively favoured. However, this

conclusion would only be valid if the documentation was from analysis completed prior to when the final decision was made. If pros and cons were generated after the decision, solely for the purposes of satisfying requirements for documentation, then this documentation would not effectively increase the rationality of the decision-making process.

Alternatively, a more informal assessment of rational decision making could be implemented at various stages in the decision-making process. The person approving the decision could ask the decision-maker questions on the risks and benefits of other options, or sit in on preliminary decision-making meetings to determine whether various alternatives were being considered. This recommendation has been proposed in business literature by Khaneman, Lovallo and Sibony (2011) who suggested that one potential way to identify whether biases may have influenced decision making is to ask whether dissenting opinions were expressed by the members of a decision-making team and whether credible alternatives were considered.

Overall, this research demonstrated that structuring the decision-making processes to engage deliberate System 2 thought may be a valuable strategy for organizations that want to increase decision-making effectiveness and encourage less reliance on automatic and intuitive judgments. By utilizing strategies that are grounded in empirical evidence, deliberate analysis may be used as a mechanism to facilitate rational choice, and decrease innate biases that pervade decision-making processes. Perhaps the most general insight provided by this research is the importance of encouraging decision-makers to evaluate various alternatives and to critically consider whether taking on risk could be a good choice, even if they were intuitively averse to the risky choice. Poor business decisions have potentially disastrous consequences for the health of a business, and society as a whole. This underscores why business leaders must promote a culture where open discussion is encouraged, and where individuals are willing to explore

various alternatives prior to making their choices. Additionally, to help decrease the likelihood that rational decision making will be stifled by loss aversion, leaders should create an environment where risk taking is encouraged and rewarded through compensation systems if the risk taking is based on sufficient deliberate analysis. In certain situations, the most rational decision choice may in fact be the riskier alternative and as long as the risks can be effectively mitigated, this choice is worth pursuing.

The decisions facing individuals in organizations are inherently complex; organizations must focus their attention on structuring systematic decision-making process that help decision makers cope with this complexity. By enabling decision-makers to accurately assess the uncertainty associated with various alternatives, organizations can foster decisions that are more rational and encourage individuals to rely less on their intuitive judgments of the situation. Individuals within organizations need to change the way they evaluate decision choices. Rather than asking questions pertaining to the risks and benefits associated with the choice that is being recommended, there may be more to gain by asking about the risks and benefits associated with the alternatives that they do *not* intend to pursue.

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Appendix A

Materials: Role Description and Hypothetical Scenarios

Role Description

Instructions: Please carefully read the following role description. You will be asked to make decisions in the next phase of the study. You are to assume that you are making these decisions as the individual descried here.

Role Description:
You are the Chief Executive Officer (CEO) of a large company. You have many years of experience as a successful leader. As the CEO, your job responsibility is to make decisions regarding all aspects of the business. You oversee and manage people in all different areas of the company. Your goal as CEO is to make decisions that are in the best interest of the company as a whole.

Scenario #1: High Risk

Instructions: Please read the following scenario carefully. You will need to use this information as you progress through the decision-making questions. You have received a printed copy to refer to.

A good understanding of the information is important; you will be asked to answer fact related multiple choice questions about the information in this scenario at a later stage.

Description:

You are the CEO of Huron & Co., a large manufacturing company that makes cell phone components. Last year was not a good year for your business due to the conditions within the market for the cell phone industry. As you think about what you should do going forward, you have two options to consider: to take out a bank loan, or to not take out a bank loan.

Your bank is willing to give you the money for a $1,000,000 loan if you choose to pursue this option, but you must consider the potential outcomes of your decision before you decide what to do.

If you **choose to take out the bank loan**, and the economic situation in the industry gets worse, you may risk bankruptcy and be forced to go out of business since you may not be able to repay the loan. But, if you take out the loan and the economic situation gets better, you will earn a significant profit in the upcoming year to that will cover last years loss and put the company in a good financial position.

On the other hand, if you **choose not to take out the bank loan** and the situation gets worse, you will end up with an even larger loss compared to last year. However, if the situation in the economy gets better, you will earn money this year and it will be enough to cover the amount

that you lost last year but likely, no more. As the CEO, you must make a decision about whether or not to take out the loan. Which decision do you think is in Huron & Co's best interest?

Scenario #2: Low Risk

Instructions: Please read the following scenario carefully. You will need to use this information as you progress through the decision-making questions. You have received a printed copy to refer to.

A good understanding of the information is important; you will be asked to answer fact related multiple choice questions about the information in this scenario at a later stage.

Description: You are the CEO of Western Inc., a large manufacturing company that makes sporting goods. Your design team has come to you with a new idea for a product. Your business has been doing well lately, and you have enough money to pay for the design and creation of this product, if you choose to go ahead with the idea. As you think about what you should do going forward, you have two options to consider: to go ahead with the design of the new product or to choose not to design the new product

The total design and creation of this product would cost about $1,000,000 and you must consider the potential outcomes of your decision before you decide what to do.

If you **choose to not to create the product**, and your competitor designs a similar product and starts selling it first, you will have missed out on an opportunity to make a significant amount of money and be known as the creator of this new product. But, if you choose not to create the product and later learn that your competitor went ahead with the product but customers did not like the product, and it did not sell well, you will have saved money that can be used to invest in other business opportunities.

On the other hand, if you **choose to create the product,** and you are the first to the market with an innovative product that customers turn out to love, you will gain considerable status as a go-to brand for unique products, and will make a significant amount of money. But, if you choose to create the product, and later learn that customers do not want this type of product, you will not make a lot of money on the product and will have missed out on opportunities to invest in other business opportunities.

As the CEO, you must make a decision about whether or not to design and create the product. Which decision do you think is in Western Inc.'s best interest? Do you go ahead with the design and creation of the new product or to choose not to design and create the new product?

Appendix B
Intuitive Judgments

Intuitive Judgments: High-Risk Condition

Note to reader: The following instructions and questions were completed immediately after participants read Scenario #1: High-Risk Condition. Each individual question was displayed on a separate page.

Instructions: Answer each of the following questions as quickly as you can based on what you have just read in the scenario description. You will have a maximum of **15 seconds** per question. When you have answered the question, you may click to progress to the next question, however if you do not answer within the allotted time, the page will automatically progress.

When you are ready to see the first question, select below:

I am ready to proceed

Question 1:

Which option are you more likely to pursue? Please select:

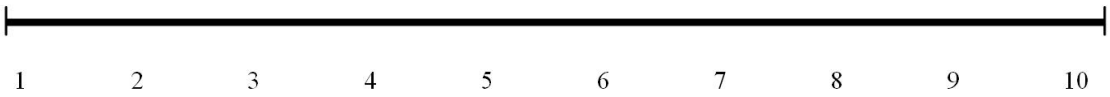
Option 1: Take out the bank loan

Option 2: Do not take out the bank loan

Question 2:

How likely are you to pursue the option that you have selected? In other words, what is the likelihood that you will follow through with your decision and carry out the actions required to implement this choice?

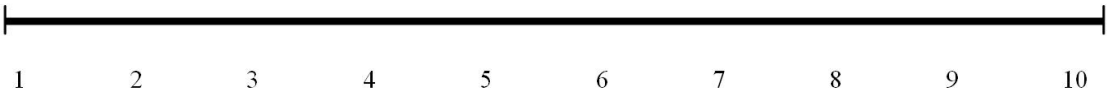
Very Unlikely Very Likely



Question 3:

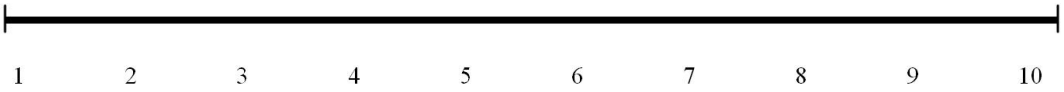
What level of risk do you think is associated with the option you have selected?

No Risk Moderate Risk Substantial Risk



ed?

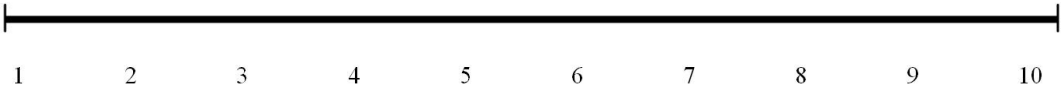
No Reward Moderate Reward Substantial Reward



Question 5:

How rational do you think your decision to pursue one option over the other was?

Not Rational at All Somewhat Rational Very Rational



Appendix B Continued
Intuitive Judgments

Intuitive Judgments: Low-Risk Condition

Note to reader: The following instructions and questions were completed immediately after participants read Scenario #2: Low-Risk Condition. Each individual question was displayed on a separate page.

Written Instructions: Answer each of the following questions as quickly as you can based on what you have just read in the scenario description. You will have a maximum of **15 seconds** per question. When you have answered the question, you may click to progress to the next question, however if you do not answer within the allotted time, the page will automatically progress.

When you are ready to see the first question, select below:

I am ready to proceed

Question 1:
Which option are you more likely to pursue? (please circle one)

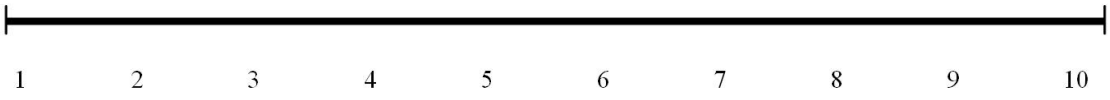
Option 1: Design & create the product

Option 2: Do not design & do not create the product

Question 2:

How likely are you to pursue the option that you have selected? In other words, what is the likelihood that you will follow through with your decision and carry out the actions required to implement this choice?

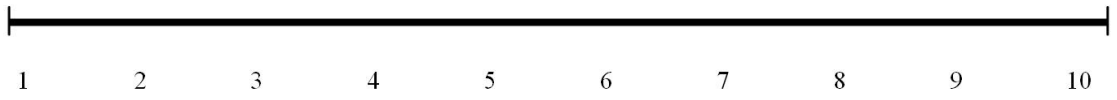
Very Unlikely Very Likely



Question 3:

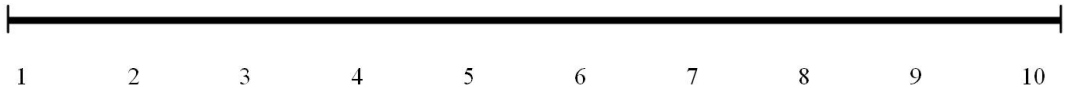
What level of risk do you think is associated with the option you have selected?

No Risk Moderate Risk Substantial Risk



What level of reward or benefit do you think is associated with the option you have selected?

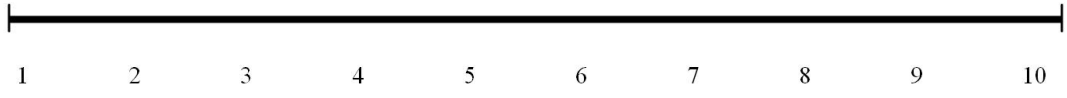
No Reward Moderate Reward
Substantial Reward



Question 5:

How rational do you think your decision to pursue one option over the other was?

Not Rational at All Somewhat Rational Very Rational



Appendix C
Rational Analysis

Rational Analysis: Selective Condition

Note to reader: The following instructions and free response section was provide to participants in the rational analysis phase for the selective condition (i.e. analysis of pros and cons for only one alternative)

Part 1 of 1: Written Instructions
Please provide a list of the pro's and con's associated with the alternative that you think is in the best interest of the company. You will have **3 minutes.**

Please use the following format for your responses:

"CON:--(enter response)--" **or** "PRO:--(enterresponse)--".

You can list your pros and cons in any order and are not required to fill every box.

Note to reader: Responses were entered in the following response format and participants were given 20 boxes total to list their pros and cons.

Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	

Waiting Period Instructions: You will now have 1-minute to reflect. After 1-minute you will be asked to respond to decision making questions based on your judgments of the scenario following the pros and cons assessment.

Appendix C Continued
Rational Analysis

Rational Analysis: Comparative Condition

Note to reader: The following instructions and free response sections were provided to participants in the rational analysis phase for the comparative condition (i.e. analysis of pros and cons for both alternatives). The instructions and response format for the chosen alternative is identical to the exercise that participants completed in the selective condition (Appendix A), however there is an additional section for the other alternative for participants in the comparative condition.

Part 1 of 2: Written Instructions Chosen Alternative
Please provide a list of the pro's and con's associated with the alternative that you think is in the best interest of the company. You will have **3 minutes.**

Please use the following format for your responses:

"CON:--(enter response)--" **or** "PRO:--(enter response)--".

You can list your pros and cons in any order and are not required to fill every box.

Note to reader: Responses were entered in the following response format and participants were given 20 boxes total to list their pros and cons.

Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	

Part 2 of 2: Written Instructions Other Alternative
Please provide a list of the pro's and con's associated with the alternative that you think is in the best interest of the company. You will have **3 minutes.**

Please use the following format for your responses:

"CON:--(enter response)--" **or** "PRO:--(enter response)--".

You can list your pros and cons in any order and are not required to fill every box.

Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	
Pro or Con	

Waiting Period Instructions: You will now have 1-minute to reflect. After 1-minute you will be asked to respond to decision making questions based on your judgments of the scenario following the pros and cons assessment.

Appendix D
Deliberate Judgments

Deliberate Judgments: High-Risk Condition

Note to reader: The following instructions and questions were completed in the deliberate condition after participants completed to the rational analysis phase (selective or comparative pros and cons) for Scenario #1 (high-risk) and waited for 1-minute.

Instructions: Answer each of the following questions based on your analysis of the scenario description. There is **no time limit** per question.

When you are ready to see the first question, select below:

I am ready to proceed

Question 1:

Which option are you more likely to pursue? Please select:

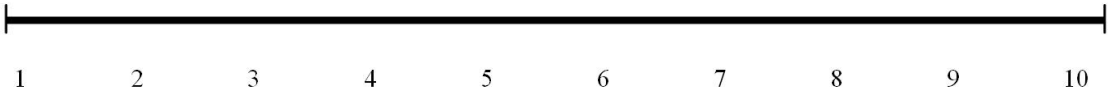
Option 1: Take out the bank loan

Option 2: Do not take out the bank loan

Question 2:

How likely are you to pursue the option that you have selected? In other words, what is the likelihood that you will follow through with your decision and carry out the actions required to implement this choice?

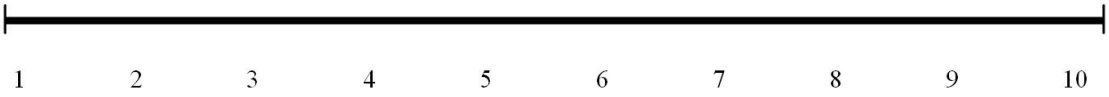
Very Unlikely Very Likely



Question 3:

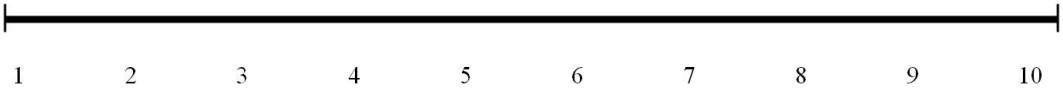
What level of risk do you think is associated with the option you have selected?

No Risk Moderate Risk Substantial Risk



Question 4:

What level of reward or benefit do you think is associated with the option you have selected?

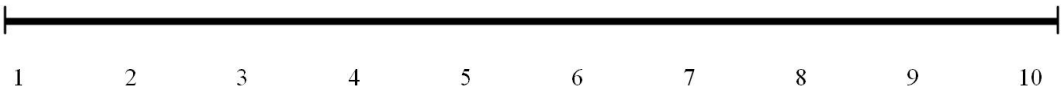


No Reward Moderate Reward Substantial Reward

Question 5:

How rational do you think your decision to pursue one option over the other was?

Not Rational at All Somewhat Rational Very Rational



Appendix D Continued
Deliberate Judgments

Deliberate Judgments: Low-Risk Condition

Note to reader: The following instructions and questions were completed in the deliberate condition after participants completed to the rational analysis phase (selective or comparative pros and cons) for Scenario #2 (low risk) and waited for 1-minute.

Instructions: Answer each of the following questions based on your analysis of the scenario description. There is **no time limit** per question.

When you are ready to see the first question, select below:

I am ready to proceed

Question 1:
Which option are you more likely to pursue? (please circle one)

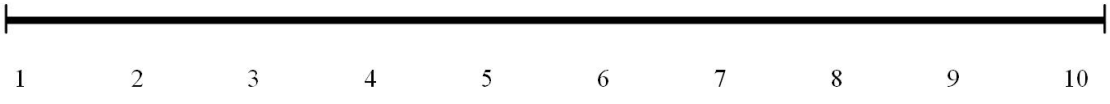
Option 1: Design & create the product

Option 2: Do not design & do not create the product

Question 2:

How likely are you to pursue the option that you have selected? In other words, what is the likelihood that you will follow through with your decision and carry out the actions required to implement this choice?

Very Unlikely Very Likely



Question 3:

What level of risk do you think is associated with the option you have selected?

No Risk Moderate Risk Substantial Risk

Question 4:

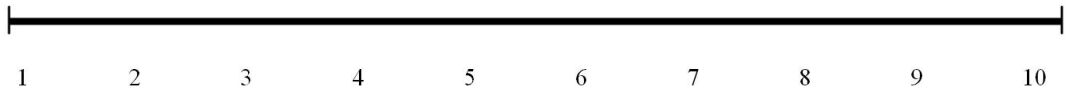
What level of reward or benefit do you think is associated with the option you have selected?

No Reward Moderate Reward Substantial Reward

Question 5:

How rational do you think your decision to pursue one option over the other was?

Not Rational at All Somewhat Rational Very Rational



Appendix E
Comprehension Check

Written Instructions: The following multiple-choice questions are intended to assess how thoroughly you read the scenario descriptions. The correct answer will have been explicitly mentioned in the scenario description.

Please select the appropriate multiple choice response for the following three questions which pertain to Scenario #1 (Huron & Co.)

1. Which of the following alternatives was not provided as an option:
   a) Option to take out a bank loan
   b) Option to take find alternate financing
   c) Option to not take out a bank loan

2. The economic situation in the previous year was described as:
   a) Bad for your business
   b) Good for your business
   c) Having no impact on your business

3. The worst-case outcome described in the scenario was:
   a) Loss of your job
   b) A law-suit from the bank
   c) Bankruptcy for the business

Please select the appropriate response for the following three questions which pertain to Scenario #2 (Western Inc.):

1) The product your company manufactured was:
   a) Clothing
   b) Sporting goods
   c) Carbonated beverages

2) The decision was concerned with:
   a) Whether or not to create a new product
   b) Whether or not to discontinue an existing product
   c) Whether or not to sell an existing product in a new country

3) Which of the following was a potential benefit described in the scenario?
   a) Making a significant amount of money
   b) Receiving an award
   c) Getting a promotion

Appendix F
Examples of Pros and Cons Provided by Participants

	Examples of Pros Generated	Examples of Cons Generated
Scenario 1 (High Risk) Decision: Take out Loan	"The loan may help the company get through a difficult period" "Having money to support the company may decrease employees fears of job loss or pay cuts"	"No control over what the market does" "Run the risk of bankruptcy"
Scenario 1 (High Risk) Decision: Do Not take out Loan	"Eliminates the possibility of bankruptcy" "You will not owe the bank money for the loan and the interest charges"	"Less likely to make profit" "Less money to use to stay ahead of the competition"
Scenario 2 (Low Risk) Decision: Design and Create Product	"Company is already doing well, so they are able to take more risk" "It may give them an advantage over their competitors"	"Customers could end up not liking the product, making them loose profits" "Sales are unpredictable and may not be good for the product"
Scenario 1 (Low Risk) Decision: Do not Design and Create Product	"Will have money to invest in other ideas that may be better" "This is the safer bet"	"We wont be seen as an innovative company" "A competitor might make this product and do well"

Curriculum Vitae

Name:	Bridget Bicknell
Place and Year of Birth:	Winnipeg, Canada, 1994
Secondary School Diploma:	Senior Matriculation, St. John's-Ravenscourt School, Winnipeg, Canada
Post Secondary Diploma:	Bachelor of Arts Honors Business Administration, Ivey School of Business, London, Canada
Awards:	Huron University College Scholarship (2012), Deans Honor List (2012, 2013, 2015)
Publications:	Bicknell, B. (2015). The impact of reward and training on intrinsic motivation. *Huron College Journal of Learning and Motivation, 54,* 14-36.

HURON UNIVERSITY COLLEGE

CERTIFICATE OF EXAMINATION

Advisor Sandra Hessels

Reader Christine Tsang

The thesis by:

Bridget Bicknell

entitled:

Cognition and Commerce: The Impact of Intuitive Judgment and Rational Analysis on Business Decisions

is accepted in partial fulfillment of the requirements for the degree of

Bachelor of Arts

in

Honours Psychology

May 5, 2017
Date

Christine Tsang
Chair of Department