THE EFFECT OF RATIONAL AND INTUITIVE DECISION-MAKING STRATEGIES ON THE QUALITY OF INTEREST FORECASTS

BY

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Abstract

The world of work has changed. To keep up, vocational psychologists have adopted a greater emphasis on career adaptability, which relies on possessing transferable skills that will remain useful regardless of job context. Adaptable clients successfully translate idiosyncratic interests into transferable skills by taking advantage of certain occupational and educational opportunities. In order to do so, clients must choose among the myriad options available in the information age. What influences these choices and how they may be optimized are questions of primary interest to vocational psychologists. Decision-making theories and methodologies from the areas of cognitive and social psychology have been applied to career adaptability through the Anti-introspectivist approach and Trilateral Model of adaptive career decision-making, which postulate both intuitive and rational systems are necessary for adaptability. One-hundred forty participants chose among a variety of videos after either an unconscious-intuitive, conscious-rational, or decision-as-usual information processing manipulation. Interest levels were assessed at three time points, before, during, and after watching the chosen video in order to determine which decision strategy produced more effective results. Level of occupational engagement and decision-making styles were also considered as potential moderators. Overall, previous levels of occupational engagement were found to be related to decisional quality, but this finding was pronounced only for the control group. Results suggest that decisions made after being immersed in decision-relevant stimuli and a period of unconscious thought were marginally more effective than decisions made as usual. Interest levels produced by intuitive choices were recalled more accurately at a two weeks follow-up than hyper-rational or control decisions. Results imply that career decision-makers may be better served by adopting decisional strategies that promote experiential engagement with options over those that rely on “thinking through” decisions.

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Chapter I

Introduction

Only experience provides knowledge,

all else just provides information. – Albert Einstein

In times past, the vocational landscape was amenable to single, circumscribed, secure career identities, in which definitive skills were required for certain positions. Entire careers could be spent not only in the same field, but with the same company, interacting with the same information, monitoring the same processes, and doing the same tasks (Blustein, 2006). It was quite easy to equip a person for a certain field by recommending particular training toward a specific skill set. Vocational psychology emerged in this stable and hierarchical environment. Parsons' (1909) Trait-Factor Approach postulated that the person-environment fit was integral for selecting the single best career for an individual. Career counselors needed only to select important information about the individual, select important information about the world of work, and then synthesize the two. Some version of this model has dominated vocational theory for the past century (Savickas, 2000), and it is still the dominant model in practice (James & Gilliland, 2003). This approach assumes that careers can be neatly abstracted into relevant descriptions, and that the decision-maker can accurately assess and report a number of self-relevant factors, such as their interests. It further assumes that decisions are reached through a rational contemplation and analysis of these two areas.

Simplified paradigms, such as Parsons' (1909), have become out-dated (Krieshok, 1998; Savickas, 2000). The world of work is no longer amenable to a stable, predictable career path (Blustein, 2006; Friedman, 2005; Savickas, 2000), and recent research indicates that individuals are not – nor should they attempt to be – the reductionistic, rational agents implied by this model

(Black, 2006; Gilbert, 2006; Krieshok, 1998; Wilson, 2002). Vocational psychologists now view the external world of work as chaotic, erratic, and inherently unpredictable at the level of the individual worker (Krumboltz, 2009). Likewise, social scientists now view the internal experiences of the individual as often contradictory, irrational, emotionally charged, and largely occurring outside of conscious awareness. These realizations have lead theorists like Krieshok, Black and McKay (2009) to challenge the assumptions, methods, and goals of traditional career counseling.

In times past, the goal of career counseling could be said to seek the answer to the question, "What career fits you best?" Based on a new relationship with the changing world of work, however, individuals may be best served by answering the question, "What skill-building tasks interest you the most?" (Savickas, 2000). Interests can be defined as latent emotional reactions that inspire continued approach behaviors despite discomfort or risk. Committing oneself to any learning endeavor comes with a number of psychological hazards, including fear of failure, embarrassment, boredom, or anxiety about the unknown and concern regarding shifting personal identity. In fact, any attempt to learn entails first admitting ignorance, which can be all the more daunting if the topic is one of personal importance. In order to enhance one's career-related skills and knowledge base, it is necessary to act on opportunities that promise to sustain one's attention and motivation through untoward psychological states. Interest provides the ability to do so. In a highly fluid world of work, it is clearly advantageous for workers to constantly expand their cache of transferable occupational skills in order to meet unexpected challenges.

The concept of "career adaptability" has become prominent in the vocational psychology literature in order to encapsulate these ideas (Super & Knasel, 1981). This approach emphasizes

the accumulation and recalibration of skill sets that are both enjoyable and potentially transferable in order to keep up with a fluid occupational landscape. Adaptable workers realize that throughout a lifetime, people have countless opportunities to learn. With every interaction with the world, we are generating, refining, enhancing, adapting, or practicing a particular set of skills. Doing so actively and mindfully allows one to keep up with a shifting work-space (Ebberwein, Kreishok, Ulven, & Prosser, 2004; Savickas, 1997; Super & Knasel, 1981).

Adaptable workers may be understood not as individuals who search for skills in order to attain a singular lifelong profession, but as individuals who seek to enhance or generate skills in which they have intrinsic interest and then utilize them whenever occupational circumstances allow or new opportunities arise (Blustein, 2006; Bolles, 2009; Krieshok et al., 2009; Krumboltz, 2009). They are able to translate psychological interests into manifest skills. It is imperative that vocational psychologists understand how individuals appraise their own interests and choose between the myriad educational and occupational options available in the information age. In order to be effective, both career counselors and job seekers need to know how individuals can optimize these decisions. Failure to choose wisely can result in lost time and resources, decreased efficacy, frustration, regret, and lost opportunities. This study sought to determine how individuals can and should appraise occupational/educational options vis-à-vis their idiosyncratic interests and values.

Recent theoretical advances in the field of vocational psychology have incorporated foundational research from the areas of cognitive and social psychology (e.g., Krieshok et al., 2009), as vocational decisions can be conceptualized as a specific type of self-referent decision (Black, 2006). Most assessments and techniques in vocational psychology have assumed, as did

Parsons (1909), the accuracy and utility of a rational self-report of one's interests and abilities (Savickas, 2000). This assumption has been challenged.

Several research programs indicate that individuals do not make optimal decisions when using a rational decision-making strategy, which is characterized by a reductionistic, conscious, deliberative approach (Dijksterhuis & Nordgren, 2006; Gilbert, 2006; Kahneman & Tversky, 1996; Wilson et al., 1993; Wilson, 2002). Furthermore, there is evidence that intuitive decision-making - choosing based on implicit knowledge, or 'gut-feelings' - can result in better decisions (Dijksterhuis & Smith, 2005; Gergrinzer, 2007; Kahneman & Klein, 2009), especially if those decisions have affective components (Gilbert, 2006; Iyengar, Wells & Schwartz, 2006; Wilson & Gilbert, 2005). Predicting what activities will hold one's interest is an aspect of "affective forecasting." Affective forecasts are predictions about future emotional states based on the consequences of one's choices. It seems that failures in this task are common (Gilbert, 2006), and likely to be compounded when predictions are reduced to components and evaluated sequentially, as is done in rational decision-making (Gilbert, Gill, & Wilson, 2002). These concepts have been explicitly linked to vocational decision-making and career counseling by Krieshok's (1998) Anti-introspective Approach.

Krieshok and his colleagues' (2009) Trilateral Model acknowledges the role of both intuitive and rational processes. This model posits that intuition, rationality, and engagement must all be present to produce an adaptive career decision. Engagement is defined as "taking part in behaviors that contribute to the career decision-maker's fund of information and experience of the larger world, not just the world as processed when a career decision is imminent" (p. 285). Engagement, therefore, is a powerful force because it effectively informs both rational and intuitive processes. Experimental evidence supporting the distinction between intuitive and

rational processes in the realm of career decision-making, as well as the mechanism by which engagement interacts with these systems, however, has yet to be defined. It is vital that vocational psychology understand not only how individuals make decisions, but how they answer the question, “What activities will I find interesting?” This can be considered a specific type of affective forecast, an *interest forecast*.

A further explication of these concepts is among the contributions of this study. Social psychology theory and methods (e.g., Wilson et al., 1993) were applied to in order to determine how well individuals can forecast how interesting and enjoyable they will find an educational/occupational video using different decision-making strategies. Theoretical distinctions between rational and intuitive strategies are derived from “dual-processing” models of human cognition. Models such as the Cognitive-Experiential Self Theory (CEST; Epstein, Pacini, Denes-Raj, & Heier, 1994), Unconscious Thought Theory (UTT; Dijksterhuis & Nordgren, 2006), and Fuzzy Trace Theory (FTT; Reyna & Brainerd, 1995) describe two discrete but interacting modes of information processing. One is conscious-rational, the other unconscious-intuitive. Although nuanced differences abound between theories, Evans (2008) concluded that “almost all authors agree on a distinction between processes that are unconscious, rapid, automatic, and high-capacity [unconscious-intuitive processes], and those that are conscious, slow, and deliberative [conscious-rational processes]” (p. 256). Generally, the conscious-rational system is considered to be precise, logical, abstract, and reductionistic, while the unconscious-intuitive system is considered to be fuzzy, emotional, concrete, and holistic (Evans, 2008; Kahneman, 2003; Wilson, 2002).

Given the changing world of work, vocational psychologists must increasingly focus on placing clients in a position to build a large collection of diverse and transferable skills. Clients

must invest precious time and resources into these educational or occupational opportunities. It is therefore essential that vocational psychologists understand exactly how one decides what skill-building activities are worth pursuing. Workers offered different training "tracks," non-traditional students returning to school, college students deciding on classes and majors, unemployed workers hoping to build skills, unsatisfied employees looking for greater fulfillment from their jobs – all must choose where to invest scarce and valuable resources. These choices will build the skills that influence their opportunities and identities.

A review of the literature revealed a number of conclusions that serve as the basis of this study: 1) there is theoretical support for distinguishing conscious-rational and unconscious-intuitive modes of information processing, 2) these systems can be experimentally manipulated, 3) viewing these as distinct systems meaningfully relates to both the *objective* and *subjective* quality of one's decisions, 4) these systems can be differentially applied to optimize interest forecasts, and 5) in a specific test of previous literature, it is hypothesized that intuitive decisions produce more effective interest forecasts than do hyper-rational ones.

If vocational psychologists strive to foster adaptability, vocational psychologists must understand how individuals translate appraisals of their own interests, goals and values into actionable choices in occupational/educational world. The purpose of the current study was to test the success of interest forecasts made under unconscious-intuitive and conscious-rational decision-making conditions. The methodology employed also allowed for the exploration of which conditions are likely to result in optimal educational/occupational decisions, and how those choices are perceived over time.

Two general research questions guided the conceptualization of this project. First, does a history of engagement behaviors influence the quality of one's interest forecasts under novel

experimental conditions? Second, do conscious-rational, unconscious-intuitive and control pre-decision information processing strategies produce discernibly different patterns of results over time? That is, when choosing one of many different experiential options, do the different strategies influence the decider's ability to choose optimally and their ability to make meaning of that decision over time? To explicate these questions and based on the available literature, three hypotheses were tested:

Hypothesis 1: Levels of previous occupational engagement behaviors, as measured by the Occupational Engagement Scale – Student (Cox, 2008), will be related to the quality of ones decisions, as measured by self-reported interest level during that experience. Furthermore, this relationship is expected to be more pronounced when participants are forced to rely on their fund of intuitive knowledge, indicating engagement primarily functions on the experiential system.

Hypothesis 2: Individuals will make more effective interest forecasts (i.e., better choices), as measured by reported interest levels during that experience, when decision-relevant data are presented in a manner amenable to unconscious-intuitive information processing strategies than those when the data are presented in a manner amenable to a conscious-rational or decision-as-usual (control) approach.

Hypothesis 3: Individuals engaging in conscious-rational, unconscious-intuitive and control decisional strategies will display markedly different self-reported interest levels over time.

Summary

It has become increasingly clear that the external world of work is highly chaotic, unstable and unpredictable at the level of individual worker (e.g., Krumboltz, 2009). Likewise, social psychological research has increasingly supported theories that describe the internal world of a human decision-maker in a similarly confusing, non-rational fashion (e.g., Gilbert, 2006). This state of affairs has placed a premium on transferable skills and adaptability, but left vocational psychologists with potentially outmoded tactics to guide decisions. The current study is an attempt to marry the decision-making models produced by experimental social psychology with applied vocational psychology in order to better understand how individuals can effectively translate latent interest into effective choices. The results of this study can be considered foundational experimental support for a post-rational theory of career counseling. Such a theory would serve as a basis for interventions that are more robust and helpful, given the current state of the decision-making and vocational fields (Krieshok, Motl & Rutt, 2011).

Chapter II

Review of the Literature

The review of the literature has been divided into seven major sections. The first is an overview intended to be an orientation to the two lines of research that intersect in the current study: decision-making and vocational psychology. The second is a general discussion of decision-making, focusing specifically on several pertinent "dual-processing models" of information processing. The third discusses the two mechanisms by which these two systems can theoretically be manipulated: overwhelming and bypassing the conscious-rational system. The fourth delves in the various studies that have pitted the two systems against one another in a direct comparison of their attributes. In the two subsections within this segment, these studies were divided into those that have objective and those that have subjective consequences. The fifth section focuses on how these findings have previously been applied to vocational psychology by the Trilateral Model of Adaptive Career Decision-Making (Krieshok et al., 2009) and anti-introspective approaches (e.g., Krieshok, 1998). The sixth describes the fusion of the two lines of inquiry by introducing *interest forecasting*, an affective forecast of particular concern to vocational psychologists. This construct is then exemplified by a short story. The seventh and final section is a summary and synthesis of the above literature.

Overview

Career decisions can be conceptualized as a specific type of decision (Krieshok et al., 2009). Appropriateness of one's career decisions has been an explicit component of most prominent vocational theories (e.g., Holland, Sorensen, Clack, Nafziger, & Blum, 1973; Krumboltz, 2009; Parsons, 1909; Super, 1980). Trait-factor matching, the most commonly practiced technique in career-counseling, explicitly promotes deliberative inspection of client

goals, values, and needs in order to determine the job with the greatest personal congruence (Holland et al., 1973; James & Gilliland, 2003). Vocational psychologists laboring under this general paradigm often seek to help their clients by coaching them through the deliberation process. The goal of career counseling is to help clients think more rigorously and systematically about themselves and their situation. This process often invokes the pro and con "balance sheet" method of decision-making (Janis & Mann, 1977), or similar quantification, calculation, and comparison of subjective experiences acquired through introspection. For instance, Brown and Lent (1996) describe the central goal of Social Cognitive Career Counseling as helping facilitate client deliberation by "actively assessing discrepancies between self-efficacy and demonstrated skill and between outcome expectations and occupational information" (p. 357). When discussing the role of strategic deliberation in career counseling, Krieshok (1998) noted that "all of the available prescriptive models mandate self-knowledge," presumably gained through introspection and self-observation (p. 215).

Just as changes in the world of work have forced individuals to reconsider how they should orient themselves to career decisions, changes in the way we understand the psychological mechanisms of the decision-making process have forced us to reconsider some previously held assumptions about how people choose between options. The hyper-rational and introspective approach implicitly or explicitly promoted by most practices of career counseling has been assailed by many current researchers (i.e., Gilbert, 2006; Wilson, 2002). Phillips (1997) stated that, ''those who have considered what actually happens in the decision-making process have offered the nearly unanimous conclusion that rational decision making simply does not reflect the decider's reality" (p.278). Furthermore, when reflecting on the past two decades of

research, Klein (2003) noted that the "thorough, systematic, rational, and scientific" model of decision-making is "a myth . . . that simply does not work very well in practice." (p. 20).

Decision-Making

In 1956, George Miller determined that the human consciousness can hold, give or take a couple, seven pieces of information at any one time. Seven pieces of information corresponds to roughly 2.8 bits of data, a bit being the smallest unit of meaningful information, which is expressed as yes/no or presence/absence binary. More recent studies have provided further evidence of the limitation of consciousness. There are some differences as to the exact numeric value of the information load of human consciousness, but the most plausible accounts range between 20-60 bits per second (Tononi, 2004). To put this number in context, our senses alone receive roughly 11 million bits per second, and our physical output is similarly massive (Norretranders, 1997). This means that only a miniscule amount, most likely less than one-millionth, of cognitive work is done consciously. Based on his work, Miller's student, Herbert Simon (1955, 1990) developed the *Theory of Bounded Rationality* to account for the systematic deficiencies of human decision-making. Humans, Simon found, utilize oceans of information. Conscious awareness, however, comprises only a few drops of that ocean. As individuals move through the world, they do so unaware of precisely what information they possess and process.

Dual-Processing Theories. In an attempt to explain how this occurs, the last two decades have seen an explosion of "dual-processing" theories of cognition that define two separate cognitive processes. Dual-processing theories assert that cognitive work is divided between two discrete processes (Evans, 2008). One system has been referred to as conscious, controlled, rational, explicit, analytic, rule-based and higher order. It is this slow, effortful, low capacity process that Miller (1956) originally described. The second system has a different set of

characteristics: unconscious, automatic, heuristic, intuitive, holistic, associative, and impulsive. This system is commonly believed to be limitless and pre-symbolic, meaning that it is not restricted by capacity or language (Evans, 2008). The activities of this system, cannot, by definition, be reported by the individual. They can only be logically inferred from the actions of that person (Dijksterhuis & Smith, 2005).

However defined, research from an array of fields have converged to form a general consensus that not only does a nonconscious cognitive system exist, but plays an indispensable role in human decision-making and goal setting (e.g., Bargh & Chartrand, 1999; Kahneman, 2003; Nisbett & Wilson, 1977; Wilson, 2003). Some of the most pertinent of the dual processing theories will be reviewed.

Perhaps the most famous dual-processing model grew out of the intersection between economics and psychology. Amos Tversky and Daniel Kahneman (1996) were among the first to delineate the difference between the two systems. The researchers set out on a course of research to support Simon's (1955) work. Several of their studies revealed that both experts and laypersons alike had difficulty coming to logical conclusions when attempting to solve problems under some degree of uncertainty. It was soon clear to the pair that most decisions were not simply the product of careful reason (Kahneman, 2003).

In the intervening years, a robust research base has supported the conclusion that individuals habitually and systematically distort reality, misuse heuristics, and fall victim to unfounded personal biases (Tversky & Kahneman, 1974). Called "heuristics-and-biases," this line of research has cataloged the systematic and consistent ways individuals fail to optimize outcomes. The inability to follow basic rules of logic often prevents individuals from optimal decision-making, thereby reducing personal gain. As Ariely (2008) noted, however, irrational

decisions are not necessarily random or illogical ones, but appear to be a hallmark of human cognition. Pure rationality, Ariely contends, simply does not reflect the way humans orient themselves to the choices they face.

This directly contradicts Rational Choice Theory (RCT), an implicit assumption of the Standard Social Science Model (Miller & Kanazawa, 2008; Thaler & Sunstein, 2009). RCT is the foundation for both modern economic theory and the principles postulated to govern human decision-making in general and career decision-making in particular (Krieshok, 1998). RCT states that individuals and institutions logically weigh costs and benefits of available options, and choose the routes that maximize the utility of their positions. By challenging RCT, Kahneman and Tversky were awarded the Nobel Prize for economics in 2002. This line of research also helped launch the field of behavioral economics, which has revolutionized economic theory by applying post-rational paradigms to traditional economic contexts (Ariely, 2008).

Based on this work, and borrowing terms from Stanovich and West (2000), Kahneman (2003) postulated that there are two separate systems at work during any decision-making process: an intuitive process, *System 1,* and a reasoned process, *System 2*. System 1 operates nonconsciously, is fast, automatic, effortless, associative, changes slowly, is emotionally charged, and can calculate in parallel. By contrast, System 2 is conscious, controlled, effortful, rule-governed, flexible, emotionless, and must calculate in serial. Kahneman concluded that distortions, heuristics and biases simultaneously disrupt the intuitive processes of System 1, while inspiring false confidence in the rational processes of System 2, resulting in suboptimal decision-making. System 2, the rational system, does not do well in situations of high complexity and uncertainty – instances in which individuals may quickly adopt heuristics as a decision-making strategy. Errors increase when individuals are not given a chance to practice decisions

under such seemingly chaotic conditions, or when the context does not supply feedback conducive to learning (Kahneman & Klein, 2009).

Another dual-processing theory, the Cognitive-Experiential Self Theory (CEST), grew out of psychodynamic theory. Proposed by Epstein (1994), CEST employed more psychological descriptors to the two systems, which he named the experiential system (conceptually similar to System 1) and the rational system (conceptually similar to System 2). Epstein described the two as "parallel and interacting systems" (p. 709). Again, one system, the rational system, is conscious; the other, the experiential, is nonconscious. The experiential system acts quickly, but changes slowly; the rational acts slowly but is very flexible. The experiential system traffics in concrete images, gestalts, gists, and self-schema; while the rational trades in abstract symbols, words and precise numbers. The experiential system is holistic, context-driven and highly affective; the rational system is logical and functions without emotion. Emotional experience – province of the experiential system – needs no justification. Logic and abstraction – the province of the rational system – must be carefully buttressed with facts and inference.

Epstein (1994) claimed that interaction with the world affects both systems. Conscious beliefs are formed by the rational system, and intuitive schemata are formed by the experiential. Schemata represent an efficient way to quickly organize information and recognize patterns, but are not under conscious control. They are largely a result of previous experience, especially those that are highly affective and meaningful (Pacini & Epstein, 1999). Intuition as a form of schematic pattern recognition has been largely supported by theory (e.g., Kahneman & Klein, 2009). Research indicates, though, that attempting to consciously activate and modify schemata is neither possible nor effective (e.g., Bargh & Chartrand, 1999). It is schematic, then, only

inasmuch as it is based on patterns of repeated experience, and is not based on consciously desired, predetermined outcomes.

CEST tenets were echoed by Koriat (2000), who drew a functional distinction between *inferential knowledge* and *experiential knowledge*. Inferential knowledge is the result of logical cognitive operations. It is an explicit, relatable, theory-based proposition regarding the relationships between concepts. Experiential knowledge, on the other hand, is the result of direct experience, and may occur without conscious mediation. This type of knowledge is "self-evident" and produces a vague, unjustified "feeling of knowing" (p. 314). Koriat's (2000) and Epstein's (1994) distinction between knowledge types and processes recalls Zajonc's (1980) famous observation that "preferences need no inferences" (p. 151), meaning that one's emotional reactions are inherently unexplainable and beyond logical defense. Experiential-intuitive data is purely phenomenological. The structure of language can only faintly refer to its nature.

As the CEST model (Epstein, 1994) hypothesizes that the two systems are interactive but independent, it is possible to have a characterological preference for one system over the other. Epstein et al. (1996) created an instrument based on CEST tenets to examine this possibility. The Rational-Experiential Inventory (REI) was developed to assess individual differences in information processing styles. This instrument has undergone some revisions, but the original ten-item measure, the REI-Short, has two independent but inversely correlated unipolar subscales (Epstein et al., 1996). The first measures the proclivity to use a rational information processing style (System 1), and is based loosely on the previously validated Need for Cognition scales. The second, a Faith in Intuition scale, measures a propensity to trust one's "gut feelings" and utilize emotion laden cues. Such an arrangement emphasizes the fact that the CEST conceptualizes the two systems as fluid tools whose influence may vary between and within

individuals. High scores on the rational subscale of the REI have been associated with decisions that are more objectively successful (Pacini & Epstein, 1999). High scores on the intuitive subscale have been associated with greater satisfaction with one's choice (Pretz & Totz, 2007). These two systems can come into conflict with one another, and it is often a function of task demands as to which will produce more effective results.

Reyna and Brainerd (1995) have integrated dual-processing concepts into the developmental decision-making framework. Fuzzy Trace Theory (FTT) is based on the distinction between *gist* and *verbatim* mental representations of experience. Verbatim representations are highly specific but very symbolic, capturing relatable, specific, and quantitative details of an experience. This information is literal and superficial. This includes verbal and written language, numbers, and pictures (e.g., "I have a 22.4% chance of developing a malignant carcinoma"). Gist representations are vague and qualitative, but capture the phenomenological impact of a situation. A gist applies meaning to information based on the subjective interpretation of a situation. These interpretations are a result of the context, and the emotional state, education, culture, experience, and developmental level of the interpreter. This interpretation is done nonconsciously, and is consciously accessible and reportable only as a finished mental product, which is often summarized in an affective interpretation of that experience (e.g., "The doctor gave me some bad news"). Although less specific, this information has more meaning, as it has been consumed and processed in context. Extraction of meaning is a complex and covert process; the factors of which the meaning maker is oblivious to (Reyna & Brainerd, 1995).

Decisions can rely on either gist or verbatim knowledge. FTT postulates gist representations do little to provide rational support for any decision, but are based on a large

summary of relevant knowledge. Verbatim knowledge, however, supplies the facts - the fodder - for inferential, conscious reasoning, and can be used to justify a particular decision. Developmentally, children rely on verbatim representations of the world. Gist-based knowledge bases are only available later. Children do not have the cultural and experience necessary to extract meaning from new information. As a result, they are forced to remember a limited number of salient specifics (Reyna & Ellis, 1994). Using only a few, decontextualized facts can result in the exact errors described by Tversky and Kahneman (1996). Gist-based judgments, on the other hand, have been shown to protect against inferential error (Reyna & Mills, 2007). Furthermore, an over-reliance on verbatim representations decreases the accuracy of judgments regardless of age or expertise (Reyna, Brainerd, Howe, & Keversham, 1991). In fact, experts rely more heavily on poorly operationalized gist-level appraisals than do novices. The ability to form intuitive data not only contributes to their expertise, but is indicative of it, as experts have had repeated exposure to situations that provide feedback and practice (Reyna & Lloyd, 2006). The benefit of such experience exists only as gist-level intuitions, while the accuracy of verbatim memory has been shown to be independent of decision-making ability (Brainerd & Reyna, 2007).

Fuzzy Trace Theory (FTT) is essentially a dual-process model, as, according to Reyna (2008), “gist and verbatim representations are extracted roughly in parallel and independently” (p. 851). The gist-level interpreter/synthesizer corresponds to the nonconscious, experiential System 1, while the verbatim memorizer/manipulator is similar to the conscious, rational System 2. FTT, however, adopts a highly fluid conceptualization of the two processes. Reyna and Brainerd (2008) describe gist and verbatim representations as poles on a continuum. Decision-makers utilize data from various points throughout this continuum when faced with choices. Price and Norman (2008) concur with this assertion, and note that intuition may be a result of

nonconscious processes, but the gist-level preferences and "gut-feelings" that are products of those processes do become conscious. These then become just one piece of data used by decision-makers. In contrast to other models of decision-making - and diametrically opposed to Rational Choice Theory - FTT researcher Reyna (2004) explicitly "places intuition at the apex of development, considering fuzzy intuitive processing more advanced than precise computational processing (e.g., trading off risks and rewards)" (p. 60).

Social psychologists Dijksterhuis and Nordgren (2006) have advanced the Unconscious Thought Theory (UTT), which is considered one of the most radical dual-processing models (Evans, 2008). UTT does not postulate two separate *systems*, per se, but instead describes two different *processes* that labor with the same underlying mechanisms: the unconscious thought (UT) process, and the conscious thought (CT) process. This is a minor, but important distinction. Unlike all other dual-processing models, the unconscious processes work in the same manner as conscious processes, but do so covertly. Both CT and UT processes perform logical operations and calculate contingencies in order to solve problems. Both are *deliberative*. Unconscious thought is not a snap judgment based on schemata, but is a thoughtful process of which we are simply unaware. The two processes have unique attributes that have allowed researchers to distinguish the two.

First, known as the *capacity principle*, conscious thought, also known as working memory, is constrained by a remarkably small capacity (Miller, 1956). Although there are many methodological problems that accompany quantifying a covert mechanism such as the unconscious though process, it appears that it does not suffer from the same capacity limitation (Norretranders, 1997; Wilson & Schooler, 1991). In essence, UTT considers any information processing that is not done consciously to be a form of unconscious thought. As previously noted,

the capacity of working memory is less than 60 bits per second. If conscious awareness is like a flashlight shining onto our inner workings, it may only shed light on a tiny portion of the machinery. The remaining 11 million bits of information that humans process are, by UTT's definition, unconscious thoughts (Dijksterhuis & Nordgren, 2006).

Second, Dijksterhuis and Nordgren, (2006) note that the UT and CT are differentiated by the *bottom-up-versus-top-down* principle. Unconscious thought represents a "bottom-up" processing approach, while conscious thought represents a "top-down" processing approach. An expansive amount of evidence indicates consciousness works schematically, establishing expectancies before gathering data (Sloman, 2002). This occurs even in high-stakes situations, such as murder trials. Instead of waiting until all the facts are in before determining the guilt or innocence of a defendant, which would be the optimal strategy, active contemplation of the relevant decision-making information is more likely to lead to *predecisional distortion*, which is also known as "jumping to conclusions" (Carlson & Russo, 2001). Even the most open-minded jurors fall prey to biased predecisional distortions due to this characteristic of rational thought. Dijksterhuis and Nordgren conclude that when consciously deliberating "it may feel as if one is processing information with the goal of making a decision," when one is really pursuing "the goal of confirming an expectancy" (p. 98). Conversely, UTT surmises that unconscious thought slowly gathers large amounts of information aschematically, producing a more organized, polarized picture of the problem or object of interest.

Any decision consists of a number of considerations. Some advantages are very big, while others may be virtually inconsequential. Individuals must determine which aspects of a decision are worth considering, and how much weight each should carry. According to the *weighting principle*, conscious thought can accomplish this as long as there are a limited number

of traits for each option and objective means by which to compare alternatives (Dijksterhuis & Nordgren, 2006). When outcomes of decisions, however, are subjective, such as aesthetics (Dijksterhuis & Nordgren, 2006), affiliation (Dijksterhuis, 2004; Experiment 3) or satisfaction (Dijksterhuis & van Olden, 2006), conscious deliberation about decisions has been found to decrease decisional consistency and accuracy. This view of unconscious thought is largely consistent with System 2 in Kahneman's (2003) Theory of Bounded Rationality, the experiential system in Epstein's (1994) Cognitive-Experiential Self Theory, and gist knowledge in Reyna & Brainerd's (1995) Fuzzy Trace Theory.

Finally, a key feature of the conscious thought system is that it can form, and then follow, discrete, simple rules. This is known as the *rule principle*, and it precludes possible options by setting definitive, objectively determined rules, then eliminating options that do not conform to this rule. This principle is similar to Tversky's (1972) Theory of Elimination by Aspects, a heuristics-based means by which individuals reduce an overwhelming amount of choices to a more manageable number. The weighting and rule principles may be demonstrated by example: While selecting an apartment in which to live, one may entertain and weigh many salient attributes before making a decision. There may be one apartment that is objectively best based on these data. However, it is also possible that this apartment has one characteristic that precludes it from consideration; for instance, cost. The conscious thought system can quickly and efficiently veto this choice based on a single construct, despite the other desirable characteristics (Dijksterhuis, 2004). In this way, the conscious system has created a rule, and then followed it. There is no indication that the unconscious system is capable of this ability (Dijksterhuis et al., 2006).

A review of the literature reveals a general consensus regarding the existence of two systems that fluidly exchange information, share responsibilities, and often have discrepant goals (Evans, 2008; Wilson, 2002). Different theorists construe their terms and definitions somewhat differently, but a general picture has emerged of the differences between the two processes.

The conscious system is limited, but has the ability to deal in abstraction. This system is flexible, but occasionally wanton and mercurial, easily fooled by spurious information or overwhelmed by stimulus-rich environments. The nonconscious system is not limited by capacity or language – it relies on gist, image, and emotion. This system supplies the building blocks used to construct our mental worlds. Unless discussing specific theoretical findings, *conscious-rational* will denote the former where possible, but *conscious* and *rational* are both theory-specific terms referencing this concept. Similarly, *unconscious-intuitive* will refer to the latter, but *unconscious*, *nonconscious*, and *intuitive* may also be used.

Manipulating the Two Systems

If dual-processing theories are accurate, it should be possible to design methods capable of reliably manipulating the effects of each. Researchers have created such methods, which usually involve accentuating, bypassing or occupying one system in order to examine the other.

Examining the role of the conscious thought system is straightforward. This system is linguistic and reportable. Accentuated use of the rational system can be induced by asking an individual to actively contemplate their choices (Wilson, 2002). A more potent intervention, however, is achieved by asking individuals to create a list of positive and negative attributes based on the tasks or objects they are to decide between (e.g., Dijksterhuis & van Olden, 2006; Wilson & Schooler, 1991). Pinning down the unconscious, however, has proved a more difficult task, as it is, by definition, impossible to access through self-report. Research in social, cognitive,

and consumer psychology has accomplished this by adopting one of two methodological strategies: steamrolling or bypassing the conscious system, leaving the nonconscious system effectively in the "driver's seat."

Overwhelming the Conscious-Rational System. It is possible to overwhelm the conscious system by forcing participants to engage in an ongoing cognitive chore, called a *cognitive load* (Bargh & Chartrand, 1999). Cognitive loads may take a number of forms, but the simplest do nothing more than introduce as many pieces of information as the participant's working memory can hold while simultaneously asking them to make a decision. For instance, a cognitive load has been reliably achieved by asking participants to rehearse a seven-digit number (e.g., Shiv & Fedorikhin, 1999), while choosing between competing options. Seven pieces of information is the approximate limit to the cognitive system, so when loaded to this point, it leaves only the unconscious system available to gather and use data (Miller, 1956). Unconscious Thought Theory researchers often present a stimulus then ask participants to engage in a written task, such as anagram puzzles (e.g., Dijksterhuis & van Olden, 2006) so participants may engage in unconscious thought but not conscious deliberation.

An example of a more potent cognitive load is the *n-back task* in which individuals hear a string of single-digit numbers. After each digit they are asked to reply with a verbal "yes" or "no" depending on if the number *n* places back in the sequence matches the number they have just heard. For instance, the participants might engage in a 2-back task, so they must correctly determine if the stimulus number is the same as the number two digits previously presented in the series. This task has been shown to adequately disrupt executive functions and maximize the capacity of one's working memory (Jonides et al., 1997). At a rate of one stimulus number per

second, the 2-back test has been successfully used as a conscious distracter to induce decisions under unconscious thought (Dijksterhuis, 2004).

Bypassing the Conscious-Rational System. The conscious system can be circumvented through either immediate judgments or implicit associations. Greenwald, McGhee, and Schwartz (1998) developed the Implicit Association Test (IAT), a computer-based assessment of nonconscious attitudes. This method has been shown to be a reliable gauge of the intuitive system and produces results with external validity, most famously in the area of racial stereotyping (Dasgupta & Greenwald, 2001). Recently, a new computer-based test of implicit attitudes, the Implicit Relational Assessment Procedure (IRAP) has been developed based on Relational Frame Theory (Barnes-Holmes, Waldron, & Barnes-Holmes, 2009). Although this measure operates under different assumptions than the IAT, it functions in largely the same way. Both methods measure response times to paired stimuli that either conform to or are dissonant with their explicit beliefs. Subtle differences in response times, measured in milliseconds, are not under conscious control, but provide insight into implicit attitudes that have been shown to be predictive of behavior.

Others have attempted to bypass the rational system by taking advantage of the discrepancy in decision speed between the two processes. The nonconscious, intuitive system recognizes patterns and comes to quick conclusions (according to most theories), while the conscious, rational system must deliberate. By forcing a quick decision, the rational system does not have time to form a hypothesis and buttress it. Information from the self-evident intuitive system, then, is the only basis upon which to make a choice (Epstein, 1994). This method has been used in a variety of experimental conditions to produce reliable effects on outcome variables (e.g., Dijksterhuis & Nordgren, 2006; Gilbert, Krull, & Pelham, 1988; Wilson et al.,

1993). In direct comparisons of intuitive and rational decisions, researchers often hyperactivate the rational system in one condition, while attempting to bypass or incapacitate it in the intuitive choice condition (e.g., Wilson et al., 1993). After doing so, researchers are able to disentangle the abilities and weaknesses of each system. Employing different forms of these procedures, both Dijksterhuis and Nordgren (2006), and Levine, Halberstadt, and Goldstone (1996) have found that judgments and predictions made under intuitive conditions are *more* consistent, per test-retest reliability, than those made under rational conditions.

In summary, many researchers (e.g., Epstein, 2003; Kahneman & Klein, 2009; Wilson, 2002) have created compelling theories that include two distinct, independent but interacting systems of information processing. One is conscious-rational, the other unconscious-intuitive. Based on these theories, researchers have successfully designed conditions under which the effects of one system can be assessed with minimal interference from the other (see Evans, 2008 for a summary).

Dueling Processes: Dual-process Models Applied to Decision-Making

Initially, researchers considered the unconscious to be nothing more than a repository for automatic processes – those skills that have been "overlearned" to the point that they occur with conscious initiation. Such automatic processes are usually equated with simple, rigid, perfunctory tasks, such as repetitive assembly line work. Only these tasks were thought to be under the purview of the unconscious (Dijksterhuis & Nordgren, 2006). It was the conscious process that was assumed to be flexible, adaptive, and capable of accurate decision-making and problem-solving. Recent findings, however, have challenged this assumption. Although automaticity does account for nonconscious behavior during many mundane repetitive tasks, it does not account for higher level cognitive functions, in which the nonconscious apparatus

serves as a problem-solver and goal-setter. Such nonconscious operations often conflict with consciously reasoned motivations (Sloman, 2002). Bargh (2006) noted that, surprisingly, it was the nonconscious system - not the conscious system - that seemed to "operate flexibly and adapt to and overcome obstacles," creating a "paradox raised by the priming and automaticity research" (p.149).

The relationship between these two systems is highly complex and covert. There is more to each of us than we know, as the unconscious-intuitive system exists beyond our awareness. It is vital to understand the interaction between the actors appearing on the stage of consciousness and those concealed forces that produce them. If the goal of psychological interventions is to allow clients to move through the world in a more adaptive manner, it is necessary to determine how these processes inform our decisions and behaviors.

Every decision, career-related or otherwise, can be divided into two categories based on the nature of the feedback received regarding those decisions. Some decisions are amenable to quantifiable measures of outcome, while others must rely on covert, internal experiences (Schwartz, 2004). For instance, in vocational psychology, objective outcomes of a career related decision are salary and tenure, as different jobs can be directly and specifically compared based on what they pay and how long an individual stays in that position (e.g., Super & Knasel, 1981). Satisfaction, on the other hand, is a common subjective career related outcome, and must be based on self-report (Iyengar et al., 2006). Researchers in a diverse array of fields, including marketing (Lindstrom, 2010), medicine (Reyna, 2008), aviation (Lehrer, 2009), ethics (Hauser, 2006), and economics (Ariely, 2008), have produced a large literature base analyzing decision outcomes. Previously, these fields labored under the Standard Social Science assumption that human decision-making is guided by Rational Choice Theory, the best possible way for people

to approach decisions (Dijksterhuis & Nordgren, 2006; Gergrinzer, 2007; Reyna & Brainerd, 1995). Recently, however, a number of studies indicate that nonconscious processes and intuitive information are integral to optimal decision-making strategies.

Computing Optimal Pathways: Decisions with Objective Outcomes. The Unconscious Thought Theory (UTT) is an attempt to place the revised view of the unconscious within the broader decision-making literature (Dijksterhuis & Nordgren, 2006). Under this paradigm, both conscious thought (CT) and unconscious thought (UT) systems require time to calculate and perform logical procedures in order to solve problems. As previously discussed, each system has its own attributes and is therefore advantageous in certain situations. UTT theorists have used cognitive load techniques to pit the two processes against one another.

Concepts, problems, choices and other general thoughts can move between the conscious and unconscious systems with the removal or application of attention (Dijksterhuis & Nordgren, 2006). UTT stipulates that individuals are always thinking unconsciously, performing calculations outside of conscious awareness. Given time and certain circumstances, unconscious thought may produce superior choices than those produced by the conscious application of attention (i.e., actively thinking about the problem). The principles of UTT create a number of empirically testable hypotheses. Dijksterhuis et al. (2006) describe one such hypothesis as the "deliberation-without-attention effect" (p. 1005). The deliberation-without-attention effect predicts, counterintuitively, simple choices will be best handled by the rule-effective, limited capacity conscious thought process. Highly complex decisions, on the other hand, require the high capacity, bottom-up, evenly weighted characteristics indicative of the unconscious process.

As a demonstration, Dijksterhuis (2004) asked individuals to choose one of four apartments based on 12 characteristics for each. One apartment was made to be attractive, with

75% of the attributes positive; another was made to be less appealing, with 25% of the attributes positive; the remaining two were average, with the same amount of positive and negative attributes. The 48 total pieces of information - far more than the working memory can handle - were given to each person.

Participants in the conscious thought condition were asked to think about the apartments for three minutes and then asked for their preferences. Others engaged in a distracter task, designed to facilitate nonconscious thought for the apartment task, for the same three minutes. As predicted by UTT, those who engaged in nonconscious thought had more accurate attitudes about each apartment and made better decisions than did the conscious deliberators. Furthermore, those who were asked to choose immediately picked more poorly than did either of the thought groups (Dijksterhuis, 2004; Experiments 1 and 2).

In a further test of this effect, Dijksterhuis (2004) asked a number of potential consumers to choose between four items based on a number of their attributes. Some items had very few attributes, while others had many (e.g., oven mitts were described with four aspects, while computers were described with twelve). In each item set, one product was given more positive attributes than the others, making it the objectively “best” choice. Dijksterhuis found that choice quality was a function of two factors: the number of salient attributes and the amount of time spent in nonconscious versus conscious thought before the purchase. For simple choices, such as choosing the best oven mitt, conscious deliberation resulted in a better objective decision. For extremely complex decisions, such as the computer, increased nonconscious thought time predicted objective measures of choice quality.

Later experiments not only replicated this principle, but extended its generalizability beyond the laboratory. In a study by Dijksterhuis, Bos, van der Leij, and van Baaren (2009),

participants were asked to pick the winners of a series of soccer matches in one of three conditions: immediately after being presented with the teams playing (no-thought condition), after a period of conscious deliberation (CT condition), or after a period of unconscious deliberation (UT condition). Participants were divided into experts, who were very knowledgeable about the soccer league and the teams, and novices, who knew little more than what would be required to make an educated guess. Experts did perform better than novices overall, however, their accuracy was highest in the UT condition. In order for their vast body of knowledge to come into play, experts needed time to unconsciously apply and weigh all of the aspects of the situation. In the no-thought condition they did not have this time. In the CT condition, their limited, biased, and distractible conscious thought processes interfered with this process, resulting in poorer choices than either of the other two groups.

Conscious deliberation works very well for simple tasks involving a small amount of information. One can weigh a few attributes efficiently while applying rules and heuristics appropriately. Unconscious deliberation is a suboptimal (but still adequate) decision strategy when the task is simple. When tasks are complex, unconscious deliberation will produce the same suboptimal (but adequate) decision; that is, unconscious deliberation is a consistently fair decision-making strategy, while conscious deliberation is only good under very simple conditions.

These findings align with other programs of research. Interestingly, a large body of research in the field of educational psychology has repeatedly shown that students who “go with their first instincts” on test answers err more often than students who go back and change their answers (Hallinan, 2009). A possible explanation for this is that students need more time to bring a large array of knowledge to bear on the task demands of exam questions. The students

consciously select an answer, but their unconscious systems continue to integrate knowledge. That is, the unconscious thought mechanism detects a problem and works on an answer despite the fact that the conscious system has moved on to the next question.

Studies supporting Fuzzy Trace Theory have found that expert medical diagnosticians are more accurate when generating gist-level intuitions about the nature of client issues, than when they attempt to utilize specific textbook knowledge (Reyna & Lloyd, 2006). Reyna (2008) advocates giving doctors and public consumers of health information fewer specific details, because they are less likely to a) become distracted by irrelevant information, b) become overwhelmed by attempting to consciously memorize information, or c) draw faulty inferences when there are fewer specifics to process. No person can consciously cull, weigh, and synthesize abundant information without error. Novice doctors and the lay public errantly attempt to do so. Experts, either in soccer or diagnostics, rely on intuitive, gist-level representations to circumvent this problem and synthesize large knowledge bases with specific task-relevant data.

Research in high-stakes expert decision-making outside the laboratory has resulted in the Naturalistic Decision Making Approach (Klein, 2003; Lipshitz, Klein, Orasanu, & Salas, 2001). Similar to the expert diagnosticians and soccer gamblers, experts from a variety of fields were found to generate predictions and solutions without consciously examining all of their options (Klein, 2003). Complex decisions under high pressure circumstances and in highly uncertain environments were made without conscious awareness of decision-making process of the decider. Based on this information, Klein (1993) created a “recognition-primed decision (RPD) model of rapid decision making” (p. 138). This model stipulates that deciders integrate vast numbers of discrete environmental cues into a single diffuse, nonspecific appraisal of the situation. Nonconscious mental simulations are then produced based on working mental models that have

been previously established through similar experiences. The entire process functions without conscious control. The results of these simulations (i.e., predictions) activate particular action scripts. According to RPD, effective decisions are not the result of the conscious comparison of competing options. They occur when intuitions are well informed and unhindered by rational analysis.

There are a plethora of studies supporting general RPD hypotheses. Approximately 80 percent of the decisions made by firefighter commanders were based solely or primarily on intuitive information (Klein, Calderwood, & Clinton-Cirocco, 1986). Army officers based judgments on intuition in 96 percent of their decisions (Klein, 1989). Naval commanders relied on intuition 95 percent of the time (Kaempf, Klein, Thordsen, & Wolf, 1996). Over 90 percent of the decisions made by oil platform managers were intuitive (Flin, Slaven, & Stewart, 1996). In each of these cases experts who were well regarded for their decision-making abilities made only a fraction of their decisions based on a rational, analytical comparison of options. Generally, the best decisions seemed to arrive inexplicably, without conscious deliberation or explicit calculation. Experienced firefighters, for instance, make judgments based on perceived risk, but even upon review of the precipitating clues, they were unable to distinguish the factors leading to this decision (Klein et al., 1986). Vast resources, including entire courses of research, have been used to determine how individuals were able to come to certain conclusions (Klein, 2000). These examinations are necessary because even when individuals made the “right” choice, they were unable to report why they did so.

The ability to discern a pattern of stimuli and act in accordance with one’s best interest is considered *implicit learning* (Price & Norman, 2008). Like the participants in Klein’s expertise studies (see Klein, 2003 for a summary), individuals may often be able to act advantageously

without the ability to consciously understand and relate the knowledge upon which they are acting. Although Klein's research is focused on decisions made in naturalistic contexts, a number of laboratory experiments demonstrate this effect in well-controlled settings.

Bechara, Damasio, Tranell, and Damasio (1997) provided evidence that intentional strategies are put into effect long before there is conscious awareness of that strategy. In a gambling task, individuals were monitored for skin-conductance reactions (SCRs) while being asked to pull cards from one of four decks. An SCR is one physiological indicator of the human stress response. Each card indicated the win or loss of a certain amount, and the individuals were monitored for stress responses as they chose from the different decks. Unbeknownst to the participants, two of the decks resulted in large gains and losses card-by-card, but ultimately resulted in overall losses. The other two decks had smaller gains and smaller losses card-by-card, but resulted in overall gains. After pulling just ten cards (on average) individuals' SCRs indicated greater physiological anxiety when pulling from the high-risk decks. This anxiety translated into significantly greater use of the safer decks. At this point, however, participants did not consciously indicate any preference between the decks, nor did they note any strategy for their decisions. It was not until participants drew about fifty cards (on average) that they began to report a conscious preference for the safe decks. At this point, however, they still did not know precisely why, instead indicating they "liked" and "disliked" certain decks for unknown reasons (p. 1244). It was only when the participants had drawn eighty cards were they able to articulate their reasons behind their decisions. Thus, the participants began acting on information after ten cards, but became aware of their emotional response to the decks after fifty cards, and could only accurately describe their decisions after eighty cards. Individuals were analyzing and utilizing information before they were aware they were doing so.

In another experiment, participants were placed in front of a computer touch screen divided into quadrants (Lewicki, Hill, & Bizot, 1988). They were instructed to touch the quadrant in which an "X" appeared as quickly as possible. After they touched the stimulus their reaction time was displayed on the screen. Unbeknownst to the participants, the computer was programmed to run a complicated 12-step algorithm to determine where the next "X" would appear. After a number of trials, average response times began to creep down. Participants reported that this was because practice effects had increased their performance. After more trials, the computer began to actually run random patterns. Participants' performance slowed to the pace they were responding at the beginning of the trial. Participants were again at a loss, and attributed their slowed times to "losing the touch."

Participants had learned the complex algorithm controlling the placement of the stimulus, but were never consciously aware of it. They did not know they had adopted an adaptive strategy. When lacking insight into their actual intentions and strategies, they were forced to invent a plausible story to explain the experience. The "practice effects" hypothesis the participants provided seemed entirely plausible and aligned with their previous experience with the benefits of practicing in general. This story was consciously adopted and precluded the report of the actual working of nonconscious processes at play. Price and Norman (2008) stripped the participants of this story, by asking participants to anticipate the location of the next stimulus. Participants guessed the correct location at significantly higher rates than would be expected by chance alone, but were left at a loss as to how they were able to perform so well. Participants were able to report accurate intuitive knowledge, but were clueless as to the processes creating a "gut feeling."

This principle is further evidenced by participants' uncanny ability to judge the

desirability of stocks (Betsch, Plessner, Schwieren, & Gutig, 2001). Five stocks, each given fake, affectively neutral names, were presented fifteen different times on a crawler placed on the bottom of a television screen that played commercials. Each presentation was paired with a loss or gain associated with the particular stock. At the end of the "day," the stocks ended with 300, 400, 500, 600, or 700 point increases. The participants were wildly inaccurate when they attempted to estimate the actual quantitative value gained by each stock, but they showed a remarkable sensitivity to the differences between the objective stock choices. In fact, diffuse, affectively charged judgments of how "good" or "bad" the stock companies were reflected a far more accurate appraisal of a stock's relative worth than their quantitative value guesses.

The researchers behind this experiment, Betsch et al. (2001), have termed this nonconscious ability the "value account" (p. 242). This metaphorical repository stores the intensities of positive and negative information related to any concept and integrates the information to create a fuzzy, gist-level intuition that helps guide our decisions. Although it may be especially true for experts, utilizing the gist-knowledge available in the nonconscious system was far more advantageous when integrating with large amounts of complex data.

Of course, in each of the previous examples, the ideal strategy would be to amass data, research and compare options, or just calculate the correct answer. Anyone with basic math skills, the time, and a pencil and paper could determine which option is the objectively best apartment, stock, or card deck. This strategy would be exact and alleviate all uncertainty, but the conditions of the experiments precluded this possibility. Experimenters forced uncertainty into the equation. Critics (e.g., Herbert, 2010) have argued that this defeats the purpose of these studies and violates the very principle - optimal decision-making - that is attempted to be studied. The creation of uncertainty, however, simulates the real-life situations, like the firefighters, pilots,

and military commanders in Klein's (2009) Naturalistic Decision Making research. Most decisions occur under highly uncertain, highly unstable circumstances. Kahneman and Klein (2009) have called situations in which the causal relationships between variables are highly unstable "low-validity environments" (p. 524). In such contexts, complex algorithms that rely on huge databases of information and conduct sophisticated equations work better than human experts. The rational system is an analog for these algorithmic strategies, as it symbolizes, integrates and applies rules in the same way computers do (Hastie & Dawes, 2010). Acting like a computer, however, requires a great amount of resources. If the decision-maker is precluded from computation because of time, emotion, confusion, lack of skill, chaos, or environmental complexity, it is perhaps best not to emulate a reductionistic, computational, "computer-like" strategy. Human deciders are not computers, and we often err when we act as if we are.

Theory supports the existence of two separate and interacting information systems. These systems may be experimentally disentangled. When this occurs, decision-makers often make more adaptive objective decisions when relying on nonconscious, intuitive processes.

Calculating the Inexpressible: Decisions with Subjective Outcomes. In contrast to decisions regarding objective measures of success, decisions with subjective outcomes require a large amount of idiosyncratic, self-referent knowledge. The cognitive and social psychology literature is replete with studies citing the deficiencies of the conscious thought apparatus in this domain (see Gilbert, 2006; Wilson, 2002 for summaries); which can be divided into motivational and nonmotivational limits to self-knowledge (Wilson & Dunn, 2004). Recent empirical evidence indicates that suppression, intentional forgetting, and repression are all mechanisms that keep self-knowledge out of conscious awareness. Although these mechanisms limit conscious knowledge, the information upon which they act still exists in nonconscious form.

Inaccessible, suppressed, repressed, and (sometimes) intentionally forgotten information that has left conscious awareness "still exists in memory and continues to influence people's thoughts, feelings, or behavior" (Wilson & Dunn, 2004; p. 495). Even when highly motivated and psychologically well-prepared, however, there are limits to what we can know about ourselves (Wilson, 2002).

Generally, individuals perform poorly when predicting exactly how they will feel under future conditions. Known as *affective forecasting*, research indicates that people make choices based on the anticipation of an emotional reward. Unfortunately, a sizeable gap often exists between one's expectation and one's actual affective response to the consequence of a choice (Patrick, Macinnis, & Park, 2007).

This phenomenon was investigated by Kurtz, Wilson, and Gilbert (2007). When individuals are given the choice between receiving two pieces of candy now, and one piece of candy at some indefinite time in the future, participants usually choose the former. The two-prizes-now option is the logical and economical choice. It did not produce, however, the affective result that the participants expected. Conscious deliberation led them to believe they would be happier if they took two prizes now, when, in fact, the anticipation and surprise of a future reward resulted in more positive mood states for longer amounts of time. This has been dubbed "positive uncertainty" (p. 797) by researchers.

When we look into the future we make predictable, consistent mistakes. As individuals assume a hyper-rational approach to decision-making, they often decompose their options, by making a mental or physical list of pros and cons. Instead of decreasing the amount of forecasting mistakes, a reductionistic approach actually compounds the chances of making them (Gilbert, Gill & Wilson, 2002). Rationally breaking down a decision into components does

nothing more than increase the chance for mistakes in affective forecasting, as prospecting about the effects of each sub-item is another opportunity for error (Gilbert et al., 2002).

Wilson and Schooler (1991; Experiment 1) created an experiment to demonstrate this effect. College students were recruited to taste and rate five strawberry jams. The jams were selected from a recent edition of consumer reports, in which experts had rated 45 popular brands of jam. Experts used 16 sensory characteristics as the basis for judgment of jam quality. The 1st, 11th, 24th, 32nd, and 44th jams were selected for the study. Given the five jams and left to their own particular tastes, the student rankings of jams "corresponded well" to expert ratings (p. 185). When asked to analyze the reasons why they liked certain jams along the 16 sensory dimensions used by the experts, student evaluations deviated significantly from expert judgments. Using non-analytical, intuitive data resulted in a holistic appraisal that incorporated unbiased personal preferences.

The student participants in the jam study have a large history of eating foods and a large body of experiential knowledge as to their likes and dislikes. They are experts in themselves, but not in tasting nuanced flavors and textures in jam. Wilson and Schooler (1991) concluded that conscious analysis led students away from deciding based on experiential expertise and toward "decisions they will eventually regret" (p. 185). Deliberate efforts to introspect resulted in poor predictions about how they will feel about their choices in the future. This conclusion has since been supported by Klein's (2003; 2009) research on the intersection of intuition and expertise.

Three constructs have been identified as impediments to the ability to successfully forecast emotions in a conscious, intentional manner. First, in what is known as the *durability bias*, individuals overestimate the lasting effects of a positive or negative event. Participants, when asked to predict how long they will be happy or sad after an emotional event (e.g., the end

of a romantic relationship), consistently overestimated the amount of time it would take them to return to their previous levels of satisfaction (Gilbert et al., 1998). Researchers showed that this effect was negated when individuals were asked to focus on aspects of their lives that would not change after the event in question (Wilson, Wheatley, Myers, Gilbert, & Axsom, 2000). One reason people were inaccurate in their affective forecasts was because they were focused on a single piece of information rather than the many variables that would affect their future state. A conscious appraisal of all potential variables that will impact one's future mood is not possible, given the limited capacity of the conscious-rational system.

The second is that individuals have difficulty separating *reality* from their conscious *perception* of reality. Gilbert (2006) makes the following metaphor: our conscious lives are lived inside what amounts to a movie that is seamlessly and effortlessly (at a conscious level) generated and edited by the brain. Nonconscious processes work to fill in the gaps, and are so good at doing so that the rational system is not aware it has even been done at all. We therefore act as if it has not. This concept is central to understanding how individuals make sense of themselves and their opportunities.

The recognition that humans process information automatically, nonconsciously, and effortlessly dates back to the origins of psychology. Gestalt psychologists emphasized the self-organizing principles of the mind. Instead of perceiving a jumble of simple lines, curves and shades, which constitute visual units that comprise images, the raw data is automatically consolidated into a finished product: a single object against a background (Friedenberg & Silverman, 2012). To do this, the brain reduces or adds information according to certain principles. Gestalt theorists invented or co-opted a variety of visual illusions that demonstrate the principle, such as the *Necker Cube* and the *Dot Lattice*. Humans sense a world of innumerous

lines, points, movements, shades, colors, and textures. Gestaltists were the first to empirically demonstrate that humans do not (and cannot) look into the world and see these phenomena. Brains take the liberty to manufacture the objects by which we are surrounded from these raw materials (Wegner, 2002). As Eagleman (2011) states, "visual illusions reveal a deeper concept: that our thoughts are generated by machinery to which we have no direct access" (p. 194).

When humans interact with the world, we do not apprehend the world as it is, but as it is perceived; after the information has been computed *sub rosa* and made meaningful by the brain (Hastie & Dawes, 2010). The sub-conscious construction of meaning is a supposition at the heart of most psychotherapeutic philosophies (Eagleman, 2011) and current neuroscientific notions of information processing (Norretranders, 1999). At the level of conscious awareness, humans only have access to the symbols (i.e., gestalts) that compose their world. In Gilbert's (2006) terminology, the events we "see" unfold in the theater of the mind should not be confused with the actual events, as we are not watching reality, but our brain's symbolized representation of reality. The process of symbolization is influenced by evolutionary, historical, cultural, and contextual factors that themselves lie beyond awareness. The fluidity and facility with which our reality is constructed seduces people into believing they live in a seamless, predictable world – one in which they can predict future emotional states based on a careful review of their experience. This particular point is of critical importance and will be revisited when discussing Wilson's (2002) theory regarding the adaptive unconscious.

The third impediment to accurate affective forecasting is a simple case of *misattribution* (Gilbert, 2006). When we engage in future forecasting, we cannot be certain that our emotions are a product of our imagined forecast, or if they are a product of our here-and-now experiences,

such as hunger or fatigue. In such cases, ambiguous attributions can easily be accidently misinterpreted or worse yet, actively misinterpreted to confirm previously held beliefs.

Gilbert, Gill, and Wilson (2002) found that consumers use current emotional reactions to products in order to estimate the future consequences of purchases. When doing so, decisions are made based on the transient feelings of which we are currently aware. Immediate psychological states seem to be integral to our affective forecasts, and therefore our decisions. The authors conclude that "this tendency will bias forecasts in some instances, but surprisingly, it may debias them in others" (p. 441). For instance, becoming hungry when coming across a certain candy bar is likely to be an excellent indicator of future reactions. Shopping while in a general state of hunger, however, is likely to yield more inaccurate forecasts about one's future enjoyment of products. A problem arises for consumers when attempting to make the appropriate attribution for their current state of arousal. Consumers cannot disambiguate pre-existing emotional states, and those elicited by thoughts of the stimulus, creating a confusing decisional landscape.

Emotional misattribution was also investigated by Dutton and Aron (1974). The researchers had an attractive female researcher give male hikers her phone number either before or after they had crossed a swaying, rickety footbridge. Twice as many participants (60% vs. 30%) called the researcher when they interacted with her *after* crossing the footbridge. The authors concluded that the participants had mistakenly confused the anxious arousal that resulted from crossing a dangerous ravine with sexual arousal produced by the presence of the researcher. The participants' expectations about how they would feel about the researcher were influenced by a totally irrelevant stimulus.

These and other problems are rampant in human goal setting (e.g., Bargh & Chartrand, 1999) and prediction (e.g., Gilbert & Wilson, 2000). Such errors are a function of the limited and

schematic nature - a proclivity to seek evidence for preconceived notions - of conscious thought. In contrast, unconscious thought works aschematically. Betsch et al.'s (2001), concept of the unconscious "value account" (noted previously) creates a nebulous but powerful opinion that serves to direct our preferences. By storing the valence and strength of relevant information, the unconscious can slowly absorb large amounts of data, creating an unbiased opinion (Dijksterhuis & Nordgren, 2006).

The inability to appropriately weigh information is perhaps the most flagrant threat to subjective decision-making, and the human consciousness is very poor at doing this accurately (Price & Norman, 2008) or consistently (Nordgren & Dijksterhuis, 2006 as cited in Dijksterhuis & Nordgren, 2006). This principle was demonstrated in a study by Wilson et al. (1993). Researchers asked college students to choose one of two posters to keep. Some students were asked to evaluate and choose the posters immediately, with little time to deliberate. Others were given time to think about their choice, and asked to deliberate about why they would prefer one over the other. Three weeks after receiving the poster, participants were contacted and asked how satisfied they were with their choice. Those that had chosen immediately were significantly happier with their choice than their deliberative counterparts.

This methodology was replicated and extended by Dijksterhuis and van Olden (2006). Commensurate with Unconscious Thought Theory, participants were placed in one of three groups: an immediate choice condition, a conscious thought condition, and an unconscious thought condition. The immediate choice and conscious thought conditions were similar to those induced by Wilson et al. (1993). In the unconscious thought condition, participants were shown the posters, and engaged in an anagram distracter task for 450 seconds to induce cognitive load and preclude conscious deliberation while allowing time for unconscious thought. Again,

participants were contacted two weeks later and asked a number of questions related to their satisfaction with their choice. Replicating the results from Wilson et al. (1993), participants in the immediate choice condition were more satisfied with their choice, had less regret about not selecting the other posters, and stated they would require significantly more money to sell their poster than the participants in the conscious thought condition. Furthermore, participants who engaged in unconscious thought before their decision outperformed both groups in all measures of satisfaction. Thinking unconsciously and making an intuitive choice resulted in a more advantageous decision.

Nonconscious thought has been shown to produce better predictions of one's future affective state. The unconscious can remain relatively unbiased because it assigns relatively "natural" weights to various attributes of a decision (Dijksterhuis & Nordgren, 2006; p. 99). Preliminary evidence indicates that idiosyncratic preferences adaptively influence unconscious weighting. Importantly, the nonconscious ability to apply personal and cultural inclinations can affect individual impressions; the optimal choice for one may be terrible for another. Like the poster study, individuals who were asked to choose roommates based on a list of characteristics were more likely to select a roommate that conforms to their personal, idiosyncratic values if they make intuitive decisions after unconscious thought than when they used conscious thought to come to a rational decision (Dijksterhuis, 2004; Experiment 3).

Furthermore, UTT's deliberation-without-attention effect has been shown to produce objectively better outcomes when deciding between competing consumer goods (e.g., Dijksterhuis & Smith, 2005). But since there are no objectively "best" answers for consumers in the marketplace, this study was replicated using consumer satisfaction as an outcome variable. Dijksterhuis (2004) found that satisfaction with purchased items was a function of two factors:

the number of salient attributes and the amount of time spent in nonconscious versus conscious thought before the purchase. For those items with only a small number of attributes, such as oven mitts, conscious thought time was more important than was nonconscious thought time. For extremely complex decisions with many salient attributes, such as choosing a computer or a car, increased nonconscious thought time predicted satisfaction. This indicates that, counterintuitively, decisions that necessitate the integration of a large amount of information should be made not after abundant conscious consideration, but after abundant nonconscious deliberation.

Dijksterhuis and Nordgren (2006) admit that there is much yet to discover about the exact mechanisms of unconscious thought. For the present purposes, the most important aspect of UTT is that the unconscious thought system is like an "archeologist . . . uncovering values that are already there" (p. 97). Conscious thought, on the other hand, is often an exercise in rationalizing decisions that we believe we "should" want.

Wilson (2002), called the intuitive system the "adaptive unconscious," and constructed a theory that is congruent with the formulations of the conscious and nonconscious systems in dual-processing models presented previously. The nonconscious-intuitive system (System 1) utilizes images, emotions and idiosyncratic behaviors that occur outside the control of the conscious system. Given that this system uses self-referential emotions as a form of language, it is no wonder that it is more predictive of affective states. The "cold" cognitions and logic used by the rational-conscious system (System 2) have little bearing on affective states, and only through a convoluted neural system. Furthermore, Wilson asserts the myriad of little decisions and actions we make throughout the day – the ticks that make us seem nervous, the smile that makes us seem confident – are under the control of the nonconscious system. These minute,

nonconscious decisions make up the fabric of our daily lives, yet we are painfully unaware of them on a conscious level.

For instance, people often have conflicting nonconscious and conscious concepts regarding the self. Studies indicate that more than half of surveyed college students were shy in childhood, but grew out of it before the age of 14. For many, however, their conscious self-story does not reflect this, and they still believe they are shy, even though others report that they are extraverted and outgoing (Melchior & Cheek, 1990). In such a case, an individual would not predict his/her behavior in a novel situation as well as a friend or stranger would. This is because most actions of the individual are not under their conscious control, but subject to one's unconscious personality. Wilson argues, however, that big choices, the ones in which we decide who to marry, where to live, what job to choose are all conscious choices and will result in choices that are less indicative of the adaptive unconscious and more closely related to one's identity, a socially constructed view of what we *ought* to do, think, and feel based on what we know about ourselves and causal relationships in the world. Of course, as noted above, we claim to know much more about ourselves than can actually be proven.

As we look at ourselves and predict our future, we do so by constructing an internal representation of ourselves and our world, so called "mental models" (Klein, 2009; Hastie & Dawes, 2010). The symbolic version of "me" is an abstraction, a reduced version of what we are. We are not consciously aware of most of our internal processes and influences, so they remain unincorporated into the narrative, symbolic self. Conscious appraisals of ourselves and future forecasts rely less on our behaviors and personality, and more on how we have symbolized our world (Wilson, 2002). Mental representations of the self are like two-dimensional images of three-dimensional objects. Even if accurately represented, the image should not be confused with

the object. The symbolic “I” present in one’s mental model of the world is a faint and often faulty representation of the “me” that exists in reality. Asking one to consciously forecast the future will result in a prediction based on redacted accounts and partial information. As previously noted, simply because an individual cannot report learning new information or enacting a particular strategy, it does not mean they have not. The reified “me” that exists here-and-now has gleaned such information from direct experience – not from introspection.

Hayes, Strosahl, and Wilson (1999) implore decision-makers to trust their fund of experiential knowledge when committing to a course of action. Experience, they contend, simply is. Thoughts, however, are rationalizations vulnerable to a host of potentially crippling judgments and assumptions. The authors do not claim that thoughts are unimportant or epiphenomenal, but that they should be held lightly. To refer again to Gilbert’s (2006) mental movie analogy, it is best for decision-makers to remain cognizant that their thoughts represent a biased and carefully edited version of reality.

Wilson’s (2002) assertions regarding the “adaptive unconscious” tie together much of what has been discussed thus far. There are two systems of information processing, and they can be manipulated. Depending on the situation, either the unconscious-intuitive or conscious-rational system can make a better objective decision, but when it comes to subjective outcomes, the unconscious system is generally preferable. The implications for vocational psychology are vast. Under such a paradigm, it is entirely possible for individuals to engage in a task that they find incredibly interesting and personally satisfying - an experience that could launch them into a career in which they find joy and fulfillment - only to discount this experience if it does not conform to consciously held self-theories. Wilson notes:

"Surely, however, we do not want our conscious conceptions to get too out of whack [from our unconscious ones]. There are many times when we would be better off recognizing our limitations, abilities, and prospects. When choosing a career, for example, it would be to people's advantage to know whether their unconscious personalities were better suited for a life as a lawyer, salesperson, or circus performer" (p. 91).

Conscious introspection about our interests, preferences and personalities often does not result in accurate appraisals of ourselves and our options. The possibility that self-reported interests and desires are not trustworthy has been forwarded, and it has frightening implications for the field of vocational psychology (Krieshok, 1998).

Decision-Making in Vocational Psychology: Anti-introspectivism and the Trilateral Model

Making a career choice is a complex endeavor. It involves holistic, integrative thinking; an examination of the outer world of job markets, economies, scales of industry, as well as the inner world of needs, interests, desires, expectations, etc. This is exactly the kind of decision that, according to Cognitive-Experiential Self Theory (Epstein, 1994), Fuzzy Trace Theory (Reyna & Brainerd, 1995), Unconscious Thought Theory (Dijksterhuis & Nordgren, 2006), and Wilson's (2002) formulation of the adaptive unconscious, should place a premium on information generated by the nonconscious thought apparatus.

Though the particulars vary based on the theoretical approach, career counselors and their clients must attempt to assimilate massive amounts of information, and try to do so consciously. Holland's Theory of Vocational Personalities in Work Environment (1978), for instance, involves accurately assessing how an individual will function within an environment (Spokane & Cruza-Guet, 2005). The resulting instruments quantify several sub-constructs for both

individuals and occupations. Dozens of assessments have been created to identify traits (e.g., Holland, 1978), interests (see Hansen, 2005 for a summary), skills (e.g., Bolles, 2009), abilities (e.g., Krane & Tirre, 2006), and needs and values (e.g., Rounds & Armstrong, 2006) that are suspected to be pertinent to the person-environment interaction. One obvious problem is the inability for consciousness to keep up with the demands of this task. Another is that almost every available assessment used in career counseling uses self-report as the primary means of data collection. Under the traditional paradigm of career counseling, undergirded by Rational Choice Theory, such observations are not considered problematic (Barak, 2001). Many, however, have questioned that paradigm.

Krieshok (1998) persuasively argued that these problems are directly applicable to career counseling, and therefore, an introspective effort toward career decision-making is theoretically problematic. Appropriately calling this the "Anti-Introspective Approach" (AI), Krieshok challenged the notion that decision-makers can successfully select and weigh salient self-information. Available career counseling techniques are susceptible to the cognitive distortions and affective misforcasting discussed previously.

Krieshok (1998) outlines a continuum upon which AI theories may be applied to career counseling. The strictest AI approach regards thoughts as epiphenomenal. Despite our subjective experience, conscious will has little or no bearing on our actions, so attempting to make career related decisions through introspection is futile. Under this view, introspective efforts result in nothing more than a plausible account of why one has acted the way one has, based on the most accessible (but not necessarily most important) self-knowledge. Decisions based on these verbalized narratives are likely to be built on faulty inferences. Career assessments, therefore, may reflect self-narratives that have little basis in reality or history. If strict-AI approaches are

correct, career counselors would be well-advised, Krieshok contends, to avoid interventions that require clients to explicitly introspect, quantify, and rank their preferences. The cognitive process underlying introspective tasks is more akin to self-fabrication than to self-exploration.

Less radical AI approaches view accurate self-reflection as difficult, but not impossible to achieve (Krieshok, 1998). This view recalls Freud's famous iceberg metaphor: only a small amount of mental life resides above the waterline of consciousness. The underlying mass is not entirely inaccessible, but its discovery requires adventurous exploration and great effort. Disciplined inquiry through journaling, guided imagery, and psychotherapy can aid this endeavor. Engaging in these exercises can yield valuable information regarding personal values and life themes, as long as clients adopt a flexible and open approach to their previously held self-narratives.

Although AI approaches suggest accurate introspection is difficult, if not impossible, it does not mean that one must guess blindly when making decisions. Introspection, the observation of covert thoughts and feelings, is not the only evidence used by decision makers. Bem's (1972) Self-Perception theory is based on the proposition that "individuals come to 'know' their own attitudes, emotions, and other emotional states partially by inferring them from their own overt behavior" (p. 2). Through a series of experiments, Bem supported the contention that people understand themselves not through direct introspection, but through a careful examination of their actions. Individuals often respond to the question "What do you like?" with an answer to "What do I usually do?" Although this may be valuable information, it is clear that the inferential leap between these two questions can be misleading, especially when attempting to predict the affective consequences of decisions.

Such inferences may be particularly hazardous, as they rely directly on memories of events, experiences, and emotions. Reports from memory are considered to be less of a recollection than a reconstruction (Hastie & Dawes, 2010). There is a robust cache of experimental and observational studies supporting the conclusion that explicit memories are highly biased, incredibly malleable, and definitively prejudiced. Reconstruction of past events is often influenced by a host of factors that are logically unrelated to the content of the memory itself, such as salient contextual attributes, emotional state, level of physiological arousal, social desirability, and expectations (both at the time of experience and at the time of recall). This literature has almost exclusively dealt with *explicit*, reportable memories, which are accessed, manipulated and brought to consciousness by the conscious-rational narrative system (i.e., System 2). Krieshok (1998) notes this connection, claiming "reconstructing reasons from available information is similar to the process of reconstruction that goes on when someone is asked to recall events from memory" (p. 218). It would be expected, then, that individuals effectively mis-remember experiences to be more consonant with their consciously held expectations of self and world.

Based on the AI literature, Krieshok (1998) challenged a number of assumptions held by the vocational psychology field at large. Conscious decisions likely have less influence on vocational behaviors than counselors and clients suspect. Career interventions that encourage clients to introspect can actually be misleading or otherwise harmful. Client self-report is important, but it is unlikely to be valid data on face value, and should be interpreted with caution and curiosity. Clinical assessments and personal judgments based on memories are shaky, at best. Regardless of the theoretical distinctions between AI approaches, how one structures the

decision-making process and relates to their self-knowledge will impact career decisions and vocational behaviors (Krieshok, 1998; 2001).

Iyengar et al. (2006) conducted one study testing the outcome of different decision-making strategies by directly linking intuitive and rational decision-making processes with career outcomes. Graduating high school seniors were given a variety of measures before beginning their job hunt. After securing jobs, participants were split into two groups based on how they decided which job to take. One group, “maximizers,” had a tendency to survey all the options and carefully weigh all the available information against their options. They relied on external, objective standards. The other, “satisficers,” however, looked at only a few options and considered only a few variables, and had a tendency to choose based on internal variables. The strategy employed by maximizers is analogous to hyper-activating the rational-conscious system. Their counterparts, the satisficers, utilize a strategy analogous to the intuitive-unconscious system. Students with maximizing tendencies were shown to do objectively better: they were earning 20% more than the satisficers. The satisficers, however, were significantly more satisfied with their job choice. In support of the literature previously discussed, the authors concluded the maximizers were “doing better but feeling worse” (p. 143).

Perhaps the best way to create the optimal environment for career selection is to experientially engage in the possible occupations of interest (Krieshok, 2001). Experience in the world informs the nonconscious system, utilizing all 11 million bits per second of bandwidth capable of being processed by humans. Talking about the world and introspecting, as suggested by traditional career counseling, activates only the conscious thought system, with its 20 bits per second processing speed, limited capacity biases and miswanting. After a survey of the literature, much of which has been presented here, Krieshok and his colleagues (2009) determined that both

intuitive and rational processes are vital for adaptive career decision-making. Neither process, however, can help guide an individual in a vacuum. The researchers have termed meaningful occupational activities that fund both intuitive and rational knowledge bases as "occupational engagement" (p. 10).

Occupational engagement gives experience primacy in the decision-making process. The best way to determine how one will feel about a certain job or activity is to actually do it (or get as close as possible to the experience of actually doing it). The Trilateral Model predicts that activities which promote greater interaction with the options of interest will lead to more optimal choices. Engagement is fundamentally about immersing oneself with the stimuli that accompany a decision. The best way to determine how you will feel about a certain job, major, or hobby is to truly "feel" it out, by developing gist-level affective responses to a vast array of contextual cues, job-relevant tasks, and environmental feedback. Consciously thinking about potential jobs is more engaging than not, but talking to those who have had those jobs is better. Looking up information about a job on the internet is more engaging than not, but shadowing someone with that job for a day is better.

Engagement is theoretically defined as consisting of both enrichment and exploration. The concept of exploration was first defined by Super and Knasel (1981), as those behaviors that increase the amount of career-relevant information. Enrichment, by contrast, is a process-oriented increase in self-awareness vis-à-vis the world of work. Exploration is a cyclical state behavior that is discretely absent or present given an individual's current activities and goals. Enrichment, however, is a constant pursuit that encapsulates both attitudes and behaviors. Krieshok et al. (2009) classify each of these in behavioral terms, emphasizing the active nature of engagement.

As we have seen, however, engagement may also be insufficient to overcome an incongruence between conscious and nonconscious systems. Experience certainly informs both rational and intuitive systems, but it is unlikely that they benefit equally. Based on the previous literature, there may be reason to suspect that engagement may differentially fund the two systems, affecting change in the experiential, subtle nonconscious system, but often without much impact on the rational system as self-narratives may be deeply entrenched.

It is undoubted that the rational system can also be influenced, but, in accordance with theories mentioned previously, this is likely to occur under analytical and verbal conditions that supply evidence to buttress an opinion. Although the unconscious mechanism may lead to enjoyable opportunities if given the opportunity, the rational system may need some help adapting to these changes. Occupational identity change is likely to require active, on-line processing. Opportunities to analyze and process such events, construct and re-construct narratives, and discover evidence about oneself and the world of work do exist – in the form of career counseling. Thus, the best way to foster meaningful change would be to align the two systems. In this vein, Krieshok et al. (2009) stated that "we would do well to teach people to think and feel about experiential information in a more intentional way" (p. 11). Career counselors can provide a conduit for this intentionality.

Interest Forecasting

This study introduces a new term, *interest forecasting*. Interest forecasts are a specific type of affective forecast; which are predictions about how different options will affect one's future emotional state. Specifically, interest forecasts are an answer to the question, "How interested will I find this experience?" Such predictions are common in everyday life, as they are

the basis upon which we select certain television programs, pick up certain magazines, or, in the case of college students, choose some classes over others.

Although there is no precedent in the literature for this specific form of affective forecast, there is no reason to believe that interest forecasts would function any differently than the literature pertaining to satisfaction with consumer products (Dijksterhuis & Nordgren, 2006), artistic aesthetics (Wilson et al., 1993), or taste (Wilson & Schooler, 1991). As discussed, the assessment and prediction of interests is vital to the field of vocational psychology, and the implicit goal of many of the most commonly used instruments in the field (Krieshok et al., 2011). Based on the extant decision-making literature reviewed previously, Krieshok (1998) and Krieshok et al. (2011) have challenged the hyper-rational approach to interest assessment and the validity of client self-report.

A Short Story. A short story may exemplify the intersection of information-processing models and the assessment of interests. In a 1999 experiment by Shiv and Fedorikhin, participants were randomly placed into one of two conditions. One half was asked to remember a seven-digit number. The other half was asked to remember a two-digit number. The task required that they memorize the number, walk down the hallway into another room, and repeat it to a researcher. As the participants walked down the hallway, however, another member of the research team stopped them and told them that for participating in the survey they could have one of two snacks: a cup of fruit salad or a piece of chocolate cake.

Of those that were asked to remember a two-digit number, 41% chose the cake. Of those that were asked to remember a seven-digit number, 63% chose the cake. When the seven-digit group was asked why they chose cake, they gave the answers one would expect: they just felt like some cake, or it looked too good to pass up. Not a single participant mentioned the seven

digit number they were asked to memorize a few moments earlier. This, despite the fact that memorizing the number obviously had something to do with their decision: the seven-digit group was more than 50% more likely to choose cake than their two-digit counterparts.

The researchers concluded that those who had little to occupy their minds (i.e., a two-digit number) had the cognitive resources available to make the prudent, logical choice. It may not have made the participant as happy as the cake, but their decision would have made their mothers happy. The fruit cup was the defensible, deliberate choice. This is the choice that they *ought* to want based on their consciously held narratives about the kind of person they were. The fruit cup represented the option they *want*.

Those who were busy rehearsing a seven-digit number were tapped out of cognitive resources. The cake was a choice unmitigated by reason. They were unable to consciously assess the options vis-à-vis their self-imposed rules of behavior. The choice was likely not as defensible as the fruit cup, but it certainly made their taste buds happy. The cake represented the option they knew they would *like*.

This begs the question, when making interest-salient decisions (such as educational and occupational opportunities) are individuals better served by using strategies that point them toward "fruit cups" activities? Or, is it more rewarding to uncover and explore "cake" activities?

Summary

In summary, most theorists agree that nonconscious factors play important roles in decision-making. Many have endorsed "dual-processing" models that postulate the existence of an intuitive, nonconscious information processing system in addition to the rational, conscious one of which we are all aware. Experimenters have used a variety of methods to induce decision-making strategies that use primarily one of these two systems. Distinct patterns of results have

been observed, suggesting the intuitive system can make objectively better decisions under certain circumstances, and subjectively better decisions under many. This information has been adopted by vocational psychologists in order to better understand how individuals can be guided toward more optimal career-related decision-making strategies by making more effective interest forecasts.

Chapter III

Methods

The purpose of this study was to understand how information processing strategies influence decisional outcomes. The methods have been designed to experimentally recreate, on a small scale, situations commonly encountered by decision-makers regarding the appraisal of their idiosyncratic interests. This chapter has been divided into three core sections: participants, measures and materials, and procedures.

Participants

Participants included 140 students from a large, Midwestern University. Of these, four had unusable data: one was considered a trial participant, one had technical difficulties, one had to discontinue during their video due to extraneous circumstances, and one did not follow researcher directions. These four participants were not used in any analyses, leaving a final sample pool of 136 individuals. Comparison group sample sizes are equivalent or greater than those in similar studies (e.g., Dijksterhuis & van Olden, 2006; Wilson & Schooler, 1991; Wilson et al., 1993).

Of the 136 participants in this study, 52 (38%) were female, and 84 (62%) were male. The ethnic breakdown of the sample was: 92 (67%) White, 15 (11%) Black, 10 (7%) Asian, 9 (7%) Multiracial, 6 (4%) Hispanic, and 4 (4%) Other. Seven participants (5%) were international students. Participant ages ranged from 18 to 49, with a mean of age 21.45. They had, on average, completed approximately 53 credit hours, had a college grade point average of 3.05, and had been in college for approximately 2.5 years. In all, 52 different majors were represented in the sample. Seventeen participants (12.5%) were officially undecided at the time of data collection.

Measures and Materials

Informed Consent. All participants were presented an informed consent both verbally and in writing. Participants signed this form if willing to participate, which were kept on file by the researcher. See Appendix A for this document. Each participant was also provided with a copy of the informed consent for their own records.

Demographic Questionnaire. The demographic questionnaire consisted of 14 items to determine sample representativeness as well as two questions that yield a rough measure of "decidedness" in major (used by Cox, 2008), and college GPA. See Appendix B for this questionnaire.

Occupational Engagement Scale-Student (OES-Student). The OES-Student is a 14-item measure that was originally developed by Black (2006) and then refined by Cox (2008) as a measure of collegiate student engagement (see Appendix C). Engagement is a theoretical extension of the Trilateral Model of Adaptive Career Decision-making (Krieshok et al., 2009). The measure has been shown to be reliable, demonstrating a coefficient alpha of .85, based on a sample of 311 undergraduates from various disciplines and advancement in college. This measure was chosen because it is a reliable and valid measure of behavioral occupational engagement in college populations (Cox, 2008). Previous interactions with the world are hypothesized to fund the decision-makers wealth of knowledge (Krieshok et al., 2009; Krieshok et al., 2011) and therefore influence decisional quality. Scores from this instrument will be used as a predictor and a covariate during analysis.

In accordance with theory, previous versions of the OES were found to be positively related with a rational thinking style as measured by the REI and Vocational Identity (Black, 2006), as well as Openness, Conscientiousness, Extraversion, and Agreeableness in both gifted

high school students (McKay, 2008) and college students (Black, 2006). Cox (2008) found that the most current iteration, the OES-Student, was related to several measures of student well-being.

Rational-Experiential Inventory-Short (REI-Short). The REI-Short is a 10-item measure (see Appendix D) derived from a 59-item version by Epstein et al. (1996). The REI was developed based on the Cognitive Experiential Self Theory (CEST; Epstein, 1994), and has two 5-item factors: Faith in Intuition (FI) and Need for Closure (NFC). Alpha coefficients for the two factors were found to be .72 and .73, respectively, indicating sufficient internal consistency.

Epstein et al., (1996) found that FI and NFC subscales were found to be independent of one another as hypothesized by CEST, and in support of the dual-process assertion that "there are two information processing systems, experiential and rational, that are independent and operate by different rules" (p. 401). As expected, the NFC subscale was found to be related to greater objective outcomes, while the FI scale was associated with greater use of heuristics while making decisions. Previous research indicates that trait comfort with decisional style affects the process and outcome of the decisional process (e.g., Gati, Landman, Davidovich, Asulin-Peretz, & Gadassi, 2010). Including REI subscale scores allowed researchers to control for these effects.

Measures of Interest in Video and Choice Satisfaction. On five different occasions (before, twice during, immediately after, and two weeks following viewing video), participants were asked to indicate how interesting they believe they will find, are finding, or found the video they chose, as well as how satisfied they are with their choice. These were presented as an un-numbered bipolar horizontal line, with each end labeled "Not at all interesting" and "Very interesting" for the interest questions, and "Not at all Satisfied" and Very Satisfied" for the satisfaction questions. See Appendix E for examples of these items.

Individuals were instructed to place a single strike through the line indicating their current attitude regarding the video. These marks were then scored with a standardized template to quantify the participant's response from 0 (not at all interested or satisfied) to 50 (very interested or satisfied). This method was used with success by Dijksterhuis and van Olden (2005), who incorporated this measurement style due to its sensitivity to subtle nonconscious affective changes.

Video Options. Participants were asked to choose one of eight occupational/educational videos, labeled Video A, B, C, D, E, F, G, and H. Videos were selected from the Technology, Entertainment, and Design (TED) Conference series, an open-source, freely distributed project (see Appendix F for links to these videos). Each video contained a fifteen to eighteen minute lecture by an expert or researcher discussing what they believe to be the most exciting developments and latest trends in their respective fields. Videos were chosen based on their content, which represent a variety of different professions. Each was carefully screened for general quality, but there is no objective determinant of how well the lecturer delivers the content of their presentation. To control for differences in lecture quality, during-video interest levels from all participants who chose a particular video were averaged to obtain a general "video quality" metric for each option.

Each video was summarized with a set of five different descriptions. The descriptions were standardized to ensure they were equal in information quality and quantity across job options. This was accomplished by formulating a standard set of questions from which to base the descriptions (See Table 1). Participants were asked to choose one of the videos based on these descriptors. The three decision groups, the conscious-rational (CR) group, the unconscious-

intuitive (UI) group, and control differed only in the means by which this information was presented.

Procedures

Participant Recruitment. Before beginning data collection, this project received approval through the governing Institutional Review Board. All research was conducted within APA ethical standards, and all participants were treated in accordance with human subjects review board guidelines.

The participant pool was gathered by entering classrooms in courses that appeal to a wide array of interests and majors, such as 100-level electives and remedial requirements. They included such courses as introductory math courses, communication elective, career exploration, and introduction to geology. Participants were asked to come to a predetermined classroom to engage in the experiment. Students were given either a $10 incentive or class credit for participation in this study. Data were collected through 39 separate data collections during the spring and summer terms of 2011.

Experimental Manipulation. Small groups of participants were randomly assigned to one of three conditions, control, conscious-rational (CR), or unconscious-intuitive (UI) upon arriving for the experiment. Every participant, regardless of condition, began the study by completing the demographic questionnaire, the OES-Student and the REI-Short. All participants were told they would be asked to choose between a number of videos containing lectures by experts discussing their respective fields, and that after they chose, they would actually watch that video.

Control condition. After completing the demographics sheet, OES-Student, and REI-Short, participants in the control condition were given the “decision sheet” of organized video

descriptions (see Appendix G) and asked to choose the video that they would find most interesting. They were then given the pre-test measures of expected satisfaction with choice and interest, as well as their confidence in decision and current mood. Participants then watched the videos they chose. They were assessed for their current levels of interest and satisfaction with their choice at three time points: six minutes into the video, twelve minutes into the video, and immediately after the video. A general during-video interest score was obtained by averaging these three scores. Approximately two weeks later, participants took the follow-up survey.

Conscious-Rational (CR) condition. Like the control condition, participants in the CR condition completed the demographic questionnaire, the OES-Student and REI-Short. Before choosing their video, however, they were asked to rate each description on a 9-point Likert scale. Participants were asked to consider each description carefully and determine the exact number that would represent their interest level. Pilot testing showed that participants needed approximately four and a half minutes to complete description ratings. Participants then tallied their scores for each video. Participants were then presented with the "decision sheet" of organized videos, and asked to choose the video they thought would interest them most.

This method was intended to induce a hyper-rational, reductionistic decision-making strategy and simulate the methods and instruments, such as the Strong Interest Inventory (Donnay & Borgen, 1996) and the Self-Directed Search (Holland, 1978), that are common to career counseling. Similar means were used to successfully induce conscious-rational decision-making strategies by Dijksterhuis and van Olden (2006) and Wilson and Schooler (1991, Experiment 2). Participants in the CR condition then watched the video they had chosen, and followed the same sequence of assessment as the control group. The descriptions upon which the

participants based their decisions were presented in a manner easily consumable on a conscious level, and the participants were asked to rationally evaluate the components of the video.

Unconscious-Intuitive (UI) condition. Like the control and CR conditions, participants in the UI condition completed the demographic questionnaire, the OES-Student and REI-Short. Before being asked to choose between videos, however, participants in the UI group were presented the descriptions of the videos via computer program. For instance, one description read as follows: "VIDEO A: Medicine." All forty descriptions were flashed on the screen for three seconds at a time. This process was repeated, so that UI condition participants watched the presentation for a total of four and a half minutes. Participants were given instructions not to attempt to memorize these prompts, but to simply "remain attentive and attempt to absorb the information."

After this, the UI group was given a distracter task consisting of an anagram puzzle consisting of 23 five- and six- letter words. Anagram words were selected from the Affective Norms for English Words (ANEW) word list (Bradley & Lang, 1999). Only words deemed emotionally neutral and non-arousing were considered. Participants engaged in the anagram puzzle for 300 seconds. This anagram distracter task was intended to allow for unconscious thought and the development of affective, gist-level appraisals of the options. Participants were then presented with the "decision sheet" of organized video descriptions, and asked to choose the video they thought would interest them most.

Follow-up. Approximately two weeks following the initial data collection, researchers returned to the classes from which participants were recruited in order to obtain a follow-up survey. Participants were asked to read the descriptions of the videos and select the one they watched. They then answered five questions regarding how interested they remember being in

the video, how satisfied they were with their choice, how much they had thought about the content, and how likely they are to seek more information about the content of their video. In addition, they were asked to estimate how many times they had discussed the content of their video with others over the past two weeks. Of the 136 usable participants, 115 (85%) completed the follow-up survey.

Summary of Variables. This methodology yields nine variables of primary importance to test the hypotheses. See Table 2 for a summary of these variables.

Data Analysis

It was the purpose of this study to experimentally reproduce career-related decisions students and workers commonly encounter by asking individuals to choose one of eight occupational/educational videos. Their reported interest levels can be tracked longitudinally as a measure of decision quality. This method supports the general research questions of this study as well as specific tests of the hypotheses generated by the literature to date. These hypotheses are highly tentative, as there has been no direct test of the effects of decisional strategy (i.e., unconscious-intuitive, conscious-rational, and control) on decision quality (i.e., interest levels). Current mood, trait comfort with rational and intuitive cognitive styles (as measured by the REI-FI and REI-NFC subscales), and video quality were potential confounds to the assessment of interest and were statistically controlled. All of the following hypotheses represented expected significant effects after accounting for these factors.

Hypothesis 1. Levels of occupational engagement, as measured by the OES-Student (Cox, 2008), were hypothesized to be positively correlated with choice quality, as measured by self-reported levels of interest during the video. Furthermore, this relationship was expected to be considerably more pronounced for the unconscious-intuitive group. These relationships were

tested using partial correlations to control for variables that may confound the observation of these relationships.

Hypothesis 2. The unconscious-intuitive condition group was expected to choose, on average, videos that they found more interesting than the conscious-rational or control conditions, as measured by self-reported levels of interest during their videos. Group differences were analyzed using an analysis of co-variance that statistically adjusted for participant variables that may have systematically affected groups.

Hypothesis 3. The following patterns were expected to emerge. The conscious-rational group was expected to have relatively high pre-video interest (indicating high confidence in choice), relatively low during-video interest (indicating poorer choice quality), and relatively high two-week follow-up interest (indicating a "mis-remembering" of the event). The opposite pattern was expected for the unconscious-intuitive group. The unconscious-intuitive group was expected to have relatively low pre-video interest (indicating low confidence in choice), relatively high during-video interest (indicating better choice quality), and relatively low two-week follow-up interest (indicating a "mis-remembering" of the event). Overall, the trends in mean scores across time between UI, CR, and control groups were expected to vary significantly. These trends were analyzed using a repeated-measure analysis of co-variance. See Figure 1 for a graphic representation of this hypothesis.

Chapter IV

Results

The methods of this study were designed to broadly address two questions. First, does occupational engagement relate to decision quality? Second, does the information processing strategy employed by the decider preceding the decision influence decision quality or the hindsight appraisal of that experience? Based on the extant literature, three hypotheses were developed to address these questions. This chapter will present the results of the analyses testing these hypotheses. Before doing so, however, information is included regarding the variables of interest. All variables involved are statistically described, tests for group differences in demographics are detailed, and the correlation matrix of variables reported.

All hypotheses were tested with an a priori alpha level of .05 using the Statistical Package for the Social Sciences (SPSS), version 18. Of the variables within this study, a number are significant characterological or contextual participant variables that may confound hypothesis testing: participant mood, Rational-Experiential Inventory's Need for Closure (REI-NFC) and Faith in Intuition (REI-FI) subscales, video quality, and Occupational Engagement Scale score. Interest and satisfaction scores before, during and two weeks after the video are considered outcome variables.

Statistical Description of Variables

Of the 136 total participants, 44 were assigned to the control condition, 44 were assigned to the conscious-rational condition, and 48 to the unconscious-intuitive condition. Table 3 contains the possible range, observed range, mean, standard deviation, skew and kurtosis values for the examined variables in the overall sample (N = 136). Although during-video and follow-up video scores displayed elevated kurtosis and skew levels, Byrne (2010) does not recommend

transforming variables with skew and kurtosis values of less than 5.0 when conducting multivariate analyses based on the general linear model, which includes all following analyses. All variables were therefore considered sufficiently normal.

Single sample *t*-tests were performed to determine if the current sample had significantly different OES-Student scores than those found in studies with similar populations. Based on a one-sample t-test, the mean OES-Student scores for this sample, 37.83, is significantly higher than the mean of 32.53 Cox (2008) found in college students, $t(135) = 6.55$, $p < .001$.This indicates that the students in this sample report significantly more behavioral engagement than those in the normative sample for this instrument.

Testing for Systematic Group Differences

Since participants were randomly assigned to one of the three experimental conditions, there is no reason to believe that the groups would differ based on any demographic or participant characteristics. One-way Analyses of Variance were conducted with Bonferroni post hoc tests in order to determine if groups systematically differed at baseline for trait variables. There were no significant differences among groups for OES-Student score, REI-NFC and REI-FI scores. It was also important to determine if experimental manipulation had differential effects on participant mood. An analysis of variance was conducted with a Bonferroni post hoc correction, which was not significant.

Furthermore, it was expected that participants would choose different videos at roughly the same rate, regardless of group. A Chi-square test for goodness-of-fit was not significant, indicating that video decisions did not differ across groups. The mean video quality score was likewise not expected to differ among groups. Another analysis of variance was conducted to

ensure that average video quality scores did not differ between groups. This test was also not significant.

Based on these results it can be concluded that the three experimental conditions did not significantly differ based on any characterological or contextual variables. This indicates that random assignment successfully created homogenous groups, and experimental manipulation did not significantly impact participant mood.

There is one more observation of note. Participants in the CR condition were asked to complete a short interest inventory that resulted in scores from 5 to 45 for each of the videos. They were then asked to choose any one of the videos they believed they would like. Four of the 44 (9%) participants assigned to the CR condition chose a video other than the video rated as highest. Although these participants may not have explicitly used the conscious-rational data supplied by the inventory, a conscious-rational response set was still induced. Examination of these participants' inventories revealed that all of them chose their second highest scoring option, each of which was within a few points of the highest scoring option. Therefore, these participants were considered to have adopted a conscious-rational strategy, even if it was not fully implemented.

Correlation Matrix

Using the entire sample (N = 136), bivariate correlations among the eight principle variables used in this study resulted in the matrix displayed in Table 5. Several of these analyses merit further discussion. Several participant state and trait variables were found to be significantly related to self-reported interest levels at the three time samples. Participant mood immediately before video was found to be strongly related to pre-video interest, $r(134) = .39$, $p < .001$, interest during the video, $r(135) = .32$, $p < .001$, and at follow-up, $r(114) = .30$, $p < .001$.

The REI Need for Closure subscale scores were associated with greater interest at all three time points as well: before the video, $r(134) = .29$, $p < .001$, during the video, $r(135) = .23$, $p = .01$, and at follow-up, $r(114) = .28$, $p = .002$. Video quality was not related with pre-video interest ratings, but was significantly associated with during-video interest, $r(135) = .37$, $p < .001$, and interest at follow-up, $r(114) = .34$, $p < .001$.

Occupational Engagement Scale scores were significantly related to a number of covariates, including mood, $r(136) = .23$, $p < .01$, and REI-NFC, $r(136) = .27$, $p < .001$. OES scores were also found to be significantly associated with interest levels before the video, $r(135) = .27$, $p < .001$, during the video, $r(136) = .31$, $p < .001$, and at follow-up, $r(115) = .32$, $p < .001$.

Finally, it is important to note that there were significant correlations between interest levels at the three time points. Pre-video interest levels are significantly related to during video interest scores $r(135) = .30$, $p < .001$, and those at follow-up, $r(114) = .39$, $p < .001$. During-video interest level was very highly correlated with reported interest at follow-up, $r(115) = .93$, $p < .001$.

Hypothesis 1

Levels of occupational engagement, as measured by the OES-Student (Cox, 2008), will be positively correlated with choice quality, as measured by self-reported levels of interest during the video. Furthermore, this relationship is expected to be considerably more pronounced for the unconscious-intuitive group.

As reported above, a bivariate correlation between OES scores and during-video interest scores was significant, $r(134) = .31$, $p < .001$, when using the entire sample. To further explicate this finding, four partial bivariate correlations were conducted to examine the relationship between Occupational Engagement Scale (OES) scores and interest levels during the video. Each

analysis controlled for participant mood, REI-FI scores, REI-NFC scores, and video quality. After controlling for these factors, the correlation between OES scores and during-video interest for the entire sample remained significant, $r(109) = .26$, $p = .005$. This correlation was also significant when examining only the control group, $r(32) = .40$, $p = .02$. This correlation was not significant, however, for either the conscious-rational group, $r(33) = .23$, $p = .18$, or the unconscious-intuitive group, $r(32) = .16$, $p = .38$. This trend was also found when the variance associated with pre-video interest levels was partialled out: the control group displayed a significant correlation between OES scores and during video interest, $r(31) = .41$, $p = .02$; but this was not the case for the conscious-rational Group, $r(32) = .21$, $p = .22$, or the unconscious-intuitive group, $r(30) = .08$, $p = .69$.

Furthermore, when two week follow-up interest levels were subjected to correlations controlling participant mood, REI-FI scores, REI-NFC scores, and video quality, the identical trends emerge. Looking at all three groups together, there is a significant relationship to between participant OES score and interest level at the two-week follow-up, $r(109) = .22$, $p = .02$. This correlation was again significant for the control group, $r(32) = .37$, $p = .03$, but not for either the conscious-rational group, $r(33) = .22$, $p = .19$, or the unconscious-intuitive group, $r(32) = .06$, $p = .75$. This trend was also found when the variance associated with pre-video interest levels was partialled out: the control group displayed a significant correlation between OES scores and follow-up interest, $r(31) = .39$, $p = .03$; but this was not the case for the conscious-rational Group, $r(32) = .18$, $p = .31$, or the unconscious-intuitive group, $r(30) = .004$, $p = .98$.

These results offer general support to the idea that occupational engagement, as measured by the OES-Student, is related to better interest forecasting, as measured by interest in participant video of choice. Contrary to expectation, however, this association was significantly stronger for

the control group, and was weakest for the unconscious-intuitive group. See Table 6 for these correlations.

Interest Levels over Time

The remaining hypotheses regard mean interest levels of the three groups across the three time points of interest: before, during, and two-weeks following the video. These nine data points serve as the basis for the analyses testing Hypotheses 2 and 3, as well as the inferences that follow. The raw mean interest scores for the three groups will be presented, followed by those same scores adjusted for the covariates previously discussed.

Raw mean interest scores for the control group were: pre-video mean of 37.21 (SD = 8.82); during-video mean of 38.25 (SD = 12.06); and follow-up mean of 36.47 (SD = 12.77). Raw mean interest scores for the conscious-rational group were: pre-video mean of 39.36 (SD = 6.66); during-video mean of 41.05 (SD = 7.93); and follow-up mean of 39.54 (SD = 9.52). Raw mean interest scores for the unconscious-intuitive group were: pre-video mean of 38.62 (SD = 8.89); during-video mean of 41.86 (SD = 8.38); and follow-up mean of 41.27 (SD = 9.22). See Figure 2 for a graphic representation of these differences.

Raw means were then adjusted by controlling for the eight covariates thought to be meaningfully related to interest scores – mood, OES score, REI-NFC, NFC-FI, and video quality – creating estimated interest levels after removing of the statistical impact of these variables on interest scores. Adjusted mean interest scores for the control group were: pre-video adjusted mean of 37.70 (Standard Error of Estimate = 1.22); during-video adjusted mean of 38.91 (Standard Error = 1.37); and follow-up adjusted mean of 37.21 (Standard Error = 1.53). Adjusted mean interest scores for the conscious-rational group were: pre-video adjusted mean of 38.91 (Standard Error = 1.21); during-video adjusted mean of 40.70 (Standard Error = 1.35); and

follow-up adjusted mean of 39.14 (Standard Error = 1.51). Adjusted mean interest scores for the unconscious-intuitive group were: pre-video adjusted mean of 38.60 (Standard Error = 1.23); during-video adjusted mean of 41.57 (Standard Error = 1.38); and follow-up adjusted mean of 40.93 (Standard Error = 1.55). See Figure 3 for a graphic representation of these differences.

A 3 x 3 (group by time) repeated-measures analysis of covariance was conducted on this model, yielding a number of general conclusions regarding these data, which will be further discussed in the sections to follow. All of the following statistics required a Greenhouse-Geisser corrected degrees of freedom to compensate for a violation of the assumption of sphericity. First, a significant interaction between group and time did not appear, $F(2.46, 130.43) = .55$, $p = .61$; nor did a main effect for group, $F(2, 106) = 1.22$, $p = .30$. Finally, significant main effects did emerge for time, $F(1.23, 130.43) = 6.89$, $p = .006$, $\eta^2 = .06$.

Unfortunately, there are no accepted post-hoc procedures for repeated measures analyses of covariance (Keppel & Wickens, 2004). Figure 3 was therefore instrumental in guiding post-hoc analyses. In order to reduce the chances of a Type I error, follow-up tests were implemented parsimoniously; only as suggested by the data and required by the hypotheses.

Hypothesis 2

The unconscious-intuitive condition will, on average, choose videos that they find more interesting than the conscious-rational or control conditions, as measured by self-reported levels of interest during their videos.

This hypothesis was first tested by using an analysis of covariance to determine group mean differences in during-video interest scores after controlling for the effects of mood, OES score, REI-NFC and NFC-FI scores, and video quality. An omnibus analysis of variance found that during-video interest levels for the control group (M = 38.90, Standard Error of Estimate =

1.27), conscious-rational group (M = 40.92, Standard Error = 1.27), and unconscious-intuitive Group (M = 41.41, Standard Error = 1.22) were not significantly different, $F(2,128) = 1.11$, $p = .33$. This is essentially a test of the difference between groups at the "during-video" time interval in Figure 3. Although the omnibus test was not found to be significant, a visual inspection of this graphic revealed the greatest difference is between the control and UI groups. A direct comparison of the UI (M = 38.69, Standard Error = 1.37) and control groups (M = 41.10, Standard Error = 1.31), was not significant, $F(1, 85) = 1.60$, $p = .21$.

Following this test, pre-video levels of interest were added as an additional covariate. This addition did not drastically change either the significance of the omnibus test, $F(1,83) = 1.47$, $p = .23$, or the difference (2.30) between these the UI (M = 38.63, SD = 11.97) and control (M = 41.46, SD = 9.08) groups.

Although a cursory examination of the mean interest level for the different groups during the video indicates that an unconscious-intuitive strategy produced more effective results, the statistical analyses are inconclusive. An omnibus test of differences between groups did not yield significant results. It is common practice to halt further analysis after a nonsignificant omnibus test, but an additional test was conducted in order to see if there was a difference between the two most disparate groups: the control and UI conditions. This test was likewise nonsignificant. It can therefore be concluded that if significant differences between groups exist (as Figure 3 suggests), this study was unable to detect them. There is little definitive support for Hypothesis 2.

However, when examining Figure 3, it appears as though follow-up scores may display greater mean differences between groups than those reported during-video scores. The same process of analysis was also performed for the data at follow-up again controlling for the five covariates outlined previously. Once again, the omnibus analysis of variance between the control

group (M = 37.08, Standard Error = 1.52), CR group (M = 39.01, Standard Error = 1.51) and UI group (M = 40.91, Standard Error = 1.52) was not significant $F(2,107) = 1.58$, $p = .21$.

A univariate analysis of variance was used to compare the two most disparate groups, which was the control group (M = 36.91, Standard Error = 1.56) and the UI group (M = 40.57, Standard Error = 1.56). This test was found to approach significance, $F(1, 69) = 2.75$, $p = .10$, $\eta^2 = .04$.

Based on these analyses and contrary to Hypothesis 2, no significant differences between the UI and CR conditions emerged at either the during-video or follow-up time points. However, the difference between the adjusted mean UI group interest score and the control group adjusted mean interest score was the largest observed, and was found to approach significance at follow-up.

Hypothesis 3

Overall, the trends in mean scores across time between UI, CR, and control groups are expected to vary significantly.

This hypothesis was tested using a repeated measures analysis of covariance analyzing the different groups over time after controlling for mood, OES score, REI-NFC, NFC-FI, and video quality (see Figure 3). As previously mentioned, this did not produce the expected interaction effect, $F(2.46, 130.43) = .55$, $p = .61$. This suggests that, contrary to Hypothesis 3, the three groups performed in similar patterns across time. However, a main effect did emerge for time, $F(1.23, 130.43) = 6.89$, $p = .006$, $\eta^2 = .06$. Upon inspection of the means associated with the three time periods, pre-video (M = 38.40, Standard Error = .70), during-video (M = 40.39, Standard Error = .78), and follow-up (M = 39.10, Standard Error = .88), a distinct inverted “V” pattern emerged. An initial Least Significant Differences post-hoc test indicated that the increase

(1.97) from pre-video to during-video interest levels are significant (p = .03), and the decrease (-1.3) from during-video interest to post-video interest is likewise significant (p = .001).

Based on Figure 3, it appears that both the control and CR groups display a similar pattern: pre-video adjusted mean interest scores appear to be very similar to follow-up post-video adjusted mean interest scores, while the during-video interest scores appear significantly greater. This pattern is much less distinct for the UI group.

These observations were explored through a set of focused repeated measures analyses of covariance in order to determine how participant two-week follow-up interest levels relate to those observed during and before the video. Each group was analyzed using an omnibus analysis of covariance, followed by direct comparisons of the relationship between both follow-up scores and during-video scores, and follow-up scores and pre-video interest scores. Based on the evidence thus far presented, it appears that there is little evidence for Hypothesis 3 as previously outlined. There is reason to believe, though, that two-week follow-up scores for the UI group may break a pattern established by both the control and CR groups. That is, it appears that control and CR group follow-up scores are almost identical to their pre-interest scores, whereas the UI group follow-up scores are almost identical to their during-video interest levels.

The Control Group (N = 38). Using a repeated measures analysis of covariance controlling for the five covariates, the difference between adjusted mean pre-video interest scores (M = 37.21, Standard Error = 1.35) and adjusted mean follow-up scores (M = 36.47, Standard Error = 1.74) was not found to be significant $F(1, 32) = .68$, $p = .68$, for the control group. However, there was a significant overall decline from the mean during-video interest score (M = 38.25, Standard Error = 1.66) and that at follow-up (M = 36.47, Standard Error = 1.74), $F(1, 32) = 5.57$, $p = .02$, $\eta^2 = .15$. This analysis reveals that the control group displays the

same inverted "V" pattern as the overall sample. This pattern suggests that, for the control group, recollections of interest after two weeks were statistically indistinguishable from pre-video interest scores, and significantly lower than they reported during the video itself.

The Conscious-Rational Group (N = 39). Using the same statistical procedure, the difference between adjusted mean pre-video interest scores (M = 39.36, Standard Error = .92) and adjusted mean follow-up scores (M = 39.54, Standard Error = 1.43) was not found to be significant for the CR group, $F(1, 33) = .13$, $p = .91$. However, there was a significant overall decline from the mean during-video interest score (M = 41.05, Standard Error = 1.12) and that at follow-up (M = 39.54, Standard Error = 1.43), $F(1, 33) = 6.39$, $p = .02$, $\eta^2 = .16$. This analysis revealed that the CR group displays the same inverted "V" pattern as the control group and overall sample. This pattern suggests that, for the CR group (like the control group), recollections of interest after two weeks was statistically indistinguishable from pre-video interest scores and significantly lower than they reported during the video itself.

The Unconscious-Intuitive Group (N = 37). Again using the same statistical procedure, it was found that the difference between adjusted mean pre-video interest scores (M = 38.62, Standard Error = 1.39) and adjusted mean follow-up scores (M = 41.27, Standard Error = 1.38) was found to approach significance for the UI group, $F(1, 31) = 2.89$, $p = .10$, $\eta^2 = .09$. There was no significant overall decline from the mean during-video interest score (M = 41.86, Standard Error = 1.27) and that at follow-up (M = 41.27, Standard Error = 1.38), $F(1, 31) = .99$, $p = .33$. This pattern of significance is opposite of that displayed by the control and CR groups. For the UI group, recollection of interest after two weeks was statistically indistinguishable from during-video interest scores and significantly greater than expected interest levels reported before the video.

These results, although clearly different from the exact predictions of Hypothesis 3, represent marked trends across time. When reflecting on their experience, participants from the control and CR conditions rated their interest level as essentially identical to what they had predicted it would be *before* the video began and significantly different from what it was *during* the video. In short, results indicate that after two weeks the participants in these groups recalled their *expectation*, not their *experience*. Participants from the UI group showed the opposite pattern. When reflecting on their experience, participants from the UI condition rated their interest level as essentially identical to what they reported during the video, and greater than they had expected. After two weeks, the UI group recalled their *experience*, not simply their *expectation*.

Behavioral Indicators of Interest

Several questions were included with the two-week follow-up to determine the degree to which participants reported increased private (e.g., thinking about) and public (e.g., discussions, internet searches) behaviors as a result of having encountered the content of their video. There were no hypotheses formulated regarding these behavioral measures of interest. Preliminary omnibus analyses of variance were conducted to determine if the groups differed based on the reported levels of these behaviors. None of these analyses indicated significant differences between groups for any of these constructs. See Table 7 for descriptions, means and standard deviations for these variables.

CHAPTER V

Discussion

This chapter is a discussion of the findings gleaned from this study. A short overview is presented before a contextualization of the methods employed by this study. Results of the hypothesis testing are summarized and considered in light of hypotheses and previous research. This is followed by a general discussion that represents a synthesis of the conclusions in order to address the research questions guiding this study. Implications for practice, limitations of this study and future directions are then offered.

Overview

The structure of this experiment simulated common decision-making situations. Three different conditions were created in order to manipulate how participants processed information preceding a decision. Regardless of condition, each participant reached the same decision point. They were all presented identical "decision pages" (see Appendix G) with identical choices, identical descriptions of those choices, and identical instructions. How participants interacted with these descriptions *before* committing to a decision constituted the only difference between groups. By assessing interest levels as an outcome variable across time, the results of this study yielded some insight into how different information processing strategies affect the subjective quality of decisions.

The current project introduces a new term, "interest forecasting." This term symbolizes the merger between the highly practical realm of vocational psychology and the highly experimental realm of social psychology. The first half of the term, "interest" denotes the tradition and importance of interest assessment in vocational psychology. The second half of the term "forecasting" denotes the recent decision-making literature spun from cognitive and social

psychology experiments and theory. Interest forecasts are hypothesized to function like any affective forecast, which are predictions about the emotional consequences of making a particular choice (i.e., Gilbert & Wilson, 2000). Traditional career assessments, such as the Strong Interest Inventory (Donnay & Borgen, 1996) and the Self-Directed Search (Holland, 1978) implicitly rely on such forecasts. The optimization of these forecasts is of paramount importance to the field of vocational psychology.

Experimental Conditions

Participants in the control condition simply chose between video options. In this condition, participants were not forced to interact with the material in any meaningful or structured way. This was the most transparent of the conditions, and participants were free to use any decisional strategy they would like. There was no experimental manipulation other than the response demands of the experiment.

Participants in the conscious-rational condition were asked to carefully and thoughtfully fill out a short interest inventory to help guide their selection. They attached numbers to their interest level regarding each description in a highly reductionistic, rational approach. In terms of the dual-processing literature reviewed previously, these procedures hyperactivated participants' System 2 (Kahneman, 2003). This aspect of the study simulated interest inventories commonly in use by career counselors.

Participants in the unconscious-intuitive condition were exposed to the descriptions and precluded from conscious interaction with the data. The manipulation in this condition drew inspiration from two theories. First, Unconscious Thought Theory (Dijksterhuis & Nordgren, 2006) has suggested that supplying time between stimulus and decision is a more effective decisional strategy, *as long as the time is not spent in conscious deliberation*. Second, both

Krieshok et al.'s (2009) Trilateral Model and Reyna and Brainerd's (1995) Fuzzy Trace Theory assert that becoming immersed in stimuli related to a decision - not simply thinking about it - creates an intuitive fund of experiential knowledge, which results in affect-laden gists of work environments. Though this was not an expressed goal of the UI manipulation, affective gist formation through stimulus immersion was an ancillary effect of this methodology. This procedure activated System 1 (Kahneman, 2003), while precluding conscious thought (e.g., Dijksterhuis & Nordgren, 2006).

Elements of methodology, such as the distracter task and graphic rating scale assessments that pertain to Unconscious Thought Theory were drawn from procedures employed with success by Dijksterhuis and van Olden (2006). The results of this line of research have been discussed in depth in the previous review of literature. The authors framed their findings, an in-part replication of the Wilson et al. (1993) "poster study," within the larger decision-making literature in the following way:

> "The experiment extends earlier work by Dijksterhuis (2004; see also Dijksterhuis and Nordgren, in press) in two important ways: First, quality of decision was operationalized subjectively rather than normatively, and second, participants chose something real. Having people choose among hypothetical objects is one thing, but having people choose among actual objects and then having their post-choice satisfaction affected by how they arrived at their choices in the first place is more intriguing. The current findings make our earlier conclusion that unconscious thought can lead to superior decisions much more ecologically valid and practically relevant" (p. 631).

The current research likewise used subjective measures of decision quality, and participants also chose something real. Instead of choosing between actual *objects*, however, participants in this study chose between actual *experiences*. Furthermore, in the study cited above, participants were asked to rate objects for desirability before being told they would receive them as a prize, making the judgment independent from perceived consequence. Participants in this study were precisely aware of what they were selecting and the ramifications of that decision, as the demand characteristics and experimental sequence were clearly defined (i.e., they were told "you will choose a video and then watch it"). Finally, the decision point was exactly the same for each participant. Each participant, regardless of condition, was free to use any decisional strategy they would like at the point of decision. But, participants were not free to choose the means by which they interacted with the stimuli (i.e., experimental manipulation) *before* the decision point.

This study retained the methodological improvements of the Dijksterhuis and van Olden (2006) study and created a more authentic decision-making context by increasing participant freedom and experiment transparency. Presentation of stimuli in brief, two-second intervals is methodologically unprecedented in the affective forecasting literature, but work regarding speed-based judgment tasks, such as the Implicit Association Test (Greenwald, McGhee & Schwartz, 1998), indicates that quickly processed information is indeed a meaningful assessment technique. Repeated exposure to a large amount of information processed on a nonconscious level was also intended to produce an immersive, experiential effect, functioning primarily on the high-bandwidth, affectively driven System 1. In this way, it was expected to function as a more richly engaging experience than simply deciding (the control condition) or consciously reasoning through a decision (the conscious-rational condition).

In summary, the methodology employed in this study has experimental and theoretical bases. The way "interest forecasts" have been defined and evaluated in the current study has two implications. First, it is an extension of the social and cognitive psychology literature regarding dual-processes into more practically significant territory. Likewise, it is a well-controlled, internally valid means of examining Anti-introspectivist Career Theory (Krieshok, 1998) and the role of occupational engagement as defined by the Trilateral Model (Krieshok et al., 2009).

Summary of the Findings

The results of each analysis will be discussed along with an analysis of how each deviated from expectation. Since this project was largely unprecedented and exploratory, many hypotheses were tentative and many of the findings were surprising. They have been interpreted based on the current data and in light of the available literature. An integration of the relevant conclusions will then be presented as a general discussion of findings.

Hypothesis 1. In general, it was hypothesized that engagement would be found to be related to the quality of occupational decision-making. It was expected to be positively correlated to decision quality, and this was expected to be especially pronounced in the unconscious-intuitive condition.

In support of the first hypothesis, Occupational Engagement Scale (OES) scores were found to be related to reported interest levels during the videos they chose. There are a number of possible explanations for this finding. First, it is possible that the OES measures not just a personal history with occupational engagement activities, but a trait propensity to find activities interesting, or a general propensity toward positive affective states. This underlying quality could potentially account for this relationship. Based on an examination of each group independently, however, it appears that the majority of the power behind this association is drawn from the

control group. In fact, the control group was the only one that displayed a significant relationship between OES scores and during-video interest levels. If high occupational engagement scores represent a latent variable that makes it more likely a participant will find any video interesting, it would be expected that the relationship would be observed across all groups.

The relationship between the two variables most likely represents, as operationalized, an association between past engagement behaviors and choice quality, as participants were specifically tasked with choosing the video they would find most interesting. Under this interpretation, it can be stated that increased engagement behaviors are related to better interest forecasts. There is, of course, no way to determine the directionality of a correlation. This relationship is likely to be reciprocal: greater engagement leads to better choices, which leads to greater interest in the selected choices, which in turn inspires more engagement behavior. In general, it can be concluded that greater engagement behaviors, as measured by the OES, are related to better occupational/educational interest forecasts.

It was surprising to find that this relationship only exists for the control group. This finding appears to be robust for a number of reasons. First, the partial correlation accounted for a number of variables that could confound the relationship. Second, the same pattern of findings (i.e., the control group showed a relationship while the others did not) existed after accounting for pre-video interest levels. Finally, the same pattern emerged at follow-up. All evidence suggests that when individuals are left to their own devices, a medium strength, positive relationship exists between occupational engagement and occupational choice quality.

It would be difficult to conclude that some aspect of the control condition elicited, manufactured or amplified this relationship, as there was no manipulation. It is more likely that some element of the conscious-rational and unconscious-intuitive conditions muted it.

Attempting to answer why this has been observed is speculative at this point. It is possible that previous engagement activities are especially informative for usual decisional strategies of the individual, and inducing unconscious-intuitive or conscious-rational strategies pushed deciders off of their usual decision-making approach. The two experimental conditions induced different kinds of thought (conscious and unconscious) through structured interaction with the stimuli. This structured, thoughtful interaction with the material resulted in less of a need to rely on engagement to make good decisions. Engagement seems to be especially beneficial in situations where the demands of the decision constrain or preclude structure or robust conscious or unconscious thought. That is, if individuals are not forced to interact with decision relevant stimuli under ambiguous circumstances (both experimental conditions were forced to interact with the material before selecting the chosen video), they will revert to the use of simple heuristics, as research indicates this is the easiest and most commonly used decision strategy (Kahneman & Tversky, 1996). Under such circumstances, it appears that previous engagement activities will be associated with better occupational/educational decisions. This raises the distinct possibility that occupational engagement streamlines the heuristics used for interest forecasts.

Hypothesis 2. The second hypothesis sought to determine if decisional strategy significantly affected the quality of interest forecasts. It was expected that the unconscious-intuitive condition would produce better decisions than the conscious-rational condition. During-video interest levels were considered to be the best operationalization of decision quality, when other contextual and characterological factors were controlled.

At its core, this inquiry was intended to answer the question, “Which group chose the best?” The means of the three groups indicated that the UI condition produced the most effective

decisions, followed by the CR condition, and then the control condition. Despite trends in that direction, there was little support for significant distinction between groups based on the during-video interest levels. When statistically controlling for pre-video interest levels, the magnitude of the difference between groups did not change significantly: the UI group outperformed the CR group, which outperformed the control group; although the differences did not reach significance. A visual inspection of group performance over time (Figure 3), reveals these trends, and suggests that group differences became amplified at follow-up. This appeared to be the case, as the difference between UI and control group interest levels at follow-up were found to approach significance.

Mean group interest scores over time seem to establish a pattern, but the power of the current analyses does not appear adequate to establish statistical significance. Previous studies (e.g., Dijksterhuis & van Olden, 2006; Wilson & Schooler, 1991) were able to find significant differences with sample sizes of this size or smaller. These studies however, were more carefully controlled. The current study sacrificed some experimental control and power in order to increase ecological validity and generalizability. Subtle trends emerged, but the magnitude of these trends was not sufficient to determine statistical significance. No substantial differences were observed at the pre-video time-point. Clear stratification appeared at the during-video time point, and this distinction increased at follow-up. The apparent reliability of group differences from during the video to follow-up suggests that these group differences may be small but stable.

So, the answer to the question, “Which group chose best?” is inconclusive. While watching the video, there appeared to be little difference between interest levels between groups. At follow-up, however, there is some support for the contention that an unconscious-intuitive strategy is superior to the unstructured control condition. Forcing individuals to nonconsciously

engage with decision-salient stimuli appears to be somewhat helpful, even if that interaction is fleeting. This test offers tentative evidence that there are systematic differences between decisional strategies on interest forecasts, and that those made under unconscious-intuitive conditions will result in higher quality decisions, especially when compared to control conditions.

Hypothesis 3. In many ways, this was the most telling examination of the data, as it considers the interest levels of all groups across time. A significant interaction was expected, with distinctive patterns of response for each group. It was suspected that follow-up interest levels would return to pre-video interest levels, since individuals have a tendency to remember events as they *expected* to experience them, instead of how they *actually* experienced them (Wilson, 2002).

No interaction was found, as all three groups had similar patterns of response over time, but a main effect emerged for time. The overall sample showed an inverted "v" pattern of interest over time. Participants seemed to be pleasantly surprised by their videos, as they were more interested during the video than they expected they would be. When asked two weeks later, however, they reported interest levels indistinguishable from their pre-video expectation, and significantly below that which they reported during their video. An identical pattern of response was also found for the control and conscious-rational groups. This data supports a remarkable conclusion: after two weeks, participants in the CR and control groups more closely recalled their *expectation* of the video, not their *experience* of it.

Participants in the unconscious-intuitive group were likewise pleasantly surprised by how interested they were during their video, as indicated by a dramatic increase from pre-video to during-video interest level. Unlike the other two groups, however, follow-up video scores decreased only slightly from during-video scores. In fact, follow-up interest scores were

statistically indistinguishable from during-video scores, and were considerably higher than their scores pre-video. This data supports a very different conclusion: after two weeks, participants in the unconscious-intuitive condition more closely recalled their *experience* of the video, not their *expectation* of it.

This raises the intriguing possibility that pre-decisional strategy may have downstream effects above and beyond simply influencing which option is chosen. In this case, the manner in which one contemplated an occupational/educational decision appears to have influenced how accurately one recalled internal states (i.e., interest levels) during an event. It is certain that decision-makers in the CR condition - and likely that those in the control condition - produced conscious, rational, logical reasons for their affective forecasts. Although this may not necessarily have resulted in significantly poorer choices (see discussion of Hypothesis 2), it seems to have resulted in significantly poorer recollections of those choices. When recalling the experience, the logic and reasoning leading up to the choice became an impediment, a distraction from the reminiscence of the experience of the event itself. In this case, participants were surprised about how much interest they had in the video, so the experience of the event was somewhat discrepant from their forecast.

Creating or deliberating about a logical set of reasons for how much or little something should interest you creates two separate and competing experiences: the creation of a prediction about an event and the event itself. When asked to evaluate an event, then, it places elements of System 2 (the logical, rational, symbolic self activated by the reasoned prediction) in direct opposition to elements of System 1 (the emotional, experiential self activated by the event itself). After two weeks, these rival experiences are likely to be easily confused. When the descriptions of the videos were re-presented and asked for single evaluation of the memory, the logic behind

the prediction can be easily recalled, as one's self-narrative and video descriptions have not changed. The interest eliciting aspects of the video - those characteristics that made the video surprisingly interesting - however, have not been re-presented, leaving these experiential memories dormant.

This finding is consistent with Epstein et al.'s (1999) assertion that "the experiential system operates in a context-specific manner," while "responses influenced by the rational system, which operates according to context-free, abstract principles, should be more cross-situationally consistent" (p. 393). The reasonable, rational, System 2 takes control and constructs the memory on the best available information and most logical narrative in order to construct how interested one logically *ought* to have been.

Those individuals in the unconscious-intuitive group do not have a well-formed rationale to compete with their experience. Instead, the UI condition created a vague, gist-level, affective response to each option, instead of discrete reasons for selecting an option. After two weeks, there were no (or at least fewer) reasons to interfere with the reconstruction of the affective gist. When faced with an evaluation of the experience, the descriptions of the video activated the unconscious-intuitive System 1, because the conscious-rational System 2 had no specific, logical reasons to use as fodder.

This interpretation is not without precedent. Research with Fuzzy Trace Theory (FTT; Reyna & Brainerd, 1995) indicates that information that is processed and gestated at the gist-level is more easily and accurately recalled than information processed on a specific, verbatim level (Reyna & Mills, 2007). FTT stipulates that gist-level experiences are more amenable to meaning-making than are verbatim data. In fact, relying on gists during the decision-making process is a hallmark of expertise (Reyna & Lloyd, 2006). In the current study, the UI group was

forced to form gist-level appraisals of the options through the stimulus immersion procedure (exposing participants to the descriptors for two seconds each), and prevented from conscious, verbatim processing through the anagram distracter task.

Placed within the context of FTT, this finding suggests that verbatim memories of the video event may have interfered with the complex meaning making and high-bandwidth nonconscious processing following the event. The UI condition forced individuals to act like experts by creating gists and precluding verbatim processing.

General Discussion

A general picture has emerged from the available data that speaks to the two research questions that base this experiment. The results are preliminary, and the interpretations offered are largely speculative. What follows is an attempt to draw general conclusions based on rough trends elicited from the analyses so that they can then be applied in the service of the goals of the study, which will be discussed in turn.

In commonly encountered, unstructured decision-making situations, previous engagement experiences seemed to matter. This is not to say, however, that these unstructured situations produced better decisions; they did not. In fact, there is some reason to believe that individuals in these situations chose more poorly than those who were forced to engage in either unconscious or conscious thought before deciding. Furthermore, these individuals are likely to misremember the event to be more like their expectation of it than the experience of it. Those who adopted a decision-as-usual strategy did not choose well, did not remember the event accurately, and relied on a catchall fund of engagement-related knowledge in order to make adaptive decisions.

In situations that provoke a reductionistic, conscious-rational decision-making process, previous levels of engagement behavior seem to matter less – although it was not entirely inconsequential. It is somewhat unclear how advantageous such a strategy is for choice quality, but it appears to inhibit accurate recall of the event. Again, it seems as though individuals who engage in this strategy remember not *what* they experienced, but what they *ought* to have experienced based on a logical analysis of available reasons. Those who adopted a conscious-rational decisional strategy chose fairly well but did not remember the event accurately. The structure of this condition rendered the positive effects of engagement fairly mute.

In situations that provoke a holistic, affective, unconscious-intuitive decision-making process, level of previous engagement did not seem to matter at all – the correlation of engagement with outcome variables was essentially zero. There is reason to believe that this strategy (i.e., stimulus immersion followed by nonconscious thought) is more effective than decisions-as-usual. Unlike the others, this strategy seemed to facilitate the accurate recall of events. Those who adopted an unconscious-intuitive decisional strategy chose somewhat better than the control group, remembered the event accurately, and did so regardless of previous level of engagement behaviors.

Based on this appraisal, some comments can address the first research question: How does occupational engagement influence decision quality? By examining these conclusions through the prism of the vocational decision-making literature, the current study can supply more specificity than the omnibus statement that previous engagement behaviors seem to relate to subjective decisional outcomes. It is striking that previous engagement behaviors were found to be helpful only for the control condition, which had the lowest interest profile across time. Producing an unconscious-intuitive decisional strategy was intended to activate the powerful

nonconscious System 1. By doing so, this procedure also mimicked a stimulus rich environment that is the hallmark of engagement. The Trilateral Model (Krieshok et al., 2009) suggests that a highly engaged decisional strategy will be maximally effective.

Krieshok, and colleagues (2009) define engagement as "taking part in decision making behaviors that contribute to the career decision-makers fund of information and experience of the larger world, not just the world as processed when a career decision is imminent" (p. 285). This "fund" serves as a base about general conditions that may lead to participant interest. Presumably, although unstated by the authors, this databank consists of rewards and punishments wrought by thousands of daily decisions. These findings suggest that, all things being equal, this fund of knowledge is a valuable asset - under usual conditions previous engagement behaviors were shown to relate to choice quality. Those with a diffuse base of knowledge about *how to choose in general,* and have rich experiences of themselves and the world were well served. The unconscious-intuitive condition, however, created immediate engagement regarding *this choice*. No matter how habitually engaged the individual, previous engagement experiences represent only a general education. For specific lessons, one must go and engage the world to inform this specific choice, examining these specific options. The UI condition forced individuals to do exactly this. Immediate engagement through stimulus immersion funded the unconscious-intuitive system, and this information was immediately useful for the novel situation at hand.

This interpretation of the findings is consistent with Krieshok et al.'s (2009) description of engagement as consisting of two components: enrichment and exploration. The authors conceptualized enrichment as a means of making "experientially informed decision making at many and various points in the future" (p. 286). This refers to the benefit of having knowledge base generated by engagement behaviors. The relationship between engagement and during-

video and follow-up interest scores both overall and for the control group are indicative of this function of engagement. Engagement, in this case, represented a trait-like repository of knowledge.

The second component, exploration, is conceptualized as the cyclical process of behaviors that lead to a career decision. This process was produced when the structure of conscious-rational and unconscious-intuitive conditions were imposed. This structure allowed the individual to interact more richly (especially in the UI condition) with the material related to this particular decision, and thus produce a (marginally) better decision over time. Engagement, in this case, represents a state-like behavioral inclination.

The second research question guiding this study addresses the profiles of interest scores over time. It is clear that the unconscious-intuitive and the conscious-rational conditions were more similar than expected, especially when examining interest levels at the during-video time point. The similar performance of the two may be a result of participants' failure to consciously deliberate while taking the video interest inventory that comprised the manipulation for conscious-rational condition. Participants may have responded quickly, without conscious thought, and based on "gut feelings." If this is the case, it would result in an information processing strategy similar to the unconscious-intuitive condition. This possibility will be discussed further in the limitations section to follow.

Regardless of how participants approached the conscious-rational condition, it did apply some structure to the decision, by creating equal weights for each of the descriptions. Unconscious Thought Theory dictates that dysfunctional weighting of attributes is a fundamental weakness of the conscious thought system, while unconscious thought supplies "natural" weights (Dijksterhuis & Nordgren, 2006). It is possible that the stratification of the results between

conditions observed represents this difference. The natural weights attached by the unconscious-intuitive system are slightly better to the flat weights applied by the structure of the conscious-rational condition inventory, which are slightly better than the poor weights attached by decisions-as-usual. Individuals may not decide as well when forced to define and weigh their own reasons for choosing or not choosing an option.

The two-week follow-up interest assessment represents a conscious recollection of participant experience of the video. The interest levels at this point can be viewed as an indicator of the meaning participants have made of their experience. As such, congruence between interest ratings at the time of experience and those at follow-up reveals that an experience has been successfully incorporated into consciously held self-schemas. Many dual-processing theories (Wilson, 2002; Gilbert, 2006) postulate strongly held theories of self are highly resistant to change, even in the face of repeated disconfirmatory experiences (e.g., Wilson, 2002).

Findings in this study are largely consistent with this conclusion. In this case, the fact that every group was pleasantly surprised by their interest levels during the video can be considered evidence that their experience of the event contrasted their expectation. Essentially, each group was more interested in the video than they thought they would be. However, individuals who actively contemplated how much they ought to have been interested given a rational (for the CR condition) or usual response set (control condition) displayed a significant disparity between their *experience* of the video and their *recollection* of it. Participants in these groups did not incorporate the new data - the surprising interest they had in their video - into their conscious self-schemas. Adopting an unconscious-intuitive decisional strategy appears to protect against disruptions in meaning making.

As individuals move through the world, they make conscious choices based on fundamental views of self. Humans strive for predictability, and that desire often begins with the belief that we are stable, consistent people (Eagleman, 2011). The tendency to remember one's past self as more similar to one's current self is called the "consistency bias" (see Ariely, 2008). This belief is both anxiety reducing and a natural by-product of our symbolic, essentialist nature (Bloom, 2010). Consistency in identity, however, may result in the unrealistic decoupling of one's unconscious personality, inclinations that are constantly changing based on feedback from the environment, and one's conscious personality, which is guided by our self-narrative (Wilson, 2002). Conscious decisions may not produce the affective responses one logically expects.

Having affective experiences, such as watching an interesting video, are valuable learning experiences and can aid in future occupational and educational choices. These findings suggest, however, those making conscious-rational and decisions-as-usual do not incorporate these types of experiences well. Instead, when choices are made after structured (e.g., the CR condition) or unstructured (e.g., the control condition) deliberation, individuals are likely to fall into the consistency bias, remembering an event as they would predict based on conscious self-knowledge. In essence, they construe the event as if it had never happened. They expect a certain level of interest based on a logical simulation, then experience an event that does not conform to that simulation. When recalling that event, the mentally re-simulate it using the same logic. This leads them to the same expectation they initially had.

This set of events, if accurate, represents a failure to incorporate new learning experiences into consciously held narratives and results in a static occupational and vocational identity. This information is very valuable to those interested in promoting vocational flexibility and adaptability. Stasis is diametrically opposed to adaptability. Adaptable workers are

constantly in flux, learning, shifting and changing to avail themselves of new opportunities and keep up with a changing workspace. Conscious-rational decisions seem to feed into a self-fulfilling prophecy and create a distorted, cyclical feedback loop. Engagement and affective-gist formation are potential keys to breaking this cycle.

Together, these findings reveal that occupational/educational choices should not be viewed as a single point of commitment, but only one small part of a larger process. The decider brings with them a fund of knowledge about themselves and the world as well as a characterological proclivity to engage (or not) with their environment. More importantly, however, positive effects seem to spring from a rich, immersive interaction with data informing *that particular decision*. This study provides foundational support for this contention: The manner in which individuals process relevant information *preceding* a decision will influence both the short- and long-term effects of that decision. This is valuable information for decision-makers of all stripes, but it is particularly imperative for those professionals tasked to help decision-makers optimize their choices, such as career counselors.

Implications for Practice

At the broadest level, the portrait painted by the general interpretation of the results supports the conclusion that vocational psychology would benefit from shifting into a post-rational account of human decision-making (Krieshok et al., 2011; Thaler & Sunstein, 2009). Such shifts have explicitly been identified in fields such as economics (Ariely, 2008), psychotherapy (Hastie & Dawes, 2010), philosophy (e.g., Fearn, 2001), and marketing (e.g., Lindstrom, 2010). Krieshok et al.'s (2009) Trilateral Model and Krieshok's (2001) Anti-Introspectivist approach represent theoretical steps in this direction. Based on these theories, several general recommendations for practice, such as increasing occupational engagement and

emphasizing motivational interventions, have been forwarded (e.g., Krieshok et al., 2011). The findings of this study offer experimental support for several specific, actionable suggestions for career counselors that are fully congruent with these recommendations.

First, decision-makers benefit from the knowledge base gained from experiential engagement. Active, reciprocal interactions with the environment vis-à-vis one's occupational and educational interests are associated with better choices. This should be viewed as a long-term, ongoing process. Fostering such behaviors is likely to be most efficient on an institutional level. Parents, teachers, administrators and managers can be educated as to the beneficial effects of environments designed to facilitate various modes of engagement, such as discussing interests, shadowing professionals, networking, and informational interviews. Structured environments that promote continued activities in such a vein will allow individuals to build a repository of self-referent educational/occupational knowledge. This database provides a foundation of knowledge useful in common, unstructured decisions.

It is important to note that not all engagement activities are equally informative. Those events that are emotionally immersive and highly interactive result in more information-rich experiences than those that are more one-dimensional, cognitive endeavors. The single best way to know if someone is interested by a task is to have them do that task. Mentally simulating events through deliberating or talking about it may be misleading, as our mental models of self and world may not be entirely accurate. Checking these predictions against bona fide experiences of the vocational or learning environment is necessary. Decision-makers should be taught, as a general rule, to trust experience over cognitions (Hayes et al., 1999).

The reality of career counseling, however, does not easily lend itself to drastic paradigm shifts. All things being equal, a career counselor may do little more than hope that their

counselee has built a fund of knowledge. Regardless of their level of previous engagement, though, the findings of this study suggest that applying an engagement-oriented protocol to the decision at hand can be extremely helpful. Weighty, difficult choices, such as those facing career counseling clients, are precisely those that are commonly believed to necessitate the long, conscious deliberation of available options (Klein, 2003). Traditionally recommended decision-making interventions, like creating a pros and cons list (i.e., Janis & Mann, 1977), imply that the hard work of choosing occurs *during* a decision. It is believed the difficulty lies in examining, comparing, and weighing options. In contrast, the results of this study suggest that the hard work of choosing occurs well *before* the decision. The difficulty lies in seeking out and immersing oneself in rich environments that will inform that decision. Mulling, introspecting and committing may not cut it. The most effective decisions occur only after throwing oneself into an experience. The point of commitment is not hard if you have gathered the appropriate information.

Career counselors are in a unique position to train deciders to become disciplined pre-decisional information gatherers. Students need to be motivated to entertain engagement as a viable option to commitment. This can be difficult, as engaging requires investment of time and energy, as well as psychological and social risks. While engaged, it is best for the client to forgo judgmental cognitions when possible. This strategy explicitly places unconscious, affective gist formation above conscious-rational deliberation. Mindfulness techniques have been designed to increase awareness of here-and-now experiences, and circumvent the natural inclination to categorize, reduce, symbolize, judge and foreclose (Hayes et al., 1999). Directly opposed to common career interventions, the findings of these studies suggest clients may have to work hard

to avoid making lists, direct comparisons, quantifications, and reasons they ought to like a particular activity.

These interventions may feel paradoxical. Clients are asked to be very behaviorally active while remaining judgmentally passive. This will almost certainly be accompanied by anxiety, because unlike interventions that rely on conscious, rational deliberation, clients do not have access to the unconscious fund of knowledge. Engagement behaviors that fund intuition are not amenable to relatable, identifiable milestones en route to making a decision. The counselor, in fact, may advocate actively reducing decision-making during the engagement phase of counseling. Failure to live with anxiety can result in premature foreclosure that is neither adaptive nor optimal. Krieshok (1998) notes that *being* undecided in not necessarily a bad thing, but it may *feel* that way.

These findings also suggest that traditional interest inventories may be helpful, as they may help individuals avoid mis-weighing attributes of the various options. However, when employed, care should be taken to ensure participants do not use a hyper-rational approach either to the test itself or to the options generated by the test. They should approach the test in a non-deliberative fashion. Then, if they engage with any of the proposed activities, they should not approach them with a desire to confirm or disconfirm the results of the test. This, however, may be difficult, as our conscious thoughts tend toward predecisional distortion (Carlson & Russo, 2001). These tests certainly have benefits, but they also seem to produce some unwanted and unhelpful effects on the decision-makers.

In a very general sense, clients may benefit from being reminded that the best and biggest decisions they have faced did not really feel like decisions at all. The path they selected was taken because it was simply and obviously the best for them. It may not have been the only

option, but a covert, nonconscious information processing mechanism produced a strong feeling of ‘knowing’ (e.g., Klein, 2003). Perhaps occupational and vocational decisions are much the same. We decide best only after we have had such rich interactions with the options that we simply ‘know’ without constructing reasons or rationales, which only end up getting in the way.

Limitations

There are a number of limitations to the current study. First, in general, tests of between group mean differences were not as persuasive as expected. Trends were observed, but group differences were not as definitive as has been found in previous studies with similar or smaller sample sizes (e.g., Dijksterhuis & van Olden, 2006; Wilson et al., 1993; Wilson & Schooler, 1991). As this study focused on the applicability of social psychological theory to vocational practice, matters of external validity were given some precedent over matters of internal validity. Potency of intervention and control were sacrificed in lieu of ecological legitimacy and generalizability.

Two aspects of methodology are prominent in this regard. First, although individuals were forced to interact with the material in a manner expected to produce a particular information processing strategy, there were no controls on the manner in which they interacted with the material upon reaching the decision page (Appendix G). At that point, those in the unconscious-intuitive condition could have adopted a very rational or decision-as-usual approach, or vice versa. Second, the manipulation within the current study was not especially potent. It consisted only of about five minutes of interaction with the material. Such a brief, one-time interaction may not have been potent enough, given the decisional freedom given to participants, to produce the desired information processing response sets.

In a similar vein, the event chosen by the participant was clearly of little consequence to their lives, as they were well informed the video would only last about fifteen minutes. Had the effects of the decision been long lasting and comprised repeated encounters, between group effects may have been more pronounced. Surely participants formed some level of interest or disinterest during their fifteen minute video, but this effect would have been compounded had it been a three hour college course. In other words, a boring fifteen minute video may be judged to be fairly uninteresting (i.e., a fairly poor choice), but a boring class three hours a week for a full semester would likely be judged as incredibly uninteresting (i.e., a very poor choice).

Another limitation springs from the challenges of operationalizing the theoretical arguments girding this study. One of the assumptions of this study is that conscious reports of interest in an event may be misleading (e.g., Krieshok, 1998). The dependent variables of interest in this study, however, were assessed in precisely such a fashion. Un-numbered bipolar graphic rating scales were used to reduce the potential for the quantifications and judgments that are hallmarks of conscious-rational thought. Nonetheless, it is possible that all of the dependent variables, regardless of group, may be considered conscious-rational appraisals of interest thereby confounding analyses based on this data. Some researchers have circumvented this problem by directly assessing brain scans (e.g., Lindstrom, 2010) or physiological stress reactions (e.g., Bechara et al., 1997). Given the covert nature of interest, there are few options other than some form of self-report. Further, the recollection of the event at the two-week follow-up may have been influenced by other factors, such as if the participant just took a test or was very hungry. Mood was not assessed or controlled for at the follow-up. These were mitigated where possible, but not eliminated by the methods of this study.

Although not a limitation, per se, another consideration is the representativeness of the current sample. The average Occupational Engagement Scale – Student scale score was significantly higher than the average obtained from the college population on which the instrument was normed. This indicates that this group had a higher than expected level of pre-existing engagement. Increased OES scores may be due to summer collection times. Students taking summer classes may be more willing to invest in their educational and occupational futures. As a group, the participants in the current study may have been better able to make occupational and vocational decisions. The possibility exists that better overall choices across all groups may have constricted group differences, and rendered the observation of group difference more difficult.

Finally, the most important limitation of this study remains a poorly formulated understanding of the manipulations involved. Dual-process models of human cognition are highly theoretical, and the problems associated with manipulating and measuring them remain ample. The methodology herein was cobbled together to create a standard manipulation that was expected to accomplish the induction of unconscious-intuitive and conscious-rational approaches.

The extent to which this was accomplished is somewhat unknown. For instance, it is expected that many participants did not attend to the material displayed in the unconscious-intuitive condition, and instead used a highly conscious-rational approach upon getting to the decision page. Likewise, it is possible that most of the participants in the conscious-rational condition did not adopt a hyper-rational, deliberative approach to the items of the interest inventory. The inventory may have, in fact, been completed very quickly, based on ‘gut-feelings’ and with little thought. Rapid responses and the structure added by the inventory may have actually reduced the use of the heuristics and biases that accompany conscious-rational decisions.

Such an interpretation would explain why the conscious-rational and unconscious-intuitive conditions performed so similarly, and the unstructured deliberation involved in the control condition performed considerably worse. In short, the state of the research is in an exploratory stage and there are no reliable ways of distinguishing conscious-rational and unconscious-intuitive approaches. There is some question as to whether the experimental conditions produced the desired information processing strategies, and this is especially true for the conscious-rational condition.

Future Directions

The current study has produced a starting point for future research. Primarily, this study needs to be replicated or augmented with more participants. A replication of the patterns found herein would lend credence to the interpretations of this study. Provided future studies support the general conclusions of this study, two future directions are possible. The first would be to increase the potency of the manipulation on the front end of an experiment of this type. The second would be to increase the consequences of the choice on the back end of such an experiment. Each of these will be discussed in turn.

First, by exercising experimenter control, more potent unconscious-intuitive and conscious-rational conditions may be created. For the unconscious-intuitive condition, pictures could be added to the background of the slides to which the UI condition participants were exposed. This would increase the richness of the stimuli and would theoretically aid in gist-level formations about the option. This would support the contention that the richness of an experience – the greater engagement of the unconscious-intuitive system – creates an environment more conducive to adaptive decision-making. For the conscious-rational condition, a more potent intervention could be accomplished by forcing participants to take more time and think

deliberately when taking the interest inventory. Also, this could be accomplished by eliminating the structure imposed by the conscious-rational inventory, and having participants create their own list of reasons to or not to choose a certain option. This may induce a "truer" conscious-rational decisional strategy than was displayed here.

The second modification to the current methodology would be to expand participant contact with the option they have chosen. In the current study, participants had only one fifteen minute interaction with the video they chose. When deciders choose courses, majors or jobs, however, they obviously have repeated, prolonged exposure to the events they have chosen. Replicating this aspect of decisions would be instructional, as the results of the current study indicate that effects (i.e., interest levels) of the decisional strategies become more disparate over time. Repeated exposure in the form of a series of lectures may exacerbate differences in outcomes. In addition, knowing that this would affect more than a single fifteen minute section of their lives may change the way participants approach the decision, especially in the control condition. Such a study would be more externally valid, as it better represents the high-stakes, long-term nature of most of the educational and occupational decisions faced by clients that arrive in career counseling.

Finally, it is interesting to consider the type of descriptions used to identify and contrast options. Different descriptions may inspire different forms of information processing. Vallacher and Wegner's (1987) theory of action identification supposes that individuals describe events differently based on a number of psychological variables. A soldier may describe combat as any of the following: "fighting for freedom," "defending a hill," and "firing a weapon." Some are more abstract and inspire affect (e.g., "fighting for freedom"), while others are very concrete and mechanical ("firing a weapon"). It would be interesting to determine how using level of action

identification as a variable would impact interest forecasts and the creation of unconscious-intuitive or conscious-rational information processing strategies. For instance, someone may be very interested in the medical field because it was described as "saving lives." The same person, however, may not be interested in job that involves "removing human organs."

It is likely that abstract descriptions, such as "saving lives" may activate the symbolic, narrative system. Participants may believe they ought to like such prompts based on how they view themselves. Concrete descriptions, such as "removing organs" may activate the more visceral, unconscious system. It would be fascinating to better understand how symbolic, long-term goals affect interest forecasting.

Conclusion

Each person is an expert in what they find interesting and what they do not. Everyone, especially by the time they get to college, has had ample chances to learn what kinds of activities bore them and which enthrall them. It is simply a matter of creating the conditions that, when faced with novel decisions, unlock this expertise.

It appears as though engagement activities preceding a decision are extremely valuable. Those that have occurred in the distant past create a helpful foundation when faced with similar scenarios. Those that occur within the context of this decision - the one facing the individual currently – are even more valuable, as they are specific to the context at hand.

Actually going out into the world and experiencing the options uses the rich, full self. Immersive experience activates both the unconscious and conscious systems. These experiences are extremely informative, and produce better results than simply mentally simulating an event. Furthermore, when we approach decisions this way, they have a tendency to "stick" better, and are less diluted or distorted by time.

References

Ariely, D. (2008). *Predictably irrational: Hidden forces that shape our decisions*. New York: HarperCollins.

Bargh, J. A. (2006). Agenda 2006: What have we been priming all these years? On the development, mechanisms, and ecology of nonconscious social behavior. *European Journal of Social Psychology, 36*, 147-168. doi: 10.1002/ejsp.336

Bargh, J. A., & Chartrand, T. L., (1999). The unbearable automaticity of being. *American Psychologist, 54*(7), 462-479. doi: 10.1037/002-3514.76.6.893

Barak, A. (2001). A cognitive view of the nature of vocational interests: Implications for career assessment, counseling, and research. In L. Frederick & A. Barak (Eds.), *Contemporary models in vocational psychology: A volume in honor of Samuel H. Osipow* (pp. 97-131). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Barnes-Holmes, D., Waldron, D., Barnes-Holmes Y., & Stewart, I. (2009). Testing the validity of the Implicit Relational Assessment Procedure and the Implicit Association Test: Measuring attitudes toward Dublin and country life in Ireland. *The Psychology Record, 59*(3), 389-406.

Bechara, A., Damasio, H., Tranell, D., & and Damasio A. R. (1997). Deciding advantageously before knowing the advantageous strategy. *Science, 275*, 1293-1296. doi: 10.1126/science.275.5304.1293

Bem, D. J. (1972). Self-perception theory. *Advances in Experimental Social Psychology, 6*, 1-62. Retrieved from: http://www.dbem.ws/SP%20Theory.pdf

Betsch, T., Plessner, H., Schwieren, C., & Gütig, R. (2001). I like it but I don't know why: A value-account approach to implicit attitude formation. *Personality and Social Psychology Bulletin, 27*(2), 242-253. doi: 10.1177/0146167201272009

Black, M. D. (2006). *Reason, intuition, and engagement: A trilateral model of adaptive career decision-making*. Unpublished doctoral dissertation, University of Kansas, Lawrence.

Bloom, P. (2010). *How pleasure works*. New York: W. W. Norton.

Blustein, D. L. (2006). *The psychology of working*. Mahwah, NJ: Lawrence Erlbaum.

Bolles, R. N. (2009). *What color is your parachute? A practical manual for job-hunters and career-changers*. Berekley, CA: Ten Speed.

Bradley, M. M., & Lang, P. J. (1999). *Affective norms for English words (ANEW): Stimuli, instruction manual and affective ratings*. Technical report C-1, Gainesville, FL. The Center for Research in Psychophysiology, University of Florida. Retrieved from http://www.uvm.edu/~pdodds/files/papers/others/1999/bradley1999a.pdf

Brainerd, C. J. & Reyna, V. F. (2007). Explaining developmental reversals in false memory. *Psychological Science, 18*(5), 442-448. doi: 10.1111/j.1467-9280.2007.01919.x

Brown, S. D. & Lent, R. W. (1996). A social cognitive framework for career choice counseling. *The Career Development Quarterly, 44*(4), 354-366.

Byrne, B. M. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (2nd ed.). New York: Routledge.

Carlson, K. A. & Russo, J. E. (2001). Biased interpretation of evidence by mock jurors. *Journal of Experimental Psychology: Applied, 7*(2), 91-103. doi: 10.1037/1076-898X.7.2.91

Cox, D. W. (2008). *Bringing vocational psychology into the 21st century: The operationalization of occupational engagement and initial validation of the Occupational Engagement Scale*

for College Students. Unpublished doctoral dissertation, University of Kansas, Lawrence, Kansas.

Dasgupta, A. G., & Greenwald, A. G. (2001). Exposure to admired group members reduces automatic intergroup bias. *Journal of Personality and Social Psychology, 81*, 800-814. doi: 10.1037/0022-3514.81.5.800

Dijksterhuis, A. (2004). Think different: The merits of unconscious thought in preference development and decision-making. *Journal of Personality and Social Psychology, 67*(5), 586-598. doi: 10.1037/0022-3514.87.5.586

Dijkersthuis, A., Bos, M. W., Nordgren, L. F., & van Baaren, R. B. (2006). On making the right choice: The deliberation-without-attention effect. *Science, 311*(5763), 1005-1007. doi: 10.1126/science.1121629

Dijksterhuis, A., Bos, M. W., van der Leij, A., & van Baaren R. B. (2009). Predicting soccer matches after unconscious and conscious thought as a function of expertise. *Psychological Science, 20*(11), 1381-1387. doi: 10.1111/j.1467-9280.2009.02451.x

Dijkersthuis, A., & Nordgren, L. F. (2006). A theory of unconscious thought. *Perspectives on Psychological Science, 2*(1), 95-109. doi: 10.1111/j.1745-6916.2006.00007.x

Dijksterhuis, A., & Smith, P. K. (2005). What do we do unconsciously? And how? *Journal of Consumer Psychology, 15*(3), 225-229. doi: 10.1207/s15327663jcp1503_7

Dijksterhuis, A., & van Olden, Z. (2006). On the benefits of thinking unconsciously: Unconscious thought can increase post-choice satisfaction. *Journal of Experimental Social Psychology, 42*(5), 627-631. doi: 10.1016/j.jesp.2005.10.008

Donnay, A. C., & Borgen, F. H. (1996). Validity, structure, and content of the 1994 Strong Interest Inventory. *Journal of Counseling Psychology, 43*(3), 275-291. doi: 10.1037/0022-0167.43.3.275

Dutton, D. G., & Aron, A. P. (1974). Some evidence for heightened sexual attraction under conditions of high anxiety. *Journal of Personality and Social Psychology, 30*(4), 510-517. doi: 10.1037/h0037031

Eagleman, D. (2011). *Incognito: The secret lives of the brain*. New York: Random House.

Ebberwein, C. A., Krieshok, T. S., Ulven, J. C., & Prosser, E. C. (2004). Voices in transition: Lessons on career adaptability. *The Career Development Quarterly, 52*(4), 292-308. Retrieved from http://web.ebscohost.com.www2.lib.ku.edu:2048/ehost/pdfviewer/pdfviewer?sid=73289867-35f8-4f62-a22a-7892fdc563a4%40sessionmgr11&vid=2&hid=9

Epstein, S. (1994). Integration of the cognitive and the psychodynamic unconscious. *American Psychologist, 49*(8), 709-724. doi: 10.1037/0003-066X.49.8.709

Epstein, S. (2003). Cognitive-experiential self-theory of personality. In T. Millon, & M. J. Lerner (Eds.), *Comprehensive handbook of psychology, Volume 5: Personality and social psychology* (pp. 159-184). Hoboken, NJ: Wiley & Sons.

Epstein, S., Pacini, R., Denes-Raj, V., & Heier, H. (1996). Individual differences in intuitive-experiential and analytical-rational thinking styles. *Journal of Personality and Social Psychology, 71*(2), 390-405. doi: 10.1037/0022-3514.71.2.390

Evans, B. T. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. *Annual Review of Psychology, 59*, 255-278. doi: 10.1146/annurev.psych.59.103006.093629

Fearn, N. (2001). *Zeno and the tortoise: How to think like a philosopher*. New York: Grove.

Flin, R., Slaven, G., & Stewart, K. (1996). Emergency decision making in the offshore oil and gas industry. *Human Factors, 38*(2), 262-277. doi: 10.1518/001872096779048110

Friedenberg, J., & Silverman, G. (2012). *Cognitive science: An introduction to the study of the mind* (2nd ed.). Thousand Oaks, CA: Sage.

Friedman, T. L. (2005). *The world is flat: A brief history of the 21st century*. New York: Farrar, Straus and Giroux.

Gati, I., Landman, S., Davidovitch, S., Asulin-Peretz, L., & Gadassi, R. (2010). From career decision-making styles to career decision-making profiles: A multidimensional approach. *Journal of Vocational Behavior, 76*, 277-291. doi: 10.1016/j.jvb.2009.11.001

Gergrinzer, G. (2007). *Gut feelings: The intelligence of the unconscious*. New York: Viking.

Gilbert, D. T. (2006). *Stumbling on happiness*. New York: Alfred A Knopf.

Gilbert, D. T., Gill, M. J., & Wilson, T. D. (2002). The future is now: Temporal correction in affective forecasting. *Organizational Behavior and Human Decision Processes, 88*(1), 430-444. doi: 10.1006/obhd.2001.2982

Gilbert, D. T., Krull, D. S., & Pelham, B. W. (1988). Of thoughts unspoken: Social inference and the self-regulation of behavior. *Journal of Personality and Social Psychology, 55*(5) 685-694. doi: 10.1037/0022-3514.55.5.685

Gilbert, D. T., Wilson, T. D., Pinel, E. C., Wilson, T. D., Blumberg, S. J., & Wheatley, T. P. (1998). Immune neglect: A source of durability bias in affective forecasting. *Journal of Personality and Social Psychology, 75*(3), 617-638. doi: 10.1037/0022-3514.75.3.617

Gilbert, D. T., & Wilson, T. D. (2000). Miswanting: Some problems in the forecasting of future affective states. In J. P. Forgas (Ed.), *Feeling and thinking: The role of affect in social cognition* (pp. 178-197). New York: Cambridge.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology, 74*(6), 1464-1480. doi: 10.1037/0022-3514.74.6.1464

Hallinan, J. T. (2009). *Why we make mistakes: How we look without seeing, forget things in seconds, and are pretty sure we are way above average*. Random House: New York.

Hansen, J. C. (2005). Assessment of interests. In S. D. Brown & R. W. Lent (Eds.), *Career development and counseling: Putting theory and research to work* (pp. 281-304). Hoboken, NJ: John Wiley & Sons.

Hastie, R. & Dawes, R. M. (2010). *Rational choice in an uncertain world: The psychology of judgment and decision making*. Thousand Oaks, CA: Sage.

Hauser, M. D. (2006). *Moral minds*. New York: HarperCollins.

Hayes, S. C., Strosahl, K., & Wilson, K. G. (1999). *Acceptance and Commitment Therapy: An experiential approach to behavior change*. New York: Guilford Press.

Herbert, W. (2010). *On second thought: Outsmarting your mind's hard-wired habits*. New York: Random House.

Holland, J. L. (1978). *Manual for the Vocational Preference Inventory*. Palo Alto, CA: Consulting Psychologists Press.

Holland, J. L., Sorensen, A. B., Clark, J. P., Nafziger, D. H., & Blum, Z. D. (1973). Applying an occupational classification to a representative sample of work histories. *Journal of Applied Psychology, 58*(1), 34-41. doi: 10.1037/h0035405

Iyengar, S. S., Wells, R. E., & Schwartz, B. (2006). Doing better but feeling worse: Looking for the "best" job undermines satisfaction. *Psychological Science, 17*(2), 143-150. doi: 10.1111/j.1467-9280.2006.01677.x

James, R. K. & Gilliland, B. E. (2003). Trait-factor counseling/person x environment fit [Supplemental material]. In R. K. James & B. E. Gilliland (Eds.), *Theories and strategies in counseling and psychotherapy* (5th ed.). Boston: Allyn and Bacon. Retrieved from: http://wps.ablongman.com/wps/media/objects/208/213944/trait.pdf

Janis, I., & Mann, L. (1977). *Decision making: A psychological analysis of conflict, choice, and commitment.* New York: Free Press.

Jonides, J., Schumacher, E. H., Smith, E. E., Lauber, E. J., Awh, E., & Minoshima, S. et al. (1997). Verbal working memory load affects regional brain activation as measured by PET. *Journal of Cognitive Neuroscience, 9*(4), 462-475. doi: 10.1162/jocn.1997.9.4.462

Kaempf, G. L., Klein, G., Thordsen, M. L., & Wolf, S. (1996). *Decision making in complex naval command-and-control environments. Human Factors, 38*(2), 220-231. doi: 10.1518/001872096779047986

Kahneman, D. (2003). A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist, 58*(9), 697-720. doi: 10.1037/0003-066X.58.9.697

Kahneman, D., & Klein, G. (2009). Conditions for intuitive expertise: A failure to disagree. *American Psychologist, 64*(6), 515-526. doi: 10.1037/a0016755

Kahneman, D., & Tversky, A. (1996). On the reality of cognitive illusions. *Psychological Review, 103*(3), 582-591. doi: 10.1037/0033-295X.103.3.582

Keppel G., & Wickens, T. D. (2004). *Design and analysis: A researcher's handbook* (4th ed.). Upper Saddle River, NJ: Pearson.

Klein, G. A., Calderwood, R., & Clinton-Cirocco, A. (1986). Rapid decision making on the fire ground. *Human Factors and Ergonomics Society Annual Meeting Proceedings, 30*(6), 576-580. doi: 10.1518/155534310X12844000801203

Klein, G. A. (1989). Recognition-primed decisions. In W. B. Rouse (Ed.), *Advances in man-machine systems research* (pp. 47-92). Greenwich, CT: JAI Press.

Klein, G. A., Calderwood, R., & MacGregor, D. (1989). Critical decision method for eliciting knowledge. *IEEE Transactions on Systems, Man and Cybernetics, 19*(3), 462-472. doi: 10.1109/21.31053.

Klein, G. A. (1993). A recognition-primed decision (RPD) model of rapid decision making. In G. A. Klein, J. Orasanu, R. Calderwood, & C. E. Zsambok, & E. Caroline (Eds.), *Decision Making in Action: Models and Methods* (pp. 138-147). Westport, CT: Ablex.

Klein, G. A. (2000). Analysis of situation awareness from critical incident reports. In M. R. Endsley & D. J. Garland (Eds.), *Situation Awareness Analysis and Measurement* (pp. 51-71). Mahwah, NJ: Lawrence Erlbaum.

Klein, G. A. (2003). *The power of intuition: How to use your feelings to make better decision at work*. New York: Random House.

Klein, G. A. (2009). *Streetlights and shadows: Searching for the keys to adaptive decision making*. Cambridge, MA: MIT.

Koriat, A. (2000). The feeling of knowing: Some metatheoretical implications for consciousness and control. *Consciousness and Cognition, 9,* 149–171. doi: 10.1006/ccog.2000.0433

Krane, N. E. R., & Tirre, W. C. (2006). Ability assessment in career counseling. In S. D. Brown & R. W. Lent (Eds.), *Career development and counseling: Putting theory and research to work* (pp. 330-352). Hoboken, NJ: John Wiley & Sons.

Krieshok, T. S. (1998). An anti-introspectivist view of career decision-making. *The Career Development Quarterly, 46*(3), 210-228.

Krieshok, T. S. (2001). How the decision-making literature might inform career center practice. *Journal of Career Development, 27*(3), 207-216. doi: 10.1023/A:1007839110404

Krieshok, T. S., Black M. D., & McKay, R. A. (2009). Career decision-making: The limits of rationality and the abundance of non-conscious processes. *Journal of Vocational Behavior, 75*(3), 275-290. doi: 10.1016/j.jvb.2009.04.006

Krieshok, T. S., Motl, T. C., & Rutt, B. T. (2011). The evolution of vocational psychology: Questions for a postmodern applied discipline. *Journal of Career Assessment, 19*(3), 228-239.

Krumboltz, J. D. (2009). The happenstance learning theory. *Journal of Career Assessment, 17*(2), 135-154. doi: 10.1177/1069072708328861

Kurtz, J. L., Wilson, T. D., & Gilbert, D. T. (2007). Quantity versus uncertainty: When winning one prize is better than winning two. *Journal of Experimental Social Psychology, 43*(6), 979-985. doi: 10.1016/j.jesp.2006.10.020

Lehrer, J. (2009). *How we decide*. New York: Houghton Mifflin Harcourt.

Levine G. M., Halberstadt, J. B., & Goldstone, R. L. (1996). Reasoning and the weighting of attributes in attitude judgments. *Journal of Personality and Social Psychology, 70*(2), 230-240. doi: 10.1037/0022-3514.70.2.230

Lewicki, P., Hill, T., & Bizot, E. (1988). Acquisition of procedural knowledge about a pattern of stimuli that cannot be articulated. *Cognitive Psychology, 20*(1), 24-37. doi: 10.1016/0010-0285(88)90023-0

Lipshitz, R., Klein, G., Orasanu, J., & Salas, E. (2001). Taking stock of naturalistic decision making. *Journal of Behavioral Decision Making, 14*(5), 331-352. doi: 10.1002/bdm.381

Lindstrom, M. (2010). *Buyology: Truth and lies about what we buy*. New York: Random House.

McKay, R. A. (2008). *The Occupational Engagement Scale for Creative Students: Initial validation and development*. Unpublished doctoral dissertation, University of Kansas, Lawrence, Kansas. Retrieved from: http://proquest.umi.com.www2.lib.ku.edu:2048/pqdlink?Ver=1&Exp=10-03-2016&FMT=7&DID=1550971611&RQT=309&attempt=1

Melchior, L. A., & Cheek, J. M. (1990). Shyness and anxious self-preoccupation during a social interaction. *Journal of Social Behavior & Personality, 5*(2), 117-130.

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. doi: 10.1037/h0043158

Miller, A. S., & Kanazawa, S. (2008). *Why beautiful people have more daughters: From dating, shopping and praying to going to war and becoming a billionaire – two evolutionary psychologists explain why we do what we do*. New York: Perigree.

Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review, 84*(3), 231-259. doi: 10.1037/0033-295X.84.3.231

Norretranders, T. (1997). *The user illusion: Cutting consciousness down to size*. New York: Penguin.

Pacini, R., & Epstein, S. (1999). The relation of rational and experiential information processing styles to personality, basic beliefs, and the ratio-bias phenomenon. *Journal of Personality and Social Psychology, 76*(6), 972-987. doi: 10.1037/0022-3514.76.6.972

Parsons, F. (1909). *Choosing a vocation*. Boston: Houghton Mifflin.

Patrick, V. M., Macinnis, D. J., & Park, C. W. (2007). Not as happy as I thought I'd be? Affective misforecasting and product evaluations. *Journal of Consumer Research, 33*(4), 479-489. doi: 10.1086/510221

Phillips, S. D. (1997). Toward an expanded definition of adaptive decision making. *The Career Development Quarterly, 45*(3), 275-287.

Pretz, J. E., & Totz, K. S. (2007). Measuring individual differences in affective, heuristic, and holistic intuition. *Personality and Individual Differences, 43*(5), 1247-1257. doi: 10.1016/j.paid.2007.03.015

Price, M. C., & Norman E. (2008). Intuitive decisions on the fringes of consciousness: Are they conscious and does it matter? *Judgment and Decision-making, 3*(1), 28–41.

Reyna, V. F. (2004). How people make decision that involve risk: A dual-processes approach. *Current Directions in Psychological Science, 13*(2), 60-66. doi: 10.1111/j.0963-7214.2004.00275.x

Reyna, V. F. (2008). A theory of medical decision making and health: Fuzzy trace theory. *Medical Decision Making, 28*(6), 850-855. doi: 10.1177/0272989X08327066

Reyna, V. F., & Brainerd, C. J. (1995). Fuzzy-trace theory: Some foundational issues. *Learning and Individual Differences, 7*(2), 145-162. doi: 10.1016/1041-6080(95)90028-4

Reyna, V. F., & Brainerd, C. J. (2008). Numeracy, ration bias, and denominator neglect in judgments of risk and probability. *Learning and Individual Differences, 18*(1), 89-107. doi: 10.1016/j.lindif.2007.03.011

Reyna, V. F., Brainerd, C. J., Howe, M. L., & Keversham, J. (1991). Fuzzy-trace theory and cognitive triage in memory development. *Developmental Psychology, 27*(3), 351-369. doi: 10.1037/0012-1649.27.3.351

Reyna, V. F., & Ellis, S. C. (1994). Fuzzy-trace theory and framing effects in children's risky decision making. *Psychological Science, 5*(5), 275-279. doi: 10.1111/j.1467-9280.1994.tb00625.x

Reyna V. F., & Lloyd, F. (2006). Physician decision making and cardiac risk: Effects of knowledge, risk perception, risk tolerance and fuzzy processing. *Journal of Experimental Psychology: Applied, 12*(3), 179-195. doi: 10.1037/1076-898X.12.3.179

Reyna, V. F., & Mills, B. (2007). Converging evidence supports fuzzy-trace theory's nested sets hypothesis, but not the frequency hypothesis. *Behavioral and Brain Sciences, 30*(3), 278-280. doi: 10.1017/S0140525X07001872

Rounds, J. B., & Armstrong, P. I. (2006). Assessment of needs and values. In S. D. Brown & R. W. Lent (Eds.) *Career development and counseling: Putting theory and research to work* (pp. 305-329). Hoboken, NJ: John Wiley & Sons.

Savickas, M. L. (1997). Career adaptability: An integrative construct for life-span, life-space theory. *The Career Development Quarterly, 45*(3), 247-259.

Savickas, M. L. (2000). Renovating the psychology of careers for the twenty-first century. In A Collin & R.A. Young (Eds.), *The future of career* (pp. 52-68). New York: Cambridge.

Schwartz, B. (2004). *The paradox of choice*. New York: HarperCollins.

Shiv, B., & Fedorikhin, A. (1999). The interplay of affect and cognition in consumer decision making. *The Journal of Consumer Research, 26*(3), 278-292. doi: 10.1086/209563

Simon, H. (1955). A behavioral model of rational choice. *The Quarterly Journal of Economics, 69*(1), 99-118. doi: 10.2307/1884852

Simon, H. (1990). Invariants of human behavior. *Annual Review of Psychology, 41*, 1-19. doi: 10.1146/annurev.ps.41.020190.000245

Sloman, S. A. (2002). Two systems of reasoning. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 379-396). New York: Cambridge.

Spokane, A. R., & Cruza-Guet, M. C., (2005). Holland's theory of vocational personalities in work environments. In S. D. Brown & R. W. Lent (Eds.) *Career development and counseling: Putting theory and research to work* (pp. 24-41). Hoboken, NJ: John Wiley & Sons.

Stanovich, K. E., & West, R. F. (2000). Individual differences in reasoning: Implications for the rationality debate. *Behavior and Brain Science, 23*, 645-655. doi: 10.1017/S0140525X00003435

Super, D. E. (1980). A life-span, life-space approach to career development. *Journal of Vocational Behaviour, 16*, 282-298.

Super, D., & Knasel, E. G. (1981). Career development in adulthood: Some theoretical problems and a possible solution. *British Journal of Guidance & Counseling, 9*(2), 194-201. doi: 10.1080/03069888100760211

Thaler, R. H., & Sunstein, C. R. (2009). *Nudge: Improving decision about health, wealth, and happiness*. New York: Penguin.

Tononi, G. (2004). An information integration theory of consciousness. *BMC Neuroscience, 42*(5), 1-22. doi: 10.1186/1471-2202-5-42

Tversky, A. (1972). Elimination by aspects: A theory of choice. *Psychological Review, 79*(4), 281-299. doi: 10.1037/h0032955

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science, 185*(4157), 1124-1131. doi: 10.1126/science.185.4157.1124

Tversky, A. & Kahneman, D. (1996). On the reality of cognitive illusions. *Psychological Review, 103*(3), 582-591. doi: 10.1037/0033-295X.103.3.582

Vallacher, R. R., & Wegner, D. M. (1987). What do people think they're doing? Action identification and human behavior. *Psychological Review, 94*(1), 3-15. doi: 10.1037/0033-295X.94.1.3

Wegner, D. M. (2002). *The illusion of conscious will*. Cambridge, MA: MIT.

Wilson, T. D. (2002). *Strangers to ourselves: Discovering the adaptive unconscious*. Cambridge, MA: Harvard.

Wilson, T. D., & Dunn, E. W. (2004). Self-knowledge: Its limits, value and potential for improvement. *Annual Review of Psychology, 55*(1), 493-518. doi: 10.1146/annurev.psych.55.090902.141954

Wilson, T. D., & Gilbert, D. T. (2005). Affective forecasting: Knowing what to want. *Current Directions in Psychological Science, 14*(3), 131-134. doi: 10.1111/j.0963-7214.2005.00355.x

Wilson, T. D., Lisle, D. J., Schooler, J. W., Hodges, S. D., Klaaren, K. J., & LaFleur, S. J. (1993). Introspecting about reasons can reduce post choice satisfaction. *Personality and Social Psychology Bulletin, 19*(3), 331-339. doi: 10.1177/0146167293193010

Wilson, T. D., & Schooler, J. W. (1991). Thinking too much: Introspection can reduce the quality of preferences and decisions. *Journal of Personality and Social Psychology, 60*(2), 181-192. doi: 10.1037/0022-3514.60.2.181

Wilson, T. D., Wheatley, T., Myers, J. M., Gilbert, D. T., & Axsom, D. (2000). Focalism: A source of durability bias in affective forecasting. *Journal of Personality and Social Psychology, 78*(5), 821-836. doi: 10.1037/0022-3514.78.5.821

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist, 35*(2), 151-175. doi: 10.1037/0003-066X.35.2.151

Appendix A

Informed Consent

Approved by the Human Subjects Committee University of Kansas, Lawrence Campus (HSCL). Approval expires one year from 3/15/2012. HSCL #19263

Activity Interest Study

INTRODUCTION

The Department of Psychology and Research in Education at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You may refuse to sign this form and not participate in this study. You should be aware that even if you agree to participate, you are free to withdraw at any time. If you do withdraw from this study, it will not affect your relationship with this class, the services it may provide to you, the University of Kansas.

PURPOSE OF THE STUDY

It is the purpose of this study to determine how people make decisions based on their interests.

PROCEDURES

You will be asked to fill out a short survey that will take about 5 minutes to complete. The survey will include demographic data, and two short instruments about the way you think about yourself and your interests. After the survey, you will be asked to choose between a number of informational videos based on short descriptions of those videos. You will then watch a video you have chosen, which will last for 15-20 minutes. Before, during, and after you watch it, you will be asked how interested you are. In total, the survey and video should take between 30-40 minutes to complete.

In two weeks, researchers will return to your class and have you fill out a short (1-2 minute) survey to determine how interested you remember being during the video. This will conclude your participation in this study.

RISKS

The survey and video should involve no extraordinary discomfort. Should any arise, however, please alert the researcher immediately. No further risks are anticipated.

BENEFITS

Although there are no direct benefits to participation, the collected data will help researchers better understand how individuals make decisions based on their interests. This will be useful to career-counselors and university administrators.

PAYMENT TO PARTICIPANTS

For your participation, you will be offered $10 in cash. If you would like to receive the cash incentive, investigators will ask for your Social Security Number (SSN) to comply with state and federal tax laws.

PARTICIPANT CONFIDENTIALITY

Your name will not be associated in any way with the information collected about you or with the research findings from this study. The researchers will use a study identification number instead of your name and cannot share information about you unless required by law or unless you give written permission. Only group data will be reported, not individual data. All information will be destroyed at after the conclusion of the study. By signing this form you give permission for the use and disclosure of your data, but not your name, SSN or other potentially identifying information, for purposes of this study at any time in the future.

REFUSAL TO SIGN CONSENT AND AUTHORIZATION

You are not required to sign this Consent and Authorization form and you may refuse to do so without affecting your right to any services you are receiving or may receive from the University of Kansas or to participate in any programs or events of the University of Kansas. However, if you refuse to sign, you cannot participate in this study and will not receive the cash incentive.

CANCELLING THIS CONSENT AND AUTHORIZATION

You may withdraw your consent to participate in this study at any time. You also have the right to cancel your permission to use and disclose information collected about you, in writing, at any time, by contacting the one of the researchers listed at the bottom of document.

If you cancel permission to use your information, the researchers will stop collecting additional information about you. However, the research team may use and disclose information that was gathered before they received your cancellation, as described above.

QUESTIONS ABOUT PARTICIPATION

Please direct all questions to one of the researchers listed at the end of this consent form.

PARTICIPANT CERTIFICATION

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study. I understand that if I have any additional questions about my rights as a research participant, I may call (785) 864-7429 or (785) 864-7385 or write the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, email mdenning@ku.edu.

I agree to take part in this study as a research participant. By my signature I affirm that I am at least 18 years old and that I have received a copy of this Consent and Authorization form.

_____

Please **Print** Your Name

_____ _____

Please **Sign** Your Name **Date**

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Appendix B

Demographic Questionnaire

Demographics

Age: _____ Gender: ☐ Female ☐ Male

High School GPA (4.0 Scale): _____ College GPA (4.0 Scale): _____

ACT Score: _____ SAT Score: _____ # Credit Hrs Completed: _____
(not including current courses)

Year in school: ☐ 1st ☐ 2nd ☐ 3rd ☐ 4th ☐ 5+

Do you expect to graduate on time? ☐ Yes ☐ No

What is your official college major? _____
-OR- ☐ Undecided

IF you listed a major above, please answer this question:
How DECIDED would you say you are?

- ☐ Officially Decided, but that could easily be Undecided.
- ☐ Officially Decided, but it would not surprise me if I changed majors before I graduate.
- ☐ Pretty Decided. I am fairly sure this is the major I want to graduate in.
- ☐ Totally Decided. I can't imagine changing majors.

IF you checked UNDECIDED, please answer this question:
How UNDECIDED would you say you are?

- ☐ Officially Undecided, but I am pretty sure about what I am going to major in.
- ☐ Still Undecided, but I have narrowed it down to just a few things.
- ☐ Pretty Undecided, but I'm not freaked out about it.
- ☐ Totally Undecided. At this point I don't have a clue as to what I should major in.

How do you identify? Check all that apply.

- ☐ American Indian or Native American
- ☐ Asian, Asian American or Pacific Islander
- ☐ Black or African American
- ☐ White (non-Hispanic)
- ☐ Other
- ☐ Mexican or Mexican American
- ☐ Puerto Rican
- ☐ Other Hispanic or Latino
- ☐ Multiracial
- ☐ I prefer not to respond

Are you an International Student? ☐ Yes ☐ No

Appendix C

Occupational Engagement Scale - Student

How Well Does Each Statement Describe You?

Please ***CIRCLE*** the answer that best describes you.

1	2	3	4	5
Not at all Like Me		**Somewhat Like Me**		**Very much Like Me**

1.	1 2 3 4 5	I talk about my career choices with family or friends.
2.	1 2 3 4 5	I am actively involved in groups or organizations.
3.	1 2 3 4 5	I have contact with people working in fields I find interesting.
4.	1 2 3 4 5	I gain hands on experience that I might use in the future.
5.	1 2 3 4 5	I volunteer in an area that I find interesting.
6.	1 2 3 4 5	I attend lectures, exhibits, and community events.
7.	1 2 3 4 5	I take part in a variety of activities to see where my interests lie.
8.	1 2 3 4 5	I ask people in social settings about what they do for a living or what they are interested in doing.
9.	1 2 3 4 5	I visit places I'm interested in working at so I can learn more about them.
10.	1 2 3 4 5	I attend presentations or talks related to a career I might find interesting.
11.	1 2 3 4 5	I pursue opportunities in life because I just know they will come in handy.
12.	1 2 3 4 5	I work with teachers or staff on activities other than coursework (committees, orientation, student life activities, etc.).
13.	1 2 3 4 5	I do lots of things that are interesting to me.
14.	1 2 3 4 5	I have meaningful conversations with students of a different ethnicity.

Appendix D

Rational-Experiential Inventory - Short

Please circle one number to indicate how true or false you find the following statements.

	Completely False				Completely True
1) I don't like to have to do a lot of thinking.	1	2	3	4	5
2) I believe in trusting my hunches.	1	2	3	4	5
3) I prefer to do something that challenges my thinking abilities rather than something that requires little thought.	1	2	3	4	5
4) I trust my initial feelings about people.	1	2	3	4	5
5) Thinking hard and for long time about something gives me little satisfaction.	1	2	3	4	5
6) I prefer complex to simple problems.	1	2	3	4	5
7) When it comes to trusting people, I can usually rely on my "gut feelings."	1	2	3	4	5
8) I can usually feel when a person is right or wrong even if I can't explain how I know.	1	2	3	4	5
9) I try to avoid situations that require thinking in depth about something.	1	2	3	4	5
10) My initial impressions of people are almost always right.	1	2	3	4	5

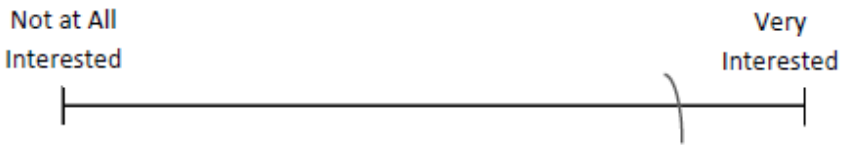
Appendix E

Sample Graphic Rating Scale

INSTRUCTIONS. Please answer the following questions by putting a single line across the scale at the point that represents your answer.

EXAMPLE:

How INTERESTED are you right now?



How INTERESTED are you right now?

How SATISFIED are you with your choice?

Appendix F

Links to Video Options

Video A

Technology, Entertainment, and Design (Producer). (2005). *Eva Vertes looks to the future of medicine* [Online Talk]. Available from http://www.ted.com/talks/lang/eng/eva_ vertes_looks _to_the_future_of_medicine.html.

Video B

Technology, Entertainment, and Design (Producer). (2010). *Joseph Nye on global power shifts.* [Online Talk]. Available from http://www.ted.com/talks/joseph_nye_on_global_power_ shifts.html.

Video C

Technology, Entertainment, and Design (Producer). (2006). *Ken Robinson says schools kill creativity* [Online Talk]. Available from http://www.ted.com/talks/lang/eng/ken_ robinson_says_schools_kill_creativity.html.

Video D

Technology, Entertainment, and Design (Producer). (2003). *Seth Godin on standing out* [Online Talk]. Available from http://www.ted.com/talks/lang/eng/seth_godin_on_ sliced_bread.html.

Video E

Technology, Entertainment, and Design (Producer). (2009). *Alwar Balasubramaniam: Art of absence and substance* [Online Talk]. http://www.ted.com/talks/alwar_ balasubramaniam_sculpture_of_substance_and_absence.html.

Video F

Technology, Entertainment, and Design (Producer). (2009). *Garik Isrealian on how spectroscopy could reveal alien life* [Online Talk]. http://www.ted.com/talks/garik_israelian_what_s_inside_a_star.html.

Video G

Technology, Entertainment, and Design (Producer). (2003). *George Dyson at the birth of the computer* [Online Talk]. Available from http://www.ted.com/talks/lang/eng/george_dyson_at_the_birth_of_the_computer.html.

Video H

Technology, Entertainment, and Design (Producer). (2004). *Susan Savage-Rumbaugh on apes* [Online Talk]. Available. from http://www.ted.com/talks/susan_savage_rumbaugh_on_apes_that_write.html.

Appendix G

Decision Sheet

INSTRUCTIONS: Below are the descriptions of the 8 video choices. Review the choices and CIRCLE the ONE video you believe will interest you most.

VIDEO **A**

Medicine
Researching cancer
Human anatomy
Experimenting on tissue
Healing illness

VIDEO **B**

Politics
Studying economic power
Developing foreign policy
Examining government regulations
Promoting international cooperation

VIDEO **C**

Teaching
Fostering creativity
Reforming educational systems
Interacting with children
Developing children's talents

VIDEO **D**

Marketing
Designing advertising campaigns
Examining customer habits
Persuading consumers
Selling products

VIDEO **E**

Sculpting
Creating art
Visual perception of objects
Crafting with one's hands
Creating beautiful works

VIDEO **F**

Astronomy
Analyzing starlight
Examining chemical elements
Interpreting scientific data
Searching for alien planets

VIDEO **G**

Technology
First software programs
Computers
History of artificial intelligence
Creating faster information processors

VIDEO **H**

Animal communication
Researching animal groups
Great Apes
Human-animal interaction
Learning about animal abilities

You will watch this video in a few moments.

Appendix H

Tables

Table 1

Standardization of video descriptions.

	Category				
Video	Field	General Action	Specific Action	Object	Goal
A	Medicine	Researching Cancer	Experimenting on Tissue	Human Anatomy	Healing Illness
B	Politics	Studying Economic Power	Examining Government Regulations	Developing Foreign Policy	Promoting International Cooperation
C	Teaching	Reforming Educational Systems	Interacting with Children	Fosters Creativity	Developing Children's Talents
D	Marketing	Desigining Advertising Campaigns	Persuading Customers	Examining Consumers Habits	Selling Products
E	Sculpting	Creating Art	Crafting with one's hands	Visual Perception of Objects	Creating Beautiful Works
F	Astronomy	Analyzes Starlight	Interpreting Scientific Data	Examining Chemical Elements	Searching for Alien Planets
G	Technology	First Software Programs	History of Artificial Intelligence	Computers	Creating Faster Information Processors
H	Animal Communication	Researches Animal Groups	Relates to Non-Human Species	Apes	Learning about Animal Abilities

Table 2

Summary of study variables.

Variable	Type	Metric	Description
Experimental Condition	Independent	--	Random Assignment, 3 Groups
Mood	Covariate	50-point graphic rating scale	One self-report item
REI-NFC	Covariate	5-point Likert scale	Sum of 5 self-report items
REI-FI	Covariate	5-point Likert scale	Sum of 5 self-report items
Video Quality	Covariate	50-point graphic rating scales	Average during-video interest level for each video
OES	Covariate, Predictor	5-point Likert scale	Sum of 14 self-report items
Pre-Video Interest	Covariate, Dependent	50-point graphic rating scale	One self-report item
During-Video Interest	Dependent	50-point graphic rating scales	Average of 3 self-report items: interest after 6 minutes, 12 minutes, and immediately following video
Follow-up Interest	Dependent	50-point graphic rating scale	One self-report item

Note. Rational-Experiential Inventory – Need for Closure Subscale (REI-NFC) and Rational Experiential Inventory – Faith in Intuition Subscale (REI-FI) are from Epstein et al., 1994. Occupational Engagement Scale-Student (OES) is from Cox, 2008.

Table 3

Statistical description of study variables.

Variable	N	Potential Range	Observed Range	Mean (SD)	Skew	Kurtosis
Mood	136	1 – 50	1 – 50	36.79 (8.53)	-1.03	1.83
REI-NFC	136	5 – 25	9 – 25	19.15 (3.63)	-.33	-.58
REI-FI	136	5 – 25	6 – 25	17.91 (3.73)	-.66	.94
Video Quality	8	1 – 50	33.75 - 46.60	40.45 (3.59)	-.07	-.15
OES	136	0 – 56	15 – 54	37.83 (9.46)	-.38	-.50
Pre-Video Interest	135	1 – 50	5 – 50	38.70 (8.12)	-1.02	1.58
During-Video Interest	136	1 – 50	1 – 50	40.43 (9.77)	-1.73	3.40
Follow-up Interest	115	1 – 50	2 – 50	39.01 (10.70)	-1.49	2.11

Note. Rational-Experiential Inventory – Need for Closure Subscale (REI-NFC) and Rational Experiential Inventory – Faith in Intuition Subscale (REI-FI) are from Epstein et al., 1994. Occupational Engagement Scale-Student (OES) is from Cox, 2008.

Table 4

Mean video quality scores and number of participant selections per condition.

	Video Quality		Number of Participant Selections			
	Mean	SD	Control	CR	UI	All
Video A	41.0	7.71	5	3	9	17
Video B	37.57	13.78	7	5	6	18
Video C	42.67	6.75	5	6	5	16
Video D	39.17	10.52	8	5	3	16
Video E	33.75	11.91	5	5	6	16
Video F	41.04	9.75	3	3	10	16
Video G	40.56	6.59	4	9	4	17
Video H	46.60	4.47	8	7	5	20
All	40.48	8.85	45	43	48	136

Table 5

Correlation matrix for the study variables.

		Variable						
		1	2	3	4	5	6	7
1. Mood	Corr.	--						
	Sig.							
	N							
2. REI-NFC	Corr.	.30	--					
	Sig.	.001						
	N	136						
3. REI-FI	Corr.	-.05	-.13	--				
	Sig.	.59	.13					
	N	136	136					
4. Video Quality	Corr.	.09	.001	-.05	--			
	Sig.	.30	.97	.56				
	N	136	136	136				
5. OES	Corr.	.23	.27	.09	-.01	--		
	Sig.	.01	.001	.29	.93			
	N	136	136	136	136			
6. Pre-Video Interest	Corr.	.39	.29	.02	-.04	.27	--	
	Sig.	.001	.001	.85	.66	.002		
	N	135	135	135	135	135		
7. During-Video Interest	Corr.	.32	.23	-.01	.37	.31	.30	--
	Sig.	.001	.01	.88	.001	.001	.001	
	N	136	136	136	136	136	135	
8. Follow-up Interest	Corr.	.30	.28	.05	.34	.32	.39	.93
	Sig.	.001	.002	.57	.001	.001	.001	.001
	N	115	115	115	115	115	114	115

Note. Rational Experiential Inventory – Need for Closure Subscale (REI-NFC) and Rational Experiential Inventory – Faith in Intuition Subscale (REI-FI) are from Epstein et al., 1994. Occupational Engagement Scale-Student (OES) is from Cox, 2008.

Table 6

Correlations between OES-Student scores and interest scores.

		During-Video		Follow-up	
		Partial Correlation	Partial, including Pre-video Interest	Partial Correlation	Partial, including Pre-video Interest
All	Corr.	.26	.24	.22	.20
	Sig.	.005	.01	.02	.04
	N	115	107	115	107
Control	Corr.	.40	.41	.37	.39
	Sig.	.02	.02	.03	.03
	N	38	38	38	38
Conscious-Rational	Corr.	.23	.21	.22	.18
	Sig.	.18	.22	.19	.31
	N	39	39	39	39
Unconscious-Intuitive	Corr.	.16	.08	.06	.01
	Sig.	.38	.69	.75	.98
	N	38	37	38	37

Note. Partial correlation controlled for the effects of mood, Rational Experiential Inventory - Need for Closure subscale (REI-NFC), Rational Experiential Inventory - Faith in Intuition subscale (REI-FI) and video quality.

Table 7

Statistical descriptions of behavioral indicators of interest.

Item	Possible Range	Observed Range	Mean (SD)			
			Control (N = 38)	CR (N = 39)	UI (N = 38)	All (N = 115)
Amount thought about content of video	1 - 50	1 – 50	23.32 (14.39)	26.54 (15.28)	28.97 (16.28)	26.28 (14.43)
Likelihood to seek out more information about the content of video	1 - 50	1 – 50	32.47 (16.52)	33.59 (17.26)	33.74 (16.03)	33.27 (16.48)
Already sought out more information	0 - 1 (yes or no)	--	11 (28.9%)	14 (35.9%)	9 (23.7%)	34 (29.6%)
Number of times discussed content of video	Free response	0 – 15	1.74 (1.56)	2.54 (2.91)	1.94 (1.62)	2.08 (2.15)

Appendix I

Figures

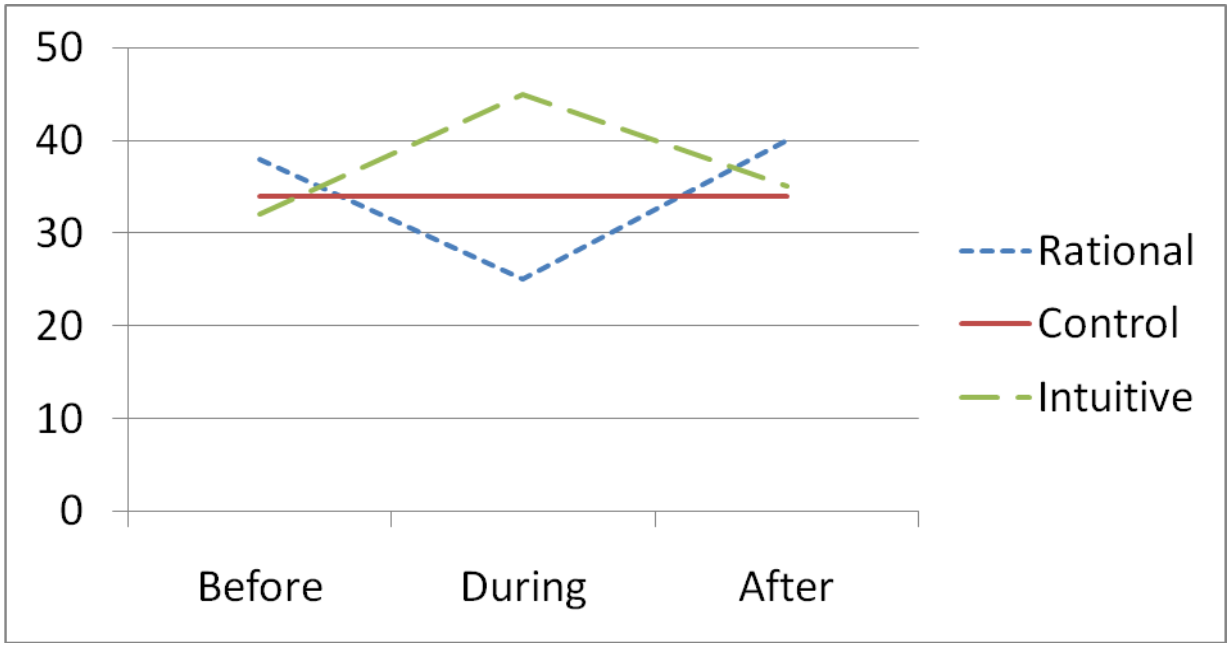


Figure 1. Hypothesis 3: Expected patterns of interest between groups over time.

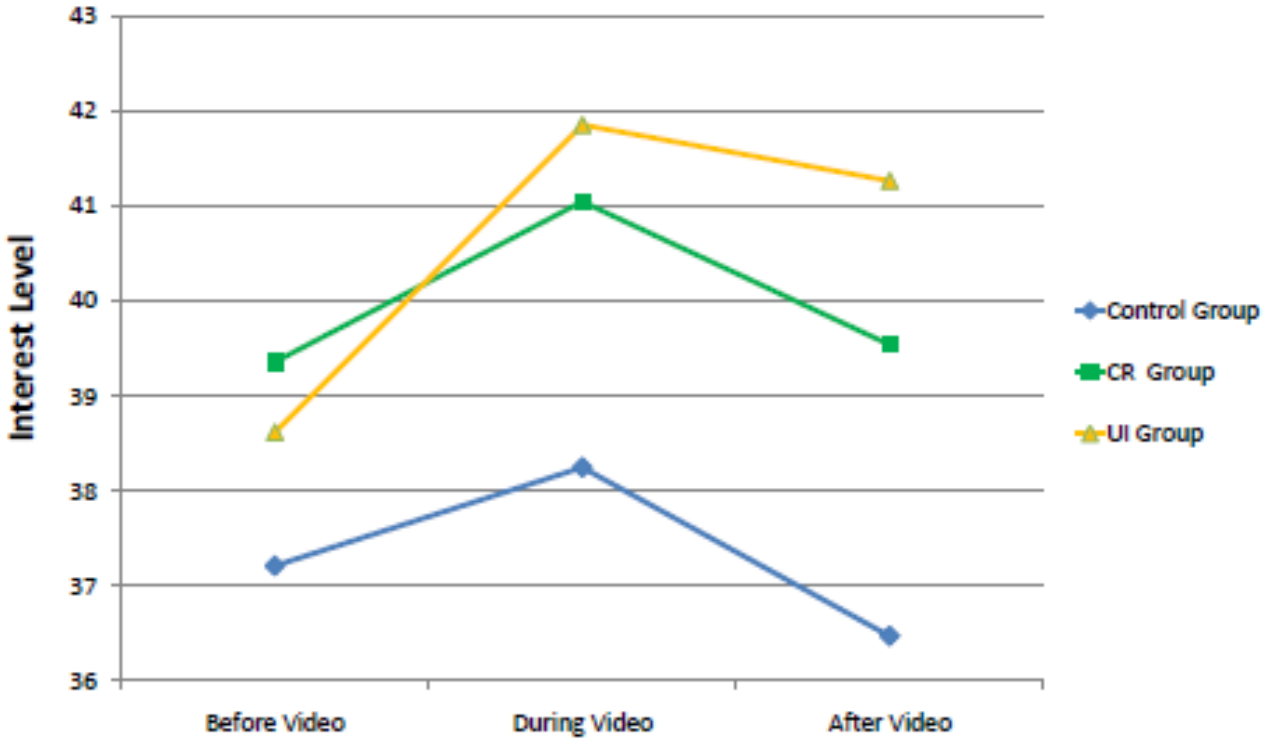


Figure 2. Raw mean group interest scores over time.

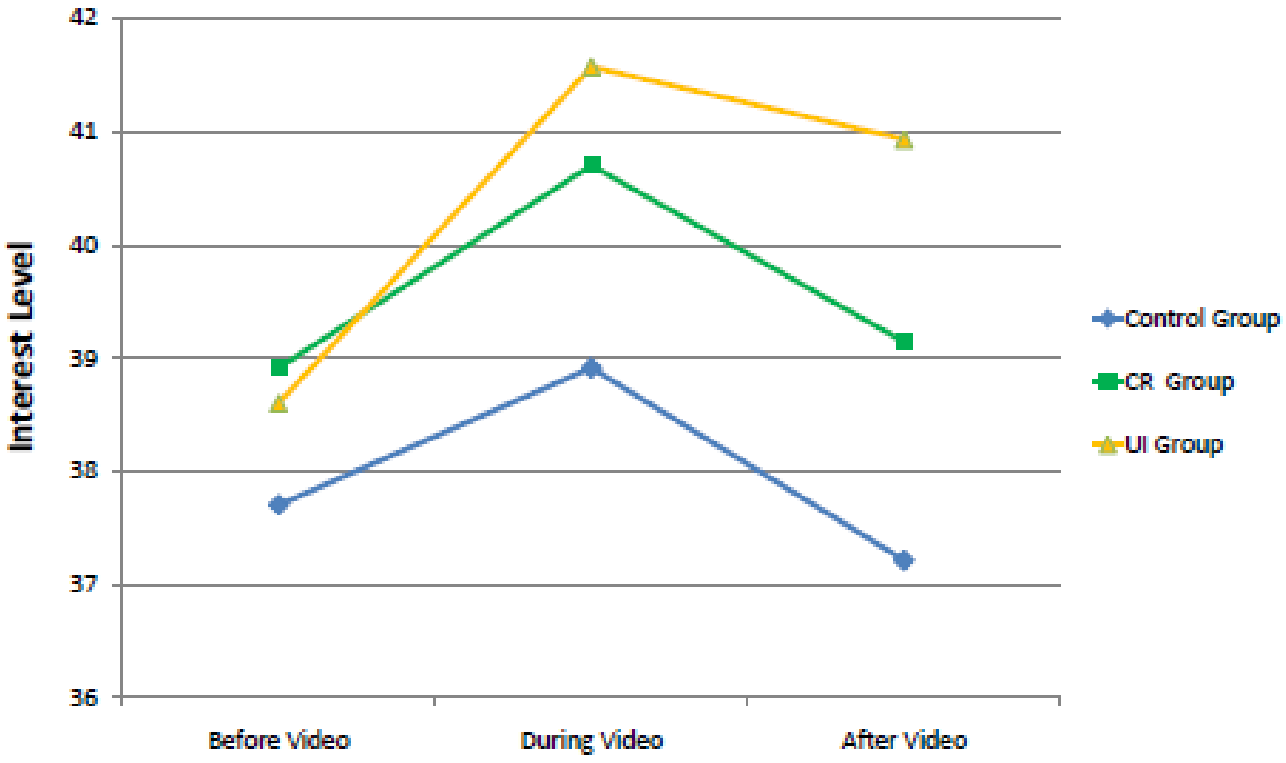


Figure 3. Group mean interest scores after adjusting for mood, OES, REI-NFC, REI-FI, and video quality.