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Empirical Connections Between the Construct of Value, the Quality of Stability, and the Construct of Regret

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Empirical Connections Between the Construct of Value, the Quality of Stability, and the
Construct of Regret

by

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Abstract

The term value is a psychological construct frequently used in the social sciences. This research addresses the issue of stability of ratings of perceived value of participants for monetary, tangible, and intangible items that cross contexts. Also elucidated is the relationship of value to regret. Hypothesis one stated that value would be stable across time and different rating conditions. Forty-four participants rated the value of 72 stimulus items at two time points and in different contexts. Paired samples t-tests indicated 28 participants had no statistical difference in scores. Twenty-eight scores out of 44, when applied to a binomial test, indicates a more than chance proportion of significant scores. The second hypothesis investigated if a difference in stability existed in monetary, tangible item, and intangible item domains. Paired samples t-tests of difference scores for all domains of stimulus items grouped by stimulus item category revealed that all three pair-wise comparisons showed statistical differences. The third hypothesis stated there was a clear and predictable relationship in the ratings of value and regret in a blind choice condition. After rating value and regret in a choice condition for hypothesis three, a statistically significant proportion of the participants fell within the hypothesized relationship between value and regret. This suggests that the construct of value has strong, stable, and predictable elements. These results encourage additional research into the nature of value, and its relationship to regret, to form a more comprehensive future definition that will benefit multiple fields of study.

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Chapter 1: Introduction

As an underlying principle in many of the social sciences, the psychological construct of value serves an important purpose. Whether the decision making scenario is medical and health related, monetary in nature, related to principles of behavior and relations to others, or a comparative for cultural reference, the idea of value, or a collection of values, acts as a guide to action.

In economics, value serves as a critical component of research in such areas as economic preferences and attitude expression (Kahneman, Ritov, & Schkade, 1999). This research attempts to clarify how individuals view their economic choices and what factors mediate purchasing options. A strong emphasis in this field is on perception and the factors that may alter perceptions of value relative to concrete pricing of items in the marketplace (Deppe, Schwindt, Kugel, Plabmann, & Kenning, 2005; Zeithaml, 1988).

The field of philosophy makes use of the construct of value in many ways. An important area for value is that of moral cognition where the neural mechanisms and justification for moral decision making within and across various theories of morality (Casebeer & Churchland, 2003) are explored. Another philosophical perspective is that of value systems, or collections of individual value judgments that, when combined within an individual and society, create a system of behavior and acceptance (Fehr & Camerer, 2007; Rokeach, 1973; Schwartz & Bardi, 2001; Stern, Dietz, Kalof, 1993)

Motivation research has made use of the psychological construct of value over many years. Atkinson (1957) recognized the impact of what an individual values on risk-taking behavior. Sorensen (1976) identified value as a specific type of reinforcement to encourage specific repeat behaviors in children. From a behaviorist perspective, this finding had great utility in explaining repeated behaviors. More recently, Expectancy Value Theory has incorporated value as an integral mediating component for the selection of one decision path over another and has a large body of experimental data for review (Bong, 2001; Eccles & Wigfield, 2002; Shah & Higgins, 1997; Wigfield & Eccles, 2000).

In the areas of cognition and perception, value is a critical component. From a perception perspective, value has been viewed as an organization principle for incoming stimuli from the environment (Bruner & Goodman, 1947) as well as a filter for those perceptions (Hsee & Rottenstreich, 2004). An associated area is that of implicit attitude formation and those unconscious processes that affect our implicit memory systems and therefore the interpretation of our perceptions (Betsch, Plessner, Schwieren, & Gutig, 2001; Roskos-Ewoldson & Fazio, 1992). Another common cognition area in which value is prominent is that of memory. A common question in the area involves emotional memories, both implicit and explicit, and whether the concept of value hinders or assists the memory consolidation process (Brod, Werkel-Berger, & Shing, 2013; Gottfried, O'Doherty, & Dolan, 2003; LaBar & Cabeza, 2006; Mather & Knight, 2005).

The construct of value is also an integral element in the judgment and decision making literature. From the cognitive moderation of decision making (McClure, Laibson, Lowenstein, & Cohen, 2004; Weber & Johnson, 2009) to hedonic impacts on

the decision process (Camacho, Higgins, & Luger, 2003; Higgins, 2000), value is ever present. Tied very closely to the fields of cognition and perception, the decision making research often deals with choice conditions and the impacts of value creation from previous experience on those decision processes (Coricelli, Dolan, & Sirigu, 2007; McKinstry, Dale, & Spivey, 2008; Peters, Västfjäll, Gärling & Slovic, 2006; Storbeck & Clore, 2008)

Though extensive research has been conducted in these fields of study, a common understanding of value, its properties and relationships, has yet to emerge as many conceptions of value are used. Examples include perceived value (Stern, Dietz, & Kalof, 1993), intrinsic value (Rabinowicz & Ronnow-Rasmussen, 2005; Beardsley, 2005), task value (Bong, 2001; Eccles & Wigfield, 2002; Fredricks & Eccles, 2002), instrumental value (Husman, Derryberry, Crowson, & Lomax, 2004), incentive value (Atkinson, 1957; Condy, Clark, & Stolovich, 2003), and attainment value (Eccles & Wigfield, 2002; Shah & Higgins, 1997; Sorenson, 1976). What has clearly emerged is that the concept of value, whether perceived or intrinsic, estimated or final, is used in areas of economic research using monetary stimuli (Brandstatter, Gigerenzer, & Hertwig, 2006; Desmeules, Bechara, & Dube, 2008; Just & Peterson, 2010; Weber & Johnson, 2009), in decision making with concrete, tangible, objects (Hastie, 2001; Wedell, 1998), and in perception, judgment, and choice conditions using intangible experiences and expressions (Roese & Summerville, 2005; Roese, Epstude, & Fessel, 2009; Rokeach, 1973). Different definitions and approaches to value within and across fields and research projects, however, does not always elucidate the issue: they can also confound.

One way to provide clarity to the understanding of value is to examine stability of perceived value across time and situations of application. Stability is the recognition that affective valuations of stimuli are learned and are often assimilated implicitly (Murray, Izquierdo, & Malkova, 2009; Phelps & LeDoux, 2005; Scherer & Ellsworth, 2009; Storbeck & Clore, 2008; Tottenham, Hare, & Casey, 2009). To understand the role affect may play in the memory of experienced stimuli, and, hence, stability, one must turn to the biology of the organism. Whether discussing affective style (Davidson, 2004), neural decision theory (Litt, Eliasmith, & Thagard, 2008), an affect oriented event-coding account of action (Lavender & Hommel, 2007), appraisal theories of affect and cognition (Scherer & Ellsworth, 2009) or the primacy of feelings in judgment (Pham, Cohen, Pracejus, & Hughes, 2001), one element is quite clear: there is a specific neural link between affective stimuli as registered in the amygdala and a positive impact on memory retention. The amygdala does not act alone in the enhancement of memory, but is shown to marshal cortical areas of the prefrontal cortex related to attention to promote continued focus on the stimuli in question, and to stimulate hippocampal regions for the actual encoding of the memory for later retrieval (Davidson, 2004; Isen, 2008; Kensinger & Schacter, 2008; LaBar, 2009; Sander, 2009).

Therefore, the concept of stability with value represents an affective memory trace for a particular stimulus that will cause an organism, barring cognitive or affective interference, to remember the felt expression of the stimulus and to regard it similarly through multiple experiences. This allows for both stability and growth as the memory trace will be used as a reference for future judgments while the memory trace is also open to modification through synaptic plasticity from new experiences.

Regret is a construct directly related to decision making. Value, as stated, has had a great deal of research conducted in the area of decision making. To consider that they may have a relation to one another is worthy of investigation. When an individual makes a decision, he or she may have particular emotions and expectations associated with the type of decision to be made (Connolly & Zeelenberg, 2002). Regret is directly tied to the expectations of the decision. More specifically, regret is the cognitively based negative emotion associated with a decision of poor outcome that an individual believes might have turned out differently with a different choice made (Gilbert, Morewedge, Risen, & Wilson, 2004). The cognitive creation of multiple alternatives in a decision situation and the attempted evaluation of those alternative has been termed counterfactual thinking – first identified by Kahneman and Tversky in 1982 (Hetts, Boninger, Armor, Gleicher, & Nathanson, 2000). Counterfactuals contain all the elements necessary to identify and research the overall decision process, including the motivation to act according to what an individual most desires or values. Counterfactuals contain antecedent conditions and multiple alternative outcomes that can give rise to the cognitive processes necessary to reach each of the alternative goal states and therefore give rise to the behavioral process that is actually used to reach an identified goal state (Hetts, Boninger, Armor, Gleicher, & Nathanson, 2000).

The quality of stability as a function of value may prove to be an important definitional characteristic. The construct of regret, and any relationship to value observed, may assist to illuminate the psychological construct of value through experimental methods.

Statement of the Problem

The psychological construct of value has been the subject of research in many fields of study. Despite the extensive research base, it is still not a coherent construct. Some understanding of how the construct of value functions within and across the domains of monetary, tangible, and intangible items is necessary if value is to become a cohesive construct. Additionally, to date, research has not yet demonstrated whether value judgments an individual makes are stable across time. The stability of a construct directly relates to its reliability in classical research terms. Reliability, in simple terms, is the ability to receive similar scores from a measure of a construct in different times and circumstances, assuming nothing has changed to alter the individual or the measure between measurements (Golafshani, 2003; Kimberlin & Winterstein, 2008; Roberts, Priest, & Traynor, 2006). Though reliability is required for there to be validity in a construct, it is not enough on its own to warrant claiming validity (Roberts, Priest, & Traynor, 2006; Trochim, 2006).

Do those value judgments, or perceived value of items and situation ratings, in one instance carry over when an individual is faced with a choice condition? As decision making and value is important in economic (Deppe, Schwindt, Kugel, Plabmann, & Kenning, 2005; Kahneman, Ritov, & Schkade, 1999; Zeithaml, 1988) as well as non-economic (McClure, Laibson, Lowenstein, & Cohen, 2004; Weber & Johnson, 2009) research areas, the idea that a person's decision processes over time would be stable relative to the value judgments made in the decision process does much for the prediction of human behavior should an individual's value judgments be made explicit.

Additionally, the construct validity of value can only be enhanced if a solid, stable, and predictable relationship exists between the construct of value and another heavily researched construct such as regret (King & Hicks, 1990; Trochim, 2006; Westen & Rosenthal, 2003).

Purpose of the Research

The purpose of this research is to address the issue of perceived value of an individual for items from multiple domains of interest: specifically the monetary, tangible, and intangible domains previously identified. Are perceived values for items stable across time and contexts, or will those ratings easily change in the presence of other items of interest from multiple categories? Additionally, this study will elucidate the relationship of value to regret which is a very thoroughly studied construct with experimental evidence across multiple fields such as personal relationships (Roese, Epstude, & Fessel, 2009; Zeelenberg, Nelissen, Bruegelmans, & Pieters, 2008), economics (Martinez, Zeelenberg, & Rijsman, 2011; Thiene, Boeri, Chorus, 2012), and general decision making (Connolly & Zeelenberg, 2002; Summerville, 2011).

Research Questions & Hypotheses

Three questions, and three accompanying hypotheses, drive this endeavor.

1. Does the psychological construct of value have stability across time and context of experience within an individual?

Hypothesis: The first hypothesis is simply that the psychological construct of value is a relatively stable construct that should resist moderation over short periods of time and across contexts of use and consideration. This hypothesis follows the tenets of implicit memory in that repeated exposures to a particular

stimulus, particularly affective exposure (Cunningham & Zelazo, 2007; Davidson, 2004; Payne, Jackson, Ryan, Hoscheidt, Jacobs, & Nadel, 2006), will enhance the longevity of the memory and allow for similar physiological responses, otherwise known as feelings, with continued exposures (Alberini, 2011; Betsch, Plessner, Schwier, & Gutig, 2001; Brod, Werkle-Bergner, & Shing, 2013; Mace, 2005).

2. Do the broad domains of value as categorized by monetary, tangible, and intangible stimuli differ in their levels of stability?

Hypothesis: It is an open question whether the three domains of monetary items, tangible items and intangible items will differ in how stable they are. A great deal of experimental work on value has been done using money as a stimulus in economic preferences (Kahneman, Ritov, & Schkade, 1999), consumer perceptions (Zeithaml, 1988) and in the categorization of immediate and delayed reward (McClure, Laibson, Loewenstein, & Cohen, 2004). Additionally, the role and value of life domains (George & Jones, 1996; Roese, 2005), collections of values and value systems (Rokeach, 1973; Schwartz & Bardi, 2001) and the effect of regret and disappointment on item valuations (Martinez, Zeelenberg, & Rijsman, 2011) has been reviewed. To date, research has not examined the three domains of tangible items, intangible items and monetary items within the same investigation. This question, therefore, is highly exploratory in nature and is designed to delineate possible relationships.

3. Is there an identifiable relationship between the well-studied construct of regret and the construct of value?

Hypothesis: Hypothesis three states that there is a clear and predictable relationship between value and regret. More specifically, the hypothesis states that when an individual is faced with a blind choice condition between two objects and/or experiences, and the perceived value of one of those items and/or experiences is higher than the other, then the regret for choosing the more valued item and/or experience over the less valued item and/or experience will be low. Similarly, if the individual in the blind choice condition chooses the lesser valued item and/or experience instead of the more valued item and/or experience, the perceived regret for that blind choice will be high. This hypothesis is believed to be accurate because of two conditions: first, the nature of the decision making process under uncertainty and its relation to the value and regret relationship, and second, the personal agency exhibited by the decision-maker. Hastie (2001) describes research in the judgment and decision making arena as, "...how people (and other organisms and machines) combine desires (utilities, personal values, goals, ends, etc.) and beliefs (expectations, knowledge, means, etc.) to choose a course of action" (p. 655). Using the stability component of value from hypothesis one, and the comment from Hastie (2001), the individual facing a choice condition will attempt to make a decision that will optimize the outcome to meet the individual's desires and beliefs. This decision process, when successful, will provide a positive affective response that will be remembered and used again when faced with a similar choice condition in the future. Likewise, should the individual facing a choice condition make a decision that leads away from his or her desires and beliefs, there will be a negative affective response that will affect

future, similar, decisions. A key component found to be essential in the expression of regret is that of personal agency and the sense that the individual had control over the situation and made a bad choice (Zeelenberg, van Dijk, Manstead, & van der Pligt, 2000). Regret, therefore, is accompanied by feelings that the individual has lost an opportunity and desire to correct one's mistake, by wanting to completely undo the situation, and a wish that the situation could be "done over" to produce a more valued outcome (Pieters & Zeelenberg, 2005). This is one of the most consistently found results in regret research and has been found in a variety of experimental contexts (Gilbert, Morewedge, Risen, & Wilson, 2004; Pieters & Zeelenberg, 2005; van Dijk & Zeelenberg, 2002). Therefore, in a choice condition, the judgment of value between what was selected, as opposed to what could have been selected, will form a regret variable that should follow a specific pattern based on the perceived, personal, value of the stimulus items in the choice condition.

Operational Definitions

To create a more empirically focused definition of value, operational definitions of the three primary constructs of the study are presented. As a construct, value will be assessed by a participant who will view a stimulus item and rate how important that item would be for the person to personally and individually have. The rating will be on a scale of 1 to 10 with 1 being not important and 10 being very important. The stimulus items will be grouped into the three domains of items and/or experiences previously identified as monetary, tangible, and intangible domains.

Stability as a construct will be assessed through the value ratings. The participant will make value ratings for the same stimulus items at two different times and under two different conditions. Statistical comparisons will then be made to judge the similarity in ratings between the two times and contexts.

The emotional response of regret can only be present when personal choice and multiple alternatives are present (Pieters & Zeelenberg, 2007; van Dijk, van der Pligt, Manstead, van Empelen, & Reinderman, 1998). Therefore, the construct of regret will be assessed in a choice condition after a participant has blindly selected one stimulus item, rated it on the value scale, viewed the unselected stimulus item, and rated it on the value scale. Once the ratings of value have been made the participant will rate the regret of having selected one stimulus item over another on a 10 point scale with 1 being low regret and 10 being high regret.

Significance

This research is a first step in exploring a very important construct, value, across different domains of interest. With additional research outside of any one discipline, but bridging multiple fields, it may be possible to have the experimental contributions of value from the field of motivation (Bong, 2001; Shah & Higgins, 1997; Sorenson, 1976) to be meaningful and assist in experimental efforts in other disciplines using value such as economics (Depp, Schwindt, Kugel, Plabmann, & Kenning, 2005; van't Wout, Kahn, Sanfey, & Aleman, 2006;) and decision making (Litt, Eliasmith, & Thagard, 2008; Mellers, Schwartz, & Ritov, 1999; Pennington & Hastie, 1988). It may also be possible to use the information from this study to begin the process of building a definition, tied to

experimental results and to an already strongly studied construct, that will bridge multiple disciplines and aid all fields that adopt its use.

As regret is already a construct with a strong experimental background in multiple fields such as personal relationships (Roese, Epstude, & Fessel, 2009; Zeelenberg & Bruegelmans, 2008), economics (Martinez, Zeelenberg, & Rijsman, 2011; Thiene, Boeri, Chorus, 2012), and general decision making (Connolly & Zeelenberg, 2002; Summerville, 2011), confirming a specific relationship between value and regret can only improve the validity of both. Construct validity cannot be established without both content and convergent validity (Trochim, 2006).

Any explication of the qualities of the construct of value, such as the stability of value, will enhance content validity (Beckstead, 2009; Cronbach & Meehl, 1955; Rubio, Berg-Weger, Tebb, Lee, & Rauch, 2003) while investigations into the relationship between value and a well and widely studied construct such as regret can only serve to assist development of convergent validity (King & Hicks, 1990; Trochim, 2006; Westen & Rosenthal, 2003).

Chapter 2: Literature Review

One underlying concept at the root of any decision process is that of value (Coricelli, Dolan, & Sirigu, 2007; De Dreu & Boles, 1998; Delgado & Dilmore, 2008; Deppe, Schwindt, Kugel, Pabmann, & Kenning, 2006; Hsee & Rottenstreich, 2004; Lerner & Keltner, 2000; Naqvi, Shiv, & Bechara, 2006; Rangel, 2008). The purpose behind studying decision making, motivation, judgment, emotion, and other psychological entities of utilitarian perspective is ostensibly to better understand human behavior; as life can be viewed as an endless string of choices and decisions that can dramatically affect an individual at the time of their determination as well as in the future (Gardner, Gabriel, & Lee, 1999; Schwartz, 1996). All of these questions affect more than the individual making the decision and impact such broad ranging topics as politics, ethics, and economics (Sanfey, 2007). Therefore, value, as a psychological construct, is a critical element in understanding human behavior.

By understanding behavior, it may even be possible to predict the course of action an individual will select under particular conditions. The greatest difficulty in attempting to predict decision making behavior is to categorize all of the relevant variables that an individual may use in any choice or decision process. Without identifying the elements of the decision process, how can any models be created that adequately predict the process?

Though value, as a construct, has been studied in psychology (Higginson, Mansell, & Wood, 2011; Marken & Mansell, 2013), philosophy (Phinney, Ong, & Madden, 2000; Rokeach, 1973; Schwartz & Huisman, 1995), and economics (Rustichini, 2005; Sanfey, Lowenstein, McClure, & Cohen, 2006) and therefore provides for a wealth of background literature, the same provides for a great deal of uncertainty. A review of the psychological construct of value is, therefore, required to identify potential common elements and properties that would prove beneficial to empirical efforts with the construct.

Although individuals commonly make decisions in uncertain conditions, it is not surprising that one emotion of particular interest is regret. When an individual makes a decision, he or she may have particular emotions associated with the type of decision to be made (getting married, buying a house, selecting a retirement savings plan, etc.) and form expectations as to the outcome, and the emotions associated with the outcome, of the decision process (Connolly & Zeelenberg, 2002). Regret is directly tied to the expectations of an individual's decision outcome. More specifically, regret is the cognitively based negative emotion associated with a decision of poor outcome that might have turned out differently with a different choice made (Gilbert, Morewedge, Risen, & Wilson, 2004).

As both value and regret are constructs strongly related to the decision making process, it is natural to question what relationship might exist between the two constructs. The more information known about how the two may work together in a decision process, the more solid the empirical data related to the important subject of decision making.

Value

As a construct used in multiple fields of study, value can be complicated to study and understand as the definitions often change from field to field. To create some sense of order from the multiple definitions and usages, a review of the construct of value as used in the fields of philosophy, motivation, cognition, and economics is provided.

Philosophy. In the philosophy literature, value traditionally makes an appearance in one of four ways: intrinsic value, or the value inherent in an item or belief (Beardsley, 2005; Feldman, 2005; Rabinowicz & Ronnow-Rasmussen, 2005; Rokeach, 1973); instrumental or final value which places the importance not on the object itself, but as an end state or relation between itself and another item (Feldman, 2005; Rabinowicz & Ronnow-Rasmussen, 2005); value as a belief that a person holds which may direct an individual's actions (Beardsley, 2005; Rabinowicz & Ronnow-Rasmussen, 2005; Rokeach, 1973; Schwartz & Bardi, 2001); and value as a collection of individual beliefs that helps to create a defining characteristic or personality for an individual (Rabinowicz & Ronnow-Rasmussen, 2005; Rokeach, 1973). Though these different conceptions of value are all somewhat related, they each have different definitions based on the state of intangible being, tangible or monetary object, personal preference, or individual being ascribed the condition of value.

Unfortunately, though Rokeach and others wished to create a foundation upon which empirical studies could be produced and shared for common understanding, the conceptions of value proposed largely have no grounding or foundation beyond that of observation and logic. Does this completely invalidate these conceptions? No, it does not. However, a researcher, following these descriptions and definitions would have no

idea of how an individual creates these preferences or why an individual would view an object as having value. The assumption is simply that people do create preferences and objects do have value in the eye of the beholder. The question of “how” is missing. This leaves the current conceptions without an empirical foundation. That is not to say, however, that empirical efforts may not include, and therefore elucidate, Rokeach’s conceptions of value.

Some empirical efforts in the philosophical arena have been made in regards to value singularly, and values, or value systems, as collections of intangible individual values that form guiding principles for motivational goals (Schwartz & Bardi, 2001). Quite often, the empirical research in this realm involves either individual relationships (Gardner, Gabriel, and Lee, 1999; Stern, Dietz, & Kalof, 1993; Tsai & Ghoshal, 1998) or cross cultural comparisons (Phinney, Ong, & Madden, 2000; Schwartz & Bardi, 2001; Schwartz & Huisman, 1995). Though not always listed as philosophy specifically, the research listed uses the philosophical resources for the conceptions and definitions that form the structure of the studies.

Gardner, Gabriel, and Lee (1999) performed three experiments to determine how culture might affect the values an individual relates as an individual, versus the values an individual may relate as a member of a specific culture. Individualistic intangible values consisted of freedom, independence, living an exciting life, choosing one’s course in life, and others as examples. More collectivist value judgment examples were belongingness, friendship, family safety, national security, etc. These individualistic and collectivist values were rated on a scale of 1 to 7 with 1 being not at all important and 7 being of extreme importance. Through priming of individualist or collectivist social judgment

through both stories and word searches, a values inventory rating 56 values as to how important a particular value might be as a guiding principle for behavior and obligation, and the Twenty Statements Task (TST) by Kuhn and McPartland (1954), the researchers determined that culture and priming both impact how an individual perceives his or her value judgments in relation to goals and behaviors. This implies that value systems are relatively flexible under priming conditions.

Another individualistic perspective can be found in the research by Stern, Dietz, and Kalof (1993). This research used a regression model with special weighting for the belief that an individual will be predisposed to take action when an adverse consequence is present for something he or she values: more specifically, if adverse consequences to the environment are likely, and those consequences will affect the individual, the individual is likely to act if the environment is valued. The researchers measured the beliefs about consequences for self, specific gender, others, and the environment through survey questions and intentional statements. These variables, used as weights in the regression analysis, point to a system of varied value levels for individuals in regards to the environment and intention to act toward valued goals.

From a group and value systems perspective, Schwartz and Bardi (2001) used 10 previously identified types of values and their importance ratings to identify similarities in values held between different cultures. The central element of identification for the 10 values was their motivationally expressed goal. The survey asked participants to rate the importance of various tangible and intangible items such as occupational choice, consumer purchases, and religiosity. Participants from 56 nations, a teacher contingent and representative contingent from each nation, rated the importance of the values.

Hierarchies of values were then calculated per nation. Means of the ratings and their ranks then allowed for correlations to be run between samples and nations. Calculated Pearson correlations between teacher samples and the 56 represented nations indicated a high degree of similarity and stability. The non-teacher samples across the same 56 represented nations also yielded Pearson correlations that indicated a degree of similarity and stability.

Motivation. In a similar manner to the field of philosophy, the area of motivation within the realm of psychology tends to focus on the ideas of incentive value, attainment value, intrinsic value, and reward. The majority of this work builds off of the early motivation work of Atkinson (1957) who suggested the importance of value in his research on risk-taking behavior. For Atkinson (1957), a major question for motivation was simply how to account for an individual's selection of one path or action over another. To answer that question, Atkinson stated that three variables must be defined: motive, expectancy, and incentive. Expectancy was defined as a cognitive anticipation of an outcome based upon cues provided by the situation. Motive, however, was not nearly so easily stated. Essentially, motive, by Atkinson's perspective, was a relatively stable internal drive to meet a particular goal or state. Incentive was the third in the triumvirate and of special interest.

When discussing this particular variable, Atkinson (1957) acknowledged that, "The incentive [value] variable has been relatively ignored, or at best crudely defined, in most research." The definition that he provides for the variable states simply that, "It represents the relative attractiveness of a specific goal that is offered in a situation, or the relative unattractiveness of an event that might occur as a consequence of some act"

(Atkinson, 1957). Working together, the motive provided a drive for a particular goal, tangible or intangible, specified as incentive value. The expectation was the cognitive anticipation of the desired, or valued, outcome based on past experiences. This early work on a theory of expectancy, value, and motive led to expansions upon the idea which continue to include the construct of value, but often in different, or multiple, conceptions.

Rosenberg (1960) developed an early theory of attitude dynamics that involved a cognitive and affective component of any valuation of tangible or intangible circumstance. The evaluative nature of the cognitive and affective component, and the expected positive or negative outcome of any venture, was expected to be a motivating factor in behavior (Cohen, Fishbein, & Ahtola, 1972). Rosenberg's early experiments included variations of tests of cognitive structures and ratings, or value judgments, regarding objects and events at intervals of 30 days. His results indicated that when affective and cognitive components of an attitude are consistent, attitudinal judgments are stable. Similarly, if the cognitive and affective components are not consistent, the attitudinal state is unstable. This instability required the individual to go through a reorganization of cognitive and affective state to again reach equilibrium and stability (Rosenberg, 1960).

Another extension of this can be found in the expectancy-value components of attitude as expressed by Fishbein (1963). In this conception, a person's attitude toward an intangible event or tangible object may be estimated by multiplying the probability of an event or goal manifesting and the affective evaluation of the tangible or intangible stimulus. Predictive validity for this model was shown by Palmgreen and Rayburn (1982) through an investigation of correlations between respondents' beliefs and affective

attitudes toward news and newsmedia and the goals, rewards, or gratifications for engaging with the news.

A more modern motivational theory expressing value as a component is expectancy-value theory (Nagengast, Marsh, & Scalas, 2011; Palmgreen & Rayburn, 1982; Wigfield & Eccles, 2000). Expectancy-value theory is an expansion upon the work of Atkinson (1957), Rosenberg (1960), and Battle (1965). Expectancy-value theory can be loosely expressed as the motivational elements involved in both the cognitive evaluation an individual makes regarding personal ability to perform a task and how much the task is valued (Wigfield, 1994). Ultimately, an achievement motivation perspective such as expectancy-value theory attempts to, "...explain people's choice of achievement tasks, persistence on those tasks, vigor in carrying them out, and performance on them." (Wigfield & Eccles, 2000). This was accurately portrayed in Feather and O'Brien's (1987) work with unemployed individuals. Feather and O'Brien found strong correlation between an individual's expectation of finding employment and the extent to which employment itself was viewed as valuable. Additionally, Wiklund, Davidsson, and Delmar (2003) identified that small business managers' expectations of different hypothetical outcomes regarding business growth were highly correlated to the value previous surveys had established for said outcomes. This analysis was confirmed through replicated linear regression analysis (Wiklund, Davidsson, & Delmar, 2003).

The expectancy component requires two elements. The first is a self-efficacy ability belief judgment related to the task, goal, desire, or value that is presented (Bong, 2001). Based on past experience with a similar task, goal, or value, the individual determines whether he or she is capable of the process. Once that cognitive and affective

evaluation is completed, an expectation of success or failure is formed (Wigfield & Eccles, 2000). The interaction of the personally variable expectancy component and the personally variable value component create the directionality of the effort and persistence of the individual to the end state in a particular domain or situation (Eccles & Wigfield, 2002). This interaction was tested in a large scale study by Nagengast, et. al. (2011) through path analysis and structural equation modeling self-concept, enjoyment of science, and science career aspirations and extracurricular activities. For the 398,750 student participants from 57 countries, the model had a high comparative fit index (.975) and accurately predicted career aspirations and extracurricular activities from expectancies and values derived for science. The previous simplistic explanation of the complex interaction of cognitive expectancies and affective value can more easily be explained and traced through figure 2.1 below.

Of particular interest for this research is the value component of the expectancy-value model. The overarching value term used in the model is task value and focuses on an individual's incentives, motivations, and reasons for engaging in activities (Mahama, Silbereisen, & Eccles, 2013). The attractiveness of task value stems not from some new and unique view of value, but from the fact that task value incorporates a number of elements from the Atkinson (1957) model as well as elements that have been derived from said model (Bong, 2001; Eccles & Wigfield, 2002; Fredricks & Eccles, 2002; Wigfield & Eccles, 2000). Task value is defined as a combination of attainment value, intrinsic value, utility value, and cost (Eccles et al., 1983). It has been studied empirically and confirmatory factor analysis has successfully differentiated the constructs

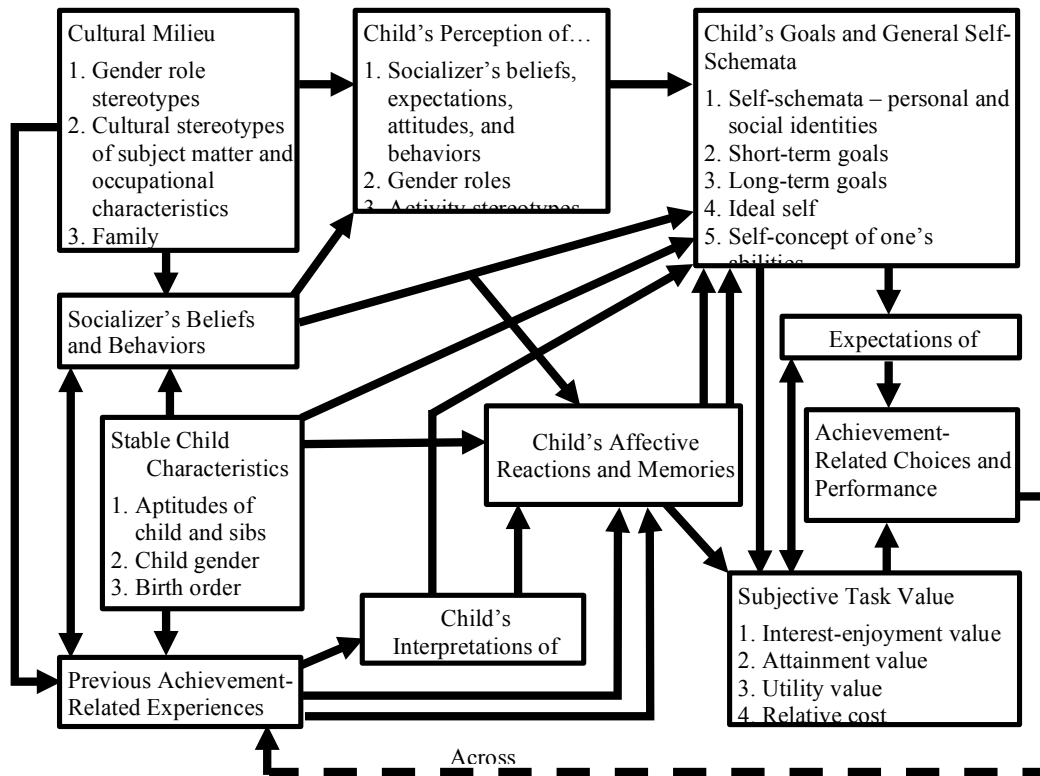


Figure 2.1. Eccles and Wigfield (2000) expectancy-value model of achievement motivation reproduction.

of task value, self-efficacy, and mastery and performance goal orientations (Bong, 2001). Combined with the previous list of value types derived from the Atkinson (1957) model, an ultimate list of potential value types was established for the expectancy-value model: Incentive Value, Attainment Value, Intrinsic Value, Reward, and Cost (Atkinson, 1957; Eccles et al., 1983; Wigfield & Eccles, 2000).

Incentive value, as provided by Atkinson (1957) has already been discussed as the provision of a positive outcome for engaging in a particular activity or the avoidance of a negative outcome by engaging in a particular activity. The incentive in this respect is either adding a positive element to a situation through a choice condition, or the avoidance or elimination of a negative element through a particular choice. This is not

dissimilar to the concept of positive and negative reinforcement from a classical conditioning perspective (Gredler, 1997). However, the motivational perspective looks at the incentive as a pre-action potential and classical conditioning looks to reinforcement as a post action response.

Following that line of thought, Heckhausen (1991) views the idea of incentive value as less a motivational attribute, and more a reinforcement. From his perspective, actions themselves have no incentive value as the incentive comes from the consequence of the action. As a consequence is a situation that can only occur after an action, incentive value was less a motivational construct to perform an initial action and more a reinforcement to encourage that action in the future to produce a more stable choice behavior.

As motivational work continued and the idea of incentive value was modified, and or expanded, into other concepts, certain overlaps occurred. This is particularly the case with attainment value as indicated by Folger and Doherty (1993). Their work revolved primarily around the idea of perceived value of monetary sums in the attainment of specific goals. This would initially place their work in the following section related to attainment value, however, the energization model presented in their work relies significantly upon, "... the perceived value of incentives given for successful task completion" (p. 422). Clearly, the idea of the value of incentives in the motivation to complete, or attain, a particular goal or state of being, was a major transitional step from the early work of Atkinson (1957).

A more clearly defined attainment value was presented by Sorenson (1976). This representation more closely follows the modern definitions of attainment value as

stipulated in the over-arching construct of task value (Bong, 2001; Eccles & Wigfield, 2002). Sorenson (1976) provides two definitions: one for relative attainment value and one for absolute attainment value. Relative attainment value is viewed as the importance of doing well in a particular area of endeavor compared to other areas while absolute attainment value is viewed as the competence one has in a particular area regardless of the competence in other areas. Although these constructs share similar roots, Eccles & Wigfield (2002) demonstrated that these constructs are separate. Researchers asked sixth grade children to first rate how important it was to perform a particular task in English, mathematics, and sports. After completing the first set of questions, students had to complete a second set that asked how competent they felt in those areas on the same scale. Analysis of findings indicated that relative attainment value is a perceived value of self or group whereas absolute attainment value deals with physical capability and competence regardless of perceived value by self or others (Eccles & Wigfield, 2002).

Shah and Higgins (1997) further explore the idea of attainment value as, “...determined by underlying needs to attain desired end-states” (p. 448). The example given to clarify the construct is that, “the value in attaining food is based on both cognitive conceptions of the value of food and one’s underlying hunger” (p. 448). Therefore, attainment value, at least in this example, may be viewed as a combination of cognitive and affective elements in regards to a particular stimulus. An individual’s reactions to a tangible object or intangible situation will clearly be predicated on the cognitive and affective experiences with said object or situation. Through four different experiments utilizing linear regression analysis, Shah and Higgins (1997) found significant interactions between regulatory focus, expectancy, and attainment value. In

essence, the directions of the interactions indicate a positive influence on goal attainment when the goal is considered an attainment as opposed to an obligation.

Still another view of attainment value comes from the expectancy-value models of Wigfield and Eccles (2000). In this model, attainment value takes a somewhat different perspective. Building on the previous work of Battle (1966), Wigfield and Eccles (2000) perceive attainment value as the importance of doing well on a particular task. To further this perspective, attainment value is doing well on a task as an element of an individual's self assessment of worth and competence in one's self-schema (Eccles & Wigfield, 2002).

The next element of task value is that of intrinsic value. The basic idea within intrinsic value is that of personal interest and enjoyment of an activity as the rationale for engaging in said activity (Fredricks & Eccles, 2002). An elaboration on this basic theme comes from Eccles and Wigfield (2002) that includes the subjective interest that an individual has for a proposed activity. Further, there is a belief that an individual who engages in an activity for intrinsic purposes will meet, and or satisfy, certain positive psychological goals (Wigfield & Eccles, 2000).

Utility value is another of the task value subsets. Wigfield and Eccles (2000) list utility value as the usefulness of an activity to reaching a greater goal. The importance of this conception is the fact that an individual may have no interest in a particular activity, but will continue to engage in said activity simply because it serves as a means to an end. Husman et al. (2004) give a good review of the various conceptions of utility value from Raynor's (1969) view of there being two temporal qualities to the construct, both present and future, to Atkinson's (1957) Expectancy x Value perspective discussed previously.

Salience is another term that has been used to describe utility value and has been shown to correlate positively with cognitive strategies used to study effectively in academic subjects (Pintrich, 1999).

Clearly there are different definitions for the various constructs mentioned within the realm of motivation. However, one element is designed to hold them together: one element to create a family of constructs. That one binding element is value. Hence, from the motivation literature, a clear definition of value is not only desirable, but essential in understanding the currently proposed constructs.

Cognition. It is also proposed that the psychological construct of value may affect how one perceives the world (Bruner & Goodman, 1947; Hsee & Rottenstreich, 2004). Bruner and Goodman (1947) proposed a number of hypotheses though only two provide an insight into the idea of value and perception. The first hypothesis suggested that the greater the social value of an object, the greater the impact it would have on perception before cognitive appraisal. The idea behind the hypothesis is that certain objects or stimuli become accentuated to our senses based on their proposed and individualized value. This proposal would suggest that the greater the social value, as recognized by culture, personal interest, and experience, the more attuned we are to the perception of said object or stimuli. A more modern approach to this issue was taken by Pessoa (2008) in discussing valued affective stimuli in the environment and the temporal qualities of the perception of affect. The automatic quality of perception was confirmed by Pessoa (2008) and elaborated upon through the biological processes of the medial temporal region of the brain, often associated with affect (Betsch, Plessner, Schwieren, & Gutig, 2001; Dolan, 2002; LeBar & Cabeza, 2006; Pessoa, 2008). The processes of

perception through any sensory organ are mediated by medial temporal region structures that evaluate the relative importance of the stimuli before sending the information to more conscious cognitive areas for additional processing. This unconscious processing of perceived elements of the environment supports the first hypothesis of Bruner and Goodman (1947) as well as the second: “the greater the individual need for a socially valued object, the more marked will be the operation of behavioral determinants” (p. 37). Both hypotheses presume that the greater the value of a tangible object or intangible stimuli, whether from a personal or social perspective, the greater impact said object or stimuli will have on our perception.

Bruner and Goodman (1947) never give a definition for the construct. They do discuss the various ways in which particular stimuli may become fixated, i.e., the senses are conditioned - to have a primacy effect on our processing. In one example, children were asked to estimate the size, from memory, of different denominations of coins. Then, the children were asked to estimate the sizes of grey cardboard squares introduced earlier. Even though the grey cardboard circles were the same size as coins, the coins were always estimated as larger. Additional analysis indicated that children from higher socio-economic backgrounds had faster and more accurate estimates of coins than children from lower socio-economic backgrounds even though their grey cardboard disk estimates were similar. Based on the hypotheses presented, the logical course would suggest that the items most likely to become fixated are items more likely to be valued. Such items include food, water, love, fame, and money and are considered rewards; a very behaviorist motivational perspective. This gives insight into the authors’ intent

regarding what is valued and what is not, but it is far from a definition and presents, therefore, a weak theoretical front.

Closely following the idea of value as perceptual moderator is the work of Hsee and Rottenstreich (2004). Their work focuses on two types of value, valuation by calculation and valuation by feeling, both of which may act in a conscious or unconscious manner and can affect behavior. Though both types of processes of valuation affect behavior, neither is clearly defined from the perspective of actual value. The closest to a definition one gets from a highly detailed analysis of preference decision-making is the idea that value is equated with satisfaction (Hsee & Rottenstreich, 2004, p. 23).

The work of Bruner and Goodman (1947), Pessoa (2008), Dolan (2002), and Hsee and Rottenstreich (2004) in the area of value as perceptual modifier, in turn, could have an impact on how an individual might organize in memory, either consciously or not, information important to his or her life (Betsch et al., 2001; LaBar & Cabeza, 2006).

The entire idea of value affecting, not just how one perceives the world, but also how one stores memories of perceptions and builds knowledge structures from experiences, has a tremendous impact on how one might view the nature of human existence beyond simply human behavior. And yet, for all of its importance, the field of cognition and psychology has both an unstructured and diverse set of possible definitions for the psychological construct of value.

Economics. The construct of value has a long and solid history in the field of economics and economic decision making, or decision making under risk, usually framed from the perspective of both normative and descriptive decision making (Gurevich, Kliger, & Levy, 2009; Hakimzada, Gutnik, Yoskowitz, & Patel, 2005). The normative

perspective is a more logical expectation of economic behavior that can be algorithmically expressed as an axiom: a should be statement of behavior (Harrison, 2008). Descriptive economic decision making recognizes that an individual perhaps should follow some rule of behavior, but often does not for some individual or personalized reason or rationale. The heuristic models are most used to represent this variability (Gigerenzer & Gaissmaier, 2011). Two specific decision making theories and one area of decision making research will be investigated to clarify the role of value in economic, and risky, decision making.

The more descriptive perspective was largely pioneered by Kahneman and Tversky with prospect theory (1973, 1983). Daniel Kahneman and Amos Tversky studied human decision making under uncertainty during the early 1970's in response to variations in responses in expected utility experiments (Kahneman & Tversky, 1973). The various studies that they conducted led to an interesting discovery: humans do not make decisions, economic or otherwise, regarding future events in a logical manner as postulated by, "the calculus of chance or the statistical theory of prediction" as found in expected utility theory (Kahneman, 1973). From these studies, the two researchers determined that, instead of following these mathematical laws, humans rely on certain heuristics in order to draw conclusions. Heuristics are strategies that are highly economical in nature and simplify complex tasks to operations more easily dealt with (Cosmides, 1996). This collection of heuristics is called prospect theory (Kahneman & Tversky, 1983). This theory contains two stages: an editing stage where an individual evaluates and simplifies the data involved in the decision, and a valuation stage where an individual, based on his or her current status, evaluates the change in value inherent in the

decision and whether that change in value would prove beneficial based on one's current status.

More specifically, the editing stage involves the coding of information into gains and losses compared to an individual's current status, the simplification of multiple probabilities that are similar through combination, the segregation of risky elements of the decision from riskless elements that do not require evaluation, and the cancellation of shared components in a decision that do not require consideration (Kahneman & Tversky, 1983). Additionally, the editing stage contains the simplification process where more complex probabilities are rounded to more easily evaluated statements and the scanning of information to detect dominated alternatives that can be immediately eliminated from the decision process (Kahneman & Tversky, 1992). All of these processes work to reduce the cognitive activity required of an individual during the deliberation process.

The valuation stage is dependent upon three elements: the current status of the individual, the change in value of the decision in relation to the status of the individual, and how the individual will weigh that value in comparison to other potential outcomes. The belief is that the change in value in a decision is only relevant in regard to the amount of that change in relation to a person's current status. If the change has significant meaning to the individual, the prospect is considered in terms of that change, and not necessarily the probabilities inherent in that change. The potential outcomes from this valuation are then given different weights based on the desirability of the outcome compared to another (Tversky & Kahneman, 1992).

More recently, value as a construct in economics has been theorized and studied empirically through a neuroscience perspective. This relatively new field of study,

neuroeconomics, attempts to use standard neuroscience techniques such as brain imaging, patients with brain damage behavior, animal behavior, and other neural recording efforts to understand how economic preference and decision making is manifest in the brain (Camerer, Lowenstein, & Prelec, 2004). Proponents of neuroeconomics point to the normative models of behavior that could not adequately predict the various ways in which humans would break the logical rules proposed, and the descriptive models that attempted to list the various heuristics for human behavior, but were unable to account for their origins and variability. To account for both perspectives, neuroeconomics uses the neuroscientific methods to account for the known issues of the past, and hopefully propose more accurate theories for the future (Hakimzada, Gutnik, Yoskowitz, & Patel, 2005; Rustichini, 2005).

The construct of value manifests in neuroeconomics often through preferences and emotions. As stated by Litt, Eliasmith, and Thagard (2008), “Economists commonly take preferences as given, but from a psychological point of view it should be possible to explain how preferences arise from cognitive and affective processes” (p. 252). Previous research on preference required the inference of preference through questionnaires and purchasing behavior, as it could not be accurately represented. Now, however, preferences can be traced through various cortical and subcortical currents of activation during purchasing decision tasks through the use of neuroimaging techniques (Kenning & Plassmann, 2005). Deppe, Schwindt, Kugel, Plassman, and Kenning (2005) were able to determine through functional magnetic resonance imaging (fMRI) when an individual was making a purchase involving a favorite, or more valued, tangible consumer good. The predictability of purchase preference based on brain imaging was quite high as the

neural pathways were very distinct in origin. In addition, the preferred consumer good was found to increase activation in areas related strongly to affect and emotion leading the team to suggest that emotional ties to consumer products and purchases create stronger preferences that drive repeat behaviors (Deppe, Schwindt, Kugel, Plassman, & Kenning, 2005; Sharot, Mauricio, Phelps, & Elizabeth, 2004). Additional studies using positron emission tomography (PET) have indicated that emotional responses from the amygdala in the medial temporal lobe correlates with individual subjective ratings of consumer items which, in turn, correlates to incentive value and activation of the lateral orbitofrontal regions of the brain (Braeutigam, 2005). These networks tie together the processes of affect and preferences, and incentives and decision making, creating the justification for affective inclusion in the decision making process and the decision process creating its own affective response that will affect future decision making actions.

Another strong case for emotion as relevant to value can be found in the work of Desmeules, Bechara, and Dube (2008) in approach and avoidance systems of motivation and decision choice. In multiple studies, the researchers have found that approach and avoidance regulating systems, identified primarily as affective systems that selectively recruit cognitive resources, create systematic preferences that lead to stable and repeated behaviors.

Sanfey, Loewenstein, McClure, and Cohen (2006) advocate a strong relationship between the affective creation of preference and value and the biological influence of reward. In animal models, electrical chemical recordings along specific neural pathways have shown that certain interior portions of the brain respond differentially to reward

magnitude. This has been repeated in brain imaging studies with humans in which choice items that have a greater affective value to the participant create greater brain activation in the reward circuits whether the choice items are monetary (Knutson, Adams, Fong, & Hommer, 2001), appetitive food items (McClure, Li, Tomlin, Cypert, & Montague, 2004), or intangible social situations (Rilling, Sanfey, Aronson, Nystrom, & Cohen, 2004).

A review of the value literature allows for an expansion of the operationalized definition of value. Though many researchers have used the term importance in empirical efforts as synonymous with value (Hsee & Rottenstreich, 2004; Sorensen, 1976; Tversky & Kahneman, 1992) there clearly exist other constructs and ideas which, bound together, create a structure for the construct of value. These other elements allow the psychological construct of value to be conceptualized as a multi-dimensional affective construct with motivational properties. Both the affective and motivational dimensions of affect play a role in yet another component of value: stability.

Stability

In line with the reasoning of value as containing both an incentive and attainment component (Eccles & Wigfield, 2002), another element of the definition of stability is considered. If value can serve to motivate behavior toward a particularly valued goal or state as considered by Atkinson (1957), Rosenberg (1960), and Shah and Higgins (1997), and value can also reinforce a behavior after reaching or attaining that goal as determined by Heckhausen (1991), Eccles and Wigfield (2000), and Nagengast, Marsh, and Scalas (2011), then the expectation should be that the behavior and value stimulus should become learned and perhaps stable relationships. As previously stated, the work of

Gottfried, O’Doherty, and Dolan (2003) touch directly on the issue of reinforcement and predictive value of behavior as represented in specific brain structures and networks. This belief is further supported by the work of Rushworth, Noonan, Boorman, Walton, and Behrens (2011) in their recent review of reward guided learning and reinforcement in decision making. The idea of learning and reinforcement from value is also a component of the cognitive processing literature as exemplified by Bruner and Goodman’s (1947) research on unconscious processing and the more recent biological elements of perceptual processing of value as given by Dolan (2002) and LeBar & Cabeza (2006). This ultimately presents the possibility that a previously unstated component may exist in the definition of value: stability.

Stability is the recognition that affective valuations of stimuli are learned and are often assimilated implicitly (Murray, Izquierdo, & Malkova, 2009; Phelps & LeDoux, 2005; Scherer & Ellsworth, 2009; Storbeck & Clore, 2008; Tottenham, Hare, & Casey, 2009). Stability represents a very specific dimension of cognitive interaction: specifically, affective memory. To understand the role affect may play in the memory of experienced stimuli, and the effect this would have on the concept of stability, one must turn to the amygdala, a small, bilateral structure in the medial temporal lobe just forward of the anterior portion of the hippocampus (Freese & Amaral, 2009). Numerous studies indicate that the amygdala is involved in the determination of valence and arousal for experienced and novel stimuli, or at least, is involved in determining the salience of the stimuli to the organism with which it is interacting (Cunningham, Bavel, & Johnsen, 2008; Dalgleish, 2004; Freese & Amaral, 2009; LaBar & Cabeza, 2006; LeDoux & Schiller, 2009). Whether discussing affective style (Davidson, 2004), neural decision

theory (Litt, Eliasmith, & Thagard, 2008), an affect oriented event-coding account of action (Lavender & Hommel, 2007), appraisal theories of affect and cognition (Scherer & Ellsworth, 2009) or the primacy of feelings in judgment (Pham, Cohen, Pracejus, & Hughes, 2001), one element is quite clear: there is a specific neural link between affective stimuli as registered in the amygdala and a positive impact on implicit memory retention. The amygdala does not act alone in the enhancement of memory, but is shown to marshal cortical areas of the prefrontal cortex related to attention to promote continued focus on the stimuli in question, and to stimulate hippocampal regions for the actual encoding of the memory for later retrieval (Davidson, 2004; Isen, 2001; Kensinger & Schacter, 2008; LaBar & Warren, 2009; Sander, 2009).

This is not to suggest that once an individual has experienced a particular stimulus and affective response pairing numerous times that the pairing would stay inviolate for the lifespan of the organism. Plasticity, or the ability of neural connections to alter and change based on past and current experience, is an important condition to any category of memory (Posner, Russell, & Peterson, 2005; Whalen, Davis, Oler, Kim, Kim, & Neta, 2009). The ability to change and alter the neural connections that represent a particular stimulus is critical to the adaptive process, both affectively and cognitively (Allen & Monyer, 2013; Cunningham, Bavel, Johnsen, 2008; Gaesser, Sorengm NcKekkabdm Addum & Sschacter, 2013; Hamann, 2009; Storbeck & Clore, 2008).

Therefore, the concept of stability in the definition of value represents an affective memory trace for a particular stimulus that will cause an organism, barring cognitive or affective interference, to remember the felt expression of the stimuli and to regard it similarly through multiple experiences. This allows for the growth of the organism as

new experiences, and experiences with novel stimuli, may change the relative affective expression for a previous stimulus. The not always consciously remembered state and felt expression is then believed to influence individual action (Cunningham & Zelazo, 2007).

Regret

One construct with a strong theoretical base and significant experimental support data is regret. Since regret is an affective construct related to decision and choice processes, it should prove to be a reasonable companion construct for the validity process. Previous research (Abraham & Sheeran, 2003; Kahneman & Tversky, 1982; Hetts, Boninger, Armor, Gleicher, & Nathanson, 2000; Zeelenberg, van Dijk, Manstead, & van der Pligt, 2000; Roese & Summerville, 2005) has identified particular characteristics of the construct of regret and are elucidated below. Described in the following sections are counterfactuals, the idea of anticipatory regret, issues of personal agency, opportunity for action, and a differentiation between disappointment and regret. Additionally, the issue of regret having the ability to inform or alter behavior will be briefly discussed as an important element within each of the above mentioned characteristics of regret (Pieters & Zeelenberg, 2005).

Counterfactuals. As uncertainty is one of the most common conditions under which an individual makes a decision, it is not surprising that one emotion of particular interest is regret. When an individual makes a decision, he or she may have particular emotions associated with the type of decision to be made (getting married, buying a house, selecting a retirement savings plan, etc.) and form expectations as to the outcome, and the emotions associated with the outcome, of the decision process (Connolly &

Zeelenberg, 2002). Regret is directly tied to the expectations of the decision. More specifically, regret is the cognitively based negative emotion associated with a decision of poor outcome that might have turned out differently with a different choice made (Gilbert, Morewedge, Risen, & Wilson, 2004). The cognitive creation of multiple alternatives in a decision situation and the attempted evaluation of those alternative has been termed counterfactual thinking – first identified by Kahneman and Tversky in 1982 (Hetts, Boninger, Armor, Gleicher, & Nathanson, 2000).

The concept of counterfactual thinking is integral to the research on regret. Counterfactuals contain all the elements necessary to identify and research the overall decision process, including the motivation to act according to what an individual most desires or values. Counterfactuals contain antecedent conditions and multiple alternative outcomes that can give rise to the cognitive processes necessary to reach each of the alternative goal states and therefore give rise to the behavioral process that is actually used to reach an identified goal state (Hetts, Boninger, Armor, Gleicher, & Nathanson, 2000). Using counterfactual thought as a basis for the regret definition, Brehaut, O'Connor, Wood, Hack, Siminoff, Gordon, and Feldman-Stewart (2003) attempted to create a decision regret scale for medical decisions by patients. After factor analysis and test-retest reliability efforts, internal consistency was positive, with mean scores and correlations consistent across items.

In simpler terms, the idea of counterfactual thought is that an individual will, after making a decision, elaborate on each of the possible outcomes that might have happened if a different choice had been made. Are these outcomes real? No, they are fictions. When an individual makes a decision, he or she is often not aware of the outcome. Nor is

the individual aware of alternative outcomes. The perceived outcomes of choices not made are based solely on guesses and inferences based on one's knowledge of the world and the circumstances surrounding a particular choice condition (Zeelenberg, Beattie, van der Plight, & DeVries, 1996). The antecedent conditions as well as the alternative goal states assist regret researchers as the anticipated negative affective outcomes and their appraisals can be assessed, albeit through self report, and the actual affective response can be assessed after the choice is made (van Dijk & Zeelenberg, 2002).

Anticipatory Regret. When an individual decides between multiple options, the regret associated with each option is included into the decision making process (Hetts, Boninger, Armor, Gleicher, & Nathanson, 2000). This type of regret, anticipatory regret, is part of the cognitive counterfactual thought process and is believed to moderate the intention-behavior relationship (Abraham & Sheeran, 2003). As part of the antecedent process to the actual decision, the potential for anticipated regret to alter the choice behavior is particularly interesting. By thinking about how the outcome of a decision will make someone feel, the individual is gauging the utility of that prospect through an emotional lens. Since individuals have a general tendency to wish to avoid negative affect, the planning stage of the decision process, or the intention to act on a particular choice facing that individual, will be affected by the prospect of the anticipated regret associated with a particular course of action (Abraham & Sheeran, 2003). The empirical results of this were made manifest in three studies performed by Abraham & Sheeran (2003). The studies used linear regression modeling and the following variables in three different scenarios: actual exercise behavior, planned exercise behavior, past exercise behavior, and anticipated regret for not exercising. The first study simply found that each

variable added to the model improved variance accounted for with anticipated regret providing minimal variance but the intention by anticipated regret variable accounted for a significant effect of variance. Similar results were found in both the second and third studies with the second priming anticipated regret through a pre-questionnaire question and the third accounting for the intention and anticipated regret interaction having a stability effect on actual behavior.

Interesting additions to this theory revolve around whether or not individuals spontaneously generate anticipated regret (Crawford, McConnell, Lewis, & Sherman, 2002). If anticipated regret is not spontaneously generated, but requires cues or questions to be activated prior to the decision, then the lack or existence of the anticipated regret should change the intensity of the regret felt for a poor decision (Crawford, McConnell, Lewis, & Sherman, 2002).

Personal Agency. A key component found to be essential in the expression of regret is that of personal agency and the sense that the individual had control over the situation and made a bad choice (Zeelenberg, van Dijk, Manstead, & van der Pligt, 2000). Regret, therefore, is accompanied by feelings that the individual has lost an opportunity and desire to correct one's mistake, by wanting to completely undo the situation, and a wish that the situation could be "done over" to produce a more valued outcome (Pieters & Zeelenberg, 2005). This is one of the most consistently found results in regret research and has been found in a variety of experimental contexts (Gilbert, Morewedge, Risen, & Wilson, 2004; Pieters & Zeelenberg, 2005; van Dijk & Zeelenberg, 2002). There have been two moderating effects identified for personal agency that may have exceptional

impact on the intensity of the regret after choice: the action/inaction effect and reactance/compliance effect.

The action/inaction effect is directly related to the individual's opportunity to act or not act in a particular decision or choice situation (Pieters & Zeelenberg, 2005). The original belief was that regret is intensified in situations where an individual has the opportunity to act but chooses not to act and therefore misses out on a desirable outcome (Pieters & Zeelenberg, 2005; Ordonez & Connolly, 2000). However, recent research has shown that it is not simply the action or inaction that influences the regret intensity, but whether the action or inaction is both "normal" behavior for the situation and justifiable under the conditions of the decisions. Therefore, under the constraints of agency and action, regret intensity will be increased when one's decision is unreasonable, unjustifiable, and inexplicable (Zeelenberg, van den Bos, van Dijk, & Pieters, 2002).

The reactance/compliance effect is tied to both personal agency and the action/inaction effect. According to reactance theory, there exists a set of free behaviors from which an individual can choose. If any of these behaviors are restricted, eliminated, or simply threatened, a motivational state called reactance is activated to reestablish this restricted behavior (Crawford, McConnell, Lewis, & Sherman, 2002). In the theories of regret, this is best illustrated when an individual is facing a decision and there is influence from another individual to pick a particular course of action. This influence can result in reactance in which the individual actively chooses against the advice given, or compliance where the individual follows the advice and chooses the recommended course of action (Crawford, McConnell, Lewis, & Sherman, 2002). Experimental results indicate that awareness and feelings of anticipated regret lead to higher levels of

compliance and that compliance leads to greater actual regret than does reactance (Crawford, McConnell, Lewis, & Sherman, 2002). This offers the intriguing possibility that behavior can be altered and changed based on the previous experience that an individual has with the influence of individuals in very particular decision and choice circumstances.

Opportunity. Opportunity could be considered as being in line, and a part of, the action/inaction effect, but there are particular elements that are best discussed on their own. In the simplest terms, opportunity is believed to breed regret (Roese & Summerville, 2005). It is clear to see how the concept of opportunity and the action/inaction effect are related. One cannot act if one does not have the opportunity to act or have the opportunity to not act. From this viewpoint, opportunity is a precursor and prerequisite for the action/inaction effect.

The opportunity principle states that regret will be strongest where the chances for corrective action are the clearest (Roese & Summerville, 2005). The second principle of opportunity is that regret spurs corrective action in the decision process and that the corrective action is more likely when the action is both possible and effective (Roese & Summerville, 2005). These principles involved with the opportunity for corrective action and the motivation to change the decision process have strong implications for any experimental condition in which participants are given the option of changing a choice selection, or in which the participant will be involved in multiple trials that allow for one to learn from the regret of a previous trial. A simple experiment by Gilbert, Morewedge, Risen, and Wilson (2004) illustrates this principle. Experimenters spent time in a subway station. When people arrived at the station after a train had left, the experimenters would

interview the individuals and give them unknown information such as the train left 1 minute ago, narrow margin condition, to the train left 5 minutes ago, wider margin condition. Individuals agreeing to participate then answered questions regarding regret over having missed the train. Participants in the narrow margin condition who missed the train by 1 minute related higher levels of regret simply because the possibility of corrective action was viewed as higher. Participants felt that leaving home only a few seconds earlier, not stopping for coffee, or even walking a bit faster were all controllable, agency, based options for not having missed the train.

Opportunity also seems to be a principle component in the regret individuals feel in different life domains that equate to the value individuals hold for those domains. In a meta-analysis that reviewed previously published regret rankings, Roese and Summerville (2005) found that an individual's biggest regrets in life are those with the biggest chance of corrective action. Additionally, opportunity and importance, or value, were the most significant independent predictors of regret intensity in a regression model. In their meta-analysis, Roese and Summerville (2005) were able to identify six high opportunity life domains and six low opportunity life domains. The regret associated with questions from each domain was significantly higher in the high opportunity domains and those high opportunity domains were found to be the ones more personally important to the participants (Roese & Summerville, 2005).

Disappointment. Before continuing, it is necessary to allay a common misconception when dealing with research in this area. There have been questions raised as to the differences between the constructs of regret and disappointment (Zeelenberg, van Dijk, Manstead, & van der Pligt, 2000). Both regret and disappointment are

associated with decision processes. How then are they to be reliably differentiated? Appraisal theory is one method that can be used to differentiate emotions as “each emotion can be related to specific patterns of evaluations and interpretations of events (appraisals)”(van Dijk & Zeelenberg, 2002, p. 322). It has been found that, using the appraisal dimensions as proposed by Roseman (1996), regret and disappointment are very clearly delineated in the outcome of a decision (van Dijk & Zeelenberg, 2002). Using autobiographical recall procedures and imagined scenarios in different research studies, Martinez, Zeelenberg, and Rijsman (2010) were able to clearly differentiate the affective states of regret and disappointment. In addition, Zeelenberg, van Dijk, Manstead, and van der Plight (2000) found distinct antecedent conditions and appraisal patterns for disappointment and regret through personal interviews and recall of past participant experiences.

As stated earlier, personal agency and a feeling of control are important elements to the expression of the regret emotion. This was clearly demonstrated in the experimental results of van Dijk and Zeelenberg (2002) where regret was associated with the control and agency appraisals while the emotion of disappointment was identified with the appraisals of unexpectedness, desirability of a pleasurable outcome, and circumstances beyond one’s control. In a similar study, Zeelenberg et al. (2000) found that regret was more intensely felt than disappointment and operated through self-recrimination over the bad choice and the desire to undo the circumstances or to get a second chance. Disappointment on the other hand, involved the feeling of powerlessness and the desire to turn away or get away from the situation. Though both are considered

to be emotions and both are expected to be experienced from the outcome of a bad decision, it is clear that they are not experienced under the same decision conditions.

Scope of Research on Regret

Regret has been extensively studied empirically in numerous fields of research such as mental health (Roese, Epstude, & Fessel, 2009; Zeelenberg & Breugelmans, 2008;) personal relationships (Roese, 2006; Summerville & Buchanan, 2013) economics and monetary decision processes (van de Venn & Zeelenberg, 2011; Thiene, Boeri, & Chorus, 2012) judgment and decision making (Zeelenberg, 1998; Connolly & Zeelenberg, 2002) and the study of the relationship of value to disappointment (van Dijk & Zeelenberg, 2002; Martinez, Zeelenberg, & Rijsman, 2011).

Even with such variety of study, what is truly laudable is that the definition for regret remains essentially the same throughout: regret is the negative affective state arising from the perceived belief that an alternative choice on the part of an individual would lead to a better, or more desired, outcome. The combination of these two factors, extensive empirical research across multiple disciplines and the consistent definition used for empirical studies, provides for a strong construct with good construct validity (Trochim, 2006).

What has not been previously clearly articulated is the relationship of regret to value. From the literature, it is clear that both value and regret have extensive empirical use in decision making, both monetary and dealing with intangible attitudes and appreciations, and motivation paradigms. It is interesting that the two constructs, used in the same research areas, have not been used together in that research.

A theoretical relationship, based on logic and awaiting empirical validation, can be seen in how the two constructs are used in the decision making and motivational research. Value, from a motivational perspective, has its earliest conceptions as a drive for a particular goal or state (Atkinson, 1957). Even later conceptions, such as incentive value from Heckhausen (1991) and task value from Expectancy - Value Theory (Wigfield & Eccles, 2000), recognize both drive for a goal and reinforcement of action for having reached that goal. That which an individual desires or values, is worth acting toward or for. Once achieved, a future situation in which that particular value is present will likely engage the previous behaviors that allowed the value to be achieved or attained.

Chapter 3 : Methods

The people, materials, and processes that are referenced in this chapter were organized and implemented to answer 3 questions. First, does the construct of value have stability across time and across contexts of experience for an individual participant? Second, do the 3 categories of stimulus items used to elicit value ratings from the participants differ in their stability ratings across participants? Third, is there a linear relationship between regret and perceived value as indicated in the previously hypothesized logic statement?

Participants

Fifty-five students enrolled in an undergraduate educational psychology course at the University of South Carolina signed up to participate in the study for extra credit. Of those 55, 11 either completed only one time period or did not fully complete one of the two time periods, leaving a total participant count of 44 (N=44, range = 19 years – 36 years, $M_{age}=21$, 75% female). Demographic data on the students who were not included in the study was incomplete and any attempt to determine specific sample differences between participants who did not complete the project and students who did complete the project was not attempted. Based on self-report, the sample proved largely homogenous with a large number of European-Americans (N=38), and a small number of Black or African American respondents (N=4) and Asian respondents (N=2).

Materials

Seventy-two cards were created with textual descriptions and visual representations of various stimulus items with one stimulus item per card, see Figure 3.1 for example stimuli. Each card had a unique number, presented to the participants as the Card Number, so that ratings for each stimulus item could be easily tracked. Each stimulus item was created to fit into one of three categories: monetary, tangible, and intangible items with twenty-four cards for each category. The tangible and intangible card groups were created as representations of the broader domains of value and regret as exemplified by Schwartz (1996), Roese and Summerville (2007), and Rokeach (1973). Each monetary card contained a dollar amount, none of which repeated, that ranged from 10 dollars to 15,000 dollars. Tangible items were physical items that an individual can buy and/or receive and expect to have over an extended period of time such as digital music players, trips, books, gaming systems, etc. Experiential stimuli, the intangible items, were primarily experiences that are more difficult to quantify with a dollar value, but are still expected to have varying levels of value such as a family reunion, a beautiful sunset in a location of the participant's choice, a period of time without pain or illness, etc. The inclusion of monetary cards was based primarily on the fact that much of the regret and decision making research is based on experiments involving money (McClure, Laibson, Lowenstein, & Cohen, 2004; van't Wout, Kahn, Sanfey, & Aleman, 2006; van Dijk, & Zeelenberg, 2002; Zeelenberg, & Pieters, 2007). See Appendix A for a list of card numbers and associated stimulus item descriptions.

Sample Monetary Card	Sample Tangible Card	Sample Intangible Card
<p>116</p> <p>1,000 dollars cash</p> 	<p>205</p> <p>2 movie tickets of choice</p> 	<p>304</p> <p>A compliment from a friend</p> 

Figure 3.1. Example Stimuli Cards

Two surveys were used in this study, see Table 3.1 for a summary of the survey design and measures. The first (Time One), collected demographic information for each participant, assigned a unique identifier not related to the participant's name for use during the analysis procedures, and provided 72 entries for a card number; a value rating scale that ran from 1, indicating the item held no importance to the participant, to 10 indicating that the item held great importance to the participant.

The second survey (Time Two), which was completed during a second session a minimum of 30 days later, contained 36 rounds of choice conditions. Participants were required to select 1 card from 2 stacks of cards (the 72 stimulus items were randomly divided into 2 equal stacks or decks with equivalent numbers of items from each category in each deck). They then rated (using a 10-point Likert-type scale) the value of the selected card, examined the non-selected card and rated the value of that card and finally rated how much regret they had for choosing the selected card over the non-selected card.

Table 3.1 *Survey Design, Measures and Scale.*

Time	Measures	Scale
Time One	Value Rating	1 = No Importance to 10 = High Importance
Time Two	Selected Card Value Rating	1 = No Importance to 10 = High Importance
	Non-Selected Card Value Rating	1 = No Importance to 10 = High Importance
	Regret at Selection Choice Rating	1 = No Regret to 10 = High Regret

Procedure

As previously stated, the study consisted of 2 phases that were separated by a minimum of 30 days. This amount of time was selected as it is maintained in this project that the value construct, as represented in human memory, is implicit in nature as opposed to explicit. As a construct represented in implicit memory, the long-term storage of information related to value stimuli is not believed to have been actively memorized for retention (Bailey & Kandel, 2008), but has maintained its presence long-term through repeated exposure, with affective exposure enhancing the retention possibility (Alberini, 2011; Brod, Werkle-Bergner, & Shing, 2013). An issue of concern for a dual exposure procedure is memory priming (Kristjansson & Campana, 2010; Mace, 2005). A 30 day delay would ensure any single exposure from Time One would not unduly influence the rating decisions in Time Two. It was expected that the repeated exposure would create a priming effect, in essence, reestablishing the affective state from previous exposures allowing for a stable rating. However, there was not expected to be an accurate declarative memory of the actual number of the rating from Time One without explicit repetition (Alberini, 2011; Brod, Werkle-Bergner, & Shing, 2013; Dalgleish, 2004).

Time One involved the use of the 72 stimulus item cards, shuffled randomly and kept in 1 deck face down, and Survey I. Participants signed up for hour long blocks of

time. Upon arrival at the designated location for the study, participants were given Survey I and asked to fill out the demographic information on the first page. When finished, the proctor then gave the instructions for the rest of the survey. Participants were instructed to turn over the top card of the stimulus item deck, read the description and look at the accompanying image, write the Card Number down in the space provided on Survey I, and then rate how important that item was to them on a scale from 1 to 10 with 1 being not important and 10 being very important. Participants were told to continue following that procedure until all cards in the deck had been rated. Before being allowed to begin, participants were asked to keep three rules in mind and a sign was placed on the desk with the rules clearly printed to help the participant to remember them.

1. Rule one: all ratings are for how important the item is to you personally. Do not consider the perceived importance by friends, loved ones, family, etc.
2. Rule two: imagine that you do not own the item on the card, or if an experience, have access to the experience. Then consider how important the item is to you.
3. Rule three: do not consider how much money the item or experience would cost you. Just consider how important the item or experience would be for you to have given rule one and rule two.

The proctor would then leave the room to remove distractions and potential bias from the rating procedure. Participants were told to open the door and ask the proctor for assistance if there were any questions. When complete, the participant left the room and the proctor took the survey to file it accordingly.

At Time Two, participants completed Survey Two, using the 72 stimulus item cards divided into 2 stacks with an equal number of monetary, tangible, and intangible items in each stack. Items within each stack were randomized for each participant.

The participants were given Survey Two and reminded that the 3 rules to remember during the rating of stimulus items in Time I still apply to Time Two stimulus ratings. Participants were asked to pick the top card from either stack of stimulus cards, designated as stack A and stack B, and turn it face up on the desk in front of the stack that it came from. This, they were told, was their selection and should be considered a hypothetical gift. They then were to write the card number in the space provided and to rate the importance of the item or experience on the same ten-point scale as used in Time One. Then, the participants were asked to turn over the top card from the stack from which their selection did not come and lay it face up on the desk in front of its origin stack. This, they were reminded, was the card that they could have selected. The participants wrote down the card number for this stimulus item and rated it on the same 1 to 10 importance scale as used in Time One. Participants were then asked to rate how much they regret having selected their hypothetical gift versus the gift they could have selected but did not. The regret scale was a 10 point scale with 1 representing no regret and 10 representing high regret. This completed one round of the Time Two survey. With 36 cards in each stack, the participants were asked to continue the process for another 35 rounds until all cards had been rated. Again, once participants had completed one round, the proctor left the room to ensure privacy of responses. Participants were told to open the door and get the proctor should they have any questions. Table 3.2

Table 3.2 Example of Participant Selection of Cards, Value Ratings, and Adherence to Hypothesized Pattern Over Three Rounds

	Round 1	Round 2	Round 3
Perceived Value Rating for 1 st Card Selected (Logic Notation S for Selected)	8	3	8
Perceived Value Rating for 2 nd Card Selected (Logic Notation NS for Not Selected)	5	6	5
Perceived Regret Rating for Comparison (Logic Notation R for Regret)	3	9	7
Hypothesized Regret Number Based on 1 st and 2 nd Card Selection	≤ 5	≥ 6	≤ 5
Follows Hypothesis	Yes	Yes	No

illustrates the application of the hypothesis logic statement on a hypothetical participant's responses over three rounds of selections.

Figure 3.2 provides a breakdown of the items used, how they were organized, and how the participants used those items in the Time One and Time Two procedures.





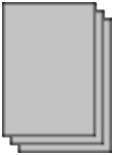




Time One	Item	Item	Item	Method	
	24 Monetary Cards 101-124 	24 Tangible Cards 201-224 	24 Intangible Cards 301-324 	Monetary, Tangible, and Intangible cards randomized into one stack of 72 cards for value rating on 10 point scale 	
Time Two	Item	Item	Method Step 1	Method Step 2	Method Step 3
	12 Monetary, 12 Tangible, and 12 Intangible cards randomly selected for Deck A and shuffled 	12 Monetary, 12 Tangible, and 12 Intangible cards randomly selected for Deck B and shuffled 	Turn over top card from deck A or B as your selection. Give value rating for item on card on 10 point scale. 	Turn over top card from deck not selected in Step 1. Give value rating for item on card on 10 point scale. 	Imagining that you received the item on card from Step 1, rate regret on 10 point scale of having item from Step 1 instead of item from Step 2 

Figure 3.2. Summary of Materials and Processes for Time One and Time Two

Chapter 4: Results

Three research questions were asked related to within subject stability of value across contexts, the stability of value ratings across subjects in different domains of interest, and the relationship between perceived value and perceived regret. Within-subject stability was measured through the rating of the same stimulus items by the participant at two different time points and under two different conditions. A paired samples t-test was the primary assessment measure used. Absolute value difference scores were then created for each participant. The difference scores for all participants were averaged for the monetary stimulus item category, the tangible stimulus item category, and the intangible stimulus item category. Paired sample t-tests were run for each pairing of stimulus item category: monetary and tangible, monetary and intangible, and tangible and intangible. The relationship between perceived regret and perceived value in a choice condition was hypothesized to follow a particular pattern. Based on the choices and ratings made by the participants, each instance of a choice following the expected pattern was considered true and each instance that did not follow the pattern was considered false. This allowed for a binomial distribution comparison of number of responses compared to number of responses listed as true to determine if a statistically significant number of responses were found to be true. Then, the participants could be compared to a binomial distribution for number of participants found to be statistically

significant out of the total number of participants. The results of these investigations are presented in this same order.

Hypothesis 1 Result: Within Subject Stability

A 72 item repeated measures t-test was used to determine if the ratings made by a participant at Time One were statistically similar to the ratings given at Time Two across all items. Therefore, 44 t-tests were run, one for each participant of the study. Of the 44 tests run, 16 showed a mean difference in scores between Time One and Time Two (N=16). However, interpretation of the results must be considered carefully. As the hypothesis states that importance ratings will not vary between phases, the tests that were not statistically significant for a t-test are the scores of interest (N=28). The 44 scores, their significance values, and their confidence intervals are listed in Appendix B.

The 44 t-tests were then subjected to a one-sided binomial test, given the one-sided hypothesis, to determine if the number of participants who demonstrated stability in scores was statistically significant given the sample size. Based on the results of the binomial test, the 28 scores of interest were determined to be a statistically significant number of scores given the sample size ($p < .048$, $CV = 28$).

Of the 44 participants in the study, 28 showed no statistical difference in ratings from Time One to Time Two. When compared to a binomial distribution with a maximum number of 44, the 28 participants were found to be a statistically significant number of participants who were stable in their rating of value.

Hypothesis 2 Result: Across Category Stability

An additional analysis was run to determine if there was a difference in level of stability rating between the three categories of stimulus items: monetary, tangible, and

intangible. Were the ratings of the participants as a group more stable for a particular group of stimulus items or were the ratings by group statistically different? To determine this, an absolute value difference score was created for each Time One and Time Two rating of each stimulus item for each participant. As the ratings were on a scale of 1 to 10 for all pairings and there was no a priori hypothesis as to whether a particular rating would be higher than another, the absolute value of change was the number of interest. Once the difference scores were created, the difference scores for each paired item were averaged across participants. This provided 24 difference scores for the monetary category, 24 difference scores for the tangible category, and 24 difference scores for the intangible category. These scores were then subjected to a paired samples t-test: Monetary category ($M = .62$, $SD = .27$) paired with Tangible category ($M = 1.93$, $SD = .67$), Monetary category ($M = .62$, $SD = .27$) paired with Intangible category ($M = 1.64$, $SD = .60$), and Tangible category ($M = 1.93$, $SD = .67$) paired with Intangible category ($M = 1.64$, $SD = .60$). The results of the absolute value difference scores t-test pairings are given in Table 4.1.

Three paired samples t-test were conducted on the absolute value difference scores of the participants grouped by stimulus item category to determine if the stability of participant ratings was similar across those categories. The Monetary and Tangible categories showed clearly that there was indeed a difference in the stability of ratings as represented by difference scores, $t(43) = 11.09$, $p < 0.001$. The effect size for the Monetary and Tangible pairing was found to exceed Cohen's (1988) convention for a large effect ($d = 2.36$). Similarly, the Monetary and Intangible category pairing showed a

Table 4.1 *Pairings of Stimulus Item Categories and Significance*

Category 1	Category 2	$t(df)$	p	Cohen's d
Monetary	Tangible	$t(43) = 11.09$	$p < 0.001$	$d = 2.36$
Monetary	Intangible	$t(43) = 10.09$	$p < 0.001$	$d = 2.15$
Tangible	Intangible	$t(43) = 2.08$	$p = .043$	$d = .44$

statistically significant difference in stability as represented in difference scores, $t(43) = 10.09, p < 0.001$. The effect size for the Monetary and Intangible pairing also exceeded Cohen's (1988) convention for a large effect ($d = 2.15$). The Tangible and Intangible pairing of difference scores also display a statistically significant difference in stability, $t(43) = 2.08, p = .043$. In this instance, the effect size for Cohen's (1988) convention can best be characterized as a medium effect ($d = .44$).

Hypothesis 3 Result: Relation Between Value and Regret

The third research question and process involves the hypothesized relation of value and regret. Time Two of the study involved 36 choice conditions for each participant as stipulated in the procedures section. Each choice condition for each participant, minus any choices in which the value ratings for "S" (selected) and "NS" (not selected) were the same, was subjected to the following logic condition to determine whether it was true: $(\Rightarrow S > NS \wedge R \leq NS) \vee (\Rightarrow S < NS \wedge R \geq NS)$.

In other words, if the participant selected a card and the value rating for that card was above the value rating of the not selected card, the perceived regret would be lower than both the selected and not selected ratings on the same scale. In addition, if the participant rated the value of the selected card as below the value rating of the not selected card, the perceived regret rating, on the same scale, would be higher than both

the selected and not selected value ratings. If either of these conditions was met, the hypothesis was deemed to be true.

Once each of the choice conditions was determined as true or false, the observed number of true responses was compared to a binomial test for the total number of responses from that participant. In order to accomplish this task, as each participant could potentially have a different number of responses once the ties were removed from consideration, a binomial table was created for responses ranging from a count of 15 to 36 total choice conditions. Confidence intervals were also calculated to help interpret the true significance of the procedure for each participant as the total number of responses varied and the samples size for each participant was not particularly large. The results from this procedure are outlined in Appendix B.

After this initial procedure, the total number of participants who had a statistically significant number of choice condition responses out of their total number of responses was again compared to a binomial table. The critical value for the 44 participants was 28 with an observed number of statistically significant participants equaling 39. This result indicates a statistically significant proportion of the participants fell within the hypothesized relationship between value and regret ($p = .048$, $CV=28$). This relationship indicates that as value for a personal selection increases compared to an alternative selection, the regret of the selection choice decreases. Similarly, if the value of a personal selection is lower than the perceived value of the unselected choice, the regret for the personal decision increases

Chapter 5: Discussion

This chapter will briefly review the research questions addressed in the study and the accompanying results. The limitations in the study are presented so the results are placed in proper context. Implications for research and practice will be reviewed before closing remarks.

Overview of this Research

The primary purpose of this research was the clarification of qualities of the psychological construct of value. Three research questions were asked related to within subject stability of value across contexts, the stability of value ratings across subjects in different domains of interest, and the relationship between perceived value and perceived regret.

Within subject stability for hypothesis one was measured through the rating of the same stimulus items by the participant at two different time points and under two different conditions. A paired samples t-test was the primary assessment measure used and indicated that any difference in ratings from Time One to Time Two could not be statistically attributed to chance.

To determine if there was a difference in stability ratings between the different categories of stimulus items presented, absolute value difference scores were created for each participant. The difference scores for all participants were averaged for the

monetary stimulus item category, the tangible stimulus item category, and the intangible stimulus item category. Paired sample t-tests were run for each pairing of stimulus item category: monetary and tangible, monetary and intangible, and tangible and intangible. Statistically significant differences were discovered in all three pairings of stimulus item categories.

The relationship between perceived regret and perceived value in a choice condition was hypothesized to follow a specified pattern. Participants made value ratings during a choice condition that requested an additional regret rating. Based on the choices and ratings made by the participants, each instance of a choice following the expected pattern was considered true and each instance that did not follow the pattern was considered false. A binomial distribution comparison could then be made to consider if the number of responses found true out of all choice conditions was statistically significant for that participant. After 44 binomial distribution comparisons, the participants could be compared to a binomial distribution for number of participants found to be statistically significant out of the total number of participants. A statistically significant number of participants were found to follow the hypothesized pattern of value and regret ratings.

Discussion of Results

The results of these three hypotheses suggest that there may be strong, stable, and predictable qualities related to the construct of value. Hypothesis one involved the question of stability. Though the literature base refers obliquely to the quality of stability in philosophy and culture (Schwartz & Bardi, 2001), motivation (Atkinson, 1957, Rosenberg, 1960; Nagengast, et. al., 2011), and economic decision making (Dougherty,

Gettis, & Ogden, 1999; Litt, Eliasmith, & Thagard, 2008; Sanfey, Loewenstein, McClure, & Cohen, 2006) it has not been the subject of direct empirical study. These results indicate that 63.6% of participants (28 out of 44) showed stable value ratings on stimulus items from Time One to Time Two. This could indicate that the affective properties of stimulus items help to create valence and arousal memory traces that are stored for use in future decision making.

It is important to note that no comparison was made on an individual level for how someone rated an item compared to someone else. These ratings, and the stability results, are only personal and individual ratings and scores.

Hypothesis two raised the question of stability of value ratings between different domains. The results of significant differences between the absolute value difference score ratings of the three domains of monetary ($M = .62$), intangible ($M = 1.64$), and tangible ($M = 1.93$) stimuli categories is not surprising and mirrors much of the work presented on preferences, value, and reward between money (Knutson, Adams, Fong, & Hommer, 2001), food items (McClure, Li, Tomlin, Cypert, & Montague, 2004), and social situations (Rilling, Sanfey, Aronson, Nystrom, & Cohen, 2004). Preferences are believed to be affective and cognitive processes that fix specific valence and arousal patterns to specific items (Litt, Eliasmith, & Thagard, 2008). Variances should be expected between stimuli. The fact that the categories themselves showed such differences, and not just individual items, is not a finding in the existing research and opens another avenue for additional research in value domains.

This also serves as a cautionary note to future researchers. There is no reason to believe that an individual who has somewhat similar ratings in one field or domain will

have similar ratings in another domain. Domain specific research must be careful of generalizations and multi-domain research in value must be aware of the potential differences across domains.

Hypothesis three investigated regret and value. Regret and value, though both integral parts of the decision process, have not been studied together in any explicit manner previously. The relationship between the two constructs is strong and predictable in this research with 88.6% of participants (39 out of 44) following the value and regret hypothesis. This suggests the possibility of using these two constructs together in future research to improve understanding of the decision process.

From a validity viewpoint, the greatest result presented is from hypothesis three. Regret is an incredibly stable construct that has been empirically studied in multiple domains using the same definition. The hypothesized relationship between value and regret was strong.

This process of measurement, using two constructs that are hypothetically linked in some way and determining if they are, indeed, related as hypothesized, is referred to as convergent validity (Trochim, 2006). This is but one part of the construct validity process, but an important part from a research perspective. Replication of these results will provide researchers with strong evidence of a solid relationship between the two constructs that can then be used in discriminant and content validity efforts (Slavin 2007, Trochim, 2006).

Limitations

A number of limitations may impact the interpretation of these results. Value, as a construct, is considered to be universal in that all nations and peoples on the planet have

the capacity for value generation for use in individual or cultural judgment situations (Phinney, Ong, & Madden, 2000; Schwartz & Bardi, 2001). Considering the population possibilities, the sample of 44 undergraduate participants from a particular university in the southeastern United States is not sufficient to make any generalizations.

Additionally, the sample was very homogeneous in respect to cultural diversity.

In addition, the students who did not complete the procedures and were not included in the study may have impacted the results. Listwise deletion, as a process, may potentially have an impact on statistical power. There is also a lack of data on the students who did not complete the procedures leaving a question as to biases that may be inherent in the project that have gone unnoticed (Myers, 2011).

The within subject question of stability suffers from a number of methodological issues. Considering the need to address how an individual would rate the importance of an item multiple times, the balance between multiple ratings and the concern of a participant remembering a previous rating of a particular stimulus was delicate. A third rating of the same stimulus items may well have better served the question of stability, however, what time delay would be appropriate to ensure no previous memory of the ratings applied to the third round of stimulus ratings? One solution would be to maintain the 30 day delay in hopes that no memory consolidation of the previous experience was possible. It is also possible that a priming test of items similar to, but not exact repeats of, the target stimulus items may have interfered with memory consolidation. Another option would be to wait a period of time designated by existing research to be sufficient in avoiding memory consolidation of the target stimulus items.

Another empirical issue relates to the stimulus items used in all three research questions. The stimulus items were specifically selected to be representative of objects, situations, and scenarios that would prove common, or at least familiar, to the participants. This may well have produced a cultural bias in the representative stimulus items. One method to validate or refute this concern would be to replicate the study with participants from multiple cultural backgrounds and compare mean and variance scores of the ratings. This may provide insight into what cultural biases may exist for each monetary, tangible, and intangible item.

Finally, another issue regarding the stimulus items used involves the method of presentation. As noted previously, images were either found or created for each stimulus item in the study and included on the cards along with explanatory text. As perception may be affected by affective response, so may interpretation of visual stimuli. As such, it is quite possible that the images used, particularly for the stimuli listed as intangible, made the item perceptually more tangible. This, in turn, could affect the rating on the stimulus item. With a sufficient number of subjects, a counter to this issue would be the division of the total sample into two equal groups both numerically and demographically. One group would go through all three procedures using stimulus cards as presented in this study. The second group would use stimulus cards that had no images, only text descriptions. Comparative analysis at the end of the study might then shed light on the potential impact the images may have provided.

One overarching and all-encompassing issue regards the very nature and definition of value. As previously stated, there are multiple ways in which value has been studied in the social sciences. Unfortunately, no common definition exists to guide

the individual and domain specific efforts toward a common goal of understanding. This study suffers from the same symptoms as the only truly definitional aspect of value included was the idea of importance and stability. The importance component was derived as synonymous for value use in previous studies. The stability component was implied in previous research and empirically tested here.

Implications for Future Research

Despite the positive experimental results and extensive literature, only the simplest of approximations for a definition of value was used in the research. The reason is that there does not seem to be a consistent definition of value to guide further research into the construct. If one were to study value only in the field of motivation, the definition most commonly used in that field could be used, but does that definition actually assist the construction of knowledge about the construct if another definition is operationalized in another field? A common definition of value, applicable to and studied within, multiple fields and domains of study is needed.

Without the common definition, and without established reference points from which to work, the majority of research in the realm of value tends to be from an empirical perspective that is severely limited in its generalizability to other uses of value as a construct. As value has the potential to be vital to the understanding of human behavior, this issue needs to be addressed. As Pham, et. al. (2001) state, “It is not a coincidence that the valuation of objects – whether products, issues, or people – has always been a major subject of inquiry in all social sciences.” (p. 167)

This raises serious construct validity issues that would serve as an excellent starting point for further research on value. This study is the first step towards a common

definition, however additional research in this area is necessary and must address the definition and origin of value as a construct.

The beginning of the search for construct validity must begin with a definition. The importance of a strong, theoretically based, definition cannot be understated for ultimately, the measure created to gauge the construct will be based upon what the construct is believed to represent (Slavin, 2007; Smith, 2005; Strauss & Smith, 2009). The definition of the construct, therefore, informs how the construct interacts with other constructs or processes and helps to define the measures that will be used to help determine its existence.

Trochim (2006) uses the phrase, “Inadequate Preoperational Explication of Constructs,” to help elucidate definitional issues. In this, he states that, even before the construct has been placed into an operational conception, that is, before the researcher attempts to determine how the construct will actually interact with other constructs, processes, and individuals, one must be especially careful to fully conceptually define the construct. Failure to do this is the first threat to construct validity. Whether the definitional process involves concept mapping, extensive research, or the assistance of other researchers in the field, the first step of construct validity must be a thorough investigation of the proposed construct (Trochim, 2006).

It should be noted that the idea of construct validity subsumes the ideas of content validity, criterion-related validity, and other validity types related specifically to psychological constructs, is well established (Slavin, 2007; Smith, 2005; Strauss & Smith, 2009; Trochim, 2006; Westen & Rosenthal, 2003).

The issues with the construct of value, as illustrated by the research in different fields of study, point to one central idea: the definition of a construct must be well formed if it is to meet the requirements of the researchers who use said construct. The current evidence suggests that the construct of value has very little common ground for assessment and has no grounds for generalizability: hence, no construct validity. Therefore, the creation of a definition must be undertaken with exceptional care and diligence.

Based on the existing literature from across multiple disciplines that have used the construct of value as a variable in empirical studies, a definition for value that may serve as an opening effort into the true investigation of the construct follows: value is an evolutionarily conserved biological process, affective in nature, that exhibits the properties of power, stability, and cognitive interaction.

Justification for Future Research

To justify future research into the definition of value, the components of the definition, how they tie into the existing literature, and how the current studies may contribute to their inclusion are discussed, beginning with a discussion of affect and suggesting that affect is biological. Future research possibilities for an evolutionarily based origin of affect will link to existing literature and research studies.

One definition of affect, provided by Frijda and Scherer (2009) in *The Oxford Companion to Emotion and the Affective Sciences*, states, “The terms affect and the corresponding adjective affective are generally used in an overarching generic sense for a mental state that is characterized by emotion feeling as compared with rational thinking” (p. 10). The definition continues to offer more

detail by elaborating with, “the term is often used in a general sense to refer to a class or category of mental states that includes emotions, moods, attitudes, interpersonal stances, and affect dispositions” (p. 10). Another definition for affect provided by Zeelenberg, et. al. (2008) posits, “Affect is a generic term that refers to many experiential concepts including moods, emotions, attitudes, evaluations and preferences” and continues with, “Thus, any experiential concept that is positive or negative can be considered affective” (p. 19).

Connected to affect, then, are personal representations of what is good or bad. Cunningham and Zelazo (2007) indicate that the term valence represents whether a stimulus is perceived as good or bad. Pham, Cohen Pracejus, and Hughes (2001) state that arousal is directly related to the intensity of the valence a particular stimulus represents. Together, valence and arousal create an appraisal process that determines whether an individual views a particular stimulus positively or negatively, and how positively or how negatively. This conception is repeatedly supported throughout the affect literature. In the affect-as-information literature, Storbeck and Clore (2008) are as clear as possible by stating that, “Affective experience is often treated as having two dimensions – valence and arousal” (p. 1862). The terms arise again with Panksepp’s (2005) discussion of affective consciousness as the traditional views of affective mental representation. Davidson (2003); Deak (2011); Desmeules, Bechara, and Dube (2007); Izard (2010); Litt, Eliasmith, and Thagard (2008); Murphy, Nimmo-Smith, and Lawrence (2003); Posner, et. al. (2009); and Zeelenberg, Nelissen, Breugelmans, and Pieters (2008) are all published researchers in the field of affect, or affective related issues, who use valence and arousal as core assumptions in their understanding.

Why should affect, or emotion, be included in the definition for value? The central feature of the motivational and decision making research is that individuals will act in such a way as to maximize a valued goal or end state (Nagengast, Marsh, & Scalas, 2011; Shah & Higgins, 1997). The focus of achievement motivation research to “...explain people’s choice of achievement tasks, persistence on those tasks, vigor in carrying them out, and performance on them” (Wigfield & Eccles, 2000) is directly tied to how desirable the end state of those tasks is viewed. The level of desirability is the valence and arousal appraisal process that forms the core of the definition of affect. Therefore, affect, and the accompanying valence and arousal appraisals, should be considered an essential component for review in future empirical efforts with value.

Is affect biological? The literature has been somewhat inconsistent in exactly how affective states are made manifest in the brain so some review of what is meant by affective and biological together is mandated. The problem is stated quite well by Panksepp (1998) with, “...there are presently no direct metrics by which we can unambiguously quantify changes in emotional states in any living creature” (p. 9). This is further elaborated by Murphy, Nimmo-Smith, and Lawrence (2003) who state, “Although some preliminary work has begun to show that anger, too, may be linked to activity of a distinct neural system, regions considered critical for the recognition of happiness, sadness, or surprise have not yet been identified” (p. 209).

This has not kept, however, research surrounding the idea that emotions have a specific biological basis from being attempted. In fact, more recent evidence, as presented by Cunningham, Bavel, and Johnsen (2008), suggests that evidence from multiple methodologies converges on a particular structure in the brain necessary for the

processing of affective properties of stimuli: the amygdala. Future researchers should use neuroimaging techniques to track amygdala activation in relation to efferent and afferent connections to other brain areas: particularly those areas related to judgment and decision making.

Despite the limitations presented for the stability element of the current research, some support is now provided overtly for the component of stability and value. The definition for stability presented in this research includes information on how stability is manifest in value as its own component, how it relates to the affective qualities of value, and how it ties to the possible physical, biological, structures of the brain that may instantiate value.

In summary of the previous work, stability represents the learned expressions of affective stimuli the organism interacts with (Murray, Izquierdo, & Malkova, 2009; Phelps & LeDoux, 2005; Scherer & Ellsworth, 2009; Storbeck & Clore, 2008; Tottenham, Hare, & Casey, 2009). These expressions are recognized through the valence and arousal appraisals an individual makes when dealing with the environment (Scherer & Ellsworth, 2009) and how those appraisals become learned responses over repeated exposures (Davidson, 2004; Isen, 2008; Kensinger & Schacter, 2008; LaBar & Warren, 2009; Sander, 2009). In addition, these learned expressions are perceptually salient and tied to physical memory structures (Posner, Russell, & Peterson, 2005; Whalen, Davis, Oler, Kim, Kim, & Neta, 2009). The ability to change and alter the neural connections that represent a particular stimulus is critical to the adaptive process, both affectively and cognitively (Allen & Monyer, 2013; Cunningham, Bavel, Johnsen, 2008; Gaesser, 2013; Hamann, 2009; Storbeck & Clore, 2008).

Future research should consider the stability factor, not as a lone variable, but as an interaction of affect, biology, and cognition. Though the cognitive interaction component has been considered briefly, a more thorough account will improve future empirical efforts in incorporating all of the components.

There is sufficient evidence to suggest that the affective process of value can, and will, interact with cognitive processes of evaluation and assessment as evidenced in the judgment and decision making literature (Clore & Huntsinger, 2007; Kahneman & Frederick, 2007; Thagard & Aubie, 2007), just as these examples of other affective processes are shown to have cognitive interaction.

As value is considered to be an affective construct, how might cognitive interaction play a role by itself and in conjunction with the other definitional components? The manner in which other affective processes and constructs have been shown to have cognitive interaction may help to illustrate the process. The focus to this point has been on the amygdala as it has been found to serve the process of evaluating the valence and arousal of external stimuli (Cunningham, Bavel, & Johnson, 2008). As stated before, it also has been shown to have extensive connections to both cortical and sub-cortical regions of the brain (Daggleish, 2004; Fuster, 2008; LaBar & Cabeza, 2006).

As affect has been implicated to have both conscious and non-conscious influence on memory and learning (LaBar & Cabeza, 2006; Tottenham, Hare, & Casey, 2009; Storbeck & Clore, 2008), judgment and decision making (Cunningham & Zelazo, 2007; Wagar & Thagard, 2004; Winkielman & Berridge, 2004; Zeelenberg, Nelissen, Breugelmans, & Pieters, 2008), and motivation (Izard, 2007; Lavender & Hommel, 2007;

Panksepp, 2008), future research should investigate these phenomena as potentially critical to the value formation process.

Conclusion

This research established the construct of value as an important element in the social sciences research on motivation and decision making in multiple contexts. One implied component of the construct of value, but not explicitly stated or previously researched, was the possibility of stability of value across time and situations. An associated construct in the decision making research, regret, was reviewed and theoretically linked to the construct of value.

Three experimental hypotheses were asked related to within subject stability of value across contexts, the stability of value ratings across subjects in different domains of interest, and the relationship between perceived value and perceived regret.

These results and the research literature related to the constructs of value and regret suggest a great deal of future related research activities. An expanded definition of value, derived from these results and existing literature, suggests that value is an evolutionarily conserved biological process, affective in nature, that exhibits the properties of power, stability, and cognitive interaction.

Continued research in this area that focuses on the elements of this definition will likely greatly improve the construct validity of value. In turn, the improved construct validity, in addition to continued convergent validity data with the construct of regret, will improve the possibility of multi-domain convergence of research efforts regarding value.

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Appendix A

Card Numbers and Associated Stimulus Item Descriptions

101	\$10.00
102	\$25.00
103	\$50.00
104	\$75.00
105	\$100.00
106	\$150.00
107	\$200.00
108	\$250.00
109	\$300.00
110	\$400.00
111	\$500.00
112	\$600.00
113	\$700.00
114	\$800.00
115	\$900.00
116	\$1,000.00
117	\$2,000.00
118	\$3,000.00
119	\$4,000.00
120	\$5,000.00
121	\$7,500.00
122	\$10,000.00
123	\$12,500.00
124	\$15,000.00
201	A digital music player of choice
202	An electric scooter
203	A home theatre system
204	An ebook reader
205	2 movie tickets of choice
206	A new laptop computer of choice
207	20" flat screen computer monitor
208	2 plane tickets to anywhere in the United States
209	A new car of choice valued under \$30,000
210	A candy bar of choice
211	1 furniture item of choice
212	A handheld video game player

- 213 100 digital music downloads
- 214 A hardback book of choice
- 215 A touch screen pda / smartphone of choice
- 216 1 kitchen appliance of choice
- 217 A new bicycle of choice
- 218 A new clothing outfit of choice
- 219 2 plane tickets to any location world-wide
- 220 A gourmet chocolate bar of choice
- 221 1 item of sports equipment of choice
- 222 A 40" flat screen HDTV
- 223 A DVD / Blu Ray disc of choice
- 224 An item of exercise equipment of choice
- 301 Time alone with a beautiful sunset
- 302 Dinner at home with family
- 303 1 week without illness, injury, or pain
- 304 A compliment from a friend
- 305 Instantly learn a new language of choice
- 306 Win 1st place in a competition
- 307 Share a special place with a loved one or friend
- 308 A personal religious / spiritual experience
- 309 Donation to a charity of choice in your name
- 310 An extra hour per day for one week
- 311 A family reunion
- 312 Dinner out with a loved one or friend
- 313 A compliment from a relative
- 314 A shared sunset with a loved one or friend
- 315 1 year without injury, illness, or pain
- 316 A free course or educational experience
- 317 A reunion with best friend not seen in more than a year
- 318 Instantly lose 10 pounds and keep them off
- 319 10 hours of service donated to a charity of choice in your name
- 320 1 month without illness, injury, or pain
- 321 1 day with a loved one who has passed away
- 322 A shared religious / spiritual experience
- 323 Time alone in the woods or at a beach
- 324 Extra time in your day for community service

Appendix B

Participants, Total Responses, Recorded Scores, and Significance

Participant	Total responses minus ties	Critical Value	Recorded Score	<i>p</i>	Confidence interval (Normal approximation)
3004	32	22	31	< .001	.97 ± .06
3006	31	21	27	< .001	.87 ± .12
3007	27	19	21	0.003	.78 ± .16
3008	28	19	23	< .001	.82 ± .14
3009	30	20	29	< .001	.97 ± .06
3010	30	20	28	< .001	.93 ± .09
3011	23	16	22	< .001	.96 ± .08
3012	25	18	24	< .001	.96 ± .08
3013	29	20	26	< .001	.90 ± .11
3014	27	19	20	0.01	.74 ± .17
3015	33	22	26	0.001	.79 ± .14
3016	28	19	21	0.006	.75 ± .16
3018	34	23	32	< .001	.94 ± .08
3019	32	22	30	< .001	.94 ± .08
3020	34	23	17	0.568	.50 ± .17
3021	19	14	14	0.032	.74 ± .20
3022	29	20	28	< .001	.97 ± .07
3023	28	19	24	< .001	.86 ± .13
3025	32	22	29	< .001	.91 ± .10
3026	27	19	22	0.001	.81 ± .15

3028	31	21	27	< .001	.87 ± .12
3029	30	20	21	0.021	.70 ± .16
3030	33	22	26	0.001	.79 ± .14
3031	29	20	22	0.004	.76 ± .16
3032	33	22	31	< .001	.94 ± .08
3033	33	22	33	< .001	1.0 ± 0
3034	32	22	27	< .001	.84 ± .13
3035	27	19	25	< .001	.93 ± .10
3036	29	20	25	< .001	.86 ± .13
3037	31	21	15	0.64	.48 ± .18
3038	31	21	14	0.763	.45 ± .18
3039	24	17	18	0.011	.75 ± .17
3040	30	20	23	0.003	.77 ± .15
3041	30	20	27	< .001	.90 ± .11
3042	33	22	30	< .001	.91 ± .10
3043	27	19	18	0.061	.67 ± .18
3044	34	23	27	< .001	.79 ± .14
3045	29	20	25	< .001	.86 ± .13
3047	30	20	21	0.021	.70 ± .16
3049	31	21	27	< .001	.87 ± .12
3050	33	22	18	0.364	.55 ± .17
3051	32	22	27	< .001	.84 ± .13
3052	28	19	23	< .001	.82 ± .14
3054	31	21	25	< .001	.81 ± .14
