

AN UPSIDE OF AGING:
AGING EFFECT IN AMBIVALENCE

by

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ABSTRACT

Ambivalence refers to a conflict between two contradicting values, principles, beliefs, or emotions. Heretofore, there have not been studies that have focused on age differences in ambivalence within the context of a dual system framework. According to dual process theory, there are two separate cognitive systems that are primarily responsible for either deliberative logical judgments (System 2) or responsible for fast, automatic, intuitive, visceral judgments (System 1). The current study investigated the impact of intra and/or intersystem conflict on decision making. Thus, in some instances the stimuli were configured in such a way as to elicit System 2 processing (only logical statements) and in other instances, the stimuli were configured so that System 1 processing would be elicited (only emotional statements). This study also investigated possible age-related changes in processing contradictory information and the ambivalence that often arises when considering opposing viewpoints. One of the unique characteristics of the current study is that I varied the extent to which participants would have to engage system 1 processing to resolve the experimenter-induced ambivalence associated with making a decision. The results of this study show that older adults generally experience less ambivalence compared to young adults, except in the condition in which they received two emotionally conflicting options (i.e., intrasystem conflict within system 1).

DEDICATION

This thesis is dedicated to all those who graciously agreed to participate in the experiment, allowing the further discovery of human nature. Thank you.

LIST OF ABBREVIATIONS AND SYMBOLS

N/ n	Number of participants in a given sample or in a given group
M	Mean: the sum of a group of numbers divided by the number of observations
SD	Standard deviation: the square root of the variances of sample
χ^2	partial eta-squared
SS	sum of squares
df	Degrees of freedom: number of values free to vary after certain restrictions have been placed on the data
F	Fisher's F ratio: a ratio of variances
p	Probability of obtaining a test statistic under the null hypothesis of a value as extreme as or more extreme than the observed value

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CONTENTS

ABSTRACT.....	ii
DEDICATION.....	iii
LIST OF ABBREVIATIONS AND SYMBOLS	iv
ACKNOWLEDGEMENTS.....	v
LIST OF TABLES.....	vii
LIST OF FIGURES	viii
CHAPTER 1. INTRODUCTION.....	1
CHAPTER 2. METHODOLOGY	16
CHAPTER 3. RESULTS	23
CHAPTER 4. DISCUSSION	33
REFERENCES	39
APPENDICES	43

LIST OF TABLES

1. Demographic characteristics of the main study participants	21
2. Mean ratings on evoked level of emotion in a pilot study	24
3. Mean ratings on evoked level of convincingness in a pilot study	24
4. Mean rating on self-reported ambivalence in main study	29
5. Mean number of chosen statements.....	31

LIST OF FIGURES

1. Mean rating on self-reported ambivalence in various conditions29

CHAPTER 1

INTRODUCTION

“To be, or not to be: that is the question” (Shakespeare, 1603, Hamlet. 3.1.57). Hamlet famously confessed the agonizing experience of decision-making when experiencing the negative emotions associated with ambivalence. Ambivalence refers to psychological conflicts an individual experiences due to holding opposing concurrent ideas and hence being drawn toward both ideas simultaneously, which in turn causes the inability to choose any of the given options (e.g., Eagly & Chaiken, 1993; Kaplan, 1972; Petty et al., 2012; Priester & Petty, 1996; Thompson et al., 1995; van Harreveld et al., 2009; Wegener et al., 1995).

A good example of ambivalence would be Heinz’s dilemma posed by Kohlberg, in which he presents a situation with a main protagonist, Heinz, who faces two options of either stealing an unaffordable drug to save his terminally ill wife or letting her perish by not stealing the drug (Kohlberg, 1981). For either of the options, Heinz is bound to experience ambivalence because the options represent two conflicting values. Saving his wife’s life would make him feel good but stealing would leave him feeling guilty. Meanwhile, not stealing would make him feel righteous but knowingly letting his wife die would make him feel guilty. As the Heinz’s dilemma exemplifies, it is difficult to commit to one option, when each option is associated with positive and negative attributes because in order to make a decision, one must face an inevitable tradeoff (Luce et al., 1997). In the Heinz example, the decision maker must sacrifice one highly valued attribute (e.g., saving life) in preference for the other highly valued attribute (e.g., adhering to the

societal rules such as not stealing). When the attributes associated with each option are equally valued, the individual often experiences the agony associated with ambivalence.

It is important to recognize that ambivalence is not synonymous with the term indifference. Indifference refers to the state of disinterest, in which an individual is drawn to neither of the ideas or options (van Harreveld, Nohlen, & Schneider, 2015). Hence, an indifferent individual may not care about the outcome of the decision. In contrast, ambivalence occurs when individuals endorse attributes associated with multiple options for both sides. Because decision making is an important component of everyday life, it is important to understand that ambivalence may have a profound effect on the way people make decisions. This study investigates self-reported levels of ambivalence as a function of age and type of decision-making task.

Decision-making and ambivalence

Occasionally, decision-makers experience the feeling of being trapped between a couple of options and cannot bring themselves to commit to just one of the options. This experience of indecisiveness due to ambivalence is often agonizing for decision-makers.

The concept of ambivalence has existed since the Socratic period during which several philosophers acknowledged the disparity and conflict between physical and spiritual domains. Plato, back in the 4th Century, acknowledged that there were two discrete systems that separately govern emotion and logic in humans. His idea was that if emotions were like wild horses rampaging out of control, logic is the charioteer that attempts to steer them into the correct path. Rene Descartes in 17th Century polished this idea and coined the term dualism. Most recently, Kahneman reignited the interest in dualism and ultimately coined a term dual processing theory. Dual processing theory distinguishes emotional, intuitive processing from deliberative processes.

Emotional or intuitive cognitive processing is referred to as system 1, and deliberative processing as system 2 (Kahneman, 2003).

The distinction between these two thought processes elucidates how cognition operates, and how ambivalence might be created in situations in which making difficult decisions involve conflict between logic and emotions. This conflict between two separate systems is known as intersystem conflict. However, ambivalence does not necessarily require both systems. It may be possible to experience ambivalence due to two conflicting ideas that involve only system 1 or system 2, which is referred to as intrasystem conflict. In the current study, I explore both intra- and intersystem conflict. I will next focus on ambivalence due to intrasystem conflict.

Ambivalence from intrasystem conflict. When referring to system 1 and System 2, I am referring to a two process model of cognitive processing with automatic processing (i.e., system 1) on one end of the continuum and attentional processing (i.e., system 2) on the other end. In the current study, I was interested in systematically examining conflicts across the continuum. In some instances, I examined the conflict that participants experience when presented with arguments that fall under the category of System 1 or closer to the automatic end of the continuum. In other instances, I examined ambivalence under conditions in which participants would be more likely to make decisions on the basis of logic and would rely less on emotional or intuitive processing.

One reason that I was interested in examining ambivalence within each of the two systems is that levels of ambivalence may vary with respect to emotional versus logical conflicts. Heretofore, logical and emotional conflicts have not been systematically studied across age groups. Thus, in the current study, young and older participants received scenarios with emotionally conflicting statements and scenarios with logically conflicting statements. I was

interested in investigating whether contradictory emotional statements would induce higher levels of conflictedness than contradictory logical statements. I was also interested in examining age differences with respect to intrasystem conflict. One reason that I wanted to study intrasystem conflict with respect to age is that there is evidence that older adults may rely on System 1 (emotions) than System (2 logical deliberation). I was interested in determining if older adults would experience relatively low conflictedness when presented with emotional contradictory statements because of their adeptness in emotion regulation and dealing with emotions. Given that older adults are less likely to engage in deliberation than younger adults, I was also interested in determining the level of conflictedness in older adults when presented with contradictory information that would require logical deliberation.

In addition to the aforementioned intrasystem conflict, individuals often experience intersystem conflict or conflict between dual systems. I was also interested in exploring possible age differences in the ability to resolve ambivalence when presented with information that would cause conflict between the emotional (System 1) and the logical (System 2) systems.

Ambivalence from dual systems. In some instances, individuals experience ambivalence because there is a conflict between their affective response to a situation and their logical analysis of the situation. Many moral decision-making studies have observed the clash of two different systems (i.e., system 1 vs. system 2) causing ambivalence (e.g., Greene & Haidt, 2002; Conway & Gawronski, 2013; Paxton, Ungar, & Greene, 2012). The aforementioned example of Heinz's dilemma (Kohlberg, 1981) elucidates this conflict between two processes, in that Heinz faces a situation that presents two options: saving his terminally ill wife by stealing an expensive drug, or letting his wife die by not stealing the drug.

Within the scenario of the Heinz dilemma, an instinctive and emotional deontological view from system 1 (e.g., stealing is “bad”) is at odds with a utilitarian view that analyzes the situation using system 2 (e.g., stealing can be acceptable in certain circumstances that can aid saving more lives; Green & Haidt, 2002). When ideas from system 1 and system 2 are similarly compelling, decision-makers start to experience ambivalence which causes a difficulty in reaching a decision (Greene & Haidt, 2002).

One reason that I wanted to include a condition that would present both logical and emotion stimuli is because there is evidence that individuals rely on affect as a heuristic when they experience ambivalence with regard to decision-making. When people rely on the affect heuristic, they make decisions based on their gut feelings about an option rather than carefully analyzing all of the options associated with a decision. It should be noted, as mentioned earlier, that ambivalence is not always evoked from collisions between system 1 and system 2. There is also a possibility of experiencing ambivalence due to two emotional responses or two logical responses. In my study, I intend to investigate all scenarios that may present ambivalence due to different types of information conflictedness within and between the dual systems. I also aim to examine how each of the arguments affect self-reported levels of ambivalence across different age groups. I am interested in the cognitive processes associated with decision making and with the specific cognitive processes associated with resolving ambivalence in making a decision.

Because no other studies have investigated inter- or intrasystem conflict as a function of age within the dual process theory framework, I believe my study will be a valuable contribution in understanding how decision-making is influenced due to the presentation of options.

Cognition, decision-making, and resolution of ambivalence

According to normative decision making models, decision making involves deliberative evaluation and weighing of each option associated with a decision. There are many cognitive processes involved in decision-making, including searching long-term memory, prioritizing information, weighing outcomes, etc. Individuals sometimes choose not to engage in deliberative processes when making a decision due to its cognitively taxing nature. Understandably, if one were to utilize deliberative processing for every decision making situation, then one would have to consider every outcome of every decision in order to calculate the best optimal decision. Considering that there are numerous decisions involved in daily living, individuals must make this cognitively taxing deliberative process of decision-making more streamlined. As a compensatory strategy, individuals tend to use heuristics, simplified shortcuts that can be implemented when solving problems rather than engaging in more cognitively taxing deliberative processes.

Decision-makers may be more prone to use heuristics when confronted with ambivalence in comparison with when the decision does not involve ambivalence. For example, there is evidence that individuals use shortcuts rather than using normative strategies (i.e., examining all options and weighted attributes objectively) to reduce the agony associated with emotional ambivalence (Luce et al., 1997) when having to choose between two options. These shortcuts are used in particular to avoid the agony associated with conflict. Luce and her colleagues (1997) found that due to the emotionally agnozing nature of affective ambivalence, people often engaged in a type of emotional avoidance.

Another circumstance that leads to heuristic usage with respect to decisions is cognitive overload. In these circumstances, the decision process is so complex that decision-makers feel

ill-equipped to consider all of the options associated with the decision. The use of heuristics, in these circumstances, is fairly common and may be adaptive. People are especially likely to use heuristics when they lack the cognitive resources to engage in the systematic analyses associated with normative decision-making. In fact, there is evidence that populations of individuals who lack cognitive resources are more prone to using heuristics than those populations with adequate cognitive resources (van Harreveld et al., 2009). One such population that lacks the cognitive resources is older adults.

Aging and cognition

There are several cognitive mechanisms that are associated with age-related decline (i.e., attention, memory, processing speed, and executive functions) that are necessary for effective decision making (Finucane, 2002; Fjell & Walhovd, 2010; Glisky, 2007; Hedden & Gabrieli, 2004; Wayde & Black, 2016). There are two age-related cognitive changes in particular that are relevant to the process involved in decision-making: age-related changes in executive processing and the age-related changes in the motivation to expend cognitive resources. The first age-related change that I will discuss is changes in executive processes and that will be followed by a discussion of age-related changes in motivation.

Executive processing refers to the ability to control the basic elementary processes associated with cognition and involves the ability to dampen irrelevant information, the ability to update working memory, and the ability switch attention (Miyake, 2002). All of the aforementioned executive processes are necessary for resolving ambivalence in a systematic fashion. Perhaps, the age-related changes in executive functioning (EF) have the biggest impact on age-related changes in decision making. For instance, Brand and Markowitsch (2010) found that age-related changes in executive functioning, (i.e., such as the ability to monitor feedback)

led to disadvantaged decision-making in older adults. Moreover, Finucane (2002) found that age-related changes in working memory led older adults to experience difficulty in making inferences which impeded their decision-making. For example, to resolve ambivalence, individuals have to determine which attribute associated with various options is most important. Upon making that determination, participants will have to select one of the options and dampen the accessibility of the less important options. Prioritizing and dampening information would involve inhibition, task-switching, and updating. Van Harreveld et al. (2009) discussed the finding that individuals in ambivalent states (when using a normative decision-making model) systematically examine all sides of an issue, when enough resources are available (van Harreveld et al., 2009). Unfortunately, however, due to the decline of cognitive resources as people age, the likelihood of engaging in systematic during decision-making decreases as a function of age. For example, age-related change in executive functioning includes the change in the ability to inhibit irrelevant information (Hasher & Zacks, 1988). This change in the ability to dampen unimportant or irrelevant information can result in older adults' holding more "clutter" in working memory. This change in inhibition efficiency may impede ambivalence resolution because older adults may be more prone to consider multiple conflicting alternatives without selecting one and dampening the activation of the nonchosen option. In fact, there is evidence that older adults are more likely than younger adults to simultaneously hold two contradictory ideas in working memory (Hasher & Zacks, 1988). Thus, older adults might be in a state of ambivalence longer than younger adults.

As indicated earlier, the second reason that older adults might have more difficulty using systematic strategies to successfully resolve ambivalence has to do with their motivation to engage in deliberative cognitive processes. Some studies indicate that older adults are more

selective than younger adults about the deployment of cognitive resources (Hess, 2006; Hess & Emery, 2012). According to the selective engagement theory, older adults are more reluctant than younger adults to engage in resource-intensive cognitive activities due to the depletion in cognitive resources), which makes it particularly burdensome to perform the cognitive computations associated with complex tasks. To explain further, older adults are more selective about the deployment of cognitive resources and thus, older adults may be less likely to employ this extra engagement unless the topic is personally relevant to them (Hess, 2006). This explains why older adults are more likely to use heuristics than younger adults. Since it is evident that older adults and young adults utilize different processes in making decisions, I postulated that there may be a difference in level of ambivalence as well. I believe that the ability to reason well and use executive processes are important for the resolution of ambivalence in decision-making. In order to resolve ambivalence using normative deliberative strategies that utilize system 2, the individual would need to systematically examine all attributes associated with each of the decision option and determine which of the attributes is most important. Moreover, the individual would select the option that has attributes that align with his/her values. Older adults may be less likely to go through aforementioned deliberative steps in resolving ambivalence, even when presented with stimuli that encourage logical thinking. If older adults have more difficulty weighing attributes associated with options and inhibiting unimportant information, they may have more difficulty resolving ambivalence than younger adults.

Aging and emotion and heuristics

I have discussed how age-related changes in cognition may result in age differences in decision-making. Along with the changes in cognition as a function of age, aging influences affective processes as well. Socioemotional selectivity theory and the aging paradox state that as

people age, they become more cognizant of the limited time and this awareness leads them to divert their attention away from negative information while gaining more motivation to focus on positive information (Carstesen et al., 2003; Carstesen et al., 2006). To explain further, young adults' attention and motivation tend to gravitate toward negative stimuli because of the inherent information value associated with negative stimuli (e.g., warnings of impending danger). However, because there is limited time left to live, the main focus of older adults is geared not toward expanding their knowledge but on their emotional well-being.

One potentially negative consequence of socioemotional selectivity theory is that older adults tend to avoid situations in which they will experience negative emotions. This avoidance of negative emotions can have negative consequences. A number of studies have found that when seniors found decision-making tasks too difficult or complicated, they would seek out ways to avoid making such difficult decisions (e.g., Anderson, 2003; Reb & Connolly, 2009). Older adults' tendency to avoid decisions associated with ambivalence could potentially exacerbate any negative consequences associated with the decision (e.g., Anderson, 2003; Reb & Connolly, 2009). One study explicitly observed the tendency of older adults to use choice deferral, which refers to the deciding not to choose any given options (Chen et al., 2014), and found that older adults not only used the choice deferral as a coping mechanism to reduce the negative affect triggered from facing a difficult decision-making task, but also for decision-making tasks that were relatively easy (Chen, Ma & Pethtel, 2011).

Another way in which changes in emotion and cognition might affect decision making in older adults is that older adults might be more prone to rely on the affect heuristic (Finucane, Alhakami, Slovic, & Johnson, 2000; Peters, Dieckmann, & Weller, 2011; Slovic et al., 2005). When people use the affect heuristic, they tag options with a negative or positive valence and

rely on overall emotional impressions when making a decision rather than weighing the pros and cons associated with each option of a decision. Slovic et al. (2005) argue that forming overall impressions based on emotional tags is less cognitively burdensome than weighing the pros and cons associated with each option.

In addition to using heuristics that involve emotions, older adults utilize other heuristics that allow them to circumvent the computations associated with normative decision making. Several additional studies that point out the increased reliance on heuristics as people age (e.g., Mutter & Pliske, 1994; Tversky & Kahneman, 1974; Yates & Patalano; Peters et al., 2000). Specifically, there was a study that demonstrated that there was a significant positive correlation between age and the use of heuristics in everyday problem-solving and decision-making (Besedes et al., 2012). One of the reasons older adults show a higher likelihood of heuristics usage is that a lifetime of experience has allowed them to learn ways of performing a task more efficiently so that they can avoid onerous computations when performing a familiar task (Wayde, Black, & Gilpin, 2016). These “short cuts” can serve as compensatory mechanisms that allow them to perform a task efficiently despite age-related changes in processing speed, deliberative thinking, etc. That is, compensatory mechanisms can be implemented in order to counter the decrement in cognitive capacity that occurs as a function of age (e.g., Mata, Schooler, & Rieskamp, 2007; Pachur, Mata, & Schooler, 2009).

Heuristics can be practical when there needs an immediate resolution, but this does not guarantee the best outcome since it bypasses deliberation that can allow more careful surveillance and evaluation of all options (Kahneman, Slovic, & Tversky, 1982; Nisbett & Ross, 1980). There is empirical evidence that sometimes when older adults rely on heuristics, they make less than optimal choices (Brand & Markowitsch, 2010). A recent study has provided

evidence that individuals that rely on heuristics experience more ambivalence ultimately than individuals who make decisions as a result of systematic analyses (Nai, 2014). Nai's rationale for this prediction is that individuals who are not used to considering all options become overwhelmed when put in a situation in which they are forced to do so. Regardless of the reason, it is evident that there is a clear age-related change in the level of reliance on heuristics. One of the purposes of study intends to investigate how this manifests in ambivalence within a difficult decision-making paradigm.

Research question and hypotheses

In the proposed study, I examined ambivalence, as it relates to decision-making, within a dual process framework—sometimes referred to as System 1 (emotional and intuitive) and System 2 (logical and analytical). Ambivalence implies that an individual has two conflicting ideas that may or may not stem from the same system. For instance, if individuals are deliberating between two logical statements that minimally evoke emotional or intuitive responses, they are comparing two ideas generated primarily from system 2 only, rather than from both systems.

Heretofore, studies have not compared the levels of ambivalence as a function of logical versus emotion-based arguments. Thus, the goal in this study was to explore the possibility that levels of ambivalence may vary as a function of the types of information considered. This ambivalence was measured by a 1) self-report survey on the participants' degree of felt conflictedness and 2) the RT of the time spent for deliberation until the final decision was made.

The current study examined ambivalence by presenting participants with two contradictory statements. In one of the conditions the contradictory statements presented rationales logically without appealing to sentiment. In another condition, the contradictory

statements appealed to emotions rather than logic. Finally, in a third condition, participants received a mixture of emotional and logical arguments. In a fourth, neutral condition, participants received statements that were not followed by arguments, but rather two congruent statements that did not contradict each other. Following the presentation of the arguments, participants received a decision screen with two possible decisions. They were instructed to choose the option that best represented their final decision. After participants made their decision with regard to a topic, they rated their level of ambivalence. At the end of the experiment, participants received a survey in which they were instructed to indicate if their prior knowledge or opinions influenced their decisions. In addition, in the narrative portion of the survey, they were asked to indicate the bases for their decisions.

My primary goal in conducting this work was to determine the cognitive processes associated with making ambivalent decisions when receiving logical, emotional, or a mixture of emotional and logical supportive arguments. A second goal was to determine if there are age differences in the cognitive processes used to make decisions when there is a high level of ambivalence.

I have several hypotheses with respect to this work. First, I hypothesized that the older adults, who tend to utilize heuristics more actively, will experience more ambivalence compared to younger adults. That is, older adults will self-report more ambivalence and will take a disproportionately longer time (relative to younger adults) to make decisions in the ambivalent conditions than in the univalent conditions. I am basing my prediction off of work that indicates that individuals who do not systematically analyze all sides of an issue actually experience more ambivalence than individuals who do engage in systematic analyses (Nai, 2014). As indicated before, older adults are more selective than younger adults with respect to engaging in

deliberation and are more likely to use heuristics than younger adults. Moreover, there is evidence to suggest that there are age-related changes in inhibition that may make it difficult to reject an option (Tipper, 1991). Finally, my prediction was based on Chen et al.'s study which found that when older adults are asked to make a choice, they tend to utilize choice deferral (Chen et al., 2014) which might be manifested by older adults pondering each option for a disproportionately longer time than younger adults. In addition, older adults are more prone to entertain contradictory views and engage in dialectical thinking than younger adults (Chen et al., 2014). This may also result in older adults taking longer to accept one option and reject the other. Thus, I am predicting that older adults will have longer reaction time responses than younger adults overall.

Second, I predicted that relative to young adults, older adults will experience higher level of ambivalence overall. They may be particularly prone to experience ambivalence in the mixed or incongruent condition, in which emotional (i.e., system 1 which governs emotion-driven heuristic processes) and logical statements (i.e., system 2 which governs cognitive deliberation) are presented. Nai's work indicates that individuals who rely on heuristics experience more ambivalence if they are forced to consider relevant, contradictory information that they usually ignore in the course of making a decision (Nai, 2014). As indicated earlier, older adults rely on heuristics to a greater extent than younger adults. To the extent that older adults rely on emotional rather than logical information in making a decision, they may experience increased ambivalence if they are prompted to consider emotional arguments (preferred source of information) and logical arguments. Because older adults as a group are less adept at systematically analyzing multiple options and choosing one over the other, they might experience increased ambivalence. Third, in keeping with hypothesis 2, I am predicting that

older adults will be more likely than younger adults to choose decisions associated with the emotional rather than the logical arguments.

Fourth, I am predicting that older adults will be disproportionately slower in the logic-logic condition than in the emotion-emotion condition. As indicated earlier, older adults often give more weight to emotional, value-based information than to logical information and give greater weight to emotional goals in decision-making situations (Peters et al., 2007; Huang, Wood, Berger, & Hanoch, 2015; Mikels, Shuster, & Thai, 2015). Moreover, logical information may involve more cognitive engagement than emotional information (Hess, 2006). In addition, I am predicting higher levels of ambivalence in the logic-logic condition than in the emotion-emotion condition.

Lastly, I am predicting that older adults relative to younger adults will provide less systematic analyses of both sides of the issue in the narrative portion of the survey due to their heavy reliance on heuristics.

CHAPTER 2

METHODOLOGY

Pilot study

Prior to the main study, a pilot study was conducted. The purpose of the pilot study was to distinguish the emotional versus the logical saliency of each statement. Specifically, it was necessary to obtain ratings of the stimuli that would be used in the primary study to assess the degree to which these stimuli evoke affective vs. logical reactions from the participants. The statements that evoked the highest levels of emotional or logical saliency were included in the primary experiment, in order to create the highest level of ambivalence for the main study. A second reason for the pilot study was to obtain a baseline measure of reading time for the stimuli.

Pilot test participants and procedure. A total of 15 participants, 10 young adults and 5 older adults, were recruited. All participants were physically present in the lab at the University of Alabama for the experiment. After the arrival, participants signed the informed consent forms. Instructions were verbally given by the experimenter, and then presented again on the computer. The instructions clearly stated that the participants should only consider the information provided and should not consider prior knowledge, opinions or experiences in reaching a decision. This was to ensure the consistency of information across participants. Participants had the opportunity to ask the experimenter questions if anything was unclear. There was a total of 2 practice trials prior to the pilot experiment to help participants become familiarized with the procedure prior to the main pilot study. The main pilot experiment included 45 topic statements, and a total of 90 argument statements, 45 (primarily) logical arguments, and 45 (primarily) emotional arguments.

Each trial consisted of a topic statement and two conflicting argument statements, one supporting and one opposing the topic statement. For example, if a topic statement was “homework should be banned,” then the argument statement that supported the topic statement was “Homework should be banned because it does not assist students in learning something new” (pro-argument), and opposing argument statement was “homework should not be banned because it enables students to learn independently outside the class” (con-argument). All statements were drawn from idebate.org and were modified to fit the design of the study. The statements were all reported to be controversial according to the website. Participants were warned multiple times throughout the experiment to withhold making a decision until receiving the decision screen.

Participants were able to process information at their own pace. First, participants read the topic sentence. Participants were instructed to press a button as soon as they finished reading the given sentence and were ready to move onto the next step. After the topic sentence was presented on the screen, the participants moved on to the next screen which showed one of the two argument statements. After the participants finished reading the first argument statement, the participants pressed a button to move onto the next screen where they saw a question asking how logical and emotional they thought the sentence was. The participants were asked to respond by using a Likert scale ranging from 1 to 7. After the simple rating task the participants pressed a button to move onto the next argument statement, (which was presented alone), and were asked to rate the second sentence again on perceived logicity or emotionality.

The reading times for all topic and argument statements were measured and averaged to be used as a baseline for the reading time in the primary study. A separate baseline was established for each age group. Participants were told to press a key when they understood the

meaning of each of the presented sentences. The reading time for the pilot test were specifically targeted to measure the length of time required for comprehension for each statement (i.e., topic and argument statement) alone. In the primary study, I assumed that participants would have to read for comprehension and would have to resolve the ambivalence induced by the arguments in the primary study. By having some indication of the reaction time when their task was to read for comprehension, I hoped that I would be able to determine the extent to which the longer reaction time in the primary study was due to the extra computation steps associated with resolving ambivalence.

Main experiment

Materials and design. The main experiment presented 33 debate topic statements, chosen based on the results of the pilot study. Each topic statement had two argument statements, one that supported the topic (i.e., pro-argument) and the other that disputed the topic (i.e., con-argument). Each argument statement was reworded to appeal to the participants' logic or emotions. In other words, each statement had two different versions that stated the same perspective but emphasized two different aspects, logic or emotions. A logical statement consisted of neutral words that did not, or minimally evoked an emotional response, while emotional statements consisted of words that either triggered positive or negative emotions. Word choices were based on published norms (John, 1988) which provided emotionality rating norms. The design was a 2 Age (Young vs. Old) x 4 Type of conditions (emotional congruent [two contradictory emotional statements, logical congruent [two contradictory logical statements], incongruent [an emotional and logical statement with contradictory viewpoints], and univalent/non-conflicting conditions [two emotional statements endorsing the same viewpoint or two logical statements endorsing the same viewpoint]) mixed-factorial design. Age was

manipulated between-subjects and Type of Stimuli and Ambivalence were manipulated within-subjects. The primary dependent measures were self-reported ambivalence, and reaction time.

On a given trial, initially participants received a topic statement. The topic statement were followed by two types of argument statements: a pro-argument, an argument statement that supports the topic statement, and a con-argument, an argument statement that refuted the topic statement. Argument statements were paired together to form three groups: 1) a logical congruent group which contained two logical statements from the same system (i.e., Logic vs. Logic), 2) an emotional congruent group which contained two emotional statements from the same system (i.e., emotion vs. Emotion), and 3) an incongruent group which contained two statements from the separate system (e.g., Logic vs. Emotion). Each condition had 9 trials, making a total of 27 trials that evoked ambivalence (i.e., pro vs. con). Additionally, 6 trials consisted of 2 statements that were not contradicting so it was expected that they would evoke univalence (i.e., pro vs. pro or con vs. con). There was a total of 33 questions that were presented in 2 blocks; the stimuli were randomized and counterbalanced across participants. Each block of trials was followed by a 5-minute break in between. The participants were allowed to skip the break if they wanted to continue. The study lasted about 1.5 hours for younger adults and 2.5 hours for older adults.

Participants. On the basis of the power analysis using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007), this study initially recruited a total of 120 participants. Power was set at .80. Alpha was set at .05, and the effect size was set at .20 (small). The 120 participants included 60 younger adults (age 18-23) and 60 older adults (age 60-99).

The older participants were recruited via the Alabama Research Institute on Aging (ARIA) that specializes in the recruitment of older adults, as well as through several senior

centers throughout Alabama. The younger participants were recruited from students enrolled in the Introductory Psychology classes and received course credit for participating in the research.

The older participants received the MMSE in order to screen out those with dementia.

Participants with a score lower than 23 (the cutoff score indicating dementia according to the MMSE manual) were excluded from the study. Unfortunately, two older adult participants were excluded from the study because one of them did not meet the cognitive criteria for this study (i.e., MMSE score below 23) and the other older adult's data were lost due to a computer error.

Older adults were compensated with 25 dollars for their 2.5 hours of participation while young adults were compensated with 3 course credits. The informed consent forms were filled out by each participant prior to the experiment.

Thus, there were a total of 118 participants, 60 young adult participants and 58 older adult participants. Of the 118 total participants, 81% were female and 19% were male. Eighty-eight percent were Caucasian and 12.1% were African American. The demographic information for the participants in this study is displayed in Table 1.

Table 1. Demographic characteristics of the main study participants

Demographic variables	Mean (SD)	[Range]
Young Adults (n=60)		
Age	18.47 (.84)	[18 - 22]
Gender		
Male	5 (8.3%)	
Female	55 (91.7%)	
Education	12	
Older Adults (n=58)		
Age	72.95 (7.65)	[61 – 90]
Gender		
Male	17 (29.3%)	
Female	41 (70.7%)	
Education	17 (3.27)	[12 - 20]
MMSE	29.22 (.94)	[27 - 30]

Procedure. All young adult participants were physically present in the lab at the University of Alabama for the experiment. When participants arrived, they signed the informed consent form. Instructions were verbally given by the administrator, and then again were presented on the computer screen. For older participants, the location of the experiment varied. The participants could choose whether they would like to show up to the lab at the University of Alabama or at a nearby public locations such as senior citizen’s centers or public libraries.

Participants were presented with 33 topic sentences and 33 pairs of argument sequences. A topic sentence that stated one view of the argument was the first stimulus participants saw on a computer screen. When participants pressed a key on the keyboard, they moved on to another slide that showed one argument statement that either supported or refuted the previously given

topic sentence. The participant pressed the key again to view the second argument statement that either supported or refuted the topic sentence. When participants finished reading both statements, they pressed a key to move onto a decision slide. Upon receiving the decision slide, it was the participant's task to choose the option that would be best for humanity as a whole, given the information provided in the preceding argument. The participants were instructed to withhold making a decision until they saw the decision slide. Response latencies reflected the time interval between the presentation of the topic sentence and the pressing of the key on the keyboard.

A self-reported ambivalence measure was used to assess subjective ambivalence. After making a decision, participants were asked to rate how much psychological conflict was associated with the decision-making task regarding the specific issue. The scale was set from 1 to 9 on a Likert scale, 1 being no psychological conflict and 9 being the highest psychological conflict the participants felt.

After participants completed the decision-making phase of the study, participants were presented with a survey. The purpose of this survey was to assess the influence of the participant's preconceived opinion on the debate topic. The survey asked whether their prior knowledge, personal experience, political beliefs, religious beliefs, and preexisting opinions played a role in their decision making. To understand the reasoning behind their decisions more extensively, I asked participants to write down a brief explanation of what influenced their decisions. The entire study lasted about 1.5 hour for younger adults and 2.5 hours for older adults.

CHAPTER 3

RESULTS

The SPSS statistical software was utilized to conduct all data analysis. I conducted an ANOVA to observe if the three conditions designed to elicit ambivalence were significantly different from the univalent or baseline condition and if these differences varied as a function of age. I had initially predicted that older adults would produce evidence of being more conflicted than younger adults. A simple *t*-test was conducted to examine the age group differences on overall conflictedness across all conditions. In addition, I conducted planned-comparisons to determine if different emotional valences would influence the level of ambivalence. Prior to discussing the data analyses for the primary study, I will discuss the results of the pilot study.

Pilot study

As indicated earlier, a pilot study that included 10 young adults and 5 older adults was conducted to obtain feedback about the stimuli via participant ratings. Participants rated on a 1 to 7 Likert scale the degree to which the sentences that comprised the experimental arguments appealed to emotion versus logic. In addition to providing emotionality and logicity ratings, the pilot study asked the participants how convincing each statement was, to ensure all statements would evoke maximum levels of ambivalence when pitted against each other. All ratings were completed on a 1-7 Likert Scale. Those statements with low ratings were discarded from the main experiment and only the statements with high logicity/emotionality ratings were paired together to present the most convincing arguments on both sides in order to elicit more ambivalence from the participants. The pilot test took about 3 hours maximum.

After eliminating the least emotional and logical statements based on the result of pilot testing on young adults, 33 pairs of emotional and logical statements were chosen for the main study. The selected 33 pairs of statements were also tested on older adults to see if they would respond similarly. The results are presented in the Table 2 and Table 3. The data for both age groups was remarkably similar, so it appears as if both groups were responding to the stimuli in the same way.

Table 2. Mean ratings on evoked level of emotion in a pilot study

	Young adults (n=10)		Older adults (n=5)	
	Mean	SD	Mean	SD
Emotional Statements	5.51	.95	5.20	1.19
Logical Statements	2.48	1.83	2.03	.89

Table 3. Mean ratings on evoked level of convincingness in a pilot study

	Young adults (n=10)		Older adults (n=5)	
	Mean	SD	Mean	SD
Emotional Statements	5.98	1.95	5.82	1.65
Logical Statements	5.76	1.29	6.13	1.01

Main study

There were three dependent variables in the main study: Response Latency, Self-rated Ambivalence, and measures designed to assess heuristic usage. I will discuss each of the aforementioned dependent variables in turn. I will start with the response latency data.

Response latency. In cognitive psychology, it is generally assumed that longer response latencies are indicative of greater deliberation. Thus, the time each participant took to make

decisions was measured in order to assess their cognitive deliberation. Young adults showed no difference in response latency across all conditions, suggesting potentially no difference in deliberative processing time across conditions. However, it could be possible that young adults wanted to curtail the long experiment without reading when each argument statement was presented alone, but rather reading everything all together at the very last phase where everything was presented in one screen. As for older adults, the response latency could not be collected due to the mechanical issues and could not be used for the analysis.

Overall difference in level of ambivalence between two age groups. The main goal in the primary study was to determine if ambivalence would differ as a function of age and as a function of types of conflict (e.g., system 1 vs system 1, system 2 vs. system 2, system 2 vs. system 2, non-conflicting condition). In this section, System 1 conflict refers to sentences rewritten to induce strong emotion and system 2 conflict refers to sentences rewritten to induce strong rationality. I am making the assumption that individuals will engage in less deliberative processing when the sentence evokes strong emotions than when the sentence does not. One of the reasons that I suspected that there would be age differences as a function of system 1 and system 2 is that there is a body of literature that indicates that older adults are less likely to engage in deliberative processing than younger adults (e.g., Mata, Schooler, & Rieskamp, 2007; Pachur, Mata, & Schooler, 2009).

Based on the research that indicates that individuals who engage in less systematic processing are more likely to experience ambivalence than individuals who engage in more systematic processing, I predicted that older adults would experience more ambivalence than younger adults.

Self-ratings of conflictedness as a function of types of conflicts in two age groups.

Table 4 and figure 1 show that, overall, the older adult data yielded lower ambivalent scores than the younger adult data. Moreover, the data indicate that levels of ambivalence varied as a function of condition. That is, for younger adults, the univalent condition (i.e., combination of two statements that are not conflicting; pro-argument vs. pro-argument or con-argument vs. con-argument) evoked less self-reported ambivalence than any of the other conditions, designed to induce ambivalence. Since the univalent condition was designed to serve as a baseline condition, this low level of ambivalence was expected. A review of Table 4 and Figure 1 show that older adults produced a different pattern of results. Figure 1 shows that the emotional congruent condition (i.e., two conflicting emotional statements) was associated with more self-reported ambivalence than any of the other conditions. In fact, when considering the conditions designed to induce ambivalence, only the emotional congruent condition appeared to have induced noticeably higher level of ambivalence than the univalent condition.

The aforementioned observations were supported by a mixed-design 2 x 4 ANOVA with age group (young, old) as a between-subject factor and types of conflict (conflict within system 1 vs. system 1, conflict between system 1 vs. system 2, and conflict within system 2 vs. system 2, non-conflicting univalent condition) as a within-subjects factor. There was a significant main effect of types of conflictedness ($F(3, 116)=3.75, p=.011$) but not of age. There was a marginally significant trend indicating an age group X type of conflict interaction ($[p < .05], F(3, 116) = 2.34, p=.074$), because older adults self-reported lower levels of ambivalence than younger adult. The marginally significant interaction was most likely due to the small sample size of the study. There is a good chance that the interaction would reach significance ($p \leq .05$) with greater power that comes from an increased sample size. Because I initially predicted that older adults

would produce more overall ambivalence than younger adults, I conducted a *t*-test to determine if there were overall group differences in levels of ambivalence. Surprisingly, contrary to my initial hypothesis, older adults ($M= 2.68, SD= 1.70$) reported significantly less ambivalence than younger adults ($M= 3.34, SD= 1.73$), $t(116)= 2.10, p= .038$. Although my hypothesis was that individuals with less working memory resources would experience higher ambivalence than individuals with higher levels of working resources, my results are more consistent with the opposite viewpoint. Most of the extant research indicates that younger adults have more working memory than older adults. If working memory resources were negatively correlated with self-reported ambivalence, then this study should have yielded evidence of older adults self-reporting more ambivalence than younger adults. However, it was younger adults who self-reported more ambivalence than older adults. Likewise, younger adults are known to engage in more elaborative processing than older adults (e.g., Peters, Hess, & Vastfjall, 2007). Moreover, if ambivalence were inversely related to cognitive engagement, then once again, older adults would be expected to self-report more ambivalence than younger adults. Thus, in this study, ambivalence appears to be associated with more deliberation rather than less deliberation and more cognitive resources rather than less cognitive resources. Again, this is speculative, as there was no measure of working memory or executive processing resources.

In addition to the analyses conducted to determine if there were group differences in levels of ambivalence, I wanted to examine ambivalence separately for younger and older adults to determine if conflictedness varied as a function of condition (i.e., intrasystem conflict or intersystem conflict) within each age groups. If one examines Table 4, it appears that the emotional congruent condition (i.e., system 1 vs. system 1), as well as the logical congruent condition (i.e., system 2 vs. system 2) and incongruent condition (i.e., system 1 vs. system 2)

evoked more ambivalence than the univalent condition. Thus, for younger adults, the stimuli designed to induce ambivalence produced significantly more ambivalence than the stimuli not designed to do so. This observation was supported by a Tukey's post hoc test that revealed that for the young adult group, the emotional congruent condition ($p=.013$), the logical congruent condition ($p=.001$), and the incongruent condition ($p=.016$) yielded significantly more self-rated ambivalence than the univalent condition.

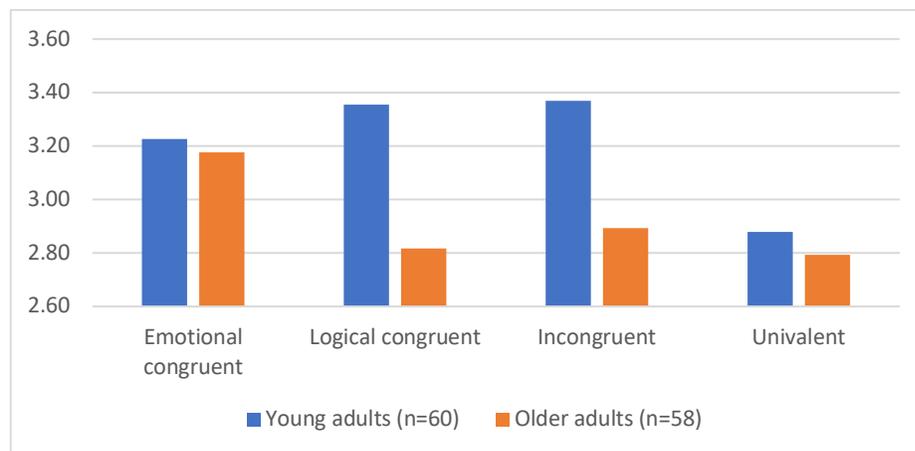
Older adults produced a different pattern of data as a function of condition relative to younger adults. If one examines Table 4 or Figure 1, it is evident that older adults self-reported more ambivalence in the emotion congruent condition than any other condition. This was contrary to my prediction. I initially predicted that older adults would produce the greatest amount of ambivalence in the incongruent condition in which individuals would receive both logical and emotional arguments. This observation was supported by a Tukey's post hoc test that revealed that the emotion congruent condition ($M=3.18, p=.024$) yielded higher levels of self-reported ambivalence than other conditions (logical congruent: $M=2.82$, incongruent: $M=2.89$, univalent: $M=2.79$) for older adults. If it is the case that ambivalence is associated with more rather than less information processing, then my findings indicate that older adults deliberated more when the stimuli evoked emotional responses. This is not inconsistent with research that shows that older adults are more invested in solving problems associated with strong emotions than solving purely logical problems (Blanchard-Fields, 1987). This proclivity for favoring emotional over logical information may have impacted the types of decisions that younger and older adults made. I will turn to the effects of age and emotionality on decision-making in the next section. The next section focuses on decision-making as a function of age and the framing

of the issue (i.e., decision option worded to induce emotional responses as opposed to decision option worded to induce logical responses).

Table 4. Mean rating on self-reported ambivalence in main study

	Young adults (n=60)		Older adults (n=58)	
	Mean	SD	Mean	SD
Emotional congruent (emotion vs. emotion)	3.23	1.10	3.18	1.59
Logical congruent (logic vs. logic)	3.36	1.79	2.82	1.86
Incongruent (emotion vs. logic)	3.37	1.22	2.89	1.48
Univalent (non-conflicting)	2.88	1.25	2.79	1.77

Figure 1. Mean rating on self-reported ambivalence in various conditions



Preferences for logical versus emotional decisions as a function of age. At the end of each trial, participants had to choose a statement that best represented their final decision. Given the data that show that older adults place more value on emotional problem-solving and emotional well-being, I wanted to follow up with additional analyses to determine if older adults might be more likely than younger adults to choose statements that endorsed an emotion-laden argument versus a logical argument.

I was also interested in examining the possibility that age effects indicating a preference for emotional over logical decisions was moderated by the valence of the emotional decision options (i.e., negative vs. positive). The basis for my prediction is that in the aging literature there is evidence that people demonstrate a positivity effect as they age. That is, older adults are more likely than younger adults to focus on positive rather than negative information. Because there are two valences within emotional statements, (i.e., positive and negative), I ran a between-subject ANOVA on the three types of statements (i.e., number of chosen positive emotional statements, negative emotional statements, and logical statements) between two age groups (i.e., young adults, older adults). The test did not yield any significant interaction or main effects. Table 5 shows the general trend in terms of the frequency of types of statements each age group chose. Although there were no significant differences between the two age groups, there was a trend for older adults in comparison with younger adults to choose statements or final decision options that were worded in such a way as to induce positive rather than negative emotions. As one might suspect and as illustrated in Table 5, there was a nonsignificant trend to for younger adults in comparison with older adults, to choose logical over emotional options as their final decision.

Table 5. Mean number of chosen statements

	Young adults (n=60)		Older adults (n=58)	
	Mean	Sd	Mean	SD
Positive emotional statements	8.85	1.54	9.21	1.52
Negative emotional statements	9.03	1.44	8.83	1.46
Neutral/logical statements	9.12	4.51	8.60	1.57

Characteristics of provided rationale. To gain more insight into the thought processes and possible heuristics that both age groups might use in making decisions, my study included a survey and a narrative portion. The survey asked whether their prior knowledge, personal experience, political beliefs, religious beliefs, and preformed opinions influenced their decision making. Recall that participants were repeatedly told to make their decisions based solely on the information provided. I wanted to examine the extent to which participants were able to follow instructions and put aside their prior opinions or experiences. Participants were instructed to check any of the aforementioned categories that influenced the decision-making process. Participants rated the degree to which heuristics made the decision making easier, had no effect, or harder. Across participants, the number of times a particular category was checked was tallied. The participants could check multiple heuristic categories, accordingly to their experience. The maximum they could score was 33 in each heuristic category, and the minimum was 0. I predicted that older adults would use more heuristics than younger adults, based on findings from earlier research (Finucane et al., 2002; Johnson, 1993; Peters, Finucane, MacGregor & Slovic, 2000).

To address whether the older adult group utilized more heuristics to make decisions, an ANOVA was conducted on the collected survey questions. There were significantly more

politics-influenced heuristics in young adult group ($M=6.70$, $SD=7.16$) compared to older adult group ($M=3.97$, $SD=5.25$), $F(1, 116)=5.57$, $p=.02$. Older adults ($M=16.16$, $SD=7.87$) showed significantly more preformed opinion influencing their decisions compared to young adults ($M=11.60$, $SD=7.08$), $F(1,116)=10.94$, $p=.001$. There were no significant age differences in religion-driven heuristics or personal experience-driven heuristics.

At the end of the experimental session, participants were instructed to justify the rationale for their decisions. The purpose of the narrative section was to examine age differences in heuristic usage and in systematic thinking. Trained undergraduate research assistants coded the narrative portion and gave one point for emotional/heuristic-based rationale. An independent sample t-test was conducted on the narrative portion of the rationale. Surprisingly, older adults ($M=14.64$, $SD=.88$) tended to provide less emotional/heuristic based rationale than young adults ($M=18.95$, $SD=1.05$), $t(116)=3.152$, $p=.002$. One reason that I may not have found the predicted age difference is that older adults might have been motivated to use systematic thinking because they were required to justify their decision. Although there is research which shows that older adults are more likely to use heuristics than younger adults, there is also research that shows that age differences in heuristic usage disappears when participants have to justify their decisions rather than making their decisions anonymously (Kim, Goldstein, Hasher, & Zacks, 2005). Ennis and colleagues (Ennis, Hess, & Smith, 2013) have concluded that older adults are more motivated when the decision topic or the decision-making process is self-relevant. Self-relevancy includes concerns about self-presentation. Concerns about self-presentation increase the likelihood that older adults will engage in deliberative processing, so that they will not be perceived negatively by their peers.

CHAPTER 4

DISCUSSION

My goals in conducting this work include examining possible age differences in self-reported levels of ambivalence when evaluating contradictory arguments. I was also interested in examining the possibility that certain types of conflicting viewpoints are associated with higher levels of ambivalence than others. According to Nai's study (2014), those who frequently rely on heuristics for making decisions tend to experience more ambivalence when presented with multiple sides of an issue—presumably because people who regularly use heuristics are not used to systematically examining all sides of an issue. Based on this information, I originally predicted that older adults would have more difficulty resolving ambivalence. Furthermore, I predicted that older adults would experience more ambivalence in the logic congruent condition than in the emotionally congruent condition. However, older adults self-reported less rather than more ambivalence than younger adults in general, and particularly less ambivalence in the logic congruent condition while more in the emotion congruent condition, so my a priori predictions about self-ratings of conflictedness were not confirmed. Finally, in the narrative portion of the experiment, I predicted that older adults would self-report using more heuristics than young adults. However, the results indicated that the opposite was true. When trained coders examined the narrative responses, there was evidence that there were no significant differences between young adults and older adults in overall frequency of their use of heuristics. Taken together, the pattern of results in this study were inconsistent with my initial predictions. I will discuss each of

these results and predictions, in turn, focusing on the reasons that my results were contrary to my initial predictions.

I will first address the issue of age differences in self-rated ambivalence. As mentioned earlier, the results were not as predicted. Older adults actually experienced less ambivalence than younger adults. This could be due to several reasons. Although I initially assumed that older adults would experience more ambivalence than younger adults because of Nai's research (Nai, 2014), there is also research that indicates that those who tend to engage in more deliberative processing with respect to decision-making experience more rather than less ambivalence (Rudolph & Popp, 2007).

Given that past studies have yielded evidence that younger adults are more likely to engage in deliberative processing than older adults and given the finding that in this study, younger adults produced more ambivalence than older adults, I would argue that in the current study, ambivalence probably increased as deliberation increased. The results of my study are consistent with research that indicates that deliberative thinking gives rise to ambivalence (Rudolph & Popp, 2007).

Rudolph and Popp examined how preformed opinions affect levels of ambivalence. That is, Rudolph and Popp (2007) examined ambivalence in regard to presidential candidates and found that those individuals who held a strong preference toward a certain political party experienced lower level of ambivalence, compared to those who did not hold strong preference. My study's results support their findings in that those who had a strong pre-formed opinion regarding the debate topic (i.e., older adults), tended to show less ambivalence.

In this study, there is evidence to suggest that participants relied on heuristics (i.e., based on past experience or preformed opinions) despite instructions that discouraged heuristic usage.

Although instructions were to rely solely on the information presented in the scenarios, older adults might have found it particularly difficult to follow the instructions. For one thing, they have lived longer than younger adults and may have stronger opinions about the issues raised in the scenarios than younger adults. Furthermore, the age-related changes in inhibition may have made it more difficult for older adults to suppress their already preformed opinions. Thus, rather than focusing on each of the attributes associated with each option, older adults may have just relied on past experience. There is support for this explanation in the survey portion of my data in that significantly more older adults, relative to young adults, reported making decisions was easier when they utilized their preexisting opinions on the topic. One study found that even among those individuals who engaged in deliberative thinking processes for making a decision, those who had more concrete preformed opinion tended to experience less ambivalence (Rudolph & Popp, 2007), and our study seems to corroborate their findings as well.

I also predicted that ambivalence for older adults would be higher in the logic-congruent and mixed (logic and emotional) condition than in the emotionally congruent condition. My prediction was based on the research that shows that older adults may focus more on emotional information than younger adults (Carstensen et al., 2003) and are less likely to engage in deliberative processing than younger adults (e.g., Peters et al., 2007). However, contrary to my a priori prediction, the highest level of ambivalence of the older adult group was observed in the emotional congruent condition. Recall that in this condition, participants received two conflicting statements which were pretested and deemed to produce fairly strong emotional reactions. In fact, in general, older adults tended to show more ambivalence in conditions that involved emotions while young adults tended to show more ambivalence in conditions that involved logic.

According to Blanchard-Fields (2007), older adults tended to show more problem-solving strategy endorsement, of which strategies included planful problem solving strategies and cognitive analysis, in interpersonal situations relative to young adults, and this could be attributed to the fact that older adults were more motivated and interested in those specific situations. Problems in interpersonal relations are more likely to give rise to emotions than problems associated with instrumental tasks such as financial management. Based on this evidence, it seems that one explanation could be provided through Carstensen's (1993, 2006) socioemotional selectivity theory. Because older adults put more weight on positive relationships and emotional well-being, they would be more motivated to carefully deliberate over statements that induced emotional responses as opposed to statements that did not.

I also made predictions about the extent to which both age groups would use heuristics to justify their decisions. At the end of my study, participants were instructed to indicate their rationale for their decisions. Trained coders examined their statements and coded the statements in terms of type of heuristic used if any. Because participants were told to make their decisions based solely on the information provided, a heuristic was operationalized in this instance as using outside knowledge to make the decision. I made the assumption that when participants indicated that they used outside knowledge, they were short circuiting the decision-making process. I predicted that older adults would be less likely than younger adults to provide logical evidenced-based rationale for their decisions. Instead, I predicted that the rationale would provide evidence of more heuristic usage for older than for younger adults. Surprisingly, when analyzing the narrative portion of the study, I discovered that older adults actually provided less emotion-based rationale when asked to write them out. This could be due to the fact that most of the older adults were verbally answering the rationale part while the experimenter was typing it

out for them, so perhaps older adults felt more conscious of their rationale and had to give more extensive one compared to young adults who typed their own rationale without conveying it to someone else. Also, there is a study which found that older adults tend to expend more cognitive resources in making decisions when they have to justify their opinion, and as a result they tend to use less heuristics during the decision-making process (Kim, Goldstein, Hasher, & Zacks, 2005).

Although I would argue that this study provided important information about ambivalence and aging, there are some limitations to this study. First, the sample size was not large, and perhaps some insignificant findings would actually reach significance if power were increased through a larger sample size. Second, the older adults in this study were significantly well-educated than average population, making this study result may reflect less ecological validity. Third, because this study divided the experimental groups purely based on the age difference, there is a great chance of overlooking individual differences such as personality, cognitive differences, and/or need for cognition. In addition, some of the stimuli were lengthy for some people to read, and the whole experiment was lengthy, which could have caused some participants, particularly older adults, to be fatigued and compromising some of the results. Finally, due to computer error, I was not able to collect response latency data on both younger and older adults.

Some of the strengths of this study is that it is the first study to investigate age differences in levels of ambivalence when processing various types (statements designed to induce emotional responses versus statements designed to encourage logical analysis) of decision making options. Future studies should examine the extent to which individual differences (e.g., executive functioning) moderate age differences in levels of ambivalence when making a decision.

Implications

Older adults actually experience less ambivalence than younger adults except when presented with conflicting emotional dilemmas. Thus, one of the benefits of a lifetime of experiences is that older adults may be able to avoid at least some of the agony associated with ambivalence. However, the downside of older adults' being strongly influenced by past experiences is that they may have trouble suppressing preformed opinions --even in situations in which it is necessary to do so (e.g., a jury trial, or when prior knowledge was inaccurate).

Although older adults experience less ambivalence than younger adults when presented with nonemotional stimuli, they experienced ambivalence comparable to younger adults when presented with emotional stimuli. Interestingly, there is evidence that older adults have to make more emotionally laden decisions (e.g., nursing home placement, decision to accept life sustaining treatment) that may give rise to ambivalence than younger adults. Thus, it is important to follow up on my findings that older adults experience more ambivalence when making emotionally laden decisions than when making nonemotional decisions. Hopefully, we may uncover strategies that can be used to help older adults with the resolution of ambivalence.

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APPENDIX A



June 13, 2018

Jaimie Choi
Department of Psychology
College of Arts and Sciences
Box 870348

Re: IRB # 18-OR-214, "Aging and Ambivalence"

Dear Ms. Choi:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on June 12, 2019. If your research will continue beyond this date, please complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, please complete the Modification of an Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the Request for Study Closure Form.

Please use reproductions of the IRB approved stamped consent forms to obtain consent from your participants.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,


Carpantato T. Myles, MSM, CPM, CIP
Director & Research Compliance Officer
Office for Research Compliance

358 Rose Administration Building | Box 870127 | Tuscaloosa, AL 35487-0127
205-348-8461 | Fax 205-348-7189 | Toll Free 1-877-820-3066

Individual's Consent to be in a Research Study

You are being asked to be in a research study. This study is called "Decision-Making Study #2." This study is being done by a doctoral student Jaimie Choi in the Department of Psychology at the University of Alabama.

What is this study about?

This is a research study investigating the decision-making process when an individual is faced with two options

Why is this study important?—What good will the results do?

This study will help us understand how people make decisions.

Why have I been asked to take part in this study?

You are between age 60 to 99.

How many other people will be in this study?

We expect to have 140 participants.

What will I be asked to do in this study?

You will read 18 decision-making scenarios (e.g., School uniforms should be implemented to all schools). After each statement you will read a pro and con argument and then will rate how emotional or logical you think each statement is. Then you will decide which one you agree with. You will then answer questions about your decisions. Lastly you will be asked to write your rationale for the decision you made.

How much time will I spend being in this study?

The study will take up to 1.5 hours, and you will be given breaks in between.

Will being in this study cost me anything?

The only cost to you from this study is your time.

Will I be compensated for being in this study?

You will receive 15 dollars for your time.

What are the risks (problems or dangers) from being this study?

You may experience mild frustration and fatigue as you evaluate options and come to a final decision.

What are the benefits of being in this study?

Individual benefits to the participants include a greater sense of self by helping researchers to gain knowledge about the process of making decisions within various contexts. Moreover, by understanding more about decision-making in individuals with varying age, you are contributing to the society by helping to find out a better way of presenting information when making decisions.

UNIVERSITY OF ALABAMA IRB
CONSENT FORM APPROVED: 6-13-18
EXPIRATION DATE: 6-12-19

How will my privacy be protected?

You will be completing the tasks in a small lab either by yourself or in small groups. You may choose to complete the tasks at your preferred location by yourself.

How will my confidentiality be protected?

The only place where your name appears in connection with this study is on this informed consent form. Your name will not be linked to your data in any way. All data will be stored on a password-protected computer or in a locked cabinet and only the researchers will have access to either. We will write research articles on this study but participants will be identified only at the group level; for example, "There were 140 participants (x% women)."

What are the alternatives to being in this study?

You may decide to withdraw from the study.

What are my rights as a participant?

Your participation is completely voluntary and the decision to participate is entirely your own. You may withdraw at any time. However, you may not receive the full 30 dollars if you withdraw before the end of the study. Not participating or stopping participation will have no effect on your relationships with the University of Alabama.

The University of Alabama Institutional Review Board is a committee that looks out for the ethical treatment of people in research studies. They may review the study records if they wish. This is to be sure that people in research studies are being treated fairly and that the study is being carried out as planned.

Who do I call if I have questions or problems?

If you have any questions or concerns before or after completing this research project please contact Jaimie Choi (205) 393-8283 or email her at jmchoi1@crimson.ua.edu, or Dr. Sheila Black (205) 657-7802 or email her at sblack@ua.edu. If you have questions about your rights as a research participant you may contact Ms. Tanta Myles, the University of Alabama Research Compliance Officer, at 205-348-8461 or toll-free at 1-877-820-3066-348-5152.

You may also ask questions, make suggestions, or file complaints and concerns through the IRB Outreach website at <http://ovpred.ua.edu/research-compliance/prco/>, or email the Research Compliance office at participantoutreach@ua.edu.

I have read this consent form. I have had a chance to ask questions.

Signature of Research Participant

Date

UNIVERSITY OF ALABAMA IRB
CONSENT FORM APPROVED: 6-13-18
EXPIRATION DATE: 6-12-19

Signature of Investigator

Date

UNIVERSITY OF ALABAMA IRB
CONSENT FORM APPROVED: 6-13-18
EXPIRATION DATE: 6-12-19

Individual's Consent to be in a Research Study

You are being asked to be in a research study. This study is called "Decision-Making Study #1." This study is being done by a doctoral student Jaimie Choi in the Department of Psychology at the University of Alabama.

What is this study about?

This is a research study investigating the decision-making process when an individual is faced with two options

Why is this study important?—What good will the results do?

This study will help us understand how people make decisions.

Why have I been asked to take part in this study?

You are between age 60 to 99.

How many other people will be in this study?

We expect to have 140 participants.

What will I be asked to do in this study?

You will read 30 decision-making scenarios (e.g., School uniforms should be implemented to all schools). After each statement you will read a pro and con argument and then will rate how emotional or logical you think each statement is. Then you will decide which one you agree with. You will then answer questions about your decisions. Lastly you will be asked to write your rationale for the decision you made.

How much time will I spend being in this study?

The study will take up to 3 hours, and you will be given breaks in between.

Will being in this study cost me anything?

The only cost to you from this study is your time.

Will I be compensated for being in this study?

You will receive 30 dollars for your time

What are the risks (problems or dangers) from being in this study?

You may experience mild frustration and fatigue as you evaluate options and come to a final decision.

What are the benefits of being in this study?

Individual benefits to the participants include a greater sense of self by helping researchers to gain knowledge about the process of making decisions within various ambivalent contexts. Moreover, by understanding more about decision-making in individuals with varying age, you are contributing to the society by helping to find out a better way of presenting information when making decisions.

UNIVERSITY OF ALABAMA IRB
CONSENT FORM APPROVED: 6-13-18
EXPIRATION DATE: 6-12-19

How will my privacy be protected?

You will be completing the tasks in a small lab either by yourself or in small groups. You may choose to complete the tasks at your preferred location by yourself.

How will my confidentiality be protected?

The only place where your name appears in connection with this study is on this informed consent form. Your name will not be linked to your data in any way. All data will be stored on a password-protected computer or in a locked cabinet and only the researchers will have access to either. We will write research articles on this study but participants will be identified only at the group level; for example, "There were 140 participants (x% women)."

What are the alternatives to being in this study?

You may decide to withdraw from the study.

What are my rights as a participant?

Your participation is completely voluntary and the decision to participate is entirely your own. You may withdraw at any time. However, you may not receive the full 30 dollars if you withdraw before the end of the study. Not participating or stopping participation will have no effect on your relationships with the University of Alabama.

The University of Alabama Institutional Review Board is a committee that looks out for the ethical treatment of people in research studies. They may review the study records if they wish. This is to be sure that people in research studies are being treated fairly and that the study is being carried out as planned.

Who do I call if I have questions or problems?

If you have any questions or concerns before or after completing this research project please contact Jaimie Choi (205) 393-8283 or email her at jmchoi1@crimson.ua.edu, or Dr. Sheila Black (205) 657-7802 or email her at sblack@ua.edu. If you have questions about your rights as a research participant you may contact Ms. Tanta Myles, the University of Alabama Research Compliance Officer, at 205-348-8461 or toll-free at 1-877-820-3066-348-5152.

You may also ask questions, make suggestions, or file complaints and concerns through the IRB Outreach website at <http://ovpred.ua.edu/research-compliance/prco/>, or email the Research Compliance office at participantoutreach@ua.edu.

I have read this consent form. I have had a chance to ask questions.

Signature of Research Participant

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Date

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EXPIRATION DATE: 6-12-19

Individual's Consent to be in a Research Study

You are being asked to be in a research study. This study is called "Decision-Making Study #1." This study is being done by a doctoral student Jaimie Choi in the Department of Psychology at the University of Alabama.

What is this study about?

This is a research study investigating the decision-making process when an individual is faced with two options

Why is this study important?—What good will the results do?

This study will help us understand how people make decisions.

Why have I been asked to take part in this study?

You are over 18 years old.

How many other people will be in this study?

We expect to have 140 participants.

What will I be asked to do in this study?

You will read 30 decision-making scenarios (e.g., School uniforms should be implemented to all schools). After each statement you will read a pro and con argument and then will rate how emotional or logical you think each statement is. Then you will decide which one you agree with. You will then answer questions about your decisions. Lastly you will be asked to write your rationale for the decision you made.

How much time will I spend being in this study?

The study will take up to 3 hours, and you will be given breaks in between.

Will being in this study cost me anything?

The only cost to you from this study is your time.

Will I be compensated for being in this study?

You will receive 4.5 credits towards the research requirement in your class.

What are the risks (problems or dangers) from being in this study?

You may experience mild frustration and fatigue as you evaluate options and come to a final decision.

What are the benefits of being in this study?

Individual benefits to the participants include a greater sense of self by helping researchers to gain knowledge about the process of making decisions within various ambivalent contexts. Moreover, by understanding more about decision-making in individuals with varying age, you are contributing to the society by helping to find out a better way of presenting information when making decisions.

UNIVERSITY OF ALABAMA IRB
CONSENT FORM APPROVED: 6-13-18
EXPIRATION DATE: 6-12-19

How will my privacy be protected?

You will be completing the tasks in a small lab either by yourself or in small groups.

How will my confidentiality be protected?

The only place where your name appears in connection with this study is the website where you signed up for the study. Your name will not be linked to your data in any way. All data will be stored on a password-protected computer or in a locked cabinet and only the researchers will have access to either. We will write research articles on this study but participants will be identified only at the group level; for example, "There were 140 participants (x% women)."

What are the alternatives to being in this study?

You may complete another research study or an independent assignment for research credits.

What are my rights as a participant?

Your participation is completely voluntary and the decision to participate is entirely your own. You may withdraw at any time. However, you may not receive the full 4.5 credits if you withdraw before the end of the study. Not participating or stopping participation will have no effect on your relationships with the University of Alabama.

The University of Alabama Institutional Review Board is a committee that looks out for the ethical treatment of people in research studies. They may review the study records if they wish. This is to be sure that people in research studies are being treated fairly and that the study is being carried out as planned.

Who do I call if I have questions or problems?

If you have any questions or concerns before or after completing this research project please contact Jaimie Choi (205) 393-8283 or email her at jmchoi1@crimson.ua.edu, or Dr. Sheila Black (205) 657-7802 or email her at sblack@ua.edu. If you have questions about your rights as a research participant you may contact Ms. Tanta Myles, the University of Alabama Research Compliance Officer, at 205-348-8461 or toll-free at 1-877-820-3066-348-5152.

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