THE SEARCH FOR MODERATION: DOES ANXIETY ENHANCE THE UNCONSCIOUS THOUGHT ADVANTAGE?

by

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A thesis submitted in partial fulfillment
of the requirements for the degree

of

Master of Science

in

Psychological Science

MONTANA STATE UNIVERSITY
Bozeman, Montana

May 2017

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ACKNOWLEDGEMENTS

I thank my family for all of your love and support. I am incredibly fortunate to have so many people on whom I can lean and who full heartedly believe in me. I would also like to thank my boyfriend, who cooks, cleans the house, and provides ample comfort when I am in need. Thank you to my beloved Kona Bear for forcing me to take occasional breaks and go outside.

I would also like to thank Keith Hutchison, Jessi Smith, and Brandon Scott for their helpful revisions and suggestions. Thank you to my mentor, Ian Handley, for your patience and support. Lastly, I would like to thank my fellow psychology graduate students for their support, friendship, and Game of Thrones fan theories.

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ABSTRACT

When people face a large amount of information on which to base a decision, common sense suggests that they should slowly and deliberatively think about that information. However, Unconscious Thought Theory (UTT) suggests that a slow yet unconscious mechanism can process complex information and output decisions that rival, and perhaps exceed, the quality of decisions that result from deliberative thought (Dijksterhuis & Nordgren, 2006). However, this idea is controversial and research into UTT reveals that an unconscious thought advantage (UTA) over conscious thinking is small and manifests unreliably (Nieuwenstein et al., 2015; Strick et al., 2011). The aim of this thesis was to identify and test a potential moderator of the UTA. Logically, situations that hinder conscious thought but leave unconscious thought relatively unaffected should enhance the UTA. The Attentional Control Theory (ACT) offers one such situation, that anxiety compromises conscious processes that rely upon attentional control and working memory (Eysenck, Derakshan, Santos, & Calvo, 2007). Because conscious thought relies heavily on working memory relative to unconscious thought, experiencing anxiety may lead the two thought processes to diverge. Specifically, anxiety should negatively influence conscious thought but not significantly influence unconscious thought. In the present study, participants viewed information about roommate candidates and made judgments after a period of either distraction or focused deliberation, while under calm or anxious conditions. Results did not support the hypothesis that the experience of anxiety would increase the UTA; participants performed comparably in the conscious thought and unconscious thought conditions. Further, participants in the conscious thought condition performed better under anxious compared to calm conditions. Exploratory analyses and future directions are discussed.

INTRODUCTION

When people face a large amount of information on which to base a decision, common sense suggests that they should slowly and deliberatively think about that information. However, Unconscious Thought Theory (UTT) suggests that slow yet unconscious thinking can process complex information and output decisions that at least rival, and typically exceed, the quality of decisions that result from deliberative thought (Dijksterhuis & Nordgren, 2006). That is, UTT predicts an unconscious thought advantage (UTA) such that individuals who direct their attention away from a complex problem after receiving relevant information (i.e. think unconsciously) will produce better decisions relative to individuals who directed their attention towards the problem (i.e. think consciously). Of course, this idea is controversial, and research into UTT reveals that the UTA is small and manifests unreliably (Nieuwenstein et al., 2015; Strick et al., 2011). In fact, with all the mixed experimental results, there is disagreement about whether unconscious thinking exists or not. Some researchers argue that the experimental literature on the issue supports the existence of unconscious thought (Dijksterhuis, 2004; Dijksterhuis & Nordgren, 2006; Strick et al., 2011), whereas others disagree (Acker, 2008; Nieuwenstein et al., 2015).

For this thesis, I take the stance that the somewhat inconsistent effects of unconscious thought might indicate there are yet unexplored psychological moderators to the effects; uncovering such moderators can help theorists predict when the effects of unconscious thought are more likely to manifest. To do this, it is useful to identify instances in which the two thought processes should produce divergent outputs. For

instance, some factors might hinder one process while enhancing the other (or leaving the latter unaffected). In this case, one process would output a better decision or evaluation based on the information at hand. Of current focus, conscious and unconscious thought processes differ in the extent to which they depend on working memory capacity (WMC); CT relies much more heavily on working memory (Baddeley, 1993; Marchetti, 2014) relative to UT(Yosai, 2012). Further, Attentional Control Theory (ACT) suggests that anxiety compromises conscious processes that rely upon working memory (Eysenck, Derakshan, Santos, & Calvo, 2007). Given this, anxiety might serve as a theoretical moderator of the UTA by hindering working memory, which is more important to the quality of outputs derived from conscious, relative to unconscious, thinking processes.

What is Unconscious Thought?

UTT specifies that humans can think about information consciously (i.e., conscious thought; CT) or unconsciously (i.e., unconscious thought; UT). UTT defines conscious thought as "the cognitive and/or affective task-relevant processes one is consciously aware of while attending to a task" (Dijksterhuis, 2004, p. 586). For instance, one may receive information regarding two different dog breeds, then think "A German Shepherd will be good for protection, but a Golden Retriever will be a good family dog." In contrast, unconscious thought is "cognitive and/or affective task-relevant processes that take place outside conscious awareness" (Dijksterhuis, 2004, p. 586). The main difference between CT and UT is that, following the presentation of task-relevant information (e.g., dog breeds), attention is directed towards a decision task during CT,

but away from the decision task during UT. Thus, if one receives information about two different dog breeds, and then becomes distracted and directs attention toward task-irrelevant information, that individual may still think about the dog-breed information unconsciously. Further, UTT proposes that UT is an active process that organizes and integrates complex information into memory (Dijksterhuis, 2004), and can output sound decisions and evaluations. Thus, a person might conclude that "the family dog will be a Golden Retriever" after the distraction period based on unconscious thinking. Even more, UTT suggests that UT has a greater processing capacity than CT, and thus can better process *complex* information (Dijksterhuis & Nordgren, 2006). That is, CT is constrained by a low processing capacity, and therefore can only use a subset of the pertinent information on which to base decision or judgment (Dijksterhuis, Bos, Nordgren, & van Baaren (2006b). Given this, CT should form good judgments based on simple information that does not exceed processing capacity, but progressively worse judgments as the complexity or volume of the information increases. Alternatively, UT should yield good judgments independent of the information complexity. As a result, UT should form better judgments than CT when information is complex, a difference called the unconscious thought advantage (UTA).

The Classic Unconscious Thought Theory Paradigm

In typical UTT experiments, participants initially receive complex information about four categorically related objects (i.e. cars, roommates, or apartments), are asked to form impressions of the information, and eventually rate the objects and/or choose the

best one. For example, after receiving the goal to form an impression, participants may see 48 randomly presented pieces of information describing four roommates. Each roommate is described by 12 different attributes (e.g. “Roommate A is relatively quiet,” “Roommate B is messy”), and the attributes are shown one at a time for 4s each. The traits are matched such that if one roommate is described as relatively quiet, another roommate would be described as relatively loud. Further, the information is designed such that there is a clearly defined best roommate (e.g., associated with 8 positive and 4 negative attributes) and a clearly defined worst roommate (e.g., associated with 4 positive and 8 negative attributes). The two intermediate roommates have an equal number of positive and negative attributes (6 positive and 6 negative). After participants view the 48 pieces of information, they are randomly assigned to different thought conditions. Participants assigned to the *conscious-thought* condition are instructed to think about the information for 3 min, then make a judgment regarding the roommates. In this condition, conscious attention is directed towards the goal-relevant information. Participants assigned to the *unconscious-thought* condition are instructed to make a judgment regarding roommates following a 3 min period of distraction (e.g. solving anagrams or completing a word-search task), which directs conscious attention away from the judgment task yet allows UT to actively integrate the roommate information. Participants assigned to an *immediate-choice* control condition are instructed to make a judgment immediately after the information presentation. The usual dependent variable (DV) in these experiments is the difference score between participants’ rating of the best and worst object, although many experiments additionally (or instead) ask participants to

choose the best object (choice DV; e.g., Dijksterhuis, 2004). Results from this paradigm commonly show that the participants in the UT condition form significantly more (less) favorable impressions of the best (worst) objects than those in the CT condition. This effect is the known as the Unconscious Thought *Advantage* (UTA) because individuals in the UT condition significantly outperform those in CT conditions when the information is sufficiently complex (Dijksterhuis, 2004; Dijksterhuis et al., 2006). Results from these paradigms also commonly show that individuals in the UT condition significantly outperform those in the immediate-choice control condition (and other versions of a control condition). This is known as the Unconscious Thought *Effect* (UTE) because it refers to the prediction that UT can make good decisions relative to decisions made with negligible thought (e.g., immediately after information acquisition).

Controversy Surrounding Unconscious Thought Research

In the brief history of unconscious-thought research, there have been many failures to replicate the UTA (Acker, 2008; Nieuwenstein et al., 2015), and debate about the actual existence of UT. Many studies have found no differences in performance between CT and UT conditions (Acker, 2008; Nieuwenstein et al., 2015; Payne et al., 2008; Rey, Goldstein, & Perrchet, 2009). Indeed, a well-powered replication (N=399) of Nieuwenstein and Van Rijn (2012)—which implemented the ideal methodological conditions to find the UTA per suggestions from Strick et al. (2011)—found no support for the UTA using object "choice" as the DV (Nieuwenstein et al., 2015). Further, some experiments have failed to find differences in performance between unconscious-thought

and immediate conditions (i.e. no UTE; Rey, Goldstein, & Perrchet, 2009). A Bayesian analysis of 16 unconscious-thought experiments found support for the null hypothesis that CT and UT produce judgments of equivalent quality (Newell & Rankow, 2011). Further, a recent meta-analysis comparing only CT and UT conditions in experiments having a *choice* (vs. rating) DV found no significant support for the UTA (Nieuwenstein et al., 2015). Yet, a different meta-analysis including preference outcome measures found that the effect sizes for the UTA (g = .218) and UTE (g = .272) are small but statistically significant overall (Strick et al., 2011). Thus, it is clear that support for the UTA is currently inconclusive.

The mere fact that the UTA is unreliable suggests that the effect either does not exist, or that there are moderators to the effect. Thus far, several studies have identified methodological moderators to the UTA that, if satisfied, result in the greatest probability of obtaining the UTA (Bargh, 2011; Dijksterhuis and Strick, 2016; Strick et al., 2011). For example, the UTA is larger when information is presented for shorter times, when thought intervals are shorter, and when experiments use a word search as a distraction task (Strick et al., 2011). These methodological moderators are important, but no one has offered a theoretical reason for why these factors moderate the UTA. In fact, to my knowledge, no one has offered or investigated a *theoretical* moderator to the UTA. Because there is disagreement about whether the UTA exists, I will operate under the assumption that there are theoretical moderators to this effect, and endeavor to move the scientific process forward.

A Potential Theoretical Moderator

A central prediction of UTT is that UT outperforms CT when relevant information overwhelms the processing capacity of CT. Thus, factors that (further) hinder the processing capacity of CT, relative to UT, would theoretically intensify the differences in outcomes between these thought modalities. As elaborated in the below section, CT relies heavily on working memory, whereas some evidence indicates that UT has a much lower reliance on working memory, as higher working memory capacity does not benefit UT. Given this, factors that detract from working memory should differentially compromise CT and UT, accentuating the UTA.

Working memory (WM) is "the process whereby information is temporarily maintained and concurrently processed in capacity-constrained active memory for use in ongoing goal-directed achievement" (Osaka, 2003, p. 27-8). WM takes the units of information selected by early attention mechanisms and binds them into a coherent, meaningful representation (Marchetti, 2014). According to Morrison (2005), the functions of WM make conscious thinking possible, and thus greater availability of WM resources facilitates CT (Marchetti, 2014). Yet, importantly, WM has a small capacity (Baddeley & Hitch, 1974). In the CT conditions of the typical UTT paradigm, individuals need to actively maintain the recently acquired information, and maintain the goal of choosing the best object (Unsworth & Engle, 2007), to successfully discriminate between the positive and negative attributes of each of the objects. Thus, compromising working memory should decrease the quality of preferences and decisions produced by CT. However, UTT suggests that individuals can process information unconsciously to satisfy

a conscious goal, even when conscious processing is otherwise occupied. This assumes that UT does not rely as heavily upon the same processing components as CT, such as WM. Importantly, there is evidence that higher levels of WM do not improve UT. For example, Yosai (2012) measured participant's trait-level WM (using the O-SPAN; Unsworth, Heitz, Schrock, & Engle, 2005) in an experiment investigating the UTA. Among participants in a UT condition, she found a negative correlation between the quality of participants' judgments and their WM capacity (i.e., higher WM capacity was related to worse judgments). Yet, her experiment did reveal the UTA. Other experiments failed to find any relationship between O-SPAN and judgment quality in UT conditions (e.g., Rivers, 2013), suggesting overall that UT, relative to CT, relies very little on WM, and at the very least that high WM capacity does not improve UT.

Because CT and UT differ on the extent to which they depend on WM, the UTA may be particularly likely to manifest in situations that compromise WM. According to Attentional Control Theory (ACT), the experience of anxiety is one such situation in which WM is compromised. In particular, the ACT proposes that anxiety interferes with goal-directed processes by redirecting WM resources away from goal-directed tasks and toward negative thoughts (Eysenck et al., 2007). Therefore, state anxiety reduces the ability of WM to actively maintain and manipulate goal-relevant information, resulting in poorer task performance (Eysenck, 1981). More specifically, anxiety decreases individuals' attentional control function, which influences WM. Attentional control (AC) is one's ability to actively maintain task-relevant information in the face of internal and external distractions (Unsworth, Fukuda, Awh, & Vogel, 2014). When WM and AC are

compromised by anxiety, as proposed by the ACT, very little capacity remains for CT to continue processing goal-relevant information. For example, one may become worried about choosing the best engagement ring for his/her significant other. The many attributes associated with each ring are important to the current goal of selecting the perfect ring, but the worry may hinder the processing of these attributes by hijacking a large chunk of the WM capacity, therefore leaving less capacity for CT to make a good decision using the goal-relevant information. This decrease in WM capacity is what leads to the detriments in performance for individuals under anxiety (Eysenck,1981). Further, because WM is of limited capacity (Baddeley & Hitch, 1974), it is likely that the negative effects of anxiety are more detrimental to performance when the task imposes considerable processing and storage requirements on working memory, such as the multi-attribute paradigm used to measure the UTA (Eysenck, 1981).

Because anxiety interferes with AC and the overall capacity of WM, Eysenck et al. (2007) suggest it should have different impacts on processing effectiveness versus processing efficiency. Effectiveness refers to "the quality of task performance indexed by standard behavioral measures (generally, response accuracy)" (p. 336). Further, given enough time and effort, individuals can eventually reach a correct conclusion even with compromised attentional control. Alternatively, efficiency refers to "the relationship between the effectiveness of performance and the effort or resources spent in task performance, with efficiency decreasing as more resources are invested to attain a given performance level" (p. 336). The negative effects of anxiety should be greater for

processing efficiency than on performance effectiveness because anxiety reduces the resources that promote efficient processing.

As mentioned above, the ACT focuses on the influence of anxiety on task performance for which individuals have a consciously held goal to complete the task. However, by only addressing conscious goal direction, the ACT fails to consider the unconscious goal-directed processes that are likely unaffected by anxiety. Because these unconscious goal-directed processes can operate while CT is directed elsewhere, UT may serve as a compensatory resource that enhances processing efficiency when CT is compromised by anxiety. In summary, by reducing AC and WM, anxiety should compromise WM-dependent CT considerably more so than UT, therefore resulting in a stronger UTA. And, there is some preliminary support for this prediction. In a study examining thought intrusions, researchers manipulated state anxiety by showing participants a film clip depicting a violent murder at a night club (Krans, Janecko, & Bos, 2013). Participants in the CT condition were informed there would be a memory test on the video content, but first were instructed to think about the clip for 4 min. Participants in the UT condition were also informed about the memory test, but they performed a distraction task (2-back task) for 4 min before completing the memory test. Following the 4 min period, the researchers administered a recall test followed by several questionnaires, including the Intrusion subscale of the Impact of Events scale (Horowitz, Wilner, & Alvarez, 1980). The primary dependent variable was the number of intrusions from the film clip. Results show that participants in the UT condition had significantly less intrusions from the traumatic video after being distracted for 4 min compared to

participants in the CT condition (Krans et al, 2013). Although participants were not making a complex decision, this is preliminary evidence that anxiety invoking situations influence CT and UT to a different extent.

Experiment Overview

In the current experiment, participants from an undergraduate sample and an Amazon Mechanical Turk sample viewed information about three roommate candidates. After information acquisition, participants were randomly assigned to deliberate on the roommate candidates for 3 min (CT condition) or to solve word search puzzles for 3 min (UT condition). During this period, participants were either exposed to a calm, control audio recording or an anxiety inducing audio recording. After the thought period, participants made judgments about the roommate candidates.

Predictions and Hypotheses

The above literature review leads to three key predictions regarding the manifestation of the UTA resulting from this experiment.

Hypothesis 1: There will be a UTA overall, such that participants will form better preferences and choices following a distraction period (unconscious thought) than following a period of conscious thought.

UTT predicts that the UTA should be present because the roommate information is complex, and UT comes to better decisions for complex information compared to CT.

Hypothesis 2: The experiment will reveal a UTA that is significantly larger when participants experience anxiety during a thought period relative to no anxiety.

Specifically, although participants in UT conditions will form better preferences and choices following a distraction period (unconscious thought) than following a period of conscious thought, this effect will be larger under conditions of anxiety. In this case, anxiety would moderate the UTA by reducing performance in the CT condition for those who experience anxiety.

Hypothesis 3: If the anxiety manipulation is distracting, CT participants will perform better in the anxious than the calm conditions, and comparably to the UT conditions.

The anxiety may lead participants in the CT condition to think unconsciously, therefore converting the CT condition to the UT condition. If supported, this hypothesis will be relatively consistent with the UTT, if one focuses on the conditions where participants are meant to think consciously.

METHOD

Participants and Design

Six hundred forty-five individuals were recruited via Amazon Mechanical Turk (58.2% female) to participate in this study. Participants received $0.50 compensation for their participation in the experiment. One-hundred eighty-four participants were removed from analysis for failing an auditory attention check designed to ensure participants were complying with experimental instructions. Further, there are several fixed time periods throughout the experiment, totaling 660 seconds, in which the participant was not able to self-advance. Sixty participants were removed from analysis because they took less than 660 seconds to complete the experiment, indicating they could not have meaningfully engaged in the experiment. Lastly, five people were removed from analysis for failing two attention checks, leaving a final sample of 396 individuals. Additionally, two hundred twenty-six undergraduate students attending Montana State University were recruited to participate in the study (60.7% female). These participants received partial course credit for their participation. Participants in both samples were randomly assigned to a 2 (thought condition: CT vs. UT) x 2 (roommate set order: ABC first vs. XYZ first) x 2 (anxiety order: high first vs. control first) x 2 (Block: Block 1 vs. Block 2) mixed-model design, in which block served as the within-subjects factor. The experiment was run using the platform Qualtrics.

Procedure

Participants in the two samples experienced subtly different methodologies. The following procedure applies specifically to the Amazon Mechanical Turk sample; however, the primary methods and measures are nearly identical for both samples, with minor word changes catered to the respective sample. Divergences in methodologies are noted when necessary. Workers on Amazon Mechanical Turk selected the current experiment from a variety of possible experiment options appearing on that platform. Workers who selected this experiment first saw a consent form and were required to select "Accept" in order to participate in this study. Each participant was required to have a pair of headphones and Adobe Flash Player installed on their computer. If the participants did not click "Accept" they were dismissed from the study without compensation. After providing informed consent, each participant was presented with a brief overview of the experimental procedures and answered a few demographic questions. Participants were also forewarned there would be various attention checks throughout the experiment and if they failed two of these attention checks, or one of the auditory attention checks, they would be dismissed from the experiment without compensation. In contrast, no participants in the laboratory sample were dismissed as laboratory computers controlled participants' auditory experience, and participants were not motivated by money to simply complete the experiment as quickly as possible.

Participants then completed the Beck Anxiety Inventory (Beck et al., 1988) before reading a cover story detailing the (false) partnership between the current researcher and the Residence Life Office at Montana State University. In the laboratory sample,

participants completed the Philadelphia Mindfulness Scale (Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008) and the Self-Compassion Scale (Neff, 2003) in addition to the Beck Anxiety Inventory. The cover story is stated below, and was designed to increase external validity of the study.

"With the recent growth in on-campus housing at colleges in the United States, our research lab is partnering with the Montana State University Residence Life Office to understand the process of roommate selection procedures. With more and more students living on campus, the Montana State University Residence Life Director has enlisted our help to try to better understand the various factors that individuals find important when considering matching with a roommate. Your input is important as we work on improving future procedures for roommate pairings."

After reading the cover story, participants were instructed to put their headphones on and to wear them for the remainder of the experiment. Participants were instructed not to proceed to the next screen until their headphones were properly adjusted. Once the headphones were situated, participants self-advanced to the next screen, where an auditory recording of a cow mooing played automatically. Participants were required to select 'cow' out of four possible farm animals to which the sound may have belonged. This measure served as the auditory attention check to ensure participants were wearing headphones and Adobe Flash Player functioned on their computer. Participants who incorrectly answered were dismissed from the study without compensation. Following the auditory attention check, participants learned they would receive information about 3 roommate candidates and were instructed to form an overall impression of each

candidate, based on the information they were about to receive. After the presentation of the roommate attributes, participants were randomly assigned to either think about the roommate information for 3 min and then report their attitudes and choices, or to perform a distraction task for 3 min, and then report their attitudes and choices. Additionally, during this 3 min period, participants were randomly assigned to hear an audio recording of calm breathing or an audio recording of erratic, anxiety-inducing, breathing.

After reporting attitudes about the first set of roommates, participants advanced to a second roommate task with a *new* set of roommate candidates, and slightly different experimental conditions. Participants received the new roommate information in the same manner as before. Further, participants who were instructed to think about the information for 3 min for the first roommate set did so again for the second set, and participants who engaged in the distraction task following the first roommate set also did so following the new roommate set. However, for this second set, the audio recording participants heard after the presentation of the roommate information switched; participants who heard the calm breathing in the first set heard the erratic breathing during the second set, and vice versa. After the 3 min period, participants reported attitudes and choices about the second set of roommate candidates before rating the extent to which they found the most recent breathing sounds distracting. Lastly, participants were fully debriefed, thanked, and given a completion code to enter into Amazon Mechanical Turk for the $0.50 monetary compensation. Rather than provide a distraction rating, participants in the laboratory completed an exploratory executive-

control task to measure WM capacity (Marien, Custers, Hassin, & Aarts, 2012) before being thanked and fully debriefed.

Materials

Roommate Stimuli

Target stimuli consisted of two sets of three fictional roommate candidates (ABC/XYZ). Each roommate was described by 12 different attributes (e.g. "Roommate A is relatively quiet," "Roommate B is messy"), and the attributes were shown one at a time for 4s each, for a total of 36 attributes per set. The traits were matched such that if one roommate was described as quiet, another roommate would be described as loud. The information was designed such that there is an objectively defined best (e.g., 8 positive, 4 negative attributes) roommate and an objectively defined worst (e.g., 4 positive, 8 negative attributes) roommate. The intermediate roommate had an equal number of positive and negative attributes (6 positive, 6 negative). The materials for the first set of roommate candidates (ABC) were taken from Usher, Russo, Brauner, & Zakay (2011). I created the second set of roommate candidates (XYZ) by scrambling the same attributes Usher et al. (2011) created for the ABC candidates such that none of the XYZ candidates were identical to the ABC candidates, yet one roommate was the best, one the worst, and one intermediate in the same fashion as for the original set. As described in more detail below, participants only viewed one set of roommate candidates at a time, and each set was only viewed once. The roommate sets were counterbalanced such that if participants saw the ABC set first, they saw the XYZ set second, and vice versa. Participants

completed the dependent measures for the first set of roommate stimuli before viewing and making judgments on the second set of roommate stimuli.

Anxiety Stimuli

The anxiety manipulation occurred simultaneously with the thought manipulation. While participants thought consciously or solved word-search puzzles for 3 min, they heard audio of either calm breathing or erratic, anxiety-inducing, breathing. Research shows that the audio recording of erratic breathing induces anxiety relative to the calm breathing (Lauter, Mathukutty, & Scott, 2009).

Independent Variables

Roommate Set Order

The order in which participants viewed the ABC and XYZ sets of roommates was counterbalanced. Depending on random assignment, some participants experienced candidates ABC first and candidates XYZ second, whereas others experienced candidates XYZ first and candidates ABC second. Thus, all participants received the two sets of information, although the order in which they received that information varied between groups. Importantly, participants reported attitudes (and choices) for both sets of candidates after a 3 min period of conscious thinking or distraction. Therefore, the attitudes regarding the 2 sets serve as repeated measures, and the Block (1 or 2) served as a within-subject factor. (i.e., within-subjects).

Thought Condition

After participants encoded the roommate candidate information for the first roommate set, they were randomly assigned to a CT or UT condition. Participants assigned to the CT condition were instructed to "think very carefully about the roommate options" for 3 min before reporting their attitudes and choices about the candidates. This instruction was designed to direct participant's conscious attention toward the goal-relevant information. In contrast, participants assigned to the UT condition solved word search puzzles for 3 min before reporting their attitudes and choices about the candidates. Each of these word-search puzzles contained one target word, and participants had to identify the target word in each puzzle before moving on to the next puzzle. Participants continued to complete these puzzles until the 3 min expired. The word search task occupies attentional resources and directs conscious attention and thinking away from the roommate information. Bos et al. (2008) state that unconscious integration of the roommate stimuli will occur even when conscious attention is directed elsewhere, because participants have a goal to continue processing the information. Once participants completed the first set of dependent measures, they moved on to the second roommate set, and viewed information about three new roommate candidates. After encoding the information about three new roommates, participants again took part in 3 min of either conscious or unconscious thought before reporting attitudes and choices about the roommates. Thus, the manipulation of thought condition was between-subjects such that if participants thought (un)consciously about the first set of stimuli, they thought (un)consciously about the second set of stimuli as well.

Anxiety Order

All participants heard both the calm breathing and erratic during the experiment, although the order in which participants heard the different breathing sounds was counterbalanced. Specifically, participants were randomly assigned to hear the calm breathing during the first task and the erratic breathing for the second task, or visa versa. Thus, the order in which participants encountered the breathing recordings varied between subjects.

Dependent Variables

After completing respective thought and anxiety manipulations, participants selected 1 of the 3 roommates before reporting attitudes towards each specific roommate. Participants completed these dependent measures after each of the two thought periods and about each set of roommates (ABC/XYZ).

Roommate choice

After the 3 min thought/distraction period, participants were first presented with the roommate names (ABC/XYZ) in random order and in multiple choice format. Participants clicked the bubble next to the roommate they thought would be the best with whom to live. Participants' choice of the best roommate was coded as a "1" (correct), whereas participants' choice of one of the other 2 roommates was coded as "0" (incorrect). Participants made a choice for the best roommate for each set of roommate options.

Roommate rating

After making a roommate choice, participants rated the roommates individually in alphabetical order. Specifically, for each roommate option, participants saw the following question: “To what extent do you think Roommate A/B/C (X/Y/Z) would be a good roommate?” and were asked to indicate their answer on a 9-point scale ranging from 1 (*extremely bad*) to 9 (*extremely good*). Following Dijksterhuis (2004) and most research investigating UTT, an attitude rating difference score was calculated by subtracting the attitude rating of the worst roommate from the attitude rating of the best roommate. Thus, higher values on this difference measure indicate a greater preference for the best over the worst roommate. In this way, a difference score was created for each set of roommates.

RESULTS

Distraction Ratings

During the final phase of the experiment, participants in the Amazon Mechanical Turk sample rated the degree to which they found the most recent breathing sound distracting. I conducted a between-subjects factorial ANOVA to analyze the distraction ratings. The ANOVA revealed a significant main effect of anxiety order $F(1, 392) = 92.82$, $p < .01$. Participants rated the erratic breathing ($M = 7.66$, $SD = 1.86$) significantly more distracting than the calm breathing ($M = 5.57$, $SD = 2.49$). No other effects or interactions were significant (all Fs < 3.55, all ps > .059). These results suggest that the anxiety manipulation influenced more than simply anxiety, which poses a problem in testing the experimental hypothesis. Specifically, although the breathing stimuli likely did differentially induce anxiety, they also differentially produced distraction during the thinking periods. Thus, it is not clear if the subsequently reported results of the breathing manipulation are best attributable to anxiety or external distraction (or a combination).

Attitude Ratings for Block 1 and Block 2

Exploring Sample Differences

To determine whether it was reasonable to combine both samples to test my hypotheses, I first conducted an analysis of attitude ratings for the first and second roommate set including the sample (Mechanical Turk versus Laboratory) as a factor. To foreshadow, this analysis yielded only two effects involving sample, and (critically) this

effect was not predicted or moderated by other experimental factors. I therefore chose to collapse across the samples to test my hypotheses for the primary analysis in the below sub-section. Attitude ratings for the first and second roommate sets were initially analyzed using a 2 (Block) x 2 (thought condition) by 2 (sample) by 2 (anxiety order) by 2 (roommate set order) mixed factorial ANOVA, in which block served as the within-subjects factor. Analysis of the within-subjects effects yielded a significant interaction between block and roommate set order**,** $F(1, 606) = 15.42$, $p < .01$. To further explore the interaction pattern, I ran a least significant difference post hoc test. Specifically, participants were significantly better able to differentiate between the roommates in Block 1 if they encountered the ABC set ($M = 1.93$, $SD = 2.49$) than the XYZ set ($M = 1.48$, $SD = 2.61$) ($MD = -.439$, $SE = .205$, 95% C.I. [-.841, -.038], $p = .032$, $d = .18$). Further, participants were significantly better able to differentiate between the roommates in Block 2 if they encountered the ABC set ($M = 1.86$, $SD = 2.52$) than the XYZ set ($M = 1.29$, $SD = 2.47$) ($MD = .565$, $SE = .201$, 95% C.I. [.171, .960], $p = .005$, $d = .23$). Because the order of the roommate set was counterbalanced, this interaction simply indicates that participants differentiated the ABC set to a greater extent than the XYZ set, regardless of the order in which they received that information. Additionally, there was a significant interaction between block and sample, $F(1, 606) = 10.74$, $p < .01$. To further explore the interaction pattern, I ran a least significant difference post hoc test. In the Mechanical Turk sample, participants were significantly better able to differentiate the roommates in Block 1 ($M = 1.81$, $SD = 2.68$) than Block 2 ($M = 1.34$, $SD = 2.52$) ($MD = .468$, $SE = .162$, 95% C.I. [.15, .786], $p = .004$, $d = .18$). In the laboratory sample,

Table 1. Mean Attitude Difference Scores by Roommate Stimuli and Block for the Laboratory and Amazon Mechanical Turk samples

	Laboratory				Amazon Mechanical Turk			
	ABC		XYZ		ABC		XYZ	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Block 1	1.79	2.26	1.29	2.37	2.00	2.61	1.59	2.74
Block 2	2.37	2.42	1.53	2.44	1.55	2.54	1.16	2.49

participants were numerically, but not significantly, better at differentiating the roommates at Time 2 (M = 1.94, SD = 2.46) than Time 1 (M = 1.54, SD = 2.32) (MD = -.410, SE = .213, 95% C.I. [-.829, .009], p = .055, d = .17). No other within-subjects effects or interactions were significant (all Fs < 3.08, all ps > .07). Analysis of the between-subjects effects revealed a significant interaction between thought and sample, $F(1, 606) = 5.08$, $p < .05$. To further explore the interaction pattern, I ran least significant difference post hoc test. In the laboratory sample, participants were significantly better able to differentiate the roommates in the CT (M = 2.04, SD = 2.74) condition than the UT condition (M = 1.45, SD = 2.73), (MD = .592, SE = .257, 95% C.I. [.087, 1.098], p = .022, d = .21). In the Mechanical Turk sample, participants were numerically, but not significantly, better at differentiating the roommates in the UT condition (M = 1.65, SD = 2.75) than the CT condition (M = 1.51, SD = 2.75), (MD = -.136, SE = .195, 95% C.I. [-.519, .248], p = .488, d = .05). No other between-subjects effects or interactions were significant (all Fs < 2.07, all ps > .14). There were no theoretical reasons to predict the laboratory and Mechanical Turk samples would differ, and there were no significant higher-order interactions involving sample and the experimental manipulations. I therefore collapsed across samples to test my hypotheses below.

Table 2. Mean Attitude Difference Scores by Thought Condition, Anxiety Condition, and Block for the Combined Sample

	CT				UT			
	Calm		Anxious		Calm		Anxious	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Block 1	1.43	2.41	2.13	2.49	1.62	2.61	1.70	2.67
Block 2	1.61	2.42	1.63	2.72	1.68	2.36	1.31	2.52

Primary Analysis of
Attitudes for Block 1 and 2

Attitude ratings for the first and second roommate set, collapsing across sample, were analyzed using a 2 (block) x 2 (thought condition) by 2 (anxiety order) by 2 (roommate set order) mixed factorial ANOVA, in which block served as the within-subjects factor. Similar to the previous analysis (including sample), analysis of the within-subjects effects yielded a significant interaction between block and roommate set order, $F(1, 614) = 14.98$, $p < .01$. Specifically, participants were significantly better able to differentiate between the roommates in Block 1 if they encountered the ABC set ($M = 1.93$, $SD = 2.49$) than the XYZ set ($M = 1.48$, $SD = 2.61$), ($MD = -.439$, $SE = .205$, 95% C.I. [-.841, -.038], $p = .032$, $d = .18$). Further, participants were significantly better able to differentiate between the roommates in Block 2 if they encountered the ABC set ($M = 1.86$, $SD = 2.52$) than the XYZ set ($M = 1.29$, $SD = 2.47$), ($MD = .565$, $SE = .201$, 95% C.I. [.171, .960], $p = .005$, $d = .23$). Considering the counterbalancing, this interaction means that participants were more successful at differentiating between the ABC set versus the XYZ set, although it is not clear why this difference occurred. This pattern was also found looking separately at the Amazon Mechanical Turk sample, $F(1,$

388) = 5.45, $p < .05$, and the laboratory sample, $F(1, 218) = 10.31$, $p < .01$ (see Table 1 for means). The main analysis also revealed a significant interaction between block, thought, and anxiety order, $F(1, 614) = 4.13$, $p < .05$ (see Table 2 for means). Although the three-way interaction was significant, further post hoc tests using Bonferroni correction revealed that there were no significant differences between any of the groups (all ps > .016). Overall, participants performed numerically, but not significantly better in UT conditions than CT conditions when they heard calm breathing, but performed numerically, but not significantly better in CT conditions than UT conditions when they heard erratic breathing. According to ACT, anxiety adversely affects CT. Therefore, assuming the erratic breathing induced anxiety within participants, these findings are moderately inconsistent with ACT. The same three-way interaction emerged looking at the Amazon Mechanical Turk sample independently, $F(1, 388) = 5.91$, $p < .02$ but not for the laboratory sample, $F(1, 218) = .177$, $p > .05$. There were no other significant within-subjects main effects or interactions for the combined sample (all Fs < 1.56, all ps > .21). (Interestingly, the within-subjects analysis for the Amazon Mechanical Turk sample revealed a main effect of block, $F[1, 388] = 8.13$, $p < .01$, such that participants performed better on Block 1 [$M = 1.81$, $SD = 2.68$] than Block 2 [$M = 1.34$, $SD = 2.52$]. However, the within-subjects analysis for the laboratory sample revealed a significant main effect of block in the opposite direction, $F[1, 218] = 3.87$, $p = .05$; participants performed better on Block 2 [$M = 1.94$, $SD = 2.46$] than Block 1 [$M = 1.54$, $SD = 2.32$]. There is no clear reason for this difference between the samples.)

There were no significant between-subject effects for the overall combined sample (all Fs < 3.17, all ps > .07) or for the Amazon Mechanical Turk sample analyzed separately (all Fs < 2.98, all ps > .08). There was a significant main effect of thought condition in the laboratory sample, $F(1, 218) = 6.30$, $p < .05$, $d = .24$, such that participants in the CT condition ($M = 2.05$, $SD = 2.50$) performed significantly better than those in the UT condition ($M = 1.45$, $SD = 2.50$). However, this effect already appeared in the within-subjects interaction between thought and sample reported above. There were no other between-subject effects for the laboratory sample (all Fs < 1.70, all ps > .19).

Testing for Carryover Effects. It is possible that the anxiety or calmness participants experienced in the first block influenced roommate ratings in the second block (i.e., that there was a carryover effect of the breathing manipulations from Block 1 to Block 2). To investigate this possibility, I collapsed across Block and Roommate set and analyzed the attitude measure as a repeated measure comparing ratings under anxious and calm conditions. Thus, I conducted a 2 (thought) by 2 (anxiety order) by 2 (breathing: anxious versus calm) mixed-model ANOVA in which breathing served as the within-subjects factor. A carryover effect of the breathing manipulation from Block 1 to Block 2 would manifest as an interaction between anxiety order and breathing. However, this analysis revealed no significant interaction between anxiety order and breathing, nor a significant 3-way interaction including thought condition (both Fs < 1.37, ps > .24). Thus, there is no evidence of a carryover effects involving the breathing manipulation.

Roommate Choice for Block 1

Participant's choice was coded as 1 (correct) if they chose the best roommate, but coded as 0 (incorrect) if participants chose one of the other two roommates. Using the combined data set, this binary outcome measure of roommate choice for Block 1 was analyzed using a hierarchical logistic regression, entering thought, anxiety order, roommate set order and sample in the first step. In the second step, I entered the six 2-way interactions. In the third step, I entered the three 3-way interactions and in the fourth step I entered the 4-way interaction. The first step revealed a main effect of roommate set order; this predictor demonstrated a significant improvement over the constant-only model. The odds of participants choosing the best roommate were 1.74 times higher for the ABC set compared to the XYZ set (b = .554, *S.E.* = .165, Wald = 11.22, p = .001). Further, there was no main effect of thought, anxiety order, or sample. There were also no significant 2-way, 3-way or 4-way interactions in the subsequent steps.

Roommate Choice for Block 2

The binary outcome measure of roommate choice for Block 2 was also analyzed using a hierarchical logistic regression. Again, using the combined data set, participant's choice was coded as 1 (correct) if they chose the best roommate, but coded as 0 (incorrect) if participants chose one of the other two roommates. Identical to the Block 1 analysis, I entered thought, anxiety order, roommate set order and sample in the first step, the six 2-way interactions in the second step, the three 3-way interactions in the third step and the 4-way interaction in the fourth step. Similar to Block 1, the first step of Block 2 revealed a main effect of roommate set order; this predictor demonstrated a significant

improvement over the constant-only model. The odds of participants choosing the best roommate were .442 times higher for the ABC set compared to the XYZ set (b = -.817, *S.E.* = .166, Wald = 24.26, $p < .001$). There was no main effect of thought, anxiety order, or sample in Block 2. In step 2, there was a significant Sample x Thought interaction (b = -.768, *S.E.* = .351, Wald = 4.796, $p = .029$). In the laboratory sample, participants in the CT condition were proportionally more likely to choose the 'best' roommate compared to those in the UT condition. In the Mechanical Turk sample, participants in the CT conditions were proportionally less likely to choose the 'best' roommate compared to those in the UT condition. In step 2, there was also a significant Thought x Roommate Set Order interaction (b = .887, *S.E.* = .336, Wald = 6.949, $p = .008$). For the ABC roommate set, participants in the CT condition were proportionally less likely to choose the 'best' roommate compared to those in the UT condition. For the XYZ roommate set, participants in the CT conditions were proportionally more likely to choose the 'best' roommate compared to those in the UT condition. There were no additional significant 2-way interactions in step 2. There were no significant 3-way or 4-way interactions in the subsequent steps.

DISCUSSION

The present experiment sought to quell some of the controversy surrounding the UTT by identifying a theoretical moderator of the Unconscious Thought Advantage (UTA). In an attempt to create a scenario in which one should expect to see the UTA, the present experiment melded the Unconscious Thought Theory (UTT) with the Attentional Control Theory (ACT). UTT proposes that UT has a vast processing capacity and actively organizes and integrates complex information into a coherent representation (Dijksterhuis & Nordgren, 2006). Alternatively, the processing capacity of CT is far more limited, meaning UT will perform better then CT when task-relevant information is sufficiently complex. This advantage of UT over CT is known as the UTA, but many experiments fail to observe this advantage, and meta-analyses often find no evidence for it (Acker, 2008; Nieuwenstein et al., 2015). Thus, it is conceivable that the UTA does not represent a true effect, or that there are undiscovered theoretical moderators to this effect. The current thesis operated under the latter assumption, reasoning that factors that hinder one process relative to the other should accentuate the UTA. In particular, WM differentially influences CT and UT; CT relies heavily on WM relative to UT (Marchetti, 2014; Morrison, 2005; Rivers, 2013; Yosai, 2012). Given this, manipulating contexts to compromise WM may further hinder CT relative to UT, and yield clearer differences between the outputs of the two thinking processes.

According to ACT, experienced anxiety reduces the WM resources allocated to a goal-directed task and directs those resources to negative thoughts (Eysenck et al., 2007). Therefore, ACT predicts that the performance of conscious processes will be negatively

affected when one experiences anxiety. However, the ACT addresses only the decision-making capabilities of CT, failing to consider the unconscious mode of thought proposed by the UTT. Taken together, it seems likely that the UTA will be especially prominent in anxiety provoking situations.

To currently test anxiety as a moderator of the UTA, each participant engaged in the classic UTT paradigm twice. Participants encoded one set of roommate information, thought consciously or unconsciously under anxious or calm conditions, and provided roommate ratings before repeating the process with a new set of roommate information. Importantly, anxiety order was manipulated between-subjects such that some participants thought under anxious conditions first and calm conditions second, whereas some participants thought under calm conditions first and anxious conditions second. Similar to the original experiments reported by Dijksterhuis (2004), participants were shown positively and negatively valanced attributes describing three roommate candidates and instructed to form an overall impression of the candidates. One roommate candidate was objectively the best (8 positive, 4 negative attributes), one was neutral (6 positive, 6 negative attributes), and one was objectively the worst (4 positive, 8 negative attributes). After encoding information for the first roommate set, participants were assigned to one of two thought conditions (between-subjects), and one of two anxiety orders (between-subjects). Participants in the CT condition were instructed to "think carefully about the roommate information" for 3 min, whereas participants in the UT condition immediately engaged in a word search distractor task for 3 min. During the thought period, participants listened to an audio recording of calm breathing or erratic, anxiety inducing,

breathing. Following the thought period, participants provided ratings of each roommate on a 9-point scale, and chose one of the roommates. After completing Block 1, participants advanced to Block 2, which was nearly identical but with a few slight changes. In Block 2, participants encoded information about three new roommate candidates. Thought condition remained constant for the participants, however the anxiety condition switched such that participants who heard the control breathing during the first thought period heard the erratic breathing during the second thought period, and vice versa.

According to UTT, participants who were distracted after receiving the roommate information (UT condition) will form better overall judgments of the roommate candidates than those who consciously deliberated after receiving the roommate information (CT condition). Additionally, ACT suggests that the participants in CT conditions should perform worse on the decision task if they experience anxiety versus do not, although the available evidence indicates that UT would be relatively unaffected by the experience of anxiety. Overall then, melding the ACT with UTT yields the prediction that the experience of anxiety should moderate the UTA such that the UTA is larger among participants who experience anxiety relative to those who do not.

When asked to rate the degree to which the breathing audio was distracting, participants rated the erratic breathing significantly more distracting than the calm breathing. Thus, it is unclear whether the results observed when participants heard erratic breathing were due to anxiety or distraction. This is noteworthy because participants in the CT conditions should perform worse (per ACT) if they experienced anxiety while

listening to the erratic breathing, but may actually perform well if they predominantly experienced distraction (per UTT). In fact, data from the mixed-model ANOVA (collapsing across sample) shows that participants performed significantly better on attitude measures when they experienced the erratic breathing and thought consciously relative to unconsciously, whereas this trend flipped when participants heard calm breathing. This finding is inconsistent to Hypothesis 2, a prediction derived from ACT, assuming the erratic breathing induced anxiety. However, this pattern is conceivably consistent with UTT and Hypothesis 3, particularly given participants in the Mechanical Turk sample found the erratic breathing more distracting than the calm breathing. In this case, the judgments of participants in the CT conditions might have resulted from UT while they were distracted by the erratic breathing. Further, neither the attitude difference score nor the roommate choice measures revealed an overall UTA, inconsistent with Hypothesis 1. This likely resulted from the unanticipated effects of the erratic breathing in the CT conditions, which diminished the UTA. Looking past the anxiety manipulation for a moment, the calm conditions of this experiment mimic those in other studies testing for the UTA. Because the decision problems were sufficiently complex, according to the UTT participants should have performed better after a period of UT than CT, however this pattern did not emerge. Therefore, not only did the present experiment fail to support anxiety as a theoretical moderator, it failed to replicate the UTA under normal conditions in which the UTT predicts a difference will be present. Overall, the results are somewhat inconsistent with the predictions derived from the ACT and the UTT. Marginal support for the UTT is present if one interprets the CT-anxious conditions as being more

externally distracting than anxiety inducing, in which case participants who are distracted perform better than those who are not.

Limitations and Future Directions

The current experiment closely followed procedures from other experiments testing for the UTA, yet it still had several limitations. As previously mentioned, the results from this experiment are relatively ambiguous given the anxiety manipulation was rated as highly distracting. In particular, although the erratic breathing likely did elicit anxiety, participants also found it was highly distracting. This is problematic because UT occurs while CT is distracted away from goal-relevant information. Therefore, participants in CT conditions may have experienced sufficient distraction resulting from the erratic breathing to permit UT to dominate the roommate attitude measures. That is, the responses of participants in CT conditions might have resulted from UT when participants were distracted by the erratic breathing, meaning the CT condition operated as a UT condition in this context. The data is consistent with this possibility, as participants performed better in the "CT" condition when they listened to the erratic, relative to calm, breathing. Overall, the evidence in hand suggests that participants who are sufficiently distracted during the "deliberation" period reach better decisions than participants who are not distracted during that period. By definition, UT occurs when conscious attention is distracted away from the goal relevant information (Dijksterhuis & Nordgren, 2006), so the difference in performance in the "CT" conditions conceivably reflects an advantage of UT processes over CT.

Because the anxiety manipulation also manipulated distraction, the current experiment did not cleanly test Hypotheses 1 and 2. It is unclear whether the erratic breathing noise served as a greater external distraction relative to the calm breathing noise, or whether the erratic breathing induced anxiety, which was in turn distracting. The way in which the erratic breathing was relatively more distracting is ambiguous; the erratic breathing could be more externally distracting, or induce anxiety, which is more internally distracting. Therefore, future research might utilize an anxiety manipulation that is subtler, and less distracting, than the current erratic breathing noises. By doing so, researchers can properly investigate the influence of (just) anxiety on CT relative to UT, and thus the experimental hypotheses laid forth in this thesis. For instance, it might be fruitful to induce anxiety (or threat) unconsciously, rather than consciously, without also distracting participants. Holbrook, Sousa, and Hahn-Holbrook, (2011) have successfully induced a threatened (or anxious) state by subliminally presenting participants with threatening (vs. neutral) primes and subsequently asking them to rate various targets. The positive and negative ratings of the targets polarize to a greater extent when participants were exposed to the anxiety inducing primes compared to the neutral primes. Because these threatening primes elicit anxiety without conscious awareness, future research might consider using such subtle primes to better investigate the moderating role that anxiety may play on the UTA. Another way to examine the influence that distraction type has on performance is to introduce a different type of distraction condition that is distracting, but not anxiety provoking, such as listening to different genres of music.

A second limitation to the study is that participants were better able to differentiate between the ABC roommate set compared to the XYZ roommate set across all conditions. This finding was unexpected given the XYZ set was comprised of the exact same attributes as the ABC set, albeit shuffled and combined into different versions. There is no clear reason why participants found the XYZ version more difficult, but clearly the versions of the roommate information introduced unanticipated variability to the experiment. Evidently, something peculiar is happening with the recently created XYZ roommate candidates that must be resolved moving forward. Future research will benefit from removing this variability by only using pre-validated information. First, one could exclusively use the ABC roommate information formulated by previous work (Usher et al., 2011). Second, one could create and pre-test two sets of information on which participants perform equally well. Doing so will reduce extraneous variability, leading to a stronger test of the relevant manipulations.

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APPENDICES

APPENDIX A

ATTRIBUTES FOR ABC ROOMMATE STIMULI

Roommate A:
Roommate A never uses all the hot water
Roommate A has a variety of interests
Roommate A has nice friends
Roommate A has a good income
Roommate A has a sense of humor
Roommate A plays pleasant music while at home
Roommate A is not a good cook
Roommate A does not take care of his/her physical appearance
Roommate A does not have similar tastes as you
Roommate A is not fun to be with
Roommate A is a bit uptight
Roommate A sometimes leaves dirty dishes in the sink
Total Characteristics
6 Positive, 6 Negative

Roommate B:
Roommate B never uses all the hot water
Roommate B is a good cook
Roommate B has nice friends
Roommate B takes care of his/her physical appearance
Roommate B has a good income
Roommate B is fun to be with
Roommate B is a relaxed and easygoing person
Roommate B plays pleasant music while at home
Roommate B does not have a variety of interests
Roommate B does not have similar tastes to you
Roommate B does not have a sense of humor
Roommate B sometimes leaves dirty dishes in the sink
Total Characteristics
8 Positive, 4 Negative

Roommate C:
Roommate C has a variety of interests
Roommate C has similar tastes to you
Roommate C has a sense of humor
Roommate C does not leave dirty dishes in the sink
Roommate C sometimes uses all the hot water
Roommate C is not a good cook
Roommate C has friends that are somewhat boring
Roommate C does not take care of his/her physical appearance
Roommate C does not have a good income

Roommate C is not fun to be with
Roommate C is a big uptight
Roommate C plays unpleasant music while at home
Total Characteristics
4 Positive, 8 Negative

APPENDIX B

ATTRIBUTES FOR XYZ ROOMMATE STIMULI

Roommate X:
Roommate X is a good cook
Roommate X plays pleasant music while at home
Roommate X has a sense of humor
Roommate X has a variety of interests
Roommate X does not take care of his/her physical appearance
Roommate X is not fun to be with
Roommate X has friends that are somewhat boring
Roommate X does not have a good income
Roommate X sometimes uses all the hot water
Roommate X sometimes leaves dirty dishes in the sink
Roommate X does not have similar tastes to you
Roommate X is a bit uptight
Total Characteristics
4 Positive, 8 Negative

Roommate Y:
Roommate Y never uses all the hot water
Roommate Y has nice friends
Roommate Y is fun to be with
Roommate Y does not leave dirty dishes in the sink
Roommate Y has a good income
Roommate Y is a relaxed and easygoing person
Roommate Y is not a good cook
Roommate Y does not have similar tastes to you
Roommate Y does not have a sense of humor
Roommate Y plays unpleasant music while at home
Roommate Y does not take care of his/her physical appearance
Roommate Y does not have a variety of interests
Total Characteristics
6 Positive, 6 Negative

Roommate Z:
Roommate Z has nice friends
Roommate Z has a sense of humor
Roommate Z never uses all the hot water
Roommate Z takes care of his/her physical appearance
Roommate Z has a good income
Roommate Z plays pleasant music while at home
Roommate Z has similar tastes to you
Roommate Z has a variety of interests
Roommate Z is not fun to be with

Roommate Z sometimes leaves dirty dishes in the sink
Roommate Z is not a good cook
Roommate Z is a bit uptight
Total Characteristics
8 Positive, 4 Negative