

ISOLATION: THE OPTIMUM ENVIRONMENT FOR CREATIVITY?  
THE RELATIONSHIP BETWEEN THE EXPERIENCE OF  
OSTRACISM AND CREATIVITY

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## ABSTRACT

Creativity is a social construct affected by personality, intelligence, motivation, historical context, and environment, among other variables. Ostracism is a form of social rejection that has been shown to negatively affect cognitive processes. The present study tested whether there was a causal relationship between the experience of ostracism and subsequent creativity. Participants in the present study were either included or excluded during a game of Cyberball, and then were in one of three social conditions (social: expectation for future social interaction with a confederate, coercion with a confederate: no expectation for future social interaction; or solo task completion: no confederate present) while they completed two tasks of creativity (drawing and writing). Multivariate analysis of the drawing task ratings revealed a significant Cyberball x social condition x drawing apprehension interaction; participants in the Cyberball-excluded/solo condition received the highest ratings on complexity, but only when they were high in drawing apprehension. Additionally, Cyberball-included/social condition, participants high in drawing apprehension received much higher ratings of drawing complexity than participants low in drawing apprehension. The implications of these findings are discussed, as well as directions for future research.

## DEDICATION

This dissertation is dedicated to my mom and my grandmother, the strong women in my life who always told me I could be anything I wanted to be.

This dissertation is also dedicated to the creators, the artists, the innovators, the dreamers, the rogues, and the rebels—May the Force be with you, always.

## LIST OF ABBREVIATIONS AND SYMBOLS

$\alpha$	Cronbach's alpha: an index of internal consistency
$df$	Degrees of freedom: the number of values in the final calculation of a statistic that are free to vary after certain restrictions have been placed on the data
$F$	Fisher's $F$ ratio: a ration of two variances
$M$	Mean: the sum of a set of items divided by the number of items within the set
$N$	Sample size of group
$n$	Sample size of a subset of the total group
$p$	Probability: chance of occurrence under the null hypothesis of a value more extreme than the observed value
$\eta^2$	A measure of effect size; proportion of variance in $Y$ explained by $X$
$r$	Pearson's $r$ : value of correlation
$SD$	Standard Deviation: value of variation from the mean
$\beta$	Estimates resulting from a regression analysis that have been standardized
$t$	Value of the $t$ -test
Wilk's $\lambda$	Probability distribution used in multivariate hypothesis testing, especially with regard to the likelihood-ratio test and multivariate analysis of variance
$\chi^2$	A test for categorical data; the normalized sum of squared deviations between observed and theoretical frequencies
$<$	Less than
$=$	Equal to

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## CONTENTS

ABSTRACT.....	ii
DEDICATION.....	iii
LIST OF ABBREVIATIONS AND SYMBOLS.....	iv
ACKNOWLEDGEMENTS.....	v
LIST OF TABLES.....	viii
LIST OF FIGURES.....	ix
1. INTRODUCTION.....	1
2. METHOD.....	21
3. RESULTS.....	33
4. DISCUSSION.....	43
REFERENCES.....	71
APPENDIX A: WRITING AND DRAWING APPREHENSION MEASURE.....	77
APPENDIX B: EXPERIMENTAL PROTOCOL AND CONFEDERATE SCRIPT.....	79
APPENDIX C: SAMPLE OF RESPONSES TO DRAWING TASK.....	84
APPENDIX D: SAMPLE OF RESPONSES TO WRITING TASK.....	87
APPENDIX E: HUMAN SUBJECTS APPROVAL.....	91

## LIST OF TABLES

1. Study Design.....	55
2. Gender Differences.....	56
3. Racial Differences.....	57
4. Relationships Between the Drawing Task Ratings and Primary Covariates.....	58
5. Relationships between the Writing Task Ratings and Primary Covariates.....	59
6. Results of $\chi^2$ Test of Independence for Drawing Task Topic and Condition.....	60
7. Results of $\chi^2$ Test of Independence for Writing Task Topic and Condition.....	61
8. Cyberball Manipulation Check: Means, Standard Deviations, and ANOVA Test Values.....	62
9. Drawing Task MANCOVA.....	63
10. Means of Social Condition x Cyberball x Median Split of Drawing Apprehension on Drawing Task Ratings of Complexity.....	65
11. Initial MANCOVA Model for the Writing Task Ratings.....	66
12. Final MANCOVA Model for Writing Task Ratings.....	67
13. Personality MANCOVA for the Drawing Task.....	69
14. Personality MANCOVA for the Writing Task.....	70

## LIST OF FIGURES

1. Need-Threat Model of Ostracism (Williams, 2009).....	53
2. Nested Social Systems Model of Creativity.....	54
3. Graphs of Simple Slopes for the Cyberball x Social Condition x Drawing Apprehension Interaction on Art Task Ratings of Complexity.....	64
4. Graph of Cyberball x Social Condition Manipulation on Writing Task Ratings of Descriptiveness.....	68

## CHAPTER 1: INTRODUCTION

Isolation: the optimum environment for creativity? The relationship between the experience of ostracism and creativity

*“With Ender, we have to strike a delicate balance. Isolate him enough that he remains creative - otherwise he'll adopt the systems here and we'll lose him.”* (Card, 2006, p.20).

As the above quote illustrates, there is a long-standing image in popular culture of the isolated genius, that isolation even fosters creativity. There is a persistent myth of the stereotypical “lonely genius”: artists, musicians, writers, and great thinkers who flourished in their isolation (Simonton, 2000). Given that many stereotypes arise from a kernel of truth (Allport, 1954), this raises the question of whether isolation could possibly incite greater creative thinking, and, if so, under what conditions. From a developmental psychology perspective, experiencing isolation and social rejection in childhood may foster creativity in children who cope with stressful interpersonal situations by retreating into a rich fantasy life (Olszewski - Kubilius, 2000). Alternatively, it may be that isolation imposed by circumstance does not necessarily facilitate creativity, but rather that creative individuals have a greater internal need for time alone (Ochse, 1991). The purpose of the present research is to explore the relationship between the experience of ostracism and creativity.

### **The Nature and Consequences of Ostracism**

Ostracism, also called social rejection, is a phenomenon in which “individuals are excluded to preserve group cohesion” (Williams, 2001). Exclusion from the group can take many forms, such as physically isolating a child for “time out”, giving one’s spouse the silent

treatment, or ignoring a colleague who failed to pull his/her own. Ostracism also occurs at the institutional level; for instance, the Catholic Church may excommunicate members who violate certain rules of the religion, the Amish engage in “shunning” of noncompliant members, and Mormons and Jehovah’s Witnesses blackball people who leave their respective churches. Ostracism has been demonstrated to be as psychologically damaging as emotional abuse, and individuals who have experienced long-term ostracism often report they would prefer physical or verbal abuse to being ignored (Williams, 2001). Ostracized individuals report increased negative affect, decreased positive affect, lower state self-esteem, and display observable behavioral changes such as increased conformity with their groups and compliance with requests (Williams, 2001, 2009). The effects of ostracism are so powerful that people still report distress and psychological pain even when the group excluding them is despised (i.e., the KKK; Gonsalkorale & Williams, 2007).

Ostracism falls under the broader heading of social rejection, but the inherently silent nature of ostracism makes it especially aversive (Williams, 2009). Williams’ theoretical need-threat model (See Figure 1) of ostracism suggests that ostracism is uniquely damaging because it threatens the human needs to belong, to control one’s environment, self-esteem, and to have a meaningful existence. Individuals who have just been ostracized report lower levels of belonging, self-esteem, control, and sense of a meaningful existence (Zadro, Williams, & Richardson, 2004). Ostracism threatens self-esteem because it is often unexplained, and the target of the ostracism is left to generate his or her own explanations; this can lead individuals to ruminate on all possible explanations and engage in self-blame for any number of possible past mistakes or shortcoming that could have prompted their present exclusion (Williams, 2009). Individuals’ need to control their own environment is threatened because the targets of ostracism

are unable to engage with the person who is ignoring or excluding them; the source's silence precludes any discussion, argument or explanation, leaving the target to feel helpless (Williams, 2009). Finally, ostracism threatens individuals' need for a meaningful existence because ostracism serves as a "social death", and a reminder of mortality, because an individual's identity is largely defined in reference to social roles (Williams, 2007). Individuals' identities are defined by who they are in relation to significant others (e.g., friends, family, colleagues); if those others begin to ignore them, it calls into question the meaning of their existence (Williams, 2009). Need-threat is an essential component of a larger model of the cognitive processes involved in recognizing and responding to ostracism: the temporal need-threat model. For the proposed study, need-threat is the only construct from the temporal model that will be assessed; however, a brief discussion of this model is presented below to demonstrate how need-threat operates within a broader context.

The temporal needs-threat model proposes a sequenced set of reactions in response to ostracism (Williams, 2009). This model is an extension of Williams's (2001) earlier model of need-threat, and consists of four distinct stages: minimal signal (the detection of ostracism), followed by the reflexive, reflective, and resignation stages. Williams (2009) argues that humans have a highly sensitive ostracism detection mechanism because ostracism is a biologically relevant threat. Thus, from an evolutionary psychological perspective, in the Environment of Evolutionary Adaptedness (EEA; Bowlby, 1984), being ostracized from the tribe was likely a death sentence because it meant greater risk of attack, decreased access to resources, and a minimal to non-existent opportunities for reproduction (Wesselmann, Nairne, & Williams, 2012). Since missing the early signs of ostracism could be deadly, during the EEA, researchers assert that people who were more sensitive to these cues would have increased reproductive

success (Wesselmann et al., 2012). As a result, humans likely have a “minimal signal” mechanism for detecting these ostracism cues (Williams, 2009). This “minimal detection” system rapidly identifies social cues of ostracism, but it is crude—over-detection of ostracism is likely, and preferable, because of the cost of failing to identify cues of social rejection. Following the detection of ostracism cues, a target of ostracism experiences the *reflexive* stage, which is characterized by significant emotional distress, negative affect, and threat to the basic human needs mentioned above. The *reflective stage* is distinguished from the *reflexive* stage by the onset of behaviors aimed at recovering from ostracism and restoring the needs it threatens, but if ostracism persists for a long period of time, individuals’ resources are depleted; they have an inability to restore needs and become resigned.

Because humans are highly sensitive to ostracism cues, it is possible to experimentally create an ostracism experience in the laboratory that is high in psychological realism, high in experimental control, externally valid, and results in no lasting psychological distress for participants (Williams & Jarvis, 2006). One of the most widely used paradigms for the psychological study of ostracism is a software program called Cyberball (Williams & Jarvis, 2006). Cyberball is presented to participants as a video game in which participants believe they are playing an online game of catch with two other research participants. In reality, the other participants are computer-controlled players, which will either include or exclude participants from the game of catch. In the inclusion condition, participants receive the ball as frequently as the two other fictitious players, while in the exclusion condition, the participant is thrown the ball only once, and then is excluded while the other two fictitious participants continue to throw the ball back and forth to each other. This paradigm is so powerful that participants still report psychological distress even when they believe the people excluding them belong to a highly

undesirable group, such as the KKK (Gonsalkorale & Williams, 2007). Perhaps even more notable is that participants *still* report psychological distress and increased need-threat when they are told, prior to playing Cyberball, that the software on the computer has been pre-programmed to exclude them (Zadro et al., 2004).

Recent research using psychophysiological methods has provided additional evidence for the biological relevancy of ostracism (e.g., DeWall et al., 2010; Eisenberger, Lieberman, & Williams, 2003). An fMRI study of participants playing Cyberball found a pattern of brain activation strikingly similar to that seen in studies of physical pain. Participants in the exclusion condition showed increased activity in the dorsal anterior cingulate cortex (dACC), relative to participants in the inclusion condition (Eisenberger et al., 2003). The dACC is an area of the brain which has been shown to be activated by physical pain, so the linear relationship between exclusion-induced social pain from Cyberball and fMRI blood-oxygen-level dependent signal in the dACC, suggests a common neurological underpinning for physical and social pain (Eisenberger et al., 2003). Other research on the link between physical and social pain found that daily doses of acetaminophen, a commonly used analgesic, reduced participants' reported hurt feelings due to social exclusion (DeWall et al., 2010). This same study found that, relative to placebo control participants, those participants who had taken acetaminophen for three weeks prior to playing Cyberball showed less activity in the dACC while being excluded. These findings provide support for Williams' model of ostracism as being an evolutionary relevant phenomenon with significant physiological correlates.

Collectively, this research shows that people react strongly to even minimal cues of ostracism, and this reaction has both emotional and physiological correlates (Eisenberger et al., 2003; Zadro et al., 2004). Ostracism threatens people's needs for a meaningful existence, control

over their environment, self-esteem, and most overtly—their need to belong (Zadro et al., 2004). When the need to belong is threatened, people compensate by immediately seeking social connection (Gonsalkorale & Williams, 2007; Van Beest & Williams, 2006). Are there any consequences of this response to ostracism? Does this increased need for social connection have any negative impact? We speculated that creativity is a type of cognitive process that may be uniquely disrupted by ostracism because creativity conflicts with the goal of social connection by distinguishing the individual as distinct (Rank, 1968).

## **The Nature of Creativity**

### **What is Creativity?**

Any discussion of creativity should begin with defining what is meant by “creativity,” as variations in definitions correspond to different theoretical orientations. Additionally, as noted by Plucker, Beghetto, and Dow (2004), the field of creativity research has suffered from the absence of a standard, empirically grounded definition of creativity; this lack of definition has led to the perception that creativity research is “fuzzy” soft science. One basic definition is: “Creativity is the ability to produce work that is both novel (i.e., original, unexpected) and appropriate (i.e., useful, adaptive concerning task constraints)” (Sternberg & Lubart, 1999, p. 3). This definition, though a useful starting point, places all its emphasis on the end result (the product) and offers no information about creator or the process of being creative. A more inclusive definition (incorporating, creator, process *and* product) is preferable because it maps out the basics of the theoretical orientation guiding the research. Therefore, our preferred definition is: “Creativity is the interaction among *aptitude, process, and environment* by which an individual or group produces a *perceptible product* that is both *novel and useful* as defined within a *social context*” (Plucker et al., 2004, p.90, emphasis in original). This definition was generated as the result of a

content analysis of 90 articles published in peer-reviewed journals, and includes the aspects of creativity that were most frequently mentioned or implied across in the 90 reviewed articles (Plucker et al., 2004). This definition is useful because it outlines the elements necessary for creativity to occur: individual aptitude (including ability and motivation), process (cognitive sets that facilitate creative thinking) and environment. Additionally, this definition moves beyond specifying novel products as the outcome of creativity by providing a benchmark for judging those novel products: the social context (Plucker et al., 2004). This definition provides the framework that will guide the subsequent discussion of how creativity is conceptualized in the present research. Creativity is conceptualized as being an inherently social construct resulting influenced by social factors on three levels. First, creativity is influenced by individual factors such as intrinsic motivation. Second, creativity is influenced by other persons factors, such as the expectation of evaluation, social desirability, social facilitation and conformity. Finally, creativity is influenced by the environment at large; what is novel and useful at any given time is relative to the larger social and environmental context. The Wright brothers were immensely creative when they built their first airplane, but by today's standards, their work is outdated. These factors can be conceptualized as nested levels, as seen in Figure 2.

This conceptualization of creativity combines elements from the componential theory (Amabile, 1983; Amabile & Pillemer, 2012), the investment theory (Sternberg & Lubart, 1992, 1995), and the systems theory (Csikszentmihalyi, 1999) of creativity.

In the present research, we manipulated the second level by varying the immediate social environment in which participants were asked to be creative. However, the larger model is relevant because the immediate social environment influences person-level factors such as motivation (Amabile, 1983). Additionally, the environment-at-large is relevant for the present

research because raters evaluated the creativity of participants work, and this assessment was inherently colored by the raters' cohort, culture and background (Csikszentmihalyi, 1999).

### **Individual Level Factors That Influence Creativity**

Most theories of creativity posit that there are some individual traits, abilities, or resources are necessary for creative thinking. Each theory has groups these abilities or resources differently, but there are overlapping, crosscutting components.

The componential theory (Amabile, 1983; Amabile & Pillemer, 2012) includes three broad individual-level components, or factors, that influence creativity: (a) domain-relevant skills (expertise, technical skill, and innate ability in the creative domain); (b) creativity-relevant skills (flexible cognitive style, personality traits such as openness to experience, skill in using creative-thinking heuristics, and persistent work style); and (c) intrinsic task motivation. The investment theory includes many of the same elements, but argues there are five individual resources necessary for creativity: (1) intellectual abilities; (2) knowledge; (3) thinking style; (4) key personality attributes (willingness to tolerate ambiguity, sensible risk-taking, perseverance and self-efficacy); and (5) intrinsic motivation (Sternberg & Lubart, 1992).

**Domain-Relevant Skills.** The domain-relevant skills factor includes an individual's knowledge about the domain, level of technical skill, and innate domain-specific talent (Amabile, 1983). This corresponds to Sternberg and Lubart's (1992) creative resources of intellectual abilities and knowledge.

Intelligence – globally, rather than an IQ score -- is important for creativity (Sternberg, 2001). Sternberg and Lubart (1995) argue that there are three intellectual abilities that are necessary for creativity to occur: (a) an ability to synthesize existing information in a new way or redefine problems, (b) an ability to analyze one's own work and distinguish between good and

bad ideas, and (c) a practical-contextual ability to effectively communicate one's idea to others and "sell" them on its value.

Sternberg (2006a) argues that there is an optimum level of knowledge. Creativity cannot occur if an individual does not know enough about their field of endeavor to move it forward; they could spend their entire career reinventing the wheel. However, too much knowledge can trap individuals into a pattern and render them unable to see a problem in a new way (Sternberg & Lubart, 1995). Frensch and Sternberg (1989) conducted a study on expert and novice bridge players. Under normal circumstances, the experts beat the novices every time. However, when meaningful changes were made to the structure of the game, the expert players were more hurt by these changes than the novices and took longer to recover.

**Creativity-Relevant Skills.** Amabile's (1983) factor of creativity-relevant skills includes a flexible cognitive style, personality traits such as openness to experience, skill in using creative-thinking heuristics, and work style. Flexible cognitive style includes the ability to break perceptual sets and avoid functional fixedness (Duncker, 1945), keeping response options open as long as possible, suspending judgment, and perceiving creatively. Perceiving creatively is crucial; the creative person sees serendipity where others see a roadblock. For example, Pavlov stumbled upon the paradigm of classical conditioning when he realized the dogs began salivating before they could see or smell the food. Rather than being bothered by this confound to his experimental paradigm, he recognized the serendipitous nature of this discovery, and began the conditioning research that would make him famous. Skill in using creative-thinking heuristics means a creative individual has a set of strategies for problem solving which may be conscious, or unconscious, and seem to be idiosyncratic (Amabile, 1983). Work style includes sustained attention and effort, as well as "productive forgetting," which is the ability to recognize and

abandon failed strategies, even to temporarily set aside stubborn problems, as well as a strong work ethic (Amabile, 1983).

The corresponding resources from the investment theory of creativity are key personality traits and thinking style. There are certain personality traits that correlate/are predictive of creativity: perseverance in the face of obstacles, sensible risk-taking, an ability to tolerate ambiguity, and self-efficacy. Self-efficacy may be particularly important for creativity because creative ideas are, by nature, unconventional and often initially rejected (Sternberg & Lubart, 1995). Thinking style is closely related to Amabile's (1983) concept of cognitive style. Sternberg and Lubart (1995) discuss three primary thinking styles: legislative, executive and judicial. Executive thinkers need rules and structures to guide their thinking, and judicial thinkers like to evaluate and analyze other people and things. Legislative thinkers prefer unstructured problems and like to create their own rules and course, rather than following the course of others. A legislative thinking style is essential to creativity.

Feist's (1998) definitive meta-analysis of the relationship between personality and creativity found that creative people, relative to non-creative people, are more autonomous, open to new experiences, self-confident, driven, ambitious and non-conforming; however, they are also more introverted, dominant, hostile and impulsive. Perhaps more interesting was that the meta-analysis revealed that the creativity in the arts and sciences does not seem to be driven by the same personality profile. Artists scored significantly higher on emotional instability, coldness and rejection of group norms than did scientists (Feist, 1998). Within the scientific domain, high-creativity scientists were distinguished from low-creativity scientists by being less conventional and close-minded (Feist, 1998). These personality traits relate to cognitive the cognitive/thinking style described above; a high correlation has been found between openness to experience and

unconventionality, which underlies the flexible cognitive and legislative thinking styles described above (Dollinger, Urban, & James, 2004).

**Intrinsic Motivation.** The final factor for the componential and investment theories is intrinsic motivation, which arises from a person's valuation of a task; i.e., is it interesting, enjoyable, and satisfying. This is in contrast to extrinsic motivation from an external source, such as rewards or punishment. The Intrinsic Motivation Hypothesis of Creativity posits "the intrinsically motivated state is conducive to creativity, whereas the extrinsically motivated state is detrimental" (Amabile, 1983, p.76). When there are extrinsic motivators or constraints in the environment, motivation can shift from being intrinsic to extrinsic and diminish creativity. In a study of elementary school children, Amabile, Hennessey, and Grossman (1986) found that receiving a reward resulted in less creative stories; this occurred even when children in the non-reward condition experienced the same "reward," and when the reward presented prior to engaging in the creativity task. In this study, children in the reward condition were told that the activity of taking pictures with a Polaroid camera was a reward, and they had to sign a contract promising to tell the researcher a story afterwards. In the non-reward condition, children were told the study included two activities: taking pictures with the Polaroid camera, and telling the researcher a story. Children in both conditions completed the same activities, but the children in the reward condition perceived taking pictures with the camera as being contingent on the creative activity. This shift in perception increased their extrinsic motivation, but decreased their intrinsic motivation, and the net result was significantly less creative stories. These results were replicated in a follow up study of undergraduate women (Amabile et al., 1986, Study 2). The women in the no-reward condition made significantly more creative collages than those in the reward condition.

**Individual Factors in the Present Research.** The present research indirectly measured aspects of domain-relevant skills through the creativity measures. For example, one of the aspects rated for the drawing task was quality. Individuals with higher levels of domain-relevant skills scored more highly on quality. Additionally, the creativity tasks were scored on originality; so individuals who were low in domain-relevant skills, but high in creativity-relevant skills, were scored high on originality, but low in quality. The present research also included a measure of divergent thinking, which provided a way to assess an individual's degree of functional fixedness, and a measure of personality. Intrinsic motivation was not assessed in the present study, but was hypothesized to be affected by the manipulations.

### **Social Factors that Influence Creativity**

Both the investment and componential models of creativity recognize that social environment plays an important role in creativity. However, while the investment model considers social environment to be just another resource—no more or less important than the individual resources reviewed above (Sternberg & Lubart, 1992)—the componential model views social environment as the bedrock, underlying and influencing each of the individual components (Amabile & Pillemer, 2012). The social environment can provide opportunities and experiences that can enhance domain-relevant and creativity-relevant skills through training and modeling. Additionally, social environment plays a critical role in determining whether intrinsic or extrinsic motivations are more salient, thus directly influencing creativity (Amabile, Goldfarb, & Brackfield, 1990; Amabile et al., 1986). A supportive social context may vary, but generally it is an environment that is tolerant of new ideas and offers feedback that does not discourage the individual, but rather helps direct him or her to refine new ideas (Sternberg & Lubart, 1992).

There are three ways that “others” can be related to the creative individual in the immediate social environment: evaluator, surveyor, and co-actor. Evaluators are perceived as conducting some evaluation of the creative product, while surveyors are just watching without evaluating. Co-actors are neither evaluating, nor watching; in research, co-actors are typically confederates introduced as participants completing the same study as the actual subjects. The presence of others has differing effects on creativity, depending on the role of the other. Amabile et al. (1990) found no effects for coaction on creativity, but found that the expectation of evaluation negatively affected creativity. Matlin and Zajonc (1968) found that surveillance had a significant, negative effect on originality, which is an important component of creativity. Shalley (1995) conducted a series of studies testing how the presence of others, and their perceived role, affected creativity. Study 1 found a significant main effect for presence of others, with individuals working alone having higher creativity than those working with others present. Study 2 had a 2 (alone vs. with others) x 2 (expected evaluation vs. no expected evaluation) x 2 (creativity goal vs. no creativity goal) design; and found no significant main effects for either evaluation or coaction (Shalley, 1995).

The present research built upon this work by including a coaction condition as part of the social manipulation, as well as adding a condition where participants had the expectation of a social interaction.

### **Environmental Factors that Influence Creativity**

The systems model of creativity sees it as the result of bi-directional interactions between the individual, society, and the culture (Csikszentmihalyi, 1999). This view of creativity emphasizes the role of society and culture in determining what is creative, but does not address an individual’s immediate social environment, as discussed in the previous section. However, the

systems model explicitly recognizes an implicit truth about creativity research: assessment of creativity is never purely objective, because there is no checklist for determining whether something is creative or not. The quality of creativity does not depend on the characteristics of the product or idea, but on how others react to it; “creativity is not the product of single individuals, but of social systems making judgments about individuals’ products” (Csikszentmihalyi, 1999, p.314).

This is consistent with the investment theory’s notion that other people, relative to the prevailing trends, determine the creative value of an idea. For example, if someone invented a new website called “Digital Yearbook” where individuals could “add friends,” and post updates about their lives—this would not be creative. Novelty is determined by what already exists (Sternberg & Lubart, 1995).

From the systems perspective, *who* determines what is creative is very clearly delineated. In every domain of study, there are “gatekeepers” who make up the field, and they are the judges of what is, or is not, creative (Csikszentmihalyi, 1999). Einstein’s theory of relativity only had to be accepted by a handful of top-level physicists, because that field was very small. In contrast, although *Star Trek* enjoys a large, loyal fan base today, it lasted only three seasons when it first aired, because it was not a commercial success (“A Look at Star Trek”, 2013). The field in that case was the American viewing public. However, this example illustrates another principle of the systems theory: what is creative at any given point in time is not fixed (Csikszentmihalyi, 1999). Some innovations, like relativity, may remain groundbreaking for decades or centuries, but some, like *Star Trek* are not recognized within their cohort as being creative, but subsequent cohorts may judge creativity differently.

For the present study, environmental level factors were not manipulated. However, as noted above, all judgments of creative work are, to some degree, subjective and influenced by the judges' cultural background, cohort and education.

### **Magnitudes and Domains of Creativity**

The discussion of creativity thus far has focused on process and person: what are the personal and environmental factors that facilitate creative thinking in an individual? However, not all creativity is the same. Creativity varies in scale or magnitude; a child's discovery that baking soda and vinegar can make a "volcano" is a creative achievement for her, but it is not the same magnitude as Marie Curie's work with radium. Creativity also varies by domain; Marie Curie was a creative scientist, but she would probably admit Sylvia Plath was a better poet. The previously discussed systems, or levels, of creativity correspond to the degrees of creative magnitude (mini-c, little-c, big-C), and these distinctions cut across domains of creativity (art, science, writing, etc.).

#### **Creative Magnitude**

Research on creativity has often focused on eminent, or "Big-C" creativity, but very few people ever achieve that status in their lifetime. More recently, researchers have begun to focus on more everyday types of creativity, including personal, subjective creative experiences. These correspond to the levels of factors; "mini-c" creativity is at an individual level, "little-c" creativity is shared with immediate others, and the distinction of "Big-C" creativity is bestowed by gatekeepers in one's field of endeavor.

At the individual level, there is "mini-c" creativity, this magnitude of creativity includes creative actions that may be internal or private, but is personally meaningful (Beghetto & Kaufman, 2007). This magnitude of creativity is focused on personal growth, so creativity is

measured at an individual level—if the creative insight represents growth or insight for that person, it can be considered creative (Kaufman & Beghetto, 2009). For example, a sewer who combines elements and techniques from different patterns to sew something in a way that is novel is being creative, even if it is just for her personal use and enjoyment.

“Little c” creativity is everyday creativity, but it is creativity that may be shared with close others (Kaufman & Beghetto, 2009). For example, creating a homemade card for a friend’s birthday, or how one decorates a particular room. These are experiences that anyone can have, and do not require advanced knowledge or skill, but are social in nature. This magnitude of creativity corresponds to the social level factors described above.

“Big C” creativity is the type of creativity many people think of first, eminent genius-level creativity that is revolutionary and paradigm changing (Beghetto & Kaufman, 2007). For example, Einstein’s theory of relativity revolutionized the field of physics, and Andy Warhol began the pop art movement, which continues to influence many other artists. It is the larger environmental context, the gatekeepers of the creative field, and history that ultimately determine whether an individual should be considered a Big C creative genius (Kaufman & Beghetto, 2009).

The present research is best conceptualized as being focused on little-c creativity because we were interested in the creative product, rather than personal creative insight. Additionally, we were interested in how participants’ creative works compared to those of their peers, rather than each participant’s individual creative progress.

### **Domains of Creativity**

Within each magnitude of creativity, there are a nearly infinite number of creative domains. Creativity may be more closely associated with the arts—writing, painting, creating

music, but creativity is also present in science, cooking, and relational skills. While some people are highly skilled in multiple creative domains, the question of whether creativity is domain-general or domain-specific remains hotly contested, with numerous studies supporting both positions (Sternberg & Lubart, 1992). Broadly, domains of creativity refer to the field of creative endeavor (See Sternberg, 2005 for a review of this debate); some of these domains include visual arts, writing, science, interpersonal problem solving, physical arts (such as dance), and crafts (such as sewing or knitting) (Sternberg, 2005). Research on self-reported creativity found that people who rated themselves as being generally creative also rated themselves as being creative in some, but not all, domains. A factor analysis of the ratings of creative domains revealed three factors: a) interpersonal relationships, writing, communication, and solving personal problems, b) art, crafts, and bodily/kinesthetic, c) math and science (Kaufman & Baer, 2004a). One proposed theory for understanding domains of creativity, and how domains relate to the underlying creative resources, is the Amusement Park Theoretical (APT) model. This is a hierarchical theory that posits there are basic domain-general requirements for creativity (i.e. level of intelligence and intrinsic motivation), but domain-specific outcomes (Baer & Kaufman, 2005). The APT model proposes there are broad thematic areas (such as writing or science), each containing more specific domains (such as physical and biology), and then micro-domains (such as quantum or applied physics). There may be different profiles of personality traits and cognitive styles, which are associated with optimal creativity in each thematic area (Baer & Kaufman, 2005). This is consistent with Feist's (1998) meta-analysis, which found different personality profiles were associated success in the arts, compared to the sciences.

Collectively, these findings suggest that creativity is at least somewhat domain specific, but that domains of creativity may be broadly related to underlying abilities; for example,

creativity in crafts requires a degree of hand-eye coordination not necessary for creativity in writing or science. Sternberg (2005) suggests that the degree to which creativity is domain-specific or domain-general is related to the underlying creative resources described above. Creativity-relevant skills, such as personality, intellectual abilities, and thinking styles are more domain-general, while domain-relevant skills, such as knowledge, are extremely domain-specific (Kaufman & Baer, 2004a, 2004b).

### **Impact of Ostracism on Creative Processes**

A review of the literature found very little direct evidence establishing a link between the experience of ostracism, or social rejection, and creativity; however, there is some research on how childhood social experiences may facilitate creativity in adulthood. Retrospective studies have found that highly creative adults are far more likely than the general population to report social isolation and rejection during childhood (See Olszewski-Kubilius, 2000 for a review of the literature.). To date, no study has measured creative processes immediately following the experience of ostracism. One study found that, after being ostracized while playing Cyberball, women overcompensated by over-participating on a mixed-gender group task (generating new uses for an everyday item), but women who were included while playing Cyberball neither overcompensated, nor engaged in social loafing. In contrast, men socially loafed regardless of whether they were included or excluded (Williams & Sommer, 1997). Although these researchers used a brainstorming task that could be considered to measure an aspect of creativity, they studied how ostracism affected group performance, rather than individual creative efforts. Additionally, they did not have a comparison condition of participants completing the task alone.

Some research has show that social rejection affects cognitive processes because it threatens the need to belong (Baumeister, Twenge, & Nuss, 2002), and the experience of social

exclusion motivates individuals to engage in need fortification by seeking interpersonal connections (Maner, DeWall, Baumeister, & Schaller, 2007). We speculated that creativity is a specific type of cognitive process that may be uniquely affected by ostracism, and under some conditions, creative thinking may be increased by ostracism. One plausible, but untested, explanation for the stereotype of the rejected, isolated artistic genius is that ostracism and rejection really do promote increased creativity. Conversely, this stereotypical social isolation could be the result of greater creativity hampering an individual's ability to connect socially.

Mueller, Melwani, and Goncalo (2012) proposed that, collectively, people explicitly endorse positive attitudes towards creative thinking, but that individuals have a covert bias against creativity that is activated when they experience uncertainty. This covert bias against creativity is related to the "mere exposure" effect; people show a strong preference for the familiar (Zajonc, 1968). People may overtly desire creativity because of the potential for progress, but because they are unfamiliar with novel, creative ideas, they react negatively (Sternberg & Lubart, 1995). This is consistent with the investment theory of creativity; creative individuals are people who are able to tolerate initial rejection of their ideas. Rank (1968) proposed that creative thinking threatens an individual's social connections by increasing one's distinctiveness. Creative expression distinguishes a person from others, and we speculated that this would be especially undesirable after a highly salient experience of ostracism. Additionally, prior research has shown that the absence of behavioral mimicry cues divergent thinking (Ashton-James & Chartrand, 2009); or, more simply put, in the absence of social models and/or social cues, individuals are forced to generate their own ideas, resulting in more creative work.

### **Present Study**

The present study was designed to directly test the relationship between the experience of

ostracism and subsequent creativity, and how the expectation of a future opportunity for social connection affects that relationship. We hypothesized that there would be a significant interaction between ostracism and the social manipulation factor. The social manipulation factor for the present study has three levels, described in greater detail below: (a) expectation for future social interaction with a confederate, (b) coaction with a confederate (no expectation for future social interaction), and (c) solo task completion (no confederate present). We speculated that the interaction between the social factor and ostracism would be linear for participants in the “exclusion” Cyberball condition, such that participants who expected a future social connection would show less subsequent creativity relative to participants in the other two social conditions. Likewise, participants in the solo task completion would show the greatest creativity, and participants in the coaction condition would fall in the middle, see Table 1.

## CHAPTER 2: METHOD

### **Participants**

A total of 301 participants were recruited for this study, and 21 were excluded from analysis, resulting in a total  $N = 280$ . The most common reason for a participant to be excluded was technical difficulties due to Cyberball, and one participant was excluded because they knew the confederate.

Of the 280 included in analyses, 149 were recruited from the Psychology 101 subject pool at the University of Alabama, and these participants were compensated for their time with course credit. The study was listed on the PY101 Subject Pool website, and any student 18 years of age or older who was enrolled in PY101 was eligible to participate. The remaining 131 participants were recruited from other introductory level courses at the University of Alabama, and were compensated with extra credit offered by their professors. Any student 18 years of age or older who was enrolled in a course with a participating professor was eligible to participate.

The sample included 173 females, and 107 males. Twelve students described themselves as Asian/Pacific Islander, 42 were African-American, 12 were other/multi-racial, and 213 were Caucasian.

### **Design**

This study utilized a 2 (inclusion vs. exclusion) x 3 (social interaction vs. coaction vs. solo task completion) between-subjects experimental design to test whether the presence of others affects creative thinking using the Cyberball paradigm (Williams & Jarvis, 2006).

Participants were randomly assigned to conditions for each of the two independent variables. The

first independent variable is the Cyberball condition: inclusion vs. exclusion. The second factor manipulated opportunity for social connection by having participants: (a) Complete creativity tasks with the expectation of subsequently interacting with the confederate who was completing the same tasks in the same room (social condition); (b) Complete creativity tasks in the same room as the confederate, but without the expectation of a future social interaction (coaction condition); or (c) Complete creativity tasks alone with no confederate in the room. These conditions are described in greater detail in a subsequent section.

## **Measures**

### **Demographics**

Participants were asked for their gender, and race/ethnicity. Gender and race/ethnicity were used in preliminary analyses to rule out confounds.

### **Ostracism Distress**

The Need Threat Questionnaire (NTQ; Williams, 2009) is a reliable and valid 20-item measure of ostracism distress (Williams, 2009). The NTQ has subscales that correspond to the four fundamental needs threatened by the experience of ostracism: belonging (e.g., “I felt rejected”), control (e.g., “I felt powerful”), meaningful existence (e.g., “I felt invisible”), and self-esteem (e.g., “I felt liked”). Items are rated on a 5-point Likert scale, from 1 (*not at all*) to 5 (*extremely*). The NTQ also includes a manipulation check (“I felt excluded,” “I felt ignored”) and asks participants to estimate the percentage of the time they received the ball.

Following the completion of the questionnaire, participants were probed for suspicion, but their data was not excluded. Less than 15% of participants reported suspicion in the present study. Prior research has shown that Cyberball induces feelings of ostracism even when participants are told they are playing against a computer (Zadro et al., 2004).

Each of the four subscales demonstrated adequate reliability: Belonging ( $\alpha = .94$ ), Control ( $\alpha = .86$ ), Self-Esteem ( $\alpha = .92$ ), Meaningful existence ( $\alpha = .92$ ). Each subscale was scored by averaging responses for the items in the subscale. The subscales were also averaged to generate a total score for Need-Threat, and the overall scale also had acceptable reliability ( $\alpha = .97$ ). Reliability in the present study was at least as high or higher than reliability reported in prior studies (Wirth & Williams, 2009).

### **Depression**

Depression was assessed using the Center for Epidemiological Studies Depression scale (CES-D; Radloff, 1977). The CES-D is a 20-item measure of how frequently participants have experienced the feelings and behaviors associated with depression over the past two weeks. A depression score is obtained by summing the responses for each item; the highest possible score of 60 indicates severe depression, while the lowest possible score of 0 indicates no depressive symptoms. The CES-D has been demonstrated to have high internal consistency and construct validity; in the present study  $\alpha = .90$ .

### **Personality**

Participants completed the Big Five Inventory (BFI), a self-report inventory (44 items) of the Big Five dimensions of personality: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness (John, Donahue, & Kentle, 1991; John, Naumann, & Soto, 2008). This scale is a reliable measure of personality, with internal reliabilities for each domain ranging from .79 (neuroticism) to .86 (extroversion) (Muscanell & Guadagno, 2012). In the present study reliabilities were  $\alpha = .89$  (extroversion),  $\alpha = .81$  (agreeableness),  $\alpha = .83$  (conscientiousness),  $\alpha = .80$  (neuroticism), and  $\alpha = .80$  (openness to experience).

## **Evaluation Apprehension**

A measure of evaluation apprehension was developed for the present study to assess the degree to which participants were concerned about being evaluated on their writing and drawing. The measure was based on a measure of writing apprehension developed by Daly and Miller (1975). The original measure had 26 items assessing writing apprehension in composition courses. For the present study, 16 items were selected from the original 26 items to reduce participant burden. Items pertaining specifically to composition courses were eliminated, as well as repetitive items. Consistent with the original measure, half of the items were positively worded (e.g., “I enjoy writing”) and half were negatively worded (e.g., “I’m nervous about writing”). The final 16 items were then revised to assess drawing apprehension by replacing “writing” with “drawing.” Items were rated on a 5-point Likert scale from 1 (*strongly agree*) to 5 (*strongly disagree*). The measure was scored by adding the responses for each subscale separately, so the highest possible score for a given subscale was 60, indicated severe evaluation apprehension. The final measure was 32 items long, with 16 items each for the writing and drawing apprehension subscales. Reliability for the writing apprehension subscale was  $\alpha = .92$ , and  $\alpha = .92$  for the drawing apprehension subscale. The correlation between the writing and drawing subscales was  $r(273) = .23, p < .001$ . A copy of the measure is included in Appendix A.

## **Creativity**

Prior to playing Cyberball, participants completed two baseline measures of creativity that were conceptualized as being “trait” measures of creativity. One was the Kaufman Domains of Creativity Scale (K-DOCS; Kaufman & Baer, 2004b), which asks participants “Compared to people of approximately your age and life experience, how creative would you rate yourself for each of the following acts? For acts that you have not specifically done, estimate your creative

potential based on your performance on similar tasks” (Kaufman, 2012, p. 3). Items were rated on a Likert scale from 1 (*much less creative*) to 5 (*much more creative*). In the present study, the scale had adequate reliability for each of the domains: self/every day ( $\alpha = .71$ ), scholarly ( $\alpha = .84$ ), performance ( $\alpha = .91$ ), mechanical/scientific ( $\alpha = .90$ ), artistic ( $\alpha = .86$ ).

Participants also completed a measure of divergent thinking before playing Cyberball. They were given three minutes to come up with as many uses as they can think of for a tin can. This was scored by generating a ratio for novel uses (uses for the can that are not primarily container-based) over total uses (Kahn, Friedman, Severson, & Feldman, 2005). Coding of the responses followed the procedure outlined by Kahn et al. (2005), and a third of coded responses were randomly selected to be coded for reliability. The coders counted the same number of novel and total uses on 97% of the cases coded for reliability ( $n = 100$ ), and were off by no more than one use on the other 3% of cases.

The primary dependent measures of creativity were from the Rainbow Project (Sternberg, 2006b; Sternberg & Lubart, 1995). The Rainbow Project tasks were developed by researchers to supplement traditional college application materials, and to provide a reliable assessment of applicant creativity. This measure was selected for the present study because it includes tasks assessing multiple domains of creativity, and the measure has demonstrated utility and reliability with college students (Sternberg, 2006b, 2012). The present study used two tasks from the Rainbow Project, each measuring a different domain of creativity, as it is possible that ostracism affects some domains of creativity more than others. For the present study, the domains of interest are writing, and drawing.

Unlike some other measures of creativity that are tasks of divergent thinking (e.g. novel uses for a shoelace), the Rainbow Project tasks are product-focused; task completion results in a

new short story, piece of art, advertising proposal, or solution to a scientific problem. Novel use tasks lack the “buy low” risk that is fundamental to the investment theory of creativity because novel use tasks do not require participants to make a choice about which idea to develop within the time constraints (Sternberg, 2012).

Previous research with these measures has found that 19% of individuals are rated as below average in all four domains, and 19% are rated as above average in all four domains (Sternberg & Lubart, 1995). Most of the participants were between these two extremes; 31% were above average in one domain, 17% were above average in two domains, and 15% were above average in three domains. These results indicate that creativity tends to be somewhat domain-specific; few people are “Renaissance Men (or women),” with broad creative abilities. The overall correlation for creativity across domains was .37, supporting Sternberg and Lubart’s (1995) assertion that creativity is neither a unilateral domain-general attribute, nor entirely domain-specific. This was our rationale for including two tasks in the present study; most people are not creative in all domains, so measuring multiple domains of creativity increases the likelihood that participants will complete a task in at least one domain they are creative in.

The order of task presentation was counter-balanced to avoid any order effects; the tasks are presented in no particular order below.

**Task 1: Writing.** For the writing task, participants were asked to spend 15 minutes writing a short story that fits one of three titles: “2983,” “Beyond the Edge,” and “It’s Moving Backwards” (Sternberg, 2006b, 2012; Sternberg & Lubart, 1995). Participants’ stories were scored by two raters on a 5-point scale on the dimensions of originality, complexity, emotional evocativeness, and descriptiveness on 5-point scales. Intra-class correlations were calculated to determine agreement between raters for each dimension: originality ( $\alpha = .61$ ), complexity ( $\alpha =$

.49), emotional evocativeness ( $\alpha = .61$ ), and descriptiveness ( $\alpha = .46$ ).

**Task 2: Drawing.** For the drawing task, participants were given art materials (colored pencils, a regular pencil, and paper) and asked to spend 15 minutes drawing a picture that fit their choice of topics: “A Dream,” “Earth from an Insect’s Point of View,” and “Tension.” Participants’ drawings were scored by two raters on a 5-point scale on the dimensions of originality, complexity, and quality on 5-point scales. Intra-class correlations were calculated to determine agreement between raters for each dimension: originality ( $\alpha = .70$ ), complexity ( $\alpha = .65$ ), and quality ( $\alpha = .74$ ).

**Raters for the Writing and Drawing Task.** There were a total of four raters who evaluated the writing and drawing tasks. Raters were trained using the writing and drawing tasks completed by participants during the pilot study. From the pilot study data, exemplars were identified for scores of 1, 3, and 5 on each dimension. So, for the drawing task, raters were shown examples of drawings that were scored as 1, 3, and 5 on originality, complexity, and quality. Likewise, for the writing task, raters were given samples of stories scored as 1, 3, and 5 on originality, complexity, emotional evocativeness, and descriptiveness. Raters were then given 10 writing and 10 drawing tasks to evaluate. The experimenter then reviewed their ratings with them, gave feedback, and gave them another set to rate. After rating the second set, the experimenter again reviewed the ratings with the raters, and gave feedback, and a third set of tasks to evaluate. The experimenter rated the third set, and raters needed to be within 1 point of the experimenter’s ratings on all dimensions to be considered reliable. All four raters were within 1 point of the experimenter’s ratings on the third set on all dimensions for both tasks.

### **Procedure**

The present study used a 2 (inclusion vs. exclusion) x 3 (social interaction vs. coaction

vs. solo task completion) between-subjects design. Participants were randomly assigned to conditions for each factor independently resulted in six mutually exclusive conditions.

Participants were scheduled one person per session, and upon arrival, the experimenter reviewed the Participant Information sheet with them. The experimenter ensured that participants knew they could discontinue the study at any time, and that all their responses to study questionnaires would be kept confidential. Consistent with procedures used by Zadro et al. (2004), participants were told that the purpose of the present study was to investigate the processes involved in mental visualization and creativity. Participants were told they would be playing a simple ball-tossing game online with two other players, and they were told that how they perform in the game does not matter, but they should focus on visualizing themselves and the others playing the game. They were seated at a computer, and instructed to click on the web link to begin the study.

### **Cyberball Manipulation**

In the version of Cyberball that was used in the present study, participants were led to believe they are playing against two others on the Internet; however, the other “players” were a pre-programmed computer simulation (Williams & Jarvis, 2006). To enhance the realism of the paradigm, before the game began participants saw a screen for 10s with the message: “waiting for other participants to log in” (Otten & Jonas, 2012). After 30s, the login screen disappeared, and Cyberball began. A gender-neutral figure represented each player; at the start of the game, the participant’s figure was at the bottom center of the screen, and the icons representing the other two “players” to the left and right of the center of the screen. Participants could “throw” the ball to the other players by clicking on the desired player with the mouse.

Participants were randomly assigned to either the inclusion or exclusion condition. The game had a total of 39 throws, and lasted approximately 6 minutes. Participants in the inclusion

conditions received the ball 13 times (1/3 of the total throws). Participants in the exclusion conditions received the ball twice during the first six throws and then did not receive the ball again for the duration of the game (Zadro et al., 2004). At the end of the game, the screen instructed participants to click to the next page to begin the next set of questionnaires.

Following Cyberball, participants completed the NTQ, Big 5, CES-D and demographics questionnaires. Then, participants completed the two creativity tasks, as detailed above.

### **Social Manipulation**

To make the three social conditions as similar as possible, all three conditions included a confederate at the beginning of the study. The experimenter reviewed the study information sheet with the participant and the confederate at the same time, and then took the confederate to a different room before the participant began the first part of the study.

Participants in the social and coercion conditions were told that another participant also just completed the first part of the study, and they would be completing their creativity tasks at the same table. This “participant” was a confederate.

Participants in the social interaction condition were told that once they have both completed their creativity tasks, they would have an opportunity to share and discuss their work with the other participant. Confederates were instructed to be polite if the participant initiated communication, but to not engage the participant in a discussion. Participants in the coercion condition completed their creativity tasks at the same table as the confederate, but were not given the expectation of a future social interaction. Participants in the solo-task completion condition completed their creativity tasks in a room by themselves.

This manipulation was hypothesized to suppress creativity in participants who have previously been ostracized during Cyberball. We hypothesized that participants would suppress

their creativity in order to be more socially desirable to the other person. Once the questionnaires were completed, the participant was probed for suspicion, and then fully debriefed about the deception and the true purpose of the experiment.

### **Sequence of Experimental Procedures**

Upon arrival at the lab, participants were instructed to have a seat in the lobby. Confederates were already seated in the lobby. After confirming the participant's name, the experimenter took the participant and confederate to the room where the experiment was conducted. The experimenter reviewed the participant information sheet with the participant and confederate, and then escorted the confederate to a different room before the participant began the first part of the study.

The remainder of the study had three parts, as detailed below. Unless otherwise noted, all participants completed the measures in the order listed below. The script used by the experimenter is included in Appendix B.

1. Part One: Baseline measures of covariates
  - a. Kaufman Domains of Creativity Scale (K-DOCS; Kaufman & Baer, 2004b)
  - b. Drawing and writing apprehension measure
  - c. Measure of divergent thinking (uses for a tin can)
  - d. Once participants completed the divergent uses task, the computer instructed them to get the experimenter.
2. Part Two: Cyberball manipulation and additional questionnaires
  - a. The experimenter explained how to play Cyberball, and then participants played the game.
  - b. Cyberball manipulation check: the Need Threat Questionnaire (NTQ; Williams, 2009).
  - c. Big Five Inventory (BFI; John, Donahue, & Kentle, 1991; John,

Naumann, & Soto, 2008)

- d. Center for Epidemiological Studies Depression scale (CES-D; Radloff, 1977).
  - e. Demographics questionnaire.
  - f. After completing the demographics, the computer instructed participants to get the experimenter.
3. Part Three: Social Manipulation and Dependent Measures
- a. Social Manipulation
    - i. For participants in the solo condition, the experimenter took the participants back to the experiment room and started them on either the writing or drawing task (tasks were counter-balanced to avoid order effects).
    - ii. For participants in the social and coaction condition, the experimenter sent the participants back to the experiment room, and then escorted the confederate to the participants' room. For participants in the *coaction* condition, the experimenter started the confederate and participant on the first creativity task (writing or drawing) with no additional prompts. For participants in the *social* condition, the experimenter explained that when they had finished both tasks, they (the participant and confederate) would have a chance to share and discuss their creative works with each other.
  - b. After 15 minutes, participants were instructed to stop working on the first creativity task, and were given directions for the second task (either writing or drawing, whichever they had not yet done).
  - c. After 15 more minutes, participants were instructed to stop working on the second creativity task. Experimenters thanked the participants for completing those tasks.
    - i. For participants in the *Solo* and *Coaction* conditions, they were told that was the end of the main part of the study, and there were just a few more brief questionnaires.
    - ii. In the *Coaction* condition, the experimenter escorted the

- confederate to a separate room before proceeding.
- iii. In the *Social* condition, participants were told there were a few questionnaires for them to complete independently before discussing their work, and the experimenter escorted the confederate to a separate room.
  - d. All participants then completed the social manipulation check, the suspicion probe, and were debriefed by the experimenter.

## CHAPTER 3: RESULTS

### Preliminary Analyses

One-way ANOVAs revealed gender and racial differences on some of the primary dependent variables and covariates. Only significant differences ( $p < .05$ ) are reported below; full results are presented in Table 2.

#### Gender Differences

A total of 12 ANOVAs were run to test for gender differences on the primary dependent variables and covariates. There was a significant gender difference ( $F(1,278) = 9.72, p = .002$ ) on average ratings of drawing quality; female participants were rated as having drawn higher quality pictures ( $n = 173, M = 1.72, SD = .70$ ) than male participants ( $n = 107, M = 1.47, SD = .60$ ).

Male participants reported significantly greater writing apprehension ( $n = 105, M = 52.31, SD = 11.37$ ) than did female participants ( $n = 168, M = 49.00, SD = 12.26$ );  $F(1, 271) = 4.99, p = .026$ .

Male participants rated themselves significantly higher levels of scholarly creativity ( $n = 107, M = 35.86, SD = 5.87$ ) than did female participants ( $n = 173, M = 33.90, SD = 7.76$ );  $F(1, 278) = 5.08, p = .025$ . The female participants rated themselves significantly higher on the dimension of artistic creativity ( $n = 173, M = 29.29, SD = 7.65$ ) ( $n = 107, M = 27.43, SD = 7.17$ );  $F(1, 278) = 4.09, p = .044$ .

## Racial Differences

The number of participants who self-identified as Asian/Pacific Islander ( $n = 12$ ) and multiracial/other ( $n = 11$ ) were very small, compared to the number of participants who identified as African American ( $n = 42$ ) or Caucasian ( $n = 213$ ). The first two groups (Asian/Pacific Islander, and multiracial/other) were not significantly different from each other on any of the dependent variables, so these groups were combined (other,  $n = 23$ ). A total of 12 ANOVAs were run to test for racial differences on the primary dependent variables and covariates.

There was a significant difference on one primary covariate, the divergent uses ratio;  $F(2, 274) = 4.66, p = .01$ . There was no significant difference between Caucasians and other participants in divergent use ratios, and no difference between other participants and African American participants. Caucasian participants did significantly better than African Americans.

One-way ANOVAs revealed significant racial differences on two rated dimensions of the writing task, descriptiveness and complexity. There was no significant difference in ratings of story descriptiveness between Caucasian ( $M = 2.56$ ) and other ( $M = 2.46$ ) participants, but both groups were rated significantly higher than African American ( $M = 2.12$ ) participants;  $F(2, 275) = 8.12, p < .001$ . On ratings of story complexity, other ( $M = 2.20$ ) participants were not significantly different from either African American ( $M = 1.93$ ) or Caucasian ( $M = 2.30$ ) participants; however, the difference between Caucasian and African American participants was significant,  $F(2, 275) = 6.35, p = .002$ .

There were also significant differences on all three of the rated dimensions for the drawing task: quality, originality, and complexity. On ratings of drawing quality, other participants ( $M = 1.64$ ) did not significantly differ from either African American ( $M = 1.35$ ),

or Caucasian ( $M = 1.68$ ) participants. The difference between African Americans and Caucasians was significant ( $F(2, 275) = 4.35, p = .014$ ), with Caucasians being rated higher on drawing quality. All pairwise comparisons were significant for ratings of drawing originality,  $F(2, 275) = 8.78, p < .001$ . Other participants ( $M = 2.33$ ) were rated the highest, followed by Caucasian participants ( $M = 1.74$ ), with African American participants ( $M = 1.33$ ) receiving the lowest ratings. On ratings of drawing complexity, other participants ( $M = 1.84$ ) were not significantly different from Caucasian participants ( $M = 1.68$ ); both groups were rated significantly higher than African American participants ( $M = 1.41$ ). See Table 3 for all means, standard deviations, and ANOVA results.

### **Relationships Between Variables: Drawing Task**

Correlations were computed among the drawing task dependent variables (originality, quality and complexity) and all potential covariates and moderators. The three drawing ratings were all significantly positively correlated with each other ( $p < .01$ ), and were also significantly positively correlated with all covariates and potential moderators, except depression. Depression, as measured by the CES-D score, was not significantly correlated to any dependent variable or any other covariate.

There were also significant positive correlations between covariates; divergent uses ratio positively correlated with K-DOCS artistic creativity, which was significantly correlated with openness to experience, and drawing apprehension. See Table 4 for full correlations between the drawing task dependent variables and covariates.

### **Relationships Between Variables: Writing Task**

Correlations were computed among the writing task dependent variables (originality, emotional evocativeness, descriptiveness, and complexity) and all potential covariates and

moderators. The four writing ratings were all significantly positively correlated with each other ( $p < .01$ ). However, unlike the drawing task, the writing task dependent variables were not consistently correlated with the covariates and moderators. Writing apprehension only significantly correlated with ratings of complexity ( $r = .14, p < .05$ ). Both baseline assessments of creativity, K-DOCS and divergent uses ratio significantly correlated with originality, complexity and descriptiveness, but not emotional evocativeness. Again, depression, as measured by CES-D score, was not significantly correlated to any dependent variable or any other covariate.

See Table 5 for full correlations between the writing task dependent variables and covariates.

### **Relationships Between Topic Choice and Conditions**

To test whether choice of topic on the writing and drawing tasks was related to participants' social and Cyberball conditions,  $\chi^2$  tests of independence were conducted. For the drawing task observed topic choice differed significantly from expected only among participants in the social condition;  $\chi^2(2, N = 93) = 13.29, p = .001$ . Participants who were in the Cyberball-Included/Social condition chose *Earth From an Insect's Point of View* more often than expected ( $O_i = 35; E_i = 26.3$ ); participants in the Cyberball-Excluded/Social condition chose *Earth From an Insect's Point of View* less often than expected ( $O_i = 16; E_i = 27.4$ ). See Table 6 for the complete  $\chi^2$  results for the drawing task. Topic choice was not significantly related to condition for the writing task; see Table 7 for the results of the  $\chi^2$  analysis.

### **Manipulation Check**

One-way ANOVAs showed Cyberball had a significant effect on participants' reported needs on the total NTQ ( $F(1, 267) = 416.91, p < .001$ ), as well as all subscales. Excluded

participants reported significantly lower total need satisfaction ( $n = 138$ ,  $M = 1.84$ ,  $SD = .66$ ) than did included participants ( $n = 131$ ,  $M = 3.54$ ,  $SD = .71$ ). Full results of the manipulation check are reported in Table 8.

### **Planned Primary Analyses**

Several multivariate models were tested for each set of dependent variables. Because this was an exploratory study, Bonferroni corrections were *not* applied to the  $p$  values reported below. This is consistent with recommendations by Nakagawa (2004) and Garamszegi (2006); Bonferroni corrections can increase the likelihood of a Type II error to an unacceptable level in behavioral research because the effects being studied are less robust. Effect sizes are reported for all significant statistical tests, consistent with APA guidelines (Wilkinson, 1999).

### **Drawing Task**

Two competing models were initially tested for the drawing task: the “basic” model that included demographic (gender, race) and theoretical (K-DOCS artistic creativity, divergent uses ratio, drawing apprehension) covariates, main effects (Cyberball condition, Social condition), and the two-way interaction (Cyberball x Social Condition); and the “everything but the kitchen sink” model. The “everything but the kitchen sink” model included the same demographic covariates (gender and race), and tested drawing apprehension and artistic creativity as moderators.

The “basic” model revealed nonsignificant main effects for both independent variables, and a nonsignificant interaction. The “kitchen sink” model revealed a significant three-way Cyberball x Social Condition x Drawing Apprehension interaction ( $p = .03$ ). The three-way interaction for Cyberball x Social Condition x Artistic Creativity was nonsignificant ( $p = .88$ ), so artistic creativity was dropped from the model as a potential moderator.

The final drawing task MANCOVA included all three drawing task ratings (originality, complexity, and quality) as dependent variables (DVs). The covariates were gender, race, divergent uses ratio, and K-DOCS artistic creativity subscale. Drawing apprehension was entered into the model as a moderator. The independent variables (IVs) were social condition and Cyberball condition. The results of this MANCOVA are presented in Table 9.

Divergent uses ratio was nonsignificant; however, all the remaining covariates (race, gender, and artistic creativity) were significant at the  $\alpha = .05$  level. The proposed moderator, drawing apprehension, was also significant at  $\alpha = .05$ . The MANCOVA revealed no significant multivariate main effects of social condition or Cyberball condition, and the Cyberball by social condition interaction was also nonsignificant. However, it revealed a significant three-way multivariate interaction (Cyberball condition x social condition x drawing apprehension) for the three drawing ratings variables as a group,  $F(6, 494) = 2.46, p = .02$ ; Wilk's  $\lambda = 0.94$ , partial  $\eta^2 = .03$ .

Follow-up univariate tests revealed that this three-way interaction was only significant for drawing task ratings of complexity;  $F(2, 249) = 2.28, p = .01$ , partial  $\eta^2 = .03$ . To parse this interaction, simple slopes of the interaction between Cyberball condition and drawing apprehension were calculated separately for each of the three social conditions. For the solo condition, the Cyberball by drawing apprehension interaction had a standardized  $\beta = -.35, p = .01$ , for the coaction condition, standardized  $\beta = -.288, p = .07$ , for the social condition, standardized  $\beta = .169, p = .23$ . Across all conditions, participants in the excluded-solo condition received the highest ratings on complexity ( $M = 1.77, SD = .88$ ). For participants in the included-solo and included-coaction conditions, there was no difference between participants high and low in drawing apprehension on ratings of drawing complexity. However, participants

in the included-social condition who were high in drawing apprehension received much higher ratings on drawing complexity than did participants low in drawing apprehension. See Figure 3 for the graphs of the simple slopes tests, and Table 10 for the means and standard deviations (presented for the median split on drawing apprehension).

### **Writing Task**

As with the drawing task, two competing models were initially tested for the writing task: the “basic” model that included demographic (gender, race) and theoretical (K-DOCS scholarly creativity, divergent uses ratio, writing apprehension) covariates, main effects (Cyberball condition, Social condition), and the primary two-way interaction (Cyberball x Social Condition); and the “everything but the kitchen sink” model. The “everything but the kitchen sink” model included the same demographic covariates (gender and race), and tested writing apprehension and scholarly creativity as moderators.

The “basic” model revealed nonsignificant main effects for both independent variables, and a nonsignificant interaction. The “kitchen sink” model revealed no significant main effects for the independent variables, and no significant interactions or moderators. However, since drawing apprehension emerged as a significant moderator for the drawing task, writing apprehension was left in the model as a possible moderator, and scholarly creativity was dropped from the model as a moderator.

The primary MANCOVA included all four writing task ratings (originality, complexity, emotional evocativeness, and descriptiveness) as dependent variables (DVs). The covariates were gender, race, divergent uses ratio, and the K-DOCS scholarly creativity subscale. Writing apprehension was included in the model as a moderator, as noted above. The independent

variables (IVs) were social condition and Cyberball condition. The results of this MANCOVA are presented in Table 11.

The only significant covariates were race ( $F(8, 500) = 2.88, p < .001, \text{Wilks}' \lambda = .91$ ), and the divergent uses ratio ( $F(4, 250) = 2.40, p = .05, \text{Wilks}' \lambda = .96$ ). The MANCOVA revealed no significant multivariate main effects of social condition or Cyberball condition, and the Cyberball x social condition interaction was nonsignificant, as was the three-way Cyberball x social condition x writing apprehension interaction.

The nonsignificant covariates, gender and scholarly creativity, as well as the nonsignificant moderator, were excluded from subsequent models. The remaining covariates included in the model were race and divergent uses ratio. The second multivariate model also revealed no significant multivariate main effects of social condition or Cyberball condition, and the Cyberball by social condition interaction was remained nonsignificant. See Table 12 for the full MANCOVA model.

Exploratory follow-up analyses were conducted to see if there was a significant univariate interaction for any individual dependent variable. Univariate ANOVAs revealed that there was a significant Cyberball by social condition interaction only for the writing task descriptiveness ratings;  $F(2, 268) = 3.64, p = .03, \text{partial } \eta^2 = .03$ . Both covariates were significant in this model; race ( $F(2, 268) = 7.11, p < .01, \text{partial } \eta^2 = .05$ ), and divergent uses ratio ( $F(1, 268) = 4.95, p = .03, \text{partial } \eta^2 = .02$ ). Pairwise comparisons revealed a significant difference among Cyberball-included/social participants, and Cyberball-included/coaction participants; Cyberball-included/social participants were rated significantly higher on descriptiveness than those in the Cyberball-included/coaction condition ( $p = .03$ ). See Figure 4.

### **Planned Secondary Analyses**

A series of secondary analyses was conducted which added personality variables to the models as covariates. Two subscales from the Big 5 were chosen: openness to experience and neuroticism. Openness to experience has most consistently been associated with creativity (e.g., Amabile, 1983), but Feist's (1998) meta-analysis found that artists had greater emotional instability, which is a core feature of neuroticism.

Another set of secondary analyses was conducted which explored depression (CES-D score) as a potential moderator of the relationship between the experience of ostracism and creativity.

### **Secondary Analyses: Drawing Task and Personality**

Neuroticism and openness to experience were added as covariates to the final multivariate drawing task model, as presented above. Neither covariate was significant (neuroticism:  $p = .09$ ; openness to experience:  $p = .38$ ); however, their inclusion in the model resulted in a greater total amount of variance explained. Partial  $\eta^2 = .03$  for the original model, and .04 for the model that included the personality covariates. K-DOCS artistic creativity subscale and divergent uses ratio were nonsignificant in this model, which may reflect the high degree of shared variance between openness to experience, K-DOCS artistic creativity, and the divergent uses measure. The correlation between openness to experience and artistic creativity is  $r = .55, p < .01$ , and the divergent uses ratio correlated  $r = .27, p < .01$  with openness to experience.

The three-way interaction between Cyberball, social condition, and drawing apprehension remained significant:  $F(6, 396) = 2.82, p = .01$ , Wilks'  $\lambda = .04$ . See Table 13 for the complete model.

### **Secondary Analyses: Writing Task and Personality**

Neuroticism and openness to experience were added as covariates to the final multivariate writing task model, as presented above. Neuroticism was nonsignificant ( $p = .58$ ), and the divergent uses ratio became nonsignificant with the addition of the personality covariates. Openness to experience was significant ( $p < .01$ ); however, the overall model remained nonsignificant. There were no multivariate main effects for Cyberball or the social manipulation, and the interaction was also nonsignificant. See table 14 for complete model.

### **Secondary Analyses: Drawing Task with Depression Moderator**

Depression was added as a moderator to the drawing ratings MANCOVA model as described in the primary analyses section. There was no significant main effect for depression, and all interactions that included depression as a factor were nonsignificant. With the addition of depression as a moderator, the overall model was also nonsignificant.

### **Secondary Analyses: Writing Task with Depression Moderator**

Depression was added as a moderator to the writing ratings MANCOVA model as described in the primary analyses section. There was no significant main effect for depression, and all interactions that included depression as a factor were nonsignificant. With the addition of depression as a moderator, the overall model was also nonsignificant.

## CHAPTER 4: DISCUSSION

The purpose of the present study was to provide an experimental test of how the immediate experience of ostracism influences subsequent creativity in two domains (writing and drawing), and whether that relationship is affected by the expectation of a future social interaction. It was hypothesized that there would be a significant interaction between ostracism and the social manipulation, such that participants who expected a future social connection would be less creative after being ostracized, relative to participants in the other two social conditions. Participants who were alone after being ostracized were hypothesized to demonstrate the greatest creativity.

These hypotheses were partially supported. The Cyberball x social condition interaction was not significant for either the writing or drawing task; however, multivariate analysis of the drawing task ratings revealed a significant Cyberball x social condition x drawing apprehension interaction. Follow-up analyses revealed this interaction was only significant for drawing task ratings of complexity. This provided partial support for one of the primary hypotheses, as participants in the Cyberball-excluded/solo condition received the highest ratings on complexity, but only when they were high in drawing apprehension.

Simple slopes tests revealed that for participants in the Cyberball-included/solo and Cyberball-included/coaction conditions, there was no difference on drawing complexity between participants high and low in drawing apprehension. However, in the Cyberball-included/social condition, participants high in drawing apprehension received much higher ratings of drawing complexity than did participants low in drawing apprehension. This improved performance by

participants in the Cyberball-included/social condition, relative to the other Cyberball-included conditions, is consistent with classic social facilitation theory (Zajonc, 1965) and Cottrell's work (1968) demonstrating that the social facilitation effect occurs only when there is a presumed evaluation. Because participants in the social condition had the expectation of a future interaction, they performed better than those in the coaction condition.

### **Drawing Task**

For individuals higher in drawing apprehension (a form of evaluation apprehension), the experience of being excluded during Cyberball could have caused participants to perceive the drawing task as more difficult, and themselves as generally less competent (as evidenced by lower state self-esteem). According to the challenge and threat theory of social facilitation, this state results in the perception of threat, and decreased performance on the task (Blascovich, Mendes, Hunter, & Salomon, 1999). In contrast, the experience of inclusion could have resulted in participants perceiving the task as a challenge, resulting in greater motivation and improved performance (Blascovich et al., 1999). These results are consistent with research showing that individuals who are high in impression management perform better on complex creativity tasks when they have an audience, than when they are alone (Uziel, 2010). Impression management refers to a tendency to present oneself in a more positive light in social contexts (Paulhus, 1984), and individuals high in impression management typically score highly on scales of social desirability (Paulhus, 2002). Uziel's (2010) study of impression management and social facilitation found a pattern of results similar to those of the present study. In his study, participants high in impression management outperformed those low in impression management on creative tasks whether they were alone or observed; however, the magnitude of differences was much greater with an observer. The measure of impression management used was a broad

dispositional measure, rather than the domain-specific measures of evaluation apprehension used in the present study, but both may reflect related underlying constructs related to self-presentation. Future research should include both domain-specific measures of evaluation apprehension, as well as trait measures of impression management.

Consistent with prior research and the study hypotheses, the greatest creativity on the drawing task was by participants in the Cyberball-Excluded/solo condition. Shalley (1995) also found that participants working alone exhibited the greatest creativity. In the present study, that was true only when those participants were also high in drawing apprehension. Drawing apprehension reflects a higher degree of self-presentational concern, and may have resulted in increased task motivation following the experience of ostracism, as a way to repair one's self-esteem (Williams & Sommer, 1997). Future research should look at whether persistence in creative endeavors is affected by a salient ostracism experience.

Individuals in the Cyberball-Included/social condition had the second-highest mean ratings of creativity on the drawing task. This was not predicted by the study hypotheses; however, as discussed above, it is consistent with research on social facilitation and impression management. It is also noteworthy that, for the drawing task, participants in this condition chose the same topic as the confederate significantly more than would be expected by chance. This suggests there were stronger social influence effects on conformity when the participant felt included. However, although participants exhibited some conformity by choosing the same task as the confederate, they approached the task in a more creative way, as evidenced by the higher mean scores on creativity. It may be that acceptance and inclusion fosters creativity on shared or similar tasks, but the present study did not address the underlying mechanism for this finding. Future research should examine this duality of creativity and conformity in social situations.

Secondary analyses examined how personality influences the relationship between the experience of ostracism and creativity, and explored whether depression acted as a moderator. None of these secondary or exploratory analyses were significant, and no support was found for a significant role of personality variables or depression in explaining the relationship between ostracism and creativity.

### **Writing Task**

As reported above, there were no significant multivariate effects for the writing task; however, exploratory univariate analyses revealed a significant Cyberball x social condition interaction only for ratings of descriptiveness. It is possible that descriptiveness was the only significant rating because it is a lower-level skill than complexity, originality, and emotional evocativeness; however, this is speculative. Cyberball-included/social participants were rated higher on descriptiveness than those in the Cyberball-excluded/social condition, which is consistent with the results from the drawing task. However, Cyberball-excluded/coaction participants scored higher on writing descriptiveness than did Cyberball-inclusion/coaction participants; this is the inverse of what was observed for the significant drawing findings reported above. It is possible that participants in the Cyberball-included/coaction condition were unmotivated to try on the writing task because they did not think anyone was going to see their work. The confederate could not see their screen, and they had no expectation of having to share their work. They also had no need to engage in self-esteem repair, unlike those in the Cyberball-excluded/coaction condition. This explanation is speculative, as there is nothing in the broader research literature that is comparable to this effect. Although this effect was significant, it should be interpreted with caution, as there was no overall multivariate effect, and the only significant univariate effect was for the dependent variable with the lowest reliability.

There are several possible explanations for why there was a significant multivariate interaction effect only for the drawing task, but not for the writing task. During both tasks, the participant and confederate were sitting across from one another, so during the writing task their computer screens were back-to-back, and the participant's screen was not visible to the confederate. The effect of having another person in the room might have been attenuated because the participant knew the other person could not immediately read their work. Another potential explanation is the degree of task novelty; anecdotally, participants commented that [the experiment] was the first time they had drawn or colored in a long time. In contrast, writing may feel like a less novel task, even if participants are unused to creative writing. In prior research on social facilitation, when unlearned tasks were performed in front of audience, there was significantly greater physiological reactivity and increased errors (Blascovich et al., 1999). The present study was not designed to specifically address this, but visibility of creative work and task novelty are both factors that should be considered in future research.

Another possible explanation has to do with characteristics of the task domains: writing and drawing. The Amusement Park Theoretical model (APT; Baer & Kaufman, 2005; Kaufman & Baer, 2004a) provides a framework for understanding how task domain may have contributed to varying results. This is a hierarchical skill model that moves from Initial Requirements for any creativity, to General Thematic Areas, to Domains, and finally, Micro-Domains (Kaufman & Baer, 2004a). The APT model proposes that there are initial requirements for all creative activities, such as intelligence and motivation, and a supportive environment (Kaufman & Baer, 2004a). However, unlike intelligence and environment, motivation is often task-specific and non-transferable (Kaufman & Baer, 2004a). For example, a person may feel *highly* motivated to play video games, but highly *unmotivated* to work on dissertation revisions; this motivation is specific

to one task, and cannot be transferred to another task. The fact that the writing task was not as novel as the drawing task could have resulted in participants feeling less motivated. Additionally, writing and drawing fall into two different General Thematic Areas; writing is part of the “Creativity in Empathy/Communication” area, and drawing is part of the “Hands-on Creativity area (Kaufman & Baer, 2004b). These areas have different skill requirements, for example, verbal skills and emotional intelligence likely play a greater role in writing than in drawing (Kaufman & Baer, 2004b). Furthermore, it may be that the writing task tapped into a narrower subset of skills than the drawing task. Research has shown that different types of writers have different types of thinking styles. Journalists tend to prefer paradigmatic thinking (logical, methodical, structured), while poets tend to prefer narrative thinking (self-directed, considering the possibilities (Kaufman, 2002a, 2002b). So, because the writing task asked participants to write a creative short story to fit the title they were given, it may have required a more specific set of skills than the drawing task. The drawing task could have been approached from a literal mindset (“Earth from an Insect’s Point of View”) or a much more abstract mindset (“Tension”), and may have allowed participants with more varied skills to be successful, even if they were not especially skilled artists.

Alternatively, the choice of college students as the sample may have influenced the results. All of the participants had to meet certain criteria to enroll as students, such as having certain SAT or ACT scores, and many of the participants would have either completed a college writing course, or been concurrently enrolled in one. Means for the writing task ratings were somewhat higher than for the drawing task, suggesting a slightly greater level of baseline skill. This sample may be a curtailed distribution, which would have limited our ability to find a significant effect for the writing task.

## **Limitations and Directions for Future Research**

As mentioned above, the sample used in the present study was comprised entirely of college students. This introduces the possibility of sample bias, and the results of this study may not generalize to the population as a whole. It should be stressed that the purpose of the present study was to test the impact of mild ostracism on everyday creativity; these results *should not* be generalized to speculate on how chronic, severe experiences of ostracism could relate to long-term creativity. In short, these findings need to be replicated, particularly because there was only one significant finding from the multiple models evaluated.

Additionally, although inter-rater reliability for coding of the drawing and writing tasks was acceptable, it was lower than in previous studies using these measures, particularly for the writing tasks. This lower reliability introduces error, which could have contributed to the lack of findings for the writing task. An additional possible limitation is that this study did not use expert raters to assess the tasks, as is typical with “traditional” consensual assessment methods. However, the raters in this study did achieve acceptable inter-rater reliability with training, and prior research has shown that ratings of creative writing by skilled students correlate highly with expert ratings (Kaufman, Gentile, & Baer, 2005). Future studies could include rater skill level as a potential moderator by using both expert raters and skilled amateurs.

Future research should consider using other measures of creativity to assess how it is affected by the experience of ostracism. It may be that certain domains, such as drawing, are just more sensitive to social influences than others. Using a variety of domain-specific measures would make it possible to test whether this effect is domain specific.

Additionally, this effect may only occur when there is a mismatch between participant and domain. Ostracism may have less impact on domains in which people feel highly competent,

and this was not tested in the present study. Future research could recruit domain-specific samples, such as art students, and manipulate the match (or mismatch) with domain.

The precise mechanism of action for the effects observed is unknown, and future research should address why these effects occurred. It may be that Cyberball-excluded individuals performed less well in the social and coaction conditions because their cognitive functioning was impaired due to negative mood as a result of being ostracized. However, participants in the Cyberball-excluded/solo condition performed better than the Cyberball-excluded/social and Cyberball-excluded/coaction participants, suggesting that mood may not explain the observed effects. An alternative explanation is that participants in the social and coaction conditions could have experienced greater cognitive load as a result of self-presentational concerns not experienced by participants in the solo condition. These, and other, possible mechanisms of action should be addressed in future research.

Motivation is a key component of creativity that was not measured in this study, but given the importance of drawing apprehension, it may be particularly important for understanding the relationship between the experience of ostracism and creativity. Future research should consider intrinsic motivation as a potential moderator of this relationship. Additionally, as mentioned above, motivation may be task-specific (Kaufman & Baer, 2004a). It would be important for researchers to measure motivation for each task, rather than global motivation.

Finally, although the present study included a brief measure of state self-esteem as part of the Cyberball manipulation check, it did not include a measure of trait self-esteem. Sociometer theory states that individuals with low self-esteem individuals have much greater self-presentational concerns that result in significantly poorer performance in front of others (Leary

& Baumeister, 2000). It is possible that the measures of drawing and writing apprehension were confounded with low trait self-esteem. Including a measure of trait self-esteem in future studies, as well as measures of self-presentation concern, would allow for the effects of these related, but distinct, constructs to be analyzed separately.

### **Implications**

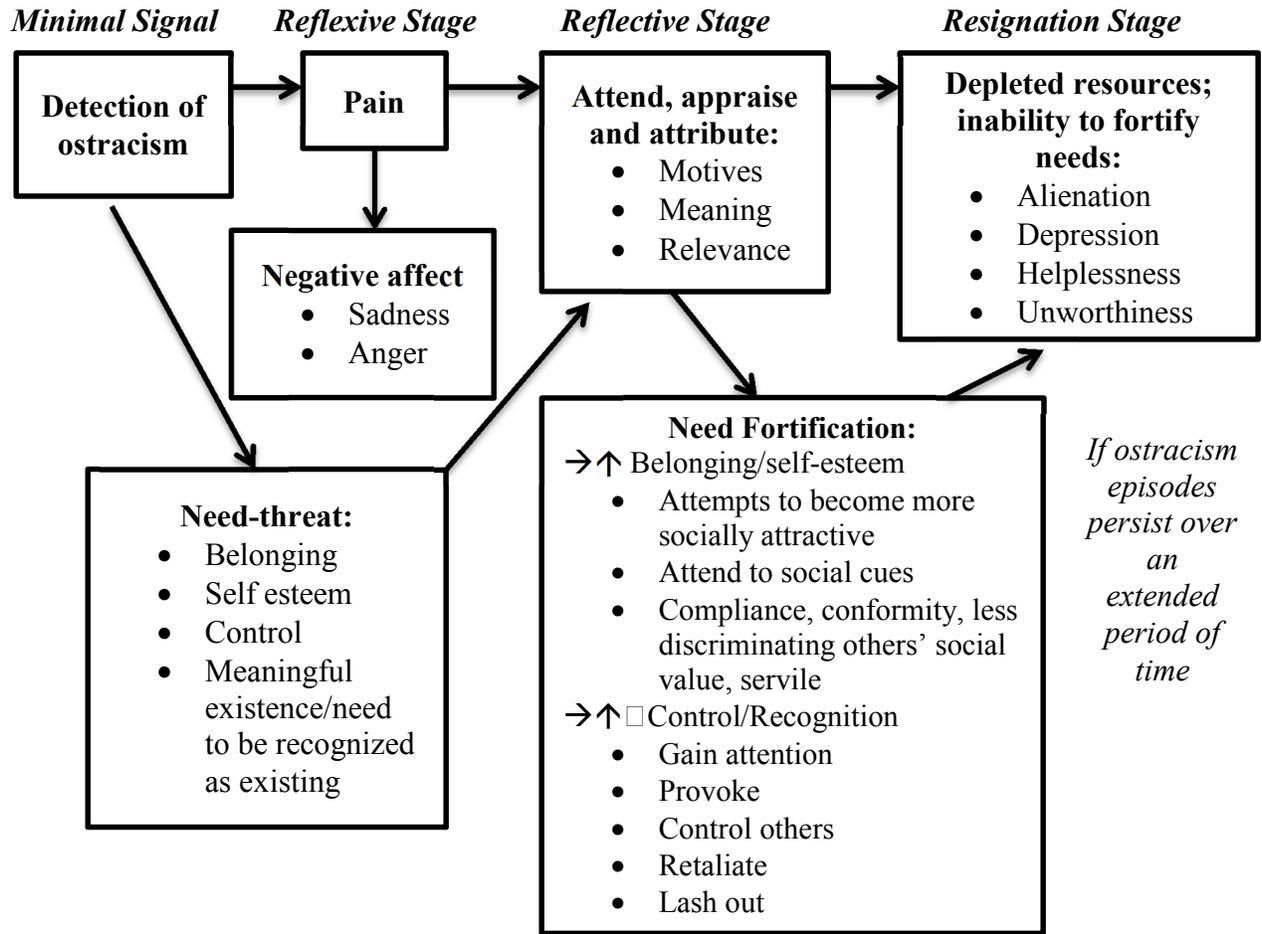
Creativity is arguably one of the attributes at the core of our humanity; indeed, a key attribute that separates *Homo sapiens* from Neanderthals is the capacity for creativity and innovation (Kuhn & Stiner, 1998). Furthermore, both writing and drawing have demonstrated benefits for mental health. Expressive writing can improve mental health by satisfying people's need for a narrative (Pennebaker, 1997), and can help people cope with trauma in a more healthy and effective way (Frisina, Borod, & Lepore, 2004; Lepore, Revenson, Roberts, Pranikoff, & Davey, 2015). Drawing can be used to distract oneself from negative emotions; several studies have shown that using drawing as a distraction results in improved mood (Drake & Winner, 2012, 2013). Beyond being important for mental health, creativity has economic value as a marketable attribute. Florida (2003) argues that approximately 30% of Americans are now part of the Creative Class, up from 20% in 1980. The Creative Class of workers includes "scientists and engineers, artists and designers, as well as creative professionals, managers and technicians in many fields who create marketable new forms or work primarily at creative problem-solving" (Florida, 2003, p. 47). Given that more Americans than ever before derive their livelihood from their creative endeavors, and that creativity has important mental health benefits, understanding the factors that promote or inhibit creativity is essential.

This study expanded on work demonstrating creativity as a process that is affected by the social environment (e.g., Amabile, 1983; Amabile et al., 1990; Shalley, 1995), and demonstrated

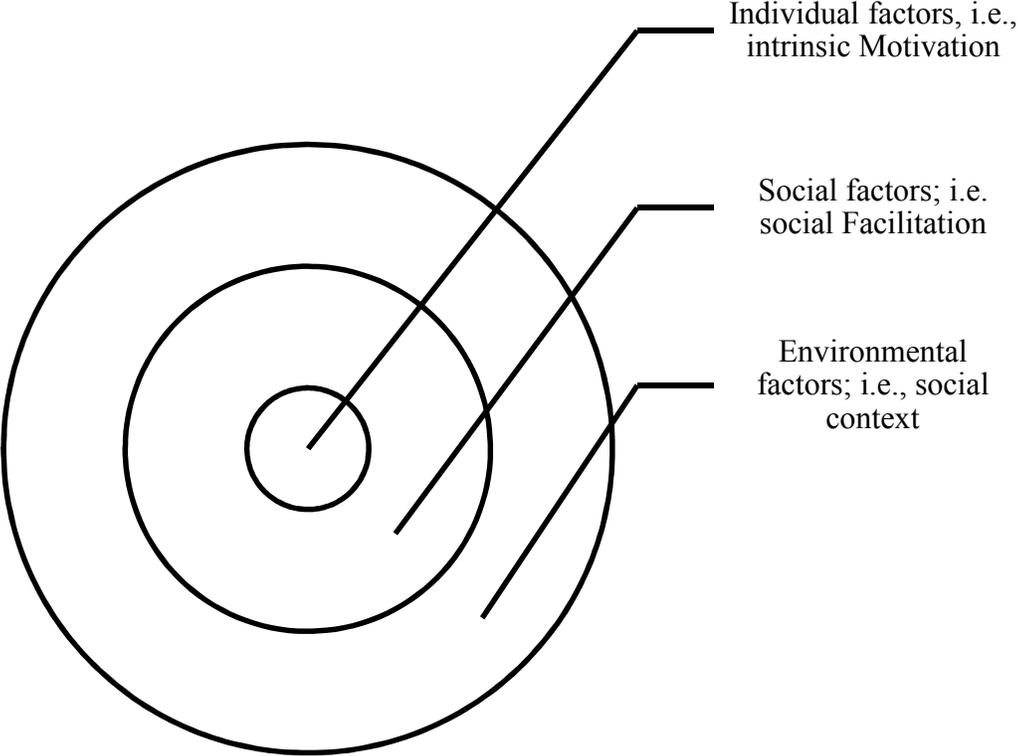
the importance of self-presentational concerns in understanding the relationship between the experience of ostracism and creativity. The present study offers initial experimental evidence for a causal relationship between the experience of ostracism and creativity. Furthermore, this relationship is not uniform, but is dependent on the individual's social environment following the ostracism experience and the individual's own level of self-presentational concern and evaluation apprehension. An effect was not found on all measures of creativity; perhaps suggesting the effect is domain specific, related to task novelty, or the degree to which the participant actually feels observed.

The present study demonstrated that a relatively mild experience of ostracism has short-term effects on everyday types of creativity. Although this study did not conclusively answer whether isolation and rejection truly result in greater creativity, the results raise intriguing questions that suggest future research in this area is warranted.

**Figure 1: Need-Threat Model of Ostracism (Williams, 2009)**



**Figure 2:** *A Nested Social Systems Model of Creativity*



**Table 1: Study Design**

Cyberball					
Exclusion			Inclusion		
<p><b>Social Interaction Condition:</b> Participants have the expectation of a future social interaction with the confederate</p>	<p><b>Coaction Condition:</b> Participants complete their tasks in the same room as a confederate with no expectation of future interaction</p>	<p><b>Solo Task Completion Condition:</b> Participants complete tasks in a room alone.</p>	<p><b>Social Interaction Condition:</b> Participants have the expectation of a future social interaction with the confederate</p>	<p><b>Coaction Condition:</b> Participants complete their tasks in the same room as a confederate with no expectation of future interaction</p>	<p><b>Solo Task Completion Condition:</b> Participants complete tasks in a room alone.</p>
<p><b>Prediction:</b> Decreased relative creativity due to increased need for social connectedness</p>		<p><b>Prediction:</b> Increased relative creativity due to the absence of social cues and no competing goal of social connection</p>	<p><b>Predictions:</b> No significant differences are predicted between conditions among “included” participants</p>		

**Table 2: Gender Differences**

		<i>n</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>
Divergent Uses Ratio	Female	172	.57	.21	.38	.54
	Male	107	.58	.23		
Writing Apprehension	Female	168	49.00	12.26	4.99	.03
	Male	105	52.31	11.37		
Drawing Apprehension	Female	166	40.48	10.79	.12	.73
	Male	103	40.93	10.44		
K-DOCS Artistic Creativity	Female	173	29.29	7.65	4.09	.04
	Male	107	27.43	7.17		
K-DOCS Scholarly Creativity	Female	173	33.90	7.76	5.08	.03
	Male	107	35.87	5.87		
Writing: Originality	Female	173	2.54	.87	3.51	.06
	Male	107	2.74	.90		
Writing: Descriptiveness	Female	173	2.48	.65	.01	.92
	Male	107	2.49	.70		
Writing: Emotional Evocativeness	Female	173	2.05	.82	1.50	.22
	Male	107	1.93	.79		
Writing: Complexity	Female	173	2.21	.62	0.86	.36
	Male	107	2.28	.66		
Drawing: Originality	Female	173	1.65	.89	2.89	.09
	Male	107	1.85	1.01		
Drawing: Quality	Female	173	1.72	.70	9.72	<.01
	Male	107	1.47	.60		
Drawing: Complexity	Female	173	1.69	.76	.49	.48
	Male	107	1.62	.76		

**Table 3: Racial Differences**

Measure		Racial Group			<i>F</i> ( <i>p</i> )
		African American <i>n</i> = 42	Caucasian <i>n</i> = 213	Other <i>n</i> = 23	
Divergent Uses	<i>M</i>	.48 <sub>a</sub>	.59 <sub>b</sub>	.59 <sub>ab</sub>	4.66
Ratio	( <i>SD</i> )	(.28)	(.20)	(.22)	(.01)
CES-D Total	<i>M</i>	17.44	14.22	14.23	1.94
	( <i>SD</i> )	(11.04)	(9.29)	(7.23)	(.15)
Neuroticism	<i>M</i>	35.42	39.32	41.81	2.68
	( <i>SD</i> )	(12.57)	(10.95)	(10.14)	(.07)
Openness to	<i>M</i>	61.54	59.33	61.05	.63
Experience	( <i>SD</i> )	(10.14)	(12.32)	(12.32)	(.53)
Writing	<i>M</i>	49.20	50.18	53.59	1.01
Apprehension	( <i>SD</i> )	(12.66)	(11.58)	(14.36)	(.37)
Drawing	<i>M</i>	41.13	40.65	40.14	.07
Apprehension	( <i>SD</i> )	(11.39)	(10.46)	(10.40)	(.94)
K-DOCS Artistic	<i>M</i>	29.40	28.40	29.44	.46
Creativity	( <i>SD</i> )	(8.02)	(7.39)	(7.53)	(.63)
K-DOCS Scholarly	<i>M</i>	35.26	34.52	35.78	.47
Creativity	( <i>SD</i> )	(8.00)	(6.77)	(7.75)	(.63)
Writing:	<i>M</i>	2.12 <sub>a</sub>	2.56 <sub>b</sub>	2.46 <sub>b</sub>	8.12
Descriptiveness	( <i>SD</i> )	(.60)	(.64)	(.84)	(<.001)
Writing:	<i>M</i>	1.93 <sub>a</sub>	2.30 <sub>b</sub>	2.20 <sub>ab</sub>	6.35
Complexity	( <i>SD</i> )	(.54)	(.62)	(.78)	(.002)
Writing: Emotional	<i>M</i>	1.87	2.01	2.22	1.38
Evocativeness	( <i>SD</i> )	(.76)	(.79)	(1.07)	(.25)
Writing:	<i>M</i>	1.33	2.64	2.80	1.42
Originality	( <i>SD</i> )	(.86)	(.94)	(.91)	(.24)
Drawing: Quality	<i>M</i>	1.35 <sub>a</sub>	1.68 <sub>b</sub>	1.64 <sub>ab</sub>	4.35
	( <i>SD</i> )	(.50)	(.69)	(.71)	(.014)
Drawing:	<i>M</i>	1.33 <sub>a</sub>	1.74 <sub>b</sub>	2.33 <sub>c</sub>	8.78
Originality	( <i>SD</i> )	(.44)	(.94)	(1.32)	(<.001)
Drawing:	<i>M</i>	1.41 <sub>a</sub>	1.68 <sub>b</sub>	1.84 <sub>b</sub>	3.16
Complexity	( <i>SD</i> )	(.51)	(.76)	(.96)	(.044)

*Notes:* For all ANOVAs, *df* = (2,275). Means with differing subscripts within rows are significantly different at the *p* < .05 based on Fisher's LSD post hoc paired comparisons.

**Table 4:** Relationships Between the Drawing Task Ratings and Primary Covariates

	<i>M (SD)</i>	Correlations						
		1.	2.	3.	4.	5.	6.	7.
1. Drawing: Originality	1.73 (.94)							
2. Drawing: Quality	1.62 (.68)	.35**						
3. Drawing: Complexity	1.66 (.76)	.67**	.53**					
4. CES-D Total	14.67 (9.44)	-.06	.04	.02				
5. Openness to Experience	59.90 (11.98)	.18**	.19**	.14*	.10			
6. Divergent Uses Ratio	.57 (.22)	.14*	.21**	.18**	.09	.27**		
7. K-DOCS Artistic Creativity	28.58 (7.51)	.16**	.32**	.16**	.07	.55**	.18**	
8. Drawing Apprehension	40.65 (10.64)	.21**	.29**	.21**	-.05	.48**	.11	.63**

**Notes:** \*\* Correlation is significant at the .01 level (2-tailed); \* Correlation is significant at the .05 level (2-tailed).

**Table 5:** Relationships between the Writing Task Ratings and Primary Covariates

	<i>M</i> ( <i>SD</i> )	Correlations							
		1.	2.	3.	4.	5.	6.	7.	8.
1. Writing: Originality	2.62 (.88)								
2. Writing: Complexity	2.24 (.63)	.66**							
3. Writing: Emotional Evocativeness	2.01 (.81)	.44**	.51**						
4. Writing: Descriptiveness	2.49 (.67)	.52**	.67**	.43**					
5. Openness to Experience	59.90 (11.98)	.18**	.23**	-.02	.15*				
6. CES- D Total	14.67 (9.44)	.05	.02	.07	-.05	.10			
7. K-DOCS Scholarly Creativity	34.65 (7.15)	.15*	.19**	.04	.14*	.45**	-.01		
8. Writing Apprehension	50.27 (12.01)	.07	.14*	.07	.10	.48**	-.09	.53**	
9. Divergent Uses Ratio	.57 (.22)	.18**	.24**	.11	.18**	.27**	.09	.15*	.11

*Notes:* \*\* Correlation is significant at the .01 level (2-tailed); \* Correlation is significant at the .05 level (2-tailed).

**Table 6:** Results of  $\chi^2$  Test of Independence for Drawing Task Topic and Condition

Social Condition	Cyberball Condition	Count	Drawing Title			$\chi^2$
			<i>A Dream</i>	<i>View</i>	<i>Tension</i>	
Solo	Excluded	Actual	17	27	9	1.32
		(Expected)	(19.6)	(25.3)	(8.1)	
	Included	Actual	17	17	5	
		(Expected)	(14.4)	(18.7)	(5.9)	
Coaction	Excluded	Actual	12	24	8	1.07
		(Expected)	(14.4)	(22.2)	(7.4)	
	Included	Actual	19	24	8	
		(Expected)	(16.6)	(25.8)	(8.6)	
Social*	Excluded	Actual	23	16	6	13.23*
		(Expected)	(16.5)	(24.7)	(3.9)	
	Included	Actual	11	35	2	
		(Expected)	(17.5)	(26.3)	(4.1)	

Notes: \* $p = .001$

**Table 7:** Results of  $\chi^2$  Test of Independence for Writing Task Topic and Condition

		Story Title				
Condition	Social Cyberball Condition		2983	<i>Beyond the Edge</i>	<i>Its Moving Backwards</i>	$\chi^2$
			Solo	Excluded	Actual	
		(Expected)	(16.1)	(19.0)	(17.9)	
	Included	Actual	11	14	14	
		(Expected)	(11.9)	(14.0)	(13.1)	
Coaction	Excluded	Actual	17	19	8	.53
		(Expected)	(15.3)	(18.5)	(10.2)	
	Included	Actual	16	21	14	
		(Expected)	(17.7)	(21.5)	(11.8)	
Social	Excluded	Actual	19	10	16	.08
		(Expected)	(15.5)	(15.0)	(14.5)	
	Included	Actual	13	21	14	
		(Expected)	(16.5)	(16.0)	(15.5)	

**Table 8:** *Cyberball Manipulation Check: Means, Standard Deviations, and ANOVA test values*

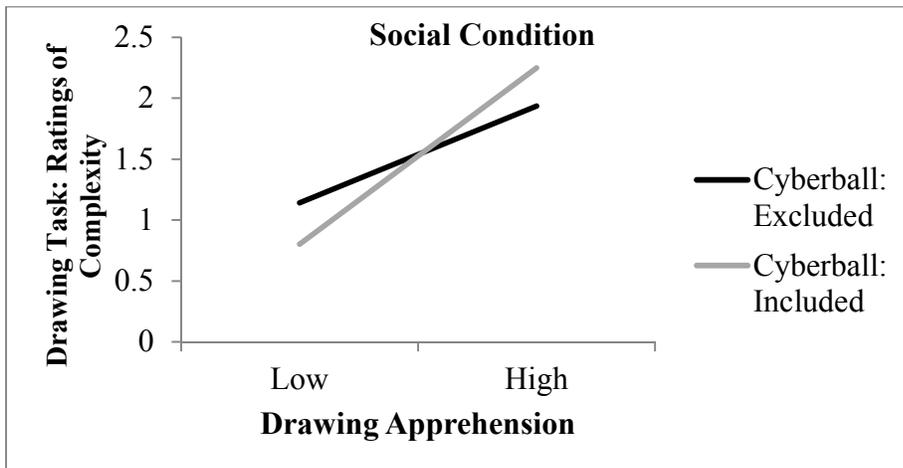
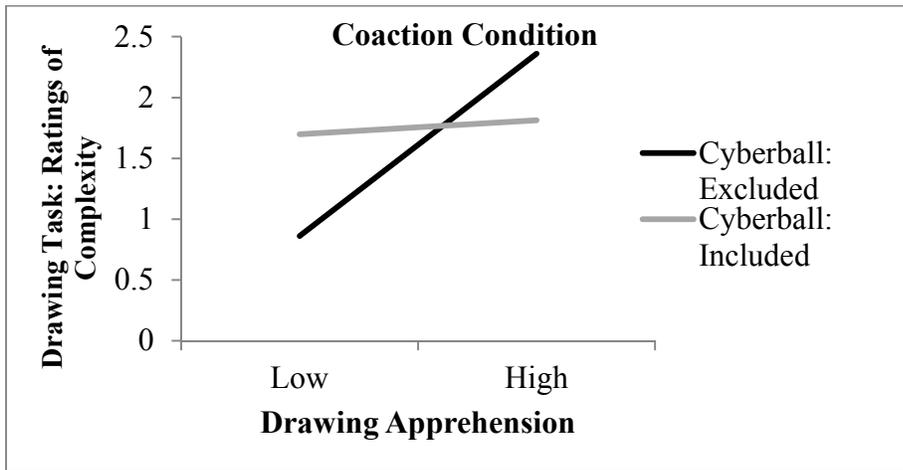
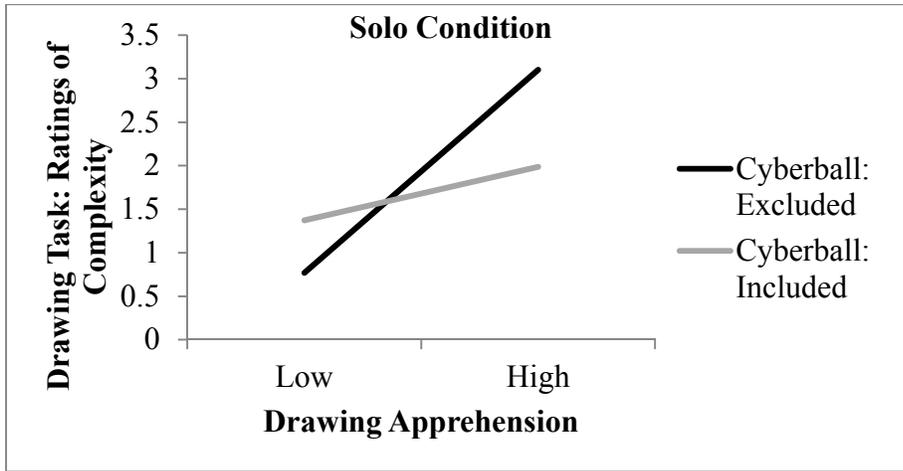
		<i>n</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>
Good	Excluded	142	1.92	.88	204.51	<.001
	Included	135	3.50	.97		
Bad	Excluded	142	3.54	1.13	227.00	<.001
	Included	135	1.70	.88		
Friendly	Excluded	142	2.20	1.16	95.21	<.001
	Included	133	3.52	1.07		
Unfriendly	Excluded	142	3.40	1.30	132.94	<.001
	Included	131	1.77	1.00		
Angry	Excluded	141	3.04	1.13	182.16	<.001
	Included	131	1.42	.80		
Pleasant	Excluded	142	1.93	.90	176.04	<.001
	Included	130	3.52	1.07		
Happy	Excluded	141	1.89	.88	136.76	<.001
	Included	131	3.31	1.11		
Sad	Excluded	140	3.09	1.20	180.95	<.001
	Included	130	1.42	.78		
I was ignored	Excluded	138	4.40	.97	369.97	<.001
	Included	133	1.92	1.15		
I was excluded	Excluded	137	4.43	.92	492.63	<.001
	Included	131	1.76	1.04		
% Received Ball	Excluded	126	8.23	6.64	310.23	<.001
	Included	120	29.63	11.82		
NTQ Belonging Subscale	Excluded	141	1.69	.74	513.63	<.001
	Included	136	3.82	.82		
NTQ Self-Esteem Subscale	Excluded	142	2.14	.81	218.90	<.001
	Included	136	3.59	.83		
NTQ Meaningful Existence Subscale	Excluded	142	1.99	.87	323.76	<.001
	Included	135	3.81	.81		
NTQ Control Subscale	Excluded	139	1.52	.65	256.16	<.001
	Included	135	2.97	.85		
NTQ Total Score	Excluded	138	1.84	.66	416.91	<.001
	Included	131	3.54	.71		

**Table 9: Drawing Task MANCOVA**

	Wilks' $\lambda$	F	<i>df</i>	<i>p</i>	Partial $\eta^2$
Intercept	.62	51.30	(3, 247)	<.01	.38
Race	.91	3.78	(6, 494)	<.01	.04
Gender	.95	4.73	(3, 247)	<.01	.05
Artistic Creativity	.96	3.24	(3, 247)	.02	.04
Divergent Uses Ratio	.97	2.40	(3, 247)	.07	.03
Drawing Apprehension	.97	2.98	(3, 247)	.03	.04
Cyberball	.99	1.11	(3, 247)	.35	.01
Social Condition	.97	1.37	(6, 494)	.22	.02
Cyberball x Social Condition	.98	1.02	(6, 494)	.41	.01
Cyberball x Drawing Apprehension	.99	0.88	(3, 247)	.45	.01
Social Condition x Drawing Apprehension	.95	2.04	(6, 494)	.06	.02
Cyberball x Social Condition x Drawing Apprehension	.94	2.46	(6, 494)	.02	.03

*Note: Dependent variables are the drawing task ratings of originality, complexity, and quality.*

**Figure 3:** *Graphs of Simple Slopes for the Cyberball x Social Condition x Drawing Apprehension Interaction on Drawing Task Ratings of Complexity*



**Table 10:** Means of Social Condition x Cyberball Condition x Median Split of Drawing Apprehension on Drawing Task Ratings of Complexity

		Drawing			
Social Condition	Cyberball Condition	Apprehension: Median Split	<i>M</i>	<i>SD</i>	<i>n</i>
Solo	Excluded	Low	1.57	.73	27
		High	2.11	1.02	21
	Included	Low	1.54	.61	23
		High	1.55	.81	16
Coaction	Excluded	Low	1.46	.50	18
		High	1.88	.63	24
	Included	Low	1.81	.77	26
		High	1.80	.73	25
Social	Excluded	Low	1.32	.57	19
		High	1.73	.98	25
	Included	Low	1.27	.48	22
		High	1.86	.81	23

**Table 11:** *Initial MANCOVA Model for the Writing Task Ratings*

	Wilks' $\lambda$	F	<i>df</i>	<i>p</i>	Partial $\eta^2$
Intercept	0.40	94.51	(4, 250)	.00	0.60
Race	0.91	2.88	(8, 500)	.00	0.04
Gender	0.97	2.17	(4, 250)	.07	0.03
Scholarly Creativity	0.98	1.61	(4, 250)	.17	0.03
Divergent Uses Ratio	0.96	2.40	(4, 250)	.05	0.04
Writing Apprehension	0.99	0.57	(4, 250)	.68	0.01
Cyberball	1.00	0.08	(4, 250)	.99	0.00
Social Condition	0.98	0.59	(8, 500)	.78	0.01
Cyberball x Social Condition	0.96	1.34	(8, 500)	.22	0.02
Cyberball x Writing Apprehension	0.98	1.17	(4, 250)	.33	0.02
Social Condition x Writing Apprehension	0.99	0.43	(8, 500)	.90	0.01
Cyberball x Social Condition x Writing Apprehension	0.96	1.26	(8, 500)	.26	0.02

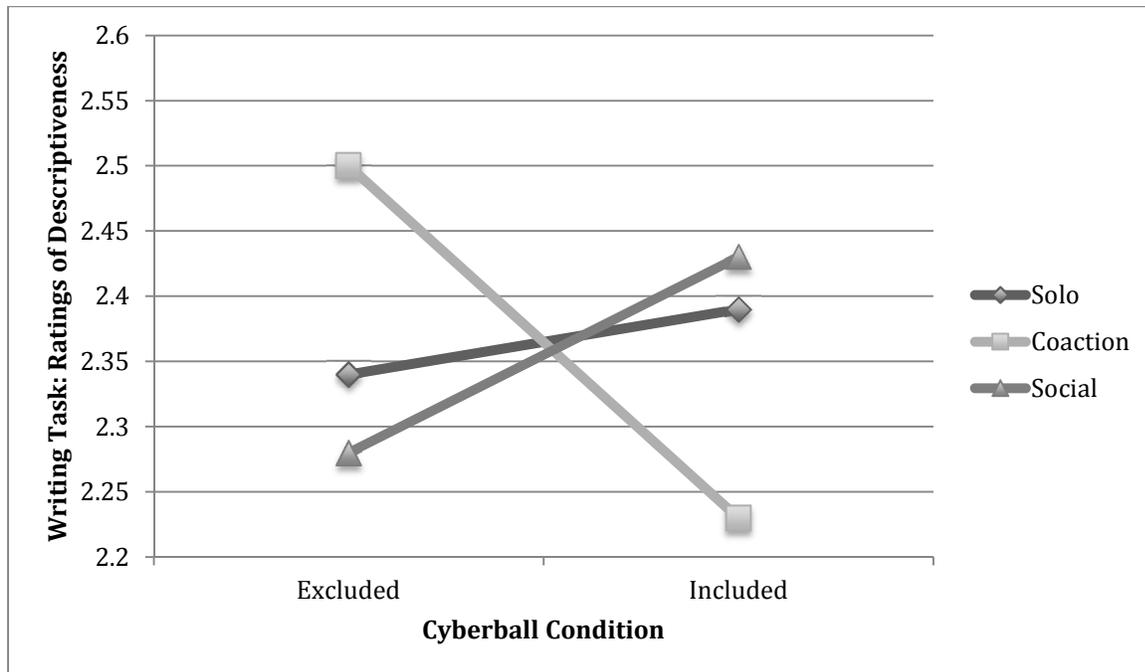
*Note:* Dependent variables are the writing task ratings of descriptiveness, originality, complexity, and emotional evocativeness.

**Table 12:** *Final MANCOVA Model for Writing Task Ratings*

	Wilks' $\lambda$	F	<i>df</i>	<i>p</i>	Partial $\eta^2$
Intercept	0.41	96.20	(4, 265)	<.01	.59
Race	0.91	3.06	(8, 530)	<.01	.04
Divergent Uses Ratio	0.96	3.02	(4, 265)	.02	.04
Cyberball	1.00	0.03	(4, 265)	.99	<.01
Social Condition	0.99	0.40	(8, 530)	.92	.01
Cyberball x Social Condition	0.95	1.57	(8, 530)	.13	.02

*Note:* Dependent variables are the writing task ratings of descriptiveness, originality, complexity, and emotional evocativeness.

**Figure 4:** Graph of Cyberball x Social Condition Manipulation on Writing Task Ratings of Descriptiveness



*Note:* The figure reflects estimated marginal means, controlling for the divergent uses ratio ( $M = .57$ ).

**Table 13: Personality MANCOVA for the Drawing Task**

	Wilks' $\lambda$	$F$	$df$	$p$	Partial $\eta^2$
Intercept	0.59	46.83	(3, 198)	<.01	.42
Race	0.92	2.72	(6, 396)	.01	.04
Gender	0.95	3.18	(3, 198)	.03	.05
Artistic Creativity	0.97	1.86	(3, 198)	.14	.03
Divergent Uses Ratio	0.98	1.52	(3, 198)	.21	.02
Drawing Apprehension	0.95	3.66	(3, 198)	.01	.05
Neuroticism	0.97	2.19	(3, 198)	.09	.03
Openness to Experience	0.99	1.03	(3, 198)	.38	.02
Cyberball	0.98	1.33	(3, 198)	.27	.02
Social Condition	0.97	1.05	(6, 396)	.39	.02
Cyberball x Social Condition	0.98	0.61	(6, 396)	.72	.01
Cyberball x Drawing Apprehension	0.97	1.85	(3, 198)	.14	.03
Social Condition x Drawing Apprehension	0.95	1.67	(6, 396)	.13	.03
Cyberball x Social Condition x Drawing Apprehension	.92	2.82	(6, 396)	.01	.04

*Note: Dependent variables are the drawing task ratings of originality, complexity, and quality.*

**Table 14:** *Personality MANCOVA for the Writing Task*

	Wilks' $\lambda$	F	<i>df</i>	<i>p</i>	Partial $\eta^2$
Intercept	.38	86.51	(4, 215)	< .01	.62
Race	.89	3.15	(8, 430)	< .01	.06
Divergent Uses Ratio	.97	1.88	(4, 215)	.11	.03
Neuroticism	.99	.72	(4, 215)	.58	.01
Openness to Experience	.93	4.05	(4, 215)	< .01	.07
Cyberball	1.00	.10	(4, 215)	.98	.002
Social Condition	.97	1.88	(4, 215)	.11	.03
Cyberball x Social Condition	.95	1.51	(8, 430)	.15	.03

*Note:* Dependent variables are the writing task ratings of descriptiveness, originality, complexity, and emotional evocativeness.

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## Appendix A: Writing and Drawing Apprehension Measure

### DRAWING AND WRITING QUESTIONNAIRE

**Directions:** Below are a series of statements about writing and drawing. There are no right or wrong answers to these statements. Please indicate the degree to which each statement applies to you by circling whether you (1) strongly agree, (2) agree, (3) are uncertain, (4) disagree, or (5) strongly disagree with the statement. While some of these statements may seem repetitious, take your time and try to be as honest as possible.

	Strongly Agree (1)	Agree (2)	Uncertain (3)	Disagree (4)	Strongly Disagree (5)
1. I avoid writing	1	2	3	4	5
2. I have no fear of my writing being evaluated	1	2	3	4	5
3. I look forward to writing down my ideas	1	2	3	4	5
4. I am afraid of writing essays when I know they will be evaluated	1	2	3	4	5
5. Expressing ideas through writing seems to be a waste of time	1	2	3	4	5
6. I would enjoy submitting my writing to magazines for evaluation and publication	1	2	3	4	5
7. I like to write my ideas down	1	2	3	4	5
8. I like to have my friends read what I have written	1	2	3	4	5
9. I'm nervous about writing	1	2	3	4	5
10. I enjoy writing	1	2	3	4	5
11. I never seem to be able to clearly write down my ideas	1	2	3	4	5
12. Writing is a lot of fun	1	2	3	4	5
13. Discussing my writing with others is an enjoyable experience	1	2	3	4	5
14. I don't think I write as well as most other people	1	2	3	4	5

15. I don't like my compositions to be evaluated	1	2	3	4	5
16. I'm no good at writing	1	2	3	4	5
17. I avoid drawing	1	2	3	4	5
18. I have no fear of my drawing being evaluated	1	2	3	4	5
19. I look forward to drawing out my ideas	1	2	3	4	5
20. I am afraid of drawing when I know I will be evaluated	1	2	3	4	5
21. Expressing ideas through art seems to be a waste of time	1	2	3	4	5
22. I would enjoy submitting my drawings to magazines for evaluation and publication	1	2	3	4	5
23. I like to draw out my ideas	1	2	3	4	5
24. I like to show my friends what I have drawn	1	2	3	4	5
25. I'm nervous about drawing	1	2	3	4	5
26. I enjoy drawing	1	2	3	4	5
27. I never seem to be able to clearly draw out my ideas	1	2	3	4	5
28. Drawing is a lot of fun	1	2	3	4	5
29. Discussing my drawings with others is an enjoyable experience	1	2	3	4	5
30. I don't think I draw as well as most other people	1	2	3	4	5
31. I don't like my drawings to be evaluated	1	2	3	4	5
32. I'm no good at drawing	1	2	3	4	5

## **Appendix B: Experimental Protocol and Confederate Script**

### **INTRODUCTION**

*Take the participant and the confederate to the initial lab room. Give the confederate and the participant each a copy of the Participant Information Sheet.*

**Researcher:** “Thank you for participating in our study. Please have a seat in front of the computer. Do you have any questions before we begin the study?”

Here is the information sheet that explains the study in detail.

*Let the participant read the information sheet and again give them an opportunity to ask you questions. Go through the Participant Information Sheet with the Participant, briefly reviewing section.*

**Researcher:** “Ok now you will complete a few brief questionnaires, and then play an online game with other participants located at various sites across campus. After you finish the game, you will complete some more brief questionnaires. When you have completed all the measures, the computer will display a message telling you to come get me.” *(Show participant how to play Cyberball, then escort the confederate to the other room)*

**Researcher:** “Now that you have completed the first part of the study, we would like you to complete several tasks of creativity *(lead participant to room for creativity tasks completion—with confederate, depending on condition)*.

SOCIAL INTERACTION ONLY: “After you have both finished these next tasks, you will have an opportunity to share and discuss your work with each other.”

*Start the participant on the first creativity task. Set the timer for 15 minutes. After 15 minutes, instruct the participant to cease work on the first task, and begin the second one. Set the timer for another 15 minutes.*

**Researcher:** “Thank you for completing those tasks.”

SOLO WORK ONLY: “That concludes the study, I would like for you to complete some final questionnaires.” *Go to suspicion probes.*

SOCIAL INTERACTION ONLY: “Before you discuss your creations, I’d like for each of you to complete some final questionnaires independently.” *Escort the confederate to another room.*

COACTION ONLY: “That concludes the study. Now, I’d like for each of you to complete some final questionnaires independently.” *Escort the confederate to another room. Give the participant a copy of the post-study questionnaire, and leave the room while they complete it. After the participant finishes the questionnaire, go through the Suspicion Check and record their responses.*

### **SUSPICION CHECK—COMPLETED BY EXPERIMENTER AS AN INTERVIEW**

1. What did you think the purpose of this experiment was?
2. Did you think there was something more going on with this experiment?
3. What had you heard about the experiment before today?
4. Have you had any previous experience with Cyberball before today? (If yes, get details)
5. Did you have any questions about anything?

*At the end of this, collect all the materials and give the participant the debriefing sheet and allow them to read it while you debrief them.*

## DEBRIEFING AND EXCUSING

**Researcher:** “I want to again thank you for your participation. The true purpose of this study is to investigate how ostracism affects creative processes.

At the beginning of the study, you were told that you were playing a computer game with two other people. Actually, you were playing with the computer. The computer was programmed to either include you in the game, or exclude you. Whether you were included or excluded was completely random, and determined by a coin flip before you began the study.

The other person you met at the beginning of the study, and who may have been in the room with you when you completed the assessments after the computer game was actually not a participant. This other person is actually a research assistant who was trained to act like a participant.

The purpose of this study was to answer two research questions. First, to see whether being excluded affected the way you approached the tasks you completed afterwards, and second, to see if the presence of another person had an effect on your performance.

If you have any questions at this time, about the study or your participation, please ask them now.”

**Researcher:** “This is the research study information sheet. Keep it for your records. Thank you again and we will make sure you receive full credit for your participation today.”

*Give them a copy of the post-experiment information sheet.*

**Researcher:** Finally, I would like to ask you not to tell anyone else about what happens during this study or what the real purpose of the study is. If people come into the study with any sort of suspicions or prior expectations, it could really bias our results. Even if you told someone who is not a University of Alabama student, word could get around and have severe effects on our

results. Can we count on you to keep the details of this study secret?

[Wait only for 5 seconds and then move on]

Thank you for participating in our study.

### **Confederate Protocol**

1. You will run sessions in pairs. Check the lab schedule to see whether you have been assigned to be the experimenter or the confederate for the day.
2. When you arrive for your scheduled session, go sit outside the computer lab in ISSR, under the sign for this study. Do not talk to the experimenter or do anything to break character while in the hallway.
3. Do homework or bring other reading while you wait so that you can avoid pre-experiment interaction with any Ss without appearing impolite or unlikeable. If the S arrives and tries to talk, provide the briefest responses you can (without appearing rude) and do not initiate conversation. Please tell the experimenter if the participant initiates interaction.
4. When the experimenter arrives, confirm your name and that you are here for the correct experiment.
5. The experimenter will take you and the participant to the lab room and review the participant information sheet with you both. Your instructions are the same regardless of condition.
  - a. COACTION condition: You will be given the same instructions as the S about completing the writing and drawing tasks. You can write whatever you want; just make sure that you are typing for most of the 15 minutes. Pause typing when it seems natural (every 2-3 minutes), and vary the speed of your typing. During the

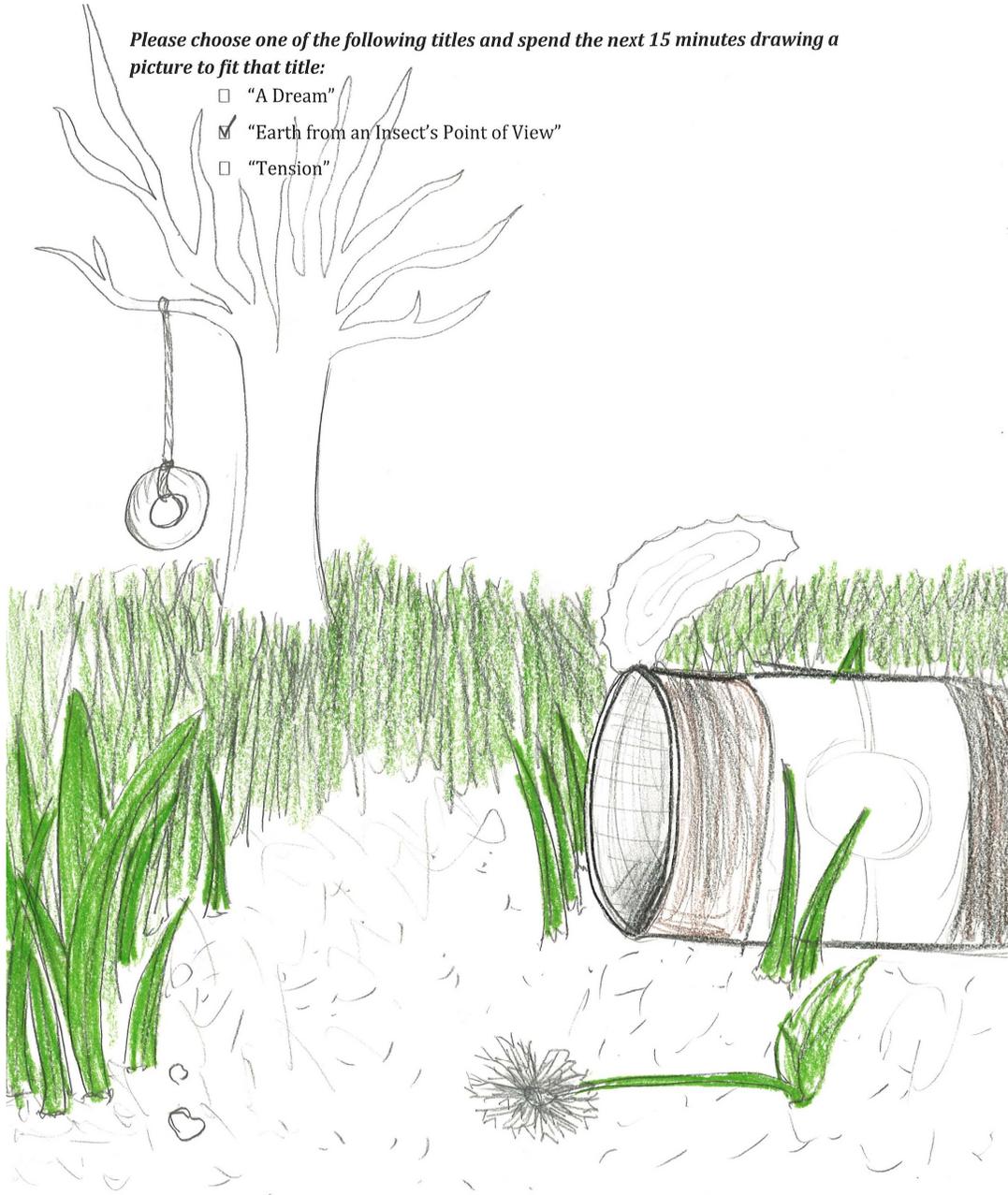
drawing task, use the materials given to draw the attached image (as best you can). Try to make your drawing take up the entire 15 minutes given. If the subject tries to talk to you, be polite, but don't engage the S in conversation. Keep your attention focused on the task. If the S continues to try to engage you, redirect their attention with a polite prompt such as "I'm not sure we're supposed to be talking right now."

- b. SOCIAL INTERACTION condition: You will be given the same instructions as the S about completing the writing and drawing tasks. You can write whatever you want; just make sure that you are typing for most of the 15 minutes. Pause typing when it seems natural (every 2-3 minutes), and vary the speed of your typing. During the drawing task, use the materials given to draw the attached image (as best you can). Try to make your drawing take up the entire 15 minutes given. If the subject tries to talk to you, be polite, but don't engage the S in conversation. Keep your attention focused on the task. If the S continues to try to engage you, redirect their attention with a polite prompt such as "I'm not sure we're supposed to be talking right now."
6. Let the experimenter know if anything unusual (e.g., the S went off task, expressed suspicion, appeared upset) happened during the task completion.
7. Go somewhere else (outside, bathroom, etc.) until 5 minutes before the next session. Then return to outside the lab and continue doing homework/reading.

## Appendix C: Sample of Responses to Drawing Task

*Please choose one of the following titles and spend the next 15 minutes drawing a picture to fit that title:*

- "A Dream"
- "Earth from an Insect's Point of View"
- "Tension"



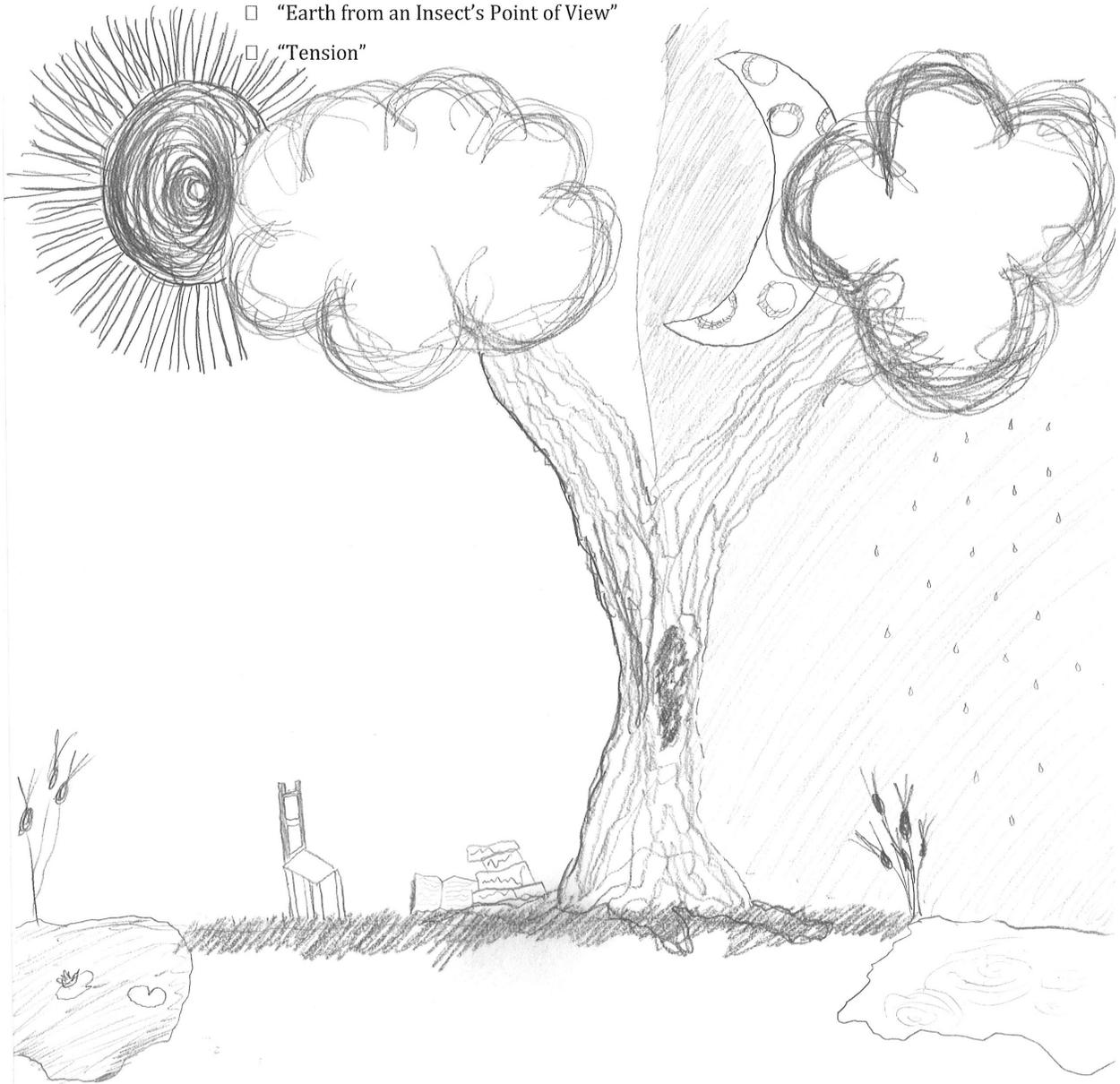
This drawing was scored high on quality and complexity, because of the artistic skill and the detail in the drawing, but it scored in the low-average range on originality.

**Please choose one of the following titles and spend the next 15 minutes drawing a picture to fit that title:**

"A Dream"

"Earth from an Insect's Point of View"

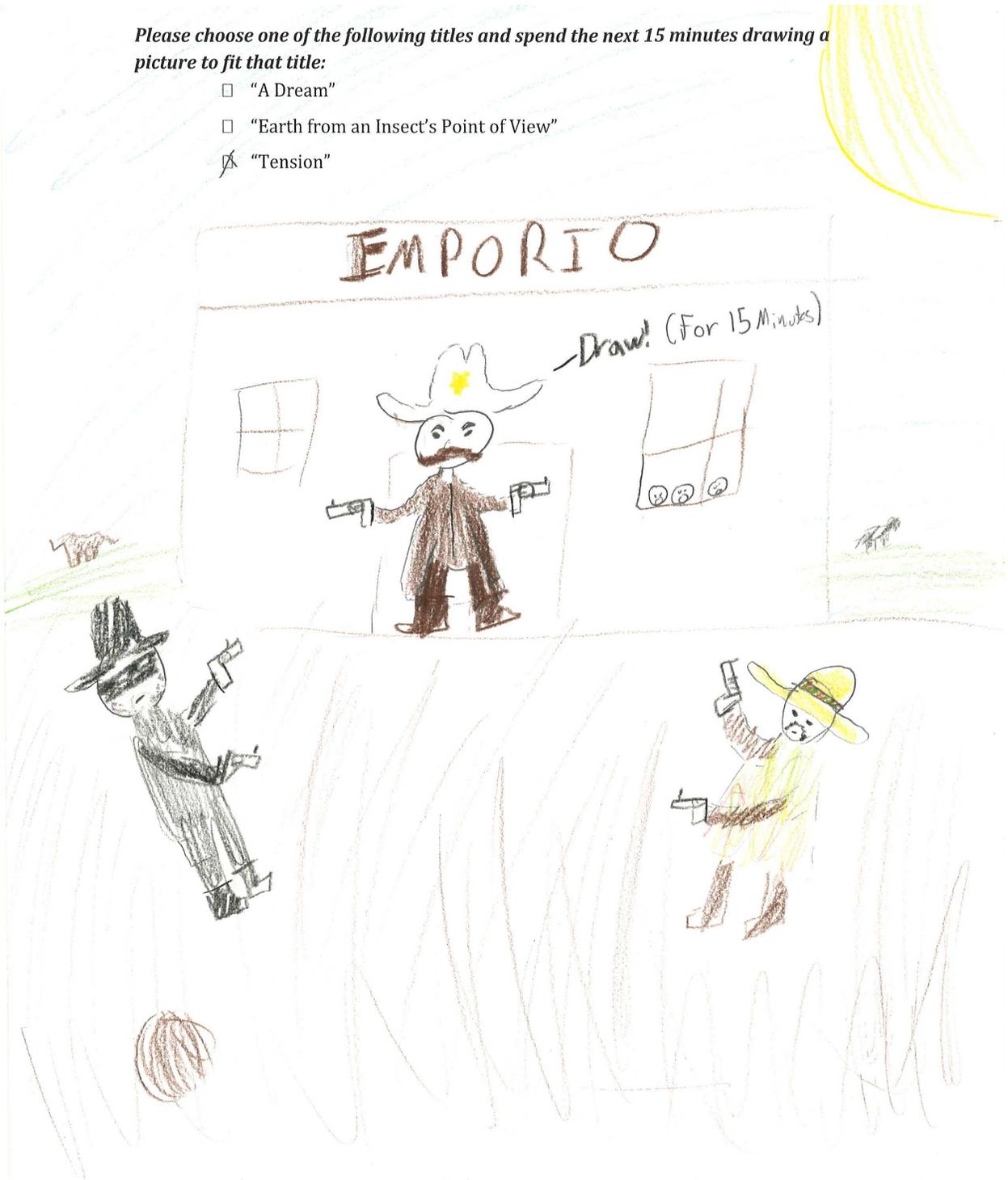
"Tension"



This was scored highly on all three scales (originality, complexity and quality).

Please choose one of the following titles and spend the next 15 minutes drawing a picture to fit that title:

- "A Dream"
- "Earth from an Insect's Point of View"
- "Tension"



This drawing scored low on quality, average on complexity, but high on originality. It reflected a unique interpretation of the concept of "Tension".

## **Appendix D: Sample of Responses to Writing Task**

### **“It’s Moving Backward”**

The day had come. Finally, after many months of therapy and intense healing sessions, the monitor finally went flat, and I could hear it. It was terrifying, yet relaxing at the same time. No more stress. No more worries, My time had finally come. As I found myself nearing the moment closer and closer, time began to move incredibly slow-- almost backwards. I began to relive every life event in what seemed to be another lifetime to me. The first thing I could see was my admittance to the hospital, where I was receiving chemotherapy. Before that I was at the clinical center where they diagnosed me- a quick two month turnaround from a healthy carefree life to a flat sound on the monitor. Then I found myself at my grandchildren's sporting events. It was awesome to get to see them again, one last time, since it had been since before my diagnosis when I saw them last. Peace in my mind with them; I finally got to say goodbye. Then I found myself teaching, and teaching a whole lot. New students every day, new information that I would present them with kept popping up in my mind. I saw my wife, the beautiful woman that she was, with me along the entire way, always supportive of my career and my life choices. I saw my children, who had grown up and became successful in their respective fields- Jack was a semi-professional baseball player, Shelly was a kick-ass lawyer, and Marty became the head of one of the largest Fortune 500 companies in America. I felt content, like my life meant something. Then I found myself in my early career years-the fun times. Filled with countless research exploration journeys, my early teaching years, and plenty of exciting new findings that were propelling my field at the time. I see my wife, our wedding. Ah, how young and gorgeous she was then, and

how gracefully she has aged and matured along with me. I see med school, all the extra years of school and shadowing that allowed my career to take flight. I see undergrad, at the University of Alabama, and I remember taking a certain psychology study on November 20th, 2014 that allowed me to take a prospective look into the future and backtrack my life- a pretty cool little short story in my mind. Before that, high school and Colorado, my home. My childhood. What great times. I had a loving family, and the greatest and most supportive friends, that allowed me to blossom and flourish before heading off to Alabama for undergraduate school. Finally I reach elementary school, my immature days. I see the glasses appear, the braces come and go, I see broken bones and skimmed knees and good night kisses from my parents. I reach infancy, and I see a toddler form of myself. He approaches me, asks me what I am doing here. "It's time, Mitchell, It's moving backwards", at which moment he appeared to know exactly what I was talking about, and walked away with a grim look. I realized what was happening, and at the same time it was insanely relaxing. I could see the light. I was slowly approaching it, yet I did not fear it. It was embracing me. But then, the light did something phenomenal. It started to move backwards. I could hear the machines chugging along, and I heard the faint shout of a doctor, he said something like "near" or "tear", and then I felt the biggest rush of life that I had ever felt. I woke up

**Notes:** This was scored high on originality, high on emotional evocativeness, high on descriptiveness, and high-average on quality.

**“2983”**

In a world ruled by technology, the world powers soon were taken over by internet browsers. The majority of the world is ruled by Google. The Google empire soon directly applied this

technology into the everyday lives of all humans. No one noticed when Google invested in military weapons, or took countries that refused its web browser by force. Most are simply happy living their lives with the luxuries that Google provides, while not questioning what this massive empire really does. / But resistance to the treat of Google still fights against this all powerful force. Internet explorer fights the battles that no one else feels they can handle now. For over 900 years, Internet explorer has remained a thorn in Google's side, seeming to never advance or even try to change. Its sole user in the year 2983, Howard, still understands what it is like to be truly human. He remains immune to the luxurious lifestyle Google tries to push on its subjects. He walks proudly down the streets wearing his retro glasses without computer enhanced designs. He may not be the hero we deserve. But he's the hero our world needs. So he'll keep fighting. Overcoming the constant emails from Google to sign up for Google drive, mostly because he can't open the emails on internet explorer. He has the one tool that no one seems to have in this bleak future: a total lack of technological savvy. And that will make all the difference in leading the fight against Google.

**Notes:** This scored high on originality, high-average on descriptiveness, high on complexity, and low on emotional evocativeness.

### **“Beyond the Edge”**

There was a small town of people, their village had stood where it is for a countless number of years. They were traditional in their culture and way of life, not caught up to contemporary times, but not by choice. They didn't know what was beyond their village limits. Generation after generation had lived in this same space, never questioning the world they were brought into. At night there were noises, more like screeches and screams out in the woods surrounding the town. No one dared venture out after sunset. The people were taught to lock their doors securely at

night. People who were seen going out at night were often never seen again after that.

A young resident of the town, Trevor, had bigger dreams of the world though. He wondered what else could be out there; he thought beyond the traditional things they learned in school. His mind ventured beyond the brink of the other children his age. Trevor's father was one of the seven council members in town, leaving Trevor with a more privileged life. He often laid awake at night in his bed, listening to the sounds of the darkness, pondering past the woods. When he would fall asleep, his dreams drifted to the same places as his conscious mind.

Trevor labored day after day once he turned fifteen and finished the schooling system. He worked as a productive member of the village, keeping his dreams and aspirations to himself because he knew his thoughts on life didn't sit well with the others in town. He was often told it was a dangerous thing to think that way in town. The people who disappeared often had similar thoughts. Trevor could not ease his restless thoughts though, and between working and taking care of his other responsibilities, he secretly planned. He stored extra things for months as he managed to come by them. Saving food from meals, buying extra lanterns and candles, stashing blankets and warm clothing is how he prepared. His assortment of goods was almost ready

**Notes:** This scored low-average on originality, low-average on descriptiveness, low-average on emotional evocativeness and low-average on complexity.

## Appendix E: Human Subjects Approval

Office for Research  
Institutional Review Board for the  
Protection of Human Subjects



September 4, 2015

Jessica Minney  
Department of Psychology  
College of Arts & Sciences  
The University of Alabama  
Box 870348

Re: IRB # 14-OR-365 (Revision # 3) "Mental Visualization and Creative Processes"

Dear Ms. Minney:

The University of Alabama Institutional Review Board has reviewed the revision to your previously approved expedited protocol. The board has approved the change in your protocol.

Please remember that your approval period expires one year from the date of your original approval, October 27, 2014, not the date of this revision approval.

Should you need to submit any further correspondence regarding this proposal, please include the assigned IRB application number. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants.

Good luck with your research.

Sincerely,

Stuart Usdan, PhD.  
Chair, Non- Medical Institutional Review Board  
The University of Alabama



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