2018

The Relationship between Social Anxiety and Conforming behavior in a computerized task

Jeremy Vargas

Acknowledgments

The Primary investigator would like to thank Dr. Michael Bordieri, Ph.D. for his supervision and guidance throughout this process, along with his support programing the computer tasked used in the current research. Special thanks to fellow Murray State University students, Bradi Cislaghi and Brighton Hollingsworth who assisted in data collection.

Abstract

This study assessed the relationship between social anxiety symptoms and conforming behavior in both ambiguous and unambiguous computerized context. The majority of the participants for the sample consisted of Caucasian (78%) females (71%) who completed the task entirely (N = 94). Measures of the Social Phobia Inventory (SPIN) were used to assess social anxiety, while a computer mediated problem-solving task was used to assess conforming behavior. It was hypothesized that conforming behavior would be greater in the ambiguous context compared to the unambiguous context; and that social anxiety scores would be correlated with higher conforming behavior. While a Wilcoxon analysis concluded that higher conforming behavior was observed in the ambiguous than the unambiguous context ($p < .001$), there was no significant correlation between social anxiety scores and conforming behavior observed. Results, clinical implications, and directions for future research are discussed.

Keywords: Computer mediated communication, Conformity, Conforming Behavior, Social Anxiety, Social Phobia Inventory (SPIN)

TABLE OF CONTENTS

List of Illustrations

Chapter 1: Review of Literature

Defining Conformity

Conforming behavior can loosely be defined as the alteration of one's own behavior to align with the behavior of others or perceived others in a social context. Asch's (1955) hallmark study of conforming behavior operationalized conformity by having participants, along with 3-4 confederates, make judgments about size comparison of lines. He found that, in public responses, participants were more likely to align with the perceived others even when the response to the prompt was obviously incorrect. Of 123 participants, 36.8% aligned with the majority in selecting the incorrect response (Asch, 1955). Building on this initial work, research on the different factors affecting conforming behavior and multiple methods of measuring conforming behavior have been employed.

Griskevicius et al. (2006) discusses several possible reasons for conforming behavior, such as adaptive functions, accurate decision making, mimicking, and inclusion. Conformity serves an adaptive function, as "following others often leads to better and more accurate decisions, especially when we face uncertainty" (p. 282). Another reason for conforming behavior is its mimicking effects. Mimicking the behavior of a group may cause that group to like an individual more (Griskevicius et al., 2006). This is important, due to the evolutionary implications. Griskevicius et al. (2006) describes several evolutionary motives for conforming behavior including, "attracting mates, protecting oneself from danger, and attaining and maintain status" (p. 282). In

addition, other authors focus specifically on interpersonal relationships as driving mechanisms of conformity. Baumeister and Leary (1995) discuss conformity, “in the context of enhancing one’s chances of inclusion in group and relationships” (p.521). Here, conforming behavior is used to facilitate social acceptance. Conformity can serve the purpose of furthering one’s own survival, increasing the availability of resources, inclusion in social settings, sharing of information, and other factors.

Defining and measuring conforming behavior is difficult. There appears to be a diverse range of approaches to how conformity is measured and what is being represented. In Asch’s original line study (1955), he described conforming behavior to be present when individuals “yielded to the error of the majority” (p. 32). While his research pioneered the idea of social pressure, other definitions began to emerge, focusing on different factors. Charles defined conforming behavior as “the fear of standing alone…causing us to lose our minds: to not-know what we thought we knew” (2013, p. 106). While both definitions share a focus on group pressure on the individual, they vary in the purported mechanisms underlying conformity. Asch’s (1955) assumes conforming behavior to be reliant on the presence of inaccurate group mentality. While Charles (2013) assumes the individual need to perceive themselves as wrong. Levitan and Verhulst (2016) explained conforming behavior as attitude change to social information, compared to factual information (Levitan & Verhulst, 2016, p.278). In Levitan and Verhulst’s version, the focus is on social interactions, and not on factual information. Their definition is based on social interaction with a group, which they assessed by comparing a control group, participants physically within a group, and participants within a computer chat-based environment.

Sloan, Berman, Zeigler-Hill, and Bullock (2009) argued that it is not the presence of the social group, but the underlying motivation to belong to that group that drives conformity. The three factors within Sloan et al.'s (2009) perspective involves accuracy, affiliation, and self enhancement. First, accuracy, which represents the social viewpoint of conforming behavior. Accuracy is acting appropriately, according to the group, for the given situation. Second, affiliation, which represents the need of the individual to be included. Third, self enhancement, which represents an external viewpoint. The individual's self-concept is based on how others view them. A unique addition is the behavioral outcome after conforming behavior occurs. Sloan et al. (2009) described that conforming behavior outcomes don't necessarily have to be positive outcomes for the individual, for example binge drinking alcohol (Sloan et al., 2009).

An older definition proposed by Cialdini and Goldstein (2004) focused on two changes which may occur within the individual, involving informational and normative conforming motivators. Informational change involves altering behavior to better fit reality, while normative change involves altering one's behavior for social approval (Cialdini & Goldstein, 2004). Many researchers implemented the use of normative and informational influences. Hornsey, Majkut, Terry, & McKimmie (2003) described informational influence as an irrational process They use the word 'irrational' to describe informational influence based on reliance on the larger group of others and not experts in the areas where conforming behavior is observed. While all these definitions appear to build on each other, progressively becoming specific on motivational factors of the individual, more research is being done on role of contextual factors.

Sloan, Berman, Zeigler-Hill, and Bullock (2009) discuss several contextual factors suggesting the context matters. One factor discussed is the serial position of the individual, the point in which an individual is expected to respond with an answer amidst a group. When conducting their research, they observed the serial position of the dissenter (participant) had a great effect on the level of conforming behavior. Participants replied to a verbal prompt, which demonstrated greater conforming behavior when participants responded last, compared to second (Sloan et al., 2009). A possible explanation to this effect is the lack of a group information. They found an increase in conforming behavior when the participant where late dissenter (required to respond after most confederates responded) compared to early dissenters (required to respond after one confederate). Another group factor discussed in the literature is the consensus of the group. Cialdini and Goldstein (2004), observed an increase in conforming behavior when the group response was unanimous; however, a significant decrease in conforming behavior was observed when there were one or more dissenters present along with the participant (Cialdini & Goldstein, 2004). In his original chain of studies, Asch also found group factors to affect an individual's level of conformity. In one of his studies, he observed private or public disclosure of response had a great effect on the level of conformity. Private responses showed decreased levels of conforming behavior, while public disclosure of responses showed an increase effect of conforming behavior (Asch, 1955). This finding reinforces the presence of normative influence in conforming behavior.

Ambiguity of the situation has also been explored as a factor of conforming behavior; however, it has not been studied in recent literature. Nordholm (1975) studied

the relationship of group size, ambiguity, and conforming behavior. His findings suggest that ambiguity has a negative correlation with conforming behavior; meaning the less likely the individual is able to rationalize the presenting issue, the more likely they are to exhibit conforming behavior. Conforming behavior was measured based on response to the task on the Crutchfield apparatus, a lighted device which depicted the confederate choices. Subjects were asked to estimate the level of susceptibility of an individual for hypnosis. The ambiguous condition involved 3 possible responses, which were predetermined by the participant in a pretest to have equal probability outcomes (Nordholm, 1975). Conforming behavior was observed when possible responses held equal value to the participant. One of the original studies of the auto kinesthetic effect was conducted by Sherif (1935). In his experiment, he studied the effects of social influence in ambiguous identification of light dot positioning and movement. The auto kinesthetic effect is described to occur when a stimulus lacks a frame of reference (Sherif, 1935) allowing the stimuli to vary depending on perspective of the observer. They observed increased conforming behavior when in a social context, compared to private responding, suggesting the participant's peers were used as a basis of reference when the nature of the task involved doubt by the participant (Sherif, 1935).

While there appears to be a general definition for conforming behavior, incorporating group and individual factors, a precise definition is necessary when assessing the reliability and validity of the existent research. Group factors such as number of individuals, unanimity, serial positioning, and method of expression play a role. Individual factors such as motivators may also affect the level of conforming behavior. There may also be an interaction of both factors, affecting confirming behavior.

For this purpose, the working definition being used for the current study will be conformity as, “the process in which, under collective pressure from a group, individuals tend to join the majority of society and follow their opinions” (Sun, Syu & Lin, 2017, p. 275).

Measuring Conformity in the Digital Age

Traditionally, conforming behavior has been measured in a behavioral task involving others (Asch, 1955; Griskevicius et.al, 2006; Sloan et.al, 2009); however, this approach requires live confederates and does not necessarily reflect all types of modern social interactions. With more social interactions conducted using computers and other technological devices, it is important to explore conformity in these digital environments (Sun, Syu, & Lin, 2017).

Griskevicius, Goldstein, Mortensen, Cialdini, and Kennrick (2006) explored conforming behaviors in a computer chat room virtual environment. In their mate attraction study, they had participants rate their preference and attraction to images. They were then told that they will discuss other images in a chat room; however, they were exposed to the same images they previously assessed along with normative attractiveness information from “virtual others.” Conforming behavior was determined by how much they altered their perception of previously assessed images to meet the opinions of the confederates. There was greater change in attractiveness rating to be more like the group in the conformity condition, when the participants were primed for mate attraction, romantic arousal, or neutral condition by means of reading an 850-word scenario and asked to respond to the scenario in a manner that they would themselves enact (Griskevicius, et al., 2006).

Condon, Cech, and Edwards (1999) also measured conforming behavior in a computer task. In their research, they asked participants to determine who would win an Oscar if they were the deciding committee. This research employed face-to-face and computer-based factors. One group discussed the candidates that would win in a face-to-face discussion verbally expressing their points. The second had the same discussion, however the discussion was done through a computer, in the form of a chatroom. Obtained results indicate that participants in both in-person and virtual conformity conditions change their language patterns to fit the larger group, which suggests the presence of conforming behaviors in both live and virtual discussions (Condon, Cech, & Edwards, 1999).

Hornsey, Majkut, Terry, and McKimmie (2003) also conducted research on conforming behavior in virtual environments; however, they focused on altering political beliefs. For their conformity manipulation they provided statistical information on the percentage of students who support or disagreed with the political issue, in the form of graphs representing the past 3 years. They altered the normative information regarding pro-gay laws to represent the opposite of the participants' personal belief. Participants were then given a questionnaire designed to measure their willingness to act on their beliefs in private and in public places. They found individuals were more likely to conform in private settings, when they had a weak basis for their beliefs, but were less likely to conform in public settings if they had a strong basis for their belief.

Conforming behavior has been measured in non-ruled based computer tasks, where participants were asked to relate various words, numbers, and pictures together. Vargas and Bordieri (2016) measured conformity by how long individuals aligned with

the group during a problem-solving task that required increasing effort to access the conforming option. The majority of participants conformed when the response effort was low, with a significant reduction in conforming behavior observed when the conforming option required 16 or greater physical computer key presses, compared to the start number of 2 key presses. However, the percentage of participants selecting the conforming response option was never observed to be non-existent, meaning there was a minority of participants who persisted in selecting the conforming option even as the effort increased to very high levels (e.g., 128 key presses for access; Vargas & Bordieri, 2016).

Conforming behavior has been measured by using face to face interactions, chat-based programs, confederates, perceived committed actions, and by speech patterns, within a larger group. The literature which used computerized measures appear to have similar findings compared to control face to face groups. This would suggest that conforming behavior can be assessed effectively in computer-based tasks.

Anxiety related to Conformity

Researchers have given increasing attention to the role of anxiety and other clinical factors on conformity. Vaughan and Taylor (1966) were among the first to measure conforming behavior as it relates to anxiety. They used a signaling apparatus developed by Crutchfield which has rows of lights, which signaled the response option others selected, who were confederates. Their findings suggest that participants who had higher levels of anxiety endorsed greater conforming motives and men with higher levels of anxiety displayed greater conformity in the experimental task. While they found a difference among men in conforming behavior, their findings suggest that females with

low levels of anxiety did not differ significantly from high anxious females in conforming behavior. However, high female conformers tend to be more anxious than low female conformers (Vaughan & Taylor, 1966). These findings suggest high anxiety individuals show greater conforming behavior than low anxiety individuals within a clinical population.

More recent research conducted by Sun, Syu, and Lin (2017) focused on how learner's conformity (the ability to learn academic concepts through aligning with group mentality) and learner's anxiety (the effect of negative emotions on the learning process) affect their motivation to learn when participating in Facebook groups used in school. They operationally defined anxiety as unpleasant, subjective, emotional responses which include negative feelings such as tension, stress, and cognitive uncomfortableness (Sun, Syu & Lin, 2017). Conformity was measured using the Attention to Social Comparison Information (ATSCI) scale, which were categorized by informational social influence and normative social influence (Sun, Syu, & Lin, 2017). Their findings suggest that participants increase their motivation to learn by practicing conformity during interaction within groups. This supports the idea of conforming behavior being conducted to ease uncertainty within the group (Sun, Syu & Lin, 2017). Learners with high anxiety, felt upset, nervous, fearful, helpless, and stress which had an effect on learning capability and increased conforming behavior scores (Sun, Syu & Lin, 2017). These findings suggest that anxiety predicts conforming behavior, especially when participants were not knowledgeable of a topic being discussed.

Several studies have also explored the anxiety-conformity relationship within the context of drinking behaviors. Buckner and Shah (2015) focused on assessing

conforming and coping motives as a mediator of the relationship between social anxiety and drinking problems. They found that participants with high social anxiety condition endorsed greater conforming motives for drinking behavior (Buckner & Shah, 2015). Regarding reducing problematic drinking Watt, Stewart, Birch, and Bernier (2006) found a decrease in conforming motivator for drinking after a cognitive behavioral therapy (CBT) intervention. They observed that CBT reduced the strength of conformity as a motivator for drinking behavior as well as anxiety symptoms in high anxiety sensitivity individuals (Watt et al., 2006). These findings suggest that conforming motives are increased when anxiety sensitivity is high, meaning the participants were more likely to conform to drinking behaviors when they had a high sensitivity to anxiety symptoms. Social anxiety is a key factor in conforming behavior, due to conforming behavior relying on the presences of perceived others, and social anxiety being a condition in which perceptions of the individual by others is important (Buckner & Shah, 2015; Terlecki & Buckner, 2015; and Wright et al., 2010)

Current Study

The purpose of the current research is to replicate and extend previous research linking anxiety to higher levels of conforming behavior. While previous research assessed social anxiety and its relationship with self-reports of conforming behavior (Buckner & Shah, 2015; Terlecki & Buckner, 2015; and Wright et al., 2010), the current investigation uses a direct measure of conforming behavior to assess the presence of this relationship. The current study will also extend the research into contextual factors of conformity by assessing the conforming behaviors in an ambiguous and non-ambiguous task configuration. Previous research has investigated ambiguity indirectly (Nordholm,

1975, & Sherif, 1935), while the current study will directly manipulate the ambiguity of the conforming task in a within-subjects design.

The following hypotheses will be assessed:

1. Consistent with previous research (Nordholm, 1975, & Sherif, 1935), there will be higher levels of conformity in the ambiguous context relative to the non-ambiguous context.
2. Consistent with previous research (Buckner & Shah, 2015; Terlecki & Buckner, 2015; and Wright et al., 2010), higher social anxiety scores will predict greater conformity in both ambiguous and non-ambiguous contexts.

Chapter II: Methods

Participants

Undergraduate students who were taking psychology courses at Murray State University were recruited through the Sona System, a research management program that allows undergraduate students from Murray State University to sign up to be a part of multiple research studies. This population was ideal because the current study sought to explore conformity in a computer task, and most college students regularly use electronic devices for social interactions. Previous research has found that, the average college population has been using social media as a form of communication for the past 9 years (Sun, Syu & Lin, 2017). A college sample has also been found to be comparable in the range of demographics and personality measures, to a crowdsourced data base (Behrend, Sharek, Meade & Wiebe, 2011).

For the current research, college students (n = 94) from the Murray State University student population were used for analysis. The frequency distribution of participant's gender, race/ethnicity, and year in school for the overall sample is presented in Table 1.

Table 1 Gender, Race/Ethnicity, and Year in School for Overall Sample (with Percentages in Parentheses)

	Overall Sample (n = 94)
Characteristics	
Gender	
Male	26 (27.65%)
Female	67 (71.27%)
Transgendered	1 (1.06%)
Race/Ethnicity	
White/Caucasian	74 (78.72%)
African/African-American	9 (9.57%)
Hispanic/Latino	3 (3.19%)
Asian/Asian-American	4 (4.25%)
Multi-racial	3 (3.19%)
Native American *	1 (1.06%)
Year in School	
Freshman	60 (63.82%)
Sophomore	24 (25.53%)
Junior	5 (5.31%)
Senior	5 (5.31%)

Note. * represents a Race/Ethnicity that was originally reported as Other, and later specified to be Native American.

Measures

Social Phobia Inventory (SPIN): The SPIN is a 17 item self-report measure designed to screen for and measure the severity of social anxiety disorders. The SPIN also contains three symptom dimension scales, that assess for fear, avoidance, and physiological effects of anxiety. The SPIN has been found to have great internal consistency at the total SPIN score (α=.92) and symptoms dimension level of fear (α = .85), avoidance (α=.82), and physiological effect (α=.79) in a sample population of participants that meet diagnostic criteria for Social Phobia (Antony, Coons, McCabe, Ashbaugh, & Swinson, 2005). For the current sample an internal consistency of α = .93 was observed. The SPIN is conceptually related to the Social Phobia Scale and the Social

Interaction Anxiety Scale, with significant correlational values of *r* =.71 and *r* =.60, respectively (Antony et al, 2005).

Demographic Survey: Participants were asked to provide demographic information, including age, gender, race/ethnicity, current year in school, and treatment/diagnosis history.

Computer Conformity Task: Participants were repeatedly exposed to a forced choice task where they were required to select between two arbitrary symbols. Both symbols led to unsolvable matching tasks, which were program to be unsolvable. During each forced choice trial an experimenter generated percentages was displayed under both symbols, with the "conforming" symbol always having a higher percentage than the "non-conforming" symbol. Participants were told that these percentages represented the response selections made by students at other universities. The primary dependent variable was the percentage of responses allocated towards the "conforming" symbol. Regardless of which symbol was selected during each forced choice trial, participants were always routed to a randomly generated matching to sample trial consisting of random stimuli, in which no clear correct answer was present in the matching array. As participants continued to choose between the conforming and non-conforming symbols, the number of key presses required to activate the conforming symbol was increased while the key presses required to activate the non-conforming symbol remained constant. This procedure allowed for the initial assessment of conforming behavior in an ambiguous context (i.e., when the response costs to access both symbols was low and knowledge base on the matching task as limited) and for a subsequent assessment of conforming behavior in an unambiguous context (i.e., when the response cost to access

the conforming symbol was significantly higher than the non-confirming option, and participant had practiced the matching task).

Procedure

All aspects of the study were completed in a controlled laboratory environment, in which the participants completed the demographics questionnaire, SPIN items, and the computer task.

Participants signed up to participate in the study online using the Sona system. After providing informed consent, they completed the demographic survey and the SPIN items. This took approximately 5 minutes to complete. After completion, participants were instructed to complete the computer task which, on average, took approximately 25 minutes to complete.

Computer Task Detailed Methods

The task will be described in three main parts, the practice phase, the ambiguous conformity phase, and the unambiguous conformity phase.

Practice Phase Stimuli: Participants were shown 10 matching stimuli in the practice phase. The items consisted of 4-in x 4-in images of the colors red, green, blue, yellow, brown, lavender, orange, pink, grey, and purple. The matching items consists of 4-in x 4-in images of the words “Red”, “Green”, “Blue”, “Yellow”, “Brown”, “Lavender”, “Orange”, “Pink”, “Grey”, and “Purple” in 48-point Arial Black font on a white background (see Figure 1 for sample stimuli).

Testing Stimuli: Problem solving stimuli, including mathematical operations, sentence completion, animal naming, and activity naming, were used for the computerized tasks (see Figure 3 for sample stimuli) There were 80 sample stimuli and

80 matching array stimuli used in the testing stimuli tasks. The stimuli were organized around four themes: math problems, activity naming, sentence completion, and animal naming. For each theme there were 20 sample stimuli and 20 matching stimuli.

For the Math Problem stimuli, participants were exposed to simple addition problems (e.g., 1+1, 3+4) as sample stimulus. The matching array of stimulus for math problem solving included numerical digits ranging from 1 – 20.

For the Activity Naming Problem stimuli, participants were exposed to different types of activities and sports. The samples involved activities in the form of words (e.g., “Archery”, “Canoeing”, “Fencing” etc.), while the matching array consisted of picture stimulus (e.g., a person holding a bow and arrow, person paddling a canoe, a person holding a foil, etc.)

For the Sentence Completion stimuli, participants were exposed to samples of simple sentences with a missing word, for example, “A _____has pages”, “Chicago is a _____”. The matching array consisted of stimuli involved single words such as “Book’ and “City”.

For the Animal Naming stimuli, participants were exposed to sample stimuli that involved the names of animals, for example, “Bear” and “Camel.” The Matching array stimuli consisted of pictures of animals within the sample set.

During each problem-solving trial, the stimuli was presented in a manner such that there was not a clear answer. In particular, a sample stimulus was randomly selected from the 80 available, with the matching arraying consistent of a random member of each of the themes not consistent with the sample. For example, if the stimulus “A bicycle has two ____” (refer to Figure 1) was selected as the sample (sentence completion theme),

the matching array consisted of a random member of the math problem matching array (e.g., 12), a random member of the animal naming matching array (e.g., a picture of a mouse), and a random member of the activity naming matching array (e.g., a picture of a person bowling). This configuration of stimuli allowed participants to come in to contact with a variety of matching to sample problems where there was not a clear answer.

In addition to the testing stimuli used for the matching to sample trials, two arbitrary shape stimuli were used to allow participants to choose between the "conforming" and "non-conforming" problem solving contexts (see Figure 2).

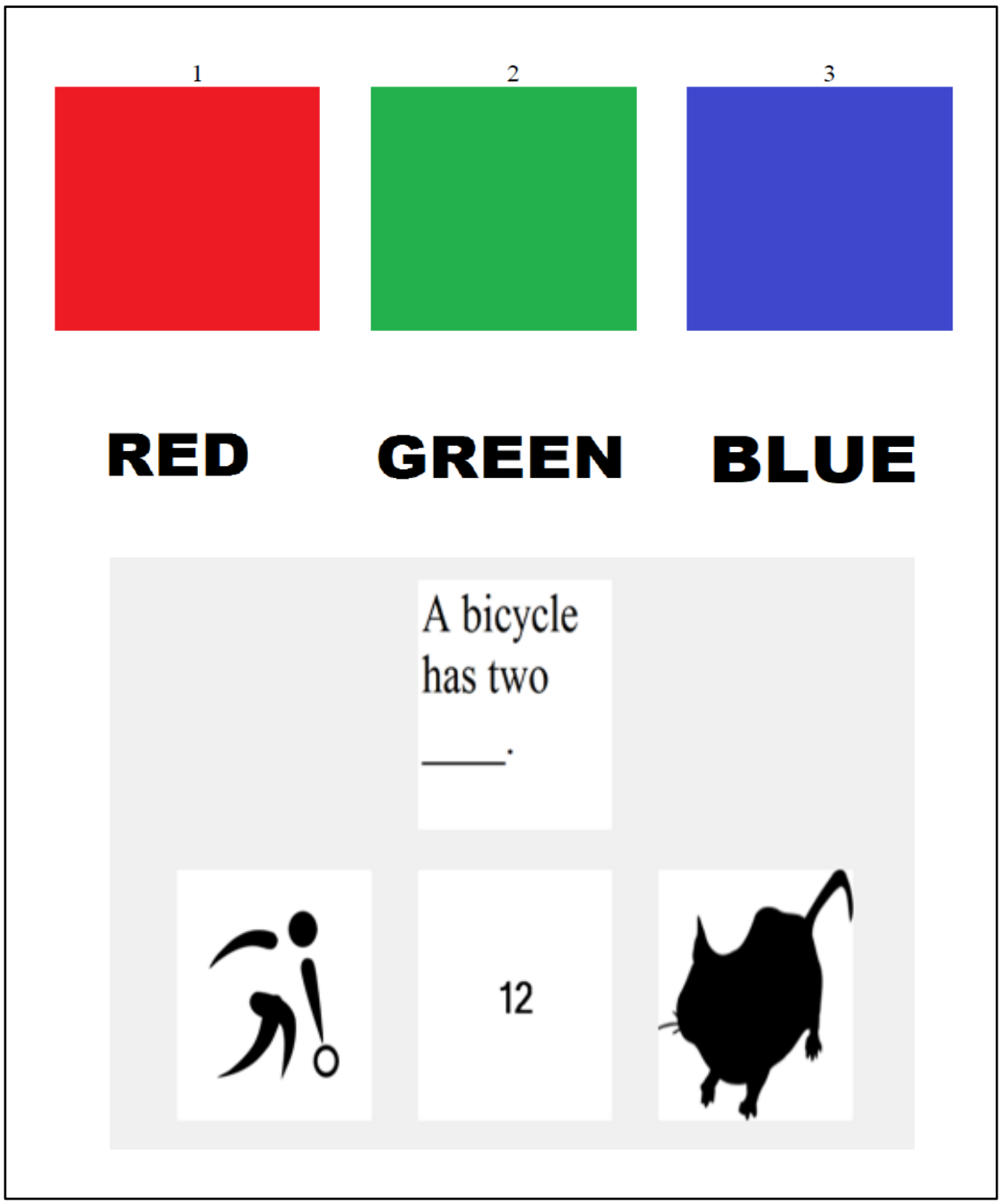

Figure 1. Sample items for the practice phase (top) and Sample item for the problem-solving phase (bottom).

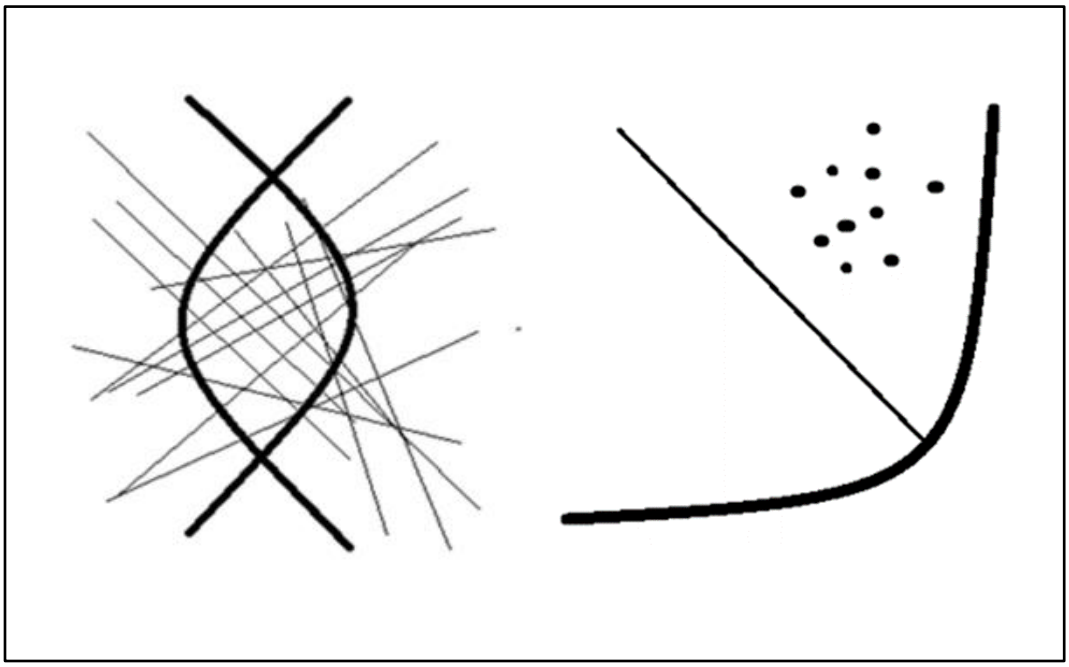

Figure 2 Symbols representing the conformity and non-conformity options. The Computer program randomly assign each symbol to a condition for each participant.

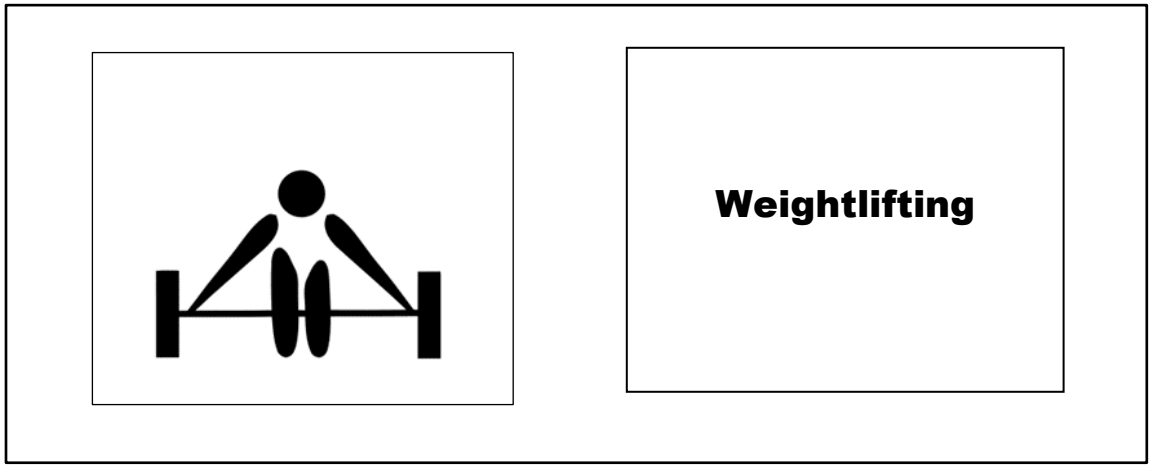

Figure 3 Sample item of activity naming stimuli set. Picture of an individual lifting weights and (right) the associated name of the activity.

Practice phase: During the practice phase, participants were exposed to 20 matching to sample trials to introduce them to the matching to sample task. The prompt by the computer program asked participants to select one option from the three blocks below the stimuli block. The sample stimulus for each trial consisted of either a name of

a color or a picture of a color, with the matching array consisting of three-color stimuli, one of which corresponds to the sample. For example, the word "yellow" was presented as the sample stimulus, with the matching array consisting of a yellow square, blue square, and purple square. No instructions or performance feedback were provided. This practice phase has demonstrated effectiveness in orienting participants to the task with a high degree of accuracy in responses observed (Bordieri, Kellum, Wilson, & Whiteman, 2015). Upon completing the 10 stimulus matching task, the ambiguous conformity testing phase commenced.

Ambiguous Conformity Testing Phase. Participants were introduced to a concurrent chain procedure where they were asked to select between a conforming and non-conforming context. Both contexts consisted of basic problem-solving tasks (i.e., simple addition, sentence completion, animal naming, and sport naming) presented in a matching to sample format. The matching to sample trials in both contexts were deliberately designed to not have a clear answer, thus the only functional difference between the contexts was the normative information presented with each cue.

Before participants began the initial chain phases, the following instruction will be provided: "We are conducting this study at several other universities across the country. To help you choose between the shapes we will provide you with information about how other participants have responded." Whenever participants were asked to choose between the two different symbols representing a problem-solving setting, they were shown a percentage value of selections under each option (e.g., 85% of participants chose this; 15% of participants chose this). These percentage values were pre-determined by the researcher and always reflected a response preference towards the randomly

assigned conformity problem solving context (M = 85%, SD = 5%). In particular, the percentage value displayed for the conformity context always ranged from 70%-100% with a 68/100 chance of falling between 80%-90%, a 27/100 chance of falling between 75%-80% or 90%-95%, and a 5/100 chance of falling between 70%-75% or 95%-100%. The percentage value displayed for the non-conformity context was yoked to 100 – the random value set for the conformity context.

Participants gained access to the contexts by pressing a key on the keyboard associated with either the conformity or non-conformity cue. Initially, both cues required only two key presses before access was granted to the conformity/non-conformity contexts. Following a series of 5 forced choice exposure trials to each cue (i.e., only one of the two cues present on the screen) participants were asked to choose between the conformity and non-conformity cues during a series of 12 concurrent choice trials. Following this initial assessment of preference, participants were sequenced through an identical procedure of 5 forced choice exposure trials per cue before being exposed to another block of 12 concurrent choice trials. The number of responses to the conformity cue during the initial blocks was used as the primary dependent measure of conformity in an ambiguous context.

During the next phase of the study, access to the conformity context required a parametrically increasing response effort while access to the non-conformity context remained constant. That is, access to the non-conformity context continued to require two key presses (i.e., a fixed ratio two schedule; FR2) while access to the conformity context required an exponentially increasing schedule requirement over six assessment blocks (i.e., FR4, FR8, FR16, FR32, FR62, and FR128). Each assessment block

consisted of 12 concurrent choice trials. Response allocation was recorded during each block to assess relative preference towards conforming and non-conforming contexts.

Unambiguous Conformity testing phase: Responses during the sixth assessment block (FR128) was used as the primary dependent measure of conformity in an unambiguous context. This was considered the unambiguous phase due to increased effort to access conforming context (128 clicks) relative to the non-conforming context (2 clicks). The assumption was that participants would have learned that access to the conforming symbol required increased effort, while the non-conforming symbol required a consistent level of effort.

Upon completing the final phase, participants completed additional computer tasks unrelated to this study and then were given a computerized message that the experiment was over and were asked to speak to the experimenter. Upon doing so, they were given a debriefing form and had an opportunity to ask any remaining questions before being dismissed from the study.

Chapter III: Results

Analytic Strategy and Data Screening

Prior to the evaluation of the study hypothesis, the datasets were screened for accuracy of values, missing data, and the fit between the obtained data and expected assumptions of the specific analytic strategies, such as normality, linearity, homoscedasticity, and multivariate data points. These assessments were completed with R Studio version 0.99.903.

Data from nine participants (approximately 9% of the original sample of 103) were excluded due to duplicate data identifiers caused by experimenter error (n = 5) or incomplete administration of the computer tasks (n = 4). Data from the remaining 94 participants were valid, in range, and complete with no missing values.

A univariate and multivariate outlier analysis was then conducted to identify normatively extreme values within the data set. Due to the nature of the research, extreme scores on measures of conforming behavior, personality measures, and social anxiety measures were not removed to better reflect participants who met these criteria and to assess the research questions. All data were screened for univariate outliers using z scores transformation ($z > \pm 3.29$) and none were identified. In relations to multivariate outliers, a Mahalanobis distance analysis was conducted on the SPIN scores, the ambiguous context and the unambiguous context measure of conforming behavior. Based on the results of the Mahalanobis analysis, no multivariate outliers were identified (i.e., no

values were greater than the critical value, 13.816. An Alpha level of p = .05 was set as the significance criteria for all study analyses.

In addition to assessment of the data by these screeners, a validity measure was used within the computer task (i.e. the practice phase color matching task). All participants obtained a score equal to or above 80% correct, which is well above the level of chance responding (i.e., 33%). This suggested that all participants understood the matching to sample task and all cases were retained for analysis.

A power analysis ran using G*Power v3.1.9.2 with an alpha of .05 (one-tail), power of .80, and an assumed correlation size of $r \geq .3$ indicated that 67 participants were needed to adequately power this analysis of SPIN scores and level of conforming behavior observed. The obtained sample size of 94 was appropriate to adequately power all study analyses.

Mean values for age, initial self-report measures (i.e., SPIN), and practice test performance are presented in Table 2.

Table 2 Means Scores and Standard Deviation of Self-Report measures

Variables	Overall Sample (n = 94)	
	M	SD
Age	19.36	2.35
SPIN	23.7	14.83
Practice Test*	99.15	24.61

Note. * Practice test analysis was computed on percentage correct

Ambiguous context vs. Unambiguous context

A Wilcoxon signed rank test was used to assess difference between the ambiguous condition and the unambiguous conditions due to non-normal distributions

observed in the unambiguous condition. There was a statistically significant difference between conforming responses in the ambiguous and unambiguous conditions, $z = -7.71$, $p < .001$, with participants in the ambiguous condition displaying higher levels of conforming behavior (*Median* = 50%) than in the unambiguous condition (*Median* = 0%). These differences can be better visualized across trials, in Figure 4.

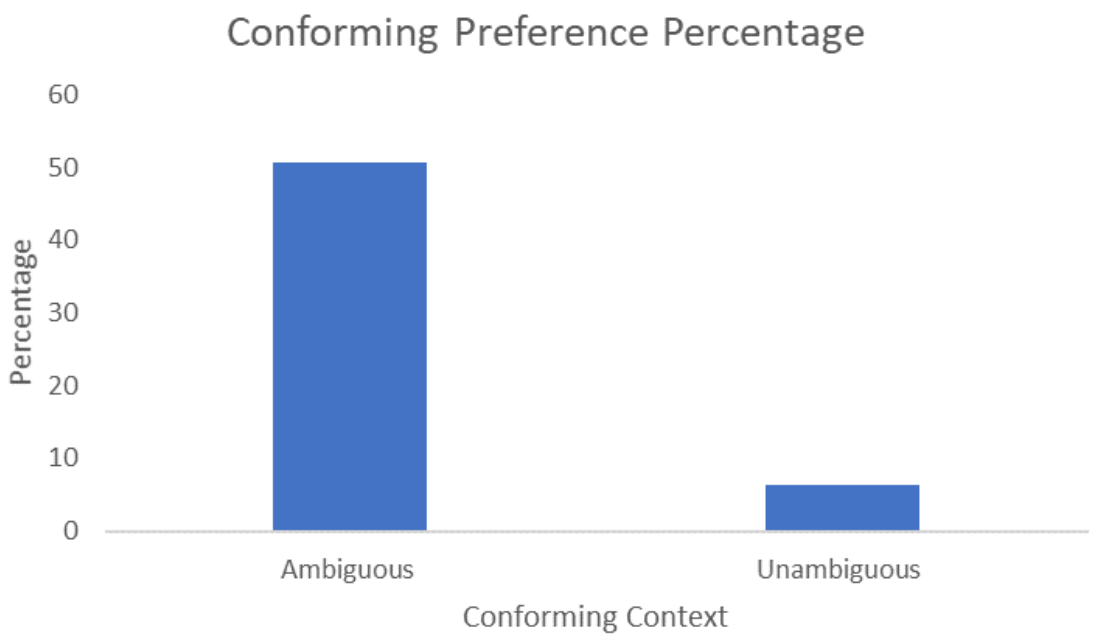

Figure 4 Percentages of preference allocated towards the Conforming Symbol and percentages allocated to the Non-Conforming Symbol.

Social Anxiety and Conforming Behavior

Pearson's correlation coefficients were conducted to test if high levels of anxiety were associated with high levels of conforming behavior in both the ambiguous and non-ambiguous computerized task. Results of the Pearson product-moment correlation coefficient indicated that there was no significant association between SPIN scores and the level of conforming behavior in the ambiguous context, r (92) = -0.06, p = .54. Results also indicated no significant association between SPIN scores and the level of

conforming behavior in the unambiguous context, r (92) = 0.06, p = 0.26. An exploratory post-hoc Point Biserial correlation analysis was completed on a dichotomized version of the SPIN scores. The distribution of SPIN scores can be observed in figure 5. The dichotomization was done based on low-risk for social anxiety being scores less than 20 and risk for social anxiety being scores ≥20, which was done in Terlecki and Buckner (2015). The results of the Point Biserial correlational analysis also indicated no significant association between SPIN scores and conforming behavior in the ambiguous context, r (92) = -0.03, p = .72, or conforming behavior in the unambiguous context, r (92) = 0.10, p = 0.31.

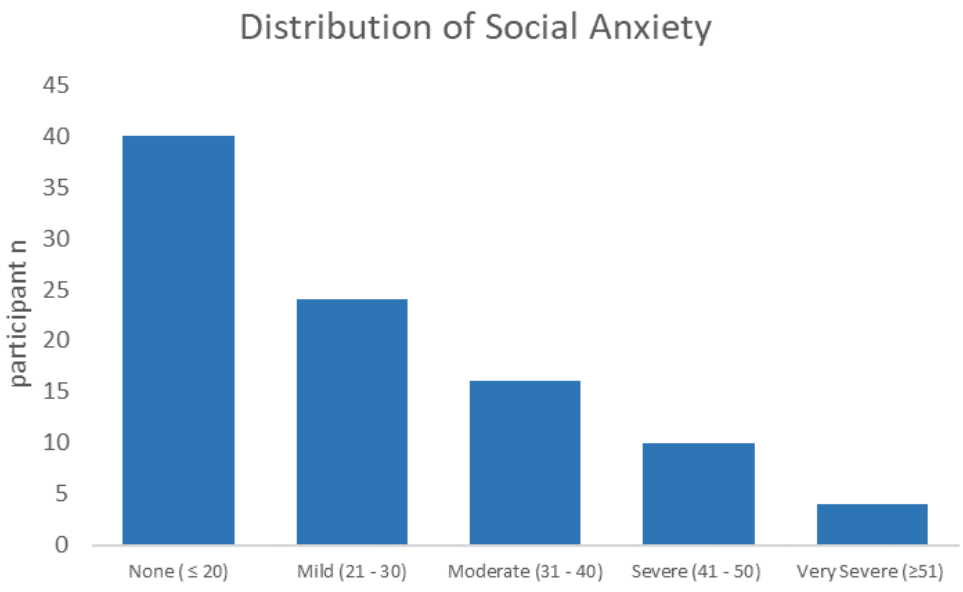

Figure 5 The distribution of participants based on severity on the Social Phobia Inventory measure (SPIN).

Chapter IV: Discussion

The purpose of the current study was to replicate and extend previous research linking anxiety to higher levels of conforming behavior. This study was also designed to assess conforming behavior without the use of confederates within a computer task. In addition, the researchers were interested in assessing the role anxiety plays with conforming behavior when there is limited information on a given task (ambiguous), compared to knowledge of the task (unambiguous).

Conforming Task Performance

Participants emitted conforming responses 50.6% of the time in the ambiguous task and 6.42% of the time in the non-ambiguous task. At its highest, conforming responses were only slightly above the level of chance selection, suggesting that conforming behavior was not robustly displayed in this study. It should be mentioned that in Asch's (1955) original study of conformity in non-ambiguous context, only 36.8 percent yielded to the majority. In comparison to Asch's original study, the current study yielded relatively consistent levels of conformity in a non-ambiguous context. In contrast, the finding that only half of responses in the ambiguous task were conforming is inconsistent with the previous literature. Nordholm (1975) observed most participants to align with group influence when placed in an ambiguous condition. The obtained findings are also inconsistent with the findings of Sherif (1935), whom also found participants to align with the group when the task involved options that were closely similar.

The measure in the current studied may have failed to provide participants with sufficient feedback on their performances, leading participants to be hyper-focused on the problem-solving task rather than the conforming and non-conforming responses. There is also the issue of frustration observed with the computer task, which may have influenced participants responding. Participants were observed to be frustrated by grunting and sighing during the task. One participant approached the experimenter and questioned the computer task, stating that the program may be malfunctioning due to the problem-solving task not making sense. There was also the issue of priming participant to a social context. The computer program displayed a message stating that other students completed the task in other universities, but there was no direct prompt stating that the participant's results would be publicized or accessible to others. That is, while participants were responding to information in a social context (i.e., the scores of others), it was not clear whether their responding was perceived to be made in a social context. Within Griskevicius, et al. (2006), they also measured conforming behavior, however they used confederates to emphasize the social pressure. By priming participants of future face to face interactions outside the chat room, Griskevicius, et al. (2006) were able to assess social priming as a factor more successfully than the preparation employed in the current study.

The current research methodology was followed due to previous success with the conforming task observed in Vargas and Bordieri (2016). However, the same effect was not observed in the current research design. This may be due to altering the problem-solving task to always be unsolvable, which may have led to participants to attend less to the conforming and non-conforming contexts and more to the problem-solving task.

Ambiguous and Unambiguous Contexts

While there were limitations observed with the conformity measure, the results from the study are still worthy of discussion. The degree of conforming responses differed between the ambiguous context (equal effort to access both symbols) and unambiguous context (increased effort to access the conforming symbol but maintenance of effort for non-conforming symbol). Compared to the unambiguous testing blocks, with a 50.6 % preference toward the conforming symbol, a decline was observed at the unambiguous testing block to 6.42% preference towards the conforming symbol. This is observed as a successful replication of the findings by Nordholm (1975), whom reported increased conforming behavior when the context was ambiguous. It is likely the case that participants selected the conforming symbol due to it requiring less effort, suggesting that the reinforcing effects of conformity became less salient as the effort required to select the conforming response increased.

While the percentage of conforming responses was near 50% in the ambiguous context, it is important to note that individual participant level of conforming was variable. By using an average of all participants, the researcher is unable to parse out individual differences. For example, a participant may have selected the conforming symbol more time than another participant, who may have preferred the non-conforming symbol. An average of their preferences would be reported as somewhat equal preference toward both symbols. Future research should use participation level analytic strategies to more clearly explore individual patterns of responding in the task. For example, aggregating individuals into groups based on patterns of responding will be helpful when comparing the aggregated groups on some other factor, such as social anxiety or

psychological inflexibility. Tracking an individual's symbol preference while assessing when the effort in conforming preference became too great, may also inform on the susceptibility to conform to a larger group and inform on the level of effort required to discourage conforming behavior for that individual.

In the unambiguous context there was a clear demonstration of preference away from the conforming symbol. As discussed in Sherif (1935) study of the auto kinesthetic effect, group influence on participant was significantly reduced when other reliable forms of information were provided. This effect was observed within the current study based on participants' reduction in preference towards the conforming symbol when the effort to access the symbol increased. Upon analyzing the data further, it was observed that a small subset of participants (n = 3) maintained preference to the conforming symbol throughout the non-ambiguous task. That is, when the effort required to access the conforming symbol was 128 button clicks, three participants maintained the preference towards the conforming symbol despite it requiring 1,512 more key presses for each participant relative to responding to the non-conforming symbol. These results demonstrate a preference to the conforming context, despite an increased in effort to access the conforming symbol. This is consistent with the findings of Vargas and Bordieri (2016), who found that a small subset of participants often persisted in costly patterns of behavior even when the majority of participants change their responding.

Social Anxiety and Conformity

Conforming behavior was not related to social anxiety in the current study. This is inconsistent with the findings of Terlecki and Buckner (2015), who found that higher levels of social anxiety were related to conforming motives. One possible reason for this

failure to replicate is the lack of a robust clinical social anxiety sample in the current study. As seen in the distribution of social anxiety within the population there was not a significant portion of participants within the upper range of the anxiety measure. Within Terlecki and Buckner (2015), they dichotomized their social anxiety measure into two groups, low risk and high risk. All participants in their study presented with the presence of social anxiety at some level, which is different than the current research population, where 40 participants presented with minimal to no anxiety (< 20 score on SPIN). Even when dichotomizing the SPIN measure by 'no risk' or 'presence of risk', there was still no relationship observed with conforming behavior. In addition to differences in the sample, the research environment which only allowed for 2 participants' participation in each session may also have impacted the failure to demonstrate the expected relationship. The lack of physical others may have minimized the conforming effect within the current study. While it is argued that computer mediated communication does not require the presence of physical others (Griskevicius, Goldstein, Mortensen, Cialdini, & Kennrick, 2006), it typically provides near immediate feedback from known others. Within the current computer task, there was only one cue of the presence of others, the task prompt before the testing phase. This may have minimized social pressure and minimized the implied social presence of others as a factor on the participant during the task.

Limitations

A significant limitation with the current research design was the insufficient social context needed to prime conformity. As discussed earlier, the effect of one prompt early in the computer task may not have been sufficient in priming participants of a social context. Compiled with the lack of in group identification with the prompt; simply stating

"other universities" rather than "other Murray State students" may also have increased the social priming necessary to observe a significant effect. As discussed in Steinel, et al. (2010), standings within the group is an important predictor of behavior in intergroup conflict. By not priming the participants to their identified university, the social prime may have been limited in the current research context. Using some form of Murray State University identifier, such as the logo or crest of Murray State University, may have increased the perceived effect. It may also be useful to manipulate private vs. public responses in future research design. It is possible to use the same research design; however, after each subsequent testing phase, have participants place their selection preference in a partially completed table which includes confederate responses, thus giving them the impression that their responses will be shared with others. Such a study would allow for analysis of current research questions, while incorporating an additional factor of private vs public change in responses.

While the required number of participants were achieved for statistical analysis, it must be mentioned that the use of a student population limited variations in the social anxiety measures. The small social anxiety sample size likely decreased the statistical power needed and minimized the ability to detect significant findings in relations to social anxiety and conforming behavior. To detect a more meaningful effect, a larger sample size should have been attained. Allowing participants from multiple disciplines may have also increased the informative value of the current findings. Inclusion of an online sample may also have increased the robustness of the current findings and informed on situational context. Adding various methods of data collection could improve the study by exploring conforming behavior across multiple contexts. Such a

study would also provide comparative groups, based on modality. A comparative group could consist of individuals completing the task from home compared to individuals within a social laboratory environment. The use of clinical populations as a comparison may also be informative on computer based conforming behavior. The inclusion of a clinical group consisting of only individuals with diagnosed Social anxiety disorder would benefit the understanding of the role conforming behavior plays within social context. It is possible that the pattern found in a clinical sample (Terlecki & Buckner, 2015) do not follow the same pattern in a general population. Clinical samples may also include participants who are subject to peer pressure, such as addiction-based diagnoses. It should also be mentioned that Terlecki and Buckner (2015) measured social anxiety using multiple scales, including the Social Interaction Anxiety Scale and Social Phobia Scale (Mattick & Clarke, 1998). Both measures are different than the measures used in the current study (SPIN). While all three measures of anxiety conceptually measure social anxiety symptoms, they differ in scale level and item count. This may have led to differences in the results observed. Further studies should maintain the use of previous scale measures along with additional new measures to facilitate comparative value of findings.

A college sample was appropriate for the current study to assess for the relationship between conforming behavior in a computerized setting and social anxiety as they are a population that is repeatedly exposed to situations where these constructs may arise. While college samples are generally diverse with regard to race and ethnicity, the current sample was not diverse, with a higher percentage of Caucasians (78.7%) compared to other races. Additionally, there were more females than males within the

current sample (74%). This may have affected the outcome of the results observed. While similar distributions of gender were observed in other research (Buckner & Shah, 2015; Terlecki & Buckner, 2015), they compensated by having larger populations within their studies, exceeding 200 participants. This may have allowed for greater statistical power for the underrepresented demographic, despite a gender bias in the overall sample. There was also a small subset of participants who maintained the conforming symbol preference through the entire computer task. Given the low base rate of this response style (approximately 3% of participants) a very large sample size would be needed to allow for an adequately powered statistical exploration of these responders (i.e., 5,000 participants).

Due to the cross-sectional nature of the data, causal effects of increased conforming behavior and social anxiety cannot be analyzed, though no effects were observed. Also, fatigue and frustration within the sample may have negatively affected the results. While the unsolvable problem-solving task was necessary, this may have negatively affected participant's motivation in the task. To control for this possibility, future research could use an additional group of participants receiving only solvable problem-solving task to reduce the effect of fatigue and increase motivation. A small subset of participants (n = 6) were removed from the overall analysis because they did not complete the computer task in the allotted time. Individuals who exceed the allotted time limit may also provide important information regarding the task and constructs being measured. This is especially the case as these participants may have been more prone to persisting in the conforming response pattern, which would lead to greater response effort and time in the task. Future research should ensure that all participants'

responses are counted by allowing participants who go over time the option of continuing in the study and receiving additional experimental credit.

Future directions

In order to build upon the findings of the current research, a more valid measure of conforming behavior should be used. This would involve increasing the implied presence of others along with reducing the level of frustration within the current design. One possible way to facilitate these aims would be providing solvable problem-solving tasks in both the conforming and non-conforming context. This would likely increase motivation to solve the task. Inclusion of social primes, such as university logos or specific in-group association, such as college students compared to general population may increase the group factor aspects. Using the mentioned social primes would also allow for assessment of group identification as a factor of conforming behavior in a computer-based environment. For the current research it was necessary to be unsolvable to create an ambiguous and unambiguous context. Future research could also include additional scales and open-ended questions regarding the task to assess for social desirability, perceptions of conforming and the social pressure, and strategies used during the problem-solving tasks. Utilizing these measures would allow for greater understanding of factors that influences task performance and would provide information that could be used to further refine the task. Reduction in the number of tests trials and phases may also improve the task. The current design involved exponential increase of effort over several testing phases. By decreasing the number of testing phases, and increasing perceivable effort, the researcher can effectively reduce fatigue for future participants.

Another way to improve the task in future studies would be to change how ambiguity is presented. For example, by having one symbol selection lead to only ambiguous problem-solving tasks with multiple possible answers and the other symbol selection lead to readily solvable problems, might be a more effective way of generating ambiguous and unambiguous contexts. Such a design would increase the distinction between the ambiguous and non-ambiguous tasks, while allowing replication and extensions of the current findings.

Adjusting feedback presentation in the current research design could be done to assess conforming behavior more effectively. The current design presented the conforming information before participants responded, giving participants some information on how others responded. However, it was not clear that all participants understood the meaning of those percentages, as the social nature of those values was only presented once during the initial task instructions. Future studies should consider providing multiple cues as to the social nature of the feedback to make the conforming information more salient.

Future research could also assess personality factors within a clinical and general population to explore how personality relates to levels of conforming behavior. In doing so, researchers could examine variables that affect clinical and general populations, while observing possible differences within those groups. Assessing personality traits as they relate to conforming behavior may increase the utility of group based therapeutic approaches by identifying group participants that might be more susceptible to conforming effects based on their personality profiles. In addition to providing insight, the inclusion of personality measures would also allow the study of factors relating to

clinical samples that may overlap with general populations. Such factors may include locus of control, support systems, and protective factors. For example, assessing conforming behavior within college sample and a clinical sample; based on measures of locus of control, support systems, and protective factors; may identify areas of intervention.

Future research should also consider the effects of social media and mimic that presentation in an experimental environment. By presenting the problem-solving task in a manner similar to social media sites like Facebook or Twitter, researchers can assess how participants react in that environment. Such a design would allow researchers to make inferences on how individuals react to the majority and their rational for selecting the majority. Factors such as self-perseveration, social desirability, and normative vs. informative influence may also be assessed in a social media environment.

Future research should consider expanding on the current findings by directly manipulating anxiety to allow for an assessment of a possible causal relationships between conforming behavior and anxiety. While there is already research linking the two factors correlationally, they are limited to drinking behavior and cross-sectional designs (Buckner & Shah, 2015; Cialdini & Goldstein, 2004; DeYoung, Peterson, Higgins, 2001; Vaughan, & Taylor, 1966; and Watt, Stewart, Birch, & Bernier, 2006). A more direct examination could be achieved by directly manipulating anxiety levels and linking the social presence to perceived others within the participants given group associations. This method could assess the effect of social pressure as it relates to conforming behavior and a diverse range of outcomes, not solely drinking behaviors.

This proposed method would allow replications of the available research while expanding on the literature for causal effects of conforming behavior.

Lastly, in terms of the ambiguous and unambiguous context, future research should amend the current research design, by altering the problem-solving tasks to something with multiple interpretations, compared to unsolvable problems. A similar construct such as the Rorschach (1921) ink blots could be used as a basis of assessing the interpretations of the image by the participant. Allowing multiple possible interpretations and voting on accuracy of interpretation may better depict conforming behavior. This methodology may also employ an exposure component, where participants may divulge their choice to the voting group after each testing phase. This may increase the observation of conforming behavior, while also include other possible factors, such as time, effort, social desirability, and psychological flexibility.

Conclusion

The current findings have implications for contemporary understanding of conformity and its relationship to social anxiety. A main strength of this study is that it assessed levels of social anxiety in relationship to conforming behavior within both an ambiguous and unambiguous context. Additionally, the computer task did not require physical confederates or an extended time frame to measure conforming behavior. This study successfully replicated the findings of Nordholm (1975) and Sherif (1935) that ambiguity led to increased levels of conforming behavior. The computer task in the current study had limitation, which may have contributed to a non-significant finding between social anxiety and conforming behavior. Improving the measurement of conforming behavior in computer-based communication is necessary as such forms of

communication are becoming more common. Social Anxiety may play a role in conforming behavior; however, more research is needed to improve measurement of conformity in a computerized task so that the influence of social anxiety can be explored.

Appendix I: Supporting Documents

Sona Sign-up descriptive paragraph

We are interested in investigating the choices people make in a computer learning task. In order to reach this aim, we are asking you to fill out a series of questionnaires and complete some computer tasks that require you to choose between different options. The experiment will take approximately one hour to complete in our laboratory and you will receive 60 Sona credits for your participation in this study. This study has been approved by Murray State University's Institutional Review Board (IRB).

Demographic Questionnaire
gender, race/ethnicity, current year in school, and treatment/diagnosis history

1. What is your gender?

    a) Male
    b) Female
    c) Other (please describe): _____

2. What is your racial/ethnic identity?

    a) White / Caucasian
    b) African / African-American
    c) Hispanic / Latino
    d) Asian / Asian-American
    e) Alaskan / Pacific Islander
    f) Multi-racial
    g) Other _____

3. What is your age? _____ years

4. What is your current year in school?

    a) Freshman
    b) Sophomore
    c) Junior
    d) Senior

5. Has someone close to you ever been diagnosed or sought treatment for a mental health disorder?

    ___Yes
    ___No

6. Have you ever been diagnosed or sought treatment for a mental health disorder?

    ___Yes
    ___No

Appendix II: IRB Approval Letter

MURRAY STATE
UNIVERSITY

Institutional Review Board

328 Wells Hall
Murray, KY 42071-3318
270-809-2916• msu.irb@murraystate.edu

TO: Michael Bordieri, Psychology

FROM: Jonathan Baskin, IRB Coordinator JB

DATE: 4/13/2018

RE: Human Subjects Protocol I.D. – IRB # 18-146

The IRB has completed its review of your student's Level 1 protocol entitled *Computer Mediated Problem Solving*. After review and consideration, the IRB has determined that the research, as described in the protocol form, will be conducted in compliance with Murray State University guidelines for the protection of human participants.

The forms and materials that have been approved for use in this research study are attached to the email containing this letter. These are the forms and materials that must be presented to the subjects. Use of any process or forms other than those approved by the IRB will be considered misconduct in research as stated in the MSU IRB Procedures and Guidelines section 20.3.

Your stated data collection period is from 4/13/2018 to 4/12/2019.

If data collection extends beyond this period, please submit an Amendment to an Approved Protocol form detailing the new data collection period and the reason for the change.

This Level 1 approval is valid until 4/12/2019.

If data collection and analysis extends beyond this date, the research project must be reviewed as a continuation project by the IRB prior to the end of the approval period, 4/12/2019. You must reapply for IRB approval by submitting a Project Update and Closure form (available at murraystate.edu/irb). You must allow ample time for IRB processing and decision prior to your expiration date, or your research must stop until such time that IRB approval is received. If the research project is completed by the end of the approval period, then a Project Update and Closure form must be submitted for IRB review so that your protocol may be closed. It is your responsibility to submit the appropriate paperwork in a timely manner.

The protocol is approved. You may begin data collection now.

Opportunity *afforded*

murraystate.edu

Bibliography

Antony, M. M., Coons, M. J., McCabe, R. E., Ashbaugh, A., & Swinson, R. P. (2005). Psychometric properties of the social phobia inventory: Further evaluation. *Behavior Research and Therapy, 44,* 1177-1185. doi: 10.1016/j.brat.2005.08.013

Asch, S. E. (1955). Opinions and social pressure. *Scientific America, 193,* 31-35

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachment as a fundamental human motivation. *Psychological Bulletin, 117,* 497-529.

Behrend, T. S., Sharek, D. J., Meade, A. W., & Wiebe, E. N. (2011). The viability of crowdsourcing for survey research. *Behavioral Research Methods, 43,* 800-813. doi: 10.3758/s13428-011-0081-0

Bordieri, M. J., Kellum, K., Wilson, K. G., & Whiteman, K. C. (2015). Basic properties of coherence: Testing a core assumption of relational frame theory. *The Psychological Record, 66,* 83-98. doi: 10.1007/s40732-015-0154-z

Buckner, J. D., & Shah, S. M. (2015). Fitting in and feeling fine: Conformity and coping motives differentially mediate the relationship between social anxiety and drinking problems for men and women. *Addictive Research Theory, 22,* 231-237. doi: 10.3109/16066359.2014.978304

Charles, M. (2013). Coercion in groups: Finding one's voice knowing one's mind. *Psychoanalytic Inquiry, 33,* 105-115. doi: 10.1080/07351690.2013.764699

Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Reviews Psychology, 55*, 591-621. doi: 10.1146/annurev.psych.55.090902.142015

Condon, S. L., Cech, C. G., & Edwards, W. R. (1999). Measuring conformity to discourse routines in decision-making interactions, ACL '99 Proceedings of the 37th annual meeting of the Association for Computational Linguistics on Computational Linguistics, 238-245. doi: 10.3115/1034678.1034720

DeYoung, C. G., Peterson, J. B., & Higgins, D. M. (2001). Higher-order factors of the big five predict conformity: are there neuroses of health? *Personality and Individual Differences, 33*, 533-552.

Griskevicius, V., Goldstein, N. J., Mortensen, C. R., Cialdini, R. B., & Kennrick, D. T. (2006). Going along versus going alone: When fundamental motives facilitate strategic (non)conformity. *Journal of Personality and Social Psychology, 91*, 281-294. doi: 10.1037/0022-3514.91.2.281

Hornsey, M. J., Majkut, L., Terry, D. J., & McKimmie, B. M. (2003). On being loud and proud: Non-conformity and counter-conformity to group norms. *British journal of Social Psychology, 42*, 319-335.

Levitan, L. C., & Verhulst, B. (2016). Conforming in groups: The effect of other's views on expressed attitudes and attitude change. *Political Behavior, 38*, 277-315, doi: 10.1007/s11109-015-9312-x

Mattick, R. P., & Clarke, J. C. (1998). Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behaviour Research and Therapy, 36*, 455–470, doi: 10.1016/s0005-7967(97)10031-6.

Nordholm, L. A. (1975). Effects of group size and stimulus ambiguity on conformity. *Journal of Social Psychology, 97*, 123-130.

Rorschach, H. (1921). *Psychodiagnostics: A diagnostic test based on perception, 5th ed rev*. Oxford: Grune and Stratton

Sherif, M. (1935). A study of some social factors in perception. *Archives of Psychology, 27*, 17-22.

Sloan, P. A., Berman, M. E., Zeigler-Hill, V., & Bullock, J. S. (2009), Group influences on self-aggression: Conformity and dissenter effect. *Journal of Social and Clinical Psychology, 28*, 535-553.

Steinel, W., Van Kleef, G. A., Van Knippenberg, D., Hogg, M. A., Homan, A. C., & Moffitt, G. (2010). How intragroup dynamics affect behavior in intergroup conflict: the role of group norms, prototypically, and need to belong. *Group Processes & Intergroup Relations 13*, 779-794. doi: 10.1177/1368430210375702.

Sun, J. C., Syu, Y. R., & Lin, Y. (2017). Effects of conformity and learning anxiety on intrinsic and extrinsic motivation: The case of Facebook course groups. *Univ. Access Inf Soc, 16*, 273-288. doi: 10.1007/s10209-016-0456-1

Terlecki, M. A., & Buckner, J. D. (2015). Social anxiety and heavy situational drinking: Coping and conformity motives as multiple mediators. *Addictive Behaviors, 40*, 77 – 83. doi: 10.1016/j.addbeh.2014.09.008

Vargas, J., & Bordieri, M. J. (2016). *I'll conform, so long as I don't do more work: A behavioral analysis of conformity*. Poster presented at the 42nd Annual Convention of the Association for Behavior Analysis International, Chicago, IL.

Vaughan, G. M., & Taylor, J. W. (1966). Clinical anxiety and conformity. *Perceptual and Motor skills, 22*, 719-722.

Watt, M., Stewart, S., Birch, C., & Bernier, D. (2006). Brief CBT for high anxiety sensitivity decreases drinking problems, relief alcohol outcomes expectancies, and conformity drinking motives: Evidence from a randomized control trial. *Journal of Mental Health, 15*, 683-695. doi: 10.1080/09638230600998938.

Wright, D. B., London, K., & Waechter, M. (2010). Social Anxiety Moderates Memory Conformity in Adolescents. *Applied Cognitive Psychology*, *24*, 1034 – 1045.