

INDIVIDUAL DIFFERENCES IN SOCIAL FACILITATION

by

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## **Abstract of the Thesis**

Individuals Differences in Social Facilitation

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The present study sought to elucidate the differences in performance in a social facilitation paradigm based on Uziel's (2007) meta-analysis. The present study measured the personality variables of anxiety, extraversion and self-esteem to determine moderation of performance on two word-pair tasks of varying complexity in a social facilitation paradigm. One hundred thirty-eight participants were randomly assigned to either the absence (alone) or presence (observer present) conditions. The results indicate that there are significant differences in performance based on differences in anxiety, extraversion and self-esteem, however in a manner other than theorized by Uziel or proposed by the present study. Individuals scoring high on extraversion and self-esteem were facilitated in the absence condition compared with the presence condition. Individuals high in anxiety did not change in performance between the absence and presence conditions. The results are discussed in terms of attentional mechanisms proposed by the distraction-conflict theory of social facilitation.

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## **Introduction and Background**

Humans react to a variety of stimuli in the environment, one of the most significant being the presence of another. Whether the presence of another has a facilitative or a detrimental effect on an individual's performance has been the subject of much debate for over 100 years. Research in the past has focused on task complexity as the moderating variable in social presence paradigms with the differences in performance accounted for by drive (Zajonc, 1965), evaluation apprehension (Cottrell, 1968), self-awareness (Duval & Wicklund, 1972; Carver & Schierer) and distraction-conflict (Baron, 1986). The purpose of this study is to test the proposal that task complexity accounts for only part of the variance in performance and what an individual brings to the task in terms of their own unique personality orientation has a significant contribution to both the facilitation and the impairment of performance.

In the seminal paper on social presence, Triplett (1898) observed that cyclists would pedal faster in competition than when riding alone. This observation inspired extensive interest on this phenomenon focusing in on the effects of social presence on performance. The term "social facilitation" originated from Allport (1924) to describe "an increase in response merely from sight or sound of others making the same movement" (p.262). These early studies focused on co-action, where individuals would perform in the presence of others who were performing the same task, whereas later studies focused on the introduction of an observer (Bond & Titus, 1983). However, as additional studies were conducted, contradictory results began to surface as to whether performance was, in fact, facilitated or inhibited when in the presence of others (Aiello &

Douthitt, 2001, Bond & Titus, 1983). Throughout the years, researchers have considered many explanations as to why these studies produced conflicting outcomes; however, individual differences have been mostly ignored in studies of social presence in favor of specific situational factors (Uziel, 2007).

Zajonc (1965) attempted to explain the conflicting results of facilitation and impairment of performance by identifying habit strength of the dominant response as the variable driving the variation in performance. Employing the Hull (1943) and Spence (1956) theories, Zajonc's drive theory of social facilitation posits that the presence of others increases drive level which then increases the probability of the dominant response. A response is dominant, has the highest habit strength, if it is the response elicited with the greatest frequency during performance. For example, during learning, the incorrect response is dominant, and after acquisition, the correct response becomes more probable and thus, dominant. For a simple task which is well-learned, the habit strength for the correct answer is quite high given that the connection between the stimulus and the response is in place and facilitation will be dominant. For a complex task, which is not well-learned, where the connections between the stimulus and response have not been formed, the habit strength for the incorrect response is high and results in impairment as the dominant response (Spence, Taylor & Ketchel, 1956; Zajonc, 1965). The drive theory is elegant and parsimonious, however the pattern of facilitation of a simple task and impairment of a complex task has not been confirmed with much evidence since proposed in 1965 (Aiello & Douthitt, 2001; Bond & Titus, 1983). Through out the years, the nature of the "simple" task has become vague and has come to

represent a task which is learned, but not all “learned” tasks will produce a dominant response.

After Zajonc’s (1965) proposal of drive strength, most social presence theories focused on task complexity as the moderating variable that determines whether an individual will be facilitated or impaired in a presence of another. As Zajonc’s proposal addressed the topic of task complexity to support his theory on habit strength, the theories which followed solely focused on determining the underlying variable that accounted for the performance disparity as a function of task complexity and ignored the concept of “drive”. Later studies eschew the concept of “drive” and propose alternative theories to explain how performance can be facilitated for a “simple” task and impaired for a “complex” task. In later years, Zajonc addressed the other theories of distraction-conflict, self-awareness and evaluation apprehension commenting that other theories may have validity but it is mere-presence that is necessary for the effect, not the nature of the observer, not the goal orientation or any factor but the presence of another (Zajonc, 1980).

In addition to the drive theory, several other hypotheses as to why individuals are facilitated in some cases and impaired in others have tried to explain the phenomenon. A few years after Zajonc’s presented his drive based theory, Cottrell (1972) asserted that mere presence was not enough to cause the observed effects and it is the knowledge of evaluation that is driving the facilitation and impairment. Previous evaluation situations caused people to develop a learned drive. The self-awareness theory posited by Duval and Wicklund (1972) maintains that people focus on themselves in a way of considering how others may see them. They attributed performance differences to increased focus on

performance ideals and an effort to make sure they achieve the goal. In 1986 Baron redirected the explanation toward cognitive processes. He attempted to account for the performance differences by the distraction-conflict theory. A certain level of distraction may cause performance impairment if the task needed attention and distraction would facilitate performance on simple tasks by focusing on the central cues (Baron, 1986).

The presence of another just may be all that is needed for the social facilitation effect, but even with all of the other explanations, the actual evidence of the effect itself has been scarce. A meta-analysis by Bond and Titus (1983) concluded that social presence only accounts for a small amount of the variance, 1-3%, in simple and complex task performance. The presence of others barely facilitates performance on simple tasks and studies found that participants were both facilitated and impaired when working on complex tasks (Bond & Titus, 1983). It is interesting, that with the focus on task complexity, the definition of a “simple” or “complex” task is still somewhat vague. The meaning of a “simple” task is now merely referred to as a “well-learned” task regardless of whether it can elicit a dominant response. As will be addressed in the discussion, there is a distinction between tasks which are well-learned, dominant or automatic. It is conceivable that a task can be well-learned, but not have become automatic and thus not dominant. Any reference to the term “dominant” as Zajonc coined will be defined as automatic. Therefore in the current social facilitation literature, there is no clear distinction between well-learned and dominant.

Given that task complexity accounts for little of the variance in performance, the mere-presence of an observer, an individual’s perception of the situation, the role of the observer, motivation and many other factors could interact with the complexity of the



task. Given these effect sizes for the phenomena and the fact that studies were poorly controlled, attempts to pin down a single theory have been unsuccessful (Guerin, 1993) and focus on another moderating factor proves more fruitful. As an individual's innate preference toward or away from stimuli can play a huge role in performance, personality differences may create a clearer picture of how and why facilitation and impairment come about in social presence conditions (Uziel, 2007).

It is remarkable that the prevailing theories of social facilitation concern an individual's performance in relation to others (Aiello & Douthitt, 2001) yet they do not investigate performance based on an individual's disposition. Nevertheless, not any of these theories include an individual's personality into their framework, only situational factors that manipulate an individual's perception. Perhaps it was Zajonc's (1980) contention that mere presence was sufficient to elevate drive levels regardless of individual differences that sustained the focus on task complexity. While Zajonc may be correct in stating habit strength and drive as the important factors in performance, there are varying individual differences which may account for differences in performance on a continuum of complexity.

There is evidence to support all of the prevailing theories of social facilitation; however the results are usually interpreted at the conclusion of the study, where the complexity of the task and impression of the observer are determined *a posteriori* (Aiello & Douthitt, 2001; Guerin, 1993). As well, many studies appear to focus only on one aspect of an individual's orientation. Perhaps all of these theories over and above the mere-presence of another can be evaluated by an individual's perspective of the situation based on their personality orientation. Given that Zajonc (1965) did not specify what was

meant by “drive” (Aiello & Douthitt, 2001), this study will use a definition that has been utilized in much of the literature, referring to an alertness to stimuli plus a readiness to respond in a particular manner (Guerin & Innes, 1984). Possibly when an individual is aware of a salient presence, not necessarily a physical presence (Aiello & Kolb, 1995; Aiello & Svec, 1993), alertness increases automatically which can either orient a person toward or away from the presence. Due to these differences, an individuals can experience a difference in the level of distraction, a difference in concern as to the nature of the presence (evaluative or not), and a cognitive evaluation of abilities to a standard. In such a situation, many reactions are likely based on an individual’s personality orientation which may influence their awareness, level of distraction and evaluation of a situation.

The few studies that do address individual differences focus on manipulating state variables by the nature of the presence (evaluative or passive) and manipulating the feedback the participant receives. These manipulations were aimed at inducing anxiety or esteem to create temporary states of negative or positive reaction and the nature of the feedback the participant receives (Blascovich, 1999; Robinson-Staveley & Cooper, 1999; Sanna, 1992; Seta & Seta, 1995). In addition, these studies never focused on the participant’s individual’s differences, but familiarity with the observer, prior experience with the task and feedback. Given that individual’s approach a situation with his or her own unique personality composition; one can expect these individual factors to play a large role in reaction to social presence. The study by Spence (1956) on which Zajonc (1965) based his drive theory, focuses on individual differences as a source of the difference in drive, resulting in varied responses in non-competitive versus competitive

word association performance. Furthermore given that only about 5% of the studies of social facilitation have measured individual differences (Geen, 1980; Paivio, 1965), the present study will provide a much needed analysis of the moderating effects of personality factors.

The most recent study on individual differences in social presence is a meta-analysis by Uziel (2007). Under social facilitation conditions, Uziel focuses on the “Big Two” dimensions of personality: extraversion and neuroticism (Eysenck & Eysenck, 1985) and categorizes these variables with self-esteem as positive and negative affective states respectively. However, even though he uses the term “neuroticism” he analyzes studies which measure anxiety instead of neuroticism per se. Uziel combines the traits of high self-esteem and extraversion to produce a “positive orientation” category and low self-esteem and anxiety to create a “negative orientation” category. This combination is based on studies which indicate that high self-esteem and extraversion are both related to subjective happiness while neuroticism and low self-esteem are both related to dissatisfaction with life (Chang, 1997; Costa & McCrae, 1980; Judge, Erez, Bono & Thorensen, 2002; Rusting, 1998). The meta-analysis concludes that an individual with a negative orientation will interpret a situation as threatening, apprehensive or distracting, while an individual with a positive orientation will approach the same situation with self-assurance and enthusiasm. These orientations are hypothesized to moderate performance under social facilitation conditions through individual interpretations of the situation (Uziel, 2007).

The results of the meta-analysis demonstrate that individuals with a positive orientation (using studies where participants were either high in extraversion or high in

self-esteem) showed improved performance of both “simple” and “complex” tasks to the same extent when an observer was present as compared to when an observer was absent. It was similarly found that individuals with a negative orientation (studies where participants were either high anxiety or low self-esteem) showed impaired performance on both “simple” and “complex” tasks to the same extent when an observer was present as compared to when an observer was absent (the weighted sum of squares = 17.76,  $p < .01$ ; weighted error sum of squares = 28.08,  $p > .10$ ) (Uziel, 2007). Thus, the performance of individuals who interpreted the situation with a self-assured orientation was facilitated regardless of task complexity. Likewise, the performance of individuals who interpreted the situation in a threatening and apprehensive manner was impaired in both the complex and simple tasks when an observer was present. These results contradict Zajonc’s drive theory, as the dominant response would have been facilitation on a simple task and impairment with a complex task.

This analysis leaves several questions open for argument. First, will anxiety and low self-esteem and extraversion and high self-esteem show the same pattern of results? Extraversion and anxiety are factors which demonstrate differing levels of activation (Eysenck & Eysenck, 1985) whereas self-esteem measures an evaluative belief about one’s identifiable internal state where one reviews perceived failings and merits (Tafarodi & Ho, 2007). This study attempts to elucidate the moderation these three personality traits separately and jointly to determine their unique variances. In addition, the issue of combining the traits in an either/or manner and summing the variables may be a better manner in which to determine a positive or negative orientation.

Although Uziel's meta-analysis appears to support an individual's orientation as a moderating factor in performance, the studies referenced in the meta-analysis included limitations which need to be addressed. The first limitation is the absence of a true alone condition, as many of the studies had an experimenter, who did not interact with the participant, present in the "alone" conditions when "observers" were not present. Only a minority of social facilitation studies report a true alone condition (Bond & Titus, 1983). Second, there is usually no objective criterion for the complexity of the task. In many cases, the classification of a task as complex or simple is defined post hoc to fit the results of the analyses (Bond & Titus, 1983). And finally, many of the studies referenced in the meta-analysis included co-action, observer presence, mirrors, video cameras and audience presence at a sporting events as presence condition. These different presence conditions are likely to cause different reactions which cannot be combined effectively.

This study addresses several issues to test Uziel's hypothesis in a sophisticated manner. The task employed was a word pair association task based on Spence et al. (1956), where the participant recalled a non-competitive (simple) word pair list after a learning period and a competitive (complex) word pair list. The non-competitive task was preceded with two practice trials and was inherently easier than the competitive task; the competitive task had no preceding practice trials and was inherently more complex than the non-competitive task. There was a presence (when an observer is present in the room seated behind the participant) condition and a true alone condition (where the participant is completely alone in the room). Lastly, it was decided that the personality variables of extraversion, anxiety and self-esteem would be analyzed separately and together to determine if personality factors would account for the variance in

performance of the simple and complex task in addition to that attributed by the presence or absence of an observer.

### *Hypotheses*

#### *Anxiety*

Neuroticism, as defined by Eysenck, is a state that is characterized by an increase in the resting level of autonomic activity, which causes increased alertness to stimuli when compared to individuals low in neuroticism (Eysenck & Eysenck, 1985). However, the use of the term “neuroticism” may encompass different definition. According to the NEO-PI-R (Costa & McCrae, 1992), the measure of neuroticism is a combination of many sub-facets, some of which will not increase the resting autonomic activity, such as depression. It is more appropriate in this study to use a measure of anxiety instead of the broad trait of neuroticism. Spence et al. (1956) found that individuals with high anxiety performed better than those with low anxiety on simple word pair-association task whereas individuals with low anxiety performed better on a complex word pair-association task. He reasoned that those higher in anxiety form stronger connections in learning and recall and are more easily conditioned due to their heightened cortical activity (Eysenck & Eysenck, 1985). For the non-competitive task, individuals high in anxiety will use the extra cortical activation, evaluation apprehension (they do not want to be evaluated negatively), and distraction which will help focus on the central cue (the task at hand) (Baron, 1986) to facilitate performance. When presented with the competitive task, those high in anxiety will be impaired due to even more increased cortical activity (Eysenck & Eysenck, 1985), which will be distracting to the point of

impairment (Geen & Bushman, 1989) and awareness of their own disruptive autonomic arousal will cause worry about failure (Wine, 1971). Given that individuals with low anxiety perform better on a competitive task due to low susceptibility to conditioning of the simple task (Eysenck & Eysenck, 1985), the following hypotheses are postulated.

The two way interaction between anxiety and presence will be the following:

1) a) Non-Competitive task

*Individuals with high anxiety in the presence condition will be facilitated to a greater degree than those in the absence condition.*

*Individuals with low anxiety in the presence condition will not perform significantly different than those in the absence condition.*

b) Competitive Task

*Individuals with high anxiety in the presence condition will be impaired to a greater degree than those in the absence condition.*

*Individuals with low anxiety in the presence condition will be facilitated to a greater degree than those in the absence condition.*

*Extraversion*

The higher an individual's level of extraversion, the more sensation an individual can take before becoming saturated. The high resting cortical activity in introverts contributes to their preference to be alone and increased alertness while extraverts seek ways to increase arousal and are comfortable with social interaction. Grant and Dajee (2003) found that on a simple task, introverts were more positively affected by the presence of an audience than extraverts. They concluded that the stimulation produced by another in the room was not enough to affect the performance of extraverts, but had a facilitative effect on introverts. Given that introverts are more easily conditioned (Eysenck & Eysenck, 1985), studies have found that introverts perform better on simple word-pair tasks than extraverts and extraverts acquire the competitive list (complex task) more quickly (Howarth, 1969). In view of these findings, it is hypothesized that introverts will be facilitated by a presence on the non-competitive task and extraverts will show no significant difference. In contrast, extraverts will be facilitated with the social component, increased awareness of stimuli, and acquire the competitive task more easily with this increased awareness.

The interaction between extraversion and presence conditions will be the following:

2) a) Non-Competitive task

*Individuals with low extraversion in the presence condition will be facilitated to a greater degree than those in the absence condition.*

*Individuals with high extraversion in the presence condition will not differ significantly from those in the absence condition.*



b) Competitive Task

*Individuals with low extraversion in the presence condition will be impaired compared to those in the absence condition.*

*Individuals with high extraversion in the presence condition will be facilitated compared to those in the absence condition.*

*Self-esteem*

Individuals with low self-esteem have a high need for approval and a desire to win points with observers (Duffy et al., 2006). When individuals with low self-esteem are confronted with esteem-threatening situations, they often react by withdrawing from the task at hand thinking they will perform poorly (Brockner & Hultton, 1978). This study proposes that those with low self-esteem will be motivated to perform well on the non-competitive task when an observer is present to gain the approval of the observer. On the competitive task, those with low self-esteem are hypothesized to show performance impairment as compared with the alone condition in view of the fact that this will be interpreted as an esteem threatening situation and their performance will be compared to a perceived standard which they are not confident they can achieve. Individuals with high self-esteem will not show this impairment because their trait self-esteem is high enough to evaluate the situation as non-threatening. As those with high self-esteem tend to be confident in their ability to perform well, the presence of an

audience will likely be seen as a challenge and facilitate performance on the complex task (Terry & Kearnes, 1993).

The interaction between self-esteem and presence conditions will be the following:

3) a) Non-Competitive Task

*Individuals with low self-esteem in the presence condition will be facilitated compared with those in the absence condition.*

*Individuals with high self-esteem in the presence condition will not be significantly different than performance of those in the absence condition.*

b) Competitive Task

*Individuals with high self-esteem in the presence condition will be facilitated compared to those in the absence condition.*

*Individuals with low self-esteem in the presence condition will be impaired compared to those in the absence condition.*

## **Method**

### *Participants*

Participants were 162 Rutgers University undergraduates who were recruited from introductory psychology classes for partial fulfillment of a course requirement. Participants were randomly assigned to one of two experimental groups (presence or absence). Due to computer malfunctions and experimenter error, 24 participant's data were not included in the final analysis. There were an even number of males and females with an average age of 18.7 with 42% Caucasian, 33% Asian, 12% African American, 6% Hispanic and 7% other.

### *Materials*

#### **Self-esteem**

Participants completed the Rosenberg (1965) self-esteem scale. The scale contained equal number of direct- and reverse-scored items. The 10-item scale has high internal consistency ( $[\alpha] = .88-.92$ ), high test-retest validity ( $r = .85$ ), and high levels of validity when compared with other scales of self-esteem ( $r = .67-.56$ ; Corcoran and Fischer, 1987).

#### **Extraversion and Neuroticism**

Extraversion and Neuroticism were measured with the NEO PI-R™ (Costa & McCrea, 1992). The NEO PI-R is a self-report personality test consisting of 5 broad domains and 30 sub domains of personality and contains 240 items. The questionnaire was developed through rational and factor analytic methods to measure the five major

factors or domains of personality: Neuroticism (alpha = .92), Extroversion (alpha = .90), Openness (alpha = .87), Agreeableness (alpha = .86) and Conscientiousness (alpha = .91). The test retest reliability reported in the manual of the NEO PR-I over 6 years was: N= .83, E= .82, O= .83, A= .63, C= .79. Costa and McCrae point out that this not only shows good reliability of the domains, but also that they are stable over a long periods of time (past the age of 30), as the scores over 6 years are only marginally more different then the scores as measured a few months apart (Costa and McCrae, 1992). Participants indicate their degree of agreement with each item on a five-point Likert scale ranging from 1 = "strongly disagree" to 5 = "strongly agree". The five-factor raw scores were converted to z-scores.

### **Anxiety**

Anxiety was measured with the State Trait Anxiety Inventory (STAI) (Spielberger, 1980). The state anxiety scale consists of 20 items which refer to how are person is feeling at the present time and are rated on a 4 point Likert scale which range from 1 = "not at all" to 4 = "very much so". The trait anxiety scale consists of 20 items which refer to how a person usually feels and are rated on a 4 point Likert scale ranging from 1 = "almost never" to 4 = "almost always". The test has high reliability with test-retest correlation for trait anxiety is .86 and .54 for state anxiety (Spielberger, 1970) and high validity to other scales that measure anxiety with correlation of scores (.73 and .85). The scores ranged from 20-80 on each of the scales.

### *Apparatus and Materials*

The task was adapted from Feinberg and Aiello (2006). A word-pair association task, similar to those used by Spence et al. (1956), Cottrell et al. (1968), and Baron et al. (1978) was presented to participants on a Power Macintosh™ 7100/66. The word-pair lists were programmed into a psychology experiment software program, Pyscope V2.1.

Participants were presented with each of two word-pair lists: a non-competitive list and a competitive list. The noncompetitive list has associations within pairs but not between pairs. Examples of word pairs on the non-competitive list include “adept-skillful” and “barren-fruitless.” The stimulus and response words on the competitive list are not highly associated, but there is a high association between stimulus words of various pairs (high between word pair association). Examples of word pairs on the competitive list include “arid-grouchy” and “desert-landing.”

A series of pre- and post-task questions were programmed into the computer. The pre-task questions were designed to assess participant expectancies and post-task questions were used to assess participant’s mood, perception of the task, as well as other manipulation checks. Several filler items were included to mask the true purpose of the present study.

### *Procedure*

Each participant signed an informed consent form and was run individually (no co-action conditions). After the participant was seated in front of the computer, the experimenter told them that they were going to be performing a word pair task which is indicative of ability in workplace tasks. They were then given the NEO-PI-R inventory,

the Rosenberg self-esteem scale and the Spielberger STAI. Participants next heard a brief explanation by the experimenter of the word pair association task. More thorough details were presented to the participant via the computer monitor after the completion of the experimenter's introduction. The participant subsequently completed a practice trial with 6 word pairs not on the competitive or non-competitive list. They were given 25 seconds to study the word-pair list and afterward were asked to type in the correct response (the second word in the pair) when the stimulus (the first word in the word-pair) was presented on the computer screen and then were asked to press the return key. The participant first went through two learning trials where the non-competitive word-pair list was presented for 60 seconds and afterward asked to type in their response when the stimulus word was presented. They went through this procedure two times with the experimenter absent from the room. In a pilot study, participants only needed 2 learning trials to reach criterion of 14/18 correct. The experimenter then either left the participant alone to complete the task (the absence condition) or sat in a chair approximately 1.2m to the right and slightly behind the participant (the presence condition). This set-up is similar to that used by Baron et al. (1978). In this phase, the word-pair list was not presented for the actual task, only the stimulus words were presented and the participant typed in their response to the stimulus word. After completing the first task participants were presented with the competitive word list task with 120 seconds to study the list before the stimulus words were presented. The experiment was completely automated and assistance from the experimenter was not needed. In the "presence" condition, participants were instructed not to interact with the experimenter.

### *Task*

Participants were presented with the word-pair list on the computer monitor. The practice list consisted of 6 word-pairs and was designed to familiarize students with the task and the computer program. The non-competitive and competitive list consisted of 18 word pairs each. The participants were given 25s to study the practice list, 60s for the non-competitive list and 120s for the competitive list.

Participants were presented with a single stimulus word from a list of word pairs and then asked to type the appropriate response word and hit the return key to move to the next item. Answers were counted as correct if there were one or two spelling errors. After being presented with the lists, participants were asked a series of post-task questions consisting of manipulation checks such as task difficulty and presence of the experimenter and several filler items.

### *Dependent Measures*

The primary dependent variable was the participant's performance on each task. The number of correct responses was calculated separately for each task (non-competitive and competitive). Participants answered the pre- and post-task questionnaire items using both 7-point and 5-point Likert scales.

## Results

### *Manipulation checks*

Manipulation checks were conducted to assure that participants were able to identify that an experimenter was either present or absent in the appropriate condition (presence or no presence). In the post-task questionnaire participants were asked whether the supervisor was present while they completed the word-pair tasks. In the experimenter present condition, 96% of participants correctly identified that the supervisor was present as they completed the tasks. In the experiment absent condition, 100% of participants correctly identified that the experimenter was not in the room as they completed the tasks. Furthermore, when participants were asked whether they believed the experimenter was monitoring their performance, 91% in the presence condition answered “yes”, whereas 97% of participants in the alone condition answered “no”. In conclusion, it appears that the presence manipulation was effective in that most participants accurately identified whether the experimenter was present, and if they were present, participants believed they were in fact being monitored.

### *Task Complexity*

The present study required participants to complete both a non-competitive and competitive word-pair task. Manipulation checks revealed that participants identified a difference in the difficulty levels of the two tasks. Participants perceived the competitive task as more difficult than the non-competitive task when asked to rate the difficulty of the task on a seven point scale ranging from 1(difficult) to 7 (not difficult). The mean



response for the non-competitive task was 5.28 ( $SD = 1.34$ ) and the mean response for the competitive task was 3.97 ( $SD = 1.37$ ),  $t(122) = 8.00$ ,  $p < .001$ (Table 1). The results were only moderately successful since participants rated the competitive task as being somewhat neutral (i.e. at the midpoint of the 7-point scale), as opposed to being difficult. However participants did rate the competitive task as significantly more difficult than the non-competitive task. As part of the post-task questionnaire most of the participants (92%) indicated the competitive task was more difficult, whereas 6% indicated that the non-competitive task was more difficult and 2% indicated there was no difference. Most of the participants (73%) specified that they performed better on the non-competitive task, whereas 13 % thought they performed better on the competitive task and 14% thought there was no difference in their performance between the two tasks. Participant's actual performance further confirmed that there was in fact a meaningful difference between the non-competitive and non-competitive tasks. Participants' non-competitive task performance ( $M = 15.12$ ) indicated they correctly completed more items as compared with the competitive task ( $M = 9.37$ ),  $t(137) = 21.80$ ,  $p < .001$ . In addition, participants thought the complex task made them feel more stressed, uptight, distressed and frustrated (Table 2).

Since the present study had participants complete a word-pair task, it was important to make sure that the participants across conditions were roughly equivalent in the knowledge of the words on the tasks. Analyses revealed that there were no differences in self-reported knowledge of the words used in the non-competitive task  $t(128) = -.609$ ,  $p > .5$  and the competitive task  $t(128) = -1.655$ ,  $p > .1$ . The participants in

the different conditions appeared to be statistically equivalent in their knowledge of the words contained in the two tasks.

As well, participants rated the statement “I was distracted during the task” and asked to answer on a 7 point scale ranging from 1(disagree) to 7 (agree). For the non-competitive task, participants in the absence ( $M = 2.29$ ,  $SD = 1.62$ ) and the presence conditions ( $M = 2.47$ ,  $SD = 1.63$ ) did not significantly differ from one other,  $t(121) = -.609$ ,  $p > .1$ . For the competitive task, participants in the absence ( $M = 2.67$ ,  $SD = 1.71$ ) and the presence conditions ( $M = 3.18$ ,  $SD = 1.56$ ) did not significantly differ from one another,  $t(121) = -1.073$ ,  $p > .1$ . When the non-competitive task ( $M = 2.39$ ,  $SD = 1.62$ ) and the competitive task ( $M = 2.95$ ,  $SD = 1.64$ ) were compared to each other, there was a significant difference,  $t(122) = -3.435$ ,  $p < .001$ . This result indicates that regardless of condition (presence or absence) participants perceived they were more distracted when completing the competitive task than when completing the non-competitive task.

### *Performance accuracy*

Out of the 138 participants, 110 reached the criteria of scoring at least 14 correct on the second practice trial and were used for the following non-competitive task analyses. Two one-way ANOVA’s were analyzed to determine the difference in performance between conditions (absence and presence). For the non-competitive task, there was a marginally significant difference between the presence ( $M = 15.92$ ) and absence ( $M = 16.56$ ) conditions,  $F(1, 109) = 3.823$ ,  $p = .053$  (Table 1). This indicates that performance in the absence condition was more accurate than in the presence

condition leading to the conclusion that the non-competitive task was not a “simple” task in using Zajonc’s (1965) classification as eliciting the dominant response.

A one-way ANOVA illustrated significant differences in performance on the competitive task between the presence ( $M = 8.83$ ) and absence ( $M = 10.03$ ) conditions,  $F(1, 137) = 4.398, p < .05$  (Table 1). Participants performing the competitive task in the presence condition showed impairment when compared with performance in the absence condition. The competitive task can be classified as a “complex” task using Zajonc’s (1965) classification.

### *Personality variables*

Extraversion, neuroticism, trait anxiety and self-esteem scores were analyzed by first calculating the z-scores for each individual for each measure. Two hierarchical multiple regressions were performed to test the two-way interaction models, one for the non-competitive task and one for the competitive task, for each personality variable. The first step included the main effects for presence (dummy-coded, no presence = 0 and presence = 1) and the continuous personality variable (trait anxiety, extraversion or self-esteem). The second step included the two-way interaction between the personality variable (trait anxiety, extraversion and self-esteem) with condition. The dependent variable was the number correct responses on the non-competitive and competitive tasks. Gender was also added into the first step since females ( $M = 16.56, SD = 1.71$  for the non-competitive task and  $M = 10.70, SD = 3.23$  for the competitive task) performed significantly better than males ( $M = 15.79, SD = 1.70$  for the non-competitive task and  $M = 8.98, SD = 2.89$  for the competitive task) for the non-competitive,  $F(1, 109) = 5.595, p$

< .05, and competitive tasks,  $F(1, 136) = 8.378, p < .01$ . Race, experimenter and age were not significant predictors of performance on either the simple or complex task and therefore not entered into the analyses.

### *Trait-Anxiety*

#### *Hypothesis 1a*

Hypothesis 1a predicted that, for the non-competitive task, individuals scoring high on the anxiety scale would be facilitated in the presence condition as compared with the absence condition whereas those who scored lower on the trait anxiety scale would not show a difference in performance between the presence and absence condition. The interaction between trait anxiety and condition did significantly predict a difference in performance for the non-competitive task. A step-wise regression analysis was performed with three variables serving as predictors: condition (presence or absence), the z-score of trait anxiety and gender. The interaction between condition and the z-score for trait anxiety was entered in step 2. The results of the analysis are presented in Table 3. Step 2 of the regression was significant and the interaction component significantly contributed to the prediction of performance with a significant change in  $R^2$  (6.2%). The overall relationship was significant  $F(4, 104) = 4.799, p < 0.01$ , and the interaction term for trait anxiety and condition was significant,  $\beta = .455, t(104) = 2.76, p < .01$ . When plotted at one standard deviation above and below the mean, the interaction demonstrates a greater performance decrement for those with low trait anxiety from the absence to presence conditions. (See Figure 1). The simple slopes demonstrate that the slope for low trait anxiety was significant ( $p < .01$ ) whereas the slope for high trait anxiety was not

significant indicating a performance decrement in the presence condition compared to the absence condition for individuals with low trait anxiety. Additional regression analyses were performed to isolate the differences in the presence and absence conditions. In the absence condition, the regression was significant,  $\beta = -.065$ ,  $t(48) = -2.389$ ,  $p < .05$ , indicating that a decrease in trait anxiety predicted an increase in performance. In the presence condition, the regression was marginally significant,  $\beta = .043$ ,  $t(58) = 1.788$ ,  $p = .079$ , indicating a trend of increased trait anxiety predicting an increase in performance. There was a significant correlation between trait anxiety and state anxiety measured before the task, ( $r = .657$ ,  $p < .001$ ). Controlling for state anxiety did not decrease the effect of the interaction between trait anxiety and condition on performance indicating that trait anxiety did not act through state anxiety. In addition, the amount of self-reported anxiety experienced during the task did not decrease the effect on the interaction.

The interaction between condition and neuroticism did not significantly predict performance on the non-competitive task,  $\beta = .114$ ,  $t(133) = .679$ ,  $p > .05$ . In addition, the interaction between condition and each sub-facet of neuroticism (anxiety, anger/hostility, depression, self-consciousness, impulsiveness and vulnerability) did not significantly predict non-competitive task performance.

In conclusion, the hypothesis was not supported and the results indicate that individuals with low trait anxiety were impaired in the presence condition compared with the absence condition. In addition, in the absence condition, those with low anxiety

performed better than those with high anxiety and in the presence condition there was a trend for those with high anxiety to perform better than those with low anxiety.

### *Hypothesis 1b*

Hypothesis 1b predicted that, for the competitive task, individuals with high trait anxiety in the presence condition would be impaired to a greater degree than those in the absence condition and individuals with low trait anxiety in the presence condition would be facilitated to a greater degree than those in the absence condition. The interaction for condition with trait anxiety was not significant,  $\beta = .103$ ,  $t(132) = .357$ , *n.s.* In addition, the interaction between condition and neuroticism in predicting competitive task performance was not significant.

### *Extraversion*

#### *Hypothesis 2a*

Hypothesis 2a predicted that individuals scoring low on extraversion in the presence condition would be facilitated to a greater degree than those in the absence condition and individuals scoring high on extraversion in the presence condition would not differ significantly from the absence condition. The interaction between extraversion and condition did significantly predict a difference in performance for the non-competitive task. A step-wise regression was performed with three variables serving as predictors: condition (presence or absence), the z-score of extraversion and gender. The interaction between condition and the z-score for extraversion was entered in step 2. The results of the analysis are presented in Table 4. The interaction component significantly

contributed to the prediction of performance with a significant change in  $R^2$  (9.6%), and a significant overall relationship  $F(4,104) = 6.331, p = .01$ . The interaction between condition and extraversion was positively related to performance on the non-competitive task and the regression coefficient for extraversion and condition was significant,  $\beta = -.516, t(104) = -3.518, p < .01$ . Simple slopes indicate that slope for high extraversion was significant ( $p < .01$ ) whereas the simple slope for low extraversion was not significant. When plotted at one standard deviation above and below the mean, the interaction shows that in the absence condition, those with high extraversion performed better than those with low extraversion (see Figure 2). Additional regression analyses indicate that there is a significant effect of extraversion in prediction of non-competitive task performance in the absence condition,  $\beta = .036, t(47) = 4.071, p < .01$ , where an increase in extraversion indicates an increase in performance. There was no difference for the performance in the presence condition.

In addition, the interaction of condition with each of the extraversion sub-facets demonstrated that four of the sub-facets (gregariousness, assertiveness, activity and positive emotion) had significant regression coefficients, while the other two (warmth and excitement seeking) were not significant. The change in  $R^2$  was highest for activity (12.8%).

In summary, hypothesis 2a was not supported. However, there was a significant interaction such that individuals scoring high on extraversion in the presence condition performed better than those scoring low on extraversion. Individuals scoring high on extraversion were significantly impaired in the presence condition when compared with the absence condition. There was no difference in performance for those with low

extraversion in the absence or presence conditions and no significant difference between those with high and low extraversion in the presence condition.

### *Hypothesis 2b*

Hypothesis 2b predicted that individuals scoring low on extraversion in the presence condition would be impaired compared with the absence condition and individuals scoring high on extraversion in the presence condition would be facilitated compared to the absence condition. The interaction for extraversion and condition for competitive task performance was not significant,  $\beta = -.028$ ,  $t(132) = -.102$ ,  $n.s.$ , and hypothesis 2b was not supported.

### *Self-Esteem*

#### *Hypothesis 3a*

Hypothesis 3a predicted that individuals scoring low on self-esteem in the presence condition would be facilitated compared with those in the absence condition and the performance of individuals scoring high on self-esteem in the presence condition would not differ significantly from those in the absence condition. The interaction between self-esteem and condition did significantly predict performance on the non-competitive task. There was no significant correlation between self-esteem and social desirability (Crowne & Marlowe, 1960). A step-wise regression was performed with three variables serving as predictors: condition (presence or absence), the z-score of self-esteem and gender. The interaction between condition and the z-score for self-esteem was entered in step 2. The interaction component significantly contributed to the



prediction of performance with a significant change in  $R^2$  (4.5%). The overall relationship was significant  $F(4, 102) = 4.651, p < .01$  with a significant interaction term for self-esteem and condition,  $\beta = -.357, t(102) = -2.318, p < .05$ . Simple slopes indicate that the slope for those scoring high on self-esteem is significant ( $p < .01$ ) whereas the simple slope for those scoring low on self-esteem was not significant. When plotted at one standard deviation above and below the mean, the interaction illustrates that in the absence condition, there is an increase in performance with an increase in self-esteem (See Figure 3). Additional analyses show that for the absence condition, self-esteem was a significant predictor of non-competitive task performance,  $\beta = .133, t(47) = 3.284, p < .01$ . The regression for the presence condition was not significant.

In summary, hypothesis 3a was not supported, however there was a significant interaction between self-esteem and condition such that those scoring high on self-esteem performed significantly better in the absence condition as compared with the presence condition and performed significantly better than those scoring low on self-esteem in the absence condition. For those with low self-esteem, there was no significant difference between the presence and absence conditions.

### *Hypothesis 3b*

Hypothesis 3b predicted that individuals scoring high on self-esteem in the presence condition would be facilitated compared to those in the absence condition and individuals scoring low on self-esteem in the presence condition would be impaired compared to those in the absence condition. The interaction between self-esteem and

condition was not significant for the competitive task,  $\beta = -.016$ ,  $t(130) = .702$ , *n. s.*, and hypothesis 3b was not supported.

*Replication of Uziel (2007)*

To replicate Uziel's study, participants were then divided into two groups. The first group consisted of individuals scoring high on trait anxiety (above the median score of 30) and low on self-esteem (below the median score of 20) and the second group consisted of individuals scoring high on extraversion (above the median score of 124) and high on self-esteem (above the median score of 20). For the high trait anxiety and low self-esteem group, condition was not a significant predictor of either non-competitive or competitive task performance. For the high extraversion and high self-esteem group, condition was a significant predictor of task performance for the non-competitive task,  $F(1, 34) = 4.18$ ,  $p \leq .05$  with  $\beta = -1.130$ ,  $t(34) = -2.195$ ,  $p \leq .01$ . This result indicates that those with high positive orientation performed better in the absence condition. This is counter to Uziel's (2007) finding that individuals high in extraversion and self-esteem were facilitated with presence on both simple and complex task performance.

To further explicate the relationship between all of the personality variables, a sum variable was calculated. Given that the trait of self-esteem was highly correlated with both trait anxiety ( $r = -.708$ ,  $p < .001$ ) and extraversion ( $r = .415$ ,  $p < .001$ ), two groups were created. The first group was the negative orientation group which was the sum of trait anxiety scores and self-esteem (reverse coded). The second group was the positive orientation group which consisted of the sum of extraversion and self-esteem scores.

### *Negative Orientation*

A step-wise regression was performed with three variables serving as predictors: condition (presence or absence), the z-score of negative orientation and gender. The interaction between condition and the z-score for negative orientation was entered in step 2. The dependent measure was performance on the non-competitive task. The result of the analysis is presented in Table 6. The interaction component significantly contributed to the prediction of performance with a significant change in  $R^2$  (6.0%). The overall relationship was significant  $F(4, 102) = 4.854, p \leq .01$ , with a significant interaction term for negative orientation and condition,  $\beta = .857, t(129) = 2.695, p < .01$ . Simple slopes indicate that the slope for individuals scoring low on negative orientation was significant ( $p < .01$ ) whereas the simple slope for individuals scoring high on negative orientation was not significant. When plotted at one standard deviation above and below the mean, the interaction illustrates that for the absence condition, there was an increase in performance with a decrease in negative orientation (see Figure 4). Additional analyses demonstrate that in the absence condition, negative orientation was a significant predictor of non-competitive task performance,  $\beta = -.675, t(47) = 3.380, p < .01$ . The regression for the presence condition was not significant.

In summary, there was a significant interaction between negative orientation and condition such that individuals with low negative orientation performed significantly better in the absence condition compared with the presence condition and performed significantly better than individuals scoring high on negative orientation in the absence condition. For those with high negative orientation, there was no significant difference

between the presence and absence conditions. In addition, there was no significant interaction for negative orientation and condition,  $\beta = .239$ ,  $t(130) = .415$ , *n. s.*, for the competitive task.

### *Positive Orientation*

A step-wise regression was analyzed with three variables serving as predictors: condition (presence or absence), the z-score of positive orientation and gender. The interaction between condition and the z-score for negative orientation was entered in step 2. The dependent measure was non-competitive task performance. The results of the analysis are presented in Table 7. The interaction component significantly contributed to the prediction of performance with a significant change in  $R^2$  (10.2%). The overall relationship was significant  $F(4, 102) = 6.536$ ,  $p < .01$  and interaction term for positive orientation and condition was significant,  $\beta = -1.050$ ,  $t(102) = -3.610$ ,  $p < .001$ . Simple slopes demonstrate that the slope for high positive orientation was significant ( $p < .01$ ) whereas the simple slope for low positive orientation was not significant. When plotted at one standard deviation above and below the mean, the interaction shows that for the absence condition, there is an increase in performance with an increase in positive orientation (see Figure 5). Additional analyses demonstrate that for the absence condition, positive orientation was a significant predictor of simple task performance,  $\beta = .738$ ,  $t(47) = 4.303$ ,  $p < .001$ . The regression for the presence condition was not significant.

In summary, there was a significant interaction between positive orientation and condition such that individuals scoring high on positive orientation performed

significantly better in the absence condition when compared with the presence condition and performed significantly better than individuals scoring low on positive orientation in the absence condition. For individuals scoring low on positive orientation, there was no significant difference between the presence and absence conditions. In addition there was no significant interaction,  $\beta = -.088$ ,  $t(130) = -.156$ , *n. s.* for the competitive task.

## Discussion

The purpose of the present research was to investigate the influence of personality variables on performance in a social facilitation paradigm. The theory of Zajonc's (1965) on social facilitation and Eysenck & Eysenck (1985) on personality were combined to propose that individuals would perform differently on a non-competitive and competitive verbal word-pair tasks based on their personality preferences in addition to task complexity. The study was based on Uziel's (2007) meta-analysis, which concluded that individuals with a negative personality orientation displayed impaired performance on both simple and complex tasks in the presence of another whereas those with a positive personality orientation were facilitated on both simple and complex tasks in the presence of another. The advantage of this research is a direct test of this conclusion with a controlled experiment including a true alone condition. The results of this study indicate that personality factors do have an influence on whether an individual is facilitated and impaired on tasks of differing complexity, but not in the manner theorized by Uziel or hypothesized in the present study.

The two tasks included are based on Spence's (1965) word-pair association task with a competitive and non-competitive word list. The non-competitive task had the stimulus and response semantically related so that the connections were easily made. The competitive task was more difficult given that the stimulus and response were not semantically related, but several stimulus words were semantically related to each other. Spence found that individuals scoring high on anxiety performed better on a non-competitive task due to little competition between the pairs and the increased "drive" experienced by individuals scoring high on anxiety facilitated these connections which

were intuitive. In contrast, this increase in “drive” of highly anxious individuals would interfere with the competitive pairs and cause performance impairment when compared with individuals scoring low on anxiety. The hypotheses of this study were based on a summation theory that a presence in the room would cause an increase in physiologic activity and facilitate individuals scoring high on anxiety and low extraversion on the non-competitive task. We did not find support for the sum of task and presence in the results, most likely due to the fact that the task was not a “simple” task in terms of Zajonc’s (1965) definition of eliciting a dominant response. The criterion of the study was 14 correct out of 18 which was an indication that the task was not “well-learned”. In view of the fact that no facilitation from absence to presence on the non-competitive task was observed with a trend in the opposite direction, the non-competitive task can not be treated as a “simple” task. However, the competitive task did show results in the hypothesized direction of performance impairment in the presence condition when compared with the absence condition.

In reference to task complexity, the competitive task did demonstrate classic social facilitation effects; individuals performing the task in the presence of another were significantly impaired compared with individuals completing the task alone. In addition, this pattern was observed regardless of personality orientation. Whereas the pattern of results for the non-competitive task indicated a social facilitation effect for a task which is not well learned as observed for the competitive task. However, given that the non-competitive task was moderately difficult, personality differences did interact with the condition. Complexity of the task can be viewed as a continuum and unless a task requires no attention impairment will be the result.

There has always been controversy over the definition of a “simple” or “complex” task<sup>1</sup>. Baron (1986) proposed the distraction-conflict theory of social facilitation, suggesting that it is not the increased activation of attentional conflict that results in decrements in performance of complex tasks, but *cognitive overload* that exhausts attentional capacity. On complex tasks, attention must focus on the stimuli of the task, and any attention directed to an observer leads to a performance decrement on difficult tasks. On simple tasks, automatic performance requires less attention, and any attention directed to an observer does not exhaust attentional capacity. Rather, the automatic performance of a simple task often improves performance in the presence of a distracter. Huguet, Galvaing, Monteil, and Dumas (1999) applied the Stroop task to support this assumption and Aiello, Chomich & Kolb (1992) applied a data entry task under computer monitoring conditions to support this contention as well.

Very similar to Baron’s theory, Manstead and Semin's (1980) capacity model based on evidence of Shiffrin and Schneider's (1977) two-process theory of information processing, classifies tasks into those that require cognitively controlled processing and those that require automatic processing. In automatic processing, the presence of others focuses attention on the automatic execution of the task, and performance therefore improves. On tasks that require cognitively controlled processes, more attention is required and any attention directed to an audience detracts from successful completion of the task (Strauss, 2002). This diversion of attention explains the decrements in performance of complex tasks in the presence of an observer.

Cognitive tasks which are not well-learned and contain novel sequences of action, require error correction or overcoming a habitual response are thought to require a central



processor for execution, while more automatized tasks are delegated to subcortical processes (Wagstaff, Wheatcroft, Cole, Brunas-Wagstaff, Blackmore & Pilkington, 2008). Participants in the present study only performed the non-competitive task two times prior to a presence in the room and thus, it most likely did not elicit a dominant response in terms of Zajonc. The central processor was most likely engaged in the non-competitive task and the presence of another caused attentional conflict. This attentional conflict resulted in different patterns of action depending on whether an individual scored high in extraversion or anxiety. The non-competitive task will be treated as a moderately complex task and the competitive task as a complex task.

#### *Trait Anxiety*

Uziel (2007) created a negative orientation group combining low self-esteem and neuroticism; however the actual studies included in the meta-analysis measured trait and state anxiety. Trait and state anxiety and neuroticism were measured in this study to determine if there was a difference in performance depending on the measure employed. No significant interaction for neuroticism or state anxiety resulted, however a significant interaction between trait anxiety and condition in predicting non-competitive task performance was observed, though not in the direction predicted by Uziel. This result is not surprising given that the original conceptualization of “neuroticism” by Eysenck (1983) was based on hyper activity and increased activation of the nervous system. Although there is high comorbidity between depression and anxiety, both actually have opposing effects on physiological activity. In Eysenck’s (1983) theory of personality, the measure of “neuroticism” differs from that measured with the NEO-PI-R where

Eysenck's measure determined strong emotional lability and overactivity. Persons with high scores tend to be emotionally over-responsive, and encounter difficulties in calming down (Eysenck & Eysenck, 1985). The interaction between trait anxiety and condition indicated that individuals scoring low on trait anxiety performed better in the absence condition than in the presence condition. And individuals scoring low on trait anxiety performed better than individuals scoring high on trait anxiety in the absence condition along with a trend for those scoring high on trait anxiety to perform better than those scoring low on trait anxiety in the presence condition.

The observed pattern of results may seem atypical when compared with the few studies on anxiety in social facilitation paradigms, although there are conflicting results in the literature concerning the nature of anxiety and performance. Cox (1966) employed a marble dropping task and found males scoring high on anxiety were impaired compared to those scoring low on anxiety when an audience was present. Ganzer (1968) found the same results with a verbal learning task however only used females in the study and Martens (1969) found that individuals scoring high on anxiety were facilitated compared to those scoring low on anxiety on a complex motor skill. Berkey & Hoppe (1972) found no significant differences between those scoring high and low on anxiety in a non-competitive word associate list while those scoring high on anxiety in an audience condition completing a competitive word-list were impaired. Quarter and Marcus (1971) observed that individuals perform less effectively on a digit span task when observers are present than when they were absent and in the audience absent condition, those scoring high on anxiety and low on anxiety did not demonstrate any performance differences. However, all of these studies are confounded given that the experimenter was in the room

in the “alone” condition and no consensus on whether the tasks were “simple” or “complex” was determined.

The literature does hold one study that reports results similar to the present study. Pendersen (1970) observed that when learning how to perform tasks, those scoring low on anxiety completed more errors in a group situation than when working alone and individuals scoring high on test anxiety made fewer errors in the group situation than in the alone condition. Once the participants had learned the task, “complex” task subjects who worked alone had a higher overall performance than subjects who worked on co-acting groups. For the “simple” task, individuals scoring high on anxiety showed facilitated performance when working alone than when working in groups and those scoring low on anxiety showed facilitated performance when working in a group than when working alone. These patterns of results indicate that the non-competitive task in the present study was not “well-learned” as the participants were most likely still learning the task, especially given the fact that the criterion was set at 14 correct out of 18.

It is interesting that there was no difference in performance between the presence and absence conditions for individuals scoring high on anxiety. Geen (1976) found that when an individual has a high level of anxiety and is actively observed, a narrowing of cue range occurs. Easterbrook (1959) posited that negative emotion acts to reduce the range of cues that an organism uses, and this reduction in cue utilization influences the action in ways that are either organizing or disorganizing. The range of cue utilization is said to get smaller when the use of peripheral cues has been reduced though the use of central cues is maintained. This focus on central cues is said to facilitate maintenance of proficiency under stress (Easterbrook, 1959). As motivation to do well was increased,

the range of cue utilization was reduced to the central (the non-competitive task), to exclusion of peripheral cues (the observer). There is evidence that the attentive field tends to become narrower under the influence of increased activity in the brain stem reticular formation as is found with those who have high anxiety (Callaway & Dembo, 1958).

It is most likely this response of the noradrenergic system that is responsible for maintaining attention in the face of distraction. Noradrenergic systems have been implicated in sustained attention and alerting and can be linked with negative affect, specifically anxiety (Sullivan, Coplan, Kent & Gorman, 1999). In addition, attention deficit disorder is linked to dysfunction of the noradrenergic system (Biederman & Spencer, 1999). Individuals prone to anxiety are less susceptible to general distracters (Keogh, Bond, French, Richards & Davis, 2004) and increased anxiety is negatively correlated with distraction whereas extraversion is positively correlated with distraction (Bagby & Parker, 2001). Negative affect induced by increased anxiety is inversely correlated with ability to shift attention (Derryberry & Rothbart, 1988; Compton, 2000) and an increase in negative affectivity reduces the range of cues that an organism uses (Easterbrook, 1959). In addition, increased allocation of resources toward a task should reduce the amount of resources available for redirection toward task-irrelevant stimuli (Smillie, Yeo, Furnham & Jackson, 2006). When highly anxious individuals are more strongly engaged in the task at hand, there are fewer resources available for attentional shifts and thus impairment (Smillie, et al., 2006). This is evident in the present study as individuals with high negative affectivity do not show a great deal of difference in performance between the presence and absence conditions for the non-competitive task.

Individuals scoring high on anxiety exhibited great locational cueing effects such that they displayed a stronger preference for the cues location, relative to an uncued location and maintained their attention on that location and thus indicate a lack of cognitive flexibility (Compton, Wirtz, Pajoumand, Claus & Heller, 2004). This would explain, in terms of Baron (1986) why individuals with negative affect performed better when compared with individuals with positive affect in the presence condition. Given that the cue utilization is limited in individuals with negative affect, the facilitation on the non-competitive task was apparent when compared to individuals who would be rewarded by attending to extraneous cues.

However, task irrelevant anxiety responses are always present somewhat in individuals with higher negative affect and are likely to disrupt performance in general. This may explain why those with negative affect did not perform as well as those with positive affect in the absence condition. Though individuals with negative affectivity were not affected by the presence, they were not able to maintain as much focus as those with positive affectivity in the absence condition, most likely due to rumination (Mischel, Ebbesen & Zeiss, 1973).

Focusing on the achievable task at hand was most likely assisted by an increase in noradrenergic activity resulting in sustained attention to the cue, the task at hand when there was a presence in the room. These individuals were more focused on achieving the task most likely afforded by the increase in noradrenergic activity. Given that those with negative affect and anxiety tend to be better at maintaining focus in the presence of additional stimuli, staying focused on the task was not an issue for those with negative affectivity whereas those with positive affectivity were distracted.

*Extraversion*

Individuals scoring high on extraversion were facilitated in the absence condition compared to the presence condition, and performed better than those scoring low on extraversion in the absence condition on the non-competitive task. Though these results did not support the proposed hypothesis, the few studies in the social facilitation literature focusing on introversion and extraversion indicate conflicting results. One study that examined the effect of personality on the social facilitation of a sporting task found that extraverts were facilitated and introverts inhibited, in an audience condition (Graydon & Murphy, 1995). However, this was a well-learned motor task that had been performed many times and performed in the presence of spectators who were encouraged to give the individuals vocal encouragement. The authors hypothesized that this may have actually created a competition effect which may have favored extraverts who crave the attention. Grant and Dajee (2003) employed an easy mathematical task which resulted in introverts positively affected by an observer whereas extraverts did not show a performance difference between absent and presence conditions. These patterns of results were hypothesized for the present study if the non- competitive task had indeed been a “dominant” task. The easy multiplication task was familiar to the participants and did not require memorization which resulted in the elicitation of the dominant response.

It is interesting that individuals scoring high on extraversion were facilitated in the absence condition as compared with the presence condition. This was most likely due to the increased cognitive flexibility afforded by increased dopamine levels in individuals who score high on extraversion. Evidence in the literature indicates that positive affect

and extraversion enhance cognitive flexibility (Isen & Daubmen, 1984; Isen, Niedenthal & Cantor, 1992), however, Dreisbach and Goschke (2004) demonstrated that increased cognitive flexibility with increased extraversion and positive affect happens at the cost of increased distractibility. Ashby, Valentin & Turken (2002) detailed a theory of positive affect and extraversion which concluded that cognitive and behavioral effects are mediated by the neurotransmitter dopamine. Derived from the general assumption that maintenance and flexibility are antagonistic processes, positive affect, while increasing cognitive flexibility, on the other hand weakens the maintenance capability (Dreisbach, 2006). This more adaptive cognitive style is advantageous when unexpected events occur, yet is maladaptive when trying to maintain focus on the task at hand, (i.e. when novel stimuli appear in the environment)

The consensus in the literature indicates that an individual's ability to orient attention is closely linked to positive affectivity. This association between positive affectivity and cognitive flexibility is thought to be mediated through dopaminergic pathways. In addition, the neurotransmitter dopamine has been linked to reward and incentives (Robbins & Everitt, 1996; Wise & Rompre, 1989) and to extraversion (Depue, Luciana, Arbisi, Collins & Leon, 1994). Likewise, dopamine has also been implicated in cognitive switching through the frontal and parietal lobes (Ashby, Isen & Turken, 1999).

Stability and flexibility are antagonistic, but needed for the engagement of goal-directed actions. While one must engage in goal-directed actions and guard against distractions, a number of individuals show more flexibility and respond more easily to significant changes in the environment (Muller, Dreisbach, Goschke, Hensch, Lesch & Brocke, 2007). The balance between stability and flexibility is modulated by dopamine

release in the prefrontal cortex (Miller & Cohen, 2001). This phasic dopamine release is obtained by signals of potential reward and is associated with positive mood and extraversion (Schultz, 1998). An indication of potential reward stimuli in the environment can influence cognitive control in two ways-toward flexibility and attention to the new stimuli or toward increased stability. Muller, et al. (2007), found that the phasic dopamine response can stabilize focus if the reward is high enough. If a task is not perceived as difficult or the rewards to switch focus are high enough, this phasic release elicits cognitive flexibility and a switch of attention.

In the present study, the more adaptive cognitive style most likely enhanced the performance of individuals with positive affect and extraversion in the alone condition, however when in the presence condition, these individuals were distracted most likely due to more flexible cognitive predilection. Extraversion seemingly leads to an increase in dopamine release which fosters more flexible cognitive capacity and distraction when another individual is in the room. This improved cognitive flexibility at the same time impaired continued maintenance capability with the increased reward of focusing on the individual in the room, unlike individuals scoring high on trait anxiety. This switch in attention most likely engaged the use of the central processor where the individuals had to divide their attention between the task at hand and the novel presence in the room.

In conclusion, there is evidence that (a) extraversion, presumably associated with increased brain dopamine, enhances cognitive flexibility and that (b) moderate increases in dopamine levels selectively attenuate focused behavior. Extraversion plays an important role in the modulation of cognitive control, and enhances cognitive flexibility but also incurs a complementary cost in the form of increased distractibility (Bolte,



Goschke & Kuhl, 2003). Extraversion, which biases attention toward novel stimuli ought to facilitate a switch to a new stimulus category and thus reduce focus, but at the same time increase distractibility when novel stimuli serve as distracters. For the competitive task, the same pattern was found with impairment in performance when an observer was in the room.

### *Self-Esteem*

The interaction illustrated indicates that individuals scoring high on self-esteem performed better in the absence condition as compared with the presence condition with no difference for the individuals scoring low on self-esteem. As well, individuals scoring high on self-esteem performed significantly better than individuals scoring low on self-esteem in the absence condition. This pattern of results is remarkable given that this is the same pattern of results found for extraversion. No previous study has indicated results illustrating this pattern however, in a review of the studies that measured self-esteem in social facilitation, conflicting results have arisen. Shrauger (1972) failed to find that the number of errors made on a concept formation task (a seemingly difficult task) performed in front of an audience varied as a function of the level of an individual's self-esteem. Brockner and his colleagues (1979a, 1979b; Brockner and Hulton, 1978) reported results that, in fact, contradict Shrauger's study. Using a similar task, they consistently found that individuals with low self-esteem made more errors when performing in front of an audience than when performing alone, while the performance of high self-esteem participants remained the same across conditions. Yet these studies had an issue with the experimenter in the room during the "alone" condition.

Terry & Kearnes (1992) found that when completing a complex task, the presence of a video camera had no impact on task performance of individuals with low self-esteem (a pattern found in the present study) and improved the performance of those with high self esteem. On a simple task individuals scoring low on self-esteem were impaired by the use of a video camera while no difference in performance was indicated for individuals scoring high on self-esteem. Perhaps the presence of a video camera resulted in performance patterns than demonstrated with an actual presence in the room. Brockner (1979a) found no difference between individuals scoring high and low on self-esteem when the participants are given task focusing instructions. Although there were no instructions designed to focus the individual's attention on the present task, the level of concentration needed to complete the non-competitive task may have imitated task-focusing instructions. Most likely in the non-competitive task, individuals scoring high on self-esteem were rewarded by paying attention to the observer rather than concentrating on the performance, analogous to the pattern of extraversion.

#### *Positive and Negative Orientation*

The amount of explained variance indicates that these results are fueled by extraversion more so than either trait anxiety or self-esteem. The combined scores exemplify the fact that self-esteem added little to the overall variance: the increase for the interaction of positive orientation with condition explained 10.2% of the variance over and above that of the control variables and negative orientation explained 6.2% while extraversion explained 9.6%, trait anxiety, 6% and self-esteem, 4.5%. The results indicate that extraversion and trait anxiety are more important to task performance on the

non-competitive task than self-esteem. With the pattern of interaction found between the personality variables and condition, it is apparent that the direction of the interaction with extraversion is very similar of high self-esteem. Additionally, the pattern for the interaction with anxiety was very similar to that of low self-esteem more while anxiety was highly correlated with low self-esteem and extraversion was highly correlated with high self-esteem. The average correlation between extraversion and self-esteem is found to be .4 (in this study it was .415) and the average correlation between neuroticism and self-esteem is found to be -.61 (-.70 in this study) (Robins, Hendin, & Trzesniewski, 2001). However, in view of the fact that self-esteem added very little to the combination, more benefit is obtained when studying these personality variables in isolation rather than grouped into positive and negative personality. The results of the positive and negative orientations did not support the findings of Uziel's meta-analysis. Uziel (2007) was limited by the studies available for the meta-analysis, most of which had no true alone condition and presence conditions consisting of different modes of observation including an audience, co-action, one observer, video camera and mirror.

Task complexity can be thought of as a continuum depending on how much attentional resources need to be allocated and how automatic the task at hand is to the individual. Much focus has been put on simple versus complex, yet there are tasks which may fall in the middle and may be facilitated for some individuals and impaired for others based on the ability and personality orientation of the individual. The distraction explanation appears to be the most widely accepted explanation for social facilitation results and is supported by studies which demonstrate effects can be found with mannequins, flashing light or noise (Bond & Titus, 1983) This is not to say that the

nature of the presence has no effect on performance and most likely plays a role when relevant to the individual.

In contrast to the arousal theory, increased cognitive flexibility and thus increased distraction in extraverts cannot be attributed to increased arousal, since higher arousal states alone do not improve cognitive flexibility (Isen, et al., 1987). Arousal is thought to have unspecific effects on cognition in increasing the likelihood of the dominant response (Berlyne, 1967; Esterbrook, 1959). If this task was indeed a “simple” task in that it was automatic and did not require a central processor, the participants would have been facilitated due to evidence that automatic tasks are performed better when the central processor is engaged.

This study gives credence to the distraction-conflict theory of social facilitation (Baron, 1986) in addition to the idea that individuals differ in their responses based on their unique personality make-up. Unfortunately, the non-competitive task did not elicit a dominant response of facilitation and most likely engaged cognitive resources even after two learning trials. The non-competitive task presumably measured learning patterns in individuals of different personality orientations. Individuals scoring high on extraversion probably had a phasic increase of dopamine in the frontal lobes and sought to increase brain levels of dopamine by engaging with other people. Because those with high extraversion are tuned to interacting with stimuli in the environment, they attended to the presence in the room. When distracted by this presence, their performance was impaired compared with the absence condition. In contrast, individuals scoring high on anxiety, who are presumed to have an increase in noradrenergic response in the reticular

formation, had a sustained attention. Individuals with high negative affect also had reduced cue utilization were focused on the task at hand.

There was little contribution to the performance results from self-esteem, as self-esteem can be conceptualized as a byproduct of either extraversion or anxiety. Self-esteem is related to both positive and negative affect and is a mediating factor between extraversion and happiness and neuroticism and depression (Cheng & Furnham, 2003; Watson & Clark, 1984). Individuals scoring high on self-esteem appear to be responsive to others and positive stimuli in the environment such as those with high extraversion while individuals scoring low on self-esteem tend to focus on the negative aspects of the situation (Wood, Heimpel, & Michela, 2003; Smith & Petty, 1995). Individuals with low self-esteem tend to feel rejected while those with high self-esteem have a greater tendency to feel accepted in social situations (Baumeister & Leary 1995). The relationship between high anxiety and low self-esteem has been frequently documented (Coopersmith, 1967) with low self-esteem individuals being more likely to develop anxious symptoms (Wylie, 1961). In addition, individuals with low self-esteem are more likely to develop stomach ulcers and suffer from insomnia which is characteristics of anxiety (Coopersmith, 1967).

Studies indicate that these temperaments, extraversion/low anxiety and introversion/high anxiety are heritable traits that are usually consistent over time. Whereas extraversion is mediated by the dopaminergic system which orients individuals toward outside stimuli, for introverts the noradrenergic system puts an individual on alert and orients them away from outside stimuli. The extraversion/Introversion and high anxiety/low anxiety traits have similar patterns of contribution to performance in this

study and are highly correlated. It is the dichotomy between an orientation to outside stimuli (dopamine activated systems) and an orientation to internal stimuli (noradrenergic activated systems) which most likely contributed to the pattern of results.

These results have implications for use in organizations, which are increasingly using personality testing as a factor in hiring potential employees. For sales positions, extraverts have the advantage, but with this advantage, these individuals also have the propensity to divert their attention. Employers tend to consider anxiety or neuroticism as undesirable in a potential employee, yet when the task is not too difficult; individuals with a propensity toward anxiety can prevail and focus attention more effectively than individuals who are prone to distraction. Given that assessment centers screen potential employees on cognitive and personality measures, it is important to appreciate the contributions of individual differences. Different tasks will need different types of employees and determining what personality characteristics are central for each occupation is essential. In the future, assessment centers can concentrate on tasks which play on an individual's strengths and recommend them for jobs that match their preferences,

### *Limitations*

There were several limitations to this study. First an attempt was made to determine patterns of a simple and complex task which not attained. One task was a complex task in the sense that the dominant response was for the incorrect answer in the presence condition, but the intended simple task produced the same pattern of results as the complex task. The moderately complex task allowed the personality differences to

emerge whereas with the more complex task, the difficulty trumped any personality differences. If the participants had more time to learn the task and the criterion level was a perfect score, then a simple, automatic task would have been achieved. In addition, there may have been a ceiling effect where if an individual scored an 18 on the second learning task, no increase in performance was possible. As with many studies conducted at colleges, the participants were not rewarded for performing well so effort may have been lacking.

The results are noteworthy, to the extent that they underscore the importance of investigating individual difference variables that moderate the effects of an audience on performance. The data present a complex interactive pattern of results that is dependent not only on the presence or absence of an audience, but also the innate differences in the individuals performing the tasks.

## References

- Aiello, J. R. & Douthitt, E. A. (2001). Social Facilitation theory from Triplett to electronic performance monitoring. *Group Dynamics: Theory, Research & Practice*, 5(3), 163-180.
- Aiello, J. R. & Kolb, K. J. (1995). Electronic performance monitoring and social context: Impact on productivity and stress. *Journal of Applied Psychology*, 80, 339-353.
- Aiello, J. R. & Svec, C. M. (1993). Computer monitoring and work performance: Extending the social facilitation framework to electronic presence. *Journal of Applied Social Psychology*, 23, 537-548.
- Aiken, L. S., & West, S. G. (1991). *Multiple Regression: Testing and Interpreting interactions*. Newbury Park, CA: Sage.
- Allport, F. H. (1920). The influence of the group upon association and thought. *Journal of Experimental Psychology* 3, 159-182
- Allport, F. H. (1924). Response to social stimulation in the group. In F.H. Allport (Ed.), *Social Psychology* (pp.260-291). Hillsdale, NJ: Erlbaum.
- Ashby, F. G., Valentin, V. V., & Turken, A. U. (2002). The effects of positive affect and arousal on working memory and executive attention: Neurobiology and computational models. In S. Moore & M. Oaksford (Eds.), *Emotional cognition: From brain to behaviour* (pp. 245-287). Amsterdam: John Benjamins.
- Baddeley, A., Emslie, H., Kolodny, J., & Duncan, J. (1998). Random generation and the executive control of working memory. *Quarterly Journal of Experimental Psychology*, 51A, 819-852.
- Bagby, R. M., & Parker, J. D. A. (2001). Relation of rumination and distraction with neuroticism and extraversion in a sample of patients with major depression. *Cognitive Theory and Research*, 25, 91-102.
- Baron, R. S. (1986). Distraction – conflict theory: progress and problems. In L. Berkowitz (Ed.), *Advances in experimental social psychology*, 19, (pp.1-40).
- Baron, R. S., Moor, D. & Sanders, G. S. (1978). Distraction as a source of drive



- in social facilitation research. *Journal of Personality and Social Psychology*, 36, 816-824.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117, 497-529.
- Berkey, A. S., & Hoppe, R. A. (1972). The combined effect of audience and anxiety on paired-associates learning. *Psychonomic Science*, 29(6A), 351-353.
- Berlyne, D. E. (1967) Arousal and reinforcement, In *Nebraska Symposium on Motivation (pp. 1-110)*, University of Nebraska Press (1967).
- Biederman J, Spencer T. Attention-deficit/hyperactivity disorder (ADHD) as a noradrenergic disorder. *Biological Psychiatry*, 1999, 46, 1234-42.
- Blaskovich, J., Mendes, W. B., Hunter, S. B. & Salomon, K. (1999). Social “facilitation” as challenge and threat. *Journal of Personality and Social Psychology*, 77, 68-77.
- Bolte, A., Goschke, T., & Kuhl, J. (2003). Emotion and intuition: Effects of positive and negative mood on intuitive judgments of semantic coherence. *Psychological Science*, 14, 416-421.
- Bond, C. F. (1982). Social Facilitation: A self-presentational view. *Journal of Personality and Social Psychology*, 42, 1042-1050.
- Bond, C. F. & Titus, L. J. (1983). Social Facilitation: A Meta-Analysis of 241 Studies. *Psychological Bulletin*, 94(2), 265-292.
- Brockner, J. (1979a). Self-esteem, self-consciousness, and task performance: replications, extensions and possible explanations. *Journal of Personality and Social Psychology*, 37, 447-461.
- Brockner, J. (1979b). The effects of self-esteem, success-failure feedback, and self-consciousness. *Journal of Personality and Social Psychology*, 37, 1732-1741.
- Brockner, J. & Hulton, A. J. (1978). How to reverse the vicious cycle of low self-esteem: The importance of attentional focus. *Journal of Experimental Social Psychology*, 14, 1378-1388.
- Callaway, E. & Dembo, D. (1958) Narrowed attention; a psychological phenomenon that accompanies a certain physiological change, *A. M. A.*

*Archives of Neurology and Psychiatry*. 79(1), 74-90.

- Carver, C. S. & Scheier, M. F. (1981). The self attention induced feedback loop and social facilitation. *Journal of Experimental Social Psychology*, 17, 545-568.
- Chang, E. C. (1997). Positive and negative affectivity for academic and interpersonal domains: Relations to general affectivity, extraversion and neuroticism. *Personality and Individual Differences*, 22(6), 929-932.
- Cohen, J.L. and Davis, J.H. (1973). Effects of audience status, evaluation and time of action on performance with hidden-word problems. *Journal of Personality and Social Psychology*, 27, 74-85.
- Colquhoun, W. P., & Corcoran, W. J. (1964). The effects of time of the day and social isolation on the relationship between temperament and performance. *British Journal of Social and Clinical Psychology*, 3, 226-231.
- Compton, R. J. (2000). Ability to disengage attention predicts negative affect. *Cognition and Emotion*, 14, 401-415.
- Compton, R. J., Wirtz, D., Pajoumand, G., Claus, E., & Heller, W. (2004). Association between positive affect and attentional shifting. *Cognitive Therapy & Research*, 28(6), 733-744.
- Coopersmith, S. (1981). *The antecedents of self-esteem*. Palo Alto, CA: Consulting Psychologists Press.
- Costa, P. T. & McCrea, R. R. (1980). Influence of extraversion and neuroticism on subjective well-being: happy and unhappy people. *Journal of Personality and Social Psychology*, 38, 668-678.
- Costa, P. T. & McCrae, R. R. (1992). Normal personality assessment in clinical practice: The NEO Personality Inventory. *Psychological Assessment*, 4, 5-13.
- Cottrell, N. B. (1972). Social Facilitation. In C.G. McClintock (Ed.), *Experimental Social Psychology*, (pp.185-236), New York: Holt.
- Cottrell, N. B. (1968). Performance in the presence of other humans beings: mere presence and affiliations effects. In E.C. Simmel, R.A. Hoppe, & G. A. Milton (Eds.), *Social facilitation and imitative behavior* (pp. 91-110). Boston: Allyn and Bacon.

- Cox, F. N. (1966). Some relationships between text-anxiety and presence or absence of other person's on boys' performance on a repetitive motor task. *Journal of Experimental Child Psychology*, 3, 110-112.
- Crowne, D. & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology*, 1960, 24 (4), 349-354.
- Derryberry, D., & Rothbart, M. K. (1988). Arousal, affect, and attention as components of temperament. *Journal of Personality and Social Psychology*, 55, 958-966.
- Dashiell, J. F. Experimental studies of the influence of social situations on the behavior of individual human adults. In C. Murchison (Ed.), *A handbook of social psychology*. Worcester, Mass.: Clark University Press, 1935.
- Depue, R., Luciana, M., & Arbisi, P, Collins, P., & Leon, A. (1994). Dopamine and the structure of personality: Relation of agonist-induced dopamine D2 activity to positive emotionality. *Journal of Personality and Social Psychology*, 67, 485-498.
- Dreisbach, G. (2006). How positive affect modulates cognitive control: the costs and benefits of reduced maintenance capability. *Brain and Cognition*, 60, 11-19.
- Driesbach, G. & Goschke, T. (2004). How positive affect modulates cognitive control: reduced perseveration at the cost of increased distractibility. *Journal of Experimental Psychology. Learning, memory, and cognition*, 30(2), 343-53.
- Duffy, M. K., Shaw, J. D., Scott, K. D., & Tepper, B. J. 2006. The moderating roles of self-esteem and neuroticism in the relationship between group and individual undermining. *Journal of Applied Psychology*, 91, 1066-1077.
- Duval, S. & Wicklund, R. A. (1972). *A theory of objective self-awareness*. New York: Academic Press.
- Easterbrook, J. A. (1959). The effect of emotion on cue utilization and organization of behavior. *Psychological Review*, 66, 187-201.
- Elfgren, C. I. & Risberg J. (1998). Lateralized frontal blood flow increases during fluency tasks: influence of cognitive strategy. *Neuropsychologia*, 36, 505-512.

- Eysenck, H. J. (1967) *The biological basis of personality*. Springfield, IL: Charles C. Thomas.
- Eysenck, H. J. (1983). The roots of creativity: Cognitive ability or personality trait? *Roepers Review*, 5, 10-12.
- Eysenck, H. J. & Eysenck, M. W. (1985). *Personality and Individual Differences*. New York: Plenum Press.
- Feinberg, J. M. & Aiello, J. R. (2006). Social facilitation: A test of competing theories. *Journal of Applied Social Psychology* 36 (5), 1087-1109.
- Ganzer, V. J. (1968). Effects of audience presence and test anxiety on learning and retention in a serial learning situation, *Journal of Personality and Social Psychology*, 8, 194–199.
- Geen, R. G. (1976). Test anxiety, observation, and range of cue-utilization. *British Journal of Social and Clinical Psychology*, 15, 253–259.
- Geen, R. G. (1980). The effects of being observed on performance. In P.B. Paulus (Ed.), *Psychology of group influence* (pp. 61-97). Hillsdale, NJ: Erlbaum.
- Geen, R. G. (1991). Social motivation. *Annual Review of Psychology*, 42, 377-399.
- Geen, R. G. & Bushman, B. J. (1989). The arousing effects of social presence. Wagner, Hugh (Ed); Manstead, Antony (Ed). *Handbook of social psychophysiology*. (pp. 261-281). xvi, 447 pp. Oxford, England: John Wiley & Sons.
- Grant, T. & Dagee, K. (2003). Type of task, types of audience, types of actor: interactions between mere presence and personality type in a simple mathematical task. *Personality and Individual Differences*, 35, 633-639.
- Graydon, J., & Murphy, T. (1995). The effect of personality on social facilitation while performing a sports related task. *Personality and Individual Differences*, 19(2), 265–267.
- Guerin, B. (1993). *Social Facilitation*. Cambridge: University Press.
- Guerin, B. & Innes, J. M. (1984). Explanations of social facilitation: A review. *Current Psychological Research & Reviews*, 3(2), 32-52.
- Henchy, T., & Glass, D. C. (1968). Evaluation apprehension and the social

- facilitation of dominant responses. *Journal of Experimental Social Psychology*, 10, 446–454.
- Hollingworth, H. L. *The psychology of the audience*. New York: American Book: 1935.
- Howarth, E. (1969). Extraversion and increased interference in paired-associate learning. *Perceptual and Motor Skills*, 29, 403-206.
- Huguet, P., Galvaing, M.P., Monteil, J.M. and Dumas, F. (1999). Social presence effects in the Stroop task: Further evidence for an attentional view of social facilitation. *Journal of Personality and Social Psychology*, 77, 1011–1025.
- Hull, C.L. (1943). *Principles of behavior*. New York: Appleton, Century-Crofts.
- Isen, A. M., & Daubman, K. A. (1984). The influence of affect on categorization. *Journal of Personality and Social Psychology*, 47, 1206-1217.
- Isen, A. M., Niedenthal, P., & Cantor N. (1992). The influence of positive affect on social categorization, *Motivation and Emotion*, 16, 65 - 78.
- Judge, T. A., Erez, A., Bono, J. E. & Thorensen, C. J. (2002). Are measures of self-esteem, neuroticism, locus of control and generalized self-efficacy indicators of a common core construct? *Journal of Personality and Social Psychology*, 83, 693-710.
- Keogh, E., Bond, F.W., French, C. C., Richards, A., & Davis, R. E (2004). Test anxiety, susceptibility to distraction and examination performance. *Anxiety, Stress & Coping*, 17, 241-252.
- Lewis, B. P. & Linder, D. E. (1997). Thinking about choking? Attentional processes and paradoxical performance. *Personality and Social Psychology Bulletin*, 23, 937-944.
- Lezak, M. (1995). *Neuropsychological Assessment*. Oxford: Oxford University Press.
- Masters, R.S.W., Polman, R.C.J., & Hammond, N.V. (1993). Reinvestment: A dimension of personality implicated in skill breakdown under pressure. *Personality and Individual Differences*, 14, 655-666.
- Martens, R. (1969). Effect of an audience on learning and performance of a complex motor skill. *Journal of Personality and Social Psychology*, 12(3), 252–260.

- Manstead, A. S. R., & Semin, G. R. (1980). Social facilitation effects: Mere enhancement of dominant responses? *British Journal of Social and Clinical Psychology, 19*, 119-136.
- Mischel, W., Ebbe, B. Ebbesen, & Zeiss, A. R. (1973) Selective attention to the self: Situational and dispositional determinants. *Journal of Personality and Social Psychology, 27*, 213-225.
- Miller, E.K. & Cohen, J.D. (2001). An integrative theory of prefrontal cortex function. *Annual Review of Neuroscience, 24*, 167-202.
- Morgenstern, F. S, Hodgson, R. J. & Law, J. (1974). Work efficiency and personality: A comparison of introverted and extroverted subjects exposed to conditions and distraction and distortion of stimulus in a learning task. *Ergonomics, Vol. 17(2)*, 211-220.
- Muller, J., Dreisbach, G., Gosche, T., Hensch, T., Lesch, K-P, & Brocke, B. (2007). Dopamine and cognitive control: The prospect of monetary gains influences the balance between flexibility and stability in a set-shifting paradigm. *European Journal of Neuroscience, 26*, 3661-3668.
- Pederson, A. M. (1970). Effects of test anxiety and co-acting groups on learning and performance. *Perceptual and Motor Skills, 30*, 55-62.
- Paivio, A. (1965). Personality and audience influence. In B. Maher (Ed.). *Progress in experimental personality research* (Vol. 2, pp.127-173). New York: Academic Press.
- Quarter, J., & Marcus, A. (1971). Drive level and the audience effect: A test of Zajonc's theory. *The Journal of Social Psychology, 83*, 99-105.
- Rajecki, D. W., Ickes, W., Corcoran, C., & Lerner, K. (1977). Social facilitation of human performance: Mere presence effects. *Journal of Social Psychology, 102*, 297-310.
- Robins, R., Hendin, H. & Trzesniewski, K. (2001). Measuring global self-esteem: Construct validation of a single-item measure and the Rosenberg Self-Esteem Scale. *Personality and Social Psychology Bulletin, 27*, 151-161.
- Robinson-Staveley, K. & Cooper, J. (1990). Mere presence, gender, and reactions to computers: Studying human-computer interaction in the social context. *Journal of Experimental Social Psychology, 26*, 168-183.
- Rogers, G. M. & Revelle, W. (1998). Personality, Mood, and the evaluation of affective and neutral pair words. *Journal of Personality and Social Psychology, 74 (6)*, 1592-1605.

- Rosenberg, M. (1965). *Society and the Adolescent Self-Image*. Princeton, NJ: Princeton University Press.
- Rusting, C. L. (1998). Personality, mood, and cognitive processing of emotional information: Three conceptual frameworks. *Psychological Bulletin*, *124*(2), 165-196.
- Sanna, L. J. (1992). Self-efficacy theory: Implications for social facilitation and social loafing. *Journal of Personality and Social Psychology*, *62*(5), 774-786.
- Sanders, G. S., & Baron, R. S. (1975). The motivating effects of distraction on task performance. *Journal of Personality & Social Psychology*, *32*, 956-963.
- Schneider, W. & Shiffrin, R. M. (1977). Controlled and automatic human information processing: 1. Detection, search, and attention. *Psychological Review*, *84*, 1-66.
- Schultz, W. (1998). Predictive reward signal of dopamine neurons. *Journal of Neurophysiology*, *80*, 1-27.
- Seta, C. E. & Seta, J. J. (1985). When audience presence is enjoyable: The influences of audience awareness of prior success on performance and task interest. *Basic and Applied Social Psychology*, *16*, 95-108.
- Shrauger, J. S. (1972). Self-esteem and reactions to being observed by others. *Journal of Personality and Social Psychology*, *23*, 192-200.
- Smillie, L., Yeo, G., Furnham, A. & Jackson, C. J. (2006). Benefits of all work and no play: The relationship between neuroticism and performance as a function of resource allocation. *Journal of Applied Psychology*, *91*, 139-155.
- Smith, S. M., & Pretty, R. E. (1995). Personality moderators of mood congruency effects on cognition: the role of self-esteem and negative mood regulation. *Journal of Personality and Social Psychology*, *68*(6), 1092-1107.
- Spence, K. W. (1956). *Behavior theory and conditioning*. New Haven, CT: Yale University Press.
- Spence, K. W., Taylor, J. & Ketchel, R. (1956). Anxiety (drive) level and degree of competition in paired-associates learning. *Journal of Experimental Psychology*, *52*(5), 306-310.

- Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *The State-Trait Anxiety Inventory: Test manual*. Palo Alto, CA: Consulting Psychologist Press.
- Spielberger, C. D. (1980). *Test Anxiety Inventory: Preliminary professional manual*. Menlo Park, CA: Mind Garden.
- Strauss, B. (2002). Social facilitation in motor tasks: A review of research and theory. *Psychology of Sport and Exercise, 3*(3), 237-256.
- Sullivan, G. M., Coplan, J. D. , Kent, J. M., Gorman, J. M. (1999). The noradrenergic system in pathological anxiety: a focus on panic with relevance to generalized anxiety and phobias. *Biological Psychiatry, 46*(9), 1205-1218.
- Tafarodi, R.W. & Ho, C. (2006). Implicit and explicit self-esteem: What are we measuring? *Canadian Psychology, 47*(3), 195-202.
- Terry, D. J. & Kearnes, M. (1993). Effects of an audience on the task performance of subjects with high and low self-esteem. *Personality and Individual Differences, 15*(2), 137-145.
- Tolman, C. W. The role of the companion in social facilitation of animal behavior. In E.C. Simmel, R.A. Hoppe & G.A. Milton (Eds.), *Social facilitation and imitative behavior*. Boston: Allyn & Bacon, 1968.
- Troyer, A. K. & Craik, F. I. M. (2000). The effect of divided attention on memory for items and their context. *Canadian Journal of Experimental Psychology, 54*, 161-171.
- Triplet, N. (1898). The dynamogenic factors in peacemaking and competition. *American Journal of Psychology, 9*, 507-533.
- Uziel, L. (2007). Individual differences in the social facilitation effect: A review and meta-analysis. *Journal of Research in Personality, 41*, 579-601.
- Wagstaff, G. F., Wheatcroft, J., Cole, J., Brunas-Wagstaff, J., Blackmore, V. & Pilkington, A. (2008). Some cognitive and neuropsychological aspects of social inhibition and facilitation. *European Journal of Cognitive Psychology, 20*, 828-846
- Wankel, L. M. (1977). Audience size and trait anxiety effects upon state anxiety and motor performance. *Research Quarterly, 48*, 181-186.
- Watson, D., & Clark, L. A. (1984). Negative affectivity: The disposition to experience aversive emotional states. *Psychological Bulletin, 96*, 465-490.



- Wheeler, L. & Davis, H. (1967). Social disruption of performance on a DRL schedule. *Psychonomic Science*, 7, 249-250.
- Wine, J. D. (1971). Test anxiety and direction of attention. *Psychological Bulletin*, 76(2), 92-104.
- Wise, R. & Rompre, P. (1989). Dopamine and reward. *Annual Review of Psychology*, 40, 191 -225.
- Wood, J. V., Heimpel, S. A., & Michela, J. L. (2003). Savoring versus dampening: Self-esteem differences in regulating positive affect. *Journal of Personality and Social Psychology*, 85(3), 566–580.
- Wylie, R. C. (1961) *The Self Concept: A Critical Survey of Pertinent Research Literature*. Lincoln, NE: University of Nebraska Press.
- Zajonc, R. B. (1965). Social Facilitation, *Science*, 149, 269-274.
- Zajonc, R. B. (1980). Compresence. In P.B. Paulus (Ed.), *Psychology of Group Influence*, (pp. 35-60). Hillsdale, NJ: Erlbaum.
- Zajonc, R. B., Heingartner, A. & Herman, E. M. (1969). Social enhancement and impairment of performance in the cockroach. *Journal of Personality and Social Psychology* 13, 83-92.
- Zajonc, R. B. & Sales, S. M. (1966) Social facilitation of dominant and subordinate responses. *Journal of Experimental Social Psychology* 2, 160-168.
- Zentall, T. R. & Levine, J. M. (1972). Observational learning and social facilitation in the rat. *Science*, 178, 1220-1221.

## Footnotes

<sup>1</sup> Triplett's (1898) seminal paper on social facilitation, involved a study of bicycle racers, a task that is nearly automatic once learned and seldom forgotten. Triplett then went on to test children with fishing rods and found the same results, when they reeled in the presence of others, their speed was facilitated. With a closer look at the studies that do show enhancement, the nature of these tasks is that they are nearly automatic and require little thought. When Allport (1920) had individuals sit down with a word and try to generate word associations, individuals who completed the task in the presence of others generated more words than those who completed the task alone. Again, in this case the task didn't require much cognitive load, as free association is nearly automatic.

A sample of the tasks which have resulted in facilitation are the following: a rotary-pursuit task set on low speed (Guerin, 1986), a simple maze where the correct path is known (Rajecki, Ickes, Corcoran & Lerner, 1977), a simple number copying task (Saunders & Baron, 1975), reading every other letter in a word (Cohen & Davis, 1973), and a recognition task (Henchy & Glass, 1968). In reference to the word-association task, one study that did find facilitation with word-pair lists, however, the "absence" condition had the experimenter still present and thus the study was not a fair account of presence versus no presence (Baron, et al., 1978). In addition to the simple task facilitation in humans, this facilitation has been found in animals. The social facilitation effect can also be found in animals such as rats pressing a lever (Wheeler & Davis, 1967; Zentall & Levine, 1972), chickens pecking faster in the presence of other chickens (Tolman, 1968) and cockroaches performing a walking task (Zajonc, Heingartner, & Herman, 1969).

Zajonc (1965) defined "simple" as well-learned tasks and "complex" as tasks-to-be-learned. Zajonc and Sales (1966) and Cottrell et al. (1968) tested models in terms of learning specific skills (retention of nonsense syllables). Zajonc, in later works, and Geen (1980, 1991) replaced acquisition of skills with discrimination of tasks into simple and complex. Simple and complex tasks were defined subjectively and sometimes defined as an attribute of the subject - either expert or non-expert performers (Strauss, 2002).

Past studies in social facilitation effects have often used a combination of tasks, classified as simple or complex, and interpreted their findings under the categorization of either simple or complex without much focus on whether the task is automatic or needs attention. Since Zajonc's (1965) delineation of simple and complex, research into social facilitation effects has focused on performance when alone or under observation, some using cognitive tasks and others using motor tasks. The theories developed to explain the effects have claimed to be applicable for both cognitive and motor tasks, and researchers have reported results in terms of performance on "simple" and "complex" without agreeing on a reliable definition of either.

The conception of a simple task is most clearly indicated by the drive theory of social facilitation (Zajonc, 1965) which is most likely instrumental when the simple task is nearly automatic and requires little cognitive load. In this case, the increased drive will facilitate the performance even if not noticed by the individual. Strauss (2002) undertook the problem of defining simple and complex in regard to motor tasks. He classified motor tasks into categories based on conditioning/coordination with those requiring stamina, power and speed as conditional abilities and those requiring only speed and coordination as coordinating abilities. Tasks placing a high demand on conditioning abilities are those that require a high level of energy and stamina and most likely can be classified as "simple" according to Zajonc, since performance is dependent on energy level. Motor tasks placing demands on coordination and requiring practice such as driving and cycling demand more attention when first performed. Performance in this case is determined by the degree of automaticity and the amount of cognitive load needed to perform the task before it becomes more automatic (Strauss, 2002). Strauss found that studies which employed conditioning abilities are more likely to result in performance facilitation in the presence of others while those placing demands on coordination need to be learned showed performance impairment until the task is learned by the individual.

Given that motor tasks can be classified as simple and complex or automatic versus controlled, it is important to determine how cognitive tasks can be classified and what stages of processing lead to near automaticity. One way tasks can be classified is to address the manner in which information is processed. There is a hierarchical structure for information processing including a supervisory mechanism or executive system involved in controlling the operation of information processing subsystems (Wagstaff, Wheatcroft,

Cole, Brunas-Wagstaff, Blackmore & Pilkington, 2008). Cognitive tasks which are not well learned, contain novel sequences of action, require error correction, situations judged to be dangerous or technically difficult and those that require overcoming a habitual response are thought to require a central processor for execution. Support for this executive system comes from evidence which demonstrates overload of the central processor by conducting two or more tasks that require central processor activity. In this case, when the central processor activity is burdened with two attentionally demanding tasks, the result is performance impairment. However, when one task requires executive processing, additional lower level subcortical tasks do not adversely affect performance (Baddeley, Emslie, Kolodny & Duncan, 1998). This central processor is in charge of with switching of attention between tasks and interference between competing systems (Elfgren & Risberg, 1998).

Wagstaff, et al.(2008) proposed that the presence of others can place high demands on the central processor, especially if others are perceived as potentially threatening, leaving less available capacity to work on the task at hand. In contrast, the presence of others facilitates performance on routine tasks, not only through drive, but by reducing the inhibitory effects on such tasks. Performance of a well-learned task tends to be disrupted by attempts to focus and devote voluntary control to these automatic tasks (Lewis & Linder, 1997; Masters, Polman & Hammond, 1993). In addition, shifting of attention involves cognitive flexibility and is relatively effortful (Troyer & Craik, 2000). As a result of a verbal fluency study, Wagstaff, et al. (2008) determined that the presence of others places high demands on the frontal and executive systems, leaving a reduced amount of processing capacity to dedicate to performing tasks which require executive capacity. Evidence also indicates that the presence of others may facilitate performance on tasks which rely less on frontal and executive processing and more on subcortical processing.

According to Lezak (1995), highly automatic behaviors such as reciting the alphabet, counting, or days of the week are effortless tasks, recalled correctly without thought. These kinds of patterns are learned in early childhood and used often. Tasks to-be-learned are more complex, requiring the central processor for effort and attention. If cognitive tasks are divided, as are motor tasks, by the amount of attention required to perform them, the use of the executive processor, we have a definition of simple and complex that might better predict performance on both types of tasks. It is very possible that allocation of attention, executive processing, can explain the social facilitation effect. Attentional mechanisms can certainly explain the differences in performances on tasks and offer a better definition of "simple" and "complex" - simple being those that require little attention and are nearly automatic and utilize subcortical processing, and complex being those that require more attention and are cognitively controlled. However, this would also depending upon a person's degree of automaticity in performing the task, it may or may not be perceived as "simple" (Strauss, 2002). In addition, an individual's personality orientation may affect the executive processing such that those with a certain neurologic make-up may be more susceptible to attentional switching.

Baron (1986) later proposed that attentional mechanisms were most important and that drive was associated with the amount of distraction encountered that produce social facilitation effects. As defined in the social facilitation literature, distraction is represented as a conflict; and in some cases this reaction to distraction can increase motivation and responses elicited by the task at hand (Saunders & Baron, 1975). The key idea with Baron's theory is social presence, which is distracting, threatens the organism with cognitive overload, a phenomenon that may actually lead to a focus of attention. This attentional focusing may result in a "drive" effect and facilitate performance (by filtering out extraneous stimuli) when the task requires attention to central cues (simple task which is nearly automatized). When the task is more complex and puts demands on the central processor, it demands attention to a wide range of cues. It is clear that if a task requires little cognitive load, attentional mechanisms will be available to attend to the presence in the room. It is conceivable that when the task includes more cognitive load there is a conflict of which stimuli to attend to, the presence or the task, and the decision will most likely lie with the individual.

Table 1  
*Performance data for the non-competitive and competitive tasks*

	Items Correct	
	Mean	SD
Simple Task (n = 110)	15.12 <sup>a</sup>	2.80
Presence	14.82	2.65
Absence	15.50	2.89
Complex Task (n = 138)	9.37 <sup>a</sup>	3.39
Presence	8.83 <sup>b</sup>	3.24
Absence	10.03 <sup>b</sup>	3.49

numbers with the same superscript differ by <sup>a</sup>  $p < .001$  and <sup>b</sup>  $p < .05$

Table 2

*Participants' self-report and performance differences between the non-competitive and competitive task*

	Non-Competitive Task		Competitive Task		t
	M	SD	M	SD	
Word Difficulty <sup>a</sup>	5.66	1.27	4.34	1.50	7.78**
Task Difficulty <sup>a</sup>	5.28	1.34	3.97	1.37	8.00**
Stress <sup>b</sup>	4.77	1.54	3.68	1.64	6.72**
Uptight <sup>b</sup>	4.67	1.51	3.67	1.54	7.37**
Distressed <sup>b</sup>	4.91	1.55	4.06	1.53	5.58**
Frustrated <sup>b</sup>	4.95	1.62	3.51	1.54	8.90**

\*\* p <.01

<sup>a</sup> Participants responded on a 7 point scale ranging from (1) very difficult to (7) not very difficult

<sup>b</sup> Participants responded on a 7 point scale ranging from (1) very to (7) not very

Table 3  
 Summary of hierarchical regression analysis for trait anxiety

Personality Variable	$\Delta R^2$	$F$	$\beta$	$t$
<u>Non-Competitive Task<sup>a</sup></u>				
Step 1		3.628*		
Trait Anxiety Condition			-.086 -.724	-.582 -2.236*
Step 2	.062**	4.799**		
TA*C			.455	2.761**
<u>Competitive Task<sup>b</sup></u>				
Step 1		5.366**		
Trait Anxiety Condition			.195 -1.419	.683 -2.594*
Step 2	.001	4.030		
TA*C			.103	.35

<sup>a</sup>  $n = 110$ , <sup>b</sup>  $n = 138$ , \* $p < .05$ , \*\* $p < .01$

Table 4  
 Summary of hierarchical regression analysis for extraversion

Personality Variable	$\Delta R^2$	$F$	$\beta$	$t$
<u>Non-Competitive Task<sup>a</sup></u>				
Step 1		3.893*		
Extraversion			.153	.992
Condition			-.703	-2.183*
Step 2	.096**	6.331**		
E*C			-.516	-3.518**
<u>Competitive Task<sup>b</sup></u>				
Step 1		5.195**		
Extraversion			.024	.086
Condition			-1.435	-2.623**
Step 2	.000	3.870**		
E*C			-.028	-.102

<sup>a</sup>  $n = 110$ , <sup>b</sup>  $n = 138$ , \* $p < .05$ , \*\* $p < .01$

Table 5  
 Summary of hierarchical regression analysis for self-esteem

Personality Variable	$\Delta R^2$	$F$	$\beta$	$t$
<u>Non-competitive Task<sup>a</sup></u>				
Step 1		4.230**		
Self-Esteem Condition			.235 -.707	.140 -2.183*
Step 2	.045*	4.651**		
SE*C			-.357	-2.318*
<u>Competitive Task<sup>b</sup></u>				
Step 1		5.439**		
Self-Esteem Condition			-.231 -1.446	-.873 -2.614**
Step 2	.001	4.090**		
SE*C			-.106	-.383

<sup>a</sup>  $n = 110$ , <sup>b</sup>  $n = 138$ , \* $p < .05$ , \*\* $p < .01$



Table 6  
Summary of hierarchical regression analysis for negative orientation

Personality Variable	$\Delta R^2$	$F$	$\beta$	$t$
<u>Non-Competitive Task<sup>a</sup></u>				
Step 1		3.819*		
Negative Orientation Condition			-.171	-1.044
			-.691	-2.122*
Step 2	.060**	4.854**		
NO*C			.857	2.695**
<u>Competitive Task<sup>b</sup></u>				
Step 1		5.427**		
Negative Orientation Condition			.242	.853
			-1.451	-2.624**
Step 2	.001	4.087**		
NO*C			.239	.415

<sup>a</sup>  $n = 110$ , <sup>b</sup>  $n = 138$ , \* $p < .05$ , \*\* $p < .01$

Table 7  
 Summary of hierarchical regression analysis for positive orientation

Personality Variable	$\Delta R^2$	$F$	$\beta$	$t$
<u>Non-Competitive Task<sup>a</sup></u>				
Step 1		3.913*		
Positive Orientation Condition			.178 -.663	1.161 -2.044*
Step 2	.102**	6.536**		
PO*C			-1.050	-3.610**
<u>Competitive Task<sup>b</sup></u>				
Step 1		5.159**		
Positive Orientation Condition			-.028 -1.471	-.101 -2.662**
Step 2	.000	4.087**		
PO*C			-.088	-.155

<sup>a</sup>  $n = 110$ , <sup>b</sup>  $n = 138$ , \* $p < .05$ , \*\* $p < .01$

Figure 1. Interaction between trait anxiety and condition in predicting non-competitive task performance graphed at one standard deviation above and below the mean.

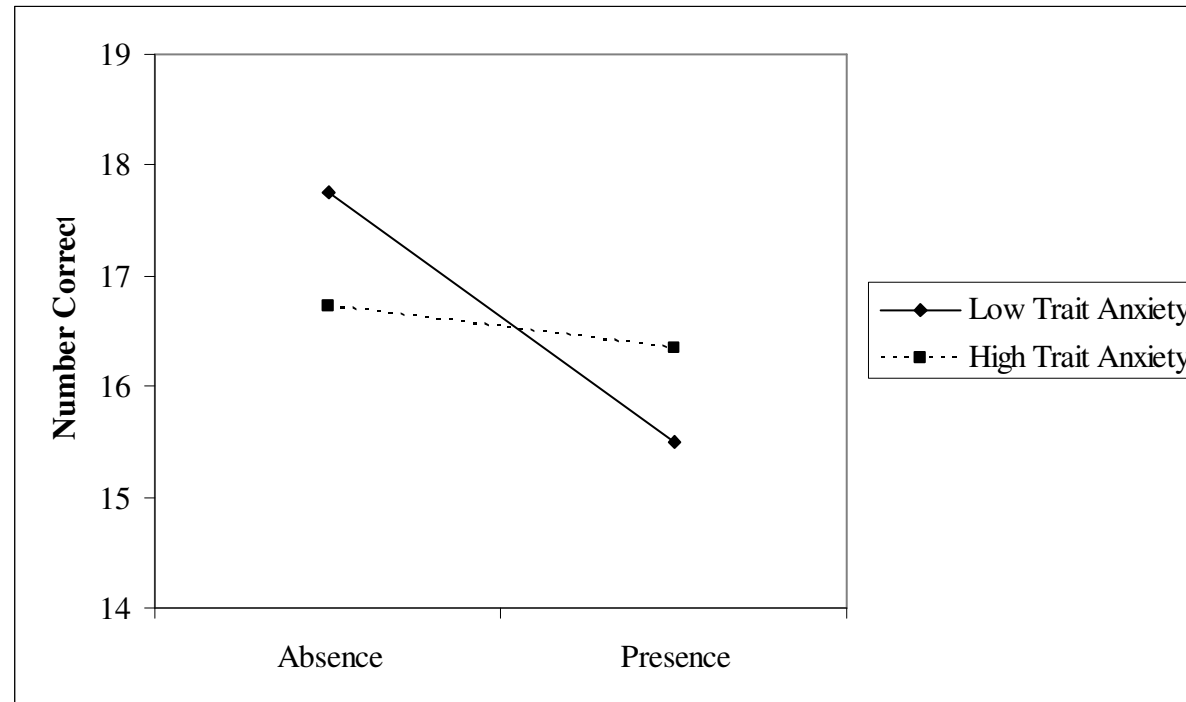


Figure 2. Interaction between extraversion and condition in predicting non-competitive task performance graphed at one standard deviation above and below the mean.

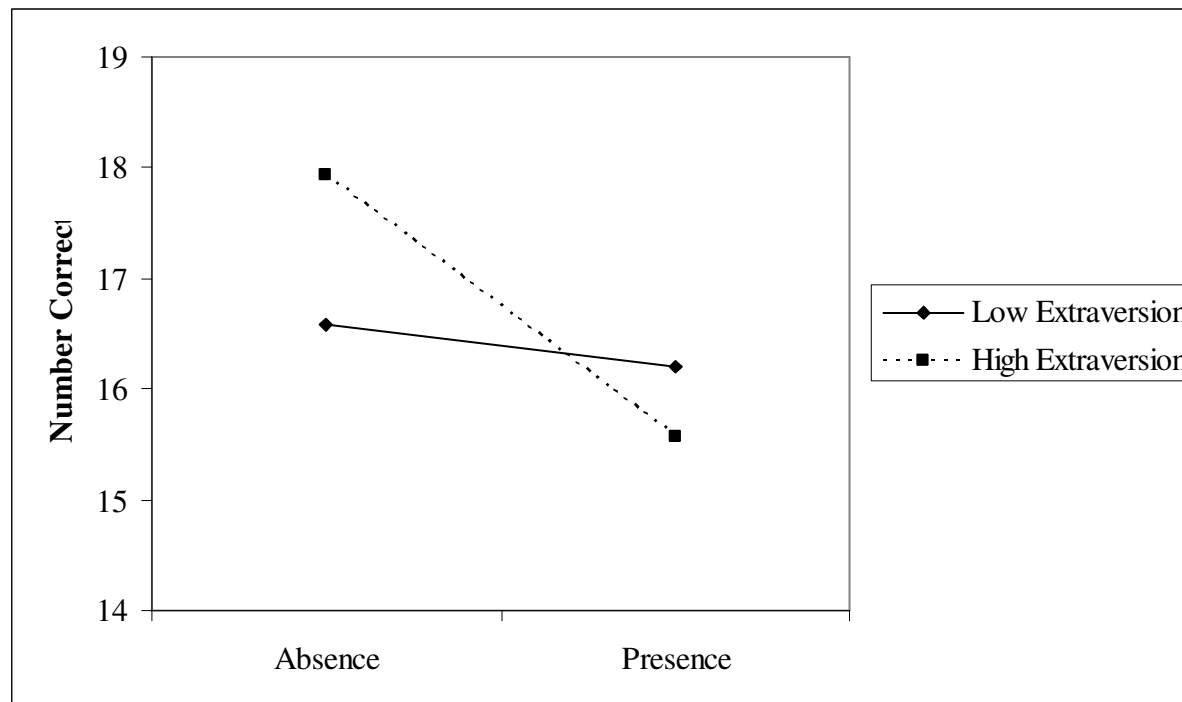


Figure 3. Interaction between self-esteem and condition in predicting non-competitive task performance graphed at one standard deviation above and below the mean.

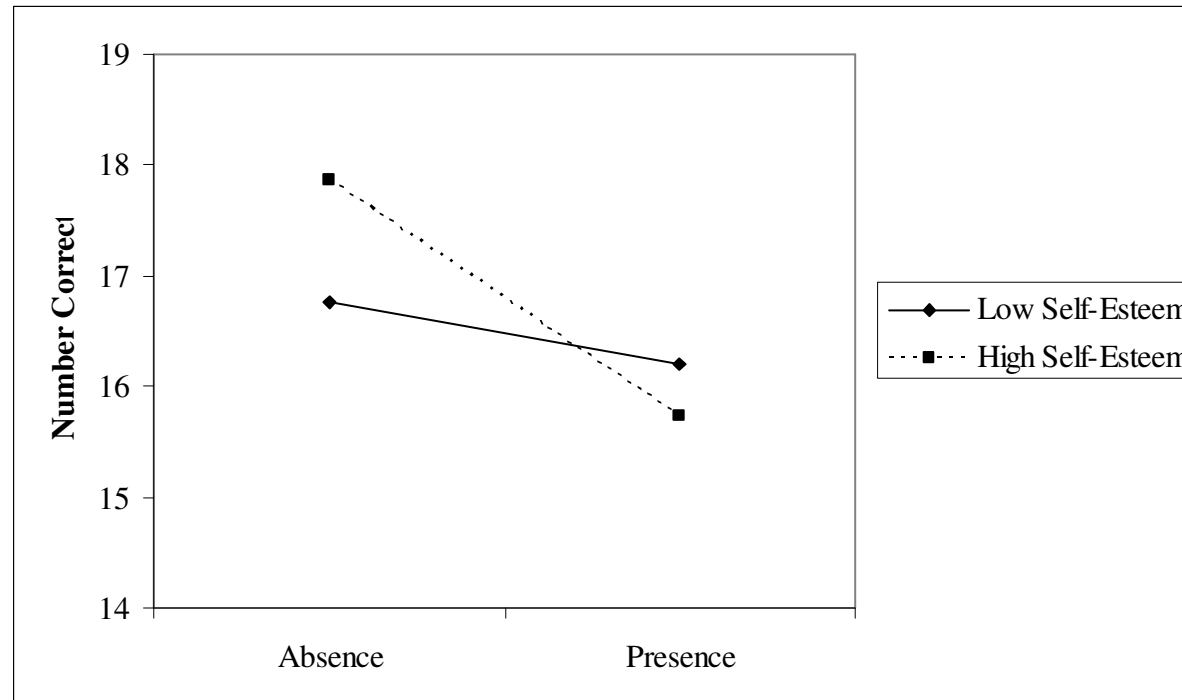


Figure 4. Interaction between negative orientation and condition in predicting non-competitive task performance graphed at one standard deviation above and below the mean.

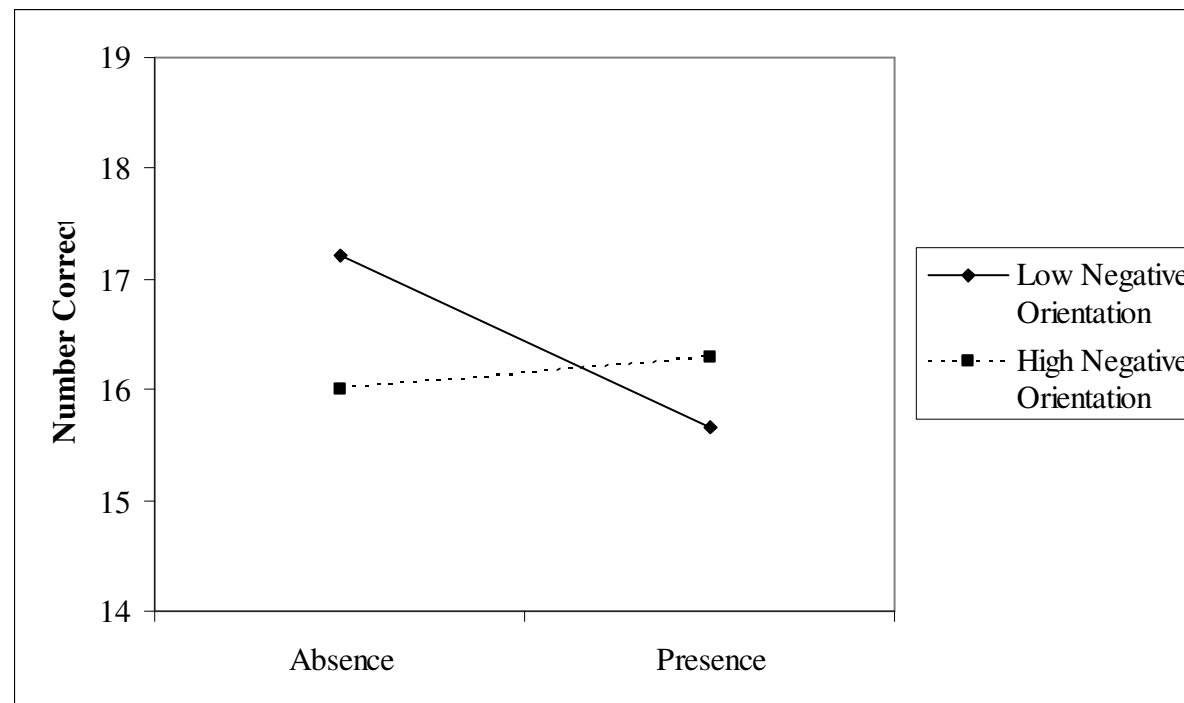
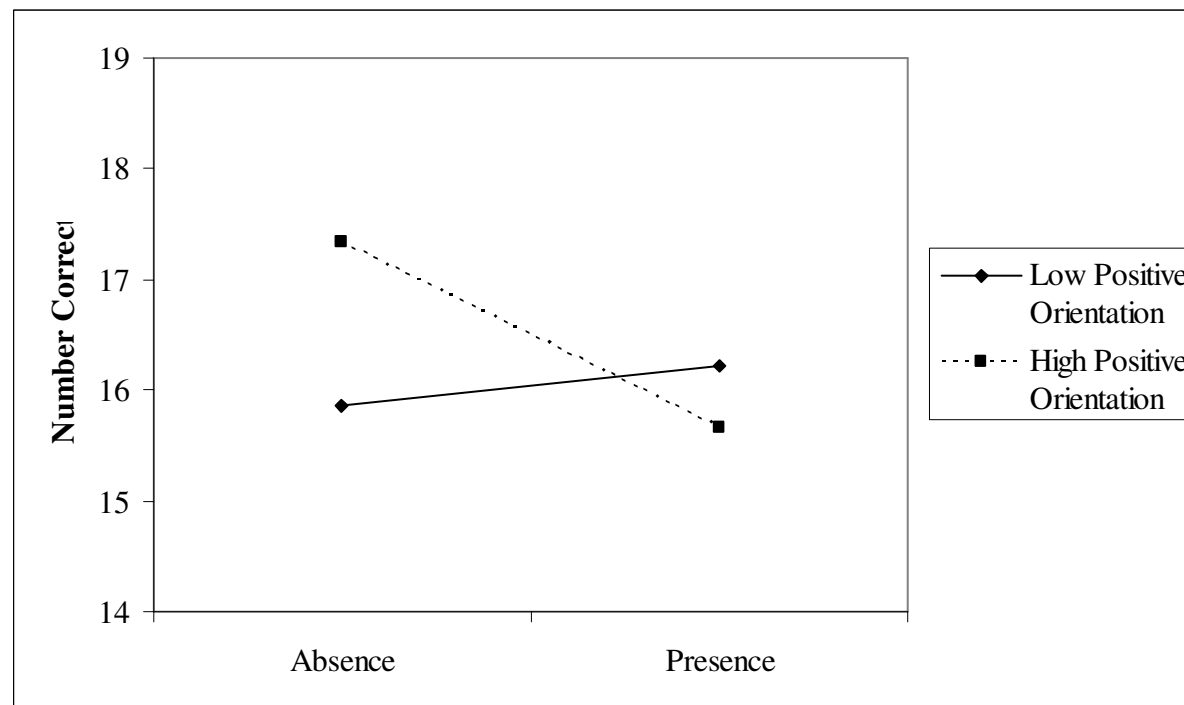


Figure 5. Interaction between negative orientation and condition in predicting non-competitive task performance graphed at one standard deviation above and below the mean.



*Appendix 1:**Word pairs**Practice List*

Tired-Sleepy  
 Slick-Rowdy  
 Angry-Mad  
 Unkind-elected  
 Happy-joyful  
 Rigorous-pretty

*Non-competitive list*

Adept-skillful  
 Barren-fruitless  
 Compete-thorough  
 Distant-remote  
 Empty-vacant  
 Frigid-arctic  
 Insane-crazy  
 Little-minute  
 Mammoth-oversize  
 Pious-devout  
 Roving-nomad  
 Tranquil-quiet  
 Wicked-evil  
 Rural-country  
 Grouchy-cranky  
 Ragged-tattered  
 Cautious-careful  
 Dirty-unclean

*Competitive list*

Insane-crazy  
 Wild-remote  
 Deranged-vacant  
 Adept-skillful  
 Expert-nomad  
 Proficient-minute  
 Complete-thorough  
 Total-funny  
 Comprehensive-country  
 Grouchy-cranky  
 Irritable-middle  
 Grumpy-circling  
 Dirty-unclean  
 Filthy-alert  
 Soiled-fast  
 Fearful-tainted  
 Alarmed-cultured  
 Afraid-scared



*Appendix 2:**Pre-task questions:*

I generally perform:  
Not well 1 2 3 4 5 6 7 Very well

In general, how well do you expect to perform:  
Not well 1 2 3 4 5 6 7 Very well

I don't like having my work compared to that of others.  
1=strongly disagree 2=disagree 3=neutral 4=agree 5=strongly agree

Today, I expect to perform very well on the tasks.  
1=strongly disagree 2=disagree 3=neutral 4=agree 5=strongly agree

I believe that I will perform better than most people on the tasks.  
1=strongly disagree 2=disagree 3=neutral 4=agree 5=strongly agree

I expect to perform at the \_\_\_\_\_ percentile today (0-100)  
1=0-20 2=20-40 3=40-60 4=60-80 5=80-100

*After the non-competitive task:*

2.1 When working on the word- pair task, I felt  
Stressed 1 2 3 4 5 6 7 Not stressed

2.2 When working on the word-pair task, I felt  
Uptight 1 2 3 4 5 6 7 Calm

2.3 When working on the word-pair task, I felt  
Frustrated 1 2 3 4 5 6 7 Not frustrated

2.4 When working on the word-pair task, I felt  
Distressed 1 2 3 4 5 6 7 Not distressed

2.5 I would describe the climate/ atmosphere for working on the task in this study as:  
Stressful 1 2 3 4 5 6 7 Not stressful

2.6 I felt I was being evaluated for the quality of my work  
Quite a lot 1 2 3 4 5 6 7 Not at all

2.7 I felt I was being evaluated for the speed of my work  
Quite a lot 1 2 3 4 5 6 7 Not at all

2.8 Was there someone present in the room while you were completing the tasks?  
1=Yes 2=No

2.9 If someone was present, How much pressure did you feel from your supervisor while working on the word-pair task?  
Quite a lot 1 2 3 4 5 6 7 None at all

2.10 I found the supervisor to be distracting:  
Quite a lot 1 2 3 4 5 6 7 Not at all

2.11 To what extent did the supervisor affect your performance on the word-pair task?  
Not at all 1 2 3 4 5 6 7 Very much

2.12 How important was it for you to do well on the task?  
Not very important 1 2 3 4 5 6 7 Very important

2.13 Before you begin the task, you thought you would perform  
Not very well 1 2 3 4 5 6 7 Very well

2.14 How much effort did you exert overall on the task?  
Very little 1 2 3 4 5 6 7 A lot

2.15 How well did you perform on the task?  
Not very well 1 2 3 4 5 6 7 Very well

2.16 How satisfied were you with your performance on the task?  
Not satisfied 1 2 3 4 5 6 7 Very satisfied

2.17 How difficult were the words that you studied for the task you just completed?  
Very difficult 1 2 3 4 5 6 7 Not very difficult

2.18 In general, how difficult was the task you just completed?  
Very difficult 1 2 3 4 5 6 7 Not very difficult

2.19 How well did you know the word-pairs from the list?  
Not very well 1 2 3 4 5 6 7 Very well

2.20 I felt distracted while working on the word-pair task.  
Disagree 1 2 3 4 5 6 7 Agree

2.21 I felt I was being judged?  
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

*After the competitive task:*

3.1 When working on the word-pair task, I felt  
Stressed 1 2 3 4 5 6 7 Not stressed

3.2 When working on the word-pair task, I felt  
Uptight 1 2 3 4 5 6 7 Calm

3.3 When working on the word-pair task, I felt  
Frustrated 1 2 3 4 5 6 7 Not frustrated

3.4 When working on the word-pair task, I felt  
Distressed 1 2 3 4 5 6 7 Not distressed

3.5 I would describe the climate/ atmosphere for working on the task in this study as:  
Stressful 1 2 3 4 5 6 7 Not stressful

3.6 I felt I was being evaluated for the quality of my work  
Quite a lot 1 2 3 4 5 6 7 Not at all

3.7 I felt I was being evaluated for the speed of my work

Quite a lot 1 2 3 4 5 6 7 Not at all

3.8 Was someone present in the room while you were completing the tasks?

1=yes 2=no

3.9 If someone was present, How much pressure would you feel from your supervisor while working on the word-pair task?

Quite a lot 1 2 3 4 5 6 7 None at all

3.10 I found the supervisor to be distracting:

Quite a lot 1 2 3 4 5 6 7 Not at all

3.11 To what extent did the supervisor effect your performance on the word-pair task?

Not at all 1 2 3 4 5 6 7 Very much

3.12 How important was it for you to do well on the task?

Not very important 1 2 3 4 5 6 7 Very important

3.13 Before you began the task, you thought you would perform

Not very well 1 2 3 4 5 6 7 Very well

3.14 How much effort did you exert overall on the task?

Very little 1 2 3 4 5 6 7 A lot

3.15 How well did you perform on the task?

Not very well 1 2 3 4 5 6 7 Very well

3.16 How satisfied were you with your performance on the task?

Not satisfied 1 2 3 4 5 6 7 Very satisfied

3.17 How difficult were the words that you studied for the task you just completed?

Very difficult 1 2 3 4 5 6 7 Not very difficult

3.18 In general, how difficult was the task you just completed?

Very difficult 1 2 3 4 5 6 7 Not very difficult

3.19 How well did you know the word-pairs from the list?

Not very well 1 2 3 4 5 6 7 Very well

3.20 I felt distracted while working on the word-pair task.

Disagree 1 2 3 4 5 6 7 Agree

3.21 The supervisor was qualified to evaluate my performance.

Agree 1 2 3 4 5 6 7 Disagree

3.22 I felt I was being judged?

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

3.23 Was there someone in the room with you as you performed the task other than the experimenter?

1=yes 2=no

Did you feel the supervisor was evaluating your performance on the word-pair tasks?

Not at all 1 2 3 4 5 6 7 highly evaluating

Did you find the supervisor distracting?

Not at all 1 2 3 4 5 6 7 very distracting