

## Social Anxiety and Word Use: How Environments Can Influence Words

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### ABSTRACT

**Language provides insight into individuals' perceptions, needs, and desires; in addition, stress has been shown to influence how others perceive an individual. In the current study, we investigated the impact of stress on language. The ninety-four participants enrolled were asked to complete a speech about the body part of theirs that they liked the least. Speeches were transcribed and entered into linguistic software where a percentage of specific word use of the whole speech sample was analyzed. The specific word use analyzed in the speeches included items such as articles, prepositions, and first person singulars. In addition, groups of dictionary words that are blanketed by a certain domain, such as self-words, social words, and references to others, were also analyzed. Initial results corroborated past research, in which males used more prepositions and articles than females, and females used more first person singulars and words related to the self than males. Secondly, results demonstrated that increased anxiety levels in males correlated with increases of words reflecting social processes and references to others. This association was not observed in females. Current gender theories of coping with stress suggest that females will seek affiliation in times of stress (tend and befriend response), while males react with aggression and social withdrawal during stressful situations (fight or flight response). The present study demonstrated that word use and stress coping mechanisms were not synonymous. Implications from this study show that various mental processes may affect word use; in addition, overt observation of word use may not be directly linked to one's gender dependent stress coping mechanism.**

### INTRODUCTION

Words serve as a link between a person's social perceptions and their sense of self. This link expands beyond just verbal communication; these words

are used to facilitate negotiation of relationships (Pinker 2007). Words used in conversation are not just words, they

are tools used to convey thoughts, desires, and needs.

Steven Pinker (2003) has shown evidence that language serves as part of an executive function and not as the medium of all thought. For example, primates and infants have categorical function of thought without the use of language, such as: objects, space, cause and effect, number, probability, agency and even tool creation (Pinker 2003). However, those who have language faculties use words as a form of expression of their self.

#### *Word Use*

Pennebaker and King (1999) have proposed that the way people speak reveals bits about their own individual identity; word choice reveals a person's mental, social, and physical state, including a person's unconscious condition (Pennebaker et al. 2003). In a study comprised of more than 14,000 language samples incorporating various forms of communication, Pennebaker and colleagues had shown that word use fluctuates on numerous degrees of demographic variables, such as age and gender, and these word choices are utilized in different ways (Newman et al. 2008; Pennebaker et al. 2003).

Gender differences were found in the types of words used; specifically, males used more prepositions and articles than females, which suggest that males demonstrated a more socially-detached linguistic pattern (Pennebaker et al. 2003). Females used more first person singulars ("I", for example), function words (like pronouns), and social references reflecting various group processes (a certain group of words that are encompassed by a social domain; including but not limited to

"they", "talk" etc.) than males. However, because this study analyzed both written and spoken language; here it was found that people would use language differently depending on modality.

Pennebaker asserts that word choice is also affected by stress. For example, when sharing a traumatic experience with others, parts of speech were found to subtly change with decreased use of first person singulars, and the use of first person plurals ("we") observably increased (Gortner and Pennebaker 2003; Pennebaker and Lay 2002; Pennebaker et al. 2003; Stone and Pennebaker 2002). Furthermore, positive correlations were found between depression and an individual's use of "I" (Pennebaker et al. 2003). When these individuals were asked to talk about any topic for ten minutes, depressed people used "I" significantly more than the non-depressed, no matter the subject they spoke about. This study indicates how one single choice of words could be an indicator of a person's negative state, which was suggested to reflect a linguistic pattern of self-focus related to depression. Depression and other affective disorders are characterized by a high degree of self-preoccupation, and this study posits a link between word choice and mental state (Pennebaker et al. 2003).

The reason for choosing use a set of words is influenced by a number of factors, including a person's perception, current state of being, as well as shifting environments (Giles and Coupland 1991; Pennebaker et al. 2003). Therefore, word choice during speech may not reflect a conscious choice, but may be influenced by the environment and social situations in which an individual is engaged.

### *Stress and Word Use*

Past research has found that word use is influenced by distress. One study conducted by Boals and Klein (2005) found significant changes in word use when people described a failed romantic relationship. Participants wrote about the time prior to and after their breakup. Boals and Klein (2005) found a significant difference between pre- and post-breakup writings in the use of cognitive and affective words, as well as differences in use of pronouns, all of which were dependent on the level of distress associated with the breakup. The word use differences found in this study suggest that the elapsed time of breakup, the occurrence and perception of the event, whether distressing or not, can alter the words used when they explained their situations.

Another study analyzed interviews conducted on 20 holocaust survivors (Boals and Perez 2009). The with-in subjects design compared conversations of people speaking about holocaust-related experiences (stressful event) to non-holocaust related experiences (non-stressful). Differences in the use of first-person singulars (I) and plurals (we), affect words (anger, happy), and cognitive words (such as therefore, because, understand) were reviewed. Cognitive word use was found to reflect coping processes, as well as serve as an indicator of non-avoidant behavior related to the traumatic experience even years after the first interview. However, use of first person singulars decreased when speaking holocaust-related events, and use of first-person plurals increased.

Differences in first-person word use were thought to be triggered,

because people experienced the holocaust with others as a collective stressful experience instead of being alone at the time of the event. Typically, past research has found that when discussing a stressful event, use of first person singulars will increase (Boals and Klein 2005; Pennebaker and Lay 2002). This is an example of how word use greatly depends on subject matter and time of the event, as well as the circumstance under which the stress was induced.

Researchers have also found that people's language use in expressive writing can help predict beneficial outcomes (Pennebaker et al. 1997). Here it was thought that by measuring word use in narratives describing traumatic and emotionally distressing periods, changes in self-reflective thinking type words (i.e., understand, insight) or causal thinking words (reason, because) between writing sessions would be indicative of health improvements over time. In addition, uses of words associated with positive emotions (e.g., happy) were thought to correlate with better health outcomes than negative word use (e.g., angry). Results suggested that participants who increased their use of positive emotion words had better health outcomes over time. In addition, those participants who used more self reflective or causal thinking words over time showed a decrease in doctor visits and physical symptoms of illness, college student's grades had improved, and unemployed engineers had found work faster than those who had not significantly increased causal thinking word use for their second narrative. This research suggests that people's word use over time is a product of one's mental and physical change.

### *Word Use in Social Situations*

Stressful situations have been found to change word choice; however, word use may also vary depending on the individual's desire to promote social interaction. The communication accommodation theory suggests that people can negotiate the social distance between themselves and others during interactions by creating, preserving, or minimizing that distance (Giles and Coupland 1991; Pennebaker et al. 2003). Perhaps then, word choice between parties in social conversation could be used as a measure for social distance.

During social situations, language can affect how listeners respond to a speaker. When individuals attempt to present themselves in a specific manner, they often attempt to control how they are viewed and evaluated by others. Listeners not only make social judgments based on the speaker's behavior, but also on the words that are used (Kircher and David 2003). People use language as a tool to help them achieve positive evaluations and maintain a safe social distance to others. However, if individuals doubt their ability to convey a particular impression, they may feel anxious in social situations (Mack et al. 2007).

Past studies have shown that people experiencing social anxiety will allow longer silences to develop during conversation, and take a longer time to respond, than those not experiencing social anxiety (Leary and Kowlaski 1995). This is an example of how language can be influenced by a person's level of perceived anxiety. However, the association between specific word choice and perception of social anxiety has not been well studied; in the present study,

we sought to examine how social anxiety, specifically social physique anxiety, can change word use.

### *Social Anxiety and Physique Evaluation*

One particular type of social anxiety, social physique anxiety (SPA), occurs when a person is concerned with how one's physical appearance is viewed by others (Russell 2002). Carron et al. (1999) had found that the presence of others, regardless of the company's gender, significantly reduced SPA as compared to the anxiety levels of the participants in the alone condition.

However, the effect of SPA may also differ depending on the type of relationship between subjects and their peers (Mack et al. 2007). Only female participants used friends as a source of protection, which reduced their levels of SPA. Mack and colleagues suggest that this reduction in SPA occurs for only females because they frequently discuss each other's physique supportively. This study found that males did not experience body related discussions or supportive engagements about physique as much as females did. As a result, when this type of engagement occurred, males had a higher level of SPA than females. The greater impact of social anxiety on males signified stronger body dissatisfaction and an even greater desire to alter one's own physique.

Being around others can alleviate rising levels of SPA for females (Mack et al. 2007). Males, however, might still be seeking for social interaction to alleviate their symptoms, but may use a different modality when seeking for this support. Word choice might serve as a means for a person experiencing SPA to unknowingly communicate a need for others, especially among males.

### *Gender Differences in Stress*

Anxious situations of all kinds can incite a stress response in individuals, but the resulting reaction differs by gender. Whether a person experiences a physiological or psychological reaction, stressful situations can impact a person in both a beneficial or negative way. Depending on whether the stressor is acute or chronic, the person may react differently.

During an acute stressor, the person realizes that they are in a situation in which they need to protect themselves. It has been proposed that males and females react differently in these times of stress. Taylor (2006) proposes that females have a tend-and-befriend response when experiencing a stressful situation. This type of reaction facilitates behaviors that are oriented towards nurturing (tend) and cooperation (befriend) instead of competition. In contrast, males are compelled, in times of stress, to react with a fight-or-flight response. Language may play an important role in these types of stress responses, solely because a person engaged in the stressful situation may have to communicate their need to act.

Empirical evidence also points toward gender differences during a stress response. Gender differences are apparent in marked differences in the fluctuation of hormonal level during times of stress. Ennis et al. (2001) found that levels of cortisol response correlate with gender and how individuals perceived their stressful situation. Males who perceived their situation as a challenge had a significant rise in cortisol and females that viewed their

situation as a challenge had a significant decrease in cortisol levels. Inhibited cortisol levels in females may facilitate a decrease in the stress response, specifically in the hypothalamic-pituitary-adrenal (HPA) activation process. This decrease in the stress response was hypothesized to promote the tend-and-befriend response in females (Ennis et al. 2001). These biological changes are due in part of a psychological perception. Many variables influence people's reactions in time of stress; including gender, perception, and hormonal response. Perhaps language is impacted specifically by a person's stress response and influenced by all of these variables that define their particular reaction to stress.

### *Stress, Anxiety, and Word Use*

The present study examines whether levels of expressed state anxiety affect words used by males and females to describe an unfavorable body part. We hypothesized that females will use more first person singulars and references to the self, and males would use more prepositions and articles, which would be consistent with past research suggesting that this word use in females reflect social processes (use of more social words, i.e. "advice", and more first person singulars than males), while male's pattern of word use reflect socially detached language (more articles and prepositions than females) (Newman et al. 2008; Pennebaker et al. 2003).

Secondly, we hypothesized that there will be an interaction between gender and state anxiety on word use. We theorize that female's word choice does not change when levels of state

anxiety increase, and that males will show a significant positive correlation between social word use and state anxiety levels.

## **METHODS AND METHODS**

### *Participants*

Ninety-four undergraduates ( $n = 61$  females) from the University of North Texas were randomly selected and received partial course credit for participation. Results from nine participants were removed for failure to follow instructions for the speech.

A control group was used in order to compare levels of state anxiety scores. This control group was not asked to give a speech; therefore, no transcriptions were able to be included in the primary analysis. However, this control group allowed for confirmation that independent variable manipulation resulted in elevated levels of stress.

### *Inducing stress*

Participants were asked to discuss their least favorite body part for three minutes while being videotaped. This task has been successfully used in prior research as a public speaking task to induce stress (Britt et al. 2001; Starcke et al. 2008). Researchers have also indicated that discussion of a person's own physique will induce anxiety (SPA), especially if the participant engages in social comparisons to others (Mack et al. 2007).

### *State and trait anxiety*

Participants completed the State-Trait Anxiety Inventory as a measure for their level of state and trait anxiety (STAI; Spielberger et al. 1970). The STAI

includes two different subscales that independently measure state and trait anxiety. The state anxiety subscale was used as a measure of SPA. Test-retest reliability differs between the two subscales, with higher reliability for trait anxiety (.97) and lower reliability for state anxiety (.45) (Metzger, 1976).

### *Demographics*

Assessments of the participant's gender, age, and ethnicity were conducted through completion of a series of demographic questions.

### *Text analysis*

Linguistic Inquiry and Word Count (Pennebaker et al. 2007) software coded various words used during participants' speech as a percentage of specific word use of the whole speech sample. Using a percentage as the word use score reduced the effects that length could have on word use in transcribed speeches.

In the default dictionary, "LIWC recognizes more than 2200 words (about 80% of the words people normally use in non-technical speech and writing)" (Groom and Pennebaker 2002). The focus for the current study was prepositions, articles, indicators of self (e.g., "me", "our", "we"), and references to others and social words (for example: "us", "communicate", "giving"). These categories were chosen to verify previous literature depicting gender differences in the previous listed word groups, as well as to examine gender differences in social word use. Additional word use categories were not relevant to the current study, and therefore not analyzed. Reliability measures indicate that across the 72 language variables that LIWC is capable

of analyzing (i.e., first person singulars, self words, insight words, etc.), a mean Cronbach's alpha coefficient (an internal consistency estimate of reliability and validity on test scores) of 0.59 was purported, in which roughly 80% of these language variables used at any time had coefficients of 0.60 or higher (Pennebaker and King 1999).

#### *Statistical Analyses*

Outlier analyses were conducted to remove any anomalies within the data set, including any scores outside of three deviations from the mean. T-tests were used to compare our control group (no speech) to our speech sample to examine whether or not stress manipulation was successful.

To determine if there any significant differences between gender and types of words used, t-tests were conducted between gender and each word type, including: articles, first-person singulars, prepositions, and self related words. A Levene's test for equality of variance was conducted, and if variances were unequal, a Satterwaite test was completed. Effect sizes were measured with Cohen's *d* for each t-test conducted. All tests were two-tailed tests.

A regression model was used to examine relationships between gender, state anxiety, and social word use. Beta weights were used to measure the strength of the regression model variables, and correlational analyses were conducted to further explore any interactions within the regression model.

#### *Procedure*

All participants gave consent to participate in the study. A trained research assistant led the participant in

to a private room in which they were told that they had to give a speech about the body part of theirs they liked the least. They were informed that the public speaking task would be videotaped and shown to a group of undergraduates for evaluation. Participants were given three minutes alone to prepare what they would speak about during their recording. Following the three-minute preparation time, participants were instructed to complete the STAI questionnaire and then conduct their speech.

When participants were instructed to give their speech, they were informed to face the camera. Participants were told that he or she could start their speech only when the experimenter left the room. The researcher turned on the video camera and exited. The participants were given exactly three minutes to talk about the body part of theirs they liked the least and why. The participants then completed the demographics questionnaire were debriefed.

## **RESULTS**

#### *Outlier Analyses*

Participants whose speech included 1.62 percent or less of self-words were excluded from analysis,  $M = 10.86$ ,  $SD = 3.08$ , ( $n = 2$  females). Also excluded were participants whose speech contained 1.54 percent or less of first person singulars,  $M = 10.69$ ,  $SD = 3.05$ , ( $n = 2$  females). Speeches using less than 2.18 percent of prepositions in their transcribed speech were also removed,  $M = 8.81$ ,  $SD = 2.21$ , ( $n = 2$  females).

Table 1.

*Percentage of Word Categories Used by Gender*

Word categories	Mean Percentage ( <i>SD</i> )			<i>t</i> ( <i>df</i> )	<i>d</i>
	Mean	Males	Female		
Articles	3.53	4.22 (1.47)	3.17 (1.35)	<i>t</i> (84) = 3.30*	.74
First person singular	10.98	9.76 (2.26)	11.61 (2.58)	<i>t</i> (82) = -3.25*	.76
Prepositions	9.03	10 (1.11)	8.51 (2.05)	<i>t</i> (81.9) = 4.32***	.90
Self words	11.16	9.83 (2.25)	11.84 (2.58)	<i>t</i> (82) = -3.54**	.83

Note. \* $p < .01$ , \*\* $p < .001$ , \*\*\* $p < .0001$

**Table 1.** This table summarizes general word use differences found between males and females. These results are synonymous with the Newman et al. (2008) study, which examined word use between genders. Newman et al. suggests this pattern reflects a socially detached linguistic pattern for males (significantly more articles and prepositions than females), and language that is more social in nature for females (significantly more first person singulars and self-words than males).

### *Analysis of Stress Manipulation*

A manipulation of stress was analyzed through a t-test to ensure that stress had been induced in the experimental groups as compared to the control condition. The experimental group had significantly higher state anxiety scores than the control group,  $t(184) = 4.54, p < 0.0001$ .

### *Gender Differences in Word Use*

T-tests revealed significant gender differences in the use of articles,  $t(84) = 3.30, p < 0.01, d = 0.74$ ; use of first person singulars,  $t(82) = -3.25, p <$

$0.01, d = 0.76$ ; and self related words,  $t(82) = -3.54, p < 0.001, d = 0.83$ . A Levene's test for equality of variance was not met for gender differences and prepositions ( $p < 0.01$ ), thus the Satterthwaite test was conducted to examine gender differences in the use of prepositions,  $t(81.9) = 4.32, p < 0.0001, d = 0.90$ . As seen in Table 1, males used a significantly greater percentage of articles and prepositions than females, while females used a greater percentage of first person singulars and self-related words than males.

### *Interaction between Gender and State Anxiety*

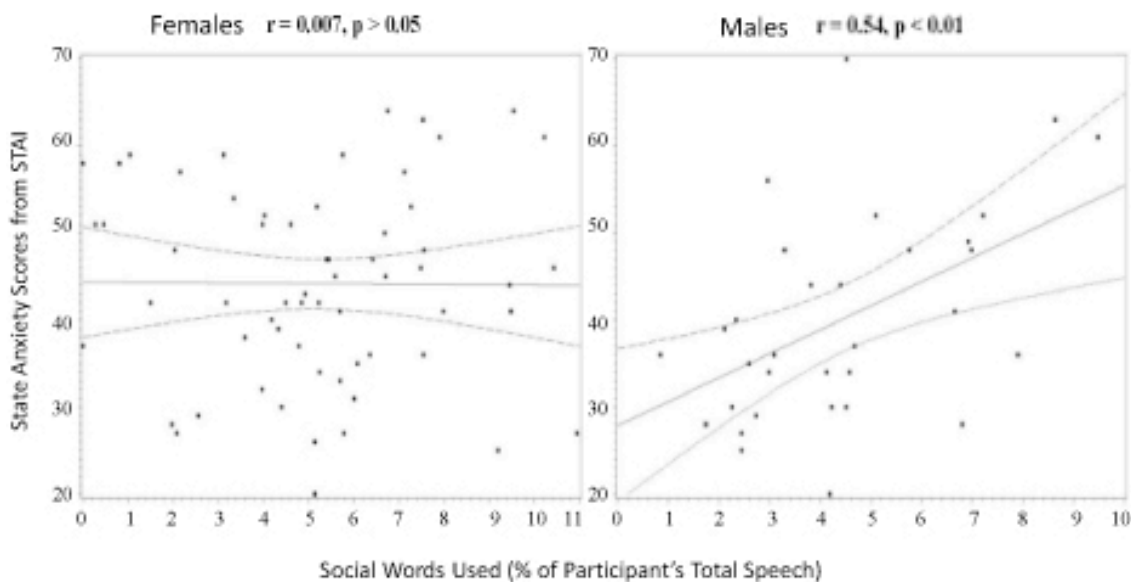
A regression model was conducted to evaluate the relationships between gender, state anxiety levels, and social word use. There was no overall correlation between anxiety levels, gender, and the percentage of social words used,  $F(4, 80) = 1.79, R^2 = 0.08, p < 0.05$ . However, gender was a significant predictor of social words used,  $F(1, 80) = -2.00, p < 0.05, \eta^2 = -0.87$ . State anxiety was not a significant predictor of social word use,  $p > 0.05$ . Interestingly, however, the interaction of state anxiety and gender on social word use was marginally significant,  $F(1, 80) = 1.89, p = 0.05, \eta^2 = 0.82$ .

To further explore this interaction, correlational analyses were conducted. As depicted in Figure 2, among female participants, there was no correlation between state anxiety levels and percentage of social word use,  $r = 0.007, p > 0.05$ . In contrast, for males subjects, there was a positive correlation of state anxiety levels and percentage of social word use,  $r = 0.54, p < 0.01$ . Not surprisingly, the categories of social



Figure 2.

*Relationship between State Anxiety Levels and Social Word Use by Gender*



word use and references to others were

highly correlated,  $r(29) = 0.92, p <$

**Figure 2.** Participants state anxiety was measured (STAI) after being told they would have to give a speech about the body part of theirs they liked the least. Individual speeches were transcribed and analyzed to find the percentage of social words used of the individual's whole speech. The resulting effects of the speech led to higher state anxiety levels. Results demonstrated that increased anxiety levels in males correlated with increases of words reflecting social processes and references to others, whereas females had no change in social word use. This suggests that current theories of stress coping mechanisms (fight or flight response for males, and tend and befriend response for females) are not directly reflected in word use linguistic patterns.

0.0001 for males, and  $r(57) = 0.89, p <$   
0.0001 for females.

## DISCUSSION

The first hypothesis posited that females used more first person singulars and references to the self than males. In addition, we hypothesized that males used significantly more prepositions and articles than females. These results corroborated past research of a general gender difference in word use, and this first hypothesis was supported (Newman et al. 2008; Pennebaker et al. 2003).

Secondly, we hypothesized that increasing state anxiety levels would be positively correlated with increases in social reference words for males and not females. Our results suggest that as state anxiety increased for males, they tended to use more social words than females. Gender was found to be a significant predictor of social word use; however, state anxiety levels were not a significant predictor of social word use. Males' use of social words was correlated with state anxiety levels, and females had no correlation between the social word category and state anxiety levels.

These results suggest that when an individual experiences SPA, social

word use varies depending on the gender of the speaker. Past research has shown differences in word use among males and females, as well as gender differences in stress and coping mechanisms. Other studies have suggested that word use differs in times of stress, in which the significance of an event played a key role in word use changes.

In the current study, we showed that anxiety levels affects the relationship between gender and word use, supporting the notion that word use may change due to a person's state of being. Specifically, social anxieties were shown to change male spoken word use. As a result, word use can be impacted in times of stress, which may alter the social negotiation a person has in their environment and their relationships with others.

Previous theoretical models of the stress response are contradictory in explaining the gender differences we found in word use and participants' rising levels of state anxiety. Past research suggests that females employ a tend-and-befriend stress response, while males react with a fight-or-flight approach when confronted with a stressor (Taylor 2006). When considering language use as a predictor in models of the stress response, one might think that females' tend-and-befriend response would cause them to use more social words and references to others as their anxiety levels increased. In addition, males theoretically would not use words reflecting various group processes in response to stress, because their stress response is not collective in nature when compared to the tend-and-befriend female stress response. The data for the current study did not

support this logical explanation of language differences during elevated anxiety levels. In fact, the moderate positive correlation of males' social word use and state anxiety levels, and females' lack of any correlation between the two, would suggest quite the opposite. Males' word use becomes more social in nature than females; additionally, as females' state anxiety rose, their social word use did not change.

Past research suggests that females' supportive conversations about body image occur with friends routinely, and that this behavior seems to facilitate the ability of women to discuss their body dissatisfactions with others (Mack et al. 2007). This engagement may be the reason why females did not change word use in this particular stressor; females have become accustomed to frequent conversations about body image related talk, thus word use is no longer impacted by SPA. However, past research has found that males may be more heavily influenced by SPA, and as a result, this anxiety leads males to have a stronger body dissatisfaction and greater urge to alter their body (Mack et al. 2007). Accordingly, the current study suggests that not only are perceptions of body dissatisfaction and alterations negatively impacted by SPA, but also males' word use is affected as a result of increasing levels of state anxiety.

Furthermore, males may use more social comparisons than females when they experience SPA. These social comparisons reflect the increases in social word use in males as compared to females. Words that males employ during speech, when related to body image discussions, might suggest that males compare themselves more to others than females. As a result, the

increase in social word use by males reflects the internal psychological process that males have when comparing themselves to others.

Explanations given for the current results may vary, but all show one thing; SPA changes social word use in males but not in females. Both explanations we offered share an underlying theme: change in social word use during speech depends on gender, and may reflect an increase in social anxieties, especially when the discussion is comparative in nature. This infers that language use may be an evolved function of underlying psychological conditions, and word use is not just a tool used for expressing ideas.

The interaction of gender and state anxiety levels on social word use was marginally significant. However, one limitation of the present study is the disproportionate sample size. The smaller sample size of males limits the power of this study. To compensate for the smaller male sample size, we utilized all available speeches, only leaving 33 males and 61 females. More of an equal sample size between genders could make it more plausible to see significant differences between genders, and how state anxiety levels affect social word use.

Another limitation of this study is that levels of SPA were measured with the STAI. Although the STAI is a measure of state and trait anxiety, it did not specifically measure SPA, and thus it was not possible to tell whether the stress manipulation impacted SPA exclusively. Prior research has found that public speaking tasks increase levels of state anxiety, which could interfere with intended measures of SPA. For this instance, using only the

STAI as a measure of SPA may result in an unintentional measure of anxiety induced by public speaking. Future research should have a measure of specific levels of SPA, perhaps by using the Social Physique Anxiety Scale (SPAS; Hart et al. 1989). This scale used in conjunction with the STAI would be a more reliable measure of the individual's SPA, thus stronger relationships could be interpreted between specific anxiety levels and word use. Even though the relationship between anxiety and word use for males and females was minimal at best, removal of these limitations could possibly increase the statistical significance in the results found with the regression model.

Examining gender-dependent word use differences during stress allowed us to appreciate how language can be impacted through various intervening factors. Most importantly, word use dictates negotiation in relationships. Other's perceptions are based on a person's behaviors, including word choice during an interaction. If environment, state of being, or perhaps even a biological response is capable of altering a person's word use, these changes must be identified because of the heavy influence language has on the speaker's social relationships. By examining SPA, word use changes give insight into how males and females are impacted differently by SPA. SPA is a very specific anxiety, but implications from this study show that various mental processes may affect word use. Future studies should inquire if word use could be used as an indicator, or even predictor, of various theoretical models and mental processes; such as making meaning of a negative or

traumatic experience, other anxieties and various psychological disorders.

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