Anxiety, Sex-Role Orientation, and Computer Interaction

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ANXIETY, SEX-ROLE ORIENTATION, AND COMPUTER INTERACTION

BY

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B.A., University of Florida, 1981

THESIS

Submitted in partial fulfillment of the requirements for the Master of Science degree in Clinical Psychology in the Graduate Studies Program of the College of Arts and Science University of Central Florida Orlando, Florida

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ABSTRACT

A group of 125 female college students were given Spielberger's State Anxiety Inventory and Bem's Sex Role Inventory. Those females with minimal typing skills and minimal computer experience interacted with a computer for ten minutes and then given a second State Anxiety Inventory. Pretest and posttest data were obtained from forty-eight subjects selected on the basis of Bem's Sex Role Inventory to test the hypotheses: females that score high on the Androgynous scale of the Bem Sex Role Inventory (BSRI) will experience relatively low levels of anxiety while interacting with a computer, females that score high on the Feminine and Undifferentiated scales of the BSRI will experience relatively high levels of anxiety while interacting with a computer, and females that score high Masculine on the BSRI will experience relatively intermediate levels of anxiety. Androgynous females will produce high performance scores on the computer typing task while Feminine or Undifferentiated subjects will have the lowest performance scores. No significant differences among the four groups were found $F(3,44)=2.14$, $p > .05$ for anxiety change. No significant differences were found for performance scores among the four groups $F(3,44)=.773$, $p > .05$. Implications for alternative predictors of anxiety are discussed.
ACKNOWLEDGMENT

I would like to take this opportunity to express my appreciation and thanks to Jack McGuire, Ph.D., for his generous contributions of time, energy, ideas, patience, and especially his understanding during the preparation of this thesis. His willingness to share his knowledge and insight during this project and throughout my graduate studies will be warmly remembered. Special thanks are also expressed to Burt Blau, Ph.D., and Dave Abbott, Ph.D., for their ideas, their time, and their support.

This project would have been very difficult without the generous support of my husband who offered ideas, encouragement, patience, and, most of all, his love during the past year. Thank you, Jerry.
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INTRODUCTION

Economic pressures and increased desire for self-fulfillment are forcing increasing numbers of women into the work place, in some instances for the first time. There they are making contact with technologies not associated with the traditional "hearth and Home". The modern working woman is being drawn into the future by low cost computing and increased business automation. With this increased technological involvement are new concerns about job satisfaction and motivation as well as increased awareness of problems associated with man-machine interaction (Zuboff, 1982).

The women of the future must learn to cope with and formulate decisions about their positions in the work place. In the words of Arlene Schrade (cited in Zuboff, 1982), "she...must be responsible, adaptive, and participating.". Ms. Schrade's concept of the future involves the application of available technologies to reduce the number of "blue-collar" workers. At the same time, a transition to a service-oriented economy is expected to provide increased opportunity for those people, women especially, who can adapt to the increasingly "electronic" nature of the working environment. With this new electronic frontier, Schrade states that it may be necessary to invent a new method of
administration and adaptation to deal with a high tech society.

The increased application of computers is bringing the future closer, and as with any radical change, the automation of the work place is being met with a measure of resistance (Goleman, 1983).

It is important not to dismiss this resistance as merely a manifestation of a desire for old, familiar ways of doing things. The introduction of new computer technologies has and will continue to create fear, suspicions, curiosity, dismay, and a host of other responses to those in the work place. It is important to realize that the application of these new technologies can bring about changes in job satisfaction and job quality that are not addressed simply by improved "operator training" or "low glare" display screens (Goleman, 1983).

Zuboff (1982) has noted that the speed and "infallibility" of computers lend an air of uniformity to typical job tasks which are repellent to career professionals and disheartening to full-time clerical personnel. With increased use of computerized clerical functions, interaction with co-workers is decreased, less allowance is made for individual input or experience, and a higher, more concentrated form of mental attention is required to utilize machine resources to their fullest. The standardization of tasks in order to promote "more efficient" use of machine
resources can lead to a "deskilling" of jobs. This may allow a reduction in know-how requirements, a plus from a human resources point of view. However, it can also lead to increased employee turnover because of constant stress to perform to machine expectations with little avenue for creative or original effort (Zuboff, 1982).

Some industrial surveys have indicated that as many as 25% of all jobs will involve computers as primary work tools by the year 1990 (Kiesler, Sproull, and Eccles, 1983). A logical extension is that computer familiarity, if not fluency, will be an essential credential in the future job market. Kiesler et al., (1983) also point out that, unfortunately, there are indications that cultural roadblocks may be preventing women in particular and little girls especially from getting exposure to computers in order to gain needed fluency.

The first exposure a child has to "computing" per se is typically through video games. Be it arcade variety or micro-computer based, fantasy worlds are opened up requiring skill and imagination on the part of the player. In a recent study Kiesler (1983) looked at children from households owning a home computer. She found that 67% of those over age twelve, and 88% under age twelve used computers to play games. Kiesler goes on to point out that unfortunately, the majority of games currently available show a bias towards masculine, aggressive themes and are marketed toward an overwhelmingly male audience. Examples include
"Cannonball Blitz", five men in battle; "Hellfire Warrior", a soldier slaying his enemy; and "Swashbuckler", seven pirates sword-fighting. In an attempt to counterbalance this trend, the video game industry is attempting to entice the untapped market of female players into the arcade by turning out an increasing number of "non-macho" games designed to appeal to girls. The success to Pac Man and Ms. Pac Man can, in part, be attributed to their less aggressive orientation (Kiesler, 1983).

Kiesler (1983) conducted an informal survey on several busy Saturdays in a shopping mall in suburban Pittsburgh. It was found that the vast majority of players were males. In fact, less than 20% (n=30) of the total arcade population was female, and in no instance was a single or lone female observed playing a video game.

Several authors have attempted to explain why females appear to play video games less frequently than their male peer group. One reason suggested by Kiesler, (1983) is that the vast majority of computer game programs are designed and written by males, the machines are sold by males, and the courses are taught by males. In a review of the field, Maccoby and Jacklin (1974), in The Psychology of Sex Differences, the fact was confirmed that boys excell in visual and spatial skills particularly in tasks that require depth perception and solving mazes, both essential skills for many video games.
It may be unfortunate that video games are the first aspect of "computer" exposure for children. Kiesler suggests that it is the confrontational, i.e., destructive, war-like, sabotage theme aspects of many games and video arcades that inhibit young girls and women from participating (Kiesler, 1983).

Introduction of computer programming courses through the schools has created a benign atmosphere for both male and female children to learn the intricacies of computer programming. Another factor favoring males over their female counterparts in the computing fields is the demonstrated early superiority of most males in the pre-requisite math courses required for a technical education. Fennema (1974) states that after fourth grade, when differences in achievement appear, mathematics achievement tends to be in the boy's favor if higher level cognitive tasks are being measured. In addition, Fennema (1974) cites a study by Haven (1972) who concluded that high school boys achieve at higher levels in mathematics than high school girls, and that differences in achievement increase as adolescence progresses. Haven goes on to conclude that the superiority of boys in mathematics achievement is further accentuated as many more boys than girls elect to continue their study of mathematics throughout high school and post-high school education. An editorial in "Infoworld" (1983) suggests that this superiority is the result of a cultural bias causing
math anxiety among females at an early age. The editorial goes on to describe a program targeting math education at young girls. The results (no data available) are described as encouraging and would suggest that females are not naturally less capable of grasping mathematical intricacies. Becker and Jacobs (1983) support this same conclusion. They suggest several psychosocial variables that may effect both the study of and achievement in mathematics by females. These factors include: perceived usefulness of mathematics, patterns in attribution to success/failure, confidence in one's ability to learn mathematics, and sex-typing of mathematics as a predominately male province.

Another reason suggested to explain why males excel above their female counterparts in the computer field is their particular approach to the learning of basic computer skills. Smith and Stander (1981) identified three modes of learning for students involved with an interactive computer-simulation game. They found that students tend to learn aurally, visually, and experimentally. Aural learners learn by doing what they are told; they do not bother to read the directions. Visual learners read the directions, but are hesitant to actually begin the game. Experimental learners use a trial and error technique of experimentation. Smith and Stander found that aural learning was the most common mode observed for both sexes. However, males were observed to experiment more than females. This reluctance
to experiment could be the result of a cultural bias against being wrong (Smith and Stander, 1981), or a manifestation of a better male self-image (Maccoby and Jacklin, 1974). If an experimental approach is best suited for the initial learning of computer skills and future success in computer interaction, the findings by Smith and Stander would indicate that males have an advantage over females because of their approach to learning.

Computers in the Work Place

The first and most obvious target of business automation has been the office or clerical worker. There is an established product line of word processors and executive work-stations that perform or simplify a whole spectrum of office/clerical tasks. There has been some evidence of resistance to wholesale office automation by unions in this country (Newsweek, 1983). Resistance to electronic automation by unions in this country due to fear of job loss because of machine replacement, has been minor because of the limited membership of clericals in the unions. A question of potential significance is, what are desirable characteristics for potential employees in a transitional data-processing environment. Should a perspective employee possess more traditional "masculine" characteristics in order to effectively adjust to the technological interactions needed, or is an employee with "feminine" characteristics more suitable for the adaptability needed in the rapidly
changing work place. Bem (1974) has completed research aimed at demonstrating that the androgenous sex role allows for maximum behavioral flexibility. Androgenous individuals score high on both "masculine" and "feminine" characteristics. Some examples of masculine characteristics include: aggressiveness, athletic ability, competitiveness, assertiveness, and the ability to analyze. It is suggested that many of the characteristics that have been linked to the masculine sex role have also been described as desirable for interaction in both the video arcade and the computer field.

Given Bem's postulations, women with an androgenous self-concept may have an advantage in adapting to new technologies in their work place. Willingness to experiment, self-reliance, and analytical thought processes are all viewed as traditionally masculine characteristics, and all would be of value to an individual facing increased computerization in the work place.

Women of today are facing an ever-changing and competitive work environment. Kiesler et al., (1983) suggests that cultural roadblocks may be preventing women from getting needed exposure to computers; i.e., male-dominated video computer market, and biases towards masculine, aggressive themes in the arcades, which tend to exclude young girls from that needed experience. Maccoby and Jacklin (1974) and Fennema (1974) have noted that boys excel in
visual and spatial skills along with higher achievement levels in mathematics. Thus females may be at a significant disadvantage compared to males in terms of familiarity and readiness for computer interaction. The introduction of computers into the classroom is beginning to counterbalance these trends, but as Smith and Stander (1981) point out, males' approaches to learning of computer skills give them an added advantage at the very rudimentary levels of man-machine interactions. Bem's notion of the androgynous sex-role orientation may be the key. The ability of a female to engage in both masculine and feminine behaviors may be the edge needed to gain much lost ground to her male colleague in the work place. If business is able to pinpoint these androgynous females before they are situated into the work place, they may be able to maximize these individuals' resources in the most favorable capacity. that is, by placing those androgenous females in the high-tech automated work stations.

This research compared psychological sex-role orientation (masculinity, femininity, androgyny, and undifferentiated) of adult female subjects with measured anxiety levels in a computer-interaction setting. It was hypothesized that those females that score high on the Androgynous Scale of the Bem Sex Role Inventory (BSRI) will experience relatively low levels of change in anxiety while interacting with a computer. Females with traditionally Feminine
or Undifferentiated BSRI profiles will have relatively high changes in anxiety levels during computer interaction. Finally, it was expected that subjects with Masculine BSRI profiles will have intermediate changes in anxiety. The instrument for measuring anxiety was Spielberger's State Anxiety Scale (1983).

It was also hypothesized that Androgynous subjects would produce high performance scores on the computer typing task with feminine and undifferentiated subjects having the lowest performance scores and masculine women having intermediate performance scores.
METHOD

Subjects

Volunteer subjects included four groups of college females between the ages of 18 and 30. The four groups were selected from a sample of 125 psychology and sociology students. The first group, called the Androgynous group was composed of women whose score on the BSRI classified them as androgynous. The second group, called the Masculine group was composed of women whose score on the BSRI classified them as masculine. The third group, called the Feminine group was composed of women who scored feminine on the BSRI. The fourth group, called the Undifferentiated group was composed of women who scored undifferentiated on the BSRI.

Materials

Bem Sex Role Inventory (BSRI) (Bem, 1974; see Appendix II). The BSRI was created by Sandra Bem at Stanford University and published in Archives of General Psychiatry in 1961 (revised 1974). From a list of 200 male characteristics, male and female judges were asked to chose 20 items that were thought to be the most indicative of males. The same procedure was used for the choice of feminine characteristics. A social desirability scale of 20 items was
also included, this was in order to provide a neutral context for the Masculine and Feminine scales. The female personality characteristics were included in the inventory if they were independently judged by both males and females to be significantly \( p < .05 \) more desirable for women than for men. The male characteristics were similarly chosen. Test-retest reliability of this instrument proved to be high: Masculinity \( r = .90 \); Femininity \( r = .90 \); Androgyny \( r = .90 \) (Bem, 1974).

State Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1983; see Appendix V).

The STAI was developed to provide a brief method of assessing the presence of both state (A-State) and trait (A-Trait) anxiety. This inventory has been available for use since 1969. By 1975, it had been used in over 200 studies. Spielberger (1983) states that the A-State scale provides a valid measure of changes in transitory anxiety in response to laboratory and real life stress. Test-retest reliability for the A-State Scale is slightly lower than the A-Trait Scale, as would be expected in a test designed to be sensitive to situational factors. For this study, only the A-State scale was used. Test-retest reliability of the A-Trait scale and the A-State scale proved reliable: A-Trait: males \( r = .71 \), females \( r = .75 \); A-State: males \( r = .62 \), females \( r = .34 \).
The computer software used was Master Typing: The Typing Instruction Game (Zweig, 1981). The typing instruction game was created in order to teach typing and at the same time play a simulated space game. The software provides 17 separate lessons, beginning with learning the home keys. The lessons progress to more difficult typing skills as you approach lesson 17. Lesson 1 and lesson 4 were used for this study.

Lesson 1 consisted of learning the home keys, beginning by learning one letter at a time, then two letters at a time, and then three letters. Finally, it teaches you four letters at a time. Lesson 4 repeats the same step-by-step learning by using the 'upper row' keys. When each lesson is successfully completed, the player wins the game. If the player fails to complete the tutorial lesson in the designated time, the player loses, and the words win.

Procedure

The BSRI questionnaire, the State Anxiety Inventory, and an explanation of the research and consent for use of data form was given to 125 female volunteer college students enrolled in introductory psychology and sociology classes at the University of Central Florida, Orlando, Florida. Prospective subjects were given the introductory explanation statement to read and then asked to sign the consent (Appendix I) giving permission for the use of their
questionnaires in the research project. Subjects were also asked to indicate on the form their approximate experience in interacting with a computer, their level of typing ability, and their experience in video arcades. Subjects were told that the results of the thesis project would be available upon request in the Psychology department. Each student was then given the BSRI questionnaire (Appendix II) and the STAI-A-State questionnaire (Appendix V).

The BSRI's of all those who met the age criteria were scored. The items on the inventory are arranged in order beginning with masculine, feminine, social desirability, etc. To obtain the masculine score, points were totaled for every third item beginning with number one, then divided by 20. To obtain the feminine score, points were totaled for every third item beginning with number 2, then divided by 20. The sex role classification for each subject was determined as follows: for the masculine score, scores of 5.0 or higher equaled high masculinity, below 5.0 equaled low masculinity; for the feminine score, scores of 4.9 or higher equaled high femininity, below 4.9 equaled low femininity. The sex-role orientation for each subject was then assigned to one of four groups: Androgynous equaled high masculinity and high femininity, Masculine equaled high masculinity and low femininity; Feminine equaled low masculinity and high femininity; Undifferentiated equaled low masculinity and low femininity.
The women in all four groups were contacted by telephone and asked to take part in a follow-up computer typing tutorial (Appendix III). Those females who agreed to continue in the experiment were told that they would be asked to interact with a computer for approximately 10 minutes and then asked to complete a Self-Evaluation Questionnaire (STAI). The women were then assigned a time and a place to complete the experiment at the University.

After the subject arrived at the computer laboratory, she was given a statement (Appendix IV) outlining the requirements for participating in the second aspect of the study and again asked to provide their consent of participation. Each subject was then asked to sign the form indicating their agreement to participate. The subject was seated in front of the computer terminal and a screen was placed diagonally to the right of the computer keyboard. Instructions for the typing tutorial game appeared on the screen. Lesson 1 began with instructing the subject to place her fingers on the eight home keys. The tutorial asked the subject to press the key or keys that coincided with those that appeared on the screen, and then asked her to press the space bar. This is repeated until all the letters have disappeared off the screen. When the letters are not typed within a designated length of time, a portion of a spaceship is destroyed which is in the middle of the screen. The letter or letters continue to move toward the
center of the screen unless they are destroyed by the subject pressing the corresponding key or keys. At the completion of lesson 1, the subject was then introduced to lesson 4, using the same approach to destroy the letter or letters by typing before the letters can reach the middle of the screen and destroy enough of the spaceship to lose the game.

When a subject lost a game (the spaceship was destroyed) a message appeared flashing on the screen: "the words win, you lost, try again". The subject's words per minute (wpm) were given as this message appeared during lesson 1, the program was advanced to lesson 4, and the subject was asked to continue. As soon as this message appeared during lesson 4, the tutorial was stopped, and the subject's wpm for lesson 4 were given on the screen. At the completion of the tutorial, each subject was given a second Self-Evaluation Questionnaire (STAI). Finally, each subject was debriefed (Appendix VI), thanked, and asked not to discuss the nature of the study with classmates.

Experimental Design

The design is a 1-way ANOVA with four experimental groups (BSRI groups) and two dependent measures: State Anxiety Inventory Pre-Post Difference Scores, and Computer Typing Performance Scores (wpm averaged for lesson one and lesson four).
RESULTS

Data analysis was done on an Apple II Plus computer using ANOVA statistical software package. The data were analyzed in terms of two dependent variables: anxiety difference score and average words per minute typed (wpm). The four experimental groups consisted of forty-eight female subjects, with twelve subjects in each group. The pretest scores on the STAI were subtracted from the post-test scores on the STAI to establish an anxiety change score for each subject in the four groups. The group means (anxiety change scores) for each of the four groups were computed: Androgynous, $M=6.5$; Feminine, $M=10.42$; Masculine, $M=7.17$; Undifferentiated, $M=3.0$. The wpm typing scores from lesson one and lesson four were averaged for all forty-eight subjects. Group means were again computed for each experimental group: Androgynous, $M=15.2$; Feminine, $M=16.5$; Masculine, $M=15.6$; Undifferentiated, $M=14.5$.

It was hypothesized that females scoring Androgynous on the BSRI would produce relatively low levels of anxiety while interacting with a computer while females scoring Feminine or Undifferentiated on the BSRI would experience relatively high anxiety levels, and females scoring Masculine on the BSRI would experience intermediate levels of
anxiety. An ANOVA on anxiety change scores on the STAI revealed no significant differences among Androgynous, Masculine, Feminine and Undifferentiated groups, $F(3,44)=2.14$, $p > .05$.

Table 1 presents means and standard deviations of pre and post anxiety difference scores for each BSRI group.

A multiple R procedure was completed with anxiety change scores as the predicted event and BSRI masculinity and femininity raw scores as predictor variables. This analysis was completed in order to assess whether there was any systematic relationship between basic Bem sex-role components (beyond the standard Masculine, Feminine, Androgynous and Undifferentiated category placement) and anxiety in this situation: $R=.073$. No systematic relationship was found between masculine and feminine raw scores on the BSRI.

It was also hypothesized that while Androgynous females would produce high performance scores on the computer typing task, Feminine and Undifferentiated subjects would produce the lowest performance scores and Masculine subjects would have intermediate performance scores. The wpm computer typing scores were analyzed using a one-way analysis of variance (ANOVA). An ANOVA on average words per minute revealed no significant differences among the four experimental groups, $F(3,44)=.773$, $p > .05$. Table 2 presents means and standard deviations of average wpm for each BSRI group.
### TABLE 1

Means and Standard Deviations of Pre and Post Difference Anxiety Scores for BSRI Groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Androgynous</td>
<td>12</td>
<td>6.5</td>
<td>17.97</td>
</tr>
<tr>
<td>Feminine</td>
<td>12</td>
<td>10.42</td>
<td>23.73</td>
</tr>
<tr>
<td>Masculine</td>
<td>12</td>
<td>7.17</td>
<td>20.29</td>
</tr>
<tr>
<td>Undifferentiated</td>
<td>12</td>
<td>3.0</td>
<td>31.34</td>
</tr>
</tbody>
</table>

### TABLE 2

Means and Standard Deviations of Words Per Minute For Each BSRI Group

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Androgynous</td>
<td>12</td>
<td>15.2</td>
<td>11.43</td>
</tr>
<tr>
<td>Feminine</td>
<td>12</td>
<td>16.5</td>
<td>11.16</td>
</tr>
<tr>
<td>Masculine</td>
<td>12</td>
<td>15.6</td>
<td>10.14</td>
</tr>
<tr>
<td>Undifferentiated</td>
<td>12</td>
<td>14.5</td>
<td>10.7</td>
</tr>
</tbody>
</table>
An analysis was completed on overall anxiety change from pre to post interaction with a computer using the matched $t$-test procedure. The analysis of overall anxiety level change for the four groups revealed significant change in the direction of increased anxiety experienced post-computer interaction across all subjects, $t(47) = -4.2$, $p > .002$. 
DISCUSSION

It was hypothesized that females who score Androgynous on the Bem Sex-Role Inventory (BSRI) would experience relatively low levels of anxiety following interaction with a computer. It was also hypothesized that females who scored Masculine, Feminine or Undifferentiated would experience intermediate and high levels of anxiety respectively. The findings of this investigation do not support these hypotheses. While there were no statistically significant differences among anxiety change scores across the BSRI groups, Table 1 reveals that as expected, the Feminine group had the highest mean anxiety level followed by the Masculine, Androgynous, and finally the Undifferentiated group which, unexpectedly, had the lowest mean anxiety score. This unexpected result of the Undifferentiated group might be explained in part by the dissimilarity of their group from the other three groups. In the literature, the undifferentiated person is lowest in self-esteem, experiences the highest childhood illness rates, dates less in college than androgynous individuals and has been described by Kelly, O'Brien, Hartford, Kinsington (cited in Kelly & Worell, 1977), as "highly inept and socially ineffective" (p. 112). Perhaps one rationale for why the Undifferentiated
group experienced the lowest anxiety was because they approached the interaction with a computer with less expectation of success on their part to do well thus little anxiety was generated in comparison to the other three groups.

It was hypothesized that females who scored Androgynous, Masculine, Feminine or Undifferentiated would produce high, intermediate and low performance scores, respectively, on the computer typing tutorial task. The findings of this study also failed to support this hypothesis.

Although not formally hypothesized, the data support the conclusion of an overall increase in anxiety which was experienced by all experimental groups after interaction with a computer. Thus, the college women in the present investigation who generally had little or no typing or computer interaction experience, appeared to become rather anxious following an opportunity to learn the "home keys" and the "upper row keys" of a typical typewriter through a computer typing game.

An explanation for the failure of both the primary and secondary hypothesis is not clear; however, several possibilities are offered. First, the degree of difficulty of the computer typing tutorial (lesson 4) may have been too high for all subjects, regardless of their sex-role orientation, thereby suppressing or masking any individual
differences related to sex role or other factors. According to the data already presented, there was an overall increase in anxiety for all four groups.

A critical question must also be considered regarding the experimental design. Was it simply interaction with a computer on the part of the subject or the specific "typing" task itself that was responsible for the overall increase in anxiety. Perhaps more research is needed in order to look at a variety of tasks to tease apart task versus computer interaction effects.

Second, to what degree does an experimental design using female college students between the ages of 18 and 29 reflect a true representative sample of the general female working population. The forty-eight females that participated in the study were selected because of their "little to no experience" with computers, their minimal typing ability, and "little to no experience" with video arcade games. Given this narrow range of age, perhaps the qualitative differences in sex-role orientation has not yet fully developed in such a young sample. Hyde & Phyllis (1979) have suggested some modification of the BSRI in terms of age to make it more useful in developmental research. Although there were some sex-typed characteristics informally observed by the experimenter during the computer interaction phase of the experiment (e.g. shyness, lack of assertiveness, soft spokeness) which coincided with the subjects profile
on the BSRI, these observations are consistent with BSRI theory, but fails to lead to any significant conclusion regarding sex-role orientation and computer-related increase in anxiety.

Third, is sex-role orientation a good predictor of anxiety while interacting with a computer? It has been shown in several sex-role identity studies, (Cosentino & Heilbrum, 1964; Gall, 1969; Gray, 1957) that feminine women are the most anxious of all women, but in regards to the nature of the anxiety characterizing these women, no literature exists. Bem (1974) has attempted to demonstrate that the androgynous sex role allows for maximum behavioral flexibility. In this study, the examined behavior was interaction with a computer. It was believed that those females who possessed significant numbers of both masculine and feminine characteristics (giving them maximum behavioral flexibility to interact with a computer) would be best suited to quickly adapt to a computer and thus experience the least amount of discomfort as measured by the STAI. Although no significant data support this hypothesis, the overall anxiety mean score on the feminine scale showed the greatest change in anxiety. This finding then, is consistent with the early literature by Cosentino et al. (1964).

In a recent study, Diebel (1980) examined sex-role orientation and sexual adjustment during pregnancy. The
author found that Androgynous women demonstrated a significantly superior level of sexual adjustment throughout pregnancy but the findings failed to support conclusively that Feminine and Undifferentiated women would experience higher levels of state-type anxiety than Androgynous and Masculine women during the last tri-mester of pregnancy. Given the results of this present study and the Diebel (1980) investigation, perhaps the BSRI is a reliable predictor of more long-term trait anxiety, but not of short-term fluctuations in anxiety (state) associated with a specific immediate task. Sex-role orientation, therefore, might well be related to more long-term adjustments to changes in one's environment such as being forced or requested to adapt to computerization in the work place. A re-evaluation of the sex-role characteristics included in the BSRI scale may also be needed in order to tease out the nature of the anxiety being measured when correlated with sex-role orientation. A second possible avenue of examination is the developmental age of the particular group in order to assess whether the patterns of androgyny exist for that age group or perhaps they may not have developed sufficiently enough for the BSRI to measure.

Several variables must be considered at this point, beyond sex-role orientation, that may help to explain why a sample of forty-eight college females all increased in anxiety following interaction with a computer. The most
straight forward explanation may be that the women in this study identified interacting with a computer as a masculine behavior and therefore outside the role of a female. Even when one considers that females in general have more typing experience than males, therefore more familiarity with a keyboard, the introduction of a computer may still represent a typically masculine behavior and therefore produce greater anxiety.

Secondly, given the design of the experiment, winning or losing a simulated space wars game, being evaluated immediately on performance, and then being asked to self-evaluate, perhaps apprehension about being evaluated produced the anxiety present in all four sex-role groups.

A third variable to be considered may be particular personality characteristics that may enhance a woman's ability to interact with a computer with minimal discomfort. Perhaps it is important to go back and look at the early experience a girl is exposed to in school, at home, and in the video arcade. As presented earlier, Kiesler (1983) found young girls lagging behind their male counterparts in computer-video experience both at home and in the arcades. The world of computers is presented and utilized mainly by males and consequently young girls do not get that needed experience and gained confidence to feel comfortable with arcade games, computer software, and computer hardware. Perhaps the personality characteristics that are desirable
for interaction with a computer are not given a chance to develop because of this lack of experience. The results of this lack of experience may follow through all the way to college-age females and therefore the uncomfortableness and anxiousness is still evident when confronted with a computer terminal.

Further research is needed to help determine if anxiety generated by computer interaction by computer-naive individuals in primarily a female phenomenon; and, if so, what characteristics of these women are predictive of their anxiety level. The present study has demonstrated a significant relationship between computer interaction and subsequent increase in anxiety level, but has failed to provide any information to help determine what about the subjects themselves or the task/situation that may have produced this increased anxiety.
APPENDIX I

Consent to Participate
You are being asked to complete 2 questionnaires. These questionnaires will become part of a study of women's attitudes and personality traits that will be used as a Master thesis at the University of Central Florida by Mary Donlin-Senne, under the direct supervision of John D. McGuire, Ph.D. You will remain anonymous and will not be identified in any way through this study.

By signing below, you signify that you have been advised of this fact and that you agree to allow the questionnaires to become a part of the study.

You may be contacted at a future time and asked to participate in a follow-up aspect of the research project. It is understood that you may discontinue your participation at any time without penalty.

__________________________  __________________________  __________________________
Telephone #  Date  Signature

Please Check:

Typing Skills  Computer Experience  Video Arcade Exp
(average)  (average)
60-90 wpm  Much (3 or more hr/wk)  Much (3 or more hr/wk)
40-60 wpm  Some (1 hr/wk)  Some (1 hr/wk)
20-40 wpm  Little (30 min/wk)  Little (30 min/wk)
0-20 wpm  None  None
APPENDIX II

Bem Sex Role Inventory
Subject #___________(last 4 digits of SS#)

On the following page, you will be shown a large number of personality characteristics. We would like you to use those characteristics in order to describe yourself. That is, we would like you to indicate on a scale from 1 to 7, how true of you these various characteristics are. Please do not leave any characteristic unmarked.

Example: Sly

Mark a 1 if it is NEVER or ALMOST NEVER TRUE that you are sly.
Mark a 2 if it is USUALLY NOT TRUE that you are sly.
Mark a 3 if it is SOMETIME BUT INFREQUENTLY TRUE that you are sly.
Mark a 4 if it is OCCASSIONALLY TRUE that you are sly.
Mark a 5 if it is OFTEN TRUE that you are sly.
Mark a 6 if it is USUALLY TRUE that you are sly.
Mark a 7 if it is ALWAYS OR ALMOST ALWAYS TRUE that you are sly.

Thus, if you feel it is sometimes but infrequently true that you are sly, never or almost never true that you are "malicious", always or almost always true that you are "irresponsible", and often true that you are "carefree", then you would rate these characteristics as follows:

Sly _____3___  Irresponsible _____7____
Malicious _____1___  Carefree _____5___
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never or Almost</td>
<td></td>
<td>Usually</td>
<td>Sometimes but</td>
<td>Occasionally</td>
<td>Often</td>
<td>Usually</td>
<td>Always or</td>
</tr>
<tr>
<td>never true</td>
<td></td>
<td>not</td>
<td>Infrequently true</td>
<td>true</td>
<td>true</td>
<td>true</td>
<td>almost true</td>
</tr>
</tbody>
</table>

Describe Yourself

- Self reliant
- Yielding
- Helpful
- Defends own beliefs
- Cheerful
- Moody
- Independent
- Shy
- Conscientious
- Athletic
- Affectionate
- Theatrical
- Assertive
- Platterable
- Happy
- Strong personality
- Loyal
- Unpredictable
- Forceful
- Feminine

- Reliable
- Analytical
- Sympathetic
- Jealous
- Has leadership abilities
- Sensitive to needs of others
- Truthful
- Willing to take risks
- Understanding
- Secretive
- Makes decisions easily
- Compassionate
- Sincere
- Self-sufficient
- Eager to soothe hurt feelings
- Conceited
- Dominant
- Soft Spoken
- Likable
- Masculine

- Warm
- Solemn
- Willing to take a stand
- Tender
- Friendly
- Aggressive
- Gullible
- Inefficient
- Acts as a leader
- Childlike
- Adaptable
- Individualistic
- Does not use harsh language
- Unsystematic
- Competitive
- Loves children
- Tactful
- Ambitious
- Gentle
- Conventional
APPENDIX III

Consent to Participate

You are being asked to briefly interact with a computer. You will be working on a typing skills game. Following the computer task, you will be asked to fill out a brief Self-Evaluation questionnaire. A total of approximately 20 minutes will be required to complete the typing skills task and questionnaire. You may discontinue your participation in the experiment at any time.

__________________________
Signature

__________________________
Date
APPENDIX IV

Request for Participation

You are being asked to take part in a follow-up research experiment. The experiment will be looking at the relationship between specific personality variables and interaction with a computer.

You will be asked to complete a short 10-minute typing tutorial. You will be working on an Apple II computer. At the end of the typing tutorial program, you will be asked to fill out a Self-Evaluation form consisting of 20 items.
APPENDIX V

Self-Evaluation Questionnaire

Developed by Charles D. Spielberger
in collaboration with
R. L. Gorsuch, R. Lushene, P. R. Vagg,
and G. A. Jacobs

STAI Form Y-1
DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

1 - Not at all  
2 - Somewhat  
3 - Moderately so  
4 - Very much so

1. I feel calm .................................. 1 2 3 4
2. I feel secure .................................. 1 2 3 4
3. I am tense .................................. 1 2 3 4
4. I feel strained .................................. 1 2 3 4
5. I feel at ease .................................. 1 2 3 4
6. I feel upset .................................. 1 2 3 4
7. I am presently worrying over possible misfortunes .................................. 1 2 3 4
8. I feel satisfied .................................. 1 2 3 4
9. I feel frightened .................................. 1 2 3 4
10. I feel comfortable .................................. 1 2 3 4
11. I feel self-confident .................................. 1 2 3 4
12. I feel nervous .................................. 1 2 3 4
13. I am jittery .................................. 1 2 3 4
14. I feel indecisive .................................. 1 2 3 4
15. I am relaxed .................................. 1 2 3 4
16. I feel content .................................. 1 2 3 4
17. I am worried .................................. 1 2 3 4
18. I feel confused .................................. 1 2 3 4
19. I feel steady .................................. 1 2 3 4
20. I feel pleasant .................................. 1 2 3 4
APPENDIX VI

Debriefing Statement

The typing tutorial that you have just completed was designed to challenge your ability to interact with a computer and at the same time teach you how to type. The software program was chosen because of its high degree of difficulty and thus may have created some anxiety on the part of the person playing the game. Any of these feelings of anxiety or discomfort should be expected and are not a reflection of your inability to win with the game successfully.

By signing below, you acknowledge that the above explanation has been given to you in full.

Thank you for your participation in this experiment.

________________________
Signature
REFERENCES


