

Androgyny and Women in Competition

by

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## Abstract

This study attempted to clarify the relationship between "masculine and feminine personality attributes" and "sex-role behavior" in the definition of androgyny by comparing an attribute and a behavioral measure of androgyny. This was done by assessing the influence of each on women in competition. Both inventories were distributed to two introductory psychology classes. Students were classified as masculine, feminine, androgynous, or undifferentiated, and 20 women were randomly selected from each category to be in a competition experiment. In the experiment, subjects did 7 trials of a digit-letter task. On the eighth trial either a male, or a female, confederate was introduced as a competitor. Changes in heart rate, perceived pleasantness and performance from Trial 7 to Trial 8 were the dependent variables. All subjects showed an increase in heart rate, perceived pleasantness, and performance during competition. Sex-role category did not influence the changes although masculine and androgynous subjects showed initially higher performance scores. Sex of confederate did not affect heart rate or performance, but perceived pleasantness increased when females competed against a male, and decreased when females competed against a female. Similar results were found using attribute or behavioral measures of sex role. Using multiple regression, feminine behavior scale scores were positively related to decreases in perceived pleasantness.

## Introduction

Androgyny has been defined as the inclusion of both masculine and feminine attributes in one's self-concept (Bem, 1974; Berzins, Welling & Wetter, 1978; Spence & Helmreich, 1978), or as flexibility in performing both sex-typed and cross-sex-typed role behaviors (Bem, 1974; Bem, 1975; Bem & Lenney, 1976; Gackenbach, 1978; LaFrance & Carmen, 1980). Whether these two definitions are related or identical constructs has not yet been examined. The purpose of the present study was to explore this issue by comparing the influence of masculine and feminine attributes to the influence of sex-role behavior on women's responses to competition. Responses to the stress of competition may include physiological changes, changes in affect, and changes in performance (Precosky, note 1). These responses may be differentially influenced by women's perceptions of their masculine and feminine personal attributes, compared to their perceptions of their sex role behavior.

Using either an attribute or a behavior definition, the concept of androgyny hypothesizes that masculinity and femininity are not ends of a bipolar continuum, as commonly believed, but are instead independent dimensions found to varying degree in all individuals. Constantinople's (1973) review of then-existing unidimensional masculinity-femininity tests suggested that this orthogonality was not being measured. The Bem Sex Role

Inventory (BSRI, Bem, 1974) was among the first measures of androgyny with separate masculine and feminine scales. These scales consist of a list of positive traits that are differentially endorsed by both sexes for typical, and ideal, males and females. Several other instruments have since been developed, including the Personal Attributes Questionnaire (Spence, Helmreich & Stapp, 1974) and the PRF-Andro (Berzins et al., 1978).

Several criticisms have been levied against androgyny research (Crosby & Nyquist, note 2; Kelly & Worrell, 1977; Pyke, in press; Locksley & Colten, 1979; Pedhazur & Tetenbaum, 1979; Spence & Helmreich, 1978). Two of the most important, since they affect the operational definition of androgyny, are (1) the interchangeable use of the terms "masculine and feminine attributes" and "sex roles"; and (2) variations in the statistical definition of androgyny.

The first criticism describes confusion between the terms "attribute" and "role". Bakan (1966) has defined two basic principles characterizing all living organisms - agency and communion. Spence and Helmreich (1978), employing these principles to distinguish masculinity and femininity, found, in a variety of cultures, a similar distinction between women and men. The ideal woman tends to be described using attributes included in Bakan's definition of communion - emotionality, sensitivity, and concern for others, while the ideal man is described as agentic -

independent, competitive and active. Self-ratings by men and women also tend in these same directions (Bem, 1974; Berzins et al., 1978; Spence & Helmreich, 1978; Spence, Helmreich & Stapp, 1974). Analysis of the BSRI and the Personal Attributes Questionnaire have indicated agency and communion as two basic factors in these instruments (Gaudreau, 1977; Helmreich, Spence & Holohan, 1979; Moreland, 1978; Pedhazur & Tetenbaum, 1978).

Distinct from masculine and feminine personality attributes is the concept of sex role. Crosby and Nyquist (1978), Horrocks and Jackson (1972), Kelly (1955), and Sarbin (1968) describe a role as a concrete behavior presenting one of an individual's identities, or self-definitions. Bem (1974, 1979) states that the BSRI measures sex role. However, Spence and Helmreich (1978, 1979) maintain that the Personal Attributes Questionnaire, which is very similar in content to the BSRI, measures only masculine and feminine attributes, and that these attributes will be only weakly related to sex role. For this study, the BSRI was used as the measure of masculine and feminine attributes. This decision was based on the fact that the BSRI appears to be primarily a list of personality traits, on ready availability of the BSRI, and on the fact that the BSRI has considerable research already completed on it.

The second criticism of androgyny research is the use of multiple statistical definitions of androgyny. In Bem's initial study (1974), a t-test was used to compare a person's responses to masculine and feminine items. If there was a significant difference with the mean for masculine items being higher, the person was defined as masculine. If there was a significant difference with the mean for feminine items being higher, the person was defined as feminine. If there was no significant difference between masculine and feminine scale scores, the individual was classified as androgynous. Androgyny was thus defined as being a balance of masculine and feminine traits.

Spence, Helmreich and Stapp (1975) criticized this method of defining androgyny, since subjects' absolute scores on masculine and feminine dimensions were not being taken into account. They advocated the use of a median split of each scale based on the combined means of both sexes for a given sample. This results in four groups: those scoring above the median on masculinity or femininity only, and classified as masculine or feminine respectively, those scoring high on both, and those scoring low on both. Those scoring high on both are called androgynous, and those scoring low on both have been termed undifferentiated. Bem has since supported this method of defining sex roles (1977), and it is the way sex roles were defined in this study. It has also been suggested that multiple regression techniques be used with subjects' masculine and feminine



scale scores (Kelly, Furman & Young, note 3).

Androgyny research has focussed on two areas: the relationship between masculine and feminine attributes and other personality characteristics, and the relationship between masculine and feminine attributes and different sex role behaviors.

A variety of personality characteristics have been correlated with each of the sex-role categories created using the BSRI. Erdwins, Small and Gross (1980) found that subjects categorized as androgynous or masculine on the BSRI tended to rate themselves more positively on the Tennessee Self-Concept Scale (Fitts, 1964), and as being less anxious on the Manifest Anxiety Scale (Taylor, 1953). Subjects classified as feminine and undifferentiated had less positive scores. Men consistently gave a healthier self-image as indicated by greater self-esteem, self-acceptance, and self-worth than did women.

In another study, Flaherty and Dusek (1980) used a multi-dimensional, semantic differential self-concept scale (Monge, 1973). They related each of the 4 dimensions on the scale to classification using the BSRI. On Factor 1, adjustment, those categorized as androgynous scored significantly higher than masculine, feminine, or undifferentiated subjects. On Factor 2, achievement-leadership, the androgynous and masculine subjects received the highest scores, and on Factor 3,

congeniality-sociability, the androgynous and feminine subjects scored highest. The fourth Factor represented the masculine-feminine stereotype with masculinity at the high end of the scale and femininity at the low end. The masculine subjects scored significantly higher than the feminine subjects, while androgynous and undifferentiated subjects scored in the midrange, significantly different from either the masculine or the feminine extreme.

Jones, Chernovetz and Hansson (1978) found individuals' category on the BSRI correlated with a wide variety of personality measures. Included were: the Women's Liberation Ideology Scale (Goldschmidt, Gergen, Quigley & Gergen, 1974), the "I am" test (Kuhn & McPortland, 1954), the Eysenck Personality Inventory (Eysenck & Eysenck, 1963), the Locus of Control Inventory (Rotter, 1966), a problem with alcohol inventory, the Alcadd test (Manson, 1965), a measure of self-esteem (Coopersmith, 1967), measures of intellectual competence (Christensen, Guilford & Wilson, 1957; Robinson & Shaver, 1969), a test for learned helplessness (Hiroto & Seligman, 1975), and a self-report measure of sexual maturity and heterosexuality. They found that, for both sexes, the masculine subjects appeared most flexible and adjusted, and that androgynous females appeared healthier than the androgynous males. In this study, Bem's initial method of defining androgyny was used, resulting in only three groups - masculine, feminine, and androgynous. However, a median split was also made on the same data, and

subjects who scored low on both masculine and feminine scales (i.e. the undifferentiated category) were compared to subjects who scored high on the masculine and feminine scales (i.e. the androgynous category). They found that the two groups were quite similar, differing only on problem-drinking and locus of control measures. Undifferentiated subjects reported significantly more drinking problems, and described themselves as being more externally controlled.

Another study employing the BSRI was done by Orlofsky and Windle (1978). Using analysis of TAT stories (Murray et al, 1938), they assessed assertiveness, personal adjustment, and the ability to recognize affect, and compared BSRI categories on each of these measures. They found that women scored higher than men on the measures of affect-cognition and assertiveness, and that androgynous subjects, in general, scored better than the masculine, feminine, and undifferentiated groups. The personal adjustment test had 3 measures. On the complexity and impulse expression scales, no differences were found among the groups; on the personal integration scale, males had significantly higher scores than females; and cross-sex-typing was related to lower levels of adjustment. Masculine and androgynous males had higher integration scores than feminine and undifferentiated males. Feminine and androgynous females had higher integration scores than did masculine and undifferentiated females.

Kelly, Caudill, Hathorn and O'Brien (1977) found that males categorized as androgynous on the BSRI tended to simultaneously accept positive masculine and feminine characteristics and reject negative masculine and feminine characteristics, while undifferentiated males were more likely to accept negative masculine and feminine characteristics and reject positive characteristics. Although feminine women tended to reject negative masculine traits, there was no difference between the masculine, feminine, androgynous, or undifferentiated females in accepting or rejecting undesirable feminine characteristics.

Bernard (1980) correlated subjects' BSRI classification with scores on four scales of the 16 PF (Cattell, 1972). These four scales (E, H, A, and I) appeared to be related to the masculine and feminine scales of the BSRI. E and H - assertive and venturesome - seemed related to the masculine scale. A and I - outgoing and tender-minded - seemed related to the feminine scale. Bernard predicted that androgynous subjects would show greater interpersonal effectiveness and better adjustment than the other three sex role groups. He found that androgyny for men was positively associated with all four scales, but that women categorized as androgynous tended to appear more instrumental (i.e. higher on the E and H scales).

To summarize, research examining masculine and feminine attributes with other personality characteristics have found some consistent patterns. One would seem to be that androgyny has different meanings for the sexes. Androgynous women do not always appear as flexible or adjusted as androgynous males, or vice versa. A second conclusion would seem to be that, depending on the personality attributes being measured, different sex-role groups may appear more flexible or adjusted.

Other androgyny research has used measures of masculine and feminine personal attributes to examine sex role behaviors. The BSRI (Bem, 1974) and the Personal Attributes Questionnaire (Spence & Helmreich, 1974) as well as the PRF-Andro (Berzins et al, 1978) and the Femininity Scale of the Adjective Checklist (Gough & Heilbrun, 1972) have been used to predict many sex-role behaviors, with varying degrees of success.

After the development of the BSRI, Bem (1975) examined conformity and nurturance among the three sex-role groups created using her initial method of selection. This was based on the presence or absence of a significant difference between subjects' scores on the the masculine and feminine scales. She looked at conformity by presenting subjects with funny and not funny cartoons. After hearing the responses of others that stated whether they felt the cartoon was funny or not funny, the subjects had to respond.

Unknown to the subject, the responses of the other subjects were actually on tape. On half the trials, a false consensus was presented to the subjects to induce conformity. On the other half of the trials, subjects heard true judgments, also presented on tape. The nurturance of subjects was examined by leaving them alone with a kitten and rating their behaviors. There were two conditions: in the first condition, subjects were instructed to interact with the kitten; the second time, they were left in a room with the kitten and a variety of other interesting objects.

Bem found that androgynous and masculine men and women were less conforming in the conformity paradigm. The results were less clearcut for the nurturance experiment. Androgynous and feminine males did interact more with the kitten; however, only androgynous, and not feminine, females showed significantly more interaction. Bem suggested that perhaps the responses required when playing with the kitten involved more than just expressive, nurturant behavior, and therefore, the feminine females could not respond as appropriately as the feminine males, androgynous males, and androgynous females.

Further studies by Bem, Martyna and Watson (1976) and Bem (1977), using four sex-role groups, supported the theory of the low-nurturant masculine male, and the high-nurturant androgynous male or female. Feminine and masculine females remained less responsive to a kitten than androgynous

subjects (Bem, 1977). However, feminine and androgynous subjects were more nurturant toward a baby than were masculine subjects. They also exhibited more nurturant, expressive behavior than masculine subjects in a role-played, dyadic conversation where they were asked to take the part of the "listener" (Bem et al, 1976). Undifferentiated subjects appeared to respond least nurturantly of the four groups.

A study by Kelly, O'Brien, Hosford and Kinsinger (note 4) examined the relationship of BSRI sex-role category to the ability to give warm, affectionate responses or to give assertive, noncompliant responses in role plays where either behavior might be warranted. They found that masculine men were less able to be warm and affectionate while feminine women were unable to display assertive, non-compliant skills. However, masculine men were not more assertive than the other sex-role groups, and feminine women were not more warm and affectionate. Only the androgynous group was appropriately assertive or affectionate. They suggested that the integration of masculinity and femininity gave the androgynous person greater social competency.

Wong-McCarthy, Jose and Crosby (note 5) found very different results in a study assessing the effects of androgyny on the display of nonassertive expressions. They split subjects according to both the Personal Attributes Questionnaire (Spence & Helmreich, 1974) and the BSRI, and

counted nonassertive verbal behaviors within a 10-minute conversation. These included: verbal hedges such as "well", "you know"; the intensive "so" (so happy, so hurt); empty adjectives such as "divine"; and question intonation in a declarative sentence. They found that androgynous females were the least assertive, while androgynous males were the most assertive. This was interpreted as indicating that androgyny implied extreme conformity to a behavioral stereotype in verbal behavior. They also found that women tended to be less assertive than men.

Klein and Willerman (1979) found, however, that where dominant behavior was made salient and socially desirable, women could be dominant. They examined the behaviors of four sex role groups, using the Personal Attributes Questionnaire as the measure of masculine and feminine attributes. They found that when dominance was the socially accepted behavior, masculine subjects were more dominant than androgynous subjects. In addition, androgynous subjects were found to be more dominant than undifferentiated subjects, and undifferentiated subjects were found to be more dominant than feminine subjects.

LaFrance and Carmen (1980) examined the nonverbal display of feminine expressive behaviors and masculine or instrumental behaviors in a dyadic discussion. They found that androgynous females tended to display fewer feminine behaviors, while androgynous males tended to display fewer



masculine behaviors.

Another study (Bem & Lenney, 1976) found that masculine males and feminine females considered it more difficult to use cross-sex-typed behavior. Bem and Lenney paid subjects to have their pictures taken doing several sex-typed and cross-sex-typed tasks. More money was paid when a subject selected to have his picture taken doing a cross-sex-typed task than a sex-typed task. Masculine males and females chose to get less money in order to get more sex-typed tasks.

Overall, research relating masculine and feminine attributes to sex role behaviors is somewhat contradictory. It seems that the results depend as much on the behavior to be performed as on the masculine and feminine attributes possessed by the subject. Despite these findings, a large number of behaviors do seem to be sex-linked and one's perceived level of masculinity, femininity, or androgyny may be based as much on highly visible behavior as on personality characteristics. Theoretically, there could be two forms of androgyny: personality and behavior. Contradictory findings would be accounted for by a confusion of the terms "personal attribute" and "sex role", when, as suggested earlier, they should not be interchangeably used. Further, attributes may be differentially displayed by each sex, and, on an individual level, one's masculine and feminine personality attributes may have little bearing on

actual sex role behaviors. Personality and behavioral inventories could then prove to be differentially predictive of behavior. For the present study, a self-report measure of behavior was devised, using test construction techniques and a statistical definition of sex role categories similar to that of the BSRI. This measure will be referred to as the O'Shea Sex Role Behavior Inventory (OSRBI).

The present study attempted to clarify the attribute-behavior issue in regard to androgyny: (1) by comparing self-ratings on a personal attribute (BSRI) and a behavioral (OSRBI) inventory; and (2) by examining the importance of both attribute and behavioral definitions of androgyny in women on level of physiological arousal, perceived pleasantness, and performance while participating in a competition. Competing on a task has been found to affect men differently than women on some of these variables (Precosky, note 1).

Generally, research has found that competition has improved performance. Triplett (1897) observed that bicycle racers had better performances when competing against another than when riding alone against the clock. He also found that children worked more quickly on a simple motor task when competing than when working alone. Dashiell (1930) found that subjects in competition on tasks such as doing multiplication and anagrams responded differently than they did when working alone, or with others, or in the

presence of an audience. Carment (1970) found that on a simple motor task, both male and female subjects showed increases in performance when being in competition. Evans and Bonder (1973), Vitassi and Evans (note 6), and Precosky (note 1) all found that on a simple perceptual-motor task, competition with another improved performance.

The last three studies mentioned used heart rate change as a measure of physiological arousal in response to competition. Evans and Bonder (1973) observed an increase in heart rate during competition, especially when subjects were also allowed to compare their scores to a peer group. Vitassi and Evans (note 6) showed that competition on a simple, compared to a complex perceptual-motor task resulted in similar increases in heart rate. Precosky (note 1) found that subjects' heart rates increased regardless of sex of competitor.

Vitassi and Evans (note 6) and Precosky (note 1) also included perceived pleasantness as another dimension of subjects' response to competition. Vitassi and Evans found that perceived pleasantness increased when a competitor was introduced for a simple task and decreased when introduced for a complex task. Precosky found that there was a trend toward an interaction effect on perceived pleasantness when subjects competed with someone of the opposite sex. Women tended to enjoy competition less when the competitor was female, and more when the competitor was male. Men tended

to enjoy competition less when the competitor was male, and more when the competitor was female.

However, competition is an area in which little, if any, research has been conducted to determine the effects of androgyny. Traditional stereotypes present males as being highly competitive, and women as tending to perform less well and less often in competitive situations, especially when their competitor is male. For example, adjectives on the masculine scale of the BSRI include such traits as "competitive", "ambitious", and "aggressive" (Bem, 1974). Behaviors rated as being masculine on the OSRBI included watching and playing hockey, baseball, and football. Neither the feminine scale of the BSRI nor the OSRBI make any reference to competitiveness.

Research looking at women and achievement has posited that women exhibit fear of success (Horner, 1972), fear of failure (Stein & Bailey, 1973), or a deficiency in achievement motivation (McClelland, Atkinson, Clarke & Lowell, 1953). Horner's work (1969, 1972) on the motive to avoid success, in particular, reflects the influence of the feminine sex role stereotype. Horner theorized that competence, competition, and intellectual achievement are not part of the feminine stereotype. Subsequently, there exists the expectancy that success in an achievement situation will have negative consequences. She hypothesized that this fear of success would be more prevalent in women

than in men, particularly in high achievement-oriented, high ability women. Differences in the motive to avoid success would become evident in competitive achievement situations where performance was being evaluated against a standard and against a competitor. The negative value of success would be especially large where the competitor was male. Some research supports this theory (Horner, 1969); other work has found that it does not always hold true (Feather, 1975).

Thus, based on the masculine stereotype, men might perform better in competition, and enjoy it more. Based on the fear of success motive, and on the feminine stereotype that women are more sensitive to others, the presence of a competitor would have a stronger negative effect on women.

Recently, Precosky (note 1) did find sex differences in response to being in a competition. Relative to base rates, men's heart rates increased more in competition than did females, while women's performance scores increased more than did the males' scores. No significant difference in perceived pleasantness of being in competition were found between men and women. Varying the sex of the competitor faced by the subjects did not result in any significant changes in physiological, self-report or behavioral measures of stress for males or females. Precosky interpreted these findings as indicating that women were able to perform more effectively in competition, as reflected by better performance and less physiological arousal. Frankenhauser

(1976, 1978) has obtained similar results and has given a similar interpretation.

As mentioned, the purpose of the present study was to examine further the effects of competition on women by assessing the impact of androgyny. The relationship between individuals' masculine and feminine personality and sex role behaviors was examined to reveal variations in response to competition with either sex. Changes in heart rate, ratings of perceived pleasantness, and performance on a digit-letter task were obtained from subjects in a competitive situation where the sex of the competitor was varied by using both male and female confederates as competitors. Subjects were selected to represent the four sex role categories as defined by the BSRI.

The experimental paradigm was, in essence, identical to that used by Precosky (note 1), so that data from the proposed experiment would be comparable to that obtained by Precosky.

Because of the lack of research available on androgyny and competition, it was difficult to hypothesize about results. Other than to predict that the BSRI and the OSRBI might be differentially related to the physiological, self-report and behavioral responses to competition, no hypotheses were made.

## Method

### Subjects

Subjects were 226 students - 152 females and 74 males - from two introductory psychology classes at Lakehead University. The mean age of these subjects was 21.33 years (SD= 4.39). The mean for males was 21.58 years (SD= 3.50), and for females was 21.21 years (SD= 4.77). All subjects were administered the BSRI and the OSRBI in counterbalanced order across the group. Each student received a package consisting of the BSRI and the OSRBI, but for every other student the order of presentation was switched. Thus, half the students did the BSRI first and the OSRBI second, and half did the OSRBI first and the BSRI second. Completion of both the BSRI and the OSRBI required approximately 15 minutes. Subjects were told that they might be contacted for further research, requiring approximately 45 minutes of their time. Eighty female subjects were then selected, on the basis of their BSRI scores, to participate in the experiment. These subjects were between the ages of 18 and 27. Participation was voluntary, and subjects received course credit. The selection of the 80 experimental subjects is explained more fully in the procedure section.

## Tests

Both a self-report of masculine and feminine attributes and a behavioral self-report of sex role were used in this study.

The test used as a measure of masculine and feminine attributes was the Bem Sex Role Inventory (BSRI), (Bem, 1974). It contains self-report measures of masculine and feminine attributes, as well as a list of traits considered socially desirable for both sexes. Twenty positive characteristics are used for each measure. Adjectives on the masculine scale include: "independent", "competitive", "masculine", "self-reliant", and "forceful". Adjectives on the feminine scale include: "yielding", "shy", "affectionate", "feminine", "sympathetic", and "sensitive to the needs of others". Each category was based on judges' rating of social desirability of specific attributes for each sex.

Individuals were classified according to their masculinity-femininity score combinations. A median split for each of the masculinity and femininity scales was obtained for the total sample. This resulted in four classifications. If a person scored above the median on masculinity but not on femininity, they were classified as masculine. If a person scored above the median on femininity but not on masculinity, they were classified as feminine. If a person scored above the median on both



masculinity and femininity, they were classified as androgynous. Finally, if a person scored below the median on both masculinity and femininity, they were classified as undifferentiated. The BSRI is presented in Appendix A.

The test used as a measure of masculine and feminine sex role behaviors was the O'Shea Sex-Role Behavior Inventory (OSBRI). It was developed by the present author to assess an individual's sex role using a list of concrete behaviors defined as being more likely to be performed by one sex than the other. To develop this inventory, 37 students in a third year social psychology class (27 females and 10 males) were given a lecture on androgyny and the difference between attributes and sex roles was explained. It was explained that the lecturer was attempting to develop a test to measure androgyny on the basis of sex-related behaviors, in contrast to attributes. The students in this class were then asked to list sex-related behaviors for both men and women. These lists were compiled, and the items most frequently cited were used for the preliminary version of the OSBRI. Fifty-one behaviors were presented on this initial version, and a 4-point scale was used, '0' indicating not at all likely, '1' slightly likely, '2' likely, and '3' very likely. This preliminary inventory was filled out twice by 103 second- and third-year arts students. They were instructed to use this list of behaviors to answer the following question: "How likely is it that men will do the following things?" The same question

was asked about women. Order of presentation of instructions was counterbalanced. Every student was asked to answer both questions, but the order of presentation was switched for every other student. Half the students rated men first, and half the students rated women first.

From the responses obtained, those items that differentiated most strongly between male and female sex roles were used in the final version of the OSRBI. T-tests comparing each of the 51 items were conducted. Twenty-four items, each with a t-value greater than 8.0 ( $p < .0004$ ,  $df = 102$ ) were selected for the final inventory. Twelve of these items are masculine-related behaviors and 12 are feminine-related. Examples of masculine behavior items are: "do heavy work", "watch hockey", "fight physically", and "work on car". Examples of feminine behavior items are: "sew", "show emotions", "do cleaning", and "go shopping".

For both the BSRI and the OSRBI, subjects masculine and feminine scale scores were obtained by calculating the mean rating they gave the items on each scale. Data from both males and females were collected on the OSRBI to ensure a more complete psychometric analysis. The OSRBI was also administered a second time 10 weeks later to obtain a test-retest reliability coefficient. Appendix B contains the OSRBI.

## Design

The design of the experiment was a 4 x 2 factorial design. The two factors were sex role of the subject, based on the BSRI pre-test, and sex of confederate. Female subjects were randomly selected from each of the four sex role groups of the larger sample of male and female introductory students and were randomly assigned to competition with either a male or female competitor. Half of each of the four groups had a male competitor and half a female competitor. Confederates were introduced as competing students for the final competition trial. Since all subjects were female, the eight conditions thus created were: masculine female, male competitor (MF-M), masculine female, female competitor (MF-F), feminine female, male competitor (FF-M), feminine female, female competitor (FF-F), androgynous female, male competitor (AF-M), androgynous female, female competitor (AF-F), undifferentiated female, male competitor (UF-M), undifferentiated female, female competitor (UF-F). Ten subjects were in each condition. The design may be illustrated as follows:

<u>Sex Role</u>	<u>Competitor</u>
masculine	male
	female
feminine	male
	female
androgynous	male
	female
undifferentiated	male
	female

### Procedure

As explained previously, two classes of introductory psychology students (n= 226) were administered the BSRI and the OSRBI. The BSRI and the OSRBI were scored, and subjects were placed in each of the sex role categories.

Sex role categories were determined by the BSRI. Two median splits using the medians of the total combined sample on both the masculine scale (Med= 4.79), and on the feminine scale (Med= 4.92) were used to create the four sex role categories. Twenty females were then randomly selected from each of the four categories, and were contacted by telephone and asked to participate. Of the first 80 subjects selected, 7 were unable to participate: one subject classified as undifferentiated and one subject classified as androgynous had incompatible schedules; one subject classified as undifferentiated and one subject classified as

androgynous refused, and one subject from the undifferentiated category could not be contacted. Seven additional subjects were then randomly selected to replace these subjects.

Due to an error that was not discovered until after the experiment was completed, the total number of subjects in each group turned out uneven. Both the masculine and undifferentiated groups had 20 subjects; however, one androgynous subject was mistakenly categorized as feminine. Therefore, the androgynous group ended up with 21 subjects, and the feminine category with only 19 subjects. This difference was considered inconsequential.

The experimental procedure that was used was virtually identical to Precosky's (note 1). Each subject was tested individually in a research room at Lakehead University, and was separated from the experimenter and polygraph equipment by a set of bookshelves. Although the experimenter was visible when explaining various procedures, she stayed as much as possible behind the bookshelves during the experiment.

Prior to the experiment, the experimenter introduced herself and asked the subject to sign an informed consent form. Appendix C contains a copy of the consent form. Subjects then had a photoelectric plethysmograph transducer placed on the index finger of their least preferred hand. This plethysmograph recorded their pulse on a Gilson

two-channel polygraph, so that heart rate could be monitored throughout as a measure of physiological response to competition. After a five-minute relaxation period, each subject was given seven one-minute trials on a digit-letter task similar to the digit symbol sub-test of the Wechsler Adult Intelligence Test (WAIS, Wechsler, 1955). For each task, the total number of consecutive letters printed below the digits within one minute were counted, and errors and skipped letters were subtracted to give the subject's score. Subjects were informed of their performance scores after each trial, and the scores were then recorded to provide a behavioral measure. After the relaxation period and each performance trial, subjects were asked to rate how pleasantly they had perceived the task on a 21-point scale. This perceived pleasantness scale was used as a self-report response to competition. On Trial 8, a confederate, introduced as another student, was brought into the room and had a plethysmograph placed on his or her finger. This plethysmograph was not attached to the polygraph. It was emphasized that this trial was a competition, that it was important to work as quickly and as accurately as possible, and that a winner would be declared. After the final rating of perceived pleasantness, the confederate left, and subjects were debriefed. The procedure is presented in step-by-step form in Appendix D. Appendices E and F present a sample of the task and the perceived pleasantness scale, respectively.

It should be mentioned that it was not thought necessary to have any formal manipulation checks in this experiment. Previous data from the same lab has shown that when a competitor is brought into the room and participants are told to compete, participants are very aware of the fact that they are in a competition. Further, during the debriefing session, subjects were asked on an informal basis how they felt during the competition trial. Subjects reported nervousness, feelings of arousal and excitement, and felt a definite sense of competition. It was also not thought necessary to see if participants knew whether their competitor was male or female. This fact seemed obvious, since competitors wore clothing that appeared to be sex-appropriate student garb, and looked to be obviously one sex or the other.

Two male and two female introductory psychology students were used as confederates, each providing a total of 20 hours of their time. Prior to the experiment, subjects were randomly assigned, to one of the two male and two female confederates, for up to five subjects in each category for each confederate. The assignment of subjects to each confederate was arranged by another graduate student so that the experimenter would be blind to the sex of the competitor prior to his or her entrance on Trial 8. Confederates arrived approximately 15 minutes after the experiment had begun and worked in another room until required, to avoid meeting subjects. The confederates were

asked to maintain as consistent an appearance, and as consistent a performance as possible throughout the sessions. Confederates were paid a small honorarium for their involvement. Scheduling of the experiment was arranged according to the convenience of subjects and the availability of confederates.

Total time required to test and debrief each subject was approximately 45 minutes.

### Statistical Analysis

All statistical analyses were conducted using the SPSS system of computer programs (Nie, Hull, Jenkins, Steinbrenner and Bent, 1975).

Psychometric analysis of the OSRBI was first conducted using the combined sample (N= 226). Reliability coefficients of inter-item consistency and stability over time were obtained for the OSRBI, and comparisons with the BSRI were made to assess validity of the OSRBI.

From the experiment, heart rate and perceived pleasantness data were collected for the last minute of relaxation and for all performance trials. Performance data were collected for all performance trials. Only data from selected trials were counted and analysed.



Heart rate measures were used from the last minute of the relaxation period, from Trial 7, and from Trial 8. These will be referred to as resting heart rate (RESTHR), heart rate 1 (HR1), and heart rate 2 (HR2). Ratings of perceived pleasantness were obtained from the relaxation period, Trial 7, and Trial 8. Measures of perceived pleasantness will be referred to as resting perceived pleasantness (RESTPP), perceived pleasantness 1 (PP1), and perceived pleasantness 2 (PP2). Subjects' performance scores were obtained from Trials 7 and 8 and will be referred to as performance 1 and performance 2 (PER1 and PER2). One-way analyses of variance were used to see if there were any initial differences among the four sex role groups.

Three dependent measures were examined to determine the effects of BSRI sex role category and manipulation of sex of competitor: heart rate change from Trial 7 to Trial 8 (HRCHG), perceived pleasantness change from Trial 7 to Trial 8 (PPCHG), and performance change from Trial 7 to Trial 8 (PERCHG).

Post hoc blocking, using the OSRBI scores, was then carried out on the same data. Medians for the masculine (Med= 1.09) and for the feminine (Med= 1.77) scale were obtained, and subjects were split into the four sex role groups created by this scale. Analyses of initial differences and change scores, identical to those conducted

above, were also performed on the four sex role groups created by the OSRBI.

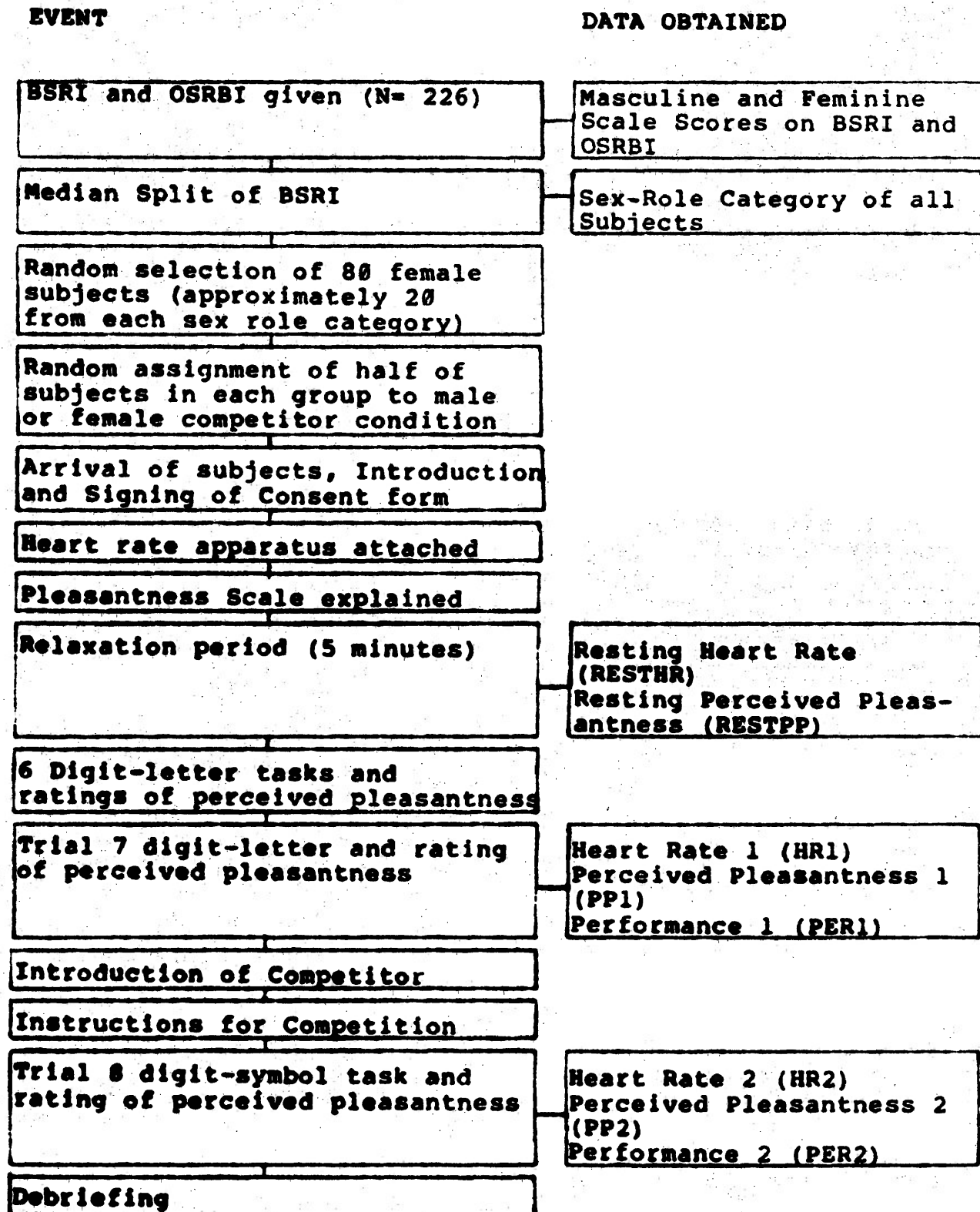
Any significant differences found with the overall F-tests were analyzed further using the Newman-Keuls procedure (Keppel, 1973).

The use of change scores has been criticised by several researchers (Cohen & Cohen, 1975; Cronbach & Furby, 1970; Keppel, 1973). Change scores are the algebraic subtraction of a pre-test score from a post-test score with the intent of allowing direct measurement of change. For many psychological and physiological measures, however, the relationship between initial values and change scores is more complex. The Law of Initial Values (Wilder, 1967) states that the pretest value limits the amount of change that can occur, depending on the direction of change. For example, higher initial values may limit increases in responding, and permit greater decreases. The variability of change scores is therefore still contaminated with the variability of the initial value. Simple subtraction does not seem to be as direct a measure of change as it originally appeared.

However, for many variables, change scores may still adequately control for differences that existed on the pretest. They are also statistically simple to analyze using regular analysis of variance techniques, and are easily interpreted. Kenny (1974) has stated that the use of

change scores analysis may be appropriate. However, if in doubt, he suggests the use of more than one method of analysis to ensure that the results obtained are relatively accurate. Multiple regression analyses were therefore also used to investigate possible relationships between BSRI and OSRBI scores and heart rate, performance and perceived pleasantness scores. This analysis was conducted using Trial 8 heart rate, rating of perceived pleasantness and performance scores as the dependent measures. Trial 7 scores were used as the covariate. Other variables included in the multiple regression analysis were sex of confederate, and subjects' masculine and feminine scale scores. Subjects' sex role categories were also dummy-variable coded (Cohen & Cohen, 1975) and used as variables in order to compare the analysis of variance on change scores to multiple regression results. Similar multiple regression analyses were carried out using subjects' masculine and feminine scale scores on the OSRBI. Figure 1 presents a flow chart of subject selection and experimental procedure, and the data obtained from each step in the procedure.

**Figure 1**  
**Flow Chart of Subject Selection**  
**And Experimental Procedure**



## Results

### Psychometric Analysis

Both inter-item consistency and test-retest reliability correlation coefficients were established for the OSRBI. Cronbach's alpha, a measure of inter-item consistency, was .85 for the masculine behavior scale, and .87 for the feminine behavior scale.

Test-retest reliability was determined on the scores of 96 subjects who had taken the test twice, separated by a period of 10 weeks. Pearson product moment correlations were determined for the masculine ( $r = .81$ ) and feminine ( $r = .83$ ) scales. These correlations were significant ( $p < .001$ ,  $n = 96$ ), and fairly high, indicating stability of the subjects' scores over time.

To examine the validity of the OSRBI, several comparisons were made between its scales and the masculine attribute and feminine attribute scales of the BSRI. T-tests were used to compare men's and women's mean scores on the two OSRBI and the two BSRI scales. All four tests showed highly significant differences. Men scored higher on the masculine behavior and masculine attribute scales; women scored higher on the feminine behavior and feminine attribute scales. Tables 1 and 2 present the means, standard deviations, t-values and significance levels of these comparisons.

Table 1

Mens's vs. Women's Scores on  
the OSRBI and BSRI Masculine Scales

## OSRBI

	N	Mean	SD	t-value	Prob.*
Males	74	1.54	.65	3.83	.000
Females	152	.97	.83		

## BSRI

Males	74	5.04	.55	7.64	.000
Females	152	4.65	.48		

Table 2

Men's vs. Women's Scores on  
the OSRBI and BSRI Feminine Scales

## OSRBI

	N	Mean	SD	t-value	Prob.*
Males	74	1.17	.42	-13.62	.000
Females	152	1.96	.39		

## BSRI

Males	74	4.56	.50	-6.92	.000
Females	152	5.07	.54		

\* Correct to 3 decimal places.

Distribution of the sample used across sex-role groups was also examined. While the scores for the females seem to be more evenly distributed over the categories, the male sample is markedly skewed, on both the OSRBI and the BSRI, toward the masculine sex-role category. No men were classified as feminine using the OSRBI, and only 5.4% were classified as feminine using the BSRI. More males were androgynous, i.e., both masculine and feminine scores were high, or undifferentiated, i.e., both masculine and feminine scores were low, than were feminine alone, on both the BSRI and the OSRBI.

Table 3

Percentage of Subjects in Each of the Sex-Role Categories  
(N= 226)

	Women				Men			
	Masc.	Fem.	And.	Und.	Masc.	Fem.	And.	Und.
OSRBI	10.5	46.7	22.4	20.4	70.3	0	6.8	23.0
BSRI	19.7	38.2	23.7	18.4	48.6	5.4	18.9	27.0

Correlations were conducted on the masculine behavior and the feminine behavior as well as the masculine attribute and the feminine attribute scale scores, for both sexes. For males and for females, the relationship between masculinity and femininity was not significant.

The third set of correlations performed indicates a significant, low positive correlation between the masculine scales of the OSRBI and the BSRI, and between the feminine scales of the OSRBI and the BSRI. As well, none of the correlations between the OSRBI masculine and the BSRI feminine scales, and the OSRBI feminine and the BSRI masculine scales reach significance.

Table 4

Correlations between the OSRBI and the BSRI  
 Masculine and Feminine Scales for males  
 (N= 74)

	Masculine Behavior	Feminine Behavior	Masculine Attribute	Feminine Attribute
Masculine Behavior		.19	.32**	.08
Feminine Behavior			.14	.28*
Masculine Attribute				.21

\*  $p < .05$

\*\*  $p < .01$



Table 5

## Correlations between the OSRBI and the BSRI

## Masculine and Feminine Scales for females

(N= 152)

	Masculine Behavior	Feminine Behavior	Masculine Attribute	Feminine Attribute
Masculine Behavior		.08	.39***	-.09
Feminine Behavior			-.10	.29***
Masculine Attribute				-.07

\* p &lt; .05

\*\* p &lt; .01

\*\*\* p &lt; .001

## Experimental Analysis Using the BSRI

Analyses were conducted on the data presented in Tables 6, 7 and 8.

### Initial Differences

The groups did not differ on resting heart rate (RESTHR) or resting perceived pleasantness (RESTPP), or on Trial 7 heart rate (HR1) or perceived pleasantness (PP1). However, there was an initial difference on Trial 7 performance (PER1) ( $F = 4.83$ ,  $p = .004$ ). Newman-Keuls comparisons showed that the masculine ( $M = 57.75$ ) and androgynous ( $M = 58.81$ ) differed significantly from both the feminine ( $M = 52.95$ ) and the undifferentiated ( $M = 52.40$ ) groups. The common element seems to be that subjects scoring high on masculinity performed better on the digit-letter matching task than did subjects low in masculinity. See Appendix G for analysis of variance summary tables, means and standard deviations.

### Analysis of Change Scores

T-tests comparing changes from Trial 7 to Trial 8 for all subjects revealed that significant changes had taken place on all 3 measures. Heart rate and performance showed increases, while perceived pleasantness showed a decrease. Table 9 shows the means, standard deviations, t-values and probability for each measure.

Table 6  
Means and Standard Deviations of Resting,  
Trial 7 and Trial 8 Heart Rate of BSRI Groups

## Male Competitor

Sex Role	N		Resting	Trial 7	Trial 8
Masculine	10	M	76.33	85.22	106.67
		SD	10.90	11.55	18.28
Feminine	9	M	76.70	82.10	98.30
		SD	3.74	5.47	11.80
Androgynous	11	M	73.55	80.64	102.82
		SD	14.47	16.18	19.17
Undifferentiated	10	M	75.80	81.80	103.10
		SD	6.65	8.20	9.07

## Female Competitor

Sex Role	N		Resting	Trial 7	Trial 8
Masculine	10	M	78.36	88.55	107.18
		SD	8.39	10.14	18.16
Feminine	10	M	73.33	76.44	92.44
		SD	9.34	8.32	12.39
Androgynous	10	M	79.20	87.80	106.40
		SD	10.65	8.87	11.83
Undifferentiated	10	M	79.70	84.90	96.70
		SD	15.63	15.16	15.88

Table 7  
Means and Standard Deviations of Resting,  
Trial 7 and Trial 8 Perceived Pleasantness  
of BSRI Groups

**Male Competitor**

Sex Role	N		Resting	Trial 7	Trial 8
Masculine	10	M	13.44	10.11	11.00
		SD	2.92	1.83	4.92
Feminine	9	M	13.20	11.50	10.90
		SD	2.78	2.72	4.18
Androgynous	11	M	13.55	10.36	10.82
		SD	2.81	2.42	5.40
Undifferentiated	10	M	13.50	9.80	10.20
		SD	2.95	4.13	4.39

**Female Competitor**

Sex Role	N		Resting	Trial 7	Trial 8
Masculine	10	M	13.91	13.55	10.82
		SD	3.02	3.17	2.44
Feminine	10	M	13.89	11.56	8.11
		SD	3.22	1.67	2.80
Androgynous	10	M	14.00	11.70	7.70
		SD	2.11	2.58	3.47
Undifferentiated	10	M	14.10	11.20	9.70
		SD	2.51	2.94	3.68

Table 8  
Means and Standard Deviations of Trial 7,  
and Trial 8 Performance of BSRI Groups

**Male Competitor**

Sex Role	N		Trial 7	Trial 8
Masculine	10	M	54.89	59.67
		SD	6.95	6.63
Feminine	9	M	53.90	59.10
		SD	6.28	6.56
Androgynous	11	M	57.82	64.36
		SD	8.00	9.70
Undifferentiated	10	M	52.90	58.10
		SD	6.15	4.93

**Female Competitor**

Sex Role	N		Trial 7	Trial 8
Masculine	10	M	60.00	66.63
		SD	6.91	6.18
Feminine	10	M	51.44	56.89
		SD	4.77	7.66
Androgynous	10	N	59.90	65.90
		SD	6.28	9.54
Undifferentiated	10	M	51.90	56.90
		SD	5.99	8.67

Table 9

Heart Rate (HR), Perceived Pleasantness (PP), and  
Performance (PER) Change from Trial 7 to Trial 8  
(N= 80)

	Mean	SD	t-value	Prob.
HR1	83.53	11.26	14.93	.000
HR2	101.84	15.24		
HRCHG	18.31	10.97		
PP1	11.25	2.91	-2.71	.008
PP2	9.94	4.04		
PPCHG	-1.31			
PER1	55.49	7.04	12.02	.000
PER2	61.14	8.29		
PERCHG	5.65	4.20		

Three 4x2 factorial analyses of variance then assessed the effects of sex-role category, sex of competitor, and the effects of possible interactions between these two factors on the dependent measures. See Appendix H for analysis of variance summary tables, means, and standard deviations.

Analysis of variance performed on heart rate change (HRCHG), ( $M = 18.31$ ) indicated no significant change from Trial 7 to Trial 8, as a result of either sex role or sex of competitor, or a sex role by sex of competitor interaction. Competition with another person, regardless of their sex, did not differentially affect heart rate change of the four different groups.

Sex role also was not significantly related to perceived pleasantness change (PPCHG) ( $M = -1.31$ ). However, sex of confederate was ( $F = 11.66$ ,  $p = .001$ ). Changes in subjects' reports of perceived pleasantness showed a slight increase when they competed against a male ( $M = .27$ ). Changes in subjects' reports of perceived pleasantness revealed a larger decrease in pleasantness when competing against a female ( $M = -2.90$ ). There were no significant interaction effects.

The third analysis of variance, conducted on performance change (PERCHG), ( $M = 5.65$ ), indicated that change was not related to sex-role category, or sex of competitor. Although all sex-role groups demonstrated superior performance when competing than when performing

alone, subjects' performance scores were not changed by the presence of a male compared to a female competitor. As well, no significant interaction was found between the two independent variables using performance scores.

To summarize, sex-role category based on the BSRI was not related to changes in subjects' scores from Trial 7 to Trial 8 on heart rate, perceived pleasantness, or performance. Sex of competitor was not related to heart rate or performance, but was related to perceived pleasantness change. When competing against a male, there was an increase in perceived pleasantness on Trial 8 in contrast to Trial 7. However, when competing against another female, there was a decrease.

#### Analysis of OSRBI post hoc Blocking

Analyses identical to those conducted for the BSRI categories were also conducted using OSRBI sex-role groups. Although the number of subjects in each group obtained using the median split method was very unequal (10, 36, 14 and 20 for the masculine, feminine, androgynous and undifferentiated groups, respectively), it seemed that the smallest group was still large enough to make comparisons. Data is presented in Tables 10, 11 and 12.



Table 10  
Means and Standard Deviations of Resting,  
Trial 7 and Trial 8 Heart Rate of OSRBI Groups

**Male Competitor**

Sex Role	N		Resting	Trial 7	Trial 8
Masculine	6	M	77.00	84.33	101.67
		SD	10.55	9.97	7.06
Feminine	17	M	74.94	81.77	102.24
		SD	11.56	13.55	16.75
Androgynous	8	M	73.13	79.38	99.38
		SD	7.61	6.82	12.06
Undifferentiated	9	M	77.78	84.67	106.89
		SD	7.26	9.73	18.25

**Female Competitor**

Sex Role	N		Resting	Trial 7	Trial 8
Masculine	4	M	69.75	80.75	94.00
		SD	16.46	19.65	20.49
Feminine	19	M	78.05	84.11	97.84
		SD	11.30	11.34	16.42
Androgynous	6	M	77.00	86.83	104.67
		SD	5.80	6.11	13.60
Undifferentiated	11	M	80.64	86.09	107.18
		SD	11.08	12.06	12.98

Table 11  
Means and Standard Deviations of Resting,  
Trial 7 and Trial 8 Perceived Pleasantness  
of OSRBI Groups

## Male Competitor

Sex Role	N		Resting	Trial 7	Trial 8
Masculine	6	M	13.83	9.33	12.00
		SD	2.71	2.67	4.34
Feminine	17	M	13.18	9.35	8.77
		SD	2.53	2.50	3.29
Androgynous	8	M	14.50	11.38	10.98
		SD	2.73	2.72	6.92
Undifferentiated	9	M	12.67	12.44	13.44
		SD	3.32	2.83	3.09

## Female Competitor

Sex Role	N		Resting	Trial 7	Trial 8
Masculine	4	M	14.75	13.25	9.25
		SD	1.71	3.86	4.19
Feminine	19	M	13.11	11.68	8.63
		SD	2.62	2.63	2.73
Androgynous	6	M	14.67	13.67	8.33
		SD	2.94	3.33	3.27
Undifferentiated	11	M	14.82	11.36	10.46
		SD	2.60	2.06	3.86

Table 12  
Means and Standard Deviations of Trial 7  
and Trial 8 Performance of OSRBI Groups

Male Competitor

Sex Role	N		Trial 7	Trial 8
Masculine	6	M	55.33	60.83
		SD	6.25	7.14
Feminine	17	M	53.00	58.88
		SD	4.87	5.70
Androgynous	8	M	58.63	65.50
		SD	9.87	10.73
Undifferentiated	9	M	55.11	58.56
		SD	7.37	5.98

Female Competitor

Sex Role	N		Trial 7	Trial 8
Masculine	4	M	58.25	61.50
		SD	13.18	16.11
Feminine	19	M	55.21	61.21
		SD	6.82	9.70
Androgynous	6	M	60.50	66.50
		SD	6.38	3.78
Undifferentiated	11	M	54.18	60.55
		SD	5.19	7.34

### Initial Differences

Analyses of variance, performed on resting heart rate (RESTHR) and on resting perceived pleasantness (RESTPP) revealed no significant differences. Heart rate (HR1), perceived pleasantness (PP1), and performance (PER1) compared at Trial 7 also showed no significant differences. See Appendix I for the analysis of variance summary tables, means, and standard deviations.

### Analysis of Change Scores using OSRBI Categories

The three dependent measures again consisted of heart rate change (HRCHG), perceived pleasantness change (PPCHG) and performance (PERCHG) from Trial 7 to Trial 8. A 4 x 2 factorial analysis of variance was conducted on each of these measures to assess the relationship between them and OSRBI sex role, sex of competitor or interaction of these two variables.

The results of the analyses are very similar to those obtained with the BSRI sex role categories. Changes in heart rate, perceived pleasantness and performance were not significantly affected by OSRBI sex-role category, nor was there any significant interaction of OSRBI sex role and sex of competitor. The only significant effect was sex of competitor on changes in perceived pleasantness ( $F = 12.33$ ,  $p = .001$ ). Changes in subjects' ratings of perceived pleasantness decreased when they competed against another

female ( $M = -2.90$ ) and increased when they competed against a male ( $M = .27$ ).

### Multiple Regression

Two sets of regression analyses were conducted: using dummy coding for sex-role category to verify findings using analysis of change scores, and using masculine and feminine scale scores instead of categories. Trial 7 scores and sex of competitor were used as covariates, and Trial 8 scores were the dependent variable. Using either regression analysis, the findings were basically similar to results using sex role categories, and change scores, in analysis of variance. Trial 7 heart rate (HR1), perceived pleasantness (PP1), and performance (PER1) each accounted for a significant amount of variability. As well, sex of competitor accounted for a significant portion of variability associated with perceived pleasantness of Trial 8 (PP2). Neither masculine or feminine scale scores, or sex role category on the BSRI and the OSRBI accounted for a significant amount of variability on Trial 8 heart rate (HR2), or performance (PER2). However, the OSRBI feminine scale score and feminine sex-role category each accounted for a significant portion of Trial 8 perceived pleasantness, and this relationship was negative (see Appendix K).

## Discussion

The object of this study was to clarify the attribute-behavior issue in androgyny by: 1) comparing self-ratings on a personal attribute (BSRI) and a behavioral (OSRBI) measure of androgyny; and 2) by examining the relationship between attribute and behavioral definitions of androgyny and changes in women's responses to competition. It was hypothesized that the BSRI and the OSRBI would differentially predict such changes.

With respect to variations in changes in heart rate, perceived pleasantness, and performance during competition, no significant differences were found related to BSRI sex role category. Results using the OSRBI sex-role groups were similar to those obtained using the BSRI. OSRBI sex-role groups were not significantly different from each other on changes in heart rate, perceived pleasantness, and performance. Multiple regression analysis on masculine and feminine scale scores revealed only one significant relationship, between OSRBI femininity score and Trial 8 perceived pleasantness variability. While regression analysis using dummy-variable coding supported this finding, other results supported the use of change scores.

Changes in heart rate and performance were also not related to sex of competitor. The only significant difference was the change in perceived pleasantness of

subjects competing against males compared to subjects competing against females. This was found using both the BSRI and the OSRBI groups.

The hypothesis that individuals' perceptions of masculine and feminine attributes and their perceptions of sex-role behavior would differentially predict changes in heart rate, perceived pleasantness, and performance is therefore mainly unsupported by the results of this study. While the use of multiple regression techniques showed some relationship between the OSRBI feminine scale and perceived pleasantness, both the BSRI and the OSRBI sex-role categories were similarly poor in predicting all three measures using analysis of variance on change scores. The strength of this finding is based on several assumptions that should be considered when interpreting the results.

#### Competition as an Effective Manipulation

First, it was assumed that competition was a manipulation that could induce some level of change in most subjects. The t-tests comparing Trial 7 to Trial 8 data show that competition did have a strong effect on heart rate, perceived pleasantness, and performance. This was to be expected from previous research (Precosky, note 1).

Heart rate went up significantly on Trial 8, suggesting an increase in level of arousal as a physiological response to competition. Subjects' perceived pleasantness showed a

decrease. Competition with another was less pleasant than non-competition. Finally, despite decreased pleasantness during competition, subjects' performance increased significantly. The presence of a competitor induced positive change in subjects' performance. These findings were directly comparable to Precosky's findings. Vitassi and Evans (note 7) reported similar changes as a result of competition. Previous unpublished research in the same lab has shown that if no competition or competitor is introduced, no changes occur.

#### Initial Differences

A second assumption was that the sex-role groups were comparable to each other prior to competition, and that any initial differences were adequately controlled.

Analysis of initial differences indicated that the four sex role groups had similar resting heart rates, and Trial 7 heart rates. Perceived pleasantness also remained consistent across the four groups while resting, and at Trial 7. Thus, the four groups were comparable on heart rate and perceived pleasantness at Trial 7.

Performance on Trial 7 did vary with sex role. Masculine and androgynous subjects performed significantly better than feminine and undifferentiated subjects. Subjects scoring high on the masculine attributes scale were likely to perform better on a task such as timed



digit-letter matching. Since this seems to be primarily an instrumental, agentic type of task, it is logical that subjects scoring high in masculinity would perform better.

However, in Precosky's study, women performed better on Trial 7 ( $M= 53.05$ ,  $SD= 7.36$ ) than men ( $M= 48.33$ ,  $SD= 6.15$ ). This apparent contradiction might be explained if it is hypothesized that performance on the digit-letter task is gender-related, with women tending to perform better than men. Other studies have found that women tend to perform better on the related digit-symbol task of the WAIS (Shaw, 1967; Wechsler, 1958). Within each sex, however, it is possible that masculine and feminine attributes could influence one's score, so that more masculine subjects tend to perform best within each sex. This study would support such a statement for women, at least. Generalizations for males would require further research. Also, further research should be done to see if the present finding is replicable.

No differences on resting heart rate or resting perceived pleasantness were found among the OSRBI groups. No differences were found on heart rate, or perceived pleasantness at Trial 7. In contrast to the groups created by the BSRI, performance did not differ among the four OSRBI sex role groups. Individuals' perceptions of their masculine and feminine attributes seems to be better predictors of performance than do their perceptions of their

behavior.

To help control for initial differences between sex role categories, change scores were used as dependent measures. Multiple regression analyses carried out on the same data tend to support the use of change scores as an appropriate method of controlling for initial differences. Significant portions of variability were related to Trial 7 heart rate, perceived pleasantness and performance. BSRI sex-role category remained unassociated with any significant amount of variability on any Trial 8 scores. OSRBI sex-role categories were not significantly related to variability of Trial 8 heart rate or performance. However, change scores were not as sensitive to changes in pleasantness. Multiple regression analysis showed that the OSRBI feminine sex-role category was negatively related to perceived pleasantness of Trial 8.

#### BSRI and OSRBI - Different Aspects of Androgyny

Whether the BSRI and the OSRBI actually are measuring different aspects of androgyny may also be questioned. Psychometric analysis of the OSRBI suggest that it is a reliable and valid measure of behavioral androgyny. The BSRI appears to be a valid measure of masculine and feminine attributes. Spence and Helmreich (1974) state that it is important to distinguish between masculine and feminine personal attributes and sex-role behavior. The results of

this study do not appear to support such a distinction. Both tests were poorly related to the dependent measures selected. There was a correlation between the masculine scales of the BSRI and the OSRBI, and between the feminine scales of the BSRI and the OSRBI. The pattern of correlations obtained for males and for females among the scales were also similar.

It may be, however, that one-to-one competition on a perceptual-motor task does not have salient cues for the appearance of masculine or feminine attributes or sex-role behavior. It should be considered that although there were no differential changes in subjects' heart rate, perceived pleasantness or performance within any of the sex-role groups, examination of initial differences does lend some support the statement that the BSRI and the OSRBI are different aspects of androgyny. Using the BSRI, masculine and androgynous subjects were better than the feminine and undifferentiated subjects at performing the digit-letter task, while this difference is not found using the OSRBI. Further support comes from regression analyses of perceived pleasantness. While the BSRI is not related to Trial 8 variability of perceived pleasantness, the feminine scale and the feminine sex-role category of the OSRBI were negatively related. Women who tend to do more feminine behaviors found competition less pleasant, while no such relationship was found for women with feminine attributes.

As for the correlations between the BSRI and the OSRBI, they can be interpreted as suggesting that the BSRI and the OSRBI are measuring different aspects of androgyny. While significant, none of the correlations exceed .40. These low, positive correlations may indicate that the two tests are measuring related, but different constructs. This would seem to be the relationship between masculine and feminine attributes and sex role behavior.

#### Other Findings

Less central, but relevant to issues in sex role research, are several other findings. The three dependent measures used to examine the effects of competition on subjects all showed a change as a result of competition. Heart rate increased for all subjects, regardless of their sex role, or the sex of the competitor against whom they were competing. Little work has been done on levels of physiological arousal and androgyny. There are sex differences in physiological responses (Frankenhauser, 1976, 1978; Precosky, 1980), but whether these responses are learned or genetic is more and more open to question.

The change in perceived pleasantness was negative, and related only to sex of competitor. Most subjects perceived competition as being slightly unpleasant. Perceived pleasantness was not related to sex role, but it was negatively related to OSRBI feminine scale scores. Subjects

who tended to do more feminine behaviors found performance in competition to be less pleasant. Perhaps women who do not enjoy competition tend to do other behaviors instead.

Perceived pleasantness change in relation to sex of competitor was contrary to what might be predicted from Horner's (1968, 1972) work. In the present study, women showed a decrease in perceived pleasantness when competing against other women, and an increase when competing against men. Horner posited that high achievement-oriented, high ability women would attach a negative valence to success, since competition and competency, especially with respect to men, are not part of the feminine stereotype. Since the subjects used in the present study were first-year university students, it is assumed that these individuals have some orientation toward intellectual achievement and have a certain level of ability. They would therefore seem to be a target group for having the expectancy that success, and by extension, competition, would be negative, especially when their competitor was male. Perhaps most strongly influenced would be women classified as feminine, who, according to androgyny theory, are most rigidly bound to the feminine stereotype.

Neither of the last two statements is supported by this study. Although females did not perceive competition to be pleasant, the males in Precosky's study also found competition less pleasant than non-competition. Further, in

this particular type of competition, women found competing with another female more unpleasant than competing with a male. Precosky did not find a significant main effect of sex of confederate on perceived pleasantness change. Rather, she found a gender by sex of confederate interaction that approached significance ( $p = .092$ ). Males found competing with other males to be less pleasant than competing with a female, and females seemed to prefer competition with males, compared to females. Perhaps subjects considered competition against someone of the opposite sex to be novel, and therefore less unpleasant (Berlyne, 1960). Another explanation could be that subjects consider competition with the opposite sex to be more a "challenge", and less a "test", and therefore find it less unpleasant.

One point that was mentioned by a number of subjects on an informal basis during the debriefing could have had an influence on perceived pleasantness change. In the competition procedure, subjects were not informed that they had won or lost until after the ratings of perceived pleasantness had been obtained. However, many subjects commented that they knew if they had won or lost before it was announced, since their competitor was directly across the table. All the women who commented on this point stated that winning was more pleasant than losing. Whether their actual behavior reflected their stated attitude could be the subject of future research. Van Egeren (1979) has shown

that winning and losing is associated with different heart rates for males and females. It would be of interest to examine how men and women of different sex-role categories respond to winning and losing.

The positive changes in performance induced by competition were unaffected by sex-role category, or by sex of competitor. Precosky obtained similar results for sex of competitor. The lack of a relationship between sex of competitor and performance is important in view of earlier studies that find such a relationship. Freishlag (1973), Krauss (1978), and Ober (1978) found that subjects tended to increase their performance more in the presence of male competitors than in the presence of female competitors. The fact that the results of the present study differ from these findings suggests that the influence of sex of competitor on variations in performance may be a function of task. Precosky interpreted her findings as suggesting that both males and females were perceived as genuine competitors, and felt that this may be partly due to a current change in thinking resulting from the women's liberation movement.

In a slightly different study, Zanna and Pack (1975) found that when they manipulated the description of a male competitor, so that in one condition he was described as being attractive, but with a traditional view of women, and in another, he was described as being attractive, but with a non-traditional view of women, they were able to alter

women's performance on an anagram task. Women performed best when told that they were competing against an attractive, non-traditional male, and worst when told that they were competing against an attractive traditional male. It is interesting that manipulation of description of type of competitor affected performance, while manipulation of sex of competitor does not. Perhaps the actual presence of a competitor had a different effect than did the influence of an imagined competitor, or perhaps both male and female competitors were perceived by the subjects in this study as possessing similar amounts of attractiveness and traditional attitudes.

Of note as well is the lack of impact that subjects' sex role category had on changes in performance, despite significant initial differences between the groups. Precosky found that women, who performed better on Trial 7 than did men, also showed significantly greater increase on Trial 8. One explanation could be that individuals possessing initially greater competence on a task show more improvement in competition. The present study does not support such an explanation. Masculine and androgynous subjects, who were initially better at the digit-letter task, showed an increase that was no greater than the feminine or undifferentiated groups.



## Conclusions

The results of this study suggest that changes in heart rate, perceived pleasantness and performance during competition are not related to sex role category. As well, females enjoyed competing more with males than with females, contrary to what might have been expected from sex role research. These findings seem most positive. Women's ability to function is not related to their sex-role category, and the presence of a male as a competitor does not seem to be any greater threat than the presence of another female. In fact, a male competitor may be less threatening for females.

Multiple regression analysis using masculine and feminine scale scores does relate high feminine scale scores on the OSRBI to lowered perceived pleasantness, suggesting that the use of continuous scale scores may be more sensitive than categories, at least on the OSRBI. Multiple regression may be considered more appropriate from a philosophical point of view, too, since it eliminates the use of categories, even though the conceptual definition of androgyny becomes obscured.

The operational definition of androgyny is important to any research in this area. The use of two complementary definitions such as those created by the BSRI and the OSRBI might help refine this definition. If studies using both measures indicate that over a variety of situations and

groups they predict subjects' responses similarly, it could be assumed that masculine and feminine attributes and sex role behavior are highly correlated. Differences in the relationship between perceived masculine and feminine attributes and perceived sex-role behaviors and subjects' responses could indicate that behavior and attributes are two different, related aspects of androgyny. Each should then be considered as separate aspects of the individual's personality.

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Full Name \_\_\_\_\_  
(Please print)

Sex \_\_\_\_\_ Age \_\_\_\_\_ School \_\_\_\_\_

Year in School \_\_\_\_\_ Occupation \_\_\_\_\_  
(if not a student)

TELEPHONE \_\_\_\_\_ (If you have no phone, please give us some way of contacting you, e.g., your address:)

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 SOMETIMES BUT INFREQUENTLY TRUE that you are sly.

Mark a 4 if it is OCCASIONALLY 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
Malicious	1

Irresponsible	7
Carefree	5

1	2	3	4	5	6	7
NEVER OR ALMOST NEVER TRUE	USUALLY NOT TRUE	SOMETIMES BUT INFREQUENTLY TRUE	OCCASIONALLY TRUE	OFTEN TRUE	USUALLY TRUE	ALWAYS ALMOST ALWAYS

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

Reliable	
Analytical	
Sympathetic	
Jealous	
Has leadership abilities	
Sensitive to the 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 B

O'Shea Sex Role Behavior Inventory

Name:

Age:

Sex:

Phone number:

On the other side of this page you will see a list of behaviors and a rating scale that goes from 0 to 3. Please use the numbers from the rating scale to indicate how likely you think it is that you would do the things listed.

Please be sure that you respond to all items.

0	1	2	3
not at all	slightly	likely	very
likely	likely		likely

\_\_\_\_\_ do heavy work

\_\_\_\_\_ sew

\_\_\_\_\_ watch hockey

\_\_\_\_\_ watch football

\_\_\_\_\_ show emotions

\_\_\_\_\_ smoke pipe

\_\_\_\_\_ knit

\_\_\_\_\_ take care of little things

\_\_\_\_\_ wear make-up

\_\_\_\_\_ do cleaning

\_\_\_\_\_ cook

\_\_\_\_\_ hunt

\_\_\_\_\_ fight physically

\_\_\_\_\_ go fishing

\_\_\_\_\_ cry

\_\_\_\_\_ do laundry

\_\_\_\_\_ watch baseball

\_\_\_\_\_ do carpentry

\_\_\_\_\_ work on car

\_\_\_\_\_ giggle

\_\_\_\_\_ play hockey

\_\_\_\_\_ go shopping

\_\_\_\_\_ do household chores

\_\_\_\_\_ play contact sports

## Appendix C

## CONSENT FORM

I, \_\_\_\_\_, have been informed that the research in which I am about to participate will place me in some demanding situations. I understand that the demands may be both physical and mental in nature but that the experience will not be dangerous for a normal healthy person. I also realize that if at any time I wish to discontinue an experimental session, I may indicate this to the experimenter and I will be free to leave. I have been told by the experimenter that the research techniques are standard procedures that have been well thought out and tested. With this understanding, I have consented to be a participant.

Signed \_\_\_\_\_

Date \_\_\_\_\_

Appendix D

Experimental Procedure

-- greet the subject in the waiting room, introduce yourself and escort the subject into the experimental room

-- ask the subject to be seated and to make herself comfortable

-- explain the consent form. Have subject sign this form and a list recording her participation in the experiment.

-- explain that a recording of the subject's heart rate will be kept throughout the experiment. Explain that this involves no harm to the subject and that after awhile she will probably even forget that her heart rate is being recorded. Place the plethysmograph on the index finger of the subject's least preferred hand and inform her that the plethysmograph must be kept still if it is to work properly. Encourage the subject to just relax and not worry about anything in the experiment.

-- after attaching the heart rate apparatus turn on the machine and give the following explanation concerning the pleasantness scale:



"Now, make yourself as comfortable as you can and just relax while I explain a few things to you. Throughout the experiment I am going to ask you how pleasant you found something that you just participated in. Posted here (on subject's right) is a Pleasantness Scale with varying degrees of pleasantness indicated. What I want you to do is give me a number from the Pleasantness Scale that tells me how pleasant or unpleasant you found a certain task. For example, if you found sitting in the waiting room unpleasant you would say seven, or if you found it very pleasant you would say seventeen. If you cannot decide if something was pleasant or unpleasant you would say eleven. When I ask you how pleasant something was you will give me a number from the scale. The number can vary from 1 to 21. Do you have any questions about this or how to use the scale? Do you understand what I want you to do?"

-- encourage questions and answer any that arise

--once settled, instruct the subject to relax:

"Now you will have a 5-minute relaxation period. Make yourself as comfortable as possible so that you will be able to stay still during the relaxation period. Any final questions? OK - just relax."

-- go behind the shelves and start stop watch and mark off relaxation period with event recorder of polygraph. Remain quiet and hidden from subject's view.

-- after 5 minutes, say:

"OK, the relaxation period is over. Now, I would like you to tell me how pleasant the last few seconds of the relaxation period were using the Pleasantness Scale."

-- record the subject's response

-- bring out the first digit-letter task and say:

"This is called a digit-letter substitution task. See these boxes at the top? Each box has a number and a letter in it. For each different number, from 0 to 9, there is a different letter (point to the numbers and the letters). Down here (point), there are numbers but no letters. What you are to do is put the correct letter in each of the boxes below the numbers. These boxes at the top show which letters go with which numbers. You are to start here (point) and continue across the row and then go on to the next row (point). Fill in the boxes one right after the other and try not to leave any out. Try to work as quickly and as accurately as you can, and remember to keep the plethysmograph as still as possible. (Turn the task face down.) When we are ready to begin, I will say, "OK", and then I will buzz the buzzer like this (demonstrate). When I buzz the buzzer, begin doing the task as quickly and as well as possible. When the time is up I will buzz the buzzer again (demonstrate), and you should stop immediately, put your pencil down, and

turn over the task sheet. Any questions?"

-- answer any questions. Then say:

"Turn over your task. Ready? OK."

-- buzz the buzzer, time 1 minute on stop watch, and  
buzz the buzzer again

-- after trial 1 ask:

"How pleasant was doing this task?"

-- record answer

-- score task, point out errors, if any, and give  
subject her score

-- bring out the second digit-letter task, place it  
face down in front of subject and say:

"Here is another form of the same task for you to  
do. You are to do this the same way as the last one.  
Work as quickly and as accurately as you can. Remember  
to stop and turn over the task when you hear the second  
buzzer."

-- run the second trial

-- after the one-minute interval ask:

"How pleasant was doing this task?"

-- score, point out any errors, and tell score to the subject

-- bring out the third task and put it face down in front of the subject, saying:

"Here is another form of the same task for you to do."

-- run the trial

-- repeat the same procedure until completion of the scoring of the seventh trial on the digit-letter task. Then say:

"Now you will be competing against another student doing the same task. Excuse me for a moment while I see if the other student is ready."

-- leave and return with competitor. Introduce the competitor. Sit confederate in chair opposite the subject and attach the heart rate apparatus. Explain that both of them have done several digit-letter tasks (the confederate having completed these tasks with another experimenter) and that on the next one they will be competing to see who can correctly complete the most transformations. Explain that they are to do their very best to beat their opponent and be declared winner at the end of the competition. After the competitive nature is emphasized, the next trial is started.

-- place two tasks face down in front of subject and confederate and say:

"Both of you have now performed this task several times. On this next task you are to do another form of the same task, but instead of just doing the task as quickly as you can, I want you to try to do your very best to beat your opponent. After the competition I will declare a winner. Work as quickly as you can to try and beat the other person. When the time is up I will buzz the buzzer, and you should stop immediately and turn over your task. Are there any questions?"

-- answer any questions, then run the competition

-- after the trial, ask each person (the subject first):

"How pleasant was doing this task?"

-- score tasks and declare a winner

-- thank competitor and ask him/her to return to the other room, stating that you will be with him/her in a moment

-- debrief the subject in a post-experimental interview, asking:

"What thoughts did you have about the experiment?"

"What do you think it was about?"

"Did you hear anything about it before?"

-- explain experiment

-- ask for ideas or suggestions for improvement.

-- can't be in experiment again

-- will be credited

-- please keep it confidential or experiment is invalid

-- ask again - "Had you heard about it?"

-- get a verbal commitment to confidentiality

-- thank subject



Appendix F

PLEASANTNESS SCALE

21

20

19 EXTREMELY PLEASANT

18

17 VERY PLEASANT

16

15 PLEASANT

14

13 SLIGHTLY PLEASANT

12

11 NEITHER PLEASANT NOR UNPLEASANT

10

9 SLIGHTLY UNPLEASANT

8

7 UNPLEASANT

6

5 VERY UNPLEASANT

4

3 EXTREMELY UNPLEASANT

2

1



## Appendix G

## Analysis of Initial Differences Using the BSRI

## Summary Table of Analysis of Variance

## of Resting Heart Rate (RESTHR)

Source	SS	df	MS	F	Prob.
Between	49.27	3	16.42	.15	.932
Within	8542.86	76	112.41		
Total	8592.16	79	108.76		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
N	20	19	21	20
M	76.95	75.63	76.24	77.75
SD	9.23	7.34	12.81	11.86

## Summary Table of Analysis of Variance

## of Resting Perceived Pleasantness (RESTPP)

Source	SS	df	MS	F	Prob.
Between	.74	3	.25	.03	.992
Within	572.06	76	7.53		
Total	572.80	79	7.25		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
N	20	19	21	20
M	13.55	13.86	13.76	13.80
SD	2.91	2.93	2.49	2.69

Summary Table of Analysis of Variance  
of Heart Rate on Trial 7 (HR1)

Source	SS	df	MS	F	Prob.
Between	419.45	3	139.82	1.11	.351
Within	9596.41	76	126.27		
Total	10015.86	79	126.78		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
N	20	19	21	20
M	86.50	80.00	84.05	83.35
SD	10.44	8.21	13.40	11.97

Summary Table of Analysis of Variance  
of Perceived Pleasantness on Trial 7 (PP1)

Source	SS	df	MS	F	Prob.
Between	23.35	3	7.78	.92	.437
Within	645.65	76	8.50		
Total	668.99	79	8.47		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
N	20	19	21	20
M	11.85	11.68	11.00	10.50
SD	3.20	2.14	2.53	3.56

Summary Table of Analysis of Variance  
of Performance on Trial 7 (PER1)

Source	SS	df	MS	F	Prob.
Between	626.00	3	208.67	4.83	.004
Within	3283.98	76	43.21		
Total	3909.98	79	49.49		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
N	20	19	21	20
M	57.50	52.95	58.31	52.40
SD	7.28	5.73	7.13	5.93

## Appendix H

## Analysis of Change Scores using BSRI

## 4 x 2 Factorial Analysis of Variance on Heart

## Rate Change from Trial 7 to Trial 8 (HRCHG)

Source	SS	df	MS	F	Prob.
Sex Role (BSRI)	441.88	3	147.29	.25	.297
Sex of					
Competitor (SC)	295.80	1	295.80	2.52	.117
BSRI x SC	284.44	3	94.81	.81	.494
Residual	8464.79	72	117.57		
Total	9507.13	79			

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
SC	Male	Male	Male	Male
N	10	9	11	10
M	22.40	14.56	22.18	21.30
SD	11.86	9.52	12.38	6.73

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
SC	Female	Female	Female	Female
N	10	10	10	10
M	19.10	15.80	18.60	11.80
SD	12.84	9.31	14.68	6.07

Summary Table of Analysis of Variance of Perceived  
Pleasantness Change from Trial 7 to Trial 8 (PPCHG)

Source	SS	df	MS	F	Prob.
Sex Role (BSRI)	23.82	3	7.94	.46	.710
Sex of Competitor (SC)	200.81	1	200.81	11.66	.001
BSRI x SC	20.03	3	6.68	.39	.762
Residual	1239.72	72	17.22		
Total	1485.18	79	18.80		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
SC	Male	Male	Male	Male
N	10	9	11	10
M	.80	.67	.45	.40
SD	5.43	3.84	5.12	4.17

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
SC	Female	Female	Female	Female
N	10	10	10	10
M	-2.90	-3.20	-4.00	-1.50
SD	2.73	3.49	3.68	3.95

## 4 x 2 Factorial Analysis of Variance on Performance

Change from Trial 7 to Trial 8 (PERCHG)

Source	SS	df	MS	F	Prob.
Sex Role (BSRI)	15.23	3	5.08	.27	.847
Sex of					
Competitor (SC)	2.67	1	2.67	.14	.708
BSRI x SC	23.30	3	7.77	.41	.744
Residual	1355.22	72	18.82		
Total	1396.19	79	17.67		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
SC	Male	Male	Male	Male
N	10	9	11	10
M	4.40	5.67	6.55	5.20
SD	2.95	2.92	4.12	3.49

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
SC	Female	Female	Female	Female
N	10	10	10	10
M	6.60	5.70	6.00	5.00
SD	4.45	4.97	6.65	3.83

## Appendix I

## Analysis of Initial Differences Using OSRBI

Summary Table of Analysis of Variance on  
Resting Heart Rate (RESTHR)

Source	SS	df	MS	F	Prob.
Between	212.09	3	70.70	.64	.591
Within	8380.04	76	110.26		
Total	8592.13	79	108.76		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
N	10	10	10	10
M	74.10	76.86	74.79	78.85
SD	12.89	11.45	6.93	9.38

Summary Table of Analysis of Variance on  
Resting Perceived Pleasantness (RESTPP)

Source	SS	df	MS	F	Prob.
Between	21.35	3	7.12	.98	.406
Within	551.45	76	7.26		
Total	573.00	79	7.25		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
N	10	36	14	20
M	14.20	13.22	14.57	13.70
SD	2.30	2.55	2.71	3.08

Summary Table of Analysis of Variance of  
Heart Rate on Trial 7 (HR1)

Source	SS	df	MS	F	Prob.
Between	56.18	3	18.73	.14	.934
Within	9959.18	76	131.05		
Total	10015.86	79	126.78		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
N	10	36	14	20
M	82.90	83.31	82.57	84.90
SD	13.69	12.49	7.36	10.53

Summary Table of Analysis of Variance of  
Perceived Pleasantness on Trial 7 (PP1)

Source	SS	df	MS	F	Prob.
Between	34.67	3	11.56	.39	.254
Within	634.31	76	8.35		
Total	668.99	79	8.47		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
N	10	36	14	20
M	10.90	10.67	12.36	11.70
SD	3.60	2.79	3.10	2.52



Summary Table of Analysis of Variance of  
Performance on Trial 7 (PER1)

Source	SS	df	MS	F	Prob.
Between	304.04	3	101.35	2.14	.103
Within	3605.94	76	47.45		
Total	3909.98	79	49.49		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
N	10	36	14	20
M	56.50	54.28	59.43	54.40
SD	9.05	6.04	8.31	6.06

## Appendix J

Analysis of Change Scores Using OSRBI  
4 x 2 Factorial Analysis of Variance of Heart  
Rate Change from Trial 7 to Trial 8 (HRCHG)

Source	SS	df	MS	F	Prob.
Sex Role (OSRBI)	553.85	3	177.95	1.50	.223
Sex of					
Competitor (SC)	305.54	1	305.54	2.57	.114
OSRBI x SC	85.72	3	28.57	.24	.868
Residual	8571.54	72	119.05		
Total	9507.13	79	120.34		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
SC	Male	Male	Male	Male
N	6	16	8	10
M	17.33	19.81	20.00	23.10
SD	8.17	12.21	8.18	11.30

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
SC	Female	Female	Female	Female
N	4	20	6	10
M	13.25	13.75	17.83	21.80
SD	10.60	10.38	10.55	12.67

4 x 2 Factorial Analysis of Variance of Perceived  
Pleasantness Change from Trial 7 to Trial 8 (PPCHG)

Source	SS	df	MS	F	Prob.
Sex Role (OSRBI)	81.85	3	27.28	1.71	.172
Sex of					
Competitor (SC)	196.45	1	196.45	12.33	.001
OSRBI x SC	54.56	3	18.19	1.14	.338
Residual	1147.16	72	15.93		
Total	1485.18	79	18.80		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
SC	Male	Male	Male	Male
N	6	16	8	10
M	2.67	-.63	-.50	-.90
SD	5.89	3.81	6.21	3.25

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
SC	Female	Female	Female	Female
N	4	20	6	10
M	-4.00	-2.95	-5.33	-.90
SD	4.69	2.82	3.45	3.57

## 4 x 2 Factorial Analysis of Variance of Performance

Change from Trial 7 to Trial 8 (PERCHG)

Source	SS	df	MS	F	Prob.
Sex Role (OSRBI)	47.06	3	15.69	.88	.457
Sex of					
Competitor (SC)	1.72	1	1.72	.10	.758
OSRBI x SC	58.12	3	19.38	1.08	.362
Residual	1288.19	72	17.90		
Total	1396.19	79	17.67		

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
SC	Male	Male	Male	Male
N	6	16	8	10
M	5.50	6.19	6.88	3.20
SD	2.17	3.31	3.52	3.33

Sex Role	Masculine	Feminine	Androgynous	Undifferentiated
SC	Female	Female	Female	Female
N	4	20	6	10
M	3.25	6.10	6.00	6.20
SD	3.40	4.82	5.76	5.49

Appendix K  
Multiple Regression  
Results Using Dummy-Variable Coding on BSRI

Criterion: Trial 8 Heart Rate (HR2)

Variable	Simple R	RSQCHG	Prob.
Trial 7 Heart Rate (HR1)	.70	.48	<.001
Sex of Competitor*	-.05	.02	n.s.
D3**	.11	.01	n.s.
D1**	.19	.01	n.s.
D2**	.23	.00	n.s.

Criterion: Trial 8 Perceived Pleasantness (PP2)

Variable	Simple R	RSQCHG	Prob.
Trial 7 Perceived Pleasantness	.25	.06	<.05
Sex of Competitor*	-.20	.08	<.05
D3**	.09	.01	n.s.
D1**	.14	.00	n.s.
D2**	.05	.01	n.s.

Criterion: Trial 8 Performance (PER2)

Variable	Simple R	RSQCHG	Prob.
Trial 7 Performance (PER2)	.86	.74	<.001
Sex of Competitor*	.09	.00	n.s.
D3**	.29	.00	n.s.
D1**	.17	.00	n.s.
D2**	.21	.00	n.s.

\*Males coded as 0; females coded as 1.

\*\*D1, masculine coded as 1; D2, feminine coded as 1; D3, androgynous coded as 1.

Results of Analysis Using Masculine and  
Feminine Scale Scores on BSRI

Criterion: Trial 8 Heart Rate (HR2)

Variable	Simple R	RSQCHG	Prob.
Trial 7 Heart Rate (HR1)	.70	.48	<.001
Sex of Competitor	-.05	.02	n.s.
Feminine Scale Score	-.05	.00	n.s.
Masculine Scale Score	.14	.00	n.s.
Feminine X Masculine	.11	.00	n.s.

Criterion: Trial 8 Perceived Pleasantness (PP2)

Variable	Simple R	RSQCHG	Prob.
Trial 7 Perceived Pleasantness (PP1)	.25	.06	<.025
Sex of Competitor	-.20	.08	<.01
Feminine Scale Score	-.09	.01	n.s.
Masculine Scale Score	.02	.00	n.s.
Masculine X Feminine	.05	.02	n.s.

Criterion: Trial 8 Performance (PER2)

Variable	Simple R	RSQCHG	Prob.
Trial 7 Performance (PER2)	.86	.74	<.001
Sex of Competitor	.09	.00	n.s.
Feminine	.11	.00	n.s.
Masculine	.21	.00	n.s.
Feminine X Masculine	.24	.00	n.s.

Results of Analysis Using Dummy-Variable Coding  
on OSRBI

Criterion: Trial 8 Heart Rate (HR2)

Variable	Simple R	RSQCHG	Prob.
Trial 7 Heart Rate (HR1)	.70	.48	<.001
Sex of Competitor*	-.05	.02	n.s.
J3**	.01	.00	n.s.
J1**	.08	.01	n.s.
J2**	.11	.02	n.s.

Criterion: Trial 8 Perceived Pleasantness (PP2)

Variable	Simple R	RSQCHG	Prob.
Trial 7 Perceived Pleasantness (PP1)	.25	.06	<.05
Sex of Competitor*	-.20	.08	<.05
J3**	-.02	.01	n.s.
J1**	.09	.00	n.s.
J2**	-.28	.07	<.05
Overall J		.03	<.05

Criterion: Trial 8 Performance (PER2)

Variable	Simple R	RSQCHG	Prob.
Trial 7 Performance	.86	.74	<.001
Sex of Competitor*	.09	.00	n.s.
J3**	.29	.00	n.s.
J1**	.17	.00	n.s.
J2**	.21	.00	n.s.

\*Male coded as 0; female coded as 1.

\*\*J1, Masculine coded as 1; J2, feminine coded as 1; J3, androgynous coded as 1.

Results of Analysis Using Masculine and  
Feminine Scale Scores on OSRBI

Criterion: Trial 8 Heart Rate (HR2)

Variable	Simple R	RSQCHG	Prob.
Trial 7 Heart Rate (HR1)	.70	.48	<.001
Sex of Competitor	-.05	.02	n.s.
Feminine Scale Score	-.13	.00	n.s.
Masculine Scale Score	-.11	.02	n.s.
Feminine X Masculine	-.14	.01	n.s.

Criterion: Trial 8 Perceived Pleasantness (PP2)

Variable	Simple R	RSQCHG	Prob.
Trial 7 Percieved Pleas- antness (PP1)	.25	.06	<.025
Sex of Competitor	-.20	.08	<.01
Feminine	-.29	.07	<.01
Masculine	.03	.00	n.s.
Feminine X Masculine	-.14	.00	n.s.

Criterion: Trial 8 Performance (PER2)

Variable	Simple R	RSQCHG	Prob.
Trial 7 Performance (PER1)	.86	.74	<.001
Sex of Competitor	.09	.00	n.s.
Feminine Scale Score	-.02	.00	n.s.
Masculine Scale Score	.17	.00	n.s.
Feminine X Masculine	.14	.00	n.s.