SEX-ROLE ORIENTATION AND RESPONSE TO COGNITIVE STRESSORS

By

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ABSTRACT

The present study was aimed at investigating the relationship between sex-role orientation, as defined by the BSRI, and heart-rate response to stress. After being administered both the BSRI and JAS, 35 female undergraduate volunteers were randomly assigned to one of two orders of presentation, of moderately stressful verbal and spatial tasks. Heart-rate was measured throughout the experimental situation, and subjects rated each task for perceived pleasantness. A significant ($p=.032$) interaction was found between masculinity and femininity, with the androgynous and undifferentiated groups showing lower heart-rate increases to both tasks. Neither the BSRI nor the JAS Type A scales were found to be significantly related with subjects' performance on either task, although a trend did emerge with higher masculinity scores being linked with somewhat better performance. Furthermore, masculinity was significantly associated with reports of greater perceived pleasantness for both tasks. While the Type A variable was positively correlated with masculinity, and negatively correlated with femininity, it did not account for any of the above relationships.

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INTRODUCTION

One direct consequence of the feminist movement has been the reappraisal traditional conceptualizations of sex-role differentiation. Proponents of this trend have criticized the traditional assumption that masculinity typifies the psychologically healthy male, whereas femininity typifies the psychologically healthy female.

Furthermore, traditional measures of sex-role orientation have been criticized because they are built on the premise that the construct of masculinity-femininity is best represented as comprising opposite ends of a single, bipolar dimension. It has been suggested (Constantinople, 1973) that masculinity and femininity are in fact independent constructs, and that membership with one of these domains does not automatically preclude membership with the other. Thus, a new sex-role ideal has emerged, in which it has been proposed that individuals should be encouraged to internalize both masculine and feminine personality attributes into their self-concepts. It has been claimed that such an individual, termed androgynous by Bem (1974), Heilbrun (1973), and Block (1973), would be capable of engaging in a much broader range of behaviours than highly sex-typed or sex-reversed persons, and that this androgynous individual may possess the psychological freedom to behave in a more adaptive and effective manner in a variety of situations.

Considerable research has been aimed at examining the

relationship of sex-role orientation, particularly the concept of androgyny, with a number of pencil-and-paper personality measures, as well as with self-reports and overt displays of behaviour, with some promising findings. However, little attention has been directed at investigating whether sex-role style may be associated with how individuals respond to stress. The present study was designed to examine this issue by focusing on how a sample of females, of differing sex-role orientations, respond at a physiological (heart-rate), as well as psychological level (perceived pleasantness), to several moderately difficult cognitive tasks.

Measurement of Sex Role

In an attempt to provide logically independent measures of masculinity and femininity, a number of sex-role inventories have been developed, based on the hypothesis that although some individuals might primarily endorse traits which are traditionally considered to be appropriate for only one of the sexes (i.e., sex-typed or sex-reversed), other individuals might endorse both traditionally masculine and feminine traits simultaneously. The most popular of these measures include the Bem Sex-Role Inventory (Bem, 1974), the Personal Attribute Questionnaire (Spence, Helmreich, & Stapp, 1974), the masculinity and femininity scales of the Adjective Check List (Heilbrun, 1976), and the Andro Scale of the Personality Research Form (Berzins, Welling, & Wetter, 1978).

Initially, Bem (1974, 1975) operationally defined

psychological androgyny as the relatively equal or balanced endorsement of masculine and feminine personality attributes on the Bem Sex-Role Inventory (BSRI), based on the Student's t-ratio, and reflecting the difference between the masculinity- and femininity-scales. Thus, an overall androgyny score was defined in terms of the difference between an individual's scores on these two scales, divided by a constant. If the individual's masculinity and femininity scores were approximately equal ($t < 1$, n.s.), the person was said to be androgynous. If an individual's masculinity score was found to be significantly higher than his or her femininity score, the individual was classified as having a masculine sex-role. Conversely, if an individual's femininity score was found to be significantly higher than his or her masculinity score, that person was classified as having a feminine sex-role. This original definition of androgyny was criticized by various investigators (Feather, 1978; Yonge, 1978; Whetton & Swindells, 1977; Wakefield, Sasek, Friedman, & Bowden, 1976; Strahan, 1975; Spence et al., 1975). Instead, Spence et al. proposed a system based on the use of median-splits as natural cutoff points, on both the masculinity- and femininity-scales, thereby yielding a four-group sex-role orientation classification procedure, as well as a new operational definition of androgyny.

Under this new definition of psychological androgyny, only those individuals scoring above the median on both masculinity and femininity, are designated as androgynous,

whereas those individuals scoring below the median on both scales, are designated as undifferentiated - a term coined by these authors. Furthermore, individuals scoring below the median on femininity, and above the median on masculinity, are labelled masculine, and similarly, individuals scoring above the median on femininity and below the median on masculinity, are categorized as feminine.

Although most researchers generally support the use of median-splits to define androgyny, it has been pointed out that this procedure focuses on the absolute number of items endorsed, at the expense of the proportional balance between masculinity and femininity (Kalin; 1979; Heilbrun & Pitman, 1979; Jones, Chernovetz, & Hansson, 1978; Gackenbach, 1978; Orlofsky, Aslin, & Ginsburg, 1977; Orlofsky, 1976; Strahan, 1975).

Bem (1977) conceded that the distinction between high-high and low-low scores may be potentially important. She points out however, that the treatment of these two types of scorers as belonging to different sex-role orientation groups, does not necessitate that the two be different from each other on all dependent variables, but rather only on some measures, which to date are not precisely identifiable nor predictable. Furthermore, Bem reminds us not to lose sight of the fact that despite their possible differences, high-high and low-low scorers nonetheless share a basic characteristic, in that neither is sex-typed.

Various methods of analyzing sex-role data have been

proposed, with a common suggestion being that the data be analyzed by means of multiple regression analyses (Heilbrun et al., 1979; Gackenbach, 1978; Feather, 1978; Kelly, Furman, & Young, 1978; Bem, 1977; DeFronzo & Boudreau, 1977; Hogan, 1977; Bem, Martyna, & Watson, 1976; Strahan, 1975). However, one of the most conceptually important issues has evolved around whether interpretation of the data should focus on main effects for the constructs of masculinity and femininity, or whether the interaction effect is most relevant with respect to studying psychological androgyny. It has been suggested that unless a significant interaction emerges between masculinity and femininity, arguments for an androgyny effect are tenuous (Deaux, 1984).

Considerable research has been directed at investigating whether, as was initially suggested by Bem (1974), individuals possessing high levels of both masculine and feminine personality attributes (androgynous) are capable of greater behavioural flexibility across a variety of situations, and are more effective and better adjusted in terms of their self-concepts and in interpersonal situations. This research has focused primarily on establishing relationships between self-reports of sex-role orientation and other personality characteristics, as well as behavioural correlates.

Generally, androgyny appears to be associated with greater behavioural flexibility, as measured through both self-reports (Currant, Dickson, Anderson, & Faulkender, 1979; Heilbrun et al., 1979; Harris & Schwab, 1979; Babladelis,

1978; Wiggins & Holzmuller, 1978; Kelly & Worrell, 1976; Spence et al., 1975) and overt displays of behaviour (LaFrance & Carmen, 1980; Baucom & Danker-Brown, 1979; Bem et., 1976b; Bem & Lenney, 1976; Bem, 1975).

With respect to the relationship between androgyny and adjustment, the findings are somewhat inconsistent, with some researchers supporting the assumption that androgyny is associated with greater adjustment (LaFrance & Carmen, 1980; Baucom & Danker-Brown, 1979; Harris et al., 1979; Nevill, 1977; Heilbrun, 1976; Bem et al., 1976b; Kelly et al., 1976; Bem, 1975; Spence et al., 1975), while other investigators have failed to find evidence for this claim (Erdwins, Small, & Gross, 1980; Hoppe, 1979; Heilbrun et al., 1979; Jones et al., 1978).

One of the most widely investigated relationships has been between sex-role orientation and measurements of self-esteem. Generally, although the findings suggest that higher levels of self-esteem are associated with androgyny, the results are somewhat mixed. Whereas some researchers have reported that high self-esteem is related with the possession of high levels of masculinity and femininity for both sexes (Flaherty & Dusek, 1980; Spence, Helmreich, & Holahan, 1979; Wiggins et al., 1978; Nevill, 1977; Heilbrun, 1976; Spence et al., 1975), as well as with the simultaneous rejection of negative self-descriptions (Kelly, Caudill, Hathorn, & O'Brien, 1977; Helmreich, Stapp, & Erwin, 1974), other researchers have found this result for only one of the sexes.

Specifically, some investigators have suggested that, while self-esteem appears to be associated primarily with high masculinity among males (Erdwins et al., 1980; Jones et al., 1978; O'Connor, Mann, & Bardwick, 1978; Bem, 1977), and with an integration of both high masculinity and femininity among females (O'Connor et al., 1978; Bem, 1977), still other investigators have reported findings that do not easily fit either of these trends.

For example, Schiff and Koopman (1978) reported that among females, masculinity, independent of femininity, appears to be associated with higher self-esteem, whereas Jones et al. (1978) did not observe any sex-role differences in self-esteem among women. Undifferentiated males and females were consistently found to report the lowest levels of self-esteem in the majority of the studies cited.

Flaherty et al. (1980) suggested that the variability among the different findings for self-esteem, may be reconciled by focusing on what aspects of self-esteem are being considered. These investigators compared the sex-role groups across four unique dimensions of self-esteem and self-concept, derived from a semantic differential measure (Monge, 1973), and found that whereas androgynous persons consistently scored higher across the dimensions of adjustment, achievement-leadership, and congeniality-sociability, their masculine counterparts scored high only on the achievement-leadership dimension, which is primarily instrumental or traditionally masculine in nature, while

feminine subjects scored high only on the dimension of congeniality-sociability, which is mainly expressive or traditionally feminine in nature. The undifferentiated group consistently scored low on these three dimensions. With respect to the fourth dimension of masculinity-femininity self-concept, masculine individuals were found to score significantly higher than the other three sex-role groups, while androgynous and undifferentiated individuals in turn scored significantly higher than their feminine counterparts.

Attempts have also been made to link sex-role orientation with differential levels of ego-development, moral judgement, and self-actualization. Generally, androgyny was found to be associated with higher ego-development (Heilbrun, 1976; Schiff et al., 1978), moral judgement (Block, 1973), and self-actualization (Nevill, 1977; Cristall & Dean, 1976).

Research examining the relationship of sex-role orientation to either self-reported or directly observed behaviour, has focused primarily on how individuals feel about performing sex-inconsistent behaviours. The findings generally indicate that sex-stereotyped individuals (i.e., masculine or feminine) actively avoid engaging in sex-incongruent behaviours. For example, Bem et al. (1976a) found that sex-typed males and females consistently rejected traditionally sex-inappropriate tasks, even when such tasks resulted in higher monetary gain. Furthermore, after being forced to engage in a sex-inconsistent task, sex-typed individuals reported feeling more nervous and uncomfortable,

less attractive and likeable, less feminine if they were females, less masculine if they were males, and less enjoyment derived from the activity. Similarly, Helmreich et al. (1979) reported that after engaging in sex-incongruent activities, androgynous individuals indicated greater levels of comfort than did the other three sex-role groups.

In spite of the considerable interest directed at investigating whether an androgynous sex-role orientation has benefits for coping with everyday situations, there is a surprising lack of research examining how androgynous individuals are able to cope with the sort of stress encountered in everyday life. Specifically, if androgynous individuals are capable of greater behavioural flexibility, and possess higher levels of self-esteem, they should be less affected by stressful tasks or interpersonal transactions. One of the few paradigms relevant to this question, consists of investigating individuals' responses within conditions of learned helplessness. The findings with respect to this question are mixed. For example, Baucom et al. (1979) found that sex-typed individuals of either gender, displayed more cognitive and motivational deficits, as well as greater susceptibility to depression, following exposure to a learned helplessness condition. While androgynous individuals did not manifest cognitive or motivational problems, they did report feeling depressed. The undifferentiated group was not found to be influenced by the learned helplessness condition. Jones et al. (1978), on the other hand, failed to find any

differences between androgynous and non-androgynous females, while among males, masculine individuals demonstrated superior performances over their androgynous counterparts.

Thus, sizeable gaps remain with respect to the understanding of how sex-role orientation relates to the wide range of potentially stressful situations one might encounter in everyday life. In view of the previously cited data, indicating that sex-stereotyped individuals experience discomfort when engaging in sex-incongruent behaviours, it is possible that these persons might experience more stress when performing moderately difficult cognitive tasks which have an apparent sex-inconsistent nature. For example, spatial tasks are ones in which males have been shown to demonstrate superior performance in comparison with females, while the reverse has been observed for verbal tasks (McGee, 1979; Maccoby & Jacklin, 1974).

It is thus possible, that individuals scoring high in masculinity might find verbal tasks relatively more stressful than spatial tasks, while those scoring high in femininity might display the opposite pattern. Independent of such differences, the greater flexibility and adaptiveness claimed for androgynous sex-role styles, might result in their finding any sort of task less stressful.

The present study is primarily concerned with examining the relationship of sex-role orientation to heart-rate response to stress. However, as will be pointed out in the following section, it is important to consider whether any

observed differences in response to stress among the sex-role groups, might also be explained by the Type A behaviour construct.

The Type A Behaviour Pattern

The Type A behaviour pattern, which has been described as being characterized by high levels of ambition and drive, aggressiveness, competitiveness, and a sense of time urgency and impatience (Friedman & Rosenman, 1959), has been linked with the development of coronary heart disease (Haynes, Feinleib, & Kannel, 1980; Blumenthal, Williams, Kong, Schanberg, & Thompson, 1978; Brand, Rosenman, Sholtz, & Friedman, 1976; Rosenman, Brand, Jenkins, Friedman, Straus, & Wurm, 1975; Rosenman, Friedman, Straus, Wurm, Kositchek, Haan, & Werthessen, 1964). The Type B pattern, on the other hand, has been defined as the relative absence of these attributes. Furthermore, while the Type A individual has been shown to possess such attributes as adaptibility, self-confidence, autonomy, dominance, impulsiveness, and the ability to make decisions quickly (Chesney, Black, Chadwick, & Rosenman, in press), individuals displaying the Type B pattern have been shown to possess better capacities for self-control.

A number of instruments have been developed to measure the Type A behavior pattern, including the Structured Interview (Rosenman et al., 1964), the Jenkins Activity Survey (Jenkins, Rosenman, & Friedman, 1967), the Cardiac Risk Test (Van Doornen, 1980), the Gough Adjective Checklist (Gough &

Heilbrun, 1975), and the Bortner Rating Scale (Bortner, 1969), as well as others. Of the pencil-and-paper measures, the Jenkins Activity Survey (JAS) is one of the most popularly used.

The JAS was first developed in 1967 (Jenkins et al.), but has been revised a number of times since. Because the JAS was originally designed to be used with employed adults, a parallel form (T) was constructed for use with student samples (Krantz, Glass, & Snyder, 1974).

Evidence has accumulated that Type A individuals respond to various psychosocial stressors with increased levels of cardiovascular arousal. For example, it has been demonstrated that Type A's tend to respond with significant increases in systolic blood pressure (Dembroski, MacDougall, & Shields, 1977; Dembroski, MacDougall, Herd, Shields, Petitto, & Lushene, 1978; Dembroski, MacDougall, Herd, & Shield, 1979; Dembroski, MacDougall, & Lushene, 1979; Glass, Krakoff, Contrada, Hilton, Kehoe, Mannucci, Collins, Snow, & Elting, 1980; Glass, Krakoff, Finkelman, Snow, Contrada, Kehoe, Mannucci, Isecke, Collins, Hilton, & Elting, 1980; Manuck, Craft, & Gold, 1978; Manuck & Garland, 1979; Weidner & Matthews, 1979) and with significant increases in diastolic blood pressure (Dembroski et al., 1978; Dembroski et al., 1977; Dembroski et al., 1979b; Pittner & Houston, 1980; Van Doornen, 1980; Waldron, Hickey, McPherson, Batensky, Grass, Overall, Schmader, & Wohlmuth, 1980; Glass, Krakoff, Finkelman, Snow, Contrada, Kehoe, Mannucci, Isecke, Collins,

Hilton, & Elting, in press; Glass et al., 1980). Less consistently, it has also been shown that Type A's display greater increases in heart rate, in response to some psychological stressors (Dembroski et al., 1977; Dembroski et al., 1978; Dembroski et al., 1979b; Manuck et al., 1979; Pittner et al., 1980; Van Egeron, 1979; Glass et al., 1980). There is also some evidence (Hart & Jamieson, 1983; Houston & Jorgensen, 1980) that Type A subjects may take longer to recover from stress, than Type B's, although these results have not been consistently supported in the literature (Dembroski et al., 1977; Dembroski et al., 1978; Dembroski et al., 1979b; Manuck et al., 1979; Pittner et al., 1980; Van Egeron, 1979; Glass et al., 1980).

Sex-Role Orientation and Type A Behaviour Pattern

In recent years, a number of researchers have observed a similarity between some of the components of the Type A behaviour pattern and traditional stereotypes of masculine-role characteristics. In general, research has demonstrated that as measured by existing instruments, Type A behaviour may be more characteristic of males than females (Haynes, Levine, Scotch, Feinleib, & Kannell, 1978; Waldron, Zyzanski, Shekelle, Jenkins, & Tannenbaum, 1977; Waldron, 1976), although there is some evidence that when socioeconomic status is held constant (i.e., occupation and education), the Type A behavior pattern does not distinguish between the sexes (Waldron et al., 1977; Shekelle, Schoenberger, Stamler, 1976).

Regardless of the conclusions drawn on the basis of these data, it is important to note that two of the main features which characterize the Type A behaviour pattern (an achievement oriented lifestyle, and intensely competitive behaviour), are also associated with traditionally male sex-role orientations and behaviours, whereas less competitive and more interpersonal sensitivity attributes and behaviors are associated with traditionally female sex-role styles (Chesney et al., in press; Eassa & Hollandsworth, in press; DeGregorio & Carver, 1980; Keegan, Sinha, Merriman, & Shipley, 1979; Waldron, 1976).

In order to investigate this possible relationship between sex-role orientation and Type A behaviour, Blascovich, Major, and Katkin (1981) compared scores on the PAQ (Spence et al., 1975) with scores on the JAS (Krantz et al., 1974) for both males and females. These authors found that independent of sex, high masculinity scores were significantly associated with high Type A scores, whereas femininity was not related with the Type A variable. Since biological gender was not found to be linked with Type A scores, either in isolation or in interaction with sex-role style, Blascovich et al. (1981) suggested that possession of high masculine personality attributes appears to be a better predictor of the Type A pattern, than sex. These authors suggest however, that since males still endorse masculine traits more frequently than females in contemporary society, there is likely to be a higher incidence of males displaying the Type A behaviour

pattern. These investigators further conclude that since the possession of masculine personality attributes, independent of feminine personality traits, appears to be strongly associated with reports of the Type A behaviour pattern, it seems probable that androgynous individuals will be as likely to display Type A behavior as their masculine sex-typed counterparts.

Similarly, Eassa et al. (in press) studied the relationship between masculinity and femininity, as defined by the BSRI (Bem, 1974), and the Type A behavior pattern, as designated by both the JAS (Jenkins et al., 1967) and the pattern A scale from the ACL (Gough et al., 1975).

A strong relationship emerged between masculinity scores and Type A scores, while no relationship was observed between femininity and Type A. Thus, androgynous and masculine individuals of both sexes were found to score significantly higher on the JAS and ACL, than their respective feminine and undifferentiated counterparts. Further analyses also revealed that the largest proportion of variance for Type A scores was accounted for by the masculinity factor, again suggesting that there is a strong relationship between self-reports of masculinity and Type A behaviour, regardless of biological gender and simultaneous levels of femininity.

The Present Study

Considering the findings which appear to suggest a relationship between sex-role orientation and the Type A

personality variable, one may ask whether there will be any differences in response style to stress, among the four sex-role categories. Since there appear to be similar dimensions underlying the constructs of masculinity-femininity and the Type A behaviour pattern, it may be that subjects scoring high on the masculine scale of the BSRI, will display greater heart-rate increases in response to stress, along with lower recovery heart-rates, than subjects scoring low on this scale. If this were to be the case, a further question is raised. If subjects scoring high on masculinity show greater heart-rate increases to stress, and/or lower heart-rate recovery from stress, will the addition of a correspondingly high score on femininity have any effect on response and/or recovery styles?

Androgyny theory has suggested that as compared with sex-typed individuals, the androgynous person should be psychologically "healthier", and should display greater behavioral flexibility. Thus, an androgynous sex-role orientation has generally come to be associated with increased adaptibility. The question addressed here then, is does this proposed greater adaptibility of androgynous sex-role styles extend itself to physiological reactions - specifically, heart-rate responding to psychological stress?[1]

This question has not been investigated in the sex-role literature, yet it may well be that androgynous individuals, with their apparently broader range of available behaviours, may be better able to minimize stress in some situations.

The present study directly addresses these questions. Of particular interest, was whether subjects obtaining high scores on the BSRI masculinity scale would show greater heart-rate arousal to stress, and/or greater recovery from stress, than subjects scoring low on this scale. If so, how much of this variability could be explained by Type A scores on the JAS? Another question of interest was whether high scores on the BSRI femininity scale, in combination with high scores on the BSRI masculinity scale, would act as a moderating influence, resulting in a less intense heart-rate increase to stress, and/or greater heart-rate recovery from stress.

Thus, the main focus of the present study is to examine the general issue of whether sex-role orientation affects how individuals respond to psychological stress. To provide a wide scope for answering this question, the present study included three aspects of reaction to stress: (1) the magnitude of heart-rate arousal to stress; (2) ratings of perceived pleasantness of the task; and (3) heart-rate recovery from stress.

A primary interest then, was whether any observed sex-role differences in response to stress would be due to the effects of masculinity alone, or to an interaction between masculinity and femininity. Furthermore, any observed differences related to masculinity, independently of or in interaction with femininity, should be further examined to see if they remain after Type A scores have been partialled out.

A secondary issue addressed in the present study, was whether response to stress depends on the nature of the stressor task. Specifically, will tasks that have been demonstrated to be associated with sex differences in performance, such as verbal and spatial tasks, produce differential heart-rate response magnitudes among individuals of different sex-role styles? For example, will subjects scoring high on masculinity, find spatial tasks relatively less stressful than individuals scoring low in masculinity, or will one sex-role type, for example androgynous, be uniformly associated with less stress?

The decision to use only female subjects in the present study, was based on the fact that it has been fairly well documented in the literature, that androgyny is qualitatively different for the two sexes. For example, Jones et al. (1978) found that biological sex appears to be a more visible and salient part of self-concept among women, regardless of sex-role orientation, while Wiggins et al. (1978) reported that androgyny appears to be more differentiated in self-reports on a variety of interpersonal traits, among females, with androgynous females scoring directly opposite of their feminine counterparts on some traits, while androgynous males differed from masculine males in terms of mean levels obtained in some traits. Furthermore, Heilbrun et al. (1979) imply that among males, androgyny may surface as an instrumental behavior pattern aimed at obtaining social reinforcement while among females, androgyny appears to

surface as a more stable, expressive blending of stereotypically masculine and feminine traits. Thus, in view of the number of studies reporting sex-differences with respect to the implications of androgyny (i.e., LaFrance et al., 1980; Kelly et al., 1977; Bem et al., 1976; Bem, 1975), it was felt that given the exploratory nature of the present study, it would be preferable to focus on only one of the sexes. A review of the literature revealed a trend emerging from androgyny research, with the concept of androgyny possibly being more promising among female subjects.

In order to avoid possible confusion, it is necessary to define several of the terms which appear frequently throughout the report. To begin with, the terms sex-role "group", "category", "orientation", and "style", are used interchangeably to refer to the four-fold sex-role classification system (i.e., masculine, feminine, androgynous, and undifferentiated), derived on the basis of the median-split procedure of scoring. Similarly, the terms "masculine"/"feminine", refer to the actual sex-role group classification, while "masculinity"/"femininity" refer only to an individual's standing on that given scale, independent of the other scale.

METHOD

Subjects

Subjects were 35 female undergraduate students enrolled in summer classes at Lakehead University, who volunteered to participate in a "heart-rate" study. Ages ranged from 19 to 30 years, with a mean of 22.7 years.

Apparatus

Pencil-and-paper tests administered consisted of the Bem Sex-Role Inventory (BSRI; Bem, 1974), the student form of the Jenkins Activity Survey Form (JAS; Krantz et al., 1974), the spatial and verbal tasks from the revised General Aptitude Test Battery, Book 1, Form B (GATB, United States Department of Labor, 1970), and a 7-point rating scale for the perceived pleasantness of each experimental task, ranging from 1 (extremely unpleasant) through 4 (neither pleasant nor unpleasant), to 7 (extremely pleasant). A similar rating scale was used by Vitassi and Evans (note 1), as an index of response to competition.

The BSRI consists of 60 personality attributes (20 socially desirable feminine items; 20 socially desirable masculine items; and 20 social desirability items, half of which are positive traits, and half of which are negative), that are self-rated by the individual on a scale from 1 (never or almost never true), through 4 (occasionally true), to 7 (always or almost always true). The subject is asked to rate

how well each of these personality characteristics is descriptive of him- or herself. Examples of test items are presented in Appendix A. Normative and psychometric data are presented in Appendix B.

The student version of the JAS is a self-report inventory, consisting of 44 forced-choice statements about lifestyle. The subject is asked to indicate the best single answer that is true for him or her from a choice of several possible answers. The JAS is comprised of a composite Type A scale, as well as a speed and impatience scale (S/I), and a hard-driving competitive scale (H/C). Examples of test items from this scale are presented in Appendix C, while normative data and psychometric information are presented in Appendix D.

The GATB Vocabulary Test (Verbal Task) consists of 60 items. Each item is comprised of a group of four words and the subject is asked to find the two words which are "most nearly the SAME in meaning or OPPOSITE in meaning". A standard time limit of six minutes is alloted.

The GATB Three-Dimensional Space Test (Spatial Task) is made up of 40 items, each comprised of a series of drawings. For each item, the drawing at the left represents a flat piece of metal, with dotted lines indicating where the metal should be folded. To the right are a group of four drawings depicting objects. The subject is told that only one of the objects could be formed by bending the metal piece. Again, a standard time limit of six minutes is given.

Examples of both the GATB Verbal and Spatial Tasks are

presented in Appendix E. Normative and psychometric data for both tasks are presented in Appendix F.

A continuous record of heart-rate arousal was obtained on a Beckman Dynograph (Type RS), by means of a photoplethysmographic transducer.

Procedure

Upon reporting to the laboratory, each subject was administered the BSRI and JAS, in that order.

Upon completion of these inventories, the subject was seated in a comfortable armchair and the photoplethysmographic transducer was attached to the index finger of the subject's non-dominant hand. At this point, the subject was instructed, "Close your eyes, lean back, get comfortable, and relax for five minutes."

At the conclusion of this relaxation period, the subject was told to open her eyes and the first task (one of the two GATB tasks, with the order of presentation alternated for consecutive subjects) was administered. Instructions for the task, as well as several practice trials, were conducted in accordance with the GATB manual (Manual for the USTES, GATB, B-1002, Section 1; Administration and Scoring, United States Department of Labor, 1970), with the only change being that the subject was asked to say the letter name of the correct answer out loud rather than marking it on the answer sheet (to avoid excessive body movements on the subject's part). Just prior to the commencement of the actual task, the subject was

instructed, "You will be allowed six minutes in which to complete the test. It is important that you do as many questions as possible, but you should also concentrate on answering as many questions as you can, correctly." The experimenter recorded the subject's answer to each question, and at the end of the alloted time period, told the subject to "Stop! Close your eyes, lean back, get comfortable, and relax for five minutes."

At the end of this second relaxation period, the subject was told to open her eyes, and the second task from the GATB was administered. Once again, task instructions and examples were presented according to the GATB manual (Manual for the USTES, GATB, B-1002, Section 1: Administration and Scoring, United States Department of Labor, 1970) and, as before, the subject was asked to call out the letter name of the correct answer for each question. Prior to starting the actual task, the subject was given the same motivating instructions as on the previous task. Again, the subject's answer to each question was recorded by the experimenter, and after the alloted six minutes, the subject was instructed, "Stop! Close your eyes, lean back, get comfortable, and relax for 5 minutes."

At the conclusion of this final relaxation period, the subject was told to open her eyes, and the dynograph transducer was removed. The subject was then asked to rate how pleasant or enjoyable she found each task to be. Finally, before leaving, the subject was informed that her scores on

each of the GATB tasks were not important as such, since the focus of the study was on heart-rate in response to stress.

Scoring of Heart Rate

Heart-rate measures were obtained by counting the numbers of peak waves recorded on the dynograph output sheets during each relevant minute. Specifically, resting heart-rate measures consisted of: the number of pulsation waves recorded in the final minute of each relaxation period, just prior to the verbal and spatial tasks. Absolute stress heart-rate measures were obtained from the mean number of pulsation waves recorded in the first and sixth minutes during the stressor task, for the verbal and spatial tasks separately. Absolute recovery heart-rate measures were obtained by counting the number of pulsation waves during the first minute of the relaxation period immediately following each of the verbal and spatial tasks.

Two heart-rate change scores were derived as measures of response to stress. These were obtained by subtracting the previous resting heart-rate from the mean heart-rate, during the spatial and verbal tasks.

Scoring of BSRI and JAS

For the BSRI masculinity and femininity scales, the numerical rating values, assigned by the subject to each relevant item, were summed independently for each scale. Only the raw scores for the two scales were used in the analyses,

with high scores indicating higher levels of masculinity/femininity.

With respect to the JAS, only the overall A scores were obtained. This was done by adding the total number of endorsed items reflecting Type A behavior pattern, with high scores thus being indicative of the Type A behavior pattern.

Scoring of the GATB Verbal and Spatial Tasks

To obtain performance scores for both the GATB verbal and spatial tasks, the number of items answered correctly within the alloted time limits, are simply added up for each task.

BSRI and JAS Comparisons

The obtained minimum and maximum scores for the BSRI masculinity and femininity scales, and for the JAS A scale, are presented in Appendix G. Subjects in the present study did not obtain either extremely low or extremely high scores on the two BSRI scales (Appendix B). With respect to the JAS A scale, no extremely high scores emerged (Appendix D).

Means and standard deviations for the BSRI and JAS A scales are presented in Table 1. A correlational matrix obtained on these scales (Appendix H) showed that masculinity is significantly correlated with Type A in the positive direction ($r=0.4083$, $p=0.007$), while femininity is negatively related with Type A ($r=-0.2991$, $p=0.04$). Thus, subjects endorsing a greater number of masculine personality attributes, also tended to describe themselves as being more Type A, whereas subjects indicating a greater number of feminine traits, tended to portray themselves as being less Type A (i.e., more Type B).

To examine whether androgyny is associated with the JAS A scale, median splits were performed on the masculinity scale (median=94.3), and femininity scale (median=96.7), to create two dichotomous variables (four sex-role groups), and a 2x2 ANOVA was then conducted on the Type A variable (Appendix I). Only a significant main effect for masculinity on Type A emerged ($F=9.307$, $df=1,31$, $p=0.005$). The absence of an

TABLE 1

Means and Standard Deviations for the BSRI and JAS Type A Scales

	Mean	Standard Deviation
Masculinity	94.7	13.3
Femininity	98.2	10.7
Type A	6.9	3.2

interaction (F=0.030, df=1,31, n.s.) indicates that androgyny was not an important factor with regard to Type A scores, i.e., masculinity scores were related to A scores independent of femininity scores. Mean scores on the Type A scale across sex-role groups are presented in Appendix J.

Heart-rate Measures

The initial heart-rate measure taken during the first minute of the initial resting period, was correlated with each of the masculinity, femininity and Type A scores, to determine whether scores on any of these scales were associated with heart-rate magnitude at the start of the experiment. No significant findings emerged (Appendix K).

In order to examine whether individuals of differing sex-role orientations differed from each other at the onset of the experiment, with respect to initial heart-rate magnitudes, a 2x2 ANOVA was carried out on this heart-rate measure, using masculine and feminine categories, based on median splits, as the independent variables. No significant main effects, nor interaction effect, were found (Appendix L). Mean initial heart-rate scores, across the four sex-role groups, are presented in Appendix M.

Although a series of 2x2x2 ANOVAs were carried out on heart-rate arousal to stress change scores, these analyses were conducted simply to identify trends in the data. Rather, the primary focus, with respect to interpretation of the findings, is placed on the results from a series of multiple

regression analyses, due to the fact that this analysis makes it possible to partial out any differences in heart-rate arousal that might be associated with the resting heart-rate measures.

Change scores for the arousal to stress measures were analyzed in a 2x2x2 ANOVA in which task (verbal or spatial) was a within-subject factor, and masculinity and femininity, based on median splits, were the between-subject factors. No significant differences between tasks, nor interactions between sex-role and task, were found for masculinity or femininity (Appendix N). However, a significant two-way interaction between masculinity and femininity did emerge ($F=5.063$, $df=1,31$, $p=0.032$).

It can be seen from Table 2 (Figures 1 and 2), that the androgynous and undifferentiated groups displayed lower heart-rate increases, while greater heart-rate changes were manifested by masculine and feminine groups.

To further examine this finding, separate multiple regression analyses were carried out on each of the verbal and spatial tasks, with average heart-rate during the task as the criterion variable, and the predictor variables entered in the order: resting heart-rate; masculinity score; femininity score; and an interaction term computed from the product of the masculinity and femininity scores. These results (Appendix O) again showed no effect for either masculinity or femininity, but a significant interaction in each case (verbal: $F=13.328$, $df=1,30$, $p<0.01$; spatial: $F=4.205$, $df=1,30$,

TABLE 2

Heart-Rate Arousal Mean Change Scores and Standard Deviations Across Sex-Role Groups

		Verbal Task		Spatial Task	
Sex-Role Group	n	Mean	Standard Deviation	Mean	Standard Deviation
Androgynous	9	3.389	3.630	4.111	4.457
Masculine	8	8.188	4.358	7.688	4.301
Feminine	9	8.111	3.895	5.944	4.283
Undifferentiated	9	6.278	5.380	4.389	4.833

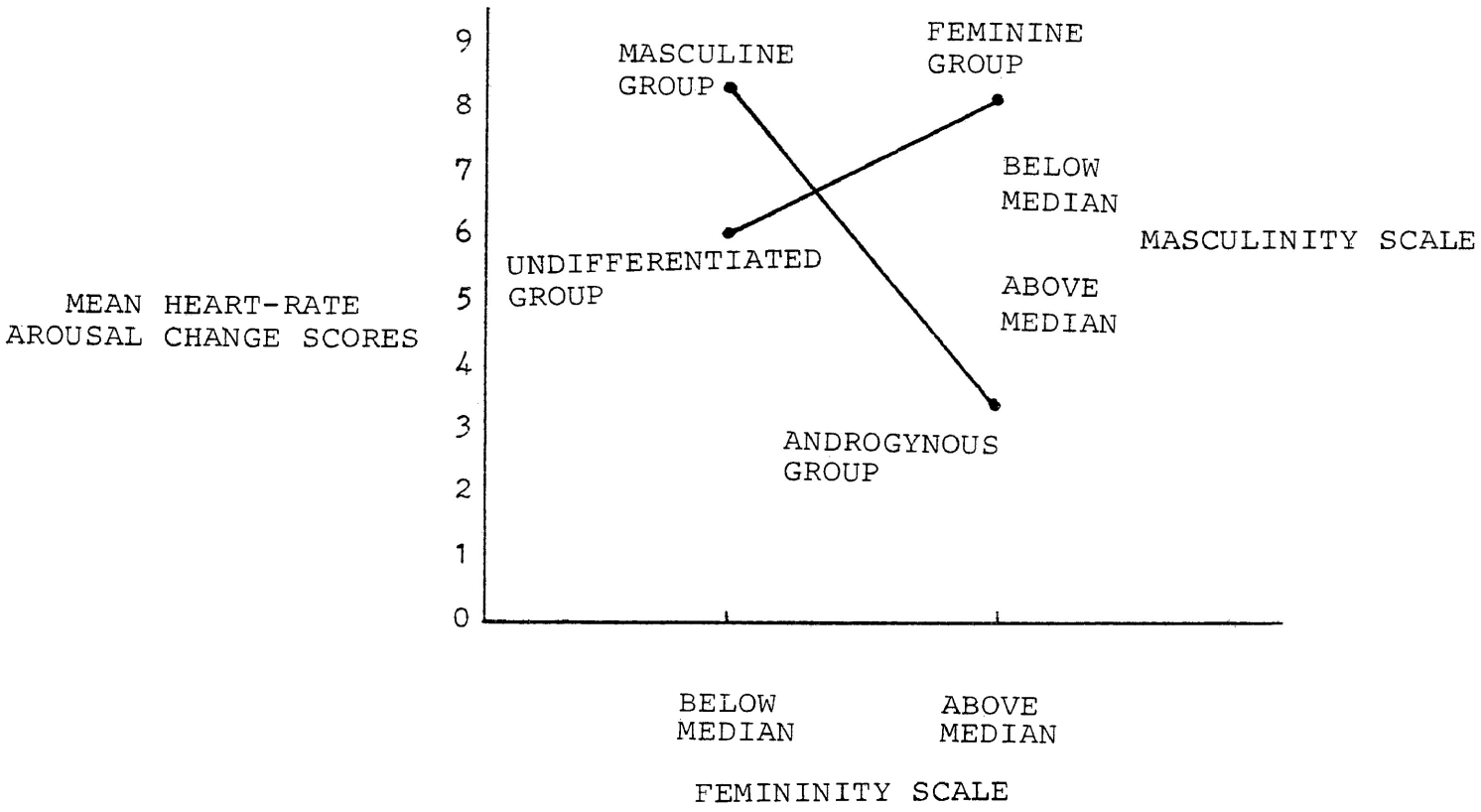

FIGURE 1 : HEART-RATE AROUSAL CHANGE SCORE MEANS FOR THE VERBAL TASK, ACROSS SEX-ROLE GROUPS

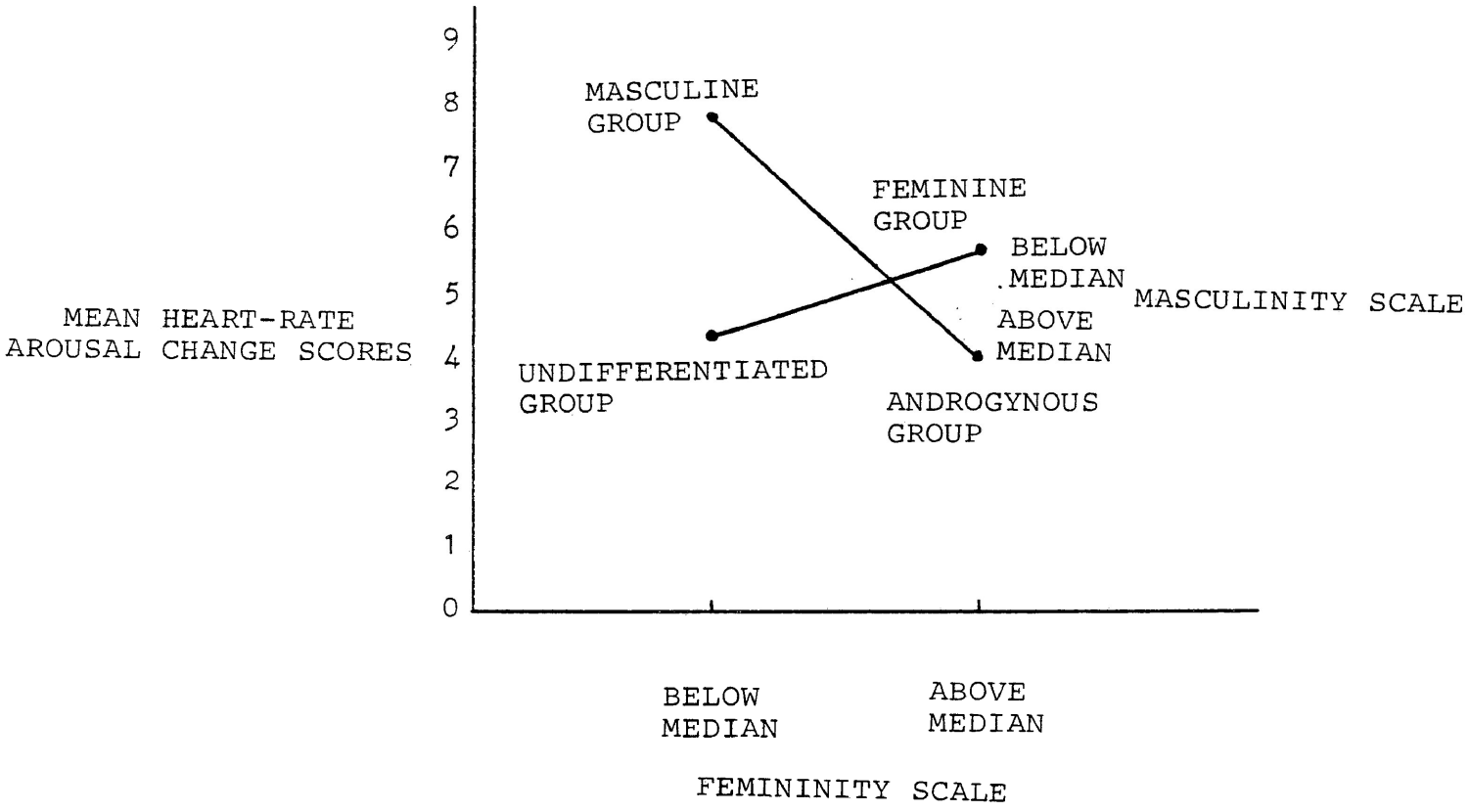

FIGURE 2: HEART-RATE AROUSAL CHANGE SCORE MEANS FOR THE SPATIAL TASK, ACROSS SEX-ROLE GROUPS

p=0.05), did emerge.

Additional multiple regression analyses were conducted, in which the Type A variable was entered before the sex-role factors. Type A did not explain a significant amount of the variability (Appendix P), and the interaction terms were still significant (verbal: $F=13.289$, $df=1,29$, $p<0.01$; spatial: $F=4.193$, $df=1,29$, $p<0.05$).

Regarding the heart-rate recovery from stress variable, the use of change scores is inappropriate, since this variable is influenced simultaneously by initial, resting heart-rate, and heart-rate during stress. Rather, any analysis carried out on the recovery measure, should only be conducted once the variability associated with both resting heart-rate and stress heart-rate, have been partialled out. Thus, no 2x2x2 ANOVAs were conducted on the heart-rate recovery from stress measures. Instead, two hierarchical multiple regression analyses were performed, with the criterion being heart-rate during the first minute of recovery for each task, and with the predictor variables entered in the order: resting heart-rate; stress heart-rate; masculinity scores; femininity scores; and interaction score (Appendix Q). Masculinity and femininity, for the spatial task only, were found to be significant (masculinity: $F=4.864$, $df=1,29$, $p<0.05$; femininity: $F=4.535$, $df=1,29$, $p<0.05$).

Additional multiple regression analyses, in which the variance associated with the Type A variable was partitioned out prior to entering the sex-role factors, no longer revealed

any significant findings (Appendix R).

Absolute resting arousal and recovery heart-rate means, across the sex-role groups, as well as for the entire group, are presented in Appendix S, for the verbal task and in Appendix T for the spatial task. Interestingly, the masculine group consistently displayed the lowest absolute heart-rates, during the resting, stress, and recovery periods despite the fact that they also exhibited the greatest heart-rate arousal to stress (Table 1), and the least heart-rate recovery from stress (Appendix U), with respect to change scores. In the present study however, arousal to and recovery from stress has been defined in terms of having the effects of basal heart-rate measures (i.e., resting heart-rate) removed (i.e., by means of partioning out the variance associated with such basal measures through multiple regression techniques). Thus absolute heart-rate measures, although interesting, are not interpreted. Furthermore these findings are consistent with the results obtained by Hart et al. (1983). These investigators also found that although their Type A subjects displayed lower resting heart-rates than their Type B counterparts, they exhibited lower recovery heart-rates after stress.

Perceived Pleasantness

A series of correlations carried out on the masculinity, femininity, and Type A scales, with perceived pleasantness ratings for the verbal and spatial tasks (Appendix V),

revealed that masculinity was positively related with more favourable ratings for both tasks. The Type A variable was correlated with more positive ratings for the spatial task only. Perceived pleasantness ratings for the two tasks were not significantly correlated with each other.

A 2x2x2 ANOVA conducted on ratings of perceived pleasantness, with task (spatial or verbal) as a within-subject variable, and median split derived categories of masculinity and femininity as the between-subject factors, revealed a significant main effect for the masculinity variable ($F=6.138$, $df=1,31$, $p=0.019$), with females scoring high on masculinity rating both tasks as being more enjoyable than did females scoring low on masculinity. No significant findings emerged for the femininity group main effect, nor was there any significant interaction between masculinity-femininity, independent of, as well as in combination with, the task variable (Appendix W). Means and standard deviations for task perceived pleasantness ratings, are presented in Table 3.

To further investigate this finding, separate multiple regression analyses were done on the perceived pleasantness ratings for both tasks, with the predictor variables entered in the order: masculinity score; femininity score; and an interaction term, created by the product of the BSRI raw scores (Appendix X). Again, only the F values for masculinity were significant (verbal: $F=4.708$, $df=1,31$, $p<0.05$; spatial: $F=5.866$, $df=1,31$, $p<0.05$).

TABLE 3

Means and Standard Deviations for Task Perceived Pleasantness Ratings, Across Sex-Role Groups

		Verbal Task		Spatial Task	
Sex-Role Group	n	Mean	Standard Deviation	Mean	Standard Deviation
Androgynous	9	4.444	1.130	4.667	1.803
Masculine	8	4.875	1.727	5.375	1.302
Feminine	9	4.111	1.537	3.667	1.225
Undifferentiated	9	4.111	1.167	4.333	1.500

In an additional set of multiple regression analyses, in which the Type A variable was entered before the sex-role factors (Appendix Y), Type A did not explain a significant proportion of the variability for ratings on the verbal task ($F=0.006$, $df=1,30$, p=n.s.), and once again, only the F value for masculinity was significant ($F=5.861$, $df=1,30$, $p<0.05$). With regard to the spatial task however, although the F value for the Type A variable was not significant ($F=3.292$, $df=1,30$, p=n.s.), neither was the F value for masculinity ($F=3.239$, $df=1,30$, p=n.s.).

Task Performance with BSRI and JAS

A 2x2x2 ANOVA on subjects' performance scores, on both the verbal and spatial tasks, with task as the within-subject factor, and masculine and feminine groups, derived on the basis of median splits, as the between-subject variables, failed to produce any relevant significant findings (Appendix Z). Although the main effect for the task variable was significant ($F=15.139$, $df=1,31$, $p<0.01$), this finding is of no consequence, since raw scores for the number of items answered correctly were used, thus rending any comparison between the two sets of scores meaningless. Means and standard deviations for task performance across the sex-role groups are presented in Appendix AA. Two near significant trends did emerge in a series of correlations between task performance and the BSRI and JAS Type A scales (Appendix BB). Specifically, there was a tendency for subjects scoring high on masculinity to perform

somewhat better on both the verbal ($r=0.270$, $p=0.058$) and spatial ($r=0.259$, $p=0.067$) tasks.

DISCUSSION

The present study was designed to investigate the relationship between sex-role orientation, and heart-rate and subjective responses to psychological stress, among women. Of particular interest was whether any observed differences would be best explained in terms of the Type A personality variable.

Both the GATB verbal and spatial tests appeared to be appropriate choices as stressor tasks, as is indicated by observed increases from pre-task to task heart-rate measures.

A significant proportion of the variance associated with the heart-rate arousal to stress was explained by an interaction term, for both the verbal and spatial tasks, with androgynous and undifferentiated females manifesting lower heart-rate increases. This finding held, even when the variance associated with the Type A variable was first removed.

With respect to recovery heart-rate, significant findings emerged only for the spatial task, with both masculinity and femininity, independent of each other, being associated with this variable. However, when the variance associated with Type A scores was partitioned out, no significant findings emerged.

The endorsement of masculine traits was significantly related with ratings of perceived pleasantness, for both the verbal and spatial tasks, with subjects scoring high on masculinity, independent of femininity, rating both tasks as

being more pleasant. When the variance associated with Type A scores was removed, masculinity still accounted for a significant proportion of the variance for pleasantness ratings for the verbal task only.

Although not significant, trends emerged between masculinity and subjects' performance scores for both tasks. It thus appears that higher levels of masculinity were associated with both greater enjoyment being experienced in performing both the verbal and spatial tasks, and somewhat better performance on both tasks.

A series of correlations conducted on the BSRI and JAS Type A scales, revealed significant positive correlations between the masculinity and Type A scales, while femininity was found to be significantly related with A in the negative direction. A 2x2 ANOVA on the Type A scale revealed only a significant main effect for masculinity. The absence of an interaction effect between masculinity and femininity, suggests that androgyny does not appear to be an important factor in explaining the Type A behaviour pattern.

These findings are generally consistent with previous studies (Chesney et al., in press; Eassa et al., in press, 1980; DeGregorio et al., 1980; Keegan et al., 1979; Waldron, 1976), that support the conceptual similarity of self-reported masculine personality attributes, and self-reports of the Type A pattern of behaviour. However, unlike earlier investigations, the present study also found that to a lesser, albeit still significant extent, femininity was inversely

related to the Type A behaviour pattern.

The Type A dimension was not an important factor in explaining the significant masculinity-femininity interaction effect observed on the measure of heart-rate arousal in response to stress, since this interaction was still significant after Type A scores were partialled out.

The finding of a significant interaction between masculinity-femininity on the heart-rate arousal to psychological stress measure, is in keeping with general androgyny theory and much of the literature, which emphasizes the importance of the concept of androgyny.

The possession of androgynous sex-role orientations among women has been shown to be associated with generally greater behavioural flexibility and overall adjustment. Specifically, androgynous individuals have demonstrated a greater willingness to engage in either stereotypically masculine or feminine activities, depending upon their situational appropriateness, whereas sex-typed and sex-reversed individuals attempted to avoid sex-incongruent activities, despite their situational appropriateness. Furthermore, when forced to engage in sex-inconsistent activities, non-androgynous individuals reported feeling greater discomfort, along with lowered levels of self-esteem (Bem, 1974; Bem, 1975; Bem et al., 1976a; Bem et al., 1976b).

Some support has also been provided for an androgynous sex-role style to be associated with greater personal and interpersonal effectiveness and adjustment, across a variety

of areas such as self-esteem, moral judgements, self-actualization, ego development, social skills (Flaherty et al., 1980; Spence et al., 1979; Wiggins et al., 1978; Nevill, 1977; Heilbrun, 1976; Spence et al., 1975; Schiff et al., 1978; Block, 1973; Cristall et al., 1976).

Thus, although sex-role orientation has been associated with a variety of attitudinal and behavioural measures, in addition the present results suggest that sex-role style also is related to heart-rate response to stress, with the integration of masculine-feminine personality attributes yielding beneficial effects. in terms of moderating autonomic responses to stress.

Unlike the lowered heart-rate arousal in reaction to stress displayed by androgynous females, the lowered heart-rate response of the undifferentiated group is less easily explained. A possible explanation for this finding is suggested by Baucom et al. (1979) study. These investigators found that after being subjected to a standard learned-helplessness paradigm, which was viewed as an experimental reflection of susceptibility to depression, sex-typed subjects were most affected by the helplessness situation, while undifferentiated individuals were relatively unaffected by this situation, in terms of motivational and cognitive deficiencies during the experimental condition, and in their self-reports of depressive moods, following exposure to this situation. Baucom et al. speculate that perhaps this unexpected finding may be accounted for by the well-

documented, lower self-esteem levels among undifferentiated subjects, which suggests that these individuals may, as a rule, expect failure and loss of control, and therefore are not upset when this occurs. These authors also suggest that perhaps the undifferentiated subjects were never really involved in the task to begin with, due to their demonstrated tendencies to remain aloof and uninvolved.

Jones et al. (1978) did not observe any differences among female sex-role groups, within a standard learned helplessness condition on measures such as number of errors to criterion, and time to criterion.

These two studies then, may offer a tentative explanation for the present study's finding that undifferentiated females, like their androgynous counter- parts, displayed lower levels of heart-rate arousal to stress.

A second possible explanation is that since only the masculine-feminine interaction effect was significant for the response to stress variable, it may be, as some researchers have suggested, that although high levels of both masculine and feminine attributes are important in the conceptualization of androgyny, the relative balance between the two should not be ignored (Kalin, 1979; Heilbrun et al., 1979; Jones et al., 1978; Gackenbach, 1978; Orlofsky, 1976; Strahan, 1975). As Bem (1977) has pointed out, although a distinction between androgynous and undifferentiated groups appears to be warranted, one should not forget that these two groups are nonetheless similar to each other, in that both endorse a

balance of masculine and feminine traits, as was emphasized in her original definition of androgyny (1974).

Although a primary interest at the onset of the present study, was whether masculine-typed females would display greater heart-rate arousal to stress and/or less heart-rate recovery from stress, due to the conceptual similarity between the constructs of masculinity and Type A behavioural patterns (Chesney et al., in press; Eassa et al., in press; DeGregorio et al., 1980; Keegan et al., 1979; Waldron, 1976), the possibility of a similar finding for the feminine sex-role group was not considered, and is therefore less easily explained. It is possible that regardless of the nature of the task, with respect to demonstrated sex-differences, when asked to perform any task within a test-like atmosphere, feminine females may experience higher levels of anxiety, and thus greater increases in heart-rate.

Multiple regression analyses conducted separately on heart-rate recovery measures for both the verbal and spatial tasks, did not reveal any significant findings for recovery after the verbal task, while both masculinity and femininity, independent of each other, were found to explain a significant amount of the variance for heart-rate recovery following the spatial task. When the variance associated with A/B was removed, no significant effects emerged.

The failure to detect sex-role related differences between the two tasks suggests that these tasks, for which sex differences have been reported (McGee, 1979; Maccoby et al.,

1974), are not related to sex-role orientation with respect to stressfulness, perceived pleasantness, nor performance. Thus, role orientation does not appear to exert a differential influence, with respect to comparisons across sex-typed cognitive domains.

The overall results of the present study, generally support the conception of androgyny as being potentially better adaptive, since not only did androgynous individuals display lower heart-rate arousal to stress for both tasks, in comparison with their sex-typed counterparts, but also expressed greater enjoyment and a trend towards somewhat better performance, for both tasks. Although the undifferentiated group did manifest lower heart-rate arousal for both tasks, and the masculine group did indicate greater enjoyment for both tasks, with a trend towards better performance, neither of these two groups were consistently associated with greater adjustment across all measures. The feminine group on the other hand, consistently leaned towards the more negative direction, on all significant variables.

An unexpected finding in the present study, was that sex-role orientation, independent of the Type A variable, was strongly related with heart-rate arousal to stress. Specifically, Type A did not account for any observed differences among the sex-role groups. This finding however, is not inconsistent with some of the research, in that, although Type A has generally been associated with heart-rate increases during stress (Dembroski et al., 1977; Dembroski et

al., 1978; Dembroski et al., 1979b; Manuck et al., 1979; Pittner et al., 1980; Van Egeron, 1979; Glass et al., 1980), other studies, like the present investigation, have failed to replicate these findings (Hart et al., 1983; Glass et al., in press).

Furthermore, it was also surprising that sex-role orientation, independent of the Type A variable, was associated with heart-rate recovery from stress, for the spatial task. However, Type A has again not been consistently linked with recovery. Whereas some investigators (Hart et al., 1983; Houston & Jorgensen, 1980) have reported that Type A individuals display greater heart-rate recovery from stress than their Type B counterparts, other researchers have failed to demonstrate this result (Dembroski et al., 1978; Dembroski et al., 1979b; Manuck et al., 1979; Pittner et al., 1980; Van Egeron, 1979; Glass et al., 1980).

Future Research

The findings of the present study, which was intended as an exploratory investigation, thus suggest a number of interesting directions for future research. To begin with, the finding that sex-role orientation was more important than the Type A factor in accounting for heart-rate arousal to stress, for both the verbal and spatial tasks, and in accounting for heart-rate recovery from stress for the spatial task, may provide a tentative explanation, at least in part, for the inconsistent results reported in the Type A

literature. For example, Blascovich et al. (1981) have indicated that the possession of high levels of masculinity, appears to be an important mediating factor with respect to the display of Type A behaviour. Similarly, DeGregorio et al. (1980) concluded on the basis of their data, that the Type A behavioural pattern, in combination with high levels of masculinity, was consistently associated with greater adjustment and effectiveness within a social framework, while the Type A pattern, together with low levels of masculinity, was related with greater maladjustment. These investigators, however, did not examine the possible effects of either femininity or androgyny. The findings of the present study indicate that these two constructs, especially the latter, appear to be important factors in understanding heart-rate responding to stress. Thus, future Type A research should perhaps incorporate a sex-role orientation focus, in order to further investigate and clarify the relationship between Type A and physiological responses to stress.

With respect to sex-role styles, it has been suggested that the addition of high levels of femininity to high masculinity levels (i.e., androgyny), is not likely to have a moderating influence on the personality attributes and behaviours associated with high masculinity (Eassa et al., in press; Blascovich et al., 1980). The results obtained in the current study however, indicate that the balance between masculinity and femininity appears to be an important variable, since only the interaction between masculinity and

femininity was found to be significant, with respect to accounting for heart-rate arousal to stress differences, among the four sex-role categories for both tasks. Thus, a proportional balance between femininity and masculinity levels, appears to exert a mediational influence on heart-rate arousal, at least in response to the type of cognitive stressor tasks used in the current study. Additional research, aimed at examining whether the present findings will hold for different types of cognitive tasks, as well as behavioural activities, is required. The heart-rate recovery from stress data is less clear, but does warrant further investigation.

Finally, the results obtained in the present study, suggest that not only does sex-role orientation appear to be related with overt behaviour, as was Bem's (1974) contention, but in addition, there appears to be an association between sex-role style and physiological responding (heart-rate arousal, and to a lesser extent, heart-rate recovery) to stress. Further research is needed in order to clarify the exact nature of possible relationships between sex-role orientation and behavioural measures, including both overt behaviours and physiological responses.

Summary

In conclusion then, sex-role orientation was found to be significantly related with heart-rate arousal in response to cognitive stressors, with androgynous and undifferentiated females displaying lower heart-rate increases than their sex-typed and sex-reversed counterparts. This result occurred independent of both the Type A pattern, and the nature of the cognitive task (i.e., verbal or spatial).

Results for heart-rate recovery from stress were less clear. Masculinity and femininity, independent of each other, were found to be significantly associated with recovery, for only the spatial task. However, when the variance associated with the Type A variable was removed, no significant findings emerged.

Subjects scoring high on masculinity, independent of femininity scores, reported that they found both tasks to be more pleasant, than did subjects scoring low on masculinity. In addition, a trend was noted, with high levels of masculinity being linked with somewhat better performance on both tasks.

FOOTNOTES

[1] An assumption involved in the given study, was that heart-rate arousal under the present conditions (i.e., engaging in two moderately difficult cognitive tasks), reflect non-adaptive stress, rather than the adaptive effort involved in attempting to achieve a high level of performance. It is evident, that if superior performance were found to accompany higher increases in heart-rate arousal while engaging in the two tasks, this intepretation would be questionable. A series of correlations were therefore conducted on the two GATB tasks, with the appropriate heart-rate during stress measures (Appendix CC), as well as with the corresponding heart-rate change scores from the resting to the stress periods (Appendix DD). Since heart-rate arousal (absolute scores and change scores) was not found to be associated with superior performance for either tasks, it was concluded that heart-rate increases to the type of stress apparently produced within the conditions of this study, may be reasonably interpreted as reflecting non-adaptive responses to stress.

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Note 1

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APPENDICES

APPENDIX A

Examples of Masculine and Feminine Items from the BSRI

Masculine Personality Attributes	Feminine Personality Attributes
Self-reliant	Yielding
Independent	Affectionate
Assertive	Understanding
Forceful	Sympathetic
Leadership Abilities	Warm

APPENDIX B

The BSRI: Normative and Psychometric Data

For the Masculinity and Femininity Scales,

And the Derived Androgyny Scores

Normative Data

(a*)	Masculinity Scale	Femininity Scale
Possible Range of Scores	0-140	0-140

(b*)

	Mean	Standard Deviation	Median
Males (n=444)			
Masculinity Scale	99.40	13.40	-
Femininity Scale	88.80	11.00	-
Females (n=279)			
Masculinity Scale	91.40	13.80	-
Femininity Scale	100.20	10.40	-
Total Group (n=723)			
Masculinity Scale	95.40	13.60	97.80
Femininity Scale	94.50	10.70	95.20

(* based on sums of endorsed rating values)

Psychometric Data

(a) Internal consistency (coefficient alpha) based on a sample of 444 males and 279 females.

Masculinity Scale Score	a = .86
Femininity Scale Score	a = .80
Androgyny Difference Score	a = .85

(b) Test-Retest Reliability (Product Moment Coefficient) based on a sample of 28 males and 28 females, with a 4-week time span between test administrations.

Masculinity Scale Score	a = .90
Femininity Scale Score	a = .90
Androgyny t-Ratio	a = .93

APPENDIX C

Examples from the JAS Type A Scale

1. Is your everyday life filled mostly by
   a. Problems needing solution.
   b. Challenges needing to be met.
   c. A rather predictable routine of events.
   d. Not enough things to keep me interested or busy.

2. If you tell your spouse or a friend that you will meet them somewhere at a definite time, how often do you arrive late?
   a. Once in a while.
   b. Rarely.
   c. I am never late.

3. How would your spouse (or best friend) rate your general level of activity?
   a. Too slow. Should be more active.
   b. About average. Is busy much of the time.
   c. Too active. Needs to slow down.

4. In school, do you ever keep two projects moving forward at the same time by shifting back and forth rapidly from one to the other?
   a. No, never.
   b. Yes, but only in emergencies.
   c. Yes, regularly.

5. When you are in a group, do the other people tend to look to you to provide leadership?
   a. Rarely.
   b. About as often as they look to others.
   c. More often than they look to others.

APPENDIX D

The JAS: Normative and Psychometric Data for the Type A Scale

Normative Data

(a) JAS Form T (Krantz et al., 1974), based on a sample of 60 males.

Mean	7.23
Standard Deviation	3.69
Median	6.70
Obtained Range of Scores	2-18
Possible Range of Scores	0-21

(b) JAS Form T (Krantz et al., 1974), based on a sample of 148 males and 84 females, in a study by MacDougall, Dembroski, and Musante (1978).

	Males	Females
Mean	7.9	7.3
Standard Deviation	3.6	3.6

Psychometric Data

(a) Validity for the JAS (Jenkins et al., 1967).

These authors found that this instrument was able to identify the behavior pattern of 72% of a sample of 2800 males, identified as being Type A's by means of the Structured Interview (Rosenman et al., 1966).

(b) Test-Retest Reliability (Product Moment) for the JAS (Jenkins et al., 1967) based on a one-year time separation between the test administrations.

$r = 0.66$ to 0.70

APPENDIX E

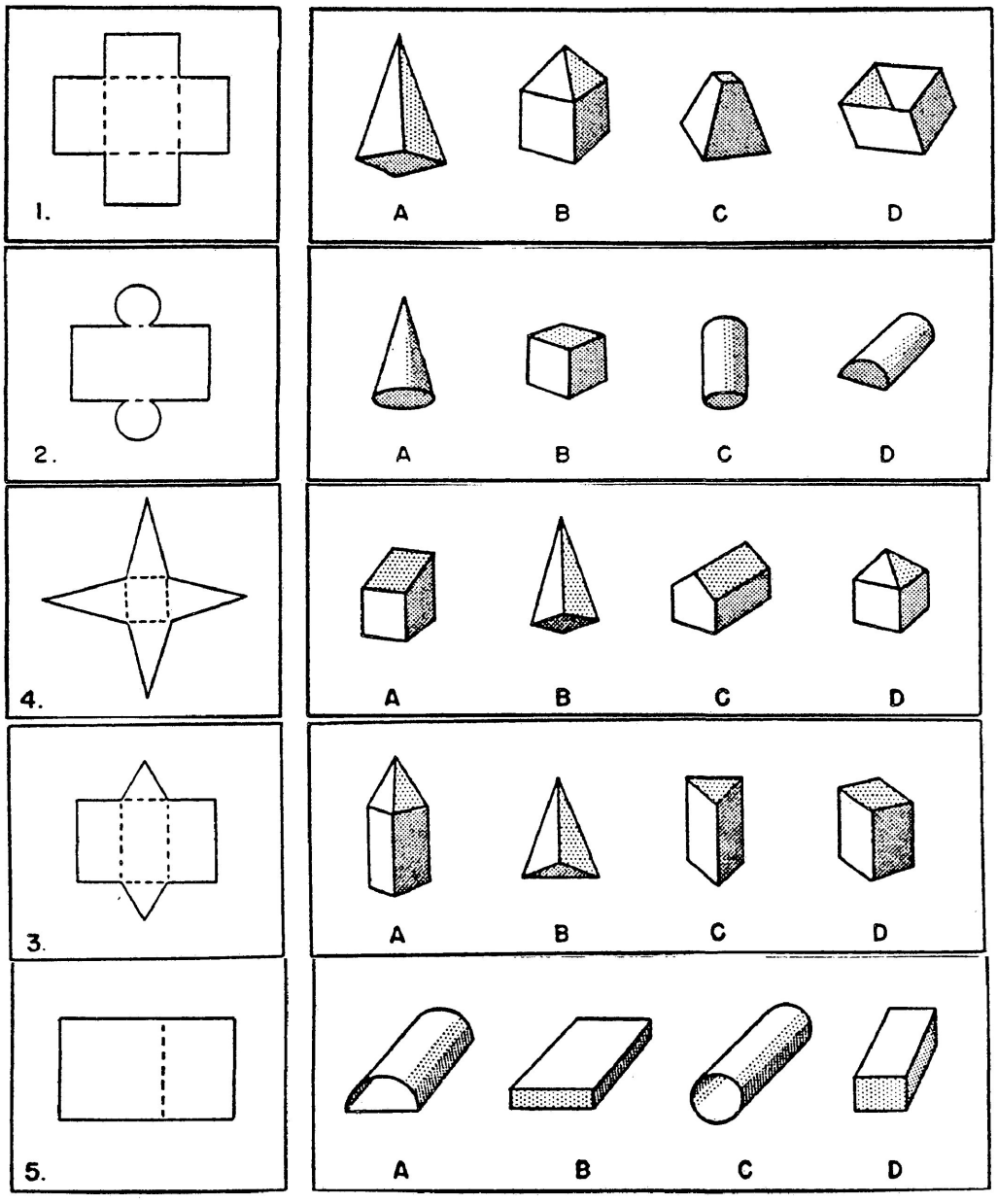
Examples from the GATB Vocabulary (Verbal)

and Three-Dimensional Space (Spatial) Tasks.

GATB Verbal Task

1.	a. big	b. large	c. dry	d. slow
2.	a. dreary	b. loyal	c. ancient	d. disloyal
3.	a. mild	b. correct	c. wrong	d. similar
4.	a. open	b. fall	c. start	d. finish
5.	a. amusing	b. tiny	c. awkward	d. funny

GATB Spatial Task



APPENDIX F

The GATB Three-Dimensional Space and Vocabulary Tests: Normative and Psychometric Data

Normative Data

(a) Based on a sample of 4000 employed males and females.

	Mean	Standard Deviation
Three-Dimensional Space Test	15.800	6.101
Vocabulary Test	20.144	10.233

Psychometric Data

(a) Validity for the GATB Aptitudes toward which the three-dimensional space and vocabulary tasks contribute to, is obtained by means of phi coefficient and virtually thousands of occupational groups, with an r of at least .05 indicating significance for the criterion occupational group only.

(b) Test-Retest reliability (coefficient of stability) based on a sample of 155 female local office applicants ranged from r = .84 to .94 for the GATB Aptitudes toward which the three-dimensional space and vocabulary tasks contribute to.

APPENDIX G

BSRI and JAS Type A Range Scores

	Obtained Minimum Score	Obtained Maximum Score
BSRI Masculinity Scale	60	124
BSRI Femininity Scale	71	117
JAS Type A Scale	1	14

APPENDIX H

Correlational Matrix for the BSRI and JAS Type A Scales

	Masculinity	Femininity	Type A
Masculinity	-	0.1741	0.4083
	-	0.159	0.007
Femininity	-	-	-0.2991
	-	-	0.040
Type A	-	-	-
	-	-	-

Note: r values are presented on the top line and p values are presented on the bottom line.

Appendix I

Results of a 2x2 two-way ANOVA on the JAS Type A Scale

	AB	
	F	p
Masculine Main Effect	9.307	0.005
Feminine Main Effect	2.079	0.159
Masculine & Feminine Interaction	0.030	0.864

df=1,31

APPENDIX J

Mean Scores on the JAS Type A Scale Across Sex-Role Groups

Sex-Role Group	n	Mean
Androgynous	9	7.78
Masculine	8	9.00
Feminine	9	4.67
Undifferentiated	9	6.22

Appendix K

Correlations for Initial Heart-Rate and the BSRI and JAS Type A Scales

	Initial Heart-Rate	
	r	p
Masculinity	0.0058	0.487
Femininity	0.0538	0.380
Type A	-0.0273	0.438

Appendix L

Results of a 2x2 two-way ANOVA on Initial Heart-Rate

	F	p
Masculine Main Effect	0.090	0.767
Feminine Main Effect	0.603	0.443
Masculine & Feminine Interaction	0.885	0.354

df=1,31

APPENDIX M

Mean Initial Heart-Rate Scores Across Sex-Role Groups

Sex-Role Group	n	Mean
Androgynous	9	74.44
Masculine	8	68.75
Feminine	9	72.44
Undifferentiated	9	72.89

Appendix N

Results from a 2x2x2 ANOVA on Heart-Rate Arousal to Stress Change Scores

	F	p
Masculine Main Effect	0.124	0.727
Feminine Main Effect	0.785	0.382
Masculine x Feminine Interaction	5.063	0.032
Task Main Effect	1.772	0.193
Masculine x Task Interaction	2.218	0.149
Feminine x Task Interaction	0.095	0.760
Masculine x Feminine x Task Interaction	0.263	0.611

df=1,31

Appendix O

MRA Results on Heart-Rate Arousal to Stress Measures, Using Resting Heart-Rate, Masculinity, Femininity, and an Interaction Term as the Predictor Variables

Predictor Variables	F	p
(a) **Verbal Task**		
Resting Heart-Rate	90.929	<0.01
Masculinity Score	0.0	n.s.
Femininity Score	0.18	n.s.
Interaction Term	13.328	<0.01
(b) **Spatial Task**		
Resting Heart-Rate	85.376	<0.01
Masculinity Score	0.034	n.s.
Femininity Score	0.014	n.s.
Interaction Term	4.205	<0.05

df=1,30

Appendix P

MRA Results on Heart-Rate Arousal to Stress Measures, Using Resting Heart-Rate, Type A, Masculinity, Femininity, and an Interaction Term as the Predictor Variables

Predictor Variables	F	p
(a) **Verbal Task**		
Resting Heart-Rate	87.899	<0.01
Type A Score	0.368	n.s.
Masculinity Score	0.065	n.s.
Femininity Score	0.608	n.s.
Interaction Term	13.289	<0.01
(b) **Spatial Task**		
Resting Heart-Rate	82.530	<0.01
Type A Score	0.345	n.s.
Masculinity Score	0.215	n.s.
Femininity Score	0.298	n.s.
Interaction Term	4.193	<0.05

df=1,29

Appendix Q

MRA Results on Heart-Rate Recovery from Stress Measures, Using Resting Heart-Rate, Mean Stress Heart-Rate, Masculinity, Femininity, and an Interaction Term as the Predictor Variables

Predictor Variables	F	p
(a) **Verbal Task**		
Resting Heart-Rate	117.821	<0.01
Mean Stress Heart-Rate	1.277	n.s.
Masculinity Score	0.0	n.s.
Femininity Score	0.0584	n.s.
Interaction Term	0.779	n.s.
(b) **Spatial Task**		
Resting Heart-Rate	128.592	<0.01
Mean Stress Heart-Rate	13.212	<0.01
Masculinity Score	4.864	<0.05
Femininity Score	4.535	<0.05
Interaction Term	0.0309	n.s.

df=1,29

Appendix R

MRA Results on Heart-Rate Recovery from Stress Measures, Using Resting Heart-Rate, Mean Stress Heart-Rate, Type A Masculinity, Femininity, and an Interaction Term as the Predictor Variables

Predictor Variables	F	p
(a) **Verbal Task**		
Resting Heart-Rate	113.759	<0.01
Mean Stress Heart-Rate	1.233	n.s.
Type A Score	0.405	n.s.
Masculinity Score	0.002	n.s.
Femininity Score	0.090	n.s.
Interaction Term	0.657	n.s.
(b) **Spatial Task**		
Resting Heart-Rate	124.158	<0.01
Mean Stress Heart-Rate	12.756	<0.01
Type A Score	1.889	n.s.
Masculinity Score	3.020	n.s.
Femininity Score	4.051	n.s.
Interaction Term	0.015	n.s.

df=1,28

APPENDIX S

Resting Heart-Rate, Heart-Rate Arousal, and Heart-Rate Recovery Means For the Verbal Task, Across Sex-Role Groups

	Total Group (n=35)	**Androgynous Group** (n=9)	**Masculine Group** (n=8)	**Feminine Group** (n=9)	**Undifferentiated Group** (n=9)
Resting Heart-Rate	71.71	74.44	67.00	72.44	72.44
Arousal Heart-Rate (Minute 1)	78.34	77.78	76.25	80.22	78.89
Arousal Heart-Rate (Minute 6)	78.03	77.89	74.13	81.11	78.56
Mean Arousal Heart-Rate (Minutes 1 & 6)	78.16	77.83	75.19	80.56	78.72
Recovery Heart-Rate	74.11	75.33	72.00	74.67	74.22

APPENDIX T

Resting Heart-Rate, Heart-Rate Arousal, and Heart-Rate Recovery Means For the Spatial Task, Across Sex-Role Groups

	Total Group (n=35)	**Androgynous Group** (n=9)	**Masculine Group** (n=8)	**Feminine Group** (n=9)	**Undifferentiated Group** (n=9)
Resting Heart-Rate	72.43	75.22	68.25	72.00	73.78
Arousal Heart-Rate (Minute 1)	78.86	80.67	77.25	78.33	79.00
Arousal Heart-Rate (Minute 6)	76.89	77.89	74.50	77.56	77.33
Mean Arousal Heart-Rate (Minutes 1 & 6)	77.90	79.33	75.94	77.94	78.17
Recovery Heart-Rate	73.17	75.00	69.38	75.00	72.89

APPENDIX U

Heart-Rate Recovery Change Score Means Across Sex-Role Groups

Sex-Role Group	n	Verbal Task	Spatial Task
Androgynous	9	0.89	-0.22
Masculine	8	5.00	1.13
Feminine	9	2.22	3.00
Undifferentiated	9	1.78	-0.89

APPENDIX V

Correlations for Task Perceived Pleasantness Ratings With the BSRI and JAS Type A Scales

	Verbal Task		Spatial Task	
	r	p	r	p
Masculinity Score	0.3631	.016	0.3989	.009
Femininity Score	0.0408	.408	0.1953	.130
Type A Score	0.0144	.467	0.3145	.033

Appendix W

Results from a 2x2x2 ANOVA on Perceived Pleasantness Ratings for the Verbal and Spatial Tasks

	F	p
Masculine Main Effect	6.138	0.019
Feminine Main Effect	2.085	0.159
Masculine x Feminine Interaction	0.145	0.706
Task Main Effect	0.092	0.763
Masculine x Task Interaction	0.381	0.542
Feminine x Task Interaction	0.404	0.530
Masculine x Feminine x Task Interaction	0.668	0.798

df=1,31

Appendix X

MRA Results on Task Perceived Pleasantness Ratings, Using Masculinity, Femininity, and an Interaction Term As the Predictor Variables

Predictor Variables	F	p
(a) **Verbal Task**		
Masculinity Score	4.708	<0.05
Femininity Score	0.0194	n.s.
Interaction Term	0.019	n.s.
(b) **Spatial Task**		
Masculinity Score	5.866	<0.05
Femininity Score	0.047	n.s.
Interaction Term	1.664	n.s.

df=1,31

Appendix Y

MRA Results on Task Perceived Pleasantness Ratings, Using Type A, Masculinity, Femininity, and an Interaction Term As the Predictor Variables

Predictor Variables	F	p
(a) **Verbal Task**		
Type A Score	0.006	n.s.
Masculinity Score	5.861	<0.05
Femininity Score	0.404	n.s.
Interaction Term	0.023	n.s.
(b) **Spatial Task**		
Type A Score	3.292	n.s.
Masculinity Score	3.239	n.s.
Femininity Score	1.897	n.s.
Interaction Term	1.630	n.s.

df=1,30

Appendix Z

Results from a 2x2x2 ANOVA on Performance Scores for the Verbal and Spatial Tasks

	F	p
Masculine Main Effect	1.614	0.213
Feminine Main Effect	0.181	0.673
Masculine x Feminine Interaction	0.218	0.644
Task Main Effect	15.139	<0.001
Masculine x Task Interaction	0.645	0.428
Feminine x Task Interaction	0.002	0.968
Masculine x Feminine x Task Interaction	0.001	0.990

df=1,31

Appendix AA

Means and Standard Deviations for Task Performance Across Sex-Role Groups

		Verbal Task		Spatial Task	
Sex-Role Group	n	Mean	Standard Deviation	Mean	Standard Deviation
Androgynous	9	33.333	6.964	23.444	5.615
Masculine	8	33.250	13.025	23.250	7.066
Feminine	9	27.222	9.458	20.778	8.151
Undifferentiated	9	29.556	15.298	22.889	8.507

Appendix BB

Correlations for Task Performance Scores

With the BSRI and JAS Type A Scales

	Verbal Task		Spatial Task	
	r	p	r	p
Masculinity Score	0.270	0.058	-0.259	0.067
Femininity Score	-0.069	0.348	-0.205	0.119
Type A Score	-0.044	0.401	0.039	0.413

APPENDIX CC

Correlations for Task Performance Scores

With Heart-Rate Arousal During Stress

	Verbal Performance Scores	
	r	**p**
Heart-Rate During Minute 1 of the Verbal Task	0.0114	0.474
Heart-Rate During Minute 6 of the Verbal Task	0.0624	0.361
Mean Heart-Rate During Minutes 1 and 6 of the Verbal Task	0.0367	0.417

	Spatial Performance Scores	
	r	**p**
Heart-Rate During Minute 1 of the Spatial Task	0.0066	0.485
Heart-Rate During Minute 6 of the Spatial Task	0.0103	0.477
Mean Heart-Rate During Minutes 1 and 6 of the Spatial Task	0.0800	0.324

APPENDIX DD

Correlations for Task Performance Scores

With Mean Heart-Rate Change Arousal Scores During Stress

	Verbal Performance Scores	
	r	**p**
Heart-Rate Change (Minute 1 of the Verbal Task)	-0.0542	0.379
Heart-Rate Change (Minute 6 of the Verbal Task)	0.0393	0.411
Mean Heart-Rate Change (Minutes 1 and 6 of the Verbal Task)	-0.0157	0.464

	Spatial Performance Scores	
	r	**p**
Heart-Rate Change (Minute 1 of the Spatial Task)	0.2154	0.107
Heart-Rate Change (Minute 6 of the Spatial Task)	0.0105	0.476
Mean Heart-Rate Change (Minutes 1 and 6 of the Spatial Task)	0.1455	0.202