

Title: Sex/Gender Research in Music Education: A Review

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It is with pleasure that we inaugurate the reprint of the entire seven volumes of The Quarterly Journal of Music Teaching and Learning. The journal began in 1990 as The Quarterly. In 1992, with volume 3, the name changed to The Quarterly Journal of Music Teaching and Learning and continued until 1997. The journal contained articles on issues that were timely when they appeared and are now important for their historical relevance. For many authors, it was their first major publication. Visions of Research in Music Education will publish facsimiles of each issue as it originally appeared. Each article will be a separate pdf file. Jason D. Vodicka has accepted my invitation to serve as guest editor for the reprint project and will compose a new editorial to introduce each volume. Chad Keilman is the production manager. I express deepest thanks to Richard Colwell for granting VRME permission to re-publish The Quarterly in online format. He has graciously prepared an introduction to the reprint series.

Sex/Gender Research in Music Education: A Review

By Laree M. Trollinger

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Objectives of research include reaching an understanding of frustrations that confront us in our work and seeking solutions. Some years ago, research findings concerning differences among boys' and girls' attitudes toward music education (MacGregor, 1968; Siemens, 1969; Nolin, 1973) sparked my interest in gender differences. The findings showed that boys did not like classroom music as much as girls did — something many of us suspected but have done little to change. Also, there were too few boys in choirs, resulting in poor balancing of parts and literature constraints.

On the other hand, even though girls had much better attitudes toward music, they were less frequently rewarded for their accomplishments. They were seldom placed as "first" chairs in instrumental festivals, even if they played best, with the typical exceptions of principal chairs in flute or strings. Male colleagues told me that they resisted placing a girl in a leadership position over a boy, but never articulated why. Outstanding, talented, teenaged girls spoke to me about these disappointments; they were hurt, knew they were treated unfairly — as did their peers — and felt betrayed by the music educators' "system."

This review poses questions, muses upon some possible answers, and suggests further inquiry relative to gender/sex differences and music education. This is a modest body of research — a basic bibliography to encour-

age further reading and investigation.

The literature reviewed is limited to works published in *The Journal of Research in Music Education*, *Bulletin of the Council for Research in Music Education*, *Psychology of Music*, and *Psychomusicology*, covering a period of 25 years, from 1968 to 1992. This period coincides with the rebirth of the feminist movement, which has led to increased awareness of sex differences and gender roles, as well as to far-reaching social changes.

A computer search yielded only 26 papers that dealt with human sex differences and music or music education; the earliest was 1973. Two were excluded: although sex was a variable, the authors did not report their findings (Harrison, 1990; Rainbow & Herrick, 1982).

The bibliography began casually; as journals were read, a card file was maintained. Comparing this file with the computer print-out showed that many researchers did not include findings in abstracts, minimized findings, or included them as incidentals. Each article was reviewed to find those which used sex/gender as a variable. Two articles were excluded as not being applicable to music education (Peretti, 1972; Polzella, 1982).

Publication in five-year blocks was: 1968-72, 17 papers; 1973-77, 15 papers; 1978-82, 24 papers; 1983-87, 19 papers; and 1988-1992, 29 papers. This indicates small growth in interest during the past quarter century.

Finally, as in much of the literature regarding this topic, there is no attempt to delineate between the use of "gender" or "sex" in this paper; the terms are used synonymously and interchangeably.

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Review of Research

Part I: Musical Abilities

Singing

Monotonism, Uncertain Singers. The incidence of poor pitch singing has been widely studied, particularly in England where Bentley (1969) and Davies and Roberts (1975) surveyed over 35,000 children between ages 4 to 18. Both studies found that the ratio of males categorized as monotones, or drones, far outnumbered females. The ratio in Bentley's study was 4:1, while Davies and Roberts found a ratio of approximately 3:1. Bentley found no significant difference regarding I.Q. between the sexes of normal or monotone singers; monotones were different in pitch and tonal memory, but not in rhythm.

Research in the United States supports English results. Klemish (1974) screened grades 1 and 2 in four laboratory classrooms. Boys labeled "uncertain singers" outnumbered girls 2 to 1. Jones (1979) noted that of those recommended for a remedial program, boys outnumbered girls 3 to 1. She observed boys' reluctance to sing in the soprano range and some attempts to force voices lower to avoid singing like girls.

Intonation. Do females have better perception of pitch? Pitch accuracy of primary children was studied by Goetze and Horii (1989), who found that girls sang at more accurate pitch levels than boys, particularly in group singing where boys were affected by others' voices. Boys, they noted, may require additional help with singing skills due to developmental lag. Sixth-grade boys and girls, Pedersen and Pedersen (1970) found, did not differ in the ability to produce pitch sequences or single intervals. College undergraduate female music majors performed more accurately than men, with women deviating 59 cents as compared to men's 80 cents (Edmonson, 1972).

Research indicates that pitch perception and singing can be improved. Girls ages 5

and 6 were found to benefit significantly more from training than male counterparts, according to a study by Jordan-DeCarbo (1982).

A traditional approach to improving uncertain singing is pitch matching, and the best models have been sought. Cross-section studies by Green (1990) determined that children most easily matched the pitch of another child, followed by a female voice; they were least able to match an adult male. Boys sang flat compared to girls, whose accuracy increased from grades 1 to 5. Girls' ability was attributed to maturation and a female

teacher-model. Effects of vocal vibrato on matching pitch were studied by Yarbrough (1992), whose models were a child and an adult female. Uncertain singers responded best to the child and a non-vibrato model, while girls tended to respond more correctly to the adult female vibrato voice than did boys.

Children's Vocal

Ranges. Reviewing research, Welch (1979) learned that females attain a wider range earlier than

males and that range increased with age. On the other hand, Wassum's (1979) long-range study of more than 1,000 children showed no significant differences due to sex or age: Range was significantly related to maturation. Moore (1991) compared intermediate-grade children with pre-service teachers; both groups averaged a two-octave range regardless of sex, but used only the lower portion. These studies do not discuss subjects whose ranges were minimal or wide.

Tests Using Singing Responses. One way to demonstrate knowledge and perception of music is through performance. Petzold (1969) conducted a longitudinal study requiring sung responses of children, ages 6 through 12, for testing perception of melody, rhythm, harmony, and timbre. He found boys and girls to be more similar in grades 1 and 2. Girls tended to perform melody with greater accuracy and continued to improve between grades 4 and 6 while

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boys did poorer in grades 5 and 6. Petzold attributed boys' scores to poorer attitudes toward singing. He found no significant differences concerning harmony, rhythm, or phrasing.

Motor/Rhythm Skills

Movement. Miller (1986) described natural and spontaneous musical behaviors of children ages 3 to 5. She noted females were consistently more involved and adept at playing a steady beat than same-age males. Drums were more frequently selected and played than other instruments by 4- and 5-year-old males.

Schleuter and Schleuter (1985, 1989) tested rhythmic clapping, chanting, and stepping in classes consisting of both boys and girls. Girls in grades 1, 2, and 3 scored consistently higher than boys on all three activities; kindergarten results were inconclusive. Maturation, it was noted, probably played a part, as stepping was more difficult than clapping. The second study, using the same tasks and age groups, compared children who had music twice weekly with those having no music instruction. Girls who had music instruction significantly outperformed male counterparts on all three skills. The authors speculate that girls may respond more to instruction.

A longitudinal study of the development of motoric music skills was conducted by Gilbert (1979, 1980, 1981). She found that girls ages 3 through 6 performed significantly better than boys of the same age on motor-pattern coordination, eye-hand coordination, and compound factors. Speed and range of movement were not significant, although boys tended to do better.

Instrumental Performance. Children without previous piano experience, ages 7 to 11, were subjects of Brotz's (1992) study on key finding, fingering, and timing in playing the piano. Females performed significantly more accurately, at a faster tempo, and in fingering all keys with right and left hands. Boys improved at age 11; the author notes other significant research which indicates that boys' development in tapping and cooperation between cerebral hemispheres develops later. Barry (1992) investigated effects of practice strategies, cognitive styles, and gender on technical accuracy and musicality.

Brass and woodwind students, grades 7 through 10, were assigned to non-structured or structured practice groups on the basis of field dependence/independence scores on an embedded-figures test. Girls in the non-structured group scored significantly higher on rhythmic accuracy. No significant gender differences arose in the structured group. Structure may cancel these differences, Barry concludes.

Tests Utilizing Listening

Pitch and Tonal Direction. Several research projects require students to choose among responses or describe what is heard. Among these are Pedersen and Pedersen (1970), who found no sex differences in sixth graders' discrimination of intervals or pitch sequences. Using written, spoken, and microcomputer responses to discriminate tonal direction, Hair (1977, 1982) also found no sex differences among children grades 1 through 4. Grouped by low, medium, and high ability, low- and high-ability males scored better than their counterparts.

Webster and Schentrich (1982) tested 4- and 5-year-olds' perception of pitch direction. Children responded verbally, or by gestures and performing. Although no significant differences occurred, it was noted that females scored well with the verbal mode while males were better with the gestural mode.

Conservation Tasks. Webster and Pflederer-Zimmerman (1983) studied tonal conservation of children in grades 2 through 6. A significant gender difference emerged favoring girls. The effect of gender depended on grade level. In grades 3 and 4, girls were dramatically better, while boys did better in grade 2. No significant difference appeared for conservation tasks of rhythm, although the girls were slightly and consistently superior to boys in grades 3-6. The authors recommend gender be considered in future conservation research.

Crowther, Durkin, and Shire (1985) researched tonal conservation among children in English primary and secondary schools using computer generated "standard" and "deformed" tunes. Individuals were tested three times, a day or more apart. Sex did not have a significant effect.

In primary grades, varying maturation rates of boys and girls may account for gender differences in singing abilities, but the incidence in older males has not been explained. Could there be a biological reason? Do male laryngeal muscles tend to be less flexible than female, even before the voice change? If so, this may relate to males' lesser ability to perform pitch exactly and may partially account for gender differences.

Zikmund and Nierman (1992) used conservation tasks developed by Webster and Zimmerman with learning-style preference as a variable. Subjects were ages 8 through 12. Boys' scores increased by grade on melodic tasks in the tactile-kinesthetic experimental group, and on rhythmic tasks in the tactile-kinesthetic control group. Girls' scores on rhythmic tasks also increased by grade in the experimental group, but decreased by grade in the control group, as well as on melodic tasks in the experimental group. Boys' total scores were higher than girls' in grades 5 and 6 for tactile-kinesthetic experimental groups on the melodic tasks. Girls in these groups and grades scored higher on rhythmic tasks. This finding, the authors say, may support the theory that boys retain kinesthetic preferences longer than girls.

Tests of Multiple Musical Abilities.

Seashore's *Measures of Musical Talent* were used by Dawkins and Snyder (1972), who found no significant differences between disadvantaged junior high school boys and girls. Haack (1975) wondered if levels of loudness affected discrimination. He adapted items to test undergraduate music majors and non-music majors. No significant differences emerged relative to gender.

Shuter's (1969) study of hereditary musical ability of identical and fraternal twins indicated that the test scores of boy twins, compared with those of girl twins, were more closely related to those of their fathers. She attributed 62 percent of their ability to heredity. Environmental factors, she said, did not account for gender differences regarding heritability. This left 38 percent of ability unassigned and unexplained.

Responding to Shuter's report, Whellams (1973) tested the hypothesis that it was pos-

sible to distinguish between persons with and without inherited aural-musical capabilities. Whellams grouped undergraduate subjects from England and the U. S. by experience, training, and sex. The hypothesis was rejected, and sex was not a significant factor.

Pitch, tonal memory, chord analysis, and rhythmic memory are tested by Bentley's *Tests of Talent*. Bentley (1969) reports that gender was not a factor in test results. Using Bentley's tests, Cleak (1969) found that differences in talent were not due to gender but to economic level, or whether or not music was taught. Concerned with drop-outs in instrumental music, Mawbey (1973) used Bentley's tests to determine why half of primary and secondary students discontinued study. Many more boys than girls dropped lessons, but test results showed no gender differences in musical abilities. It should be noted that instrumental options were slim: Primary students could choose only among violin, viola, and cello, while secondary students could select brass and woodwinds as well.

Taylor (1969, 1973) developed aural tests for responsiveness to melody, rhythm, and harmony, and discrimination of musically correct and distorted items. Interested in charting the musical development of children, Taylor's subjects included over 1,000 English children, ages 7 to 11, equally divided according to age and sex. Additional variables were instrumental/choral experience and I.Q.; the latter was measured by verbal reasoning tests. Girls were found to be significantly superior to boys on melody, rhythm, and harmony, particularly at the upper age group, while no significant differences emerged on the discrimination test.

Tests of Single Musical Abilities.

Billingsley and Rotenberg (1982) used

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Gordon's *Musical Aptitude Profile* to test children in grades 1, 4, and 7. Children were asked to recognize transposed sequences. Results indicated interval processing develops with age and is related to melody sophistication. Sex was not a significant factor.

Developmental, experiential, and gender factors were examined by DeNardo (1990) in order to understand children's cognitive processes for comparing same, similar, and different phrases. Children in grades 2, 4, and 6 showed no significant interaction relative to gender and music training.

Listening Tests: Verbal/Gestural/Written Responses. Listening achievement could best be inferred from verbal descriptions of aural stimuli, Zimmerman (1971) postulated. High school students were asked to select appropriate descriptors for melody, rhythm, harmony, timbre, texture, and dynamics. At each grade level, females scored higher than males.

Van Zee (1976) asked kindergarten children to respond verbally and demonstrate an understanding of musically descriptive terms by playing simple keyboards. Testing individuals, she found that boys produced significantly superior results on same/different verbal and performance responses of pitch, melodic contour, duration, and rhythm patterns.

In Finland, Karma (1982) investigated the relationships of musical, spatial, and verbal abilities. Subjects were music students, ages 8 to adult. Younger females tended to show greater musical talent relative to higher verbal abilities, while teen-age boys, with strong spatial abilities, were better able to organize sound. Young girls seem more musical, Karma said, because they are verbally talented, while boys' musical and spatial talent emerges later, eliminating earlier sex differences.

Haack (1969) compared deductive with inductive approaches in teaching high school band students at a music clinic. Pre- and

posttests were given for perception of thematic relationships on paired musical excerpts. Both approaches resulted in significant gains. Sex differences were not significant.

Tests of Information Learned. Testing conservation, Perney (1976) found females in grades 2 and 3 significantly superior to males in knowledge of terminology, arranging notes on staves, identifying note values, and comparing metric motion. Verbal ability linked significantly with performances of both sexes.

Senior high school students studied musical factors and concepts in choral literature and were tested for gains by the Choral Music Test, adapted by Flom (1971), who also administered music discrimination and vocal performance tests. Owen (1973) used programmed materials to teach music fundamentals to seventh-grade students, with sex, I.Q., and music aptitude as variables. Neither study reported significant gender differences.

Tests of Hemispheric Function. Effects of musical aptitude, gender, and dominant hand, sighting, and footedness were variables used by Schleuter (1978) in assessing musical achievement. Subjects were elementary students in grades 4 through 6. No significant gender differences emerged.

Selby, Rosenfeld, Styles, and Westcott (1982) required right-handed men and women, with and without musical training, to judge whether tonal sequences were the same or different. Left-ear superiority was affirmed for musically trained men and women. Overall, women showed less hemispheric specialization than men, and musically trained females were almost equal in both hemispheres.

Four short-term memory tasks were used by Huntsinger and Jose (1991) to test whether digit and tonal memory were a separate domain or part of the short-term memory system. Subjects were groups of

musically experienced and inexperienced children, ages 6 through 10, gender balanced. Girls performed significantly better than boys on these tasks; age and experience were also highly significant factors.

Tests of Creativity. Webster (1979) tested creative behavior with regard to composition, improvisation, and analysis. Seventy-seven high school students who participated in music groups but who were untrained in creative skills were subjects of the study. Females were found to perform significantly better on creative analysis, while males were significantly better on improvisation.

The relationship between music audiation, creativity, and cognitive style was researched by Schmidt and Sinor (1986). Subjects were second-grade children selected on the basis of reflective/impulsive cognitive styles based on Kagan's *Matching Familiar Figures Test*. The children were tested with Gordon's *Primary Measures of Music Audiation* and Webster's *Measure of Creative Thinking in Music*. In the creativity tests, boys scored higher on music originality, flexibility, and syntax; no similar interaction appeared on the time required for the musical response. The authors speculate that there may be a subtle sex bias in the test items, citing tasks that require the creation of truck or robot sounds, or music depicting a trip to outer space, which they feel may favor males.

The Measures of Creativity in Sound and Music by Wang, based on Torrance, were used in a validation study by Baltzer (1988). Second-grade subjects, randomly selected, were rated by the music specialist and classroom teacher on fluency, flexibility, originality, elaboration, imagination, and independence of thought in both music and general creativity. (Correlations between music specialist and classroom teacher ratings were low.) *Stanford Achievement Test* scores, age, and sex were variables. No significant differences between males and females surfaced.

Kratus (1989) gave children, ages 7, 9, and 11, ten minutes to compose a song on an electric keyboard. He analyzed their processes of exploration, development, repetition, and silence, finding no gender differences.

In Germany, longitudinal research carried on by Hassler, Birbaumer, and Feil (1985;

1986; 1987), using several measures, tested boys and girls ages 9 to 14, divided into three groups:

1. musically talented with ability to compose and improvise;
2. musically talented but unable to compose and improvise; and
3. non-musician controls.

Initial results indicated that spatial visualization was significantly related to musical talent in both boys and girls. One year later, a sample of those who had scored highest on Wing tests and were able to play at least one instrument were given a dichotic listening task and asked to demonstrate creative musical ability by writing an original composition, playing the composition, performing an improvisation, and improvising two phrases based on a given melody. Boys' improvisations were significantly related to Wing test scores and to spatial and verbal ability. Also significant for boys was composition ability and right-ear performance in the dichotic listening task and composition ability, and psychological androgyny. For girls, a significant correlation existed between the ability to compose and right-hand performance on Witelson's *Dichotic Stimulation Test*. Third and fourth stages of the study showed a decrease in talent for children who had tested extremely high on Wing tests and had been able to compose and improvise; the decline was more marked in girls. The creative group increased in spatial ability, with improvement more marked in girls. Those who had previously shown no ability to compose or improvise, or were non-musicians, were not affected. The authors believe that the onset of puberty, as determined by beginning voice changes or menarche, was the most important variable regarding the deterioration of musical talent and the ability to compose and/or improvise. They also noted that musical activities were being replaced by other artistic interests at this time.

Summary and Discussion

It is likely that more males than females are monotones, drones, or out-of-tune singers. Females, on the whole, may perceive and perform more accurately with regard to pitch. Females are more able than males to hear single and higher frequencies during

childhood and into adult years; they retain the ability to hear higher frequencies longer than males (Baker, 1987; Rebok, 1987; Schaie, 1987).

In primary grades, varying maturation rates of boys and girls may account for gender differences in singing abilities, but the incidence in older males has not been explained. Could there be a biological reason? Do male laryngeal muscles tend to be less flexible than female, even before the voice change? If so, this may relate to males' lesser ability to perform pitch exactly, and may partially account for gender differences.

Do intonation patterns in language affect the ability to create and sustain pitches? A great deal of research has been done on infant acquisition of speech. Infants learn to accept or ignore phonemes (meaningful sounds of a specific language) in the acquisition of speech (Werker & Tees, 1984). From ages 4 to 6 months, babies develop singing patterns, squeals, and yells (Oller & Ellers, 1988). The potential to sing may be present at this stage, but if response to infant intonations is not forthcoming, infants may learn to ignore pitch changes. The research reviewed is based on English-speaking children; would results be different in another culture? Chinese children, for example, must learn to pitch phonemes accurately or the meaning of words is altered.

Gender identification begins to develop in early childhood, probably due to both biology (Money, 1987) and socialization (Eagly, 1987). It is possible that the primary boy becomes aware, through observation and interaction with primarily female teachers, that boys do not sing as well as girls. With few male singing models and minimal positive reinforcement, boys may learn not to expect to do well in singing and label it a girl's activity.

Regarding motor and rhythm skills, girls ages 3 through 11 exhibit better small-motor coordination. They are more self-disciplined, attentive, involved, and responsive to instruction. Earlier maturation may account for all of these, and socialization and expectation regarding gender roles may account for older boys' lesser self-discipline. Biological differences in musculature account for boys' ability to move with greater speed and range but

hinder them in small, precise movements. Gender differences have not been proven with regard to the abilities to discriminate intervals, pitch, transposed sequences, tonal pitch direction, tonal conservation, or phrase comparisons.

Verbal abilities, which apply to all components of language use, may be related to musical ability, but why, how, or which components are as yet unexplained. Whether or not sex differences really exist in this area is also unknown. A meta-analysis review encompassing research of varied components of verbal abilities was done by Hyde and Lynn (1988). Overall they found small differences favoring females age 5 and younger, and adults over age 26; notable differences were not apparent between ages 6 through 25. Males had better command of vocabulary from ages 6 to 10, while females had the advantage from ages 19 to 25. No differences emerged at other ages. Females read with greater comprehension and proficiency at age 5 and younger, which may be accounted for by maturation rates. Conversely, Hines (1990) found highly significant differences favoring females on the ability to generate synonyms and on word fluency. To complicate matters further, male stutterers outnumber females three or four to one (Skinner & Shelton, 1985), and dyslexia is predominantly a male problem (Vandenberg, 1987).

Spatial abilities, strong in mathematicians and scientists, appear related to manipulating and organizing sounds creatively. Boys begin to perform better than girls on spatial tasks beginning in grade 4 (Johnson & Meade, 1987). Meta-analysis by Linn and Petersen (1986) found a lack of consistency in research concerned with spatial abilities and gender. They noted that many factors could be contributing to observed gender differences. Among these are instruction and experience and affective variables such as society expectations, confidence, and females' unwillingness to be wrong. They found no evidence for biological factors.

However, biology may play a part: hormones may affect spatial abilities (Hier & Crowley, 1982). Halpern (1992) reviewed research showing that high prenatal levels of androgens may be associated with higher-

than-average spatial abilities for girls. The amount of androgens at puberty may be a determinant of spatial abilities. Furthermore, females' cognitive abilities may vary across the menstrual cycle, with verbal ability and manual dexterity high when estrogen and progesterone are high at mid-cycle, and spatial abilities high at the end and beginning of the cycle. A similar hormonal cycle for males has not as yet been identified. On the other hand, biology responds to environment and there is evidence that the brain differentiates in development in context with socialization which can affect body chemistry (Petersen & Hood, 1988). Nature and nurture may not be separable.

To further demonstrate the intertwining of nature and nurture, it has been shown that culture may play a part in the development of spatial abilities — perhaps also verbal abilities. For example, male and female Eskimos showed no significant differences on spatial tasks (Berry, 1966). Male children of one ethnic group in New Zealand outperformed females, while in another group, female children outperformed males on spatial tasks (Brooks, 1976).

Part II: Factors Mediating Gender Differences

Personality

The relationship of personality and instrumental success was investigated by Sample and Hotchkiss (1971). They used the *IPAT Personality Questionnaire* and the *Kuder C* form in a study of seventh graders that included band and non-band students. Band boys were significantly more interested in the outdoors, mechanical, computational, active, and assertive, while band girls were significantly more interested in artistic, social-service, and clerical pursuits, and they were termed more "tender-minded" and "apprehensive." Sex-role interests appear typical for 1971. Would these results hold true today?

In England, Kemp (1981) used Catell's *16 Personality Factors* in a study of male and female composers, and male and female non-composer musicians, ages 24 through 62. Differences between male and female professional composers surfaced: males rated themselves more intelligent and expedient, while females were more introverted

(self-sufficient). Kemp (1982) asserts that gender is an important variable in the study of the personality of musicians. Three groups of subjects, ages 13 through 17, ages 18 through 25 (both musicians and non-musicians), and professional musicians were examined using Catell's measure. Kemp concluded that gender differences among musicians decreased with age: professional musicians were more androgynous. Recent literature shows a general trend toward androgyny for both men and women, from middle age onward, which may account at least in part for these findings (Sinnott, 1984, 1988). It should be noted that Catell's instrument used separate scales for men and women, resulting in sex-stereotyped measuring.

Later, Kemp (1985) selected the more recent *Bem Sex Role Inventory*, which does not use separate scales for males and females, to assess personality characteristics of musicians. Subjects were groups of music majors and non-music majors. Female musicians were found to be both more masculine and more feminine, while male musicians showed a reduction in masculine traits; both were rather androgynous. Kemp concludes that unconscious sex-stereotyped practices may have long-term limiting effects on the development of abilities, aspirations, and achievements of both sexes.

Personality styles, stresses, and coping patterns of college music students in three regions of the United States were analyzed by Dews and Williams (1989). The authors developed a 22-item questionnaire for the assessment. Only two significant gender differences emerged: females were significantly more troubled by criticism and personal comments, while males were bothered by public misunderstanding. The authors did not discuss this finding.

The Effect of Personality on Listening to Music

Undergraduates subjects were used by Hedden (1973) and Wheeler (1985) and adults by Nielzen and Cesarec (1981) in studies to determine whether personality played a part in responding to music. Gender and personality were not significantly correlated. Nielzen and Cesarec found women experienced more tension, while Wheeler found

them more likely to express enjoyment. Wheeler suggested that the sexes may respond differently to music, or that a procedural aspect may have intervened. Could it be the selection? The composition used was a barcarole, which typically is low in dynamics and moderate in tempo.

Dolgin and Adelson (1990) were interested in determining when children begin to recognize affective qualities in vocal and instrumental music. Subjects ages 4, 7, and 9 were pretested for understanding the terms "happy," "sad," "angry," and "frightened." Wordless melodies, previously rated by adults according to these categories, were sung by a soprano and played by a viola. A gender difference occurred at age 4: Females were found to correctly select "angry" more frequently than 4-year-old males. No significant gender differences emerged in a similar study by Terwogt and Grinsven (1991). They studied three different age groups: 5- and 10-year-olds, and adults from 21 to 64 years old. Subjects were required to link the descriptors "happiness," "sadness," "fear," and "anger" to a musical excerpt.

Music Literature Preferences

In a study of musical development of English children, Taylor (1969, 1973) gave a 30-item preference test covering six style periods to over 1,000 subjects ages 7 through 11. Significant differences surfaced: girls preferred music of Bach, Handel, Haydn, and Mozart in the first study, and Haydn, Mozart, Beethoven, and Schubert in the second. Boys preferred Brahms and Tchaikovsky in both investigations.

After studying tenth graders in East Germany, Michel (1977) concluded that both boys and girls had strong interests in light music. Herberger (1987), also from East Germany, presented 18 excerpts of contemporary music of different styles, genres, and trends to 15-year-olds enrolled in a polytechnical high school. Students preferred "Thriller," sung by Michael Jackson. Significant gender differences emerged: Boys expressed a stronger interest in rock music and favored rhythmically exciting symphonic sounds, while girls preferred popular music and symphonies closer to traditional styles.

May (1985) investigated music preferences

of first-, second-, and third-grade students. Females tended to prefer children's music, and music that was legato, low in dynamics, and of slower tempos. Boys preferred rock, country and western, and jazz/bebop — music that was accented, louder, and faster. Would students differ in the expression of musical preference if they expressed it privately rather than publicly?

Finnås (1989) studied Finnish and Swedish children ages 12 through 14 and discovered that students rated traditional music lower when their ratings were publicly announced, but found no gender-based differences. Similarly, Brittin (1991) wondered if overt categorizing of popular, rock, and jazz would affect preferences of non-music majors in appreciation courses. Gender emerged a significant variable: Females rated all examples higher than did males, and preferred popular music. No gender differences emerged for jazz and rock.

Boyle, Hosterman, and Ramsey (1981) asked students in grades 5, 7, 9, and 11, and college undergraduates, why they preferred particular popular music. Males and females differed significantly. Females gave importance to lyrics, melody, and sentiment, while males rated instruments and peer influence as more important. In a study of perceived humor and preferences in vocal music, LeBlanc, Sims, Malin, and Sherrill (1992) affirmed that females in grades 7 and 11 respond more strongly to lyrics than males, and that this response increases with age. Subjects were children in grades 3, 7, and 11 and college undergraduates in three states, who were asked to respond to humorous and non-humorous song excerpts in three popular music styles.

Preferences in Listening and Sex Role Models

The following four studies suggest that preferences for vocal music may be related to sex role models. Traditional jazz excerpts, representing both vocal and instrumental media, were used by LeBlanc and Cote (1983) to test preferences of fifth- and sixth-grade children. Fifth-grade females significantly preferred female vocalists while sixth-grade males preferred male vocalists. The authors were perplexed by these results, as sixth-grade

females and fifth-grade males evidenced no similar patterns. Replication is needed to determine if this finding is an anomaly.

Baker (1980) studied third and fourth graders divided into two groups: those who sang lullabies and sea chanties with appropriate dynamics and tempo, and those who learned inappropriate renditions. The taped songs were presented by a trained female voice. Later all children heard both the appropriate and inappropriate versions and were tested for preference. Results showed that, compared with boys, girls significantly preferred hearing appropriate renditions and reacted more favorably to the female model. The author suggests that the results of the study may have been different if a male model had been used.

LeBlanc and Sherrill (1986) examined the effects of vocal vibrato of male and female performers on the preferences of students in grades 4 through 6. Twenty-four examples were selected from a variety of popular styles and art music. Both boys and girls significantly favored low vibrato and male singers, and associated strong performances with male singers. However, female preference was less marked: Girls viewed vibrato and female performers more favorably.

In Killian's (1990) study, culturally and racially varied junior high students were asked to pick the solo they would prefer to sing after watching the video "We Are the World." Subjects preferred songs sung by the same race and sex as themselves. Boys overwhelmingly preferred male-model choices. On the other hand, while girls chose more female models, they also selected some songs sung by males.

Gender Associations with Music Activities and Instruments

The nineteenth century may have been a turning point with regard to stereotyping vocal music and music teaching as pursuits for women. Gates's (1989) historical study showed United States men have moved away from choral singing since the eighteenth century. He observed a recent decline of women participants in choral singing, which he believed may be due to androgynous values. He further noted that music teaching became a feminine profession during the last

century, but that twentieth-century women have not filled the leadership gap left by eighteenth-century men. Sex-stereotyping with regard to music, Koza (1990) discovered, was evident in the pages of *Godey's Lady's Book*, a popular women's magazine of the nineteenth century. Music was represented as a feminine activity, but only rudimentary instruction was considered necessary for women. The author concluded that these stereotypes have deep historical roots, resist eradication, and continue to shape the schools' curriculum.

The first studies assessing sex-stereotyping of musical instruments were done by Abeles and Porter (1978). The series examined gender associations with instruments using eight instruments on a masculine-feminine continuum. Subjects were adults, children from kindergarten through grade 5, and undergraduate music and non-music majors. Adults selected the clarinet, flute, and violin for daughters and the drum, trombone, and trumpet for sons; no significant differences arose regarding the cello or saxophone. College students made the same choices as the adult sample. Stereotyping was not very strong in kindergarten children but became more pronounced beyond grade 3. Among their conclusions were:

1. parents' gender stereotypes may influence their children's choice of instrument;
2. girls chose a wider variety while boys selection was more a restricted; and
3. sex-stereotyping may diminish when instruments are presented free of gender association.

Griswold and Chroback (1981) confirmed sex-stereotyping of instruments and music occupations. Subjects were undergraduate music and non-music majors who were asked to rate names of 17 music instruments and two occupations on a scale from most feminine to most masculine. The harp, flute, and piccolo were rated highly feminine, with the cello, clarinet, piano, French horn, oboe, and choral conducting also high on the feminine scale. Highly masculine were the trumpet, string bass, and tuba, with the guitar, cymbals, saxophone, bass drum, and instrumental conducting also high on the masculine scale. They believe that sex stereotyping is related to exposure to the study of music,

to the professionals and music educators, and to the social reality of the profession.

Factors influencing the choice of instrument may include the teacher's desire to balance instrumentation as well as children's idea of what is popular, according to Byo (1991), whose subjects were enrolled in third-grade classes in private metropolitan schools. Subjects were divided into two groups: those receiving demonstrations of instruments with an emphasis on the clarinet, and those experiencing a non-biased presentation of six instruments. Boys ranked the alto saxophone first, followed by the drum and flute. Girls chose this ranking: drum, flute, and alto saxophone. Byo concludes that a change of consequence has taken place in the past dozen years. Since the schools were private, did socioeconomic status affect the results?

Concluding that the magnitude of gender association with instruments has lessened, Delzell and Leppla (1992) found gender association still present when replicating Abeles's and Porter's study. Subjects were college music and non-music majors, and fourth grade students in 13 varied schools. The investigators found results similar to the early study, with the exception that the violin was perceived as slightly more masculine than the clarinet. The majority of fourth-grade boys wanted to play the drums or the saxophone, while girls selected the flute, drums, saxophone, and clarinet. Drums remained the most popular instrument for boys and flute for girls.

Music in Education: Attitude, Achievement, Motivation

Listening, moving, creating, and singing were balanced activities taught to fourth graders in a two-year study by MacGregor (1968), which aimed to assess activity preference. Girls significantly preferred singing and listening on initial and final inventories; boys preferences were not focused. Female interest in and attitudes toward classroom music appear to be significantly more positive than those of males. Nolin (1973) developed a *Musical Attitude Quotient* inventory to assess attitudinal growth patterns toward music among boys and girls in grades 3 through 6. He found boys' attitudes lower at

all grade levels. Using a *Music Class Attitudes Index* and a *Musical Attitude Inventory* modeled after Nolin's, Pogonowski (1985) assessed attitudes toward a process-oriented curriculum. Subjects were in grades 4 through 6. Gender, grade, and socioeconomic status were variables. Socioeconomic status and grade resulted in interesting variables for both males and females. Overall, however, females expressed more favorable attitudes toward classroom music. Boswell (1991) replicated Pogonowski's study with middle and junior high school students and affirmed these results.

Attitude has been shown to affect achievement in classroom music. Siemens (1969) divided children into an experimental group using the Orff approach, and a control group using traditional procedures. Comparisons were based on an interest questionnaire, the *Knuth Achievement Test in Music*, the *Kwalwasser-Ruch Test of Musical Accomplishment*, I.Q., and socio-economic status. Overall, girls showed a significantly greater interest in and a more favorable attitude toward music. High-I.Q. boys in the experimental group performed persistently poorly. Correlation of interest and attitude with achievement was highly significant.

Seeking to predict musical achievement, Hedden (1982) studied fifth and sixth graders' attitudes toward music, self-concept in music, music background, academic achievement, and gender. A positive attitude and self-concept in music were significant predictors of music achievement, although academic achievement surfaced as the best predictor. Gender was not a factor; comparisons in attitudes between boys and girls were not made.

Sundin (1985) noted that music as a subject tended to repel Swedish boys. During a three-year project he broadened the curriculum, giving choices to subjects in the experimental group, while maintaining a traditional curriculum for a control group. The experimental group was combined into grade-mixed groups based on interest. Children were required to stay with the chosen activity the entire term, but could switch at a new term. Groups included winds, keyboards, dancing, drums, and listening. Although all

Males with low parental involvement and musical aptitude did poorest on the *Watkins-Farnum Performance Scale*, while males with low aptitude but high parental involvement did well. Females with low parental involvement and musical aptitude outperformed low musical aptitude females with high parental involvement.

groups initially included both sexes, only two groups remained so at the experiment's end. Boys selected brass, drums, and woodwind (except flute), while girls chose dance and flute groups. After three years, completed questionnaires indicated that those in the experimental group ranked music higher than controls, and that boys and girls in the experimental group were equally interested in music.

Parental involvement, music aptitude, and gender, Zdzinski (1992) found, interacted significantly with instrumental students' achievement and aptitude. He used the *Parental Involvement Measure* and other instruments to study brass and woodwind students, ages 10 to 14. Males with low parental involvement and musical aptitude did poorest on the *Watkins-Farnum Performance Scale*, while males with low aptitude but high parental involvement did well. Females with low parental involvement and musical aptitude outperformed low musical aptitude females with high parental involvement. Males scored higher on Colwell's *Music Achievement Tests*. Parental involvement, the author suggests, may inhibit females of low musical aptitude; females may view it as a form of control. Males, on the other hand, may view feedback from parents as information on task competence.

Asmus (1986) used an open-ended questionnaire to determine student beliefs regarding success and failure in music. Females in grades 4 through 12 made more internal-stable attributions than males did. Society, the author believed, promotes internal-stable (ability and innate capability) attributes as opposed to internal-unstable attributions (effort or persistence). These results may indicate that innate musical ability is sanctioned if one is female, but not if one is male. No gender differences regarding motivation for music emerged in the later study of undergraduate non-music majors by Asmus and

Harrison (1990). These researchers found that college non-music majors of both sexes emphasized affect for music as the reason for success or failure, while twelfth grade students tended to stress effort and ability.

Anxiety

The effect of music on induced anxiety, as measured by galvanic skin response, was studied by Peretti and Swenson (1974). Subjects were college music/non-music majors. Females responded to music more consistently; they had significantly greater decreases in anxiety than did corresponding male groups. Female music majors tended to be most influenced by music; the authors suggested these women had more flexible anxiety states.

Abel and Larkin (1990) checked heart rate, blood pressure and self-reported anxiety of undergraduate music students prior to jury performances. Sex differences were reported: males' systolic blood pressure was higher, while females had higher self-reported anxiety. Females reported increased confidence as the jury approached while males experienced no similar surge. The authors suggest that females may be willing to express anxiety and that males' inability to disclose feelings may have caused increased blood pressure.

Summary and Discussion

Does personality affect cognitive performance? While a meta-analysis of research by Signorella and Jamison (1986) showed no significant evidence of a relationship between androgyny and the ability to perform cognitive tasks, there was some evidence that girls with high masculine and low feminine scores perform better on spatial and mathematical tasks. If spatial ability is requisite for a high level of creativity in music, educators need to encourage females to be less concerned with correct, traditional responses

and more willing to take risks, to be self-reliant, and to defend their beliefs. Females need encouragement to improvise, compose, conduct, and perform in any medium or genre, without fear of social censure or personal criticism. The need for females to perform "correctly" may inhibit creative exploration and could result in hypersensitivity to criticism. This need to conform — to be right — is based on fears that have historically surrounded females; persons in power positions, mainly male, had to be pleased for the sake of survival and security.

Young male musicians in the study by Dews and Williams (1989), bothered by public misunderstanding, may reflect the lack of public acceptance and understanding of what they do, as well as a shortage of jobs and a lack of social status for the classically trained male musician. This may challenge some men to perform at a high level in order to achieve acceptable status, but may cause others to choose alternate vocations and avocations.

Male and female preferences for music reflect sex-role stereotypes. Females tend to prefer quiet, calm, traditional, predictable music; they identify with and respond to female voices, but may prefer and accept male vocal models. They are willing to express an enjoyment for music and respond to sentiment in lyrics. These preferences reflect culturally acceptable traits for women: accommodating, restrained, accepting, dependable, obliging, appreciative, sensitive, emotional, and mannerly, to name a few. Likewise, male preference for louder, rhythmically accented, less predictable music, mirrors their socially acceptable traits: robust, aggressive, disorderly, dominant, adventurous, excitable, active, assertive, and inventive. These traits are reinforced by society and the educational system (Sadker & Sadker, 1982; Best et al., 1977). The preference for male role models and concern for peer approval may be indicative of the pressures placed upon males to be manly.

While gender-free introductions to musical instruments probably will reduce sex-stereotyping, it is possible that associations of gender with instruments may be unconsciously and deeply rooted in language systems, perhaps based on historical traditions. For ex-

ample, while English and Scandinavian languages use gender-free articles, Italian, Spanish, French, and German assign gender articles to instruments. Furthermore, gender assignments are not cross-culturally consistent: Italian uses a masculine article for the flute, while Spanish, French, and German use a feminine article; the clarinet is masculine in Spanish and German, but feminine in Italian and French. The use of a generic "he" pronoun has been shown to affect the way children and adults think about activities and occupations (Martyna, 1978; MacKay, 1983; Hyde, 1984); during the past decade, many institutions, publications, and organizations have adopted gender-free language. Is it possible that the assignment of a specific gender article or masculine/feminine ending to an activity, occupation, or instrument influences our thinking? Cross-cultural studies and investigations into the development and endurance of gender assignments may result in knowledge and understanding that will help to free us from the bondage of stereotyping.

Historical studies depicting the development of views that singing and music instruction are primarily feminine pursuits clarify the interweaving of societal forces in the development of gender differences in attitude toward and achievement in classroom music as well as instrumental choice. The consequences of the absence of strong male vocal role models for young boys and strong female instrumental role models for girls need to be addressed. However, the effects of biology must not be dismissed. Specifically, the negative attitudes of boys toward classroom music may be partially due to delayed maturity, sex-linked problems with singing, and other disabilities more common to male children than female.

There is evidence that males have a strong need for peer approval, and teacher, public, and parental support in developing and expressing musicality. As teachers we need to examine, understand, and address societal pressures upon males with regard to music learning and performing; we need to know how to encourage male participation and expression in community and school music. On the whole, females have more readily accepted, enjoyed, and used music for artistic,

therapeutic, vocational, and avocational purposes. Females need to be encouraged to broaden their occupational choices in music and challenged to create, excel, and lead.

Music educators may not recognize subtle and unintentional gender bias in their classroom behavior. Research indicates that teachers are more interactive with boys than girls. Teachers more frequently praise/disapprove, question, and direct male students; this greater involvement has been shown to increase independence, confidence, and persistence, and may influence differences in achievement (Sadker & Sadker, 1988). We need to know how to educate teachers to be gender fair in the classroom.

Recommendations for Further Study

Cross-cultural research is needed to ascertain if biology really plays a part in gender differences found in musical abilities. Is male difficulty with singing and pitch due to sex-linked or sex-related factors? Infant research to stimulate pitch development and singing may prove or disprove whether these abilities are due to sex or culture. Do hormonal cycles really influence creativity performance, and achievement? If so, how may these cycles be accommodated and/or used to best advantage? If the brain is affected by socialization, and influences one's biology, teachers and parents need a better understanding of how nature and nurture intertwine.

Evidence is strong that spatial and verbal skills may be culturally determined. In what ways do these skills correlate with music? Since both appear related to music abilities and achievement, how can we improve female spatial and male verbal skills?

Boys do not respond as positively as girls do to music. We need to experiment with alternative curriculums, methods, and approaches which prove appropriate and attractive to both sexes. We need to research the presence of any subtle, sex-biased interactions operating between music educators and students. If such are found, we must find ways to change teacher behavior to improve the classroom climate for both boys and girls. Because social sanctions appear to limit the musical potential of both males and females,

we must find ways to neutralize these effects.

Finally researchers need to be aware that the sex of the researcher may act as a subtle variable and thus result in biased research outcomes. Ways to insure gender fairness in research must be delineated.

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