Can Musicians Alter the Music Preferences of Their Audience?

The Effect of Pre-Performance Informational Presentations on Music Preference

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December 2000

Abstract

An investigation explored the influence of pre-performance informational presentations on audience preference for classical piano works. Using a latin-square experimental design, three treatments were compared: (N) no introduction of musical work, (ID) introduction of musical work by discussion, and (IP) introduction of musical work by a short dramatic play involving audience members. Subjects were students (lower elementary, upper elementary, middle school, and high school groups) and audiences at four concerts open to the public. Results showed that, for the aggregate of all audiences studied, works receiving treatment ID received a significantly higher preference rating than works receiving treatment N. For the aggregate of elementary and middle-school audiences, treatment N was associated with the lowest preference ratings, ID produced higher preference ratings, and IP produced the highest preference ratings. The difference (ID + IP) - N was significant but ID - IP was non-significant. Response of different age groups to the treatments was investigated. For audiences at public concerts, the results were consistent with the aging stability model of attitude change, which posits a steady decrease in attitude changeability with age. For school groups, younger students showed more response to treatment ID than older students; this finding did not rise to the level of significance but does suggest that the impressionable years model of attitude change (a strong hardening of musical attitude after the impressionable years, approx. age 10-13) may apply to school groups. School groups' aggregate response to treatment ID was significantly lower than that of concert audiences of similar age; the difference may be attributable to the fact that recital audiences were self-selected and interested in classical music. Different age school groups responded differently to treatments ID and IP, suggesting that matching the type of presentation to the interest and capacity of each age group increases effectiveness. Reasons are put forward for the hardening of musical attitudes over the lifespan: the neural network model of learning suggests that decreasing changeability of attitude over time is necessary for the development of discriminating taste. Yet, a very slow decrease in this changeability of attitude is preferable for developing both broader and more accurate knowledge. Implications of this and other findings are discussed from the point of view of both the music educator and of the music performer.

Introduction

Why Influence Music Preference?

The Musician

Musicians have a natural interest in understanding and influencing the public's preference for the type of music they play. Classical musicians, for instance, worry about the decline of audiences for their music. The topic is often addressed at professional meetings and conferences and the decline of the classical music audience has been much ballyhooed in the popular and periodical literature, too (Pridinoff, et al., 2000; Lebrecht, 1997; Small 1998). Despite all the attention given to the purported problem, it turns out that empirical evidence for or against the decline of the classical audience is difficult to interpret (Repp, 1999; Newberry, 1999); the classical audience appears to be declining in some sectors and increasing in others.

Regardless of the general rise or decline in audiences, the classical performer has an interest in creating a preference for classical music in new audiences and increasing the preference for classical music among those who already enjoy it. Musicians who wish to perform must create an interest in and a liking for the type of music they play among some audience somewhere or they will not be performing music for long.

The Music Educator

Music educators may have a different reason than performers for influencing the musical preference of students. In American society, the highbrow musical taste in previous decades was elitist, exclusivist, and focused on classical music as performed by the best musicians--in a word, it was snobbish. In the last two decades or so, the highbrow musical taste has shifted. It is no longer snobbish, but more eclectic and musically omnivorous (Peterson & Kern, 1996). The new musical omnivore puts importance on music from a tremendous variety of sources--folk music,

various pop musics, different forms of jazz, classical music, world musics--essentially any and every kind of music perceived to be authentic, high-quality and musically interesting. The omnivore treasures not one particular style of music, but quality of music in whatever style it may be found.

From the sociological point of view, musical styles are expressions of, and closely associated with, the societies and subgroups within societies that produce them. Different age groups, ethnic groups, religious groups, social classes, regions, and historical times and places have their own distinct styles of music, expressing their particular social styles, values, and interests. Thus it is little surprise that Bryson (1996) found a strong association between political tolerance and musical tolerance. The correlation between political and musical tolerance holds across all educational levels, indicating that there is something specifically helpful about exposure to a wide variety of musical ideas--even above the exposure to a variety of general cultural ideas found in those with more education--that creates political tolerance.

A few studies have shown specifically that tolerance for and acceptance of a group's music leads to a tolerance for an acceptance of the group itself. For instance, fourth graders receiving instruction in Native American music had positive changes in attitude towards both the Native American music and Native American culture in general (Edwards, 1994). Fung (1994a) found a significant correlation between higher preference scores for music from eight world cultures and multicultural attitudes.

Several studies have shown that it is possible, in general, to influence musical tolerance and acceptance. For instance, Bryson (1996) found that more education is associated with an openness towards more different types of music. Gregory (1994) found that among U.S. high school and college musicians, training increased musical preference ratings both within and

across musical genres. It seems, then, that it is possible to broaden the musical preferences of students and this broadening of musical preferences can help broaden students' general multi-cultural interests.

Research Questions

Both the educator and the musician have valid reasons to try to change the musical preferences of students and audience members. For both the educator and the musician who wish to affect music preference, these questions arise: What factors affect music preference? What, specifically, can the musician and educator do to affect students' and listeners' music preferences? Do different groups (for instance, various age groups, or groups with musical training vs. those with no musical training) respond differently to treatments designed to affect music preference, and do these differences suggest specific strategies to use with these various groups?

An investigation was planned to answer these specific questions:

1. Does presentation of musical information by a recital performer, immediately prior to performance of a particular music selection, change music preference ratings of audience members for that selection?

2. Do presentations that actively involve audience members affect music preference ratings differently than presentations to which audience members passively listen?

3. Are music preferences of younger audience members affected in a different way by these informational presentations than music preferences of older audience members?

4. Do recital audiences and school audiences of a similar age respond differently?

5. Do audiences prefer a recital format that includes informational introductions of the music by the performer?

Factors Affecting Music Preference

Literature shows three important factors that affect the listener's perception and enjoyment of music: (a) the social context of the music, (b) knowledge about musical styles, composers, and particular pieces, and (c) repetition of music over a period of time.

Social Context

Sims (1990) listed five important elements in teaching elementary students a listening lesson. Of the five elements, two are social (teacher enthusiasm for the music, teacher eye contact with the children), two are musical (plenty of time for uninterrupted listening, a recording of good quality), and only one relates to specific items the students should be learning (the students should have a specific task to accomplish while listening to the music). Similarly, LeBlanc (1982) identified eighteen factors that influence musical preference. Of these, seven are purely social (ethnic group, socio-economic status, educators and authority figures, incidental conditioning, family, peer group, and media), and a further four have strong social components (personality, sex, maturation, musical training, and performance quality--which LeBlanc takes to include the charisma and even the sex appeal of the performer).

Farnsworth (1969) argued that the opinions of critics and other prominent opinion-leaders are crucial in forming the public's opinion of different classical composers. For instance, he lists the influence of these opinion leaders as one important reason for the high degree of correlation he found among responses from those asked to list the greatest composer in history. Alpert (1982) found that approval for the music by music teachers and disc jockeys significantly increased fifth grade students' preference for particular classical music works.

Radocy (1976) and Duerksen (1972) both found that students' judgments of musical performance changed in correspondence with biased statements by authority figures. It was

easier to manipulate opinions of a musical performance ("Which performance of this piece do you prefer?"), however, than to change opinions of the compositions themselves ("Which of these two compositions do you prefer?"). This finding squares with Hargreaves's theory (1984) that musical prejudices are paramount in determining liking for particular compositions and styles. Attitudes about other aspects of the music (for instance, the relative value of different performances of a single work) may be more easily influenced.

Furman and Duke (1988) demonstrated that students' opinions about musical excerpts were affected by the verbally expressed opinions of others in the room. Students were asked to evaluate and compare two musical excerpts. Students were more susceptible to influence by the opinions of others when the excerpts were identical, and less susceptible when the excerpts varied significantly. Students less familiar with the general style of the excerpts were more susceptible to the influence of other's opinions, while those more familiar with the style were less susceptible to the influence of others.

Hargreaves (1986), analyzing seven studies dealing with the influence of "prestige and propaganda" on music preference ratings, concluded that six of the seven studies "found social influences to have a significant effect on aesthetic judgements, and it may be that these are more powerful in the case of music than in other art forms" (p. 198). Two of the studies show strong prestige effects on the musical judgements of musically experienced subjects, which Hargreaves found surprising because "it seems intuitively quite likely that the power of social influences should be inversely related to the background knowledge of the listener" (p. 198).

Clearly the social context of music is important, and developing a positive social context may be crucial in encouraging a positive preference, both among experienced and inexperienced listeners.

Knowledge

"The relationship between . . . eminence, knowledge, and preference . . . is a very close one" (Farnsworth, p. 100). Nevertheless, it is not perfect: the correlation between college students' knowledge of and eminence rankings of classical composers is as low as 0.65. (Farnsworth, p. 113). This again confirms Hargreaves's theory of musical prejudice: Educators may inform and even indoctrinate, but in the end the strongest factor in determining preference is a person's musical prejudice, which may be shaped but not entirely overcome.

Studies by Price (1988) and Price and Swanson (1990) confirmed this. Participation in a ten week music appreciation course clearly improved students' knowledge of classical composers in abstract and in response to questions about specific musical excerpts played as part of a pre-test and a post-test. Participation in the class also significantly affected students' rank-order listing of their ten favorite composers, but failed to significantly change their responses on a like/dislike scale to the musical excerpts.

Novak's 1994 longitudinal study confirms that musical training made a significant difference in the development of musical tastes through the middle school and high school years. Hargreaves, Comber, and Colley (1995) found that, among British secondary school students, a higher level of interest in art music was positively associated with a higher level of musical training (although Hargreaves et al. found that all students, musically trained and untrained, gave lower preference ratings to art music than to popular music).

A possible explanation for the correlation between higher levels of training and higher preference for music is that individuals with higher musical aptitude, who may have a naturally higher preference for music, may also seek out or be channeled by music educators into higher levels of musical training. This possible explanation for the correlation of higher levels of

training and higher preference is refuted by the model of music preference put forward by LeBlanc (1982), which did not consider musical aptitude to be an important factor in determining music preference. A study by Reynolds (2000), demonstrating that there is no relationship between musical aptitude (either tonal aptitude or rhythmic aptitude) and music preference, confirmed this aspect of LeBlanc's model.

A preliminary study to the present one (Hugh, 1996) indicated that audiences at classical music concerts enjoyed short presentations by the performer with insights and information about the music played at the concert. However, within the limitations of this small study, changes in music preference ratings due to this information were not significant. A possible link was established involving increasing rapport between the performer and audience over time that caused preference ratings to rise as rapport rose. Again, the suggestion was that, for listeners whose musical prejudice is set, the effect of music knowledge on music preference was small compared with the effect of social factors.

What sort of information is most likely to affect music preference? Bimberg (1987) found that preliminary lessons emphasizing the value of being open to new and challenging ideas significantly decreased the subjects' rejection of modern music excerpts. Mumford (1984) found that giving prospective music teachers the opportunity to come into direct contact with ethnic and popular music was more effective in changing their attitudes toward the music than simply giving lectures and readings on the subject.

Schaffrath (1978) found that, in giving information to affect music preferences, students were helped by concrete as opposed to abstract information. Furthermore, the students' ability to process abstract information about the music was related to their general intellectual level and abilities rather than any specific musical training. Gilbert and Real (1982) found that elderly

listeners preferred observational experiences over experiences requiring participation. Both Schaffrath's and Gilbert and Real's studies suggest that, for best results, teachers should tailor the musical information and type of introductory presentation to the general intellectual capacities and interests of their students.

Repeated Listening

The importance of repeated listening for understanding a musical style.

The language-analogy model of music learning suggests that people learn the grammar and vocabulary of a particular style of music--the tonal, melodic, harmonic, and rhythmic gestures that distinguish it from other musical styles and communicate its musical meaning--in the same way the grammar and vocabulary of a language are learned. "We learn music in exactly the same way we learn language" (Gordon, 2000, p. 1; see also Gordon, 1979).

In learning a language, children learn a vast vocabulary and the mastery of complicated rules of grammar, first by listening to many thousands of hours of spoken language and then by a trial-and-error process of speaking and imitating.

This model of music learning suggests, then, that the first pre-requisite for understanding, and presumably developing a preference for, a particular style of music is listening to many hours of music in that style. Without the understanding that develops from these hours of listening, music in that musical style may be misunderstood or appear meaningless (Gordon, 2000).

Bradley (1972) compared groups of seventh graders who were given a listening program in contemporary art music combined with an analytic teaching method, repetitive listening only (no teaching), and no treatment. He found that there was a highly significant change in preference for this type of music in the listening/analytic teaching group, a significant change in the repetitive

listening group, and no change in the control group. This demonstrates that listening alone can increase preference but listening combined with increased knowledge increases preference by a greater degree.

Repeated listening to an individual musical work. Hargreaves (1984, 1986) proposed an inverted-U theory to explain the relationship between complexity of a musical selection as perceived by the listener and the listener's response to repeated listening. Preference for music increases with each subsequent hearing until a point of satiation is reached, when preference begins to decline. Preference for both simple music and complex music over repeated hearings describes this inverted-U shape, but the peak of the preference curve will occur sooner with simple music and later with complex music. Hargreaves's experiments with college students at least partially confirmed the inverted-U theory, although the effects of repeated listening were relatively small compared to the overriding effect of the listeners' musical prejudices. Getz's 1966 study of seventh graders confirmed both the inverted-U theory and the relatively stronger effect of musical prejudice; Schaffrath's 1978 study of fifteen-year old students in Germany confirmed that repeated listening affects aesthetic judgment.

Heyduk (1975) found that the effect of repeated exposure varied, depending on the relationship between the complexity of the music heard and the degree of complexity preferred by the listener. If the degree of complexity of the musical selection is lower than the listener's preferred complexity, repeated listening causes a decrease in preference. If the degree of complexity of the music is higher than the listener's preferred complexity, repeated listening leads to a gradual increase in preference. Hargreaves (1986) explains this difference by theorizing that listeners are entering the repeated-listening inverted U at different points: on the

ascending part of the curve for music more complex than their preference, and the descending part of the curve for music less complex than their preference (p. 116).

Wiebe (1940) found that playing popular songs over the radio more often than normal does not increase preference for the songs. However, playing the songs less often does decrease the preference ratings; songs that are less well liked are more affected by reduced play than are well-liked songs.

Musical Prejudice and the Changeability of Musical Attitudes Over the Lifespan

Musical Prejudice

Listeners have strong musical prejudices for and against different styles and genres (Hargreaves, 1984). Knowledge about a particular composer or composition, opinions of others, or repeated listening to a composition may slightly affect the like or dislike of a piece within the framework of a person's musical prejudice, but the overall effect of the prejudice is difficult to overcome. For instance, Hargreaves found that repeated listening to three different compositions twelve times each over a period of three weeks changed the like/dislike rating of each of the pieces somewhat. However, this difference was very slight in comparison with the overall preference for the popular composition first, the classical composition second, and the avant-garde jazz composition last (Hargreaves, 1984).

The existence of this musical prejudice, evidently existing to a greater or lesser degree in every listener, leads to further questions:

1. How do musical attitudes develop?
2. Can the development of musical attitudes be influenced more easily at certain stages of a person's development or at certain times of a person's life?
3. Why do more or less strong musical prejudices seem to be part of most every listener?

4. Are there musical, social, developmental, or other reasons for the development of these prejudices?

Models of Attitude Changeability

Three models of attitude changeability over a person's lifespan have been suggested:

1. The **impressionable years model** suggests that attitudes are highly changeable during some specified span of impressionable years. After these impressionable years, attitudes are set and relatively unchanging (Krosnick & Alwin, 1989).
2. The **aging stability model** suggests that attitudes early in life are highly changeable and that attitude changeability gradually and steadily decreases throughout the lifespan (Krosnick & Alwin, 1989).
3. The **lifelong openness model** suggests that attitude changeability remains the same throughout life; preferences do not necessarily become more set with age (Tyler & Schuler, 1991).

Attitude change has been studied frequently in the areas of politics, public policy, and government. These studies have shown areas of attitude where each of the three models of attitude change fit, and at least one area that fits none of the models.

For instance, Krosnick and Alwin compared the impressionable years model and the aging stability model of attitude change. Their 1989 analysis of political opinion data supported the impressionable years hypothesis while their 1991 study of political party identification found support for both the impressionable years and aging stability models. Tyler and Schuler (1991), studying attitudes toward government, found support for the lifelong openness model. They found that attitudes of older people towards government change as much as those of younger

people; changes in attitudes of both old and young are dependent on personal experience with government agencies and independent of age.

On the other hand, Krosnick and Visser's recent research showed that "political attitudes are especially open to change between ages 18-25, become more resistant to change immediately thereafter, and become more open to change at the end of the life-cycle. Other manifestations of attitude strength (e.g., the personal importance of attitudes, the confidence with which they are held, and the amount of knowledge people feel they have) also show this same surge and decline." (Krosnick, 2000, para. 10; see also Visser & Krosnick, 1998). This seems to indicate a more complicated relationship between age and attitude strength than any of the three simple models presented previously.

Krosnick suggested several possible explanations for change in attitude strength over the lifespan: "(1) changes in the size, composition, and frequency of contact with people's social networks, (2) changes in the frequency of role transitions and new social identifications, (3) changes in the nature of people's self concept, and (4) changes in cognitive functioning over the life span" (Krosnick, 2000, para. 13).

Changeability in Music Preference: The Impressionable Years Model

Most research seems to indicate that, in the development of musical taste, the impressionable years model fits best.

Rubin, Rahhal, and Poon (1998) suggested that the period from 10 to 30 years of age is central in determining listeners' core musical preferences (as well as other aesthetic preferences and general worldview). This is the period from which "favorite films, music, and books come and the period from which [people] judge the most important world events to have originated" (p. 3).

Stipp (1990) agreed that there is a formative period for developing musical tastes but suggests that this period is around the onset of puberty, age 10-13. Fung, Ming, and Chung (1999-2000) found that dislike of various styles of music increases with age, starting around age 10. Peery and Peery (1986) found that, even among pre-school children, dislike of less-often-heard styles of music increased over the period of a school year. However, Peery and Peery also found that in this age group preference for a style of music can be increased, at least to a limited degree, by a year-long program of listening to and learning about that style. Working with an older group for a shorter time period (sixth grade students over five weeks), Shehan (1985) found no transfer of preference from taught to untaught pieces in non-Western musical styles.

Schulkind, Hennis, and Rubin (1999) found that listeners age 66-71 had greatest emotional response to and memory of popular songs for music popular during their youth. Furthermore, there was a significant correlation between emotion and memory, suggesting that music that resonates emotionally with the listener creates longer-lasting memories.

LeBlanc, Colman, McCrary, Sherrill, and Malin (1988), LeBlanc, Sims, Siivola, and Obert (1996), and LeBlanc, Sims, Malin, and Sherrill (1992) found that general music preference ratings started high in grade one, declined for grades one through six, then rose from grade six through college age, and declined slightly from college age to adult (the adult ratings remained higher than any others except grade one and college age). This, again, suggests that something different, and perhaps crucial, happens to music preferences around the sixth grade (age 11-12).

Explanations for the impressionable years model in music preference

Why does the impressionable years hypothesis apply to music preference? How is attitude towards music different from other attitudes that may fit the aging stability hypothesis, the lifelong openness hypothesis, or other models?

Research has not definitively answered this question, but some studies suggest ways in which music preference may be different from other areas of preference.

Preference and memory: Memory differences with age. Park (1998) found that memory declines with age for most, but not all, types of memory. Park accounted for the difference in memory decrements by "the amount of processing resource or mental effort required to encode and retrieve information" (p. 69) in different memory tasks.

Given the close relationship between memory and preference, it seems possible that the age differences in musical memory contribute to the age differences in attitude strength. As suggested by the results of Schulkind et al. (1999), adolescents who associate the powerful emotions of their stage of development with a particular style of music may develop very strong and long-lasting memories of, and thus preferences for, that music. This may at least partly explain why these impressionable years are so important in developing music preference. On the other end of the age spectrum, it may be more difficult for elderly people to make strong, long-term musical memories of the type that affect music preference--especially of new or different genres of music, because, according to a study by Tun and Winfield (1995), processing novel information is more difficult for subjects age 60-91. In the early years (up to age 10-12) and the middle years (approximately age 20-60), when musical memory is neither particularly impressionable, as in adolescence, nor resistant to change, as in those 60 and older, other factors may be more important than musical memory in determining openness to new music.

Neural networks and preference: The making of sophisticated taste. Network theory, neural networks, and parallel distributed computing have been used to model neural and brain functions in humans. Neural network computing systems are more brain-like than most computing systems and seem, to a degree, to mimic behavior of the human neural system (Crick & Asunama, 1986;

Berkeley, 1997). Neural networks have even been used to model the specific cognitive changes that occur with aging (Balota & Duchek, 1992).

Experience with neural networks gives an intriguing possible explanation for the decreasing changeability of preferences that comes with age. The neural network model suggests that "our decreasing ability to accept new things is essential in the making of sophisticated taste" (Mok, 2000, para. 2).

A neural network, like a human, learns by experience and accumulates knowledge and experience over time. The accumulated knowledge and experience is used in making judgements and in solving problems. As new information is encountered, the neural network adds the new knowledge to the old knowledge. In a neural network, "interneuron connection strengths known as synaptic weights are used to store the knowledge" (Haykin, 1994, p. 2). But as time progresses and the network gains experience, the network must make progressively smaller modifications of these synaptic weights. If the changes in weight do not become progressively smaller, the network never learns to make fine distinctions. On the other hand, if the network begins by making very, very small changes in weight, the time it takes to train the network becomes extremely large. The optimal combination for training a neural network, then, seems to be initially large changes in synaptic weights (to allow fast learning of general concepts, though with little detail) followed by progressively smaller changes in weights (to allow the learning of progressively finer detail and the ability to make fine distinctions).

The increasing strength of attitudes with age (which corresponds in neural network terms with progressively smaller changes in synaptic weight over time) appears, then, as a fundamentally important component of learning in any neural network, including the human nervous system. The earlier period of a person's life, in which preferences and opinions are less

set, is the period of quickly learning vast amounts of knowledge and information. With age, as attitude changeability decreases, this early, rough knowledge is progressively refined. Without the early period in which the mind is more open to change, the person would not be able to absorb the vast amount of knowledge necessary to live and thrive. Without the later period in which the openness to change is restricted, refined knowledge and taste would never develop.

According to Durrant (2000), the necessity for a neural network to start with larger changes of synaptic weight and continue with progressively smaller changes over time "does seem to be a property of directed distributed learning, and not just of particular implementations" (para. 4). This suggests that the general principle applies to all distributed learning systems, including the human brain. Durrant cautions, however, that the neural network model may tell an important part of the story of age differences in learning and attitudes, but "simple technical explanations such as variable learning rates" are never going to tell the whole story (para. 5). The principles underlying neural networks must apply to the brain (which is a neural network), but in any real situation these fundamentals are always overlaid by such factors as personality and individual motivation.

Why decreasing openness to change is necessary for the development of refined knowledge. The training of computer-based neural networks, which is a well-established and well-studied area of computer science, demonstrates empirically that decreasing changes in synaptic weights over time are a necessary factor in training neural networks to have a refined and detailed knowledge (Mok, 2000, para. 3). The biological analog of the decreasing changes in synaptic weights is "the limit in the foldings that [are] possible with the growth of the human brain and the decreases in the chemical that fosters growth of brain cells and nerve connections as we age" (para. 1). But why are these decreasing changes in synaptic weights necessary? Why

is the hardening of attitude over time necessary in order to develop refined knowledge? Three reasons are apparent; the basis for all three is the insight given by the neural-network model of learning: the purpose of attitudes is to determine how information is processed and turned into knowledge.

1. Attitude affects interest and interest affects knowledge. A listener equally interested in every different kind of music would not have time or mental capacity even to listen in detail to each of the thousands of musical styles that have existed in world history. In order to develop detailed knowledge, a few styles must be relatively preferred and the remainder relatively neglected. Time and effort is put into listening to and gaining understanding of the preferred styles; the result is a more detailed knowledge of the preferred styles and a less detailed knowledge of the non-preferred styles. Early in life when the basic discrimination between music and non-music is learned, strong preferences are not necessary or helpful; listening to any kind of music will do. On the other end of the spectrum, a musician learning to make fine distinctions among, say, the early, middle, and late periods of Beethoven's piano music, between the musical styles of Palestrina and Vittoria, or between Heavy Metal and Gothic Metal, must do considerable listening to a small segment of the musical repertoire. Without strong interests and preferences to guide this listening, the necessary focused listening and learning would not take place.

2. Attitude affects cognition. One of the primary functions of the brain is to filter the welter of sensory and perceptual input that continually inundate it, choosing the few perceptions of highest interest and importance to pass along to the areas of higher brain function. Further processing is done to filter some perceptions into short-term memory and reject others, and yet further processing to filter some contents of short-term memory into long-term memory and

reject others (Brower, 1993). It is well known that attitudes and beliefs affect brain function even on this most basic level. For instance, Rice and Okun (1994) found that subjects recalled information in conflict with their previous beliefs less accurately than information that coincided with their previous beliefs. On a higher level, Larsen and Berntsen (2000) found that subjects' attitudes are a strong determinant of the way subjects organize their memories. Zimny and Robertson (1997) find that attitude influences memory, but not always in the way predicted by simplistic models.

All this suggests that the development of strong attitudes over time is not necessarily antithetical to continued growth in knowledge and learning. Development of (the right kind of) strong attitudes can, in fact, be a powerful cognitive strategy to help focus the perception, attention, and memory on ideas, facts, and perceptual streams of importance. It is precisely strong attitudes and well-established prior knowledge that allow a listener of, for instance, a Beethoven symphony, to select and tune into the important information out of an overwhelming background of sensory input, to direct the attention to important nuances of a performance, to understand musical gestures as creating or fulfilling certain expectations, and to hear certain aspects of the composition as stereotypical and others as revolutionary. Of course, in order to be helpful, these strong attitudes must be of the right sort. For instance, strongly held misinformation could lead the attention in the wrong direction or a strongly held opinion that "Beethoven's music is not worth much" might prevent attention from being directed toward listening at all.

3. Strong attitudes and firmly-held knowledge serve as a springboard for learning more detailed knowledge. The fact that the synaptic weights in a neural network are allowed to move by smaller amounts as time goes by does not mean that the mature neural network is learning

less. It simply means that, in a mature neural network, the learning takes a different form--and not necessarily an inferior one.

The difference can be explained (in somewhat simplified form) by asking this question: When the neural network encounters a novel piece of information, how do the synaptic weights change? In a young network, in which synaptic weights are allowed to vary by large amounts, accommodating a new piece of information will likely produce large effect on a few synaptic weights. In a mature network, in which synaptic weights may only change by small amounts, accommodating this new piece of information will produce a small effect on many synaptic weights. In the mature network, the new information does not determine the network's total sum of knowledge about that subject (as it would in a new, previously unprogrammed neural network), rather it is layered upon and seen in the context of the firm base of existing knowledge; the new knowledge adds depth, detail, and perspective.

How might this play out in terms of musical knowledge in humans? Consider a hypothetical situation in which two people, one unknowledgeable about classical music and with weakly held attitudes about it, and the another very knowledgeable and with firmly held opinions, both read the following statements made by pianist Glenn Gould:

> Beethoven was a composer "whose reputation is based entirely on gossip." He was "the supreme historical example of a composer on an ego trip." (Glenn Gould, quoted in Schonberg, 1987, p. 478)

The unknowledgeable person, his opinions easily swayed by this authoritative statement from a famous performer whose photo is prominently featured in the book in which he reads these comments, concludes that Beethoven's reputation really is far overrated and, probably, due

more than anything to egotistical self-promotion. The encounter with this single fact has essentially created his opinion on the subject.

The classical music connoisseur, with a background of knowledge about Gould and Beethoven and strongly held opinions about both of them, reads the comments with a smile that adds a significant detail to her understanding of Gould. She recognizes, as well, that there is a germ of truth in Gould's observations about Beethoven's reputation and ego, but these are factors with but a minor effect on her already well-considered evaluation of Beethoven's character and stature.

The unknowledgeable person has clearly had his opinions shaped to a much greater degree than the connoisseur by reading Gould's statement. His synaptic weights have changed much more than the connoisseurs'. Yet has the unknowledgeable person or the connoisseur really learned more?

The connoisseur has displayed a relatively minor shift in synaptic weights, yet the end result is that she sees the statement in a much richer context and understands it in much greater depth. Gould's statement adds small, but significant, details to her understanding of both Gould and Beethoven.

The unknowledgeable person, on the other hand, has added a great deal to his store of knowledge, but this new knowledge is based on a single statement that is exaggerated and to some degree false. The unknowledgeable person now has much more knowledge about Beethoven than he did before reading the statement. Unfortunately, this new knowledge is to a large degree distorted, inaccurate, lacking context, and misleading.

The connoisseur (the mature neural network), precisely because of her firmly held knowledge and strong opinions, has learned from Gould's statement accurate information in

greater depth. The unknowledgeable person (the immature neural network) has accumulated from the statement a crude and inaccurate knowledge, which, if it is to be useful, must be greatly refined by future knowledge.

"Our decreasing ability to accept new things is essential in the making of sophisticated taste"; if attitude remains too flexible and new knowledge is not measured against previously held knowledge and beliefs, "we can only perceive things crudely." (Mok, para. 2). That is the insight the study of neural networks gives to the theory of learning.

Why different models of attitude change may apply to different areas of attitude. The neural network model of learning also suggests why the different hypotheses of attitude change may apply to different areas of attitude. In areas in which a high degree of refinement in learning is desirable, the impressionable years model or the aging stability model would apply. The decreasing variability of preference over the lifespan allows highly refined learning to develop. In areas in which quick adaptability to changing situation is necessary over the entire lifespan, and in which this quick adaptability is more important than refined and detailed knowledge, the lifelong openness model would apply.

In music and most other arts, detailed knowledge and refined taste are highly valued in most cultures. On the other hand, there are few survival situations in which quick adaptability in artistic tastes would be crucial. Thus, musical taste tends to follow the impressionable years model or aging stability model.

A contrasting area of attitude is that of political policies. Markus (1986) found in studying opinions of policies over a nine-year time period that subjects' opinions of policies often changed, yet the subjects most often did not believe that they had changed their opinions. Subjects simply altered their recollections of previous opinions to match current opinions. Here

changeability of opinion is very high and detailed memory of previous beliefs very low (Markus suggests that subjects tend to use simple rules of thumb to reconstruct previous beliefs, as opposed to having actual strong memories of opinions and events). The easily changing attitudes and poor memory suggest the lifelong openness model, and again the neural networks model of learning suggests why: For most people, personal policy beliefs have little chance of having any effect on actual governmental policies, yet unusual beliefs have a high probability of causing social dissonance and conflict. So the actual political policies a person subscribes to have little effect on the person's daily survival and happiness. More important is that the person has opinions that are reasonably in concert with those of his or her social group. When prevailing opinions in the social group change, as they inevitably do, personal beliefs must have the flexibility to change with them. In day-to-day life, then, flexibility in policy opinion is more important than detailed knowledge about policies and the lifelong openness model is more likely to apply.

Neural network model: Lessons for music educators. The neural network model has ramifications for educators who wish their students to be more open-minded about different musics and musical cultures and for those who wish their students to develop a very refined aesthetic taste.

Encouraging students to be more open-minded about music and exposing them to a wide variety of musics will have the effect of keeping the students' opinions about music flexible for a longer time. Opinions must eventually become more inflexible in order to develop a more refined knowledge and taste. Nevertheless, the period of greater flexibility can be prolonged in order to develop a more wide-ranging and inclusive knowledge; the final result will be a broad knowledge that is still detailed. The student who rushes early to inflexible opinions on music

may develop a detailed knowledge sooner, but the area of knowledge will inevitably be narrower.

Furthermore, it is well known that all human knowledge is a "play of differences" (Gordon, 2000, p. 1). No fact or idea can be known in isolation; ideas are known and understood by comparison and contrast with other similar ideas. A person with broad knowledge can triangulate an idea with many other ideas of greater and lesser similarity. Thus the understanding of any particular idea can be both broader, because it is understood in the context of a range of ideas, and more precise, because the ability to distinguish one idea from a broad range of others leads to a more multifaceted understanding of the idea. A person with a narrower range of knowledge triangulates any new idea within a narrower field of differences and thus understands it less completely and in less detail (Gordon, 2000).

For instance, De Yarman (1972) explored whether kindergartners and first graders "who were taught to sing songs only in usual meter [duple and triple] perform songs in usual meter better than children who were taught to sing songs in usual, mixed and unusual meters" (p. 30). Students were taught according to the experimental plan for an entire school year. De Yarman found that students who were taught to sing songs in usual, mixed, and unusual meters performed songs in all three kinds of meters--usual, mixed, and unusual--better than those who were taught in usual meters only. The superior performance of those taught usual, mixed, and unusual meters came despite the fact that this group sang less songs in usual meters in order to make time for the mixed and unusual meter songs.

De Yarman found a similar result for teaching of tonal melodies: "Young children who are exposed to both tonal and nontonal music perform tonal music better than children who receive instruction in only tonal music" (p. 32). De Yarman speculated that the reason nontonal melodies

and mixed/unusual meters are not taught more often in schools is the set musical attitudes of the music teachers: "Because those who currently teach elementary general music initially learned to perform tonal music in usual meters in their early childhood, they find it difficult to perform music in mixed and unusual meters or modal and nontonal music" (p. 3). He quotes Leonard Meyer (1967), who said, "The formation later in life of new channels and pathways in the brain deep and clear enough to insure new modes of perception and cognition is not an impossible task, but certainly it is a formidable one" (p. 276).

Simulated annealing: A learning strategy with a more accurate end result. Extending the period of flexibility of opinion and slowing the onset of inflexibility has another, unexpected side effect. This can perhaps be explained best by analogy to the metallurgical process of annealing. In annealing, the temperature of a molten metal is cooled very, very slowly to room temperature. The extraordinarily slow cooling allows the electrons in the metal molecules the time to find the lowest possible energy state before the cooling process locks them into a fixed position in the solid metal. The result of this annealing process is a solid that has its molecules aligned into perfect crystals. The slower the cooling process, the more perfect the resulting crystals, and the faster the cooling process, the more imperfections remain. Annealed metal is stronger and more malleable; un-annealed metal (for instance, metal cooled quickly by quenching in water) is weaker and brittle (Mok, 2000, para. 7).

Neural network experimenters have, by analogy, adopted this annealing process; they call it simulated annealing (Davis & Steenstrup, 1987; Black, 2000). Just as the cooling process in annealing a metal can take place slowly or quickly, the cooling process in a neural network--the learning process in which the synaptic weights in the network change from hot (very flexible and changeable) to cool (solidified and unchangeable)--can also happen slowly or quickly. The

results in the neural network are similar to those in metallurgy: A fast cooling process in which inflexibility of opinion sets in quickly results in quick learning but also the inclusion of many errors and inaccuracies. A slow cooling process in which flexibility of opinion is preserved for much longer results in a longer learning period but also in learning that is much more precise, accurate, and correct.

The application of the annealing analogy to students music preference is clear: Students whose musical opinions cool very, very slowly from flexible to inflexible will develop broader musical interests and, in the end, more precise, detailed, and accurate musical knowledge. General musical training is one way teachers can help students' musical opinions cool more slowly: Hargreaves concludes that general musical training promotes "greater overall liking for all types of music investigated (including classical and popular . . .)" (1986, p. 101).

Another simple and effective method for expanding students' musical interests, unfortunately not often put into practice, is to simply expose students, starting in the earliest grades, to the widest possible variety of music in different styles, from different countries and cultures, from different historical periods, with a variety of different instruments and timbres, with a variety of textures, in a variety of different styles, and in a mixture of different tonalities and meters. Students hear a large amount of music through the mass media, but much of the music promoted by corporate arbiters of musical taste lies within a narrow range in several important musical parameters. For instance, De Yarman (1972) found that the vast majority of music found in elementary school music series published by major publishers was major (90 percent or more) and in duple meter (80 percent or more). Less than one percent of the songs in these series was in a tonality other than major or minor or a meter other than duple or triple. This

overwhelming preponderance of major tonality and duple meter is also found in the music aired by radio stations and used in television broadcasts and movies (Gordon, 2000).

Unfortunately, the relative monochromaticism of the music students hear encourages the early formation of rigid musical preferences, with all the attendant problems that brings. By exposing students to a much wider variety of music in the early grades, helping students to develop an understanding and appreciation for this music, and teaching students to sing and perform much music that lies outside the narrow cultural norm, music teachers can help students develop a musical understanding that has the strength and flexibility of an annealed metal.

Summary

Social context, knowledge of music, and repeated listening affect listeners' music preferences. Listeners have musical prejudices that become stronger with age. The neural network model of learning suggests why music preferences must become stronger with age but also that listeners who wish to have a broad and deep knowledge of music should slow this hardening of attitude in their musical preferences.

As a practical matter, can a performing musician use these ideas from the literature about music preference to affect audiences' musical attitudes? Can musical preferences of audiences be expanded during a performance, at least to the extent of creating greater preference for the particular works performed? Will the presentations affect different age groups in differing ways, as predicted by the impressionable years model of music preference and the neural network model of learning?

Method

A pianist prepared a program of several different classical works and presented the program to several different audiences. Informational presentations were created for each musical work.

Presentations included relevant information about the composer's life, general musical style, and/or information specific to the particular piece being performed. Presentations were not merely factual, but were intended to give the audience members a context with which they could be better able to make an emotional connection to the work. Presentations were designed to be engaging and occasionally humorous and to convey, along with the facts, the performer's enthusiasm for the works (see Appendix A for an outline of one set of presentations).

Subjects

This musical presentation was given to five different groups:

1. Group LE (Lower Elementary): First- and second-graders in general music classes at a public elementary school in Wyoming (n = 48).
2. Group UE (Upper Elementary): Fifth-graders in general music classes at a public elementary school in Wyoming (n = 48).
3. Group MS (Middle School): Sixth- and seventh-graders in general music classes at a public middle school in Wyoming (n = 78).
4. Group HS (High School): Tenth- through twelfth-graders in musical performing groups at a public high school in Wyoming (n = 255).
5. Group RA (Recital Audiences): General recital audiences of mixed ages at concerts open to the public in four cities in Missouri, Utah, and Wyoming (n = 253).

Groups LE and UE consisted of students in general music classes; the general music class was required of all students in those schools. Group MS consisted of students enrolled in general music classes; the general music class was one of several music classes in which students in those grades could choose to enroll. Students in Group HS were enrolled in band, orchestra, or choir classes, which are elective classes. Group RA consisted of members of the general public

who responded to announcements and advertisements for a piano concert, as well as friends, acquaintances, and extended family members of the performer. Thus, groups LE and UE represent the entire populations of particular grades and schools, groups MS and HS represent students who choose particular music classes, and group RA represents audience members who voluntarily choose to attend a concert.

Although some of the groups are self-selecting, and thus may not be representative of the population as a whole, they do represent groups of interest to music teachers (students taking music classes in public schools) and performing musicians (audiences attending community music concerts).

Demographic data for group RA. Demographic data were collected for group RA. After balancing the subgroups as required by the experimental design (see Experimental Plan, below), 122 audience members contributed data used in the study. Of these audience members, 67% were female and 33% male (n = 117). Age data is summarized in Table 1; audience members represent a broad spectrum of age groups.

Audience members who listen to classical music rarely or never made up 19% of the respondents; 18% listen to classical music an average of once a month; 33% were weekly listeners; and 30% were daily listeners (n = 121). Those who indicated that they had attended no classical music concerts in the last year made up 27% of the responses; 50% had attended 1-5 concerts within the preceding year; 13% had attended 5-10 concerts; and 10% had attended more than 10 concerts.

Those who indicated that they had taken no music classes in grades K-12 made up 64% of the audience; 25% had taken one or two years of music classes in grades K-12; and 12% had taken three years of music classes or more in grades K-12 (n = 110). Of audience members age

21-80, 53% indicated that they had taken no music classes at a college or university; 25% had taken 1-5 years of music classes at a college or university; 19% had taken 6-10 years of such classes; and 4% had taken more than 10 years of music classes at a college or university (n = 57).

Audience members were asked to report the number of years they had taken private instrumental or vocal music lessons. Data was tabulated for the number of years of private study on respondents' main musical instrument (the instrument with the most years of private study). Thirty-six audience members did not respond to this question; many of these probably had no private lessons. Of those who responded to the question, no private music lessons (zero years) were indicated by 8%; 1-3 years of private music lessons were indicated by 33%; 4-6 years were indicated by 24%; 7-9 years were indicated by 12 percent; and 10-25 years were indicated by 20% (n = 86).

The performer of these concerts had a local, rather than a national or international reputation, and, as the demographic data suggest, group RA may be representative of audiences at local or community concerts rather than the audiences of high profile, highly marketed events featuring musical artists of national or international prominence.

Programs

Musical repertoire for the programs was selected from the pianist's active recital repertoire. Repertoire consisted of these four works:

1. J.S. Bach: Capriccio on the Departure of a Beloved Brother
2. Beethoven: Fantasy, Op. 77
3. Liszt: Funérailles
4. Schuman: Carnaval

Because of the time available for different presentations and varying attention spans of the different age groups, selections from this repertoire were used, as appropriate for each group. For instance, for group RA, all four pieces were played in their entirety. For group LE, where time and attention span were much shorter, the Fugue of the Capriccio, an excerpt from the Fantasy, and an excerpt from Funérailles were played. (See Table 2 for details of musical works presented to each group.)

Despite these necessary differences in programs, effort was taken to keep the programs as similar as possible among the different groups. Although slightly different excerpts were used with different groups, the same basic repertoire was used for all groups. Although informational presentations differed somewhat in length and detail, they were designed to cover the same essential material, with only exact form and detail differing as appropriate for each group. The same presenter gave all performances and presentations, within a relatively short period of time. Presentations to the four schools (groups LE, UE, MS, and HS) were given within an eighteen-day period. The five recitals (group RA) were given over a four-month period.

There were variations in the performances and informational presentations, as is typical of live musical performances and of presentations that follow an outline but are not scripted word-for-word. However, the variation was kept to a reasonable minimum by employing the same performer playing the same repertoire and giving the informational presentations from the same outlines.

Consideration was given to the possibility of performing the repertoire via recordings and giving the presentations via videotape, for absolute consistency. However, the social contexts of recorded performance vs. live performance are dramatically different, as are the social contexts of videotaped informational presentation vs. live, extemporaneous informational presentation.

Considering the importance of social context in determining attitude towards music, priority was given to maintaining a similarity the experiments' social context to that of real situations (i.e., the experimental treatments were given at actual concerts in which the performer spoke about the music before performing and in actual school classes in which the performer interacted with the students before performing). Exact repeatability of performance and presentation, which could have been maintained with videotaped informational presentations and recorded performances, was sacrificed.

Within the several programs given to subgroups of a single group (see Experimental Plan, below), even more attention was given to keeping performances, presentations, and environment similar. Presentations to subgroups LE, UE, and MS were each given on one day. Presentations to group HS were given over a three-day period. Presentations for group LE were all given in the same room and with the same instrument; similarly for groups UE, MS, and HS. The order of the music played remained the same for all performances for a particular group.

A preliminary study had indicated that there may be a cumulative effect of interaction between the performer and the audience, due to the building of rapport over time (Hugh, 1996). Therefore, although the informational presentations given to each subgroup vary (see Experimental Plan, below), the total length of the spoken presentations given to each subgroup within a group was kept approximately the same. Furthermore, the general types of interaction (speaking, playing excerpts, involving audience members in presenting plays, involving audience members in singing or clapping) were kept as similar as possible for subgroups within a group, although there was some necessary adaptation of material as different treatments were applied to different repertoire pieces according to the experimental plan for the group.

Experimental Plan

Three treatments were tested for their effect on music preference ratings:

Treatment I, introduction of the music by the performer. Treatment I took two forms:

Treatment ID, introduction by discussion: The performer talked about the composer and music and played short excerpts from the music.

Treatment IP, introduction by play: Audience members were invited to come forward and participate in a short play about the composer and music, complete with props, costumes, and simple acting.

Treatment N, no introduction: musical selection was simply performed, with no introductory discussion or activities.

These treatments were applied to different subgroups within each group in a latin-square design (Farmen, 1998a). The experiments were designed to allow analysis of differences between treatments N and I (ID and IP combined or ID alone) and also differences between the two different forms of treatment I (ID and IP). By giving the treatments to the different age subgroups (LE, UE, MS, and HS) and by classifying the one mixed age group (RA) by age, analysis of the differences due to audience age was possible, as well.

Applying the latin-square design requires equal numbers of treatments, repertoire selections, and subgroups within a group. For instance, in group LE, three treatments were given (N, ID, and IP), three repertoire selections were used (Capriccio, Fantasy, and Funérailles), and three subgroups were used. Repertoire selections (a constant of the experiment) were kept the same for each of the subgroups and were always played in the same order. The order of the treatments, however, is changed in the different subgroups, and this is arranged so that each treatment is

applied to each repertoire selection once. The three treatments were applied to the three repertoire selections as shown in Table 3.

When the data from these experiments were analyzed, data from the repertoire selections that received treatment N from all three subgroups were grouped together. The data from treatment N can be compared with similar data from repertoire selections that have received treatments ID and IP. This way of gathering and analyzing data has the advantage of canceling out any differences among the subgroups, because data for each particular treatment come in equal parts from each of the three subgroups. The experimental method equalizes differences in preferences due to the different repertoire selections (data for each particular treatment have equal amounts of data from each of the three repertoire selections) and differences due to order of presentation (each treatment has equal amounts of data from subgroups where that treatment was presented first, second, and third; see Table 4).

In the latin-square design, the subgroups are ideally of equal size. Because of naturally varying class sizes in the public schools and audience sizes at concerts, the subgroup sizes were initially unequal. For the analyses presented hereafter, all subgroups of a particular group have been made equal in size by randomly deleting members of larger subgroups.

For groups LE, UE, and MS, three repertoire selections were presented and three treatments (N, ID, and IP) were tested (see Table 3). For groups HS and RA, more time was available for the presentations. Four repertoire selections were presented with two different treatments (N and ID). This effectively doubles the latin square and allows twice the data to be gathered from each group (see Table 5 and Table 6). Preliminary studies had shown that music preference ratings have a high variance and that the effect of informational introductions on music preference is moderate or small. Therefore it was known that a large amount of data would be required to

show statistical significance, and giving each treatment to these groups twice was one way of gathering the large amount of responses necessary.

Surveys

Subjects were given a survey with demographic questions and questions about music preference. Subjects were asked to respond to the appropriate music preference question during or immediately after hearing each repertoire selection. Subjects were asked to rate their overall enjoyment of the selection on a five-point Likert scale, from 1 (Very Unenjoyable) to 5 (Very Enjoyable; see Appendices B, C, and D).

For the youngest group (LE), reading comprehension was a problem. A very basic survey form was designed, with only a few simple written words. Response was on a five-point Likert scale, with the degrees between hate it and love it indicated by smiley and frowny faces (a scale with similar faces was used with pre-school children by Peery & Peery, 1986). A brief explanation and demonstration of the rating scale was given to these young students at the beginning of each presentation (see Appendix B).

Surveys with incomplete data for the analysis of interest were removed (although incomplete or unanswered questions were ignored if the omitted information was not relevant to the particular analysis being made; such incomplete responses were included in the tabulations). Subjects occasionally circled two numbers on the five point scale or otherwise indicated a response between two numbers on the scale. Although the instructions did not necessarily encourage this type of response, they did not specifically disallow it either, and so for purpose of analysis these responses were simply averaged (e.g., a circled 4 and 5 was entered as 4.5).

Questions

Question 1: Does presentation of musical information by a recital performer, immediately prior to performance of a particular music selection, change music preference ratings of audience members for that selection?

Method

Data from all five groups (LE, UE, MS, HS, and RA) were combined in a latin square to compare the effects of treatments ID and N. As explained previously (see Experimental Design), for three of the groups (LE, UE, MS) three treatments were used (N, ID, and IP). Since Question 1 was designed to investigate the effects of treatments N and ID only, the data relating to treatment IP were simply omitted (see Table 7).

Results

The data were evaluated with the paired t-test. Mean rating on the five-point Likert scale for treatment ID (M = 4.08, SD = .92) was significantly higher than for treatment N (M = 3.99, SD = .93), $t(680) = 1.96$, $p < .01$.

Discussion

Spoken informational presentations by the performer (treatment ID) significantly increase musical preference ratings above simply performing the music with no introduction (treatment N). This difference in preference ratings seems quite small: the difference of 0.09 is 2.3% of the possible range in ratings, 1-5.

How does the difference in ratings due to different treatments compare in size to differences in ratings stemming from performances of works by different composers? The mean rating from group RA for the Cappriccio is 3.95 (SD = 0.93), for the Fantasy is 4.23 (SD = 0.94), for Funérailles 4.28 (SD = 0.95), and for Carnaval 4.28 (SD = 1.07). This gives differences in

ratings due to different repertoire ranging in magnitude from 0.00 (0%, Funérailles-Carnaval), to 0.33 (8.3%, Cappriccio-Funérailles). As results from questions 2, 3, and 4 will show, differences in preference ratings for different treatments applied to different subgroups cover a slightly wider range than those due to different repertoire: Preference rating differences found in results from questions 2, 3, and 4 range in magnitude from 0.01 (0.03%) to 0.46 (11.5%; see Table 8, Table 11, and Table 13).

Seen in this context, the difference in preference attributable to treatment ID (0.09, 2.3%), is, on the one hand, about one-fifth of the largest difference in preference ratings found, and on the other hand, almost twice the difference in preferences ratings from a piano work by Beethoven (Fantasy) as compared to one by Liszt (Funérailles; the difference in ratings Beethoven-Liszt is 0.05 or 1.3%).

What accounts for this difference in music preference? Is it increased knowledge and awareness of the music? The force of the performer's personality? The social or emotional impact of the performer's comments? Freeform comments by subjects, solicited on the final page of the surveys ("What factors increased your enjoyment of this recital?" and "What factors decreased your enjoyment of this recital?"), seem to support all of these possibilities:

"The friendliness of the artist--his demeanor. He wasn't distant--as warm and with as much expression as the composers played."

"I appreciated the description of feelings."

"When he would tell us what to listen for and what the composer was writing the music for."

" . . . letting you hear specific tones to listen for, so as to remember the music."

"It helped me understand the story behind the music."

"Performer was very personable & displayed an interest not only in the music but also in the stories behind the music, which interested me."

"The background information made the pieces more interesting & enjoyable."

Question 2: Do presentations that involve audience members actively affect music preference ratings differently than presentations to which audience members listen passively?

Method

In three groups LE, UE, and MS, trials were arranged so that a comparison could be made among treatments ID (introduction by discussion), IP (introduction by a short dramatic play involving audience members), and N (no treatment). The same basic information was presented in both treatments ID and IP; however, method IP was designed to involve audience members actively and to present information through vision and action as well as through words.

Results

Repertoire receiving treatment N received the lowest preference rating (M = 3.83, SD = 1.05). Treatment ID was associated with a higher preference rating (M = 3.98, SD = .97) and Treatment IP with a yet higher rating (M = 4.04, SD = 1.02; see Table 8).

Analyzing treatments N, ID, and IP using repeated measures ANOVA with planned orthogonal contrasts (contrasts N vs. ID-IP and ID vs IP) showed that there was a significant difference between N and ID-IP (see Table 8; Table 9; Farmen, 1998b). However, the analysis also showed that the difference between ID (introduction by discussion) and IP (introduction by use of a play) was non-significant ($p > .40$).

The lower elementary (LE) and middle school (MS) groups showed an increase in preference ratings when comparing treatments N and ID, and a further increase in preference ratings for treatment IP. However, the upper elementary (UE) group showed a large increase in

preference ratings due to discussion (treatment ID) but ratings from introduction by play (treatment IP) dropped almost to the level of no introduction (see Table 8 and Figure 1).

Discussion

The results show, again, that introducing the music, whether by discussion or by an audience-involving play, makes a significant difference in preference ratings. For some of these groups and some of the treatments, the magnitude of change due to the treatment is larger than the largest magnitude of change due to different repertoire. For instance, the difference from treatments N versus IP in group LE is 0.46 (11.5%), larger than the difference from repertoire selections Bach versus Schumann, which is 0.33 (8.3%). Certainly, then, at least some of the differences in preference ratings due to the treatments are substantial.

These results give further insight into the reason for the change in preference ratings. The change in attitude about the music apparently stems mainly from the interaction between the performer and the audience and the information that is communicated in this interaction. The particular interests and capabilities of the age group determine which form of interaction (discussion or audience-involving interactive activity) is most effective.

Although the difference in ratings between introduction by discussion (ID) and introduction by a dramatic play (IP) did not rise to the level of significance, it is interesting that, in the aggregated group and in groups LE and MS, ratings for treatment IP were higher than those for ID. This tends to support the idea that activities promoting interaction between audience and performer and inviting active participation of audience members will be more effective in changing music preference. Music is a social activity and social factors are important in affecting attitudes towards it.

Equally remarkable as the overall greater effectiveness of treatment IP is the different response of the upper elementary group (UE) to this treatment (see

Figure 1). Preference ratings from group UE had a positive response to treatment ID but response to treatment IP was much lower. This seems to be an individual reaction of this grade to the treatment; it may be that this grade, which was the oldest in its elementary school, had a distaste for dramatic plays, which they may have perceived as a childish activity.

On the other hand, the responses of group LE (1st and 2nd graders) to treatments ID and IP may reflect that fact that some of the introductory discussion (treatment ID) was above their cognitive level, so that treatment ID was only moderately effective. The hands-on nature of treatment IP may have helped this group to grasp the concepts presented, making treatment IP very effective for this group.

In any event, the difference in response to treatment by different grade levels underscores the fact that educators and musicians wishing to affect the musical preferences of audience members should use their good judgement and experience in planning activities to introduce musical works. Any activity that introduces the music and/or composer and that appeals to the audience and is appropriate to their level of understanding (Schaffrath, 1978), will likely have a positive influence on audience attitudes towards the music. On the other hand, the effect on preference ratings may be small if the audience dislikes the introductory activity, finding it either simplistic and below their level of interest or too complex and above their level of understanding.

Although some treatments are more effective than others with particular age groups, it is worth pointing out that all results from school groups show a positive response to introductory activities. Though in some cases the response is very small, the effect of introductory activities on music preference was always positive. This result should be encouraging, both to educators

who know relatively little about music and to musicians uncomfortable with public speaking. Such individuals should not let these deficiencies dissuade them from giving introductions to musical selections. If the educator or musician can create a brief informational introduction that engages and interests the audience, this introduction is likely to have a positive influence on the audience's preference for the musical work introduced.

Question 3: Are music preferences of younger audience members affected in a different way by informational presentations than music preferences of older audience members?

Recital Audiences

Method. Respondents from group RA (n = 234) were divided into four age groups:

RA1: age 6 through 20 (n = 74)

RA2: age 21 through 40 (n = 54)

RA3: age 41 through 60 (n = 72)

RA4: age 61 through 80 (n = 34)

Within each age group, the size of the subgroups receiving different treatments was equalized by randomly removing respondents from larger groups, so that the latin-square design of the experiment was valid for each age group.

Results. Analyzing these age subgroups using repeated measures ANOVA with two-way interaction showed that there was a significant difference in response to treatment ID from different age groups (see Table 10). The ages 6-20 showed a strong increase in preference ratings due to treatment ID, ages 21-40 showed an increase just slightly less, age 41-60 showed a fairly strong decrease in preference ratings, and ages 61-80 showed a slight decrease in preference ratings (see Table 11 and Figure 2).

School audiences.

The responses from the school groups (LE, UE, MS, and HS) were analyzed by age. Treatment ID increased mean preference ratings of younger students more than those of older students (see Table 13 and Figure 3). However, analysis of the school group data using repeated measures ANOVA with two-way interaction indicates the age differences among the school groups do not rise to the level of significance (see Table 12).

Discussion

Recital Audiences. The results support the aging stability model of attitude change for the type of music preference measured in this study and for the recital audiences (group RA). Music preference attitudes seem to be more amenable to change for younger subjects and, with age, attitudes become gradually more hardened and difficult to influence.

This finding is in contrast to finding of previous research, which suggested that the impressionable years model of music preference holds in all areas of musical preference. The impressionable years model clearly does not hold for group RA: Audience members age 21-40 are not set in their preferences; their preference rating rose by 0.26 (6.5%) as a result of the treatment, which is greater than the mean rise in preference ratings for the community concert audience as a whole and greater than the mean rise in preference ratings for the school groups as a whole.

The negative response of group RA3 (age 41-60) to treatment ID is perhaps due to the change the treatment introduces to the usual routine of recitals, which normally include music only and no discussion. This age group may be socialized to expect a kind of classical music recital that includes music only and no other interaction of the audience with the performer and may have rather set attitudes about this format. Interestingly, though, data from free-response

section of the surveys do not support this explanation of the negative response: four responses indicated a dislike of the treatment (ID), but three of these four were highly educated musicians age 15-30.

Group RA4 (age 61-80) has a negative response, as well, but it is rather small (-0.04, -1.0%) in comparison to the response of group RA3. This may be an indication that the older group does not actively dislike the informational introductions, but, since this group is very well set in their musical preferences, the introductions have little effect on their preference ratings.

School audiences. Results for the school groups (LE, ME, MS, and HS), although inconclusive, suggest the possibility that the impressionable years model may apply to the general population of school children. Certainly the general trend shown by the data from this experiment is a greater response to treatments in younger students and close to no response (0.01 or 0.3%) in high school students. This trend is particularly apparent when data from treatment IP is considered along with the other data, as shown in Figure 3.

If this impressionable years model of music preference for the general school population is confirmed by further research (and research by Stipp [1990] does suggest that for the general population, age 10-13 are the impressionable years for musical taste), it indicates a fascinating dichotomy: among the general population (all public school children) the impressionable years model holds; their musical preferences are set by age 15-20. Among the population self-selected as interested in classical music (people choosing to attend a classical music concert), the aging stability model holds; their musical preferences may not become set until they are much older, perhaps in their 30s or 40s.

Whichever model holds for school children, the message for music educators is clear: if music educators wish to influence the music preferences of music students, they must start when

the students are very young. This research shows that preferences for individual pieces within one particular musical style can be significantly and substantially changed in public school students from 1st grade (age 6-7) through 8th grade (age 13-14). Other research suggests that similar results hold in changing preferences for musical styles and indeed for music in general: musical tastes can be affected in young students (Novak, 1994; Hargreaves et al., 1995; Hargreaves, 1996, p. 101-102; Fung, Lee, & Chung, 1999-2000; Peery & Peery, 1986). On the other hand, this research shows that in the population of high school students studied (group HS), it was very difficult to change the preference ratings of even a few individual pieces. If it is difficult to change students' attitudes towards a few particular pieces under relatively advantageous circumstances (a live performance, a good instrument, students self-selected as having an interest in performing music), then it may be even more difficult to affect attitudes of students this age for entire musical styles. Again, literature supports the generalization of the results of this study; general musical taste is more set in older students (Fung et al., 1999-2000; Stipp, 1990; Rubin et al., 1998).

Studies have disagreed as to the exact ages at which musical attitudes are more and less susceptible to change, and results the present study suggest that different models of attitude strength toward music over the lifespan apply to different subgroups of the general population. But there is general agreement in the literature that younger students are more open to various unfamiliar styles and older students are more set in their musical preferences (Fung et al., 1999-2000).

The message, then, for music educators who wish their students to develop an interest in or a love for any music that is not actively marketed to this age group by society--and this would include classical music, but also genres such as folk music, world music, jazz, opera, musicals,

and so on--may find that they must start influencing their students' music preference early in elementary school.

If further studies confirm that the impressionable years model and aging stability models apply to different populations within the general school population, this, too, has obvious ramifications for educators. This implies that the preferences of some school-aged students are amenable to change whereas other students are already rather set in their preferences. For students in earlier grades (approximately grade 7 and younger), teachers may wish to broaden the musical horizons of undifferentiated groups of students, with the expectation that the musical preferences of all students this age group are still amenable to change. With older students, the educator may wish to concentrate effort in affecting musical preference of self-selected groups of students who already demonstrate some interest in a particular type of music. High school students who have already shown a spark of interest in classical music, opera, jazz, world music, folk music, musicals, or any other particular styles of music, may allow an educator to fan this spark to a flame. Starting with this area of pre-existing musical interest, it may be possible to gradually broaden students' musical tastes by introducing new musical styles related to the styles of primary interest. For instance, Fung (1994b) found that college students prefer world music that sounds similar to music with which students are already familiar and, when introducing students to world musics, suggests starting with those styles most similar to students' pre-existing tastes. For students in high school and college, it may be very difficult to spark students' initial interest in new styles of music that are completely foreign to the students' already well developed sense of musical taste and an approach such as that suggested by Fung may be the only one that will succeed with the majority of students.

Question 4: Do recital audiences and school audiences of a similar age have a different response to the informational presentations?

Results

Responses to treatments N and ID were compared for (a) the subgroup of recital audiences under age 1-20 and (b) school groups (LE, UE, MS, and HS), which represent approximately the same age range. Analysis of variance with repeated measures showed that, in this age group, recital audiences responded to the treatments in a significantly different way than did school groups (see Table 14). For recital audiences under age 20, the difference in mean ratings due to the treatments is 0.30 (7.5%) and for school audiences the difference is 0.07 (1.8%; see Table 11 and Table 13).

Discussion

The result of this question establishes even more strongly the difference between the responses of the school groups and the recital audience. The preference ratings of recital audiences are influenced far more by informational introductions than are preference ratings of school audiences. This finding lends support to the idea that different models of attitude change apply to these different groups.

The question of why the two groups are so different in their response is difficult to answer precisely. The recital audience volunteered to attend the concert and so presumably has a high interest in the type of music played and a high interest in finding self-justification for the decision to spend time attending the concert. This may partly explain the higher average preference ratings (regardless of treatment) given by group RA1 in comparison to the ratings given by the school groups. However, with the latin-square experimental design, this confounding variable should have no bearing on effects found for treatments and so does not, by

itself, explain the difference in response to treatments. If, however, these stronger preferences were applied to the performer and his informational presentations as well as to the music, this could affect response to treatments.

Another possible explanation lies in further difference between the school audiences and the recital audiences: a number of individuals in the recital audiences were friends and acquaintances of the performer, while very few individuals in the school audiences knew the performer personally. It may be that pre-existing social bonds between the performer and the recital audience enhanced communication, giving his ideas more weight.

Question 5: Do audiences prefer or not prefer a recital format including informational introductions of the music by the performer?

Results

Members of group RA were asked two free-response questions: "What factors increased your enjoyment of this recital?" and "What factors decreased your enjoyment of this recital?" Responses were categorized and tabulated; the results are shown in Table 15.

Discussion

Results support the general conclusions reached in answer to other research questions. "Performer's discussion of music" is most often given the factor increasing enjoyment of the recital. Choice of repertoire, composers, and specific musical selections also were important. Demeanor and affect of the performer were mentioned often, supporting the idea that social factors are important in affecting musical enjoyment.

Four audience members disliked the whole idea of performer discussion. A typical comment was, "Don't lecture, just perform!" All of these responses were from highly trained young musicians who attend the concert in Logan, Utah. Piano majors at the university where the

concert was held were required to attend the concert. It appears that all four of the "Don't talk, just play!" responses came from this group of audience members (age group 15-20 or 21-30, with seven or more years study of piano; three of the four indicated two or more years of music study at a college/university). This suggests--though with such a small sample, certainly does not prove conclusively--that the response of this kind of audience member may be quite different from the response of other parts of the audience. The expectations and likes/dislikes of serious young musicians towards informational presentations during music concerts may be quite different from those of the audience at large.

Remarkable was the fact that so few audience members expressed dislike for the performer discussion. The performer had expected a much larger proportion of the audience to disapprove of this departure from the standard recital format; it may simply be that very few of the audience members who disapproved stated their dissatisfaction on the survey form.

Several audience members made specific suggestions for improving the performer introductions. By far the most common complaint was that the introductions were too long or too detailed. The results from Question 2 showed that tailoring presentations to the interests of audience members is important. Since many audience members disapprove of lengthy introductions, in recital and concert situations brief informational introductions may be more appropriate than lengthy introductions.

Too-long introductions could be one reason that music preferences of some audience members decrease with introductions. If audience members consider introductions long, boring, and irrelevant, the negative emotion produced during the introduction may spill over and affect audience members' perception of the music.

Categorizing the "talked too much" respondents by age groups gives some support to this idea (see Table 16). An interaction between the attitudes of different age groups towards the informational presentations and strength of music preference in different age groups may explain the age difference in preference ratings in group RA (see Table 17 and Figure 2). However, categorizing "discussion increased enjoyment" respondents by age group contradicts this simple explanation (see Table 16). For instance, group RA3 (age 41-60) had the largest decrease in preference ratings due to introductory discussion but also the largest proportion of respondents (57%) indicating that they enjoyed the performer discussion.

Another audience suggestion was to make clear to the audience (both in pre-concert advertising and at the concert itself) the fact that the format of the concert departs from the standard classical concert format and that it includes discussion as well as music.

General Discussion

The results of this research show that

1. It is possible to affect the music preference of audience members and students, at least in the short term. The changes in music preference are different for various subgroups but, in general, modest in size.

2. Activities that involve audience members actively can be somewhat more effective than simple lectures. Activities used and concepts presented should be appropriate to a particular audience's interests and cognitive level.

3. With school audiences, performers and educators should strongly consider using introductory activities. In these groups, introductory activities always increased preference ratings, either by smaller or larger amounts, so it appears that introductory activities are likely to be helpful in many situations and unlikely to be harmful.

4. For some subgroups within the recital audience, informational presentations cause a decrease in music preference ratings. With such audiences, a different type of presentation may need to be developed. Many audience members expressed a preference for brief comments; perhaps these audiences prefer no spoken presentations at all (although free-form comments by audience members seem generally supportive of the idea of spoken presentations during concerts).

5. Some groups are more receptive to introductory comments and the effect on their music preference is greater. In general, the younger the audience member, the more music preference may be swayed. Those who self-select as being more interested in the particular style of music will be more likely to have their music preference increased (above its presumably already high level). Those who have a pre-existing social connection with the performer may be more swayed by the performer's comments.

6. For the musical works and treatments studied, response of school groups seems to fit the impressionable years model of music attitude, with students approximately age 14 and younger more open to influences on the music preferences and students approximately age 15 and older quite set in their preferences.

7. For the musical works and treatments studied, the response of recital audiences seems to fit the aging stability model of music attitude. Audience members age 6-40 were all quite open to influences on their music preferences and only above age 40 were musical opinions set and unchangeable.

Further research

Further research projects suggested by this study:

1. A study with perhaps 1000-1500 subjects evenly distributed across four different age groups would confirm or refute the hypothesis that the impressionable years model of music preference applies to the general school-age population.

2. A study could further explore the interaction between the attitudes of different age groups towards the informational presentations and strength of music preference in different age groups. The survey used in this study was not specifically designed to explore this interaction. In addition to music preference questions such as those asked in this study, survey questions could ask audience members to rate their enjoyment of the informational presentations, to indicate whether the presentations were to simple or too complicated, and to indicate whether the presentations were too long or too short.

3. Further study could explore the relationship between the audience's social connection with the performer and the effect of the informational presentations on their musical preferences. A survey question asking whether audience members are related to the performer or whether they know the performer socially would allow this relationship to be studied.

4. Research could explore further the hypotheses about music attitude and learning suggested by the neural network model of learning and by simulated annealing. Experiments could test the relationships among the relevant variables: (a) a slower hardening of musical opinion, (b) broader interest in and knowledge of music, (c) more detailed and accurate knowledge and understanding of music, and (d) more refined taste in music. Audience members age 20-40 (or perhaps 15-40) would make ideal candidates for such a study, since measuring the changeability of these audience members' musical opinions would easily discriminate between those with set opinions (impressionable years model) and whose opinions are not yet hardened (aging stability model). If the predictions of the simulated annealing model of learning are

correct, audience members whose opinions are not yet set at this age should have a broader interest in a wider range of musics, a wider range of musical knowledge, and perhaps more accurate knowledge of these musics. They may demonstrate a more refined taste or ability to make fine musical discriminations, but it may be necessary to follow the development of these audience members for a further decade or two before the more refined taste and fine discrimination become apparent.

5. The common teaching situations in which the presenter is a music educator (rather than the performer, as in this study) and/or the music is played via recordings (rather than live, as in this study), could be studied. This research would help isolate to what extent preference differences are due to (a) simple communication of information and knowledge about the composers and music to audience members, giving audience members context for the music they hear, and (b) rapport created between the performer and the audience, which may be established during discussion about the music and continued and expanded during the performance of the music.

6. Different techniques for altering music preference could be studied. For instance, studies could compare (a) informational presentations via text (program notes), videotape, and live performer, or (b) presentations in which the presenter gives simple information about the music vs. presentations in which the presenter tries to make the audience feel an emotional association with the music. These studies, again, could help confirm whether the effect of informational presentations on music preference is due to information received or to the social and emotional responses evoked.

7. A wider range of recital audiences could be studied. The fact that some age groups have a different (even a negative) response to spoken introductions to the music suggests that other

subgroups within the recital audience may react in different ways. Perhaps more sophisticated audiences prefer a different type of verbal introduction, or no introduction at all.

8. The long-term effect of informational presentations on music preference could be studied. Do the effects of the treatments last beyond the class or recital in which they were given? If not, then what strategies might be adopted to affect music preference in the long term?

Conclusion

This investigation shows that musicians and educators can influence the musical preferences of students and audience members. Performers should be encouraged to know that relatively simple presentations can influence audience members to have a greater preference for the music they perform. Educators, too, should know that they can influence and broaden the musical tastes of their students and that research shows that there are many good reasons to do so. Students who develop broader musical tastes and who are slower to harden their musical prejudices are more likely to develop deep, precise, and accurate knowledge of music and musical styles (Mok, 2000). These students are likely to develop into musical omnivores whose understanding and acceptance of a wide range of musics leads them to a greater understanding and acceptance of a variety of cultures and cultural values (Peterson & Kern, 1996; Bryson, 1996).

Research has shown that breaking down musical prejudice is an important tool in reducing cultural prejudice; this investigation demonstrates that musicians and teachers can indeed affect listeners' musical prejudices.

Table 1

Age Distribution of Recital Audiences (Group RA)

Age	Frequency	Percent
6-10	7	6
11-15	16	13
16-20	16	13
21-30	10	8
31-40	21	17
41-50	16	13
51-60	20	16
61-70	10	8
71-80	6	5
TOTAL	122	100

Table 2

Repertoire Performed for Audiences

Group	Cappriccio	Fantasy	Funérailles	Carnaval
LE	Fugue	Short Excerpt	Short Excerpt	--
UE	Fugue	Short Excerpt	Short Excerpt	--
MS	Movements I, II, and Fugue	Medium Excerpt	Medium Excerpt	--
HS	Fugue	All	Medium Excerpt	Finale
RA	All	All	All	All

Note. Group LE (lower elementary) = 1st-2nd graders; group UE (upper elementary) = 5th graders; group MS (middle school) = 6th-7th graders; group HS (high school) = 10th-12th graders.

Table 3

Latin-Square Experimental Design for Groups Receiving Three Treatments

Subgroup	Cappriccio	Fantasy	Funérailles
Subgroup 1	N	ID	IP
Subgroup 2	IP	N	ID
Subgroup 3	ID	IP	N

Note. Presentations are given to three different subgroups (1, 2, and 3). Each presentation includes the same repertoire selections (Cappriccio, Fantasy, Funérailles). The table shows how treatments N (no treatment), ID (introducing the music by discussion), and IP (introducing the music by a short dramatic play involving audience members) are applied to different repertoire selections for each subgroup.

Table 4

Latin-Square Experimental Design: Arrangement of Data from Experimental Design (Table 3) for Analysis of Three Treatments

N	ID	IP
Subgroup 1 Cappriccio 1st	Subgroup1 Fantasy 2nd	Subgroup 1 Funérailles 3rd
Subgroup 2 Fantasy 2nd	Subgroup 2 Funérailles 3rd	Subgroup 2 Cappriccio 1st
Subgroup 3 Funérailles 3rd	Subgroup 3 Cappriccio 1st	Subgroup 3 Fantasy 2nd

Note. N = no treatment; ID = introduce musical selections by discussion; IP = introduce musical selections by a short play involving audience members. Data from repertoire selections that received the same treatments (N, ID, and IP) in all three subgroups are gathered together and analyzed. Each different subgroup, repertoire selection, and order of presentation is equally represented in each column. These confounding variables are balanced among the three columns and cancel out. The differences that remain are due to the different treatments (N, D, and ID).

Table 5

Latin-Square Experimental Design for Groups Receiving Two Treatments

Group HS					
Subgroup	Audience	Cappriccio	Fantasy	Funérailles	Carnaval
Subgroup 1	HS classes 1 and 3	N	ID	N	ID
Subgroup 2	HS Classes 2 and 4	ID	N	ID	N
Group RA					
Subgroup	Audience	Cappriccio	Fantasy	Funérailles	Carnaval
Subgroup 1	RA recitals 1 and 3	N	ID	N	ID
Subgroup 2	RA recitals 2 and 4	ID	N	ID	N

Note. Group HS = high school audience (grades 9-12); Group RA = Recital Audience (mixed ages).

The HS presentation was given to four different classes (HS classes 1, 2, 3, and 4). For each of the classes, each treatment (no treatment [N] and introduction by discussion [ID]) is given twice. This effectively doubles the amount of data that is collected from each class. A similar procedure was followed for the four recital audiences (RA recitals 1, 2, 3, and 4).

Table 6

Latin-Square Experimental Design: Arrangement of Data from Experimental Design (Table 5) for Analysis of Two Treatments

N	ID
Subgroup 1 Cappriccio 1st	Subgroup 1 Fantasy 2nd
Subgroup 2 Fantasy 2nd	Subgroup 2 Funérailles 3rd
Subgroup 1 Funérailles 3rd	Subgroup 1 Carnaval 4th
Subgroup 2 Carnaval 4th	Subgroup 2 Funérailles 3rd

Note. Data collected according to the scheme diagrammed in Table 5 are rearranged for analysis according to this table. N = no treatment; ID = introduction of music selections by discussion. For each treatment as applied to each subgroup, the table shows subgroup (1, 2, 3, or 4), repertoire selection (Cappriccio, Fantasy, Funérailles, or Carnaval), and order of repertoire selection in the program for that subgroup (1st, 2nd, 3rd, or 4th).

In this experimental design, confounding variables (subgroups, repertoire, order of presentation) are present in equal amounts in both the N and the ID columns. Any differences due to these confounding factors will then cancel out because they are equally present in both columns. The remaining difference between the N and the ID columns is then attributable solely to the N and the ID treatments.

Table 7

Latin-Square Experimental Design for Question 1

Group		TREATMENT	
		N	ID
LE	Subgroup 1	Cappriccio 1st	Fantasy 2nd
	Subgroup 2	Fantasy 2nd	Funérailles 3rd
	Subgroup 3	Funérailles 3rd	Cappriccio 1st
UE	Subgroup 1	Cappriccio 1st	Fantasy 2nd
	Subgroup 2	Fantasy 2nd	Funérailles 3rd
	Subgroup 3	Funérailles 3rd	Cappriccio 1st
MS	Subgroup 1	Cappriccio 1st	Fantasy 2nd
	Subgroup 2	Fantasy 2nd	Funérailles 3rd
	Subgroup 3	Funérailles 3rd	Cappriccio 1st
HS	Subgroup 1, 3	Cappriccio 1st	Fantasy 2nd
		Funérailles 3rd	Carnaval 4th
	Subgroup 2, 4	Fantasy 2nd	Funérailles 3rd
		Carnaval 4th	Funérailles 3rd
RA	Subgroup 1, 3	Cappriccio 1st	Fantasy 2nd
		Funérailles 3rd	Carnaval 4th
	Subgroup 2, 4	Fantasy 2nd	Funérailles 3rd
		Carnaval 4th	Funérailles 3rd

Note. This table shows how treatments (no treatment [N] and introduction by discussion [ID]) were applied to each subgroup of the five main groups. Group LE = 1st-2nd graders; group UE = 5th graders; group MS = 6th-7th graders; group HS = 10th-12th graders. For each treatment as applied to each subgroup, the table shows subgroup (1, 2, 3, or 4), repertoire selection (Cappriccio, Fantasy, Funérailles, or Carnaval), and order of repertoire selection in the program for that subgroup (1st, 2nd, 3rd, or 4th).

Table 8

Preference Ratings for Treatments Nothing, Introduction by Discussion, and Introduction by Play for Groups LE, UE, and MS

Group	n	Treatment N M (SD)	Treatment IP M (SD)	Treatment ID M (SD)	Difference in M for ID-N (%[a])	Difference in M for IP-ID (%[a])
LE (1st-2nd graders)	48	3.92 (1.35)	4.06 (1.26)	4.38 (0.98)	0.14 (3.5%)	0.32 (8.0%)
UE (5th graders)	48	3.90 (1.02)	4.15 (0.92)	3.96 (1.07)	0.25 (6.3%)	-0.19 (-4.8%)
MS (6th-7th graders)	78	3.73 (0.85)	3.83 (0.76)	3.89 (0.97)	0.10 (2.5%)	0.06 (1.5%)
LE, UE, & MS combined	174	3.83 (1.05)	3.98 (0.97)	4.04 (1.12)	0.15 (3.8%)	0.06 (1.5%)

Note. Treatment N = no introduction to musical selections; treatment ID = musical selections introduced through discussion; treatment IP = musical selections introduced by short dramatic plays involving audience members. Music preference ratings were given on a five-point Likert scale, from 1 (Very Unenjoyable) to 5 (Very Enjoyable).

[a]Percentage is based on the difference in means in proportion to the maximum possible difference in ratings.

Table 9

Repeated Measures Analysis of Variance with Planned Orthogonal Contrasts Comparing Treatments Nothing, Introduction by Discussion, and Introduction by Play

Source	df	MS	F
N vs (ID+IP)	1	23.54	7.27**
Error	173	3.24	
ID vs IP	1	0.56	0.49
Error	173	1.18	

Note. This table shows results for combined groups LE (1st-2nd graders), UE (5th graders), and MS (6th-7th graders). Treatment N = no introduction to musical selections; treatment ID = musical selections introduced through discussion; treatment IP = musical selections introduced through a short play involving audience members.

**$p < .01$.

Table 10

Repeated Measures Analysis of Variance for Change in Music Preference By Age Group (Recital Audience)

Source	df	MS	F
Between subjects			
Age group	3	0.65	0.46
Error	230	1.42	
Within subjects			
Treatment	1	0.67	1.52
Treatment x Age group	3	1.94	4.34**
Error	230	0.44	

Note. The repeated measures variable (treatment) is preference ratings under treatment ID (introduction of musical selections by discussion) vs. ratings under treatment N (no introduction of musical selections).

**$p < .01$.

Table 11

Preference Ratings by Age Group (Recital Audiences, Group RA)

Age Group	n	Treatment N M (SD)	Treatment ID M (SD)	Difference in M for ID-N (%[a])
Age 6-20	74	4.11 (0.85)	4.41 (0.83)	0.30 (7.5%)
Age 21-40	54	3.96 (1.12)	4.22 (1.14)	0.26 (6.5%)
Age 41-60	72	4.33 (0.90)	4.13 (1.07)	-0.20 (-5.0%)
Age 61-80	34	4.25 (0.74)	4.21 (0.85)	-0.04 (-1.0%)
All age groups combined	234	4.17 (0.95)	4.25 (0.99)	0.09 (2.3%)

Note. Treatment N = no introduction to musical selections; treatment ID = musical selections introduced through discussion. Music preference ratings were given on a five-point Likert scale, from 1 (Very Unenjoyable) to 5 (Very Enjoyable). Due to rounding, numbers in the Difference in M (ID-N) column appear to vary slightly from differences as calculated from the means as reported to two significant digits in the Treatment N and Treatment ID columns.

[a]Percentage is based on the difference in means in proportion to the maximum possible difference in ratings.

Table 12

Repeated Measures Analysis of Variance for Change in Music Preference By Age Group (School Audiences)

Source	df	MS	F
Between subjects			
Age group	3	1.94	1.64
Error	425	1.19	
Within subjects			
Treatment	1	2.23	5.63*
Treatment x Age group	3	0.46	1.17
Error	425	0.40	

Note. The age groups are: Group LE (lower elementary) = 1st-2nd graders; group UE (upper elementary) = 5th graders; group MS (middle school) = 6th-7th graders; group HS (high school) = 10th-12th graders). The repeated measures variable (treatment) is preference ratings under treatment ID (introduction of musical selections by discussion) vs. ratings under treatment N (no introduction of musical selections).

*$p < .05$.

Table 13

Preference Ratings by Age Group (School Audiences)

Age Group	n	Treatment N M (SD)	Treatment ID M (SD)	Difference in M for ID-N (%[a])
LE	48	3.92 (1.35)	4.06 (1.26)	0.15 (3.8%)
UE	48	3.90 (1.02)	4.15 (0.92)	0.25 (6.3%)
MS	78	3.73 (0.85)	3.83 (0.76)	0.10 (2.5%)
HS	255	3.98 (0.78)	4.00 (0.82)	0.01 (0.3%)
All groups combined	429	3.92 (0.90)	3.99 (0.88)	0.07 (1.8%)

Note. Group LE (lower elementary) = 1st-2nd graders; group UE (upper elementary) = 5th graders; group MS (middle school) = 6th-7th graders; group HS (high school) = 10th-12th graders). Treatment N = no introduction to musical selections; treatment ID = musical selections introduced through discussion. Music preference ratings were given on a five-point Likert scale, from 1 (Very Unenjoyable) to 5 (Very Enjoyable). Due to rounding, numbers in the Difference in M (ID-N) column appear to vary slightly from differences as calculated from the means as reported to two significant digits in the Treatment N and Treatment ID columns.

[a]Percentage is based on the difference in means in proportion to the maximum possible difference in ratings.

Table 14

Repeated Measures Analysis of Variance of Change in Music Preference, School Audiences vs. Recital Audiences

Source	df	MS	F
Between subjects			
School (S) x Recital (RA1)	1	8.79	7.22**
Error	501	1.22	
Within subjects			
Treatment (T)	1	4.41	11.05**
T x S x RA1	1	1.73	4.33*
Error	501	0.40	

Note. School (S) = all school groups combined (LE, UE, MS, and HS); Recital (RA1) = subgroup of recital audience (group RA) age 6-20. The repeated measures variable (treatment, T) is preference ratings under treatment ID (introduction of musical selections by discussion) vs. ratings under treatment N (no introduction of musical selections).

*$p < .05$, **$p < .01$.

Table 15

Elements That Increased or Decreased Enjoyment of Music at Recitals (Group RA, n = 174)

Elements that increased enjoyment		Elements that decreased enjoyment	
Element	Number of responses	Element	Number of responses
Performer's discussion of music	67	Discussion before pieces was too long or too detailed	10
Choice of repertoire, composers	20	Environment (hall, noisy audience members, poor condition of piano)	9
Performance, musical interpretation	19	Disliked specific repertoire or composers	6
Affect of comments (humor, personality, interest in music communicated)	7	Performer's gestures, facial expressions	5
Demeanor of performer (stage presence, gestures)	8	Specific pieces were too long	5
Environment, setting	7	Overall length of recital was too long	4
		Dislike whole idea of performer discussion ("just play, don't talk")	4
		Intermission was too long	3
		Late start	2
		Unfamiliar with particular repertoire selections/classical music in general	2
		Disliked performance, musical interpretation	1

Table 16

Selected Freeform Question Responses by Age Group

	Group RA1 (age 6-20 n = 53)	Group RA2 (age 21-40 n = 45)	Group RA3 (age 41-60 n = 46)	Group RA4 (age 61-80 n = 19)
Discussion too long/too detailed	5 (9%)	1 (2%)	4 (9%)	0 (0%)
Discussion increased enjoyment	15 (28%)	19 (42%)	26 (57%)	6 (32%)

Note. The numbers of subjects in groups RA1, RA2, RA3, and RA4 given in this table are different from the numbers listed under Question 3 because this table list the total number of subjects who participated in the study in each age group and Question 3 lists the number of responses in each age group that were used to analyze the influence of treatments on preference ratings, according to the experimental plan.

Table 17

Interaction of Attitude Towards Information Presentations and Strength of Music Preference in Group RA

	Group RA1 (age 6-20)	Group RA2 (age 21-40)	Group RA3 (age 41-60)	Group RA4 (age 61-80)
Negative attitude toward informational presentations	Feeling that they are too long	Slight feeling that they are too long	Feeling that they are too long	No strong feeling
Strength of music preference	Very open	Moderately open	Moderately set	Very set
Result of negative attitude and preference strength	**Increase in preference ratings**	**Increase in preference ratings**	**Decrease in preference ratings**	**No effect on preference ratings**

Note. Strength of music preference is based on the aging stability model for group RA. Negative attitude towards informational presentation is based on the proportion of audience members who felt informational presentations were too long or too detailed (see Table 16). Combining the effects of negative attitude and preference strength suggests a net effect on preference ratings similar to that found in Figure 2. RA1 felt that the presentations were too long but, because music preferences are so malleable at that age, still found the presentations to have a net positive influence. RA2 had only a slight feeling that the presentations are too long and, since music preferences at this age are still moderately malleable, the presentations had a net positive effect. RA3 felt that the presentations were too long and, since music preferences are quite set at this age, this negative impression of the presentations became the controlling effect, causing a net negative effect on preference ratings. RA4 had no strong negative feeling about the presentations and, because their music preferences are strongly set, the net effect on their preference ratings is negligible. Unfortunately, this explanation of the results is contradicted by the proportion of each group who indicated that the discussions increased their enjoyment of the concert (see Table 16).

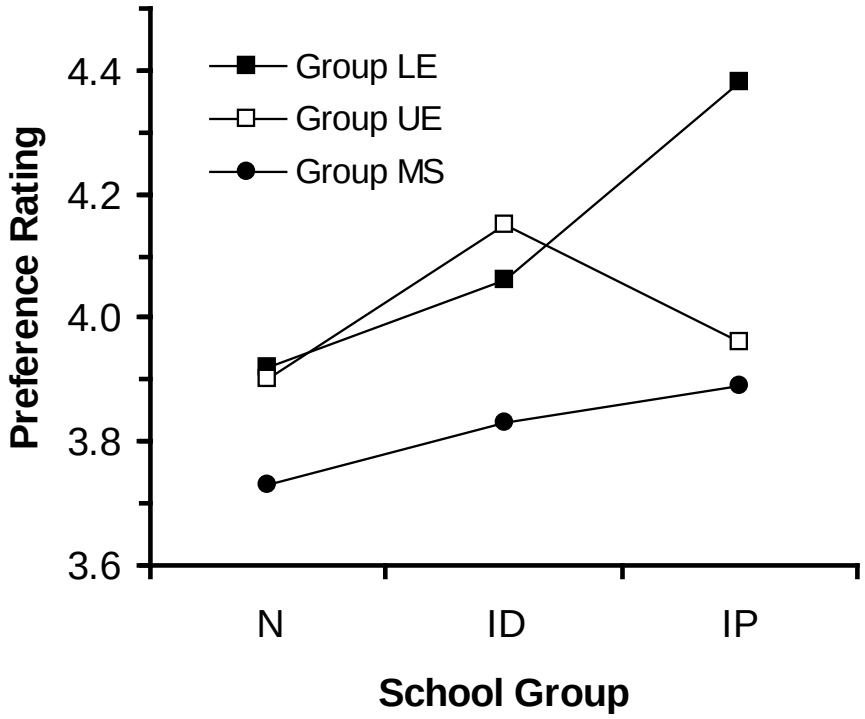

Figure 1. Mean preference ratings for school groups. Group LE (lower elementary) = 1st-2nd graders; group UE (upper elementary) = 5th graders; group MS (middle school) = 6th-7th graders. Treatment N = no introduction to musical selections; treatment ID = musical selections introduced through discussion; treatment IP = music selections introduced through dramatic plays. Music preference ratings were given on a five-point Likert scale, from 1 (Very Unenjoyable) to 5 (Very Enjoyable).

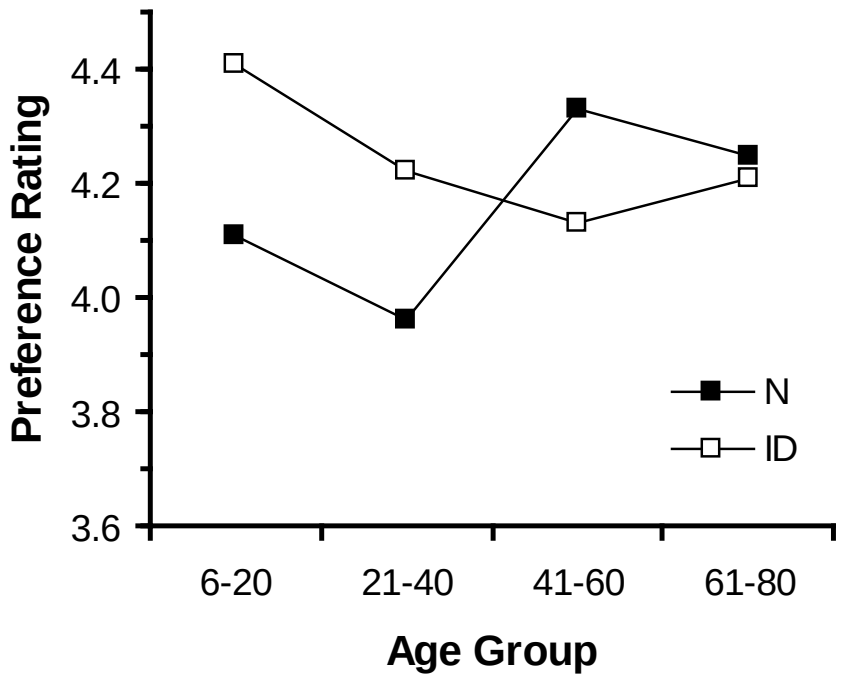

Figure 2. Mean preference ratings for recital audiences. Treatment N = no introduction to musical selections; treatment ID = musical selections introduced through discussion. Music preference ratings were given on a five-point Likert scale, from 1 (Very Unenjoyable) to 5 (Very Enjoyable).

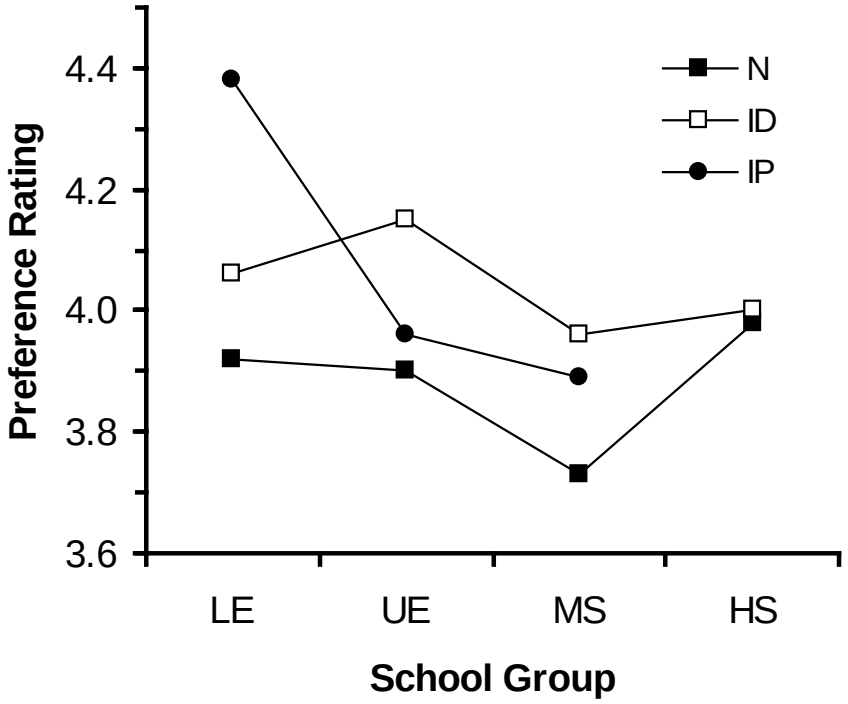

Figure 3. Mean preference ratings for school groups. Group LE (lower elementary) = 1st-2nd graders; group UE (upper elementary) = 5th graders; group MS (middle school) = 6th-7th graders; group HS (high school) = 10th-12th graders. Treatment N = no introduction to musical selections; treatment ID = musical selections introduced through discussion; treatment IP = music selections introduced through dramatic plays. Treatment IP was not applied to group HS because it was judged age-inappropriate. Music preference ratings were given on a five-point Likert scale, from 1 (Very Unenjoyable) to 5 (Very Enjoyable).

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Appendix A

Outlines of Information Presentations Given to Group HS

Presentations given to all groups were videotaped. To give an idea of the content of the informational presentations, outlines of informational presentations were prepared from these videotapes. These outlines represent the main ideas presented in the informational presentations but not necessarily the precise language or phrasing used in the presentations.

The four presentations outlined below were given to two different subgroups of group HS. The first subgroup heard informational presentations about Capriccio and Funérailles; the second subgroup heard presentations about Fantasy and Carnaval.

J.S. Bach: Capriccio on the Departure of a Beloved Brother

Outline of informational introduction

The capriccio was written when Bach was seventeen years old. This work tells the story of Bach's brother and his friends when the brother enlisted in the army. Each movement tells part of the story (movement I: friends try to convince the brother to stay home; II: misfortunes that will happen to brother while traveling; III: lament for departure of brother; IV: celebration on departure of brother; V: postillion's air, explanation of postillion; VI: fugue based on the postillion's air). Explanation of fugue with musical illustrations of the fugue subject and demonstration of how voices are played in counterpoint to the subject over the course of the fugue. Demonstration of the "whip-crack" motive and how it is combined contrapuntally with the main subject. [Total length of presentation: 3 minutes 40 seconds]

Performance

Fugue from Capriccio on the Departure of a Beloved Brother, J. S. Bach [Total length of performance: 2 minutes 30 seconds]

Liszt: Funérailles

Outline of informational introduction

Liszt was Hungarian. Three of his friends had been killed in a revolution in Hungary during 1800s. Funérailles is a memorial to these friends. Funérailles means a "funeral" or "elegy". Three main themes from the piece are given names and illustrated at the piano. The "weeping theme" is performed. Audience is asked to hum or sing the theme as performer plays it. This theme will be heard several times in this piece, and will be changed and have a different character each time. The "heroic theme" is performed. This theme has an accelerando. Performer plays this theme and asks audience members are asked to clap the beat so that they feel the accelerando. The "burial theme" is performed. The performer then asks audience to sing or hum along as he plays it. This theme, too, will be transformed and heard in several different versions. [Total length of presentation: 5 minutes 0 seconds]

Performance

Excerpt from Funerailles, Franz Liszt. [Total length of performance: 7 minutes 37 seconds]

Beethoven: Fantasy, Op. 77

Outline of informational introduction

A fantasy is free and open to anything the composer's fantasy can imagine. There are no definite rules to follow; anything goes. Beethoven liked to improvise. Friends and acquaintances liked to invite Beethoven to parties and dinner, then invite him to play afterward. Beethoven hated being asked to do this and usually showed some resistance. But finally he might be convinced to sit down at the piano where, in exasperation, he tosses off a few scales [the performer illustrates by sitting at the piano and playing the opening scales from the Fantasy]. This might lead into a few disconnected musical ideas; whatever sprang into his mind at that

moment [brief illustrations from various themes in the Fantasy]. Finally he alights on a theme he really likes, and, as all pianists in those days were expected to be able to do, he improvises a set of variations on it [different variations are illustrated at the piano]. This story (that Beethoven improvised the Fantasy in a situation similar to the one described in this situation, and only later wrote it down), is confirmed by writings of friends of Beethoven and really is how this piece was written. [Total length of presentation: 5 minutes 0 seconds]

Performance

Fantasy, Ludwig van Beethoven (entire). [Total length of performance: 10 minutes 40 seconds]

Schuman: Carnaval

Outline of informational introduction

All performances today (except Fantasy) are excerpts of longer works that will be played in their entirety in a community concert.

Carnaval is a long piece made up of a series of short character pieces. A character piece is short and usually about a person, like a character sketch. A carnaval is a German masked ball. The twenty movements of Carnaval represent different people Schumann might have met at such a ball, for instance his fiancé, his future wife (at that time just a friend), and many others.

Schumann was a writer who advocated against mindless music and wrote very passionately and emotionally on this subject. He used various imaginary characters in his writing. The characters had conversations and discussions among themselves, with each character representing different sides of Schumann's personality. Schumann called this group of characters the "League of David" and imagined them doing battle against musical "Philistines".

The final movement in Carnaval is called "The march of the league of David against the Philistines". It represents the end of the carnaval, when Schumann and his friends (real and imaginary) march against the musical Philistines and do battle with them.

The performer plays a brief excerpt from the "March"; the audience is asked to identify the time signature; several identify it correctly as 3/4. This is the only march the performer knows that is in 3/4 time. Another excerpt from Carnaval is played; this comes from Beethoven's fourth piano concerto and represents the "good guys". Another excerpt is played and identified as the "Grandfather's Waltz" which was used to signal the end of the carnaval. The students are asked to sing or hum the waltz tune as the performer plays it. [Total length of presentation: 7 minutes 56 seconds]

Performance

Finale from Carnaval, by Robert Schumann. [Total length of performance: 3 minutes 34 seconds]

[Appendices B-E omitted from online version]