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A VALIDITY STUDY OF
THE ADVANCED MEASURES OF MUSIC AUDIATION
AMONG UNDERGRADUATE COLLEGE MUSIC MAJORS

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A Dissertation
Submitted to
the Temple University Graduate Board

in Partial Fulfillment
of the Requirements for the Degree
DOCTOR OF PHILOSOPHY

by
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ABSTRACT

A VALIDITY STUDY OF
THE ADVANCED MEASURES OF MUSIC AUDIATION
AMONG UNDERGRADUATE COLLEGE MUSIC MAJORS

by Richard T. McCrystal
Doctor of Philosophy
Temple University, 1995

Major Advisor: Dr. Edwin E. Gordon

The purpose of this study was to investigate the validity of the Advanced Measures of Music Audiation (AMMA), a test of music aptitudes for college undergraduate music majors. The three problems of the study were to establish the reliability of AMMA; to establish the immunity of AMMA to instruction, practice, and maturation; and to determine if AMMA scores could serve as predictors of success in music study.

The investigator administered AMMA twice to the same forty college undergraduate music majors. The first administration was at the beginning of the academic year and the second administration was at the end of the academic year. The results of the first administration were used to

determine predictive validity. The students' grade point average in applied music, aural skills, and written harmony were the validity criteria. The split-halves method was used to determine the reliability of the test. Both administrations of AMMA served as a pretest and posttest to determine the test's immunity to instruction, practice, and maturation.

The split-halves reliability coefficients were .82 for the pretest and .84 for the posttest. The gain in mean scores between the pretest and the posttest was not significant at the .05 level of confidence. The correlation coefficients between the AMMA pretest and each of the validity criteria were strongest when limited to only the highest and lowest AMMA scores. The highest and lowest AMMA scores were also better predictors of success in music than achievement in any of the validity criteria.

It may be concluded that AMMA is a reliable test. AMMA was also immune to instruction, practice, and maturation over the length of the study. It may also be concluded that the AMMA predictive validity coefficients found for high and low scoring students were more robust than were any of the intercorrelation coefficients found among the three validity criteria.

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My wife Margaret and our children Walter, Hilary, Margery, and Tobias were all supportive and happy for me to become a student again. I hope they will also never stop learning.

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CHAPTER 1

INTRODUCTION

To warrant the assertion that the Advanced Measures of Music Audiation (AMMA) by Edwin E. Gordon (Gordon, 1989) is a test for stabilized music aptitudes would require establishing the validity of AMMA as a test of music aptitudes, particularly stabilized music aptitudes (Gordon, 1987, pp. 17-52). First, some preliminary questions need to be asked. Do aptitudes exist? If they exist, can they be identified and measured? Are there specific aptitudes for music? If there are specific aptitudes for music, how may they be described? Once described, how may they be further studied and understood? Presuming there are specific music aptitudes, does AMMA meet the criteria for a valid test of music aptitudes?

Do aptitudes exist? In both World War I and World War II, the United States found it had to rapidly change from a nation with a small peace time military establishment to a nation with an enormous military force. A major factor in successfully accomplishing this task, within a relatively brief time frame, was aptitude testing. Aptitudes, basic to military needs, were identified. Aptitude tests for those

aptitudes were developed. The resultant aptitude tests were administered to a large sample from the civilian population. Many from that sample were selected, based upon their aptitude test scores, for brief but intensive training in skill areas in which they scored high. The criterion validity of those efforts may be found in the success of the military establishment. From such successful results one may presume aptitudes exist, and that aptitudes can be identified, measured, and evaluated with a high degree of veridicality.

Are there music aptitudes? As with all human behaviors, one may safely presume there are aptitudes for music. The safety of this presumption is manifested in the many efforts, some quite successful, to identify and measure behaviors related to aptitudes for music (Seashore, 1919 & 1967; Seashore, Lewis & Saitveit, 1957; Wing, 1961; Shuter-Dyson & Gabriel, 1981; and Gordon, 1987). How many music aptitudes be described? Gordon wrote, "At the core of the nature of music aptitude is what traditionally has been referred to as the 'nature-nurture' issue" (Gordon, 1987, p.5). At issue is which is the greater factor regarding how one's music aptitude develops, nature (genetics) or nurture (environment). Gordon concluded the roles of the innate and environment regarding music aptitudes are not clear, and not known (Gordon, 1987, p. 7).

May we be certain aptitudes are innate? Two ways to address this question would be from either the biological view or the psychological perspective. A possible third approach would be at the juncture between biology and psychology. For example, studies have been conducted on song birds. Staddon, an animal behaviorist, noted that some bird species (e.g., song sparrows, *Melospiza melodia*) are little affected by early deprivation of song role models because their song information is clearly innate. On the other hand, some species (e.g., white-crowned sparrows, *Zonotrichia leucophrys*) develop severely abnormal songs if deprived of the opportunity to hear their specie's song during the first six months of life (Staddon, 1983, p. 398). Studies of other species, including humans, involving different sensory pathways, reported similar findings (Edelman, 1987, p. 302). That is, deprivation at critical growth periods results in abnormalities. Arms, a biologist, would say that animals are genetically (innately) predisposed to learn the behavior patterns of their own species (Arms, 1979, p. 616). Gordon, whose interest is at the interface between music and psychology, would add, a music environment for human infants that either encourages or discourages music behavior, will have a positive or negative influence on the infant's music behavior (Gordon, 1987, p. 8).

Longitudinal studies conducted on human monozygotic (same egg) twins, separated at birth and reared apart,

provides support for the innate claim for human characteristics as reported by Bouchard, Lykken, McGue, Segal, and Tellegen (1990). According to their study, among such twins about 70% of the variance in IQ was found to be associated with genetic variation. What may be somewhat surprising are the findings reported in the study on other traits of monozygotic twins reared apart. On multiple measures of personality and temperament, occupational and leisure-time interests, and social attitudes, twins reared apart were about as similar as monozygotic twins reared together. It is a strong argument for the power of the genetic or innate factor. However, it is not meant to demean the power of the environmental factor. Both, as Gordon would assert, are important.

There is a third factor to be considered in the nature-nurture equation, a question that seems to have a potent influence; when, in chronological time, is the organism genetically most open to be influenced by its environment? Primitive species may be less affected in their development by deprivation at critical chronological periods, but a higher life form is affected. The white-crowned sparrow is one example of how deprivation of song role models can affect its song production at a critical time in its development. For humans, Gordon has reported on test results that indicate music aptitude stabilizes around the age of 9. Between birth and age 9 music aptitude is developmental, or more readily

influenced by environment. In addition, the earlier children have favorable experiences with music, the more susceptible their music aptitude is to change. It may even approach its innate potential (Gordon, 1987, p. 9). The identification of developmental and stabilized music aptitudes strongly suggests the need for a variety of tests to be designed for either developmental or stabilized music aptitudes.

Related to the nature-nurture issue is a learning loop, and its place in time. Staddon wrote of such a learning loop in which birds develop their species' song. Initially this loop in birds is a genetically influenced template for a specific type of song. But a template is not enough. The other factor in the loop is practice (Staddon's underline). In order for practice to be effective it must take place during critical growth periods. There is a striking similarity between Staddon's learning loop for bird song and Gordon's description of a "babble" stage in the early development of music aptitudes. For birds, Staddon wrote, "The final song is evidently built up by a circular process in which the bird sings, hears the result of its singing, and slowly modifies what it sings until its production matches the stored template" (Staddon, 1983, p. 400). Staddon thought this was analogous to a musician programmed to learn a single Baroque piece. He would be immune to the "charms of Brahms or the Beatles, but would fixate instantly on anything by Bach or Vivaldi" (Staddon, 1983, p. 400).

According to Staddon, "This loop can be interrupted in two places: either by disrupting the motor apparatus, to prevent practice, or by deafening the bird, to prevent its hearing its own production" (Staddon, 1983, p. 400). An experimentally deafened bird will develop a normal subsong (from its template), but it will never evolve it into a normal adult song. This experiment offers strong support for the importance of auditory feed-back, and is similar to what Gordon has concluded from his investigations. Gordon reported how critical early informal and formal experiences in music are to maintain a child's level of music aptitude. He wrote, "What is known is that regardless of the level of music aptitude a child is born with, he must have favorable early informal and formal experiences in music in order to maintain that level of potential" (Gordon, 1987, p. 8). He added that one cannot increase his innate level of music aptitude with favorable early experiences in music. A lack of early experiences, however, could adversely affect his music aptitude, whether potentially high or low, to perhaps only slightly more than nothing.

Another dimension regarding babble was reported in a recent study on hearing infants between 7 and 10 months of age and severely deaf infants of similar age (Petitto & Maretette, 1991, pp. 1493-1496). While hearing infants engaged in spontaneous speech babble, the deaf infants engaged in spontaneous manual (sign language) babble. This

study not only supports the concept of babble, but it indicates there is an underlying innate capacity for language in the human species. If the customary speech modality for language babble is adversely affected, the mode in which language manifests itself seems optional. Prudence would suggest there is also an underlying innate capacity for music in humans.

Any study about music aptitude must address the meaning of audiation, a term put forward by Gordon to fill a serious gap in our language (Gordon, 1976, p. 6). It is to music what auding is to a spoken language; that is, auding is what we do when we hear and process the sound of language inside our heads without those sounds being physically present on the outside (Taylor 1964, p. 4). When sounds are physically present and heard one is also perceiving. However, perceived sounds need to be processed through auding or audiation to be intelligible.

We audiate when we listen to music for its syntactical tonal and rhythm patterns.

We audiate when we read notation and hear what we read, with or without making an external sound.

We audiate when we write music from dictation.

We audiate when we recall music from our past.

We audiate when we write music we have recalled.

We audiate when we improvise music on the spot.

And we audiate when we write down the music we have created or improvised (Gordon, 1988, pp. 10-13).

The powerful role audiation plays in any processing of sound as music, as exemplified above, leads to the conclusion that its role in how one describes and measures music aptitudes is formidable. It supports Gordon for his choice of the word "audiation" in AMMA rather than "aptitudes."

The distinction between developmental and stabilized music aptitudes is critical to this study, for stabilized music aptitudes are believed to be more immune to practice than developmental aptitudes. Practice customarily means to take the time necessary to hone one's performing and aural skills, mostly through the exercise of those skills. To qualify as a test of stabilized music aptitudes, AMMA scores should not be significantly improved by practice, instruction, or maturation.

Another factor critical to this study is the distinction between aptitude and achievement. Aptitude is potential, or how suited one is to a purpose. Achievement is what one accomplishes. They are not the same, for achievement is dependent upon aptitude. It is not uncommon to hear it said that aptitude may be measured by achievement. The strength of that argument is, one cannot achieve highly without a correspondingly high aptitude for what it is one achieved so well. The weakness of that argument is, it ignores the issue of persons with high aptitude and low achievement. According to Gordon, in a typical school there are many students (perhaps as many as 50%) with high music aptitude who are not