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THE RHYTHMIC AND TONAL MUSICAL ABILITIES IN THE FUNCTIONAL- LEARNING MUSIC KINDERGARTEN CHILDREN

***Abstract:** Musical abilities include a number of abilities developed under the influence of innate dispositions, environment, maturity, informal music learning experience and formal music education. The paper aims to identify the potential difference between the musical abilities of preschool and early school-age children at the initial and final testing stages and whether there is any difference between the rhythmic and tonal component of their musical abilities in terms of their sex. The survey was conducted on a sample of 70 respondents. The respondents were second-year students of the Elly Bašić Functional-Learning Music Kindergarten in Zagreb. A general information questionnaire was used in the survey, as well as the Gordon Primary Measures of Music Audiation (PMMA) test, as an indispensable measuring tool used to identify the key music potential variables in a timely, reliable and objective manner.*

The obtained results indicate that the tonal and rhythmic aptitude of the participants in the survey were substantially higher at the final stage of testing with respect to the initial one. Moreover, the sex of the participants in the survey did not prove to be a significant musical aptitude predictor.

The author calls for changes to the music school curriculum aimed at integrating preschool music education into the formal music education system.

***Keywords:** functional-learning music kindergarten, rhythmic musical abilities, tonal musical abilities*

INTRODUCTION

Abilities are the traits that can determine the success rate in specific activities. Whether such abilities are innate or inherited through a genetic predisposition, they are a prerequisite for efficiency, speed and skill at performing a specific activity with no prior training or teaching. People differ in the abilities they possess and their level of development. Various theories have attempted to explain what affects the development of human abilities. According to Empiricism, the abilities are conditioned exclusively by the environment in which an individual was born and raised and in which he lives, which means that the abilities of an individual will be as shaped by his or her environment. The theory of Nativism assumes the opposite view, suggesting that abilities are determined exclusively by our genetic inheritance, with environmental factors not being able to affect their development in any way. According to the theory of convergence, human abilities are the result of converging or interacting hereditary and environmental factors (Grgić, 1997).

Musical abilities include a number of abilities, such as the ability to understand and remember a melody, known as musical melody, beat perception, tonality perception, melodic interval perception, aesthetic sense of music and absolute pitch ability. According to Mirković-Radoš (1996), it is the ability of an aesthetic experience of music, including the aesthetic evaluation and artistic sensitivity to musical content or its interpretation. The issue of musical ability development is still open to debate. While some highlight the crucial role of genetic material, others advocate the importance of the environment, yet others underline the connection between innate dispositions, maturity, informal music experience and formal music education. In terms of the structure of musical abilities, there is an ongoing argument about whether it is a single general ability or a large number of specific abilities. The founder of the Elementaristic (atomistic, pluralist, mosaicist) view on the musical ability

structure, Carl E. Seashore (as cited in Mirković-Radoš, 1996) states that musical aptitude is the totality of a specific number of independent traits present to varying degrees. Musical talent is a hierarchy of talent branching out within the area of musical consciousness, with sensory properties of the tone being crucial. On the other hand, there is a Unitarian (holistic, Gestalt) view of the musical ability structure assuming that musical aptitude is a general ability of a composite type, the aspects of which are more or less interrelated (Mirković-Radoš, 1996). Geza Révész (1954), an important exponent of the latter view, claims that the most important trait of a musical individual is their sensitivity to the artistic quality and the aesthetic evaluation ability related to the musical piece and its artistic performance. However, he relates it to the innate abilities, claiming that they are distributed in the population based on the all-or-none law. According to the behaviorist theory developed by Robert Lundin (1967), there is no unique musical ability. It consists of a series of interrelations with musical stimuli throughout one's lifetime partly relying on the biological potential. In view of the foregoing, we can conclude that innate individual dispositions are necessary for the development of musical abilities, but it is not a matter of the predominance of the environment or genetics. Rather, it is an interaction between genetics and favorable environmental influences. "Musical abilities represent a totality of innate dispositions, maturity, informal and formal music experience. The ability of an aesthetic experience of music, that is, a sensitivity with regard to the artistic value of the music piece without which there is no conceptual definition of musical abilities" (Dobrota and Tomaš, 2009, p. 29).

Edwin Gordon (1990), the American scholar of the Psychology of Music, distinguishes between the two levels of musical abilities, which are the following: developmental musical aptitude indicating one's potential and the stabilized music aptitude indicating full development of that potential. He believed that the developmental stage lasted up to the age of 9, after which time the individual enters into the stabilized musical aptitude stage, and that each individual possessed an innate potential for music. Over the course of the past two centuries and a more intensive research of the intelligence quotient (IQ), talent and abilities, much attention has been focused on the research of musical aptitude and the development of the tests used to measure them. The first musical aptitude tests were designed in 1880 by Carl Stumpf. In 1919, Carl Emil Seashore published his first standardized musical aptitude test, and in 1920, the tests developed by Geza Révész appeared. They are used predominantly to test the musical pitch, melody memorisation, memorising and perceiving rhythm and harmony, and aesthetic evaluation. Edwin Gordon's *Primary Measures of Music Audiation* (1979) test is the first and only test used to measure musical aptitude in preschool- and early school-age children (5 – 8). The test consists of a rhythmic and tonal part, with each one containing 40 tasks. The children are required to provide an intuitive answer in terms of whether the rhythmic and tonal models are equal or different. To solve the test, the child does not need to be able to read or write or have received a musical experience or education.

Research on musical abilities has been performed by a vast number of scholars thus far. They used the PMMA test in their research. Testing of the rhythmic and tonal component is usually associated with the listener's traits, such as age, sex, maturity influence or music education. Researchers who studied musical aptitude and maturity found that the rhythmic and tonal components are both much influenced by maturity. Thus, Groves (1969) concluded that practice of the rhythmic component has no significant effect, but it is maturity that represents the vital element in developing one's musical abilities. Dobrota and Tomić Ferić (2004) agree with him. On a sample of 128 school and preschool children, they used the PMMA test and concluded that maturity and formal education affected the development of the rhythmic and tonal component. For musical aptitude and formal education, Gordon (2004) conducted research on a sample of one thousand children, monitoring their developmental musical aptitude. In the period from 2000 to 2002, the children were tested several times using the PMMA test, and their development was monitored while attending the kindergarten and the first, second and third grade school programs. During this period, the children attended a music course once a week. The conclusion of the research indicates that children need to receive a formal music education with a frequency of at least twice a week to be stimulated to develop their musical abilities further. Such formal education is also a prerequisite for the stabilization of musical aptitude. Gordon claims that the relevant music education of small children cannot be overrated, as the child's potential cannot be developed if it is absent. A number of researchers have studied the differences between musical abilities in children in terms of their sex (Gilbert, 1980; Milne et al.,

1976; Rainbow, 1981; Schleuter and Schleuter, 1989), and the results obtained confirm that girls possess a more developed rhythmic component with respect to boys.

McDonald and Ramsey (1979) studied the influence of sex on melody perception and concluded that girls can perceive a melody better than boys. In his research on gender differences in musical abilities related to melody memorisation, Hair (1977) did not find any influence of sex on these abilities. We can conclude that the early school and preschool ages represent an irreplaceable period in which we can influence the development of musical abilities.

The Functional Music Pedagogy (FMP) of Elly Bašić is a music pedagogy concept, the syllabus and curriculum of which have been verified by the Ministry of Science and Education of the Republic of Croatia. The *Elly Bašić School of Music in Zagreb* offers the educational programme of Functional Music Pedagogy along the vertical structure of the education system, including preschool, elementary and high school music education. According to the syllabus published on the official website of the school (<http://www.ellybasic.hr/>), the music kindergarten programme entitled Preparation Program I (Cro. *Pripremni I.*) and Preparation Program II (Cro. *Pripremni II.*) has been implemented twice a week for a duration of two years. Music-related activities performed within the programme prescribed by the curriculum are as follows: songs, rhymes, learning about musical instruments, musical sensitisation to sounds and key notes, improvisation, listening to classical music and visual art expressions. According to the syllabus (2006), the basic objective of FMP music education is not a mere acquisition of musical abilities and knowledge but also the 'development of the child's innate physical and physiological music skills and abilities; as well as the preserving and stimulating imagination and creativity in children; educating the future professional musicians and amateur musicians, as well as the educating of the public' (The syllabus and curriculum of the music and dance preschools and elementary schools, 2006, str. 183).

With this in mind, Elly Bašić claims that the journey of the child's music education initiates with the music experience, leading toward the raising of awareness in this respect, giving priority to singing, dancing, improvisation and listening to music. Pranjić (2013) claims that the functional music pedagogy as a result of a long-term maturation and methodological basis of development uses music as an educational tool in the hands of the music teacher as a true educator. One of the peculiarities of the FMP is the fully implemented functional methodology that, as the original closed system of music education uses its specific didactic and methodical approach in order to meet its basic pedagogical requirements, such as the respect of a child, a mutual trust between the child and the teacher, the development of musicality, child's imagination and creativity, the emotional experience leading to the raising of the awareness of musical abilities, spontaneous improvisation, development of the syncretic expression of the child, playing games, telling stories and reciting of songs and rhymes (Sućeska Ligutić, 2005; as cited in Vasilj 2021).

METHODOLOGY

The purpose of the survey is to examine the potential difference in the musical abilities of the participants in the initial and final testing stages, as well as the difference in the rhythmic and tonal components of musical abilities in terms of sex.

In accordance with the set objective, the following hypotheses have been established:

H1 There is a statistically significant difference in the rhythmic abilities of children between the initial and final testing stages.

H2 There is a statistically significant difference in the tonal abilities of children between the initial and final testing stages.

The survey was conducted at the *Elly Bašić School of Music in Zagreb* during a single academic year at two intervals: at the beginning and at the end of the school year. During this period, the students attended the second year of the preschool programme of the Functional Music Pedagogy entitled Preparation II (Cro. *Pripremni II.*). There were 70 students included in the survey, with 55.7% of them being girls ($N = 39$) and 44.3% of them accounting for boys ($N = 31$). The statistical software program STATISTICA13 was used for the processing of the obtained data.

Gordon's *Primary Measures of Music Audiation* test (Gordon, 1979) was used in the survey, consisting of a rhythmic and a tonal part, with each part of the test containing 40 tasks. The children were asked to provide an intuitive reply to questions such as whether the rhythmical and tonal

expressions were different or the same. To solve the test, the child did not need to be able to read or write or have received a musical experience or education. The child would first listen to several expressions and then decide whether such expressions were different or the same by circling the corresponding image appearing on the answer list. Gordon's test is an essential measuring tool used to identify the key musical variables playing an important role in music learning success in a timely, reliable and objective manner.

The results of the rhythmic ability evaluation test (applied in the initial stage) indicated a satisfactory reliability rate (Cronbach $\alpha = .69$), and a single total result was obtained as a sum of the correct answers provided to all 40 tasks. The average result was $M = 30.81$ with a standard deviation of $SD = 4.53$, and the results ranged from 20 to 40 (possible range from 0 to 40). The distribution of the obtained results indicates that there is no significant deviation with respect to the usual distribution (asymmetry = $-.27$; flatness = $-.37$). The results of the tonal ability evaluation test (applied in the initial stage) indicated a satisfactory reliability rate (Cronbach $\alpha = .64$), and a single total result was obtained as a sum of the correct answers provided to all 40 tasks. The average result was $M = 32.66$ with a standard deviation of $SD = 3.85$, and the results ranged from 22 to 40 (possible range from 0 to 40). The distribution of the obtained results indicates that there is no significant deviation with respect to the usual distribution (asymmetry = $-.33$; flatness = $-.02$).

RESULTS AND DISCUSSION

H1 There is a statistically significant difference in the rhythmic abilities of children between the initial and final testing stages.

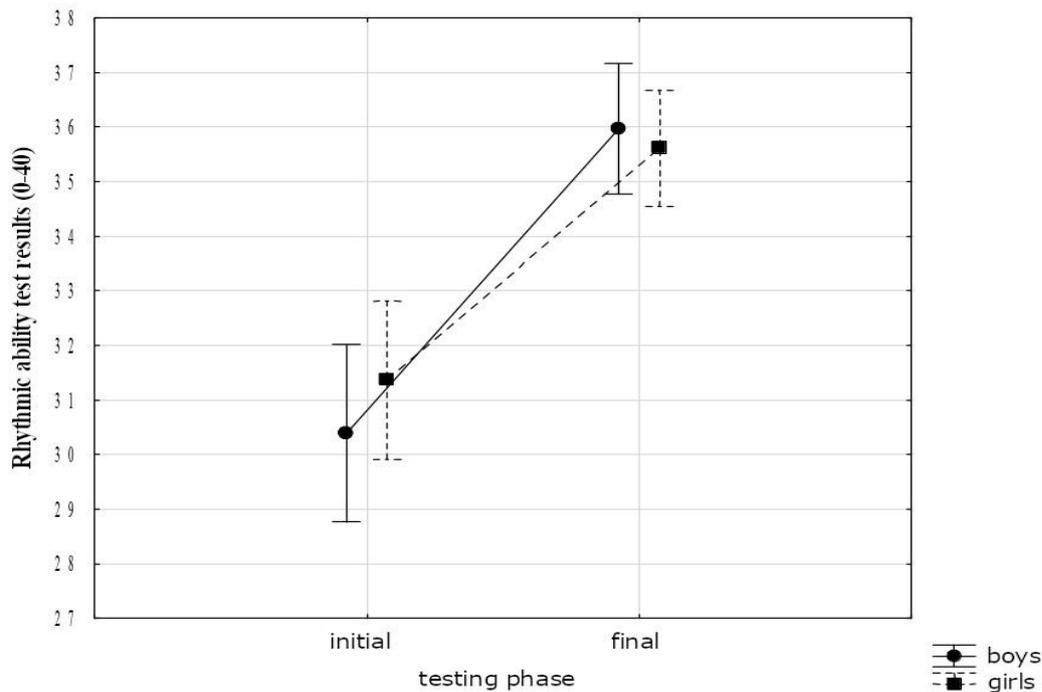
In this part of the survey, the author wished to examine whether there is a significant difference between the rhythmical abilities of children between the initial and the final testing stage.

To test the hypotheses on the increase in rhythmical abilities during the school year and significant differences in musical abilities with respect to sex, a two-way variance analysis was performed with repeated measures.

Figure 1 shows the results of the rhythmical abilities in the initial and final stages of testing with respect to sex.

Figure 1

Differences in rhythmical abilities between boys and girls in the initial and final testing stages



A significant effect of the testing stage was identified (stage = S; Cro. Faza = F) ($F = 74.92$; $df = 1,68$; $p = .000$), with no effect of sex identified ($F = .16$; $df = 1,68$; $p = .688$) or any interaction between sex and the testing stage ($F = 1.36$; $df = 1,68$; $p = .248$). Figure 1 shows that rhythmical abilities in the final stage are significantly higher than those in the initial stage, making it possible to confirm the first research hypothesis. The analysis of the effect rate indicates that the effect of the testing stage is significant ($\eta^2p = .52$).

Such results are in line with Gordon's (2004) view and the hypothesis of his longitudinal survey conducted from 2000 to 2002. Gordon conducted research on developmental musical abilities in over a thousand children monitoring their development from preschool age to the third grade of elementary school by applying the PMMA test at the beginning and at the end of each school year. During this period, the children attended a music course once a week for 45 minutes. The results have shown the need for a music course to take place at least twice a week, and the very purpose of the research was to provide different proposals that might contribute to music education for preschool and early-age elementary school children.

Many scholars have examined the influence of individuals' sex on their musical abilities. Thus, Pollatou et al. (2005) conducted a survey on a sample of 95 preschool children with the aim of determining the potential differences in the children's rhythmical abilities with respect to their sex. They did not identify any differences in rhythmical abilities between boys and girls, which is in line with Gordon's research (1986), who did not note any influence of one's sex on the results of the PMMA test. Schleuter and Schleuter (1989) listed the results of a number of surveys that contest the sex-related differences in one's rhythmical abilities.

H2 There is a statistically significant difference in the tonal abilities of children between the initial and final testing stages.

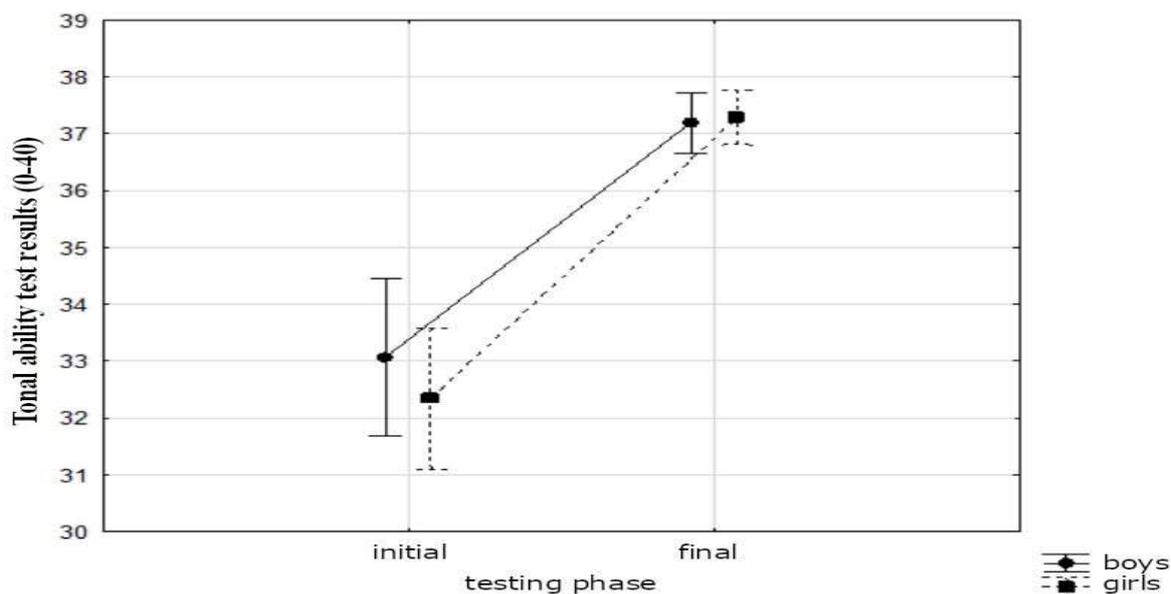
In this part of the survey, the author wished to examine whether there is a significant difference between the tonal abilities of children between the initial and the final testing stage.

To test the hypotheses on the increase in tonal abilities during the school year and significant differences in musical abilities with respect to sex, a two-way variance analysis was performed with repeated measures.

Figure 2 shows the results of the tonal abilities in the initial and final stages of testing with respect to sex.

Figure 2

Differences in tonal abilities between boys and girls in the initial and final testing stages



A significant effect of the testing stage was identified (stage = S; Cro. Faza = F) ($F = 92.94$; $df = 1,68$; $p = .000$), with no effect of sex identified ($F = .38$; $df = 1,68$; $p = .541$) or any interaction between sex and the testing stage ($F = .76$; $df = 1,68$; $p = .387$). Figure 2 shows that tonal abilities in the final stage are significantly higher than in the initial stage, making it possible to confirm the second research hypothesis, as well as the first one. The analysis of the effect rate indicates that the effect of the testing stage is significant ($\eta^2p = .58$).

Such results are in line with those of the research conducted by Lee (2010) on the implementation of the PMMA test in preschool children in Korea. For 12 weeks, the children attended a music course twice a week. In addition to the confirmation of the validity and application of the standardized Gordon's PMMA test in children in the Republic of Korea, the scholar monitored the development of the girl with the lowest results obtained in the initial rhythmical and tonal PMMA test. Following the completion of the music course, the girl showed a significant improvement in the final tonal ability test, while the rhythmical component remained at a low level in terms of the obtained results. The research results confirm the influence of music education on the development of musical abilities in children. The author emphasizes the influence of preschool music programmes in children with a low level of musical abilities.

This survey did not confirm any influence of sex on tonal musical abilities in children. Such results are in line with the results obtained by DeCarbo (1982), who has not identified any significant difference in melody-related musical abilities of preschool children and early-age school children in terms of their sex, i.e., between boys and girls.

CONCLUSION

The results of the research confirmed the presence of a statistically significant difference in the development of musical abilities in the initial and final stages of testing. The conducted survey did not confirm the influence of sex on the development of rhythmical and tonal abilities.

This suggests that systematic music education in preschool and early-age school children provided at the *Elly Bašić* School of Music in Zagreb influences the development of musical abilities in children. Gordon (2004) emphasizes the importance of formal music education with a course in music taking place at least twice a week but also addresses the importance of timely music education,

the aim of which is for the child to obtain as much music-related information and knowledge by the age of 9. This forms a prerequisite for the stabilization of the child's musical abilities that are shaped, according to Gordon (1990), by the age of 9. Moreover, in his music teaching theory, Gordon (1984) emphasizes the concept of sound before symbols, in the direction from the familiar to the unfamiliar and the role of improvisation as the basic prerequisites to meet in teaching music to children. His theory is based on the listening of music and learning arranged in sequences, which makes it linked in many ways to Suzuki's, Dalcroze's, Kodály's and Orff's music teaching methods. The said methods, including Gordon's music learning theory, emphasize the development of listening and performance skills in the first place through singing, rhythmical movements accompanied by music and the adoption of tonal and rhythmical elements, followed by the introduction to key notes and music theory.

The Functional Music Pedagogy is based on the same prerequisites, with the concept of music learning beginning with the music experience and leading to the perception of music, with a substantial stimulation of improvisation and imagination. With the said aspects of learning, the Elly Bašić School of Music is significantly approaching Orff's and Dalcroze's theories, which emphasizes the importance of the earliest improvisation and rhythmical movement as a music learning principle. Pollatou et al. (2005) agree with such a view, proposing an introduction of the methods of Orff and Dalcroze as a stimulus in developing musical abilities in harmony with movement coordination.

Therefore, we can conclude that the functional music pedagogy is similar to the prerequisites and principles of Gordon's music education theory owing to its methodical and pedagogical principles and formal preschool education. The two theories share the views of other art education and pedagogy theories of the 20th century.

Such music education and pedagogy concepts should form an integral part of formal music education with a tendency of an early music education of children. With a timely implementation of music education programmes, we can establish a prerequisite for a stabilized musical aptitude, as well as for the development of one's overall personality in general.

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