

DOCTORAL DISSERTATION - THESES

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THE DEVELOPMENT OF MUSICAL KNOWLEDGE AND ABILITIES IN THE LOWER YEARS OF ELEMENTARY SCHOOL

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2006

1. Introduction, objectives

Research in the psychology of music has a long history in Hungary. Owing to the work of Géza Révész (1916; 1946), Margit Varró (1921; 1930), Elemér Gyulai (1936, quoted by Mrs Dombi, 1992), and Endre Szögi (Szeghy) (1940, quoted by Mrs Dombi, 1992), research focusing on the issues of musical talent and musical abilities began in Hungary almost simultaneously with the initiatives abroad. In our country - beginning from the 20s and 30s of the 20th century – Zoltán Kodály gave a new perspective to music education, which had a great influence on the direction of research in the psychology of music. On Kodály's initiative research into the transfer effects of music has become a major area of the psychology of music in Hungary. Kodály was convinced that music has a crucial role in the harmonious development of a child's personality. "Music is food for the soul, and cannot be replaced by anything else. A full emotional life cannot exist without music." (Kodály, 1964a, p.156) In order to make the educational authorities and the society accept the indispensability of musical education, he wanted to support his conviction by scientific research. As a result, musical studies gained considerable momentum (Kokas, 1972; Barkóczi & Pléh, 1978; Benis & Kalmár 1979; Mrs Székács, 1980; Laczó, 1985; 2002a; Kalmár, 1989; Czeizel, 1992; Mrs. Pásku, 1999). From the 1990s the focus of the psychology of music has turned to music-therapy and the emotional effects evoked by music. (Nagy, 2004).

Research in the field of the psychology of music has been going on in Hungary for nearly one hundred years – and that on a wide spectrum. From the point of view of practical pedagogical work, the most important of these are the ones that focus on the psychological and pedagogical aspects of the methodology of musical education. Kodály's work was influential in this respect as well. Kodály considered the musical education of young people the token of the cultural development of Hungary. The methodology that he developed together with his colleagues was outstanding at the time – it justly won worldwide recognition and still stands fast in the face of the latest findings of the psychology of music. Katalin Forrai (1974, 1991) developed the methodology of musical education in nursery schools, and Jenő Ádám (1944), György Kerényi and Benjamin Rajeczky (1940) implemented the basic principles into practice for musical education in elementary schools. By working out a high quality course-book for music classes in schools, Helga Szabó – partly together with László Dobszay – and for solfege education in music schools Erzsébet Szőnyi and László Dobszay proved that the music-pedagogical conception generally known as "the Kodály method" is a decisive factor of development regardless of the place of education or the number of lessons.

In relation to these issues the question of the structure of musical abilities has come up, which has been addressed in detail by Erzsébet Kemény (Mrs Dombi) (1992), Mrs István Erős (1993) and Mária Sági (Vitányi & Sági, 2003). All in all, however, ability-tests remained on the outskirts of the field of the psychology of music. This fact was an inspiring factor in our choice of topic.

The research conducted abroad in the field of musical abilities was at the beginning characterized by the setting up of theoretical models (Billroth, 1895; Häcker & Ziehen, 1922; Kries, 1926). Later the focus turned in the direction of the measurability of musical abilities (Seashore, 1919; Wing, 1941; Karlin, 1942; Bentley, 1966; Colwell, 1969; Stankov & Horn, 1980; Gordon, 1979; 1982; 1988). These studies focused primarily on the ability of musical perception. Other musical abilities received much less attention. In the study of the ability of singing the work of Davidson (1994), in the study of the ability to represent music graphically the work of Bamberger (1991), Gromko (1994), and Gordon (1997) serve as points of reference.

The aim of our research was to explore the special features of development in the basic musical abilities at the age of 7-10, in the context of musical education in Hungarian schools. Building on the traditions of Hungarian music pedagogy, our research examines the abilities of musical perception, singing, and musical reading and writing. Although the ability-tests of musical perception have a long history, there has been no research conducted in the first four years of elementary school focusing on the abilities of singing and musical reading and writing. We find this age-group especially significant, since it is a generally accepted notion that the period of musical sensitivity closes at the age of 9 or 10. Musical development was measured by a task-system of our own making, in a three-year longitudinal study. Because the command of the mother-tongue and the understanding of the tasks is not sufficient in the first year of elementary school to have measures done, we conducted our study in years 2-4. In order to get a wider perspective on the special features of musical abilities, we also examined the role of certain background factors, such as education, motivational background, general intellectual abilities and gender.

2. Methods

The means of the study:

- A task system of our own making measuring musical ability
- For the study of general intellectual abilities:

- the coloured (children) version of the Raven standardized test of intelligence,
- the Meili sequence of numbers that measures problem-solving through the recognition of regularity and also the Cattell task of creating sequences
- verbal memory was measured by the classical method of testing the ability to recall 25 meaningful words, and visual memory was tested by the Schenk-Danzinger sequence of figures
- attention was measured by the Bourdon-test.
- Motivational factors: the questionnaire of Bernáth et al. (1981) examining learning attitude, and the questionnaire of Duckworth-Entwistle (1974) focusing on subject-motivation.

The presentation of the ability structure serving as the basis of our study:

In our study we developed a system of tasks especially for an ability-structure we defined ourselves. In our interpretation – building on the basic music-pedagogical principles of Kodály’s – the abilities necessary for certain musical activities are layered in a hierarchical way. The foundation for forming our system was the distinction of knowledge acquired through experience and knowledge acquired through formal education. We also separated the knowledge of musical reading and writing that does not require a musical activity - only an intellectual approach - from musical activities. We treated singing separately because of its special role. We built our study on this approach.

We distinguished four levels. We further broke levels 1-3 into two sub-levels.

- the level of knowledge was defined as *level 0*. In this category *no musical sound is attached* to the tasks.
- *Level 1* looks at the experimental knowledge of music in everyday life, musical activities that can develop without a formal education but nevertheless are important areas of musical education in schools. We should include in this category the musical cognitive structures developing in the process of musical perception with the help of which information transmitted through musical sound can be processed (level 1a). Singing by ear is also the result of the experimental knowledge of everyday life (level 1/b).
- On *level 2* we made a distinction between musical writing (2a) and reading (2b). On this level we excluded singing, so we provided tasks for musical reading that required children to compare the pictures of typical melodic and rhythm turns of children’s songs with the melody/rhythm heard.

- On level 3 we examined the possibility to mobilize the relationship between singing and notation. On level 3a we had solfa singing after hearing a tune and on level 3b singing by letter notation.

Tests of music generally categorize musical abilities according to the dimensions of the ingredients - tune, rhythm, harmony, tone and volume – of musical sound. We looked at our system of tasks as a matrix of musical activities and the qualities of musical sound. The following table gives a summary of the musical ability-structure that served as a basis for our study and the categorization of the tasks according to the theoretical model.

Activity Qualities of the musical sound	Level 0: Knowledge	Level 1: Musical experience		Level 2: Transforming sound into note and transforming note into sound		Level 3: Transforming singing into note and singing by note	
		a) discrimination by ear	b) singing by ear	a) writing	b) reading	a) post-solmization	b) singing from notation
A) Tune	2	2	3	3	1	1	2
B) Rhythm	2	3	*****	1	2	*****	*****
C) Harmony	*	2	1	1	*	1	*
D) Tone	****	3	**	****	****	****	****
E) Volume	****	1	***	****	****	****	****

Table 1. The structure of the system of tasks examining musical abilities

Note: We have marked the number of tasks examining each ability. There are no tasks attached to the squares marked by an asterisk. The key of these marks:

* The material for the lower classes of elementary school does not include the knowledge of harmony. This is the reason why in the row of harmony you can find tasks only in the squares where children had the knowledge necessary for dealing with the problem.

** The tone of the singing voice is a given quality.

*** Producing a sound at different volumes does not belong to the category of musical abilities.

**** The notes referring to tone and volume are not parts of the musical notation, these are references in words written in the notation.

***** The sounding of rhythm sequences is through clapping, not singing.

***** Post-solmization refers to tune.

The sample:

The sample was supplied by 17 classes of 8 schools. The participating schools included schools in big cities, towns and villages; there were secular and religious schools as well. The final sample included 302 children, 145 boys (48%) and 157 girls (52%). During the course of the study 41 children (13,6%) received music school training. All of the schools participating in the study followed the General Curriculum in their education of music, none of them followed a different or modified program.

The course of the study:

We measured musical abilities in the period between 2004 and 2006, from grade 2 to grade 4, having a test in the spring semester of each year. Entrance to the study was approved of in groups or – in the case of singing tasks – individually. With the exception of the measurement of musical abilities, all examinations were taken in the 4th grade, and the findings were analysed in relation to their achievement at the time.

Statistical analysis:

The findings were processed with the computer programme SPSS 13.0 for Windows. The following statistical methods were used: descriptive statistics, one- and two sample t-test, variation analysis, the Mann-Whitney test, correlation-calculation, regression analysis, factor analysis, multi-dimensional scaling, general linear model.

3. The findings of the study

In the following section, the answers to our proposed hypotheses will be presented.

Hypothesis 1. On the level of musical knowledge (level 0) the development of the knowledge of rhythm is faster, because it is not so complex as melodic knowledge.

The knowledge of rhythm proved to be more easily acquired than melodic knowledge: at the beginning, children achieved much better at the knowledge of rhythm than at melodic knowledge. In spite of this fact, the rate of development was the slowest at the knowledge of rhythm of all areas of knowledge and ability – what is more, this was the only area where decline was experienced at the time of the second measurement. The achievement level of the first year could not be reached by the later years as far as the application of the knowledge of rhythm was concerned. This was due to the fact that the quantity and the level of complexity of rhythmic knowledge introduced in the third year did not meet the requirement of gradation. However, the acquirement of melodic knowledge was smooth.

Hypothesis 2. On the level of everyday musical experience (level 1) the rate of development of the knowledge of rhythm and tune is faster than that of the abilities of harmony, tone and volume. The reason for this is that more attention is paid to the former abilities in the education of musical reading and writing.

Although the abilities on this level do not contain the knowledge of notation writing and reading, we propose that they represent an addition to the aspects of musical cognition. Because these types of knowledge refer to tune and rhythm, their effect is felt on these areas the best. This effect was experienced in the area of discrimination by ear (level 1a): although the achievement of the abilities belonging here – tune, rhythm, harmony, tone and volume – was similar at the beginning, the discrimination of tune and rhythm by ear developed at a much faster rate. The other sub-level of musical experience in everyday life is singing by ear (level 1b). On this level, quick development was experienced in the area of singing harmony by ear at the time of the third measurement – by this time, the rate of development of this ability was higher than that of singing tune by ear. The development of the abilities of harmony is the last to proceed according to the literature as well. Thus, although the ability of singing harmony by ear is of a lower level than the ability of singing tune by ear, our findings supported the notion that the development of the former gains momentum around the age of 10 – probably partly as a special feature of this age group.

Hypothesis 3. On the level of musical writing and reading (level 2), the development of the less complex area of rhythm comes before the development of tune – the slowest area to develop is that of harmony, which is not included in the curriculum.

According to the curriculum, individual musical writing by ear (level 2a) is not included in the requirements, thus the development of these abilities was slower than those related to musical reading (level 2b).

Within the activity of musical writing the development of melody and rhythm was altogether of the same rate, but the line of development differed to a great extent in the two areas. While the development of tune writing was constant, the development of rhythm writing increased slightly by the time of the second measurement and showed a sudden rise by the time of the third measurement. This unsteady development backed up our findings about musical knowledge: the material on rhythm in the third year of elementary school is not proportional with the time allowed for practice. In the ability of musical writing, to the practice of which more opportunity was given in education, the development of rhythm reading came before that of tune reading. The development of the area of harmony – not present in the curriculum – stayed at a low level. This was taken to be partly due to the special

features of this age-group, but the fact that the development of harmony is included in the music education of the lower years of elementary school also had a significant role. This ability is so unformed that its study proved far too early.

Hypothesis 4. Among the abilities realizing the relationship between the system of musical symbols and singing (level3), the post-solmization of tune develops much faster than singing by notation, and the post-solmization of harmony shows the slowest rate of development.

This hypothesis proved to be true. We should note, however, that achievements measured at these levels were extremely low. In the hierarchy of the musical abilities that we measured these abilities rank the highest, which means that all the abilities of the lower levels are needed for these ones to appear. The deficiencies of any of the abilities of the lower levels hinder their development.

Hypothesis 5. Starting out from their originating achievement (measurement taken in the second year) the development of the students belonging to each quartile was different in the course of our research programme.

Comparing the quartiles it can be stated that the higher the originating achievement of the student, the smaller the rate of development. Our findings showed that all in all the weakest students developed at the fastest rate. The rate of development of the students with different originating achievements differed especially in the first period (between the first and second measurements): while the students belonging to the lower quartile showed a surge in their development, the ones belonging to the upper quartile were practically stagnating. The compensation of the drawbacks was thus successful, however, the best students did not receive enough impulse for further development. The second period (between the second and the third measurement), however, was more beneficial for the best students. The students belonging to the two quartiles in the middle – those approximating the average – showed a similar rate of development in both periods. These findings point out the deficiencies of differentiated development.

Hypothesis 6: Advancing in musical development, the structure of these abilities undergoes a transformation.

The change in the structure of the musical knowledge and abilities that we measured was verified and was interpreted as development. The strengthening of relationships between the abilities was a signal of musical cognition becoming multi-dimensional. Due to this fact, information coming through different channels adds up. In the case of certain abilities – especially singing by ear and tune writing – this process was easily observable.

Hypothesis 7: In the structure of musical abilities the ability of discrimination by ear has a crucial role.

Spontaneous musical experience is partly built on the discrimination of musical phenomena by ear and partly on the musical experience gained through the singing voice of one's own. It is a fact, however, that the ability of singing in tune is not a trait owned by everyone. In spite of this, it is common practice in music pedagogy that the development-level of musical abilities is judged by the ability of singing. For this reason we also examined whether singing is truly such a decisive factor in musical knowledge and abilities, or it is the discrimination of musical phenomena by ear – with a term of music pedagogy “having a good ear” - that plays the more crucial role. According to our findings, discrimination by ear became a decisive factor by the third measurement, it played an important role in the abilities connected to musical writing and reading. It can be stated about the relationship between singing and discrimination by ear that – although having a good ear is accompanied by the ability of discrimination by ear – those with a poor singing voice can perform on a high level in the area of discrimination by ear.

Hypothesis 8. Positive attitude to learning and the preference of music lessons in schools shows a connection with the activity of singing rather than with musical knowledge, discrimination by ear or the abilities associated with musical reading and writing.

The main aim of the subject of music in schools – as part of artistic education – is to provide students with musical experience, which is primarily realized through singing songs in class. In spite of this, motivational factors show the least connection with the activity of singing. The significance of background motivational factors is greatest with regard to the abilities of musical reading and writing, and somewhat less significant in the ability of discrimination by ear. This is due to the fact that in the context of school subjects and activities the activities labelled ‘serious work’ became more important from the students’ – and presumably from the educators’ – point of view.

Hypothesis 9. The connection with general intellectual abilities is strongest in the areas of musical knowledge (level 0) and the abilities of notation writing and reading (level 2), while in the areas of everyday musical experience (level 1) and the activity of singing related to notation reading (level 3), the role of general intellectual abilities is less significant.

In general it can be stated that the role of general intellectual abilities is strongest in musical knowledge that does not include actual musical activity. Since musical knowledge is indispensable to musical reading and writing, general intellectual abilities play a significant

role in this area as well. The two levels in the area of everyday musical experience, however, show a difference in this respect: while the ability of discrimination by ear – although it does not need knowledge acquired in schools – depends significantly on general intellectual abilities, in the activity of singing by ear their role is the least significant. In the singing activity related to notation reading – as a resultant of their lower level of significance in the area of singing by ear and their higher level of significance in the area of notation reading and writing – the general intellectual abilities are of relatively small significance. All in all, it has become clear that from among the intellectual abilities we examined, general intelligence plays a role of outstanding importance.

Hypothesis 10. The standard of the students' knowledge and abilities is influenced by which class they go to in school and whether they take part in music school education.

In our analysis we also examined – apart from examining the differences between the achievements of students in participating classes and the students taking or not taking part in music school education – whether the rate of their development differed or not. In overall achievement and its development both the school class and music school education is influential. Examining the areas of musical knowledge and abilities separately it turned out that the significance of education varied. Its influence can be proven in all areas of performance, however, its influence over the rate of development was not always evident. There were three such areas: the knowledge of rhythm, the ability of discrimination of volume by ear and the ability of tune reading. The uncertainty in the acquirement of the knowledge of rhythm was attributed to the inadequacy of the arrangement of the material, which the education system could clearly not handle. We had come to the conclusion before that the ability of discrimination of volume by ear was less of a musical ability. This conclusion was supported by the fact that its development was not much influenced by musical education. Musical education did not have much significance in the development of tune reading either, however, this was attributed to the special features of the task we employed: since the task examining this aspect was a novelty for the students, aside from the development level of this ability, individual problem-solving creativity had a significant role in the achievement.

Hypothesis 11. Examining the two main factors of school education (school class, music school) we propose that music school education plays a more significant role in the development of musical knowledge and abilities.

We proposed the priority of music school education because education is carried out individually or in small groups and also there is more time for development than in the one-and-a-half hours a week in schools. In spite of this, the more influential nature of music

school education was not verified. The significance of school and music school education in the level of achievement is similar. While the school class has a key role in the rate of development in almost all fields of knowledge and abilities, the significance of music school education is typically influential only in the development of the abilities related to singing. We came to the conclusion that the amount of time spent practising has the biggest role in these abilities – something that music schools have a much greater opportunity to provide.

Hypothesis 12. The generally better school-achievement of girls shows in musical knowledge and abilities as well.

Although the general achievement of girls is better, they do not develop at a faster rate than boys. The separate study of musical knowledge and abilities proved that the differences in performance – to the advantage of girls – are apparent only in knowledge-content activities. Not even in these, however, is there an area where girls develop faster. The higher level of school performance that generally characterizes girls is manifested in musical knowledge and abilities to a certain extent only.

Conclusion:

The significance of our research lies in the fact that our system makes the examined musical knowledge and abilities separable, thus making it possible to explore the underlying connections and to approach the process of development from a new perspective. It is a novelty that our system examined the development of musical abilities in relation to the acquirable knowledge, which helped to observe the process from a special point of view. Amongst the changes brought about by past decades, the traditional, world-famous methodology of our music education can hardly do without a closer examination of the developmental process of musical abilities. Our research took on the task of exploring only one – although an especially significant - age-group of this developmental process – but this way it can serve as a starting point for the studies focusing on the special features of the age groups previous to or following this one.