

TESTING MUSIC-READING ABILITY ON THE BASE OF KODÁLY CONCEPTION

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In my pilot study I am dealing with the music-reading ability of singer students who are studying at Kodály School, in Kecskemét. I would like to explore the characteristics of the expert music-reading strategy users and the different possibilities for teaching of music-reading. I would like also examine whether sight-reading is an acquired skill and analyze the individual differences in sight-reading performance. In different domains of expertise (including music), there is a close relationship between the level of performance individuals have attained and the amount of practice time they have accumulated during training in the domain. From the early studies on the importance of eye-voice span we know that the ability to read ahead while singing unrehearsed music is a condition for successful sight-reading. Eyetracking analysis has become nowadays a popular tool in methodological researches. Eye movement in music reading – the scanning of a musical score by a musician's eyes – is a very complex phenomenon that involves a number of unresolved issues in music psychology and requires intricate experimental conditions to produce meaningful data. I conducted my research at Teacher Training College in Kecskemét, where eye movements data during singing was measured by an eye tracking system. The music-reading materials were all Zoltán Kodály's compositions, whose conception forms the basis of the Hungarian music education. The results of latest researches suggested that skill level of performers, difficulty of music pieces and knowledge for music pieces were crucial factors which influenced the preview time, as well.

Keywords: music education, eye-tracking, musical skills, sight-reading

Improving music-reading ability is one of the central parts of music education including instrumental, vocal or Solfége trainings. Solfége education in Hungary is based on the well-known Kodály conception. In 2012 around the world musicians remembered the 130th anniversary of the birth of Zoltán Kodály, and his death 45 years ago. It was also 65 years ago in 1947, when Kodály wrote about his idea and goal in his article called *The 100 Year Plan* in a music teachers' periodical: "...it may well be hoped that by the time we reach 2000 every child that has attended a primary school will be able to read music fluently. This however, will only be an external sign of what will surely have developed by then and will rightly bear the name of Hungarian culture" (Kodály, 1947).

The focus of Kodály conception is music literacy, achieved through listening, singing, reading, writing, and creating music. Kodály's pedagogy emphasizes developing music literacy through the indigenous music of the culture, beginning with folk songs.

The Kodály Conception

Zoltán Kodály, the Hungarian composer, folk music researcher and pioneer in music education, inspired revolutionary changes in the teaching of music in Hungary from the late 1930's. Kodály, together with some of his former disciples, like Lajos Bárdos, György Kerényi, Gyula Kertész established new principles of music education, which have come to be known as the Kodály conception.

According to the Kodály conception musical training should be an integral part of the general curriculum and music should not only be accessible to the elite. Musical literacy – it was Kodály's belief – the ability to read and write music is as important as general literacy. To establish this skill, Kodály suggested adopting relative solmization on the base of reverend John Curwen's Tonic Sol-fa system of music education in England. Curwen's system was designed to aid in sight reading of the staff with its lines and spaces. Curwen adapted it from a number of earlier musical systems, including the Norwich Sol-fa method of Sarah Ann Glover (1785-1867) from Norwich.

Zoltán Kodály composed reading and singing exercises needed for practicing from primary to professional levels, he claimed that music reading and writing (like the alphabet) can be learnt by anyone.

Kodály wrote numerous articles and essays on his educational concept and gave many speeches at international conferences. He stressed that the goal is not only teach music, but also to improve teaching techniques (Király, 2012). In all his pedagogical writings Kodály emphasizes that music should have a central role in education.

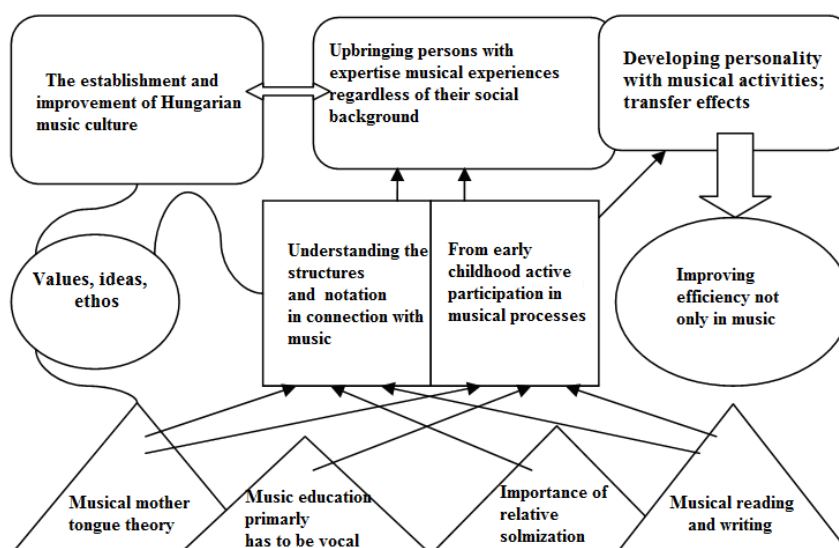
Although the application of Kodály's ideas on music education in Hungary is rooted in Hungarian folk music, his concept is easily adaptable to the folk music of any other nation. Kodály promoted the teaching of general musicianship to both instrumental and Solfége students.

Kodály believed that musical aptitude is a characteristic of every person and that, ideally, a music education should begin as early as possible in a person's life - first at home and later within the school curriculum. Kodály elaborated the structured and sequential system of music education that would make music accessible to all students in Hungary. His concept has gained international interest and remains in the use of many countries' music education, not only in Europe, but all over the world.

Research studies showed that there is a positive transfer effect of Kodály's musical training to several other areas of the elementary school curriculum - such as grammar, spelling, reading, arithmetics and physical education (Barkóczi & Pléh, 1982).

As a practicing music teacher I use Kodály's conception in my everyday teaching completed it with the use of the latest info communication technologies. Gönczy (2009) created the hierarchical illustration of the main elements of Kodály conception.

Figure 1. Gönczy (2009): The hierarchical illustration of the main elements according to the Kodály Conception



Researches in Hungary

The first researches in connection with musical abilities in Hungary were started in 1916 by Géza Révész, who made an intensive study of the young Hungarian pianist, Erwin Nyiregyházy. Endre Gyulay examined 400 children how music affects their psychic world. The generative effects of music are being proved by the analysis of Iván Vitányi, Zoltán Laczó, dr. Judit Gál music psychologists, sociological essays of Agnes Losonczy. The works of Klara Kokas, Ilona Barkóczi, and Csaba Pléh in the 1970's have great significance, they were about the transfer effects of music and the importance of everyday music learning in children's personality (Czeizel & Batta, 1992).

The outcomes convincingly proved that not only the level of intelligence changed, but mostly it is the creativity which is changing because of musical education. Studying an instrument and the active training with music means a kind of activity for the children in which they can feel happiness. The serious work process itself becomes a source of joy which urges children to repeat the action. The state of perfect experience is *autodelic*, the activity is not aimed at usefulness, but for pleasure. This is a way how a child becomes a complex and mature person with the help of *flow experience* (Hercz-Dorman, 2009).

During the teaching process a music teacher can be a positive example for his students. This is very important since from early school years peer groups and examples gain an increasing importance in forming the personality (Somló, 1961). In recent days Rita Pécsi also examines the possibilities of development of emotional intelligence with the help of music. Marta Janurik also deals with the transfer effects of musical activity.

Erzsébet Dombiné Kemény (1992) summarized the 29 most common musical tests that mentioned 87 different musical skills. In these musical tests the most common exercises are in connection only with musical hearing (listening discrimination of musical sameness or diversity), not with music reading or music writing. *Istvánné Erős* (1992) created the *model of basic musical skills*. She separated five musical dimensions (melody, harmony, rhythm, dynamics and tone). She also distinguished four types of information-giving in musical communication (hearing, conveyance, reading and writing) (Czeizel & Batta, 1992). On a higher level of music education, in music schools or conservatories we should complete the chart of the model of basic musical skills with *tone-conveyance*, *tone-reading*, *tone-writing* and *dynamic-conveyance*, *dynamic-reading* and *dynamic-writing*.

Table 1.

	Hearing	Conveyance	Reading	Writing
Melody	Melody hearing –	Melody conveyance –	Harmony reading –	Melody writing –
Harmony	Chord hearing –	Chord conveyance –	Chord reading –	Chord writing –
Rhythm	Rhythm hearing –	Rhythm conveyance –	Rhythm reading –	Rhythm writing –
Tone	Tone hearing –			
Dynamics	Dynamic hearing –			

In: Erősné (1992): The model of basic musical skills

Music-reading ability

In the 20th century thousands of researches have been dealing with reading, but with music-reading less than 400 studies, and about music reading have not been born global theories. This fact is very interesting, because music (including music reading or even writing) constitutes an important part of general education in all level.

Music reading is a process of converting special visual symbols – music notation – into sounds. The sounds may be silent, conceived internally, or they may be produced externally through the voice or musical instruments. From this simplistic definition there arises a number of more complex issues to be explored (Hodges, 2011).

Music reading is a complex process involving at least two distinct skills: the reading skill and the mechanical skill (Wolf, 1976). From a cognitive perspective, music reading requires several simultaneous processes including coding of visual information, motor responses and visual-motor integration (Gudmundsdottir, 2010).

Studies find that music reading achievement at a high level is determined by the speed of information processing and psychomotor speed. This means that the decoding ability and the motor response are important in music reading but the integration of these abilities may be the key to a successful execution. Studies on perception indicate that pitch information and timing information is processed separately. Perhaps not surprisingly, studies have demonstrated that good rhythmic reading abilities have a high positive correlation with success in music reading (Elliott, 1982).

There are no research studies at all that deal with not only pitch and timing, but with the other elements of a music score – like dynamic or agogic and how these signs could effect on sight reading. Also researches are needed in the field of singing from a music score with text or singing a polyphonic composition in choir. To reveal the characteristics of good music-reading strategy users and the possibilities of various music-reading teaching strategies would be important and relevant, as well.

In Hungarian or in other European music schools it is Solfège lesson which is dealing with improving of music-reading or music-writing. Solfège is taught two hours in a week for instrumentalist and singer students in all level. At conservatory level the number of students, who study Solfège is about five thousand, in music schools their number is about 250 000 in Hungary. However, on Solfege and its transfer effects has been only a very little research yet. From our previous research in conservatory it turned out, that a high correlation exists between the grades of Solfege and the grades of Mathematics, Italian and Hungarian literature ($p < 0.001$) and Solfège also correlates with English language and Grammar ($p < 0.005$). Also it turned out from our last year research in a conservatory that musical reading and writing skills are highly correlated with each other, and these musical skills are highly correlated with clear intonation and rhythmic skills ($p < 0.001$). Interestingly, musical writing shows a high correlation with other skills, such as critical thinking, goal setting or concentration ($p < 0.001$).

Different countries have different systems of music education that could effect on the improvement of music-reading ability. In Western European countries, for example in Luxembourg or in Belgium conservatories special sight-reading lessons are offered for all the instrumentalist students from the age of 14, while in Hungary, only at music colleges pianist students can exercise sight-reading in half an hour with the help of an experienced teacher.

Eye-tracking researches in music education

Using eye-tracking nowadays is becoming a popular methodological tool, but eye movement analysis is not only an educational research tool, but also an opportunity, which facilitated the development of student learning, as well. Researches so far suggest that the individual's musical skills significantly influence the eye movements during music reading.

Researchers have found that better pianists use more economical their eye-movements, keeping their eyes on the score during playing the piano, while the less trained pianists often unnecessarily watching their hands.

In Hungary János Steklács is the most well-known researcher in eye movement, with whom an article is appeared with Martha Janurik about comparing music-reading and reading skills. Eye movement in music-reading is the scanning of a musical score by a musician's eyes. This usually occurs as the music is read during performance, although musicians sometimes scan music silently to study it, and sometimes perform from memory without score. Most eye-movement studies focus on instrumentalist students – pianists, violin or guitar players, less studies deal with singers and only a few of them are about a specific music teaching method.

Most research with eye movement in music-reading has primarily aimed to compare the eye movement patterns of skilled and unskilled performers. Skilled and unskilled performers typically sight read the same passage at different tempos and/or levels of accuracy.

About the research

According to previous research in connection with eye-tracking, experienced music readers read more units ahead. Their eyes fix on the structurally important functions, such as certain chords or phrases, and then they glide towards the less important details. The perception of visual information occurs almost entirely during fixations and little information is picked up during saccades. Fixations comprise about 90% of music-reading time, typically averaging 250–400 ms in duration.

Sloboda (1974) proposed that eye-voice span in reading research could be named as eye-hand span in music-reading. During reading a normal eye-voice span usually is five to seven words, in music-reading it is normally five to seven notes and the distance is larger if the score is more complicated (*Sloboda*, 1984).

In our research the participant conservatory students got six increasingly complex tasks, all of them are Kodály's compositions, and after one minute studying the score on the computer screen, students should sing them. Timing is essential in music and much of the musical information is coded in the meter and the rhythm. The first score contains only rhythm with changing metres; the next is composed with Sol-fa syllables from Kodály's *Pentatonic Music*, volume III. The use of different keys is an important part of the *Solfége* education. The next compositions are not only in G-clef, but in C-clef and with more complex rhythms or intervals. The last task for the young musicians was a Hungarian folk song with three verses collected by Kodály, which were sung with text after one minute preview.

Our research was conducted at Kecskemét College Teacher Training Faculty, with the help of János Steklács. The participants were seven singer students between the ages of 16-18 from the Kodály School in Kecskemét. The eye movement tracking device was a *Tobii T120 with Tobii Studio 2.2.7. software*, which also made video and audio recordings.

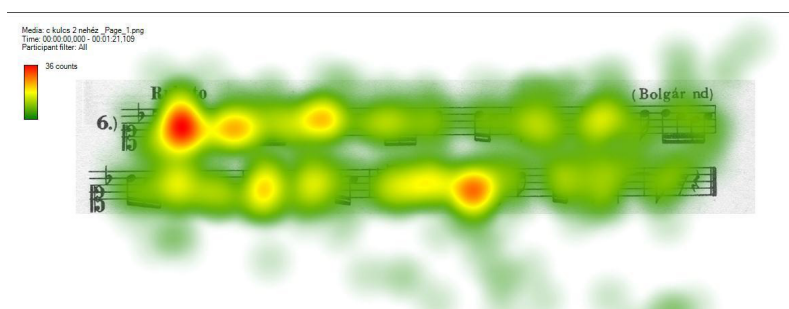
Results of the study

A number of conclusions in connection with music reading can be drawn on the basis of the thermal images of the eye movement tool. The eye fixates the longest period in the beginning of the music score, examining the meter and the different key signatures, and also fixates on the more complex rhythms and intervals.

On the thermal images we can see where the eyes fixate the longest, these parts highlighted in red, and where students looked rarely; these areas are shown in green colour. The importance of this research is that those areas in different music materials could be discoverable where students have difficulties during music reading.

We can see in the task with C-clef that the difficulty for the students is not with the intervals, but that after a long, sustained tone they should go on with the precise rhythms.

Figure 2. Thermal image of the C-clef score



On the music score of Sol-fa syllables it is clearly seen the progress, how students became more and more better as they were getting familiar with the music, they have less fixations towards the end of the score. Generally, students observed more the notes, then the rhythm notation. Longer time they fixed, however, if the rhythms became more difficult.

For us, the most interesting example was the folk song with text. Students used a variety of strategies to perform the song. The video recordings showed that some students memorized the melody of folk songs, and they rarely glanced back from the verses to the notes. However, they had difficulties with some strange words; it seemed that the folk text was the most difficult for the students. On each example it was recognized that most of the students were focusing the beginning of the music, where they processed the information - meter, clefs, initial note with the proper Sol-fa name, etc.. All students performed the examples with relative Sol-fa, except the task with C-key and the folk songs with text, so they used the main principle of Kodály conception.

Conclusion

Eye-tracking researches in music education started about seventy years and we have about eighty studies; the majority of these deal with instrumentalist and mostly with adult amateur and professional artists. Our research was the first attempt with eye-tracking about music-reading with conservatory singer students on the base of Kodály conception.

The aim of our further research is to create an online assessment system for testing the musical abilities in conservatory students. I would like to compare the results of the different age groups and also examine the relationship between the development of mathematical, reading and writing skills and musical abilities.

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