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Recognizing Modal Versions of Tonality by Students of Preschool and Early Childhood Education

Rozpoznawanie modalnych wersji tonalności przez studentów edukacji przedszkolnej i wczesnoszkolnej

KEYWORDS

music listening, early musical education, musical skills, tonality

ABSTRACT

The vast majority of preschool and early childhood teachers admit that they have problems with implementing musical issues. Experimental research indicates that the inability to sing, move to music, differentiate tonality and meter, improvise, read and write down music, is mainly caused by deficits in audiation. The article focuses on research results regarding the effectiveness of recognizing a melody presented instrumentally in eight tonalities: 1. Major; 2. Dorian; 3. Phrygian; 4. Lydian; 5. Mixolydian; 6. Aeolian; 7. Harmonic Minor; 8. Locrian. Due to the purpose of the research, the rhythmic content of all versions was the same, and the procedure used allowed for comparing students' attention by determining the time of receiving (listening to) the melodic line and the moment at which they gave the answer. Listening skills help develop critical thinking skills, which are important in any form of communication: speaking, singing, reading, writing or synthesizing information.

SŁOWA KLUCZE

słuchanie muzyki, wczesna edukacja muzyczna, umiejętności muzyczne, tonalność

ABSTRAKT

Zdecydowana większość nauczycieli przedszkoli i wczesnoszkolnych przyznaje, że ma problemy z realizacją zagadnień muzycznych. Badania eksperymentalne wskazują, że niemożność śpiewania, poruszania się w rytm muzyki, różnicowania tonacji i metrum, improwizowania, czytania i zapisywania muzyki wynika głównie z deficytów audiacji. W artykule skupiono się na dwóch podstawowych elementach muzycznych – tonacji i rytmie. Przedstawiono wyniki badań dotyczących efektywności rozpoznawania melodii prezentowanej instrumentalnie w ośmiu tonacjach: 1) durowej; 2) Dorian; 3) frygijskiej; 4) lidyjskiej; 5) miksolidyjskiej; 6) liparyjskiej; 7) molowej harmonicznej; 8) Locrian. Ze względu na cel badań zawartość rytmiczna wszystkich wersji była taka sama, a zastosowana procedura pozwoliła na porównanie uwagi uczniów poprzez określenie czasu otrzymania (wysłuchania) linii melodycznej oraz momentu, w którym udzielili odpowiedzi. Umiejętności słuchania pomagają rozwijać umiejętności krytycznego myślenia, które są ważne w każdej formie komunikacji – mówieniu, śpiewaniu, czytaniu, pisaniu lub syntezie informacji.

The Need for Early Music Teaching

The vast majority of preschool and early childhood teachers admit that they have problems with implementing musical issues. Children are accustomed to artistic activities that provide relaxation and pleasure, and limit the assessment of their development and effort. If music classes in kindergarten and music lessons at school take place at all, they are often conducted by people who are not prepared well enough in this area of education. Teachers use ready-made lesson plans and background music (serving as accompaniment), but they are unable to decide on their own what, when, why to teach, and how to work with children who do not want to sing or play instruments (Krajewski & Schmidt, 2014).

The greatest value resulting from musical activity is the variety of actions based on commitment. This is made possible by the implementation of the concept of audiation development, which teaches how to achieve specific goals, communicate effectively within a group, correctly recognize sounds, keep one's own and other people's reactions in memory, and function harmoniously. Success in the process of learning music is determined by access to individual resources, ease of adaptation, perception, reception, and assimilation of sounds, and the ability to present music. A teacher implementing the concept of audiation development improves the effectiveness of the activities of each person performing specific musical tasks. Appropriate education is needed to maintain the potential of innate musical abilities and support the development of children's

audiation skills. Convincing observations, analyses, opinions and arguments justifying the importance of the preschool and early school period are provided by Edwin E. Gordon's music learning theory (Zwolińska, 2019, pp. 112, 114).

In the process of musicalization, concentration of attention is important, i.e. the ability to consciously direct and maintain interest in specific activities. Good ways to practice this ability include: listening carefully, teaching accuracy, releasing excess energy, making decisions, consistent action, planning tasks and appreciating the child's effort. Drawing attention to what is happening in music is possible thanks to frequent changes in the tonality, dynamics, timbre and tempo of the songs. Musical education in early childhood allows not only to build solid foundations for the development of the musical language, but also opens up opportunities to acquire various skills in a natural way (Zwolińska, 2011, p. 147).

Changes in students' opinions, emotions and feelings depend on teachers' behaviour in various social situations, i.e. on what they do, think and feel. The teachers' effectiveness increases if they are perceived as decisive and competent (Giggio & Friedman, 1986), and their choice of the optimum dose of expressiveness results from knowledge of cultural norms (Goleman, 2007). Lack of musical refinement is often associated with a deficit of social skills, emotional disorders or behavioral disorders. An important part of the definition of a music learning disability is its exclusions: incompetence in this area does not result from a lack of musical ability, mental delay, emotional disorders, or cultural differences.

Experimental research indicates that the inability to sing, move to music, differentiate tonality and meter, improvise, or read and write down music, is mainly caused by deficits in audiation, which is independent of discrepancies in talents and achievements, and is related to the musical content, that is, the components of experience (Gordon, 1997). Using tests, you can identify the level of children's musical talents and, on this basis, take effective actions in the field of tone and rhythm (Gordon, 1979, 1982, 1989, 1991). Unfortunately, the inability to learn music is not decreasing, and the disturbing reasons for this increase are the lack of basic knowledge about the development of musical abilities, the lack of financial incentives to work with particularly gifted students, as well as inadequate preparation of teachers by universities.

Most students of preschool and early childhood pedagogy have great difficulties in learning music and are not competent to take up the profession of a teacher managing the musical development of a small child. If the musical development of future teachers is neglected in childhood, they are unable to acquire the desired skills in listening, singing, improvising, reading and notating music. This means that in educational and professional practice, no specialised intervention on their part will be possible. Research by Edwin E. Gordon (1997, 1999) shows that all children, regardless of their level of talent, can achieve the ability to understand music to a degree appropriate to

their abilities, provided that they receive intensive educational exposure over a long period of time by a competent teacher.

This report focuses on research results regarding the effectiveness of recognizing a melody presented instrumentally in eight tonalities, which required competent auditory differentiation. Listening to music is a learned communication skill that includes three stages: receiving, giving meaning and reacting to sounds. Receiving means attending to the whole message and consciously paying attention to some things and ignoring others (Wolvin & Coakley, 1996). The presented research focused on the overall perception of melodies and conscious attention to their characteristic features in tonality.

Creating meaning depends on how listeners understand the sound of the received information (Bohlken, 1995), and this requires readiness to listen in various situations (Wolvin & Coakley, 1994; Roberts, 1998). Two elements transform skillful sound recording into competent listening: motivation to listen effectively and the ability to listen effectively in various situations (Morreale et al., 2011). A competent recipient has this readiness even when the situation is not important or intriguing to him.

Research Method

The answer was sought to the following question: What is the effectiveness of listening to the same melody that is tonally different? A test was developed presenting the melodic line in eight tonalities: 1. Major; 2. Dorian; 3. Phrygian; 4. Lydian; 5. Mixolydian; 6. Aeolian; 7. Harmonic Minor; 8. Locrian. Due to the purpose of the research, the rhythmic content of all versions was the same. The use of this tool allowed us to compare the choices of 134 students from the same field of study (Preschool and Early Education Pedagogy) who studied at the Kazimierz Wielki University in Bydgoszcz. Most of the subjects had comparable education in music education, and they were recruited on the basis of voluntary and informed consent to participate in the experiment. The musical stimulus was a twelve-bar melody in a duple meter, which was differentiated into eight modal tonalities. Individual versions were played to each person using a CD, and based on the indicated choices the correctness of identifying the eight tones was determined.

Procedure

First, musical aptitude was measured using a test named *The Advanced Measures of Music Audiation* (AMMA) by E. E. Gordon (1989), and then the effectiveness of listening to modal tonal versions was checked using the LTC_1 Test in which each

variant referred to a different tonality. Ambitus, i.e. the range between the lowest and highest notes in all melodies was within the range b-c2, and their rhythmic content was the same. Listening to all examples, by every participant, took place in one series. The entire test consisted of six sets (one lasted 2:29 minutes), each of which presented the same tonal series, but their exposure took place in a different order and none of them was repeated. In this way, the analysis of decisions made by students (including the occurrence of errors) excluded the incidentalness of events. The break between subsequent exposures of tonality was always the same and corresponded to two bars of the meter being implemented. Due to the length of the test tasks, the test was conducted in two parts within one week.

The procedure used allowed for comparing students' attention by determining the time of receiving (listening to) the melodic line and the moment at which they respond. The study took place in controlled conditions, and the melody played as long as the subjects focused their attention. The total examination time for one person was 35 minutes. All test melodies were electronically recorded on a Solton KETRON X3 synthesizer in order to control possible associations of the presented melodies with a specific timbre of the selected musical instrument that was known to the subjects (preferred or averse) (Gordon, 1984; Trzos, 2014; Kendall & Carterette, 1993; Zacharakis et al., 2014). In this way, it was ensured that the remaining elements of the presented modal versions (rhythm, time, tempo, dynamics, timbre, method of playback) were the same throughout the study.

Results

The results obtained below show the relationship between musical aptitude and test results. Variables relating to the results of the test were divided into two groups: 1. quantitative and 2. dichotomous. Quantitative variables are those in which the result is the number of recognized melodies, i.e. all ending in "_SUM" and the number of recognized melodies in particular tonalities (Maj., Dor., Phry., Lyd., Mix., Aeol., Harm. and Loc.). Correlations were calculated for these variables. Dichotomous variables, on the other hand, are those in which we received information about whether the melody was (1) or not (0) recognized, i.e. all with the ending "_w". In this case, the so-called odds ratio (OR) was not calculated. The results determining the level of musical talents were expressed in percentiles.

Level of Musical Aptitude and Tonality Recognition – Quantitative Variables

The data was analyzed in two dimensions: tonal (Tonal_C; Table 1) and rhythmic (Rythm_C; Table 2) regarding students' listening to music; and supplemented with general results (Total_C; Table 3).

In the tonal range, the analyzed variables were not normally distributed, which was revealed by the significance of the Shapiro-Wilk test result ($p \leq 0.05$), so Spearman's r correlation coefficient was used. The level of tonal aptitude (Tonal_C) was defined as the percentile score on the Tonality subtest (AMMA). A significant relationship was revealed between the level of tonal abilities and the induced change in 2 out of 15 test results: B_SUM ($p = 0.045$) and Mix ($p = 0.015$). These relationships are positive. It can be concluded that the better all tonalities were recognized, the better the results were in terms of listening to tonality in these two aspects (Table 1).

Table 1. *Correlations of LTC_1 Test Results with Tonal_C (E. E. Gordon's AMMA) in the Tonal Dimension*

LTC_1 Test result	**Tonal_Correlation**			
	R	***p***	**Relation direction**	**Relation strength**
A_SUM	0.168	0.053	---	---
B_SUM	0.173	0.045	positive	W
C_SUM	0.142	0.103	---	---
D_SUM	0.081	0.351	---	---
E_SUM	0.022	0.797	---	---
F_SUM	0.128	0.139	---	---
OG_SUM	0.161	0.064	---	---
Maj	0.119	0.169	---	---
Dor	0.103	0.238	---	---
Phry	0.15	0.084	---	---
Lyd	0.159	0.067	---	---
Mix	0.21	0.015	positive	W
Aeol	0.161	0.063	---	---

LTC_1 Test result	Tonal_Correlation			
	R	*p*	Relation direction	Relation strength
Harm	0.071	0.415	---	---
Loc	0.122	0.161	---	---

Source: the author's own research. Legend: Maj – Major; Dor – Dorian; Phry – Phrygian; Lyd – Lydian; Mix – Mixolydian; Aeol – aeolian; Harm – Harmonic minor; Loc – Locrian; W – very weak

In the rhythmic dimension of music listening, the relationship between the level of rhythmic skills and test results was checked. Quantitative variables were also analyzed. Similarly to the tonal dimension, the analyzed variables did not show a normal distribution (significance of the result for the Shapiro-Wilk W test $p \leq 0.05$). For this reason, the Spearman's r correlation coefficient was also used in the rhythmic dimension. It turned out that the result of rhythmic abilities (Rhythm_C) showed a significant relationship between 10 out of 15 detailed results of the LTC_1 test ($p \leq 0.05$). These correlations turned out to be positive. It can be assumed that the better the general rhythm recognition abilities, the better these people were able to differentiate the tonal details of the presented melodies. The rhythm of the tasks did not cause a significant additional burden on the perception of musical content. These relationships were revealed in three of the six series (A_SUM; B_SUM; C_SUM) and the overall result (OG_SUM), and in six of the eight tonal versions of the same melody (Table 2).

Table 2. *Correlations of LTC_1 Test Results with Rhythm_C (E.E. Gordon's AMMA) in the Rhythmic Dimension*

LTC_1 Test result	Rhythm_Correlation			
	R	*p*	Relation direction	Relation strength
A_SUM	0.273	0.001	positive	W
B_SUM	0.2	0.02	positive	W
C_SUM	0.217	0.012	positive	W
D_SUM	0.111	0.202	---	---
E_SUM	0.137	0.115	---	---
F_SUM	0.135	0.121	---	---

LTC_1 Test result	Rhythm_Correlation			
	R	*p*	Relation direction	Relation strength
OG_SUM	0.251	0.003	positive	W
Maj	0.24	0.005	positive	W
Dor	0.193	0.025	positive	W
Phry	0.252	0.003	positive	W
Lyd	0.22	0.011	positive	W
Mix	0.19	0.028	positive	W
Aeol	0.217	0.012	positive	W
Harm	0.121	0.165	---	---
Loc	0.156	0.072	---	---

Source: the author's own research. Legend: Maj – Major; Dor – Dorian; Phry – Phrygian; Lyd – Lydian; Mix – Mixolydian; Aeol – Aeolian; Harm – Harmonic minor; Loc – Locrian; W – very weak.

The tested relationships between quantitative variables were also related to the general results of the musical aptitude test (Total_C) and the test results (LTC_1 test). Also in this approach, the analyzed variables did not indicate a normal distribution (significance W – Shapiro-Wilk $p \leq 0.05$). Therefore, Spearman's r correlation coefficient was used in further analysis. It was revealed that the general level of musical talents (Total_C) significantly correlated with the level of 9 out of 15 results of the LTC_1 Test ($p \leq 0.05$). The discussed correlations also revealed a positive direction. It can be assumed that the better the recognition of tonality and rhythm, the better results the students obtained in the aspects (A_SUM; B_SUM; C_SUM; OG_SUM) and in five out of eight tonal versions of the same melody – Table 3.

Table 3. *Correlations of LTC_1 Test Results with the Overall Total_C (E. E. Gordon's AMMA)*

LTC_1 test result	Total_Correlation			
	r	*p*	Relation direction	Relation strength
A_SUM	0.238	0.006	positive	W
B_SUM	0.212	0.014	positive	W

LTC_1 test result	Total_Correlation			
	r	*p*	Relation direction	Relation strength
C_SUM	0.188	0.029	positive	W
D_SUM	0.109	0.211	---	---
E_SUM	0.071	0.412	---	---
F_SUM	0.149	0.087	---	---
OG_SUM	0.221	0.01	positive	W
Maj	0.19	0.028	positive	W
Dor	0.159	0.066	---	---
Phry	0.231	0.007	positive	W
Lyd	0.204	0.018	positive	W
Mix	0.224	0.009	positive	W
Aeol	0.192	0.027	positive	W
Harm	0.102	0.24	---	---
Loc	0.149	0.087	---	---

Source: the author's own research. Legend: Maj – Major; Dor – Dorian; Phry – Phrygian; Lyd – Lydian; Mix – Mixolydian; Aeol – Aeolian; Harm – Harmonic minor; Loc – Locrian; W – very weak.

Level of Musical Aptitude and Detailed Test Results. Analysis of Dichotomous Variables

A dichotomous variable can be interpreted as the occurrence or absence of an event. In this case, it is about the accuracy of recognizing the objective modal tonality of the modified melody. The OR index determined the level of relationship between the occurrence and intensity of the independent variable (here: Tonal_C) with the probability of correctly determining a given tonal version of the melody. It was assumed that:

- OR = 1 means no relationship;
- OR > 1 means the positive direction of the relationship (i. e. the higher the value of the independent variable, the greater the chances of an event occurring that is understood as the correct determination of objective tonality);

- OR<1 means the negative direction of the relationship, i.e. the higher the value of the independent variable, the lower the chances of an event occurring (understood as the correct determination of objective tonality).

The strength of the relationship was determined as follows:

- in a positive direction – e.g. OR = 1.026, which should be understood that each unit of the independent variable (here: percentile) increases the chance of an event occurring by 2.6% (because in 1.026 more than 1 "appears" 0.026, i.e. 2.6%);
- in the negative direction – e.g. OR = 0.98, which should be understood that each unit of the independent variable (here: percentile) reduces the chances of an event occurring by 2% (because in 0.98 to 1 there is a "missing" of 0.02, i.e. 2 %).

The analysis revealed that the tonal level of abilities (Tonal_C) has a significant relationship with the respondents' chances of correctly recognizing 6 out of 48 tonal structures of the same melody ($p < 0.05$). These relationships are positive, which means that the higher the level of tonal abilities, the greater the chances of recognizing different versions of the same melody. The effectiveness of recognizing exposure to the modal version of tonality turned out to be significantly higher due to the level of tonal abilities, mainly in series A tasks (A_1_w:A_8_w), and in six exposures these relationships turned out to be significant (A_2_w: i.e. Doric tonality) and highly statistically significant (A_3_w; A_4_w; A_5_w; A_6_: i.e. Phrygian, Lydian, Mixolydian, Aeolian). The order of the presented versions in this series was consistent with the diatonic shift of the degree of the next melody. It can be assumed that the natural order of the presented tonal versions could have been additionally related to the effectiveness of determining the transferred "tonal center", and, consequently, a given tonality. The analysis was performed separately for the tonal dimension (Table 4), rhythmic dimension (Table 5) and overall results (Table 6):

Table 4. *Relationships Between the Level of Tonal Abilities (Tonal_C AMMA Test) and Dichotomous Determination of Modal Versions of Tonality (LTC_1 test)*

Melody (LTC_1 Test)		**Tonal_C – AMMA by E. E. Gordon**		
Modal tonality	**Melody in series**	**OR**	***p***	**Relation direcion**
Maj	A_1_w	1.001	0.89	---
Dor	A_2_w	1.026	0.02	positive
Phry	A_3_w	1.037	0.003	positive

Melody (LTC_1 Test)		Tonal_C – AMMA by E. E. Gordon		
Modal tonality	**Melody in series**	**OR**	***p***	**Relation direcion**
Lyd	A_4_w	1.033	0.004	positive
Mix	A_5_w	1.029	0.011	positive
Aeol	A_6_w	1.039	0.002	positive
Harm	A_7_w	1.021	0.068	---
Loc	A_8_w	1.008	0.461	---
Aeol	B_1_w	1.007	0.642	---
Lyd	B_2_w	1.018	0.097	---
Loc	B_3_w	1.018	0.075	---
Maj	B_4_w	1.007	0.46	---
Harm	B_5_w	1.02	0.093	---
Phry	B_6_w	1.015	0.311	---
Mix	B_7_w	0.997	0.82	---
Dor	B_8_w	0.978	0.156	---
Phry	C_1_w	0.989	0.42	---
Harm	C_2_w	1.019	0.193	---
Lyd	C_3_w	1.004	0.683	---
Maj	C_4_w	1.029	0.006	positive
Loc	C_5_w	1.006	0.557	---
Aeol	C_6_w	1.035	0.071	---
Dor	C_7_w	0.997	0.825	---
Mix	C_8_w	1.021	0.062	---
Mix	D_1_w	0.999	0.924	---
Maj	D_2_w	1.019	0.066	---
Lyd	D_3_w	1.017	0.12	---
Dor	D_4_w	0.985	0.251	---
Loc	D_5_w	1.004	0.677	---

Melody (LTC_1 Test)		Tonal_C – AMMA by E. E. Gordon		
Modal tonality	**Melody in series**	**OR**	***p***	**Relation direcion**
Harm	D_6_w	0.99	0.399	---
Aeol	D_7_w	0.998	0.863	---
Phry	D_8_w	1.01	0.387	---
Loc	E_1_w	1.001	0.941	---
Lyd	E_2_w	1.014	0.219	---
Phry	E_3_w	1.005	0.689	---
Maj	E_4_w	0.996	0.667	---
Mix	E_5_w	1.023	0.093	---
Harm	E_6_w	0.993	0.492	---
Dor	E_7_w	0.987	0.478	---
Aeol	E_8_w	0.985	0.194	---
Harm	F_1_w	0.998	0.871	---
Maj	F_2_w	1.005	0,.632	---
Phry	F_3_w	1.012	0.259	---
Dor	F_4_w	1.012	0.316	---
Lyd	F_5_w	1.005	0.666	---
Aeol	F_6_w	0.992	0.527	---
Loc	F_7_w	1.015	0.142	---
Mix	F_8_w	1.023	0.129	---

Source: the author's own research. Legend: Maj – Major; Dor – Dorian; Phry – Phrygian; Lyd – Lydian; Mix – Mixolydian; Aeol – Aeolian; Harm – Harmonic minor; Loc – Locrian.

In the rhythmic dimension, it was found that the level of students' talents (Rythm_C) had a significant relationship with the chances of recognizing 12 out of 48 melodies ($p \leq 0.05$). These relationships were positive, which explains that the higher the potential for recognizing rhythmic structures, the more frequent cases of correct audiation of modal structures. It can also be assumed that people with a high level of rhythmic talents (Rythm_C) had greater comfort in listening to modally modified

musical structures whose rhythmic content was unchanged. A higher level of rhythmic talents helped these people to select musical content based on tonal and rhythmic content and, at the same time, control the variability of the former.

It was noticed that most of the compounds turned out to be significant mainly for tasks in series A, where exposures of subsequent tonal versions were organized in a natural modal order. Moreover, most correct results of people highly talented in rhythm concerned tasks constructed in major tonality (A_1_w; C_4_w; D_2_w) – tables 5, 6. It can be assumed that this is a consequence of the musical education received by the surveyed students based on the dominant system, evenly tempered according to the order of a 12-point scale. It is worth wondering what the possible impact on the results obtained by students educated on the basis of solutions other than the major-minor system could be. This aspect should be further investigated in longitudinal studies.

Table 5. *Relationships Between the Level of Rhythmic Abilities (Rythm_C) and Dichotomous Determination of Modal Versions of Tonality (LTC_1 test)*

Melody (LTC_1 Test)		**Rhythm_C – AMMA by E.E. Gordon**		
Modal tonality	**Melody in series**	**OR**	***p***	**Relation direction**
Maj	A_1_w	1.028	0.019	positive
Dor	A_2_w	1.041	0.003	positive
Phry	A_3_w	1.05	0.001	positive
Lyd	A_4_w	1.053	<0.001	positive
Mix	A_5_w	1.037	0.006	positive
Aeol	A_6_w	1.061	<0.001	positive
Harm	A_7_w	1.059	<0.001	positive
Loc	A_8_w	1.017	0.165	---
Aeol	B_1_w	1.019	0.268	---
Lyd	B_2_w	1.015	0.23	---
Loc	B_3_w	1.032	0.009	positive
Maj	B_4_w	1.006	0.578	---
Harm	B_5_w	1.005	0.728	---

Melody (LTC_1 Test)		Rhythm_C – AMMA by E.E. Gordon		
Modal tonality	**Melody in series**	**OR**	***p***	**Relation direction**
Phry	B_6_w	1.029	0.086	---
Mix	B_7_w	1.016	0.315	---
Dor	B_8_w	0.995	0.788	---
Phry	C_1_w	0.9995	0.973	---
Harm	C_2_w	1.011	0.477	---
Lyd	C_3_w	1.003	0.795	---
Maj	C_4_w	1.069	<0.001	positive
Loc	C_5_w	0.994	0.586	---
Aeol	C_6_w	1.021	0.285	---
Dor	C_7_w	1.009	0.58	---
Mix	C_8_w	1.016	0.2	---
Mix	D_1_w	1.005	0.758	---
Maj	D_2_w	1.02345	0.048	positive
Lyd	D_3_w	1.018	0.145	---
Dor	D_4_w	0.985	0.34	---
Loc	D_5_w	1.004	0.749	---
Harm	D_6_w	0.998	0.877	---
Aeol	D_7_w	1.005	0.7	---
Phry	D_8_w	1.004	0.736	---
Loc	E_1_w	1.007	0.521	---
Lyd	E_2_w	1.037	0.01	positive
Phry	E_3_w	1.011	0.384	---
Maj	E_4_w	1.02	0.089	---
Mix	E_5_w	1.029	0.061	---
Harm	E_6_w	0.996	0.737	---
Dor	E_7_w	0.979	0.328	---

Melody (LTC_1 Test)		Rhythm_C – AMMA by E.E. Gordon		
Modal tonality	**Melody in series**	**OR**	***p***	**Relation direction**
Aeol	E_8_w	0.998	0.856	---
Harm	F_1_w	0.99	0.487	---
Maj	F_2_w	1.015	0.199	---
Phry	F_3_w	1.034	0.014	positive
Dor	F_4_w	1.009	0.493	---
Lyd	F_5_w	1.001	0.96	---
Aeol	F_6_w	0.99969	0.983	---
Loc	F_7_w	0.998	0.874	---
Mix	F_8_w	1.008	0.639	---

Source: the author's own research. Legend: Maj – Major; Dor – Dorian; Phry – Phrygian; Lyd – Lydian; Mix – Mixolydian; Aeol – Aeolian; Harm – Harmonic minor; Loc – Locrian.

The analysis of the overall results in terms of dichotomous variables showed that the overall level of abilities (Total_C) revealed a relationship with the chances of recognizing 11 out of 48 melodies ($p \leq 0.05$). These relationships are mostly highly statistically significant and positive. This means that the better the recognition of tonality and rhythm, the greater the chances of recognizing these melodies. Most of the observed relationships in this area, as well as in the tonal and rhythmic area, were revealed in the tasks in series A. This fact was described above, concluding with the need for further research in this area.

Table 6. *Relationships Between the Level of General Abilities (Total_C) and Dichotomous Determination of Modal Versions of Tonality (LTC_1 test)*

Melody (LTC_1 Test)		Total_C – AMMA by E. E. Gordon		
Modal tonality	**Melody in series**	**OR**	***p***	**Relation direction**
Maj	A_1_w	1.012	0.24	---
Dor	A_2_w	1.035	0.004	positive
Phry	A_3_w	1.047	0.001	positive

Melody (LTC_1 Test)		Total_C – AMMA by E. E. Gordon		
Modal tonality	**Melody in series**	**OR**	***p***	**Relation direction**
Lyd	A_4_w	1.043	0.001	positive
Mix	A_5_w	1.033	0.007	positive
Aeol	A_6_w	1.052	<0.001	positive
Harm	A_7_w	1.037	0.004	positive
Loc	A_8_w	1.014	0.199	---
Aeol	B_1_w	1.013	0.388	---
Lyd	B_2_w	1.016	0.15	---
Loc	B_3_w	1.024	0.025	positive
Maj	B_4_w	1.007	0.503	---
Harm	B_5_w	1.015	0.23	---
Phry	B_6_w	1.023	0.143	---
Mix	B_7_w	1.003	0.81	---
Dor	B_8_w	0.984	0.324	---
Phry	C_1_w	0.992	0.557	---
Harm	C_2_w	1.016	0.299	---
Lyd	C_3_w	1.003	0.757	---
Maj	C_4_w	1.047	<0.001	positive
Loc	C_5_w	0.999	0.945	---
Aeol	C_6_w	1.03	0.115	---
Dor	C_7_w	1.002	0.895	---
Mix	C_8_w	1.019	0.094	---
Mix	D_1_w	1.004	0.787	---
Maj	D_2_w	1.022	0.041	positive
Lyd	D_3_w	1.018	0.115	---
Dor	D_4_w	0.982	0.204	---
Loc	D_5_w	1.005	0.676	---

Melody (LTC_1 Test)		Total_C – AMMA by E. E. Gordon		
Modal tonality	**Melody in series**	**OR**	***p***	**Relation direction**
Harm	D_6_w	0.993	0.557	---
Aeol	D_7_w	0.999	0.942	---
Phry	D_8_w	1.01	0.411	---
Loc	E_1_w	1.002	0.839	---
Lyd	E_2_w	1.026	0.041	positive
Phry	E_3_w	1.008	0.479	---
Maj	E_4_w	1.005	0.645	---
Mix	E_5_w	1.026	0.068	---
Harm	E_6_w	0.992	0.45	---
Dor	E_7_w	0.982	0.351	---
Aeol	E_8_w	0.989	0.375	---
Harm	F_1_w	0.992	0.567	---
Maj	F_2_w	1.008	0.439	---
Phry	F_3_w	1.02368	0.049	positive
Dor	F_4_w	1.013	0.307	---
Lyd	F_5_w	1.002	0.845	---
Aeol	F_6_w	0.993	0.608	---
Loc	F_7_w	1.007	0.492	---
Mix	F_8_w	1.018	0.257	---

Source: the author's own research. Legend: Maj – Major; Dor – Dorian; Phry – Phrygian; Lyd – Lydian; Mix – Mixolydian; Aeol – Aeolian; Harm – Harmonic minor; Loc – Locrian.

Discussion

Effective music listening must be taught from the earliest years of life. A child must experience a variety of musical presentations before the age of eighteen months in order to develop the readiness needed to learn music later in life. After this time, he/she will engage in the use of spoken language and music will be pushed to the

background (Gordon, 1997). The youngest children should be provided with many opportunities to grow up by listening to live music. You need to sing to and for the child so that he or she can make his or her own attempts under control, which will result in progress in the development of musicality. Listening to music is a matter of training, so without controlled practice organized by competent teachers, children will be growing up in random situations and developing bad habits.

To achieve the appropriate level of tonal or rhythmic content, it must be learned in conjunction with the skill level. The internal meaning in music, which Gordon describes as syntactic, is given by the listener and is based on his sense of tonality and meter. The external meaning, however, is programmatic, suggesting various events and images in addition to sound effects. Most teachers direct students to derive external meaning from music and devote very little time to the internal aspects of music. It should be emphasized that the sense of tonality is the basis, as it is a preparation not only for the ability to appreciate music, but also for reading and writing music (Gordon, 1999, pp. 195, 222).

Children need to hear a lot of Major, Minor, Doric, Mixolydian, Phrygian, Lydian and Locrian chants to be able to notice differences in tonality. The more diverse material a child hears, the better his/her tonal sense will develop, which manifests itself in the ease and speed of learning and harmonizing melodies. Teachers responsible for music education in kindergarten and early school grades should be able to differentiate and sing short melodies without words to children so that they can hear the relationships between sounds and be able to imagine a given melody in different modes (Zwolińska, 2004, p. 30).

In the analysis of the research results, the diagnosis of the individual musical potential of the surveyed students turned out to be crucial. When considering the fluency of processing a series of musical sounds in eight versions (tasks) for the same melody, it is necessary to seek explanations for previously incomprehensible phenomena. As other studies report, these phenomena concern the fluency of processing tonal content based on: 1. experience accumulated so far (Tobby & Cosmides, 2001; Temperley & Tan, 2013); 2. the related level of musical talents and preferences (Reber et al., 2004; Tekman, 2009; Kendal & Carterette, 1993; Shepherd & Sigg, 2015) and 3. the ability to audiate the general musical syntax (Gordon, 1997).

Effective listening during music classes brings many benefits. Improving listening skills helps develop critical thinking skills, which are important in any form of communication – speaking, singing, reading, writing, or synthesizing information (Hunsaker, 1991). Researchers point out that listening skills play a central role in assessing one's communication skills (Campbell & Inguagiato, 1994; Graves, 1995), and people who have this skill are perceived as more competent (Hass & Arnold, 1995). If teachers

create opportunities to listen to diverse musical material in terms of tone, rhythm and style, they will teach children to listen to, understand and transform music.

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