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PROCEEDINGS

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Faculty of Music, University of Arts in Belgrade, 2023

The Influence of Twentieth-Century Music on the Emotional Response of Students in the Music Education

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Abstract

Music is one of the most potent stimuli of emotions in humans. It is an essential part of young people's lives, as evidenced by the fact that they consume music to a large extent, but also that most strong music experiences occur in early adolescence. The influence of contemporary classical music on the affective experience of young adolescents has not been researched through the Circumplex model of affect, which explains emotions induced by the music as pleasant or unpleasant or with high/low activation. The classical music of the 20th century brings a new, different musical language. As the music education of primary school students is based on functional harmony and tonal material, the critical question is what kind of emotions the music of the 20th century stimulates in students whose acoustic experience is based on the tonal system. The research aims to determine what emotions arise in fifth-grade elementary school students when listening to contemporary tonal and atonal music of the 20th century. Furthermore, the research aims to examine whether distinctly atonal music stimulates emotion of displeasure predominantly, that is, whether tonal music stimulates emotions of pleasure, and to interpret them with the Circumplex model of affect. In addition, we wanted to determine whether there is a difference in emotional experience between boys and girls. The results showed tonal compositions evoked mostly high-activation and low-activation pleasure emotions. In contrast, atonal compositions evoked mostly high-activation displeasure emotions and evoked high-activation and low-activation pleasure much less frequently. Boys and girls differed in emotions evoked by tonal compositions, with girls being more prone to low-activation pleasure emotions and less prone to high-intensity and low-intensity displeasure. There was no difference between the emotional reactions of boys and girls to atonal compositions. This research confirmed the different influences of tonal and atonal music on emotions and that tonal music stimulates pleasant emotions far more strongly than atonal music. Although atonal music mainly stimulates emotions of displeasure, it offers outstanding potential for enriching students' spiritual and intellectual aspects.

Introduction

Music is one of the keys to the well-being of the individual and the community (Rickard, 2011), regardless of the context in which it is used. This type of art "has the ability to convey powerful emotional meanings to listeners" (Eerola, 2011, p. 349). The Qualifications and Curriculum Authority (QCA, 1999, according to North et al., 2000) spoke about the importance of music and its power in influencing children in schools:

> Music can change the way children feel, think, and act. […] The teaching of music deepens and extends everyday experiences, providing new opportunities and forging important links between the home, the school, and the outside world. (Qualifications and Curriculum Authority, 1999, p. 162)

How music is going to be heard depends on many factors, such as personality (Kallinen & Ravaja, 2004), experience preferences, environment, the form of art, general musical knowledge (Živanović et al., 2018), musical structure (Gabrielsson & Lindström, 2010; Juslin & Sloboda, 2001), models of emotions (Eerola, 2011; Eerola & Vuoskoski, 2011), musical expectations (Huron, 2006), and cultural and social effects (Brattico et al., 2013; Fossum & Varkøy, 2012; Hargreaves & Colman, 1981; Juslin & Västfjäll, 2008; Popović Mlađenović et al., 2014; Zentner et al., 2008).

Many years of research and experience have brought up many questions and dilemmas. One

of them is related to the question of whether the emotion could be perceived as well as induced (Eerola, 2011; Evans & Schubert, 2008). Different researchers proposed different models. Eerola and Vuoskoski (2011) claim that discrete and dimensional models of emotions evoked by music represent perceived emotions. According to the categorical emotion model, all emotions come from then of basic emotions: happiness, sadness, anger, fear, and disgust. Russel (1980) proposed 2-dimensional Circumplex model of affect. In this model, emotions are distributed in a system of coordinates where the x-axis measures the valence of emotions from negative to positive, and the y-axis specifies how actively or passively the emotion is experienced. Therefore, the model, illustrated in a 2-dimensional graph, results in a 2-valued vector for each emotion and makes it possible to compare emotions with each other.

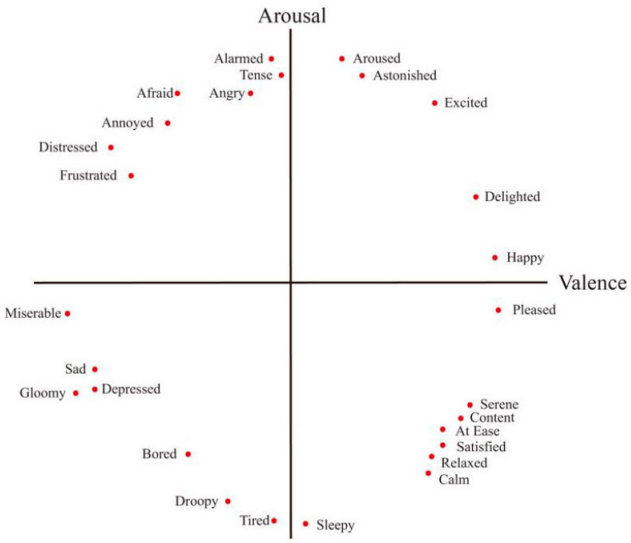

Figure 1. Two-dimensional circumplex model of affects (Russel, 1980; Russel et al., 1989).

As previously stated, emotions can be influenced by certain musical components. Gabrielsson and Lindström (2010) state that the most powerful musical features are tempo, dynamics, articulation, timbre, and phrasing. Many researchers state that happiness is induced by major scale, fast tempo, and high pitch, compared to sadness, where musical features are quite the opposite – minor scare, lower pitch, and slow tempo (Dalla Bella et al., 2001; Eerola, 2011; Peretz et al., 1998). Many authors stand out musical features that influence emotions apart from happiness and sadness, such as anger or fear (Balkwill et al., 2004; Vieillard et al., 2008).

We mentioned musical features and their relationship because the research we will show later should come up with data on what emotions are induced by atonal and tonal music. Given that both groups have specific musical features, it should be borne in mind that this must have influenced the emotional reaction. The compositions used in the research will be described further on.

Aims

The goal was to examine the emotional response to 20th-century music according to the Circumplex model of affect (Russel, 1980), in a group of fifth-graders in Elementary general school, in a frame of the Music Culture classes. Specifically, research aimed to determine affects, their valence and activation, induced by the selected music pieces of the 20th century. Three research hypotheses emerged from the goal:

H1: Tonal compositions encourage high activation pleasure and low activation pleasure emotions.

H2: Atonal compositions encourage high activation displeasure and low activation displeasure emotions.

H3: There is no difference in emotional response between boys and girls to either tonal or atonal music.

Method

Participants

The sample consists of 270 fifth-grade students from 5 primary schools in Sombor, Serbia. The respondents who did not provide an-

swers to all 12 musical examples (21 of them) were excluded from the sample, thus ending up with the final sample of 249 fifth-graders, 46% boys and 53% girls, who provided a total of 2,988 answers.

Measurements

The questionnaire, constructed for this study contained 12 open-ended questions, related to the emotional response to selected musical excerpts, students were listening to. Besides them, the questionnaire consisted of an additional question regarding the gender of the respondents.

Selection of Musical Compositions

For the research, 12 instrumental compositions were selected that were not included in the Curriculum for the fifth grade (Službeni glasnik RS, 2018 [Curriculum]): *Gymnopedia No. 1* by Erik Satie, *Five Orchestral Pieces Op. 16* – third movement by Arnold Schoenberg, *Waltz No. 2* by Dmitri Shostakovich, *The Rite of Spring* – first movement by Igor Stravinsky, *Violin Concerto* – second movement by Alban Berg, *Six Pieces for Orchestra Op. 6* – first movement by Anton Webern, *Petrushka* – first tableau: *The Shrovetide Fair* by Igor Stravinsky, *Threnody for the Victims of Hiroshima* by Krzysztof Penderecki, *Peter and the Wolf Op. 67* – the Peter (theme) by Sergei Prokofiev, *Le Bœuf sur le toit* by Darius Milhaud, *Dreams* by Sergei Prokofiev, and *Music for Strings, Percussion, and Celesta* – third movement by Béla Bartók.

The author compiled a list of 12 compositions, which were then divided into 2 groups: tonal and atonal, considering that both styles were widely represented in the stylistic directions of the 20th century. The compositions were chosen based on tonality criteria and the musical style they belong. Thus, the goal was to take the most significant representatives from each stylistic direction. In addition to the tonality, the criteria for choosing the compositions were based on the different means of expression in the compositions – melody, harmony, rhythm, tempo, dynamics, timbre, and the metric level. An essential criterion for the selection was the composition's atmosphere and mood, what emotions they could induce, and its character.

The group of tonal compositions includes the following: *Gymnopedia No. 1* by Erik Satie (Minimalism), *Waltz No. 2* by Dmitri Shostakovich (Russian Neoclassicism), *Petrushka* by Igor Stravinsky (Russian Neoclassicism), *Peter and the Wolf Op. 67* by Sergei Prokofiev (Russian Neoclassicism), *Le Bœuf sur le toit* by Darius Milhaud (French Neoclassicism), and *Dreams* by Sergei Prokofiev (Russian Neoclassicism).

The group of atonal compositions includes the following works: *Five Orchestral Pieces Op. 16* by Arnold Schoenberg (Expressionism – Second Viennese School), *Violin Concerto* by Alban Berg (Expressionism – Second Viennese School), *Six Pieces for Orchestra Op. 6* by Anton Webern (Expressionism – Second Viennese School), *Threnody for the Victims of Hiroshima* by Krzysztof Penderecki (Aleatoric music), and *Music for Strings, Percussion and Celesta* by Béla Bartók (Expressionism). The last composition, *The Rite of Spring* by Igor Stravinsky is bimodal in its tonal basis. Because of that, the author added it to the atonal group of compositions, although it is not based on the techniques of atonal music such as the works of the 12-tone technique and free atonality of Schoenberg, Webern or Berg, or the rules of aleatoric as is the case with Penderecki.

Musical features of compositions. As a composer, Satie was known as the "apostle of simplicity" (Prodanov Krajišnik, 2012, p. 34). His approach marked a breakup with the harmonic complexity of Romanticism and, on the other hand, Impressionists' tendencies to create a unique style. In *Gymnopedie No. 1*, a short, very simple composition, all expressive elements were reduced to a minimum, and subordinated to the melody as the main musical component. The melody is the most basic but essential element of Sati's music, while the harmony is reduced to triads. At the same time, their connections are very unusual for the un-

derstanding of classical harmony. The 3/4 beat is very simple, subordinate to the melody so that the listener focuses on the melody (Austin, 1966).

Five Orchestral Pieces Op. 16 by Arnold Schoenberg – atonal composition. The most prominent is the III movement. It is called *Farben or Mäßige Viertel*, in which the composer uses "Klangfarbenmelodie" (Prodanov Krajišnik, 2012), a technique that breaks up the melody and distributes it between different instruments (Rogers, 2004).

Shostakovich's *Second Waltz* is a composition of a lively, waltz character in 3/4 time with marching accompaniment. This composition is distinguished because the alto saxophone plays the main melody, which is a significant step forward in orchestration. The melody is transferred from the soloist to the orchestra, as in a concerto grosso. A trombone solo is later performed. The strings have the role of accompanying the soloist by maintaining the rhythm, or they have the role of modulating into new tonalities. Double basses and snare drums dominate the bass line. This is undoubtedly one of the best-known and most loved waltzes of today.

Violin Concerto by Alban Berg – the concerto is written in dodecaphonic technique, but the 12-tone series is based on the tonal basis (g – b flat – d – f sharp – a – c – e – g sharp – h – c sharp – d sharp – f) initiating the following tonality: g minor, D major, a minor and E major. Ultimately, the author chose the second movement for this research because of its pronounced character, symbolizing suffering and death (Prodanov Krajišnik, 2012).

Petrushka by Igor Stravinsky – a ballet in four scenes where the composer used diatonic, i.e., diatonic melody and harmony, with occasional polytonality and polymetry, which had the role of conveying the spirit of melody to Russian folk folklore (Prodanov Krajišnik, 2012). In some segments, harmonic complexes dominated the harmony in the form of a long progressive series of chords, seventh chords, and even the interfacing of the C major seventh chords with the polar tonality of F major. The rhythm was so organized that rubato rarely appeared. He carefully selected the orchestration to evoke the images appropriately (Austin, 1960).

Six Pieces for Orchestra Op. 6 by Anton Webern – an atonal composition with the presence of a miniature form, diminutive treatment of motifs, a melody where the minor second dominates, with rhythmic diversity and the frequent use of pauses as an essential means of expression (Pople, 1991; Prodanov Krajišnik, 2012).

Threnody for the Victims of Hiroshima by Krzysztof Penderecki – an atonal composition composed for 52 string instruments. The work uses a sonoristic technique focused on timbre, dynamics, and texture (Delisi, 1985). The composer uses clusters that do not create harmony but go near and move away from each other, creating a sound mass (Prodanov Krajišnik, 2012).

Peter and The Wolf Op. 67 by Sergei Prokofiev is a symphonic fairy tale for children and has a primarily didactic role in the curricula of music education courses. The narrator tells the story while the orchestra illustrates using specific instruments for each character in the story. During the research process, the students listened to the main theme, where Peter, the main character, was presented by a string quartet accompanied by a simple melody and harmony.

Le Bœuf sur le toit by Darius Milhaud. The composer was experimenting with dissonant harmonies, creating complex polytonal and polyrhythmic music in this composition (Whipple, 1999). The melody moves through all major tonalities with a nominal appearance of minor tonalities with the dominance of syncopated rhythm, citing Brazilian songs, as shown in the study from 2002, where it was determined that more than 20 compositions of 14 different Brazilian composers were quoted (Aranha Correa do Lago, 2002).

Music for Strings, Percussion and Celesta by Béla Bartók was composed for 2 string orchestras that, similar to a concerto grosso, play music either simultaneously or one by one. The third movement is of a slow tempo where "eerie

dissonances provide a backdrop to sounds of nature and lonely melodies" (Schneider, 2006, p. 84).

Procedure

During the 45-minute music class, the researcher reproduced excerpts from 12 different 20th-century musical examples. Six musical examples were tonal, while the other 6 examples were atonal. All music examples are played from the beginning. The examiner did not play the musical compositions for longer than 4 minutes so that the listener's attention would not fall and focus on the non-musical content while listening to the examples. Examples over 4 minutes were interrupted at the appropriate place – at the cadence or the end of the section. Each musical excerpt was played to the respondents only once, without any information about the title and composer. After each excerpt was over, the respondents were asked to describe their emotional reaction while listening to it.

Data Analysis

Students' descriptions of emotional responses to each of the musical excerpts were categorized according to the Circumplex model of affect into high and low activation displeasure, and high and low activation pleasure emotions. Those descriptions that, for any reason, could not be categorized into one category were marked as 'could not be categorized'. Since all students that did not provide an answer to all 12 musical excerpts were excluded from the sample, the final dataset consisted of 249 respondents that gave 12 answers each (2,988 answers in total). Chi-square test was used to test whether tonal and atonal music differ in the frequency of different emotional reaction categories, as well as to test the difference between boys and girls in their emotional reactions to tonal and to atonal music. Cramer's V was used as a measure of the effect size of those differences. Z-test with Bonferroni adjustment was used as a post-hoc test to test the difference between tonal and atonal music, and boys and girls, in each particular emotional reaction category.

Results

The compositions of the tonal basis evoked different emotional reactions than those of the atonal basis (Table 1), with tonal compositions evoking mostly high-activation (51% of answers) and low-activation pleasure (25% of answers) emotions. In comparison, atonal compositions evoked mostly high-activation displeasure emotions (46% of answers) and evoked high-activation and low-activation pleasure much less frequently (13% and 17% respectively). There was no difference between the number of answers that could not be categorized clearly (about 13% of answers in both cases).

Table 1. The difference in evoked emotional reactions between tonal and atonal music.

Evoked emotional reaction	Tonal music	Atonal music
High-activation pleasure	767	195
	51.3% $_a$	13.1% $_b$
Low-activation pleasure	376	256
	25.2% $_a$	17.1% $_b$
High-activation displeasure	100	685
	6.7% $_a$	45.9% $_b$
Low-activation displeasure	65	156
	4.4% $_a$	10.4% $_b$
Cannot be categorized	186	202
	12.4% $_a$	13.5% $_a$
Total	1494	1494
	100%	100%

Note. $\chi^2(4) = 836.98$, $p < .001$, Cramer's V = 0.53, $p < .001$.
Different subscripts ($_a$ and $_b$) denote the existence of statistically significant differences between tonal and atonal music for each emotional reaction category; (Z-test with Bonferroni adjustment).

Boys and girls differed when it comes to emotions evoked by tonal compositions (Table 2), with girls being more prone to low-activation pleasure emotions (28% vs. 21%) and being less prone to high-intensity (4% vs. 10%) and

low-intensity (3% vs. 6%) displeasure. There was no difference between the emotional reactions of boys and girls to atonal compositions.

Table 2. Gender differences in evoked emotional reactions for tonal and atonal music.

Evoked emotional reaction	Tonal music[1]		Atonal music[2]	
	Boys	Girls	Boys	Girls
High-activation pleasure	348	419	100	95
	50.0% $_a$	52.5% $_a$	14.4% $_a$	11.9% $_a$
Low-activation pleasure	149	227	122	134
	21.4% $_a$	28.4% $_b$	17.5% $_a$	16.8% $_a$
High-activation displeasure	66	34	292	393
	9.5% $_a$	4.3% $_b$	42.0% $_a$	49.2% $_a$
Low-activation displeasure	44	21	78	78
	6.3% $_a$	2.6% $_b$	11.2% $_a$	9.8% $_a$
Cannot be categorized	89	97	104	98
	12.8% $_a$	12.2% $_a$	14.9% $_a$	12.3% $_a$
Total	696	798	696	798
	100%	100%	100%	100%

Note. [1] $\chi^2(4) = 36.67$, $p < .001$, Cramer's V = 0.15, $p < .001$;

[2] $\chi^2(4) = 8.84$, $p < .05$, Cramer's V = 0.08, $p < .05$. Different subscripts ($_a$ and $_b$) denote the existence of statistically significant differences between boys and girls in each emotional reaction category, separately for tonal and atonal music (Z-test with Bonferroni adjustment).

Tables 3 and 4 (Appendix) show the distribution of answer categories by individual compositions within tonal and atonal music. In terms of tonal music, it evokes emotional reactions of pleasure. High activation pleasure is the most common in 4 of the total 6 tonal examples. On the other hand, in all atonal compositions, emotions of displeasure (high activation displeasure and low activation displeasure) are the most common. Regarding individual compositions, high activation displeasure is the most common, except for the composition of Stravinsky, where low activation pleasure and high activation are practically the same. In contrast, emotional reactions of pleasure (high and low action pleasure) even prevailed concerning emotions of displeasure (high and low activation displeasure).

Discussion

Based on the research results, it could be said that tonal compositions predominantly evoked pleasant emotions. Five of the 6 tonal compositions were very bright, playful, and with forte dynamics. This confirms the results of previously conducted research where musical features such as fast tempo, major scales, and high pitch induced positive emotions (Dalla Bella et al., 2001; Eeola, 2011; Peretz et al., 1998). On the other hand, a major scale does not always have to be a feature of high activation pleasure emotions. *Gymnopedie No. 1* is written in a major scale, but other musical parameters suggest emotions from low activation pleasure.

The results showed that atonal compositions mainly cause emotions of high activation displeasure due to their unusual and somewhat unpleasant sound from children's perspective. The only exception is the first movement of *Rite of the Spring*, is somewhat understandable, given that the first movement, compared to later movements, still sounds very tonal and is much closer to children's hearing than other atonal works. Both boys and girls did not differentiate between evoked emotional response to tonal and atonal music. It is essential to point out that, concerning other atonal compositions emotional, *The Rite of Spring* rather evoked responses of pleasure (high and low action pleasure), which triumphed concerning emotions of high and low activation displeasure.

Conclusion

The results should guide music education teachers in organizing classes where this kind of music is heard, bringing music closer to stu-

dents, helping them understand it better, and recognizing it as an aesthetically valuable composition.

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Appendix

Table 3. Category differences in evoked emotional reactions for tonal music.

Tonal musical composition	Evoked emotional reaction				
	High activation pleasure	Low activation pleasure	High activation displeasure	Low activation displeasure	It is not possible to unambiguously categorize
***Gymnopedia No. 1*, Erik Satie**	7.8%	67.2%	3.7%	8.5%	12.6%
***Waltz No. 2* (from *The Suite for Jazz Orchestra No. 2*), Dmitri Shostakovich**	68.5%	10.9%	4.8%	1.8%	13.8%
***Petrushka* – first tableau: *The Shrovetide Fair*, Igor Stravinsky**	63.2%	6.7%	13.7%	3.7%	12.6%
***Peter and the Wolf Op. 67*, the Peter (theme), Sergei Prokofiev**	60.7%	16.9%	7.2%	3.4%	11.7%
***Le Bœuf sur le toit*, Darius Milhaud**	68.8%	11.2%	5.2%	3%	11.6%
***Dreams*, Sergei Prokofiev**	31.5%	38%	7.6%	6.8%	15.9%

Table 4. Category differences in evoked emotional reactions for atonal music.

Musical composition	Evoked emotional reaction				
	High activation pleasure	Low activation pleasure	High activation displeasure	Low activation displeasure	It is not possible to unambiguously categorize
Five Orchestral Pieces Op. 16, III movement, Arnold Schoenberg	8.2%	24.2%	39.9%	12.6%	14.9%
The Rite of Spring, I movement, Igor Stravinsky	13.4%	30.7%	26.9%	8.6%	20.2%
Violin Concerto, II movement, Alban Berg	24.3%	11%	45.2%	5.3%	14%
Six Pieces for Orchestra Op. 6, I movement, Anton Webern	16.85%	20.2%	35.5%	13.8%	13.4%
Threnody for the Victims of Hiroshima, Krzysztof Penderecki	4.4%	1.8%	83.9%	4.4%	5.2%
Music for Strings, Percussion and Celesta, III movement, Béla Bartók	11.4%	15.6%	39.3%	19%	14.5%