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Methodological Difficulties in Conservation-Type Tasks in Music

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Abstract

The main aim of this work was to review methodological difficulties that arise while designing and administrating music conservation-type tasks, thus contribute to the expansion and redefinition of theoretical constructs. Another aim was to present the results of the pilot study, in order to extract potential means for problems-solving and to point out to the remaining difficulties. Music conservation represents the ability to perceive unchanged attributes of the music as same, despite the change in another attribute. The analogy of cognitive and music conservation and development remains questionable. Results have shown that the efficiency of music conservation increases with age, and tonal models conserve before rhythmic. Numerous critics followed, which could be arranged into three categories: 1. Before (task selection, stimuli, sample); 2. During (test procedure, additional material) and 3. After (data analysis, interpretation) data collection. Within the mentioned pilot study following methodological problems were considered: duration, sole auditory domain, terminology adjustment to the age, aspects of music that can be compared with Piaget's (melody, rhythm, meter), and unfamiliarity with the stimuli. Contradictory results were obtained, and the assumption is that they were caused by methodological difficulties. Based on what was said above, guidelines for improvement were proposed. Recently there has been no significant research in this field. Therefore, mentioned critiques should be considered and *methodologically more correct* tasks designed. The significance of this research is reflected in the contribution to the validation of conservation-type tasks, and a better understanding of musical development.

Introduction

The reason for naming these music tasks conservation-type tasks is the fact that they significantly differ from Piaget's, for they are in the auditory domain, provide mediate insight into the change and have no obvious compensation and reversibility. There is also a question of the

relevance of the aspects changed, such as one specific note in regard to the amount of water. The conservation in music represents the ability to perceive unchanged attributes of the music as same, despite the change in another attribute (Radoš, 2010). The pioneer in this research was Marilyn Pflederer-Zimmerman (Pflederer, 1964, 1966, 1967; Pflederer-Zimmerman, 1986). She abstracted five conservation laws: *identity, metrical groupings, augmentation and diminution, transposition, and inversion*. Results showed that older children are more successful in solving tasks, also visual tasks were much easier to solve, and that tonal model conserved before rhythmic, but rhythmic before metric. Also, the critical period for the development was placed between 5 and 7 years and ends between 9 and 10. Numerous critiques followed. Hildebrandt (1987) noted that the relationship between two certain aspects of music is not necessarily causal, as height and width are for the glasses of water. On the other hand, Serafine (1975) criticized small samples, mediate insight into the change, and a problem of the analogy with Piaget's conservation tasks. Other critiques concerned the fact that correlation does not imply causation. Authors also did not consider potential poor hearing and memory capacities of young children, who might not understand the task and instruction, nor the age and attention problems. It is important to be aware of the duration of the echoic sensory memory and keep recordings as short as possible. Darwin, Turvey, and Crowder have found that this memory lasts about four seconds (according to Kostić, 2014). It is also essential to work on linguistic and affective factors (Pflederer-Zimmerman & Sechrest, 1970), as well as on the relationship between Piaget's and music conservation (Botvin, 1974, according to Pflederer-Zimmerman, 1986).

the sample was small. The number of completed musical tasks increases with age, except for meter. Rhythmic models conserve before tonal, not the other way around. The metric tasks seem easier for younger children, and Piaget's, and musical cognitive developments are not parallel.

Implemented changes. When it comes to *task selection*, the transformation, compensation, and reversibility were included, as well as the essential aspects of music – rhythm, meter, melody. As for *the nature of the stimuli*, the melody was completely new and simplified, which is considered an important factor for these types of tasks (Hargreaves, Castell, & Crowther, 1986). The *duration* of the stimuli has been shortened on four seconds, which is the echoic sensory memory upper range limit (Kostić, 2014). One of the crucial points was to be careful not to mix the *domains*, hence exclusively auditory one was used. When it comes to testing *procedure*, it was important to adjust the terminology to the age of the children, so the words such as clock beating, clapping, and singing were applied. The *affectivity* was controlled indirectly by securing the unfamiliarity with the melody. Of *additional materials*, both headphones and speakers were used, depending on the children's concentration. The *age of the sample* was the same as in Piaget's studies, so the comparison of the conservations was possible. The only significant aspects that weren't controlled in this research were *talent and experience* (Vuletić & Jegdić, 2017).

Discussion of the Methodology

Before data collection. There are three important aspects of this section that should be discussed. The first is *task selection*. Melody, rhythm, and meter were introduced as crucial aspects of a musical piece. Nevertheless, other aspects, such as dynamics, tempo, harmony, instruments, etc., should also be included and examined in a way that reflects the principles and laws of Piaget's conservation. The other difficulty within task selection is the notion that these tasks are still possibly hard for young children, so the aim should be to make them more transparent and obvious. Additionally, tasks shouldn't be familiar to the children, because in

that case, some children are predestined to solve them better. What could be done, for example, is to make completely new stimuli one week before testing music conservation, then play it to the children once a day for the whole week. When it comes to *stimuli*, there are also some recommendations. Primary, the duration must somehow be under 4 seconds, and it is most certainly the main change that should be made, especially when participants are this young. The stimuli should be as distinctive as possible, at least like in the mentioned pilot study. Additionally, the meter was not highlighted properly with the c1 note, hence the harmony was probably unintentionally introduced. This is problematic not only because certain aspects of the melody may sound dissonant, but because harmony is a new uncontrolled variable. The recommendation is to use a metronome that produces vague sound, but still punctuates every first beat in the bar. As for the *sample*, it is very important, but challenging, to control the previous experience and talent. The one idea or suggestion is to conduct longitudinal research. This way it would be possible to follow, not only the social stimulation and the experience children gain, but also the nature of their talent. An additional problem that appears considers the years-span of the critical period for the development of music conservation, which is not as obvious as in the case of Piaget's conservation.

During data collection. It seems that a lot of methodological difficulties come from the *testing procedure*. First, it is very important to apply adequate terminology, as well as to be flexible with the words. Children often have their own terms for different phenomenon, and one could be able to use their terms during testing if he/she previously made sure that children understand the meaning of those words. This fosters creativity and interest during the testing. Piaget had a strict protocol for his conservation tasks, but it could not be rigidly applied to music tasks. Children must be asked to pay attention to one aspect and also provide an answer about what changed. During the testing, one could notice that children remember the tasks better if there is no speaking between two recordings (Vuletić & Jegdić, 2017). How could the children then be

informed that the second recording is about to play? Contrary to the previous situations, it is possible to use a visual domain here. The idea is to raise one finger when the first recording is about to play and two fingers before the second recording. This wouldn't interfere with the auditory domain, which is crucial for the tasks. Additionally, attention should also be paid to the fact that even silence, let alone verbal and facial reactions, could be suggestive (Vuletić & Jegdić, 2017). The solution lies in the sitting arrangement (the same as in the Rorschach technique) next to each other. During data collection, the **additional material** seems to be important. Hence, the dilemma of using speakers or headphones occurred. This variable was not controlled in pilot research, but it has been noticed that headphones mostly help children focus and hear isolated sounds (Vuletić & Jegdić, 2017).

After data collection. An important aspect of this section is **data analysis**. The Chi-square was used because it was the only possible test for statistical analysis with the current sample. In order to use more serious analysis, it is necessary to plan a larger sample and to pose additional hypotheses, which would include new significant variables. Nevertheless, the qualitative analysis seems to be important for this type of study. To better understand the patterns of behavioral, cognitive, and emotional processes when it comes to children, the specialists in developmental psychology, or the researchers who have experience with children, should use qualitative methods too. This leads to the **interpretation** of the data, and so the mentioned pilot research points to the importance of the finesse in the responses of children with no music conservation (Vuletić & Jegdić, 2017). Children's terms and interpretations could be arbitrarily divided into two groups. In the first group are the children who have no music conservation, but the answers in the second group seem to be more complicated. Here looms the mindset that could soon lead to the development of music conservation, and therefore researchers must pay attention to it. An additional problem, or better, a dilemma that should be considered, is the relationship between Piaget's and music conservation. The results of the mentioned pi-

lot study implied that music conservation might start developing earlier than Piaget's, since children who solved none of Piaget's tasks managed to solve at least one musical task, no opposite cases (Vuletić & Jegdić, 2017). There is no definite explanation for these results, but there is a possibility that the difference between auditory and visual domains plays an important role, having in mind that the child is born with much better hearing than visual abilities.

Conclusion

What should be mentioned first is that recently no significant research has been conducted in this field. Most of the studies are outdated, notwithstanding new technology, which provides precision in many respects. It seems like these, and other methodological difficulties might be the reason for obtaining contradictory results. These studies deepen the validity problem of the conservation-type music tasks, so the critiques should be considered and methodologically more correct tasks designed.

Developing this topic could contribute to a better understanding of musical development. Radoš (2010) emphasizes the importance of cognitive theories in musical development for planning an adequate education program. These tasks might also be helpful when it comes to the auditions for admitting children to music schools.

Considering the value of the conservation aspect for understanding cognitive-musical abilities, solving methodological problems should continue. Generally, longitudinal research could be essential for this particular field, as well as exploring the connection between Piaget's and music conservation. It is also important to include other music aspects, such as harmony, duration, instruments, etc., and possibly to apply other aspects of Piaget's conservation (e.g., seriation) to these conservation-type tasks in music.

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