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CONGENITAL AMUSIA AMONG YOUNG ADOLESCENTS IN KUCHING, SARAWAK

Rachael Kar-Way Ang
Universiti Malaysia Sarawak

Sock-Siang Thia[♣]
Universiti Malaysia Sarawak

ABSTRACT

This paper outlines an investigation into the occurance of congenital amusia, commonly known as tone deafness, among young adolescents in Kuching, Sarawak. It provides new insights on the prevalence of congenital amusia, among young adolescents aged between 13-14 years, using Montreal Battery of Evaluation of Amusia (MBEA). It also compares the occurance of congenital amusia between tonal and non-tonal language speakers; and establishes the predictors of the MBEA scores, namely musical experience, musical training/listening habits and musical difficulties, with questions adapted from Queen's music quesionnaire. Using quantitative method, the results suggest that there is no prevalence of congenital amusia among the group of young adolescents who took part in this study. It also appears that first language, either tonal or non-tonal, does not have significant impact on the ability to comprehend music. The findings show that musical experience, musical training/listening habits and musical difficulties are not the predictors of the Montreal Battery of Evaluation of Amusia (MBEA) scores among young adolescents. The study contributes useful knowledge about how first languages, both tonal and non-tonal languages, could have an impact on the ability to comprehend music among young adolescents.

Keywords: Congenital Amusia; Tone Deafness; Tonal and Non Tonal Languages; Young Adolescents.

1. INTRODUCTION

The research examines the occurrence of congenital amusia among young adolescents aged 13 and 14 years in Kuching, Sarawak. Although research into congenital amusia has expanded over the past twenty years mainly with the aim of developing a deeper understanding into its nature and also attempting to identify its underlying causes (Patel, Wong, Foxton, Lochy and Peretz, 2008), very few studies have been conducted from the Asian context especially among a population which consists of a mixture of people from diverse ethnicities, cultures, native and first languages.

As in speech and language, humans are believed to be born with the innate ability for perceiving and producing music. There are, however, instances, where individuals never acquire these basic musical abilities (Peretz, 2008; Peretz et al., 2008b). These individuals, called amusics, are said to have congenital amusia or more commonly known as tone-deafness, note-deafness or tune-deafness (Peretz, 2008; Peretz et al., 2008b).

♣ Corresponding author: Sock-Siang Thia, Faculty of Applied and Creative Arts, Universiti Malaysia Sarawak, 94300 UNIMAS Kota Samarahan, Sarawak, Malaysia. Email: ssthia@unimas.my. Tel: +6082 581403.

Congenital amusia can be defined as the lifelong deficit in musical perception and processing that cannot be explained by brain injuries, hearing loss, intellectual disorders or the simple lack of musical exposure (Omigie, Mullensiefen, and Stewart, 2012; Peretz, 2008; Peretz et al., 2008b). This deficit is characterized mainly by the inability to perceive and differentiate musical pitches less than one semitone apart, the difficulty in recognizing and differentiating melodies, the inability to recognize when the music is out of key and the inability to recognize familiar tunes without the aid of lyrics (Levitin and Tirovolas, 2009; Henry and McAuley, 2010; Patel et al., 2008; Omigie et al., 2012). Another form of amusia is acquired amusia, which usually occurs following accidental brain injury (Levitin and Tirovolas, 2009; Peretz, 2008). However, this research will only focus on congenital amusia.

Music can boost motivation that creates positive effects on our nervous system. Recent studies, like those of Wekerle, Waechter, Leung, and Leonard, (2007) and Fuhrmann, Knoll, and Blakemore, (2015) as well as Knoll et al., (2016), suggested that adolescence might present a second 'window of opportunity' in brain development.

According to Peretz (2008), musical abilities are the result of genetic and environmental factors which affect brain development and cognition, and so any anomaly at the behavioral level can be traced back to cognitive or perpetual process, then to the neuronal or brain processes and in the end to the genetic level. Hence, in the study of congenital amusia, several characteristics can be identified at each of the levels; the behavioral level, the cognitive or perceptual level, the neuronal or brain level and finally the genetic level.

Presently, the main instrument used in the identification of congenital amusia is the Montreal Battery of Evaluation of Amusia (MBEA) developed by Peretz, Champod, and Hyde (2003). It is a test made up of six tests that assess the functioning of each musical component, specifically that of contour, interval, scale, rhythm, meter and memory.

As the connection between music and language processing in the brain cannot be denied, there has been significant debate on whether language ability is actually affected in congenital amusia (Hamann, Exeter, Pfeifer, and Krause-Burmester, 2012). Older research, like that of Ayotte, Peretz, and Hyde (2002) and Peretz et al. (2002), argued that congenital amusia is a domain specific disorder with no effect on language processing abilities. More recent studies, however, Peretz et al. (2008b) found that congenital amusia is not actually specific to the musical domain as the results point to deficits in the perception of linguistic intonation among amusics. Further studies studying congenital amusia among tonal language speakers, like those of Tillmann et al. (2011) and Nan, Sun, and Peretz (2010) also found that amusics have impaired ability in tonal language processing even of the tonal language was their native language. The study by Peretz et al. (2008b) conducted among English and Canadian French amusics found that amusics were impaired in discriminating statements from questions based on intonation.

These studies suggest that the type of language, either tonal or non-tonal, may play a role in determining the occurrence of congenital amusia. Thus, the MBEA test served as the tool in diagnosing adolescents from five different language speaking backgrounds, namely Chinese, English, Malay, Iban and Bidayuh.

2. MATERIALS AND METHODS

The research utilized quantitative research method involving primary source of data. An instrument comprises of a questionnaire and a test was employed. Queen's Music Questionnaire developed by Cuddy, Balkwill, Peretz, and Holden (2005) was adapted to identify the three predictors of the disorder, namely musical experience, musical training/listening habits and musical difficulties whereas the Montreal Battery of Evaluation of Amusia (MBEA) (2003) was conducted to obtain the occurrence of congenital amusia.

Data for this study was collected on 70 samples. The data was collected from students of SMK Green Road with 37 participants aged 13 years and 33 participants aged 14 years. Random sampling method was applied to students of different languages, tonal and non-tonal.

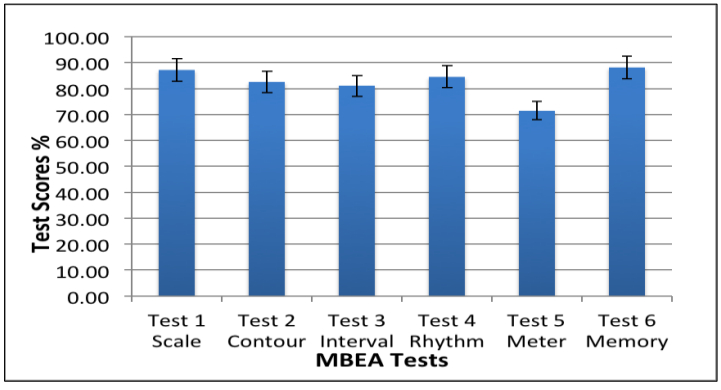
The session took place in a classroom setting in the school. The students were first presented with an extensive self-assessment questionnaire on their musical background, involvement and interest. The questionnaire took an hour and followed by a short break of ten minutes.

The six tests of MBEA were conducted after the break. The tests were presented in a fixed order starting with test 1 on scale, test 2 on contour, test 3 on interval, test 4 on rhythm, test 5 on metric and test 6 on memory. Printed respond sheets for all six tests were distributed. For tests 1 to 4 and 6, participants heard two examples before the actual test commenced. For test 5, four examples were presented. Musical tunes were played through the computer loud speakers. Each test took approximately 10 minutes. The entire session with both the questionnaire and MBEA tests lasted approximately 2 hours and 30 minutes.

3. RESULTS AND DISCUSSION

The data collected was analyzed using SPSS Statistics and Spearman rank correlation. The distribution of mean composite scores of the six tests across 70 participants is projected in Figure 1.

Figure 1: Distribution of Mean Composite Scores of MBEA



Based on the distribution of mean composite scores of Montreal Evaluation of Amusia (MBEA) test 1 to 6 by 70 participants aged 13 and 14 years, participants scored an average of more than

80% for test 1 except for the test 5 being 70%. The mean presented 82% correct and the mean as 6.1.

The mean and standard deviation of the findings are presented in Table 1.

Table 1: MBEA Test Correct Responses Mean and Standard Deviation

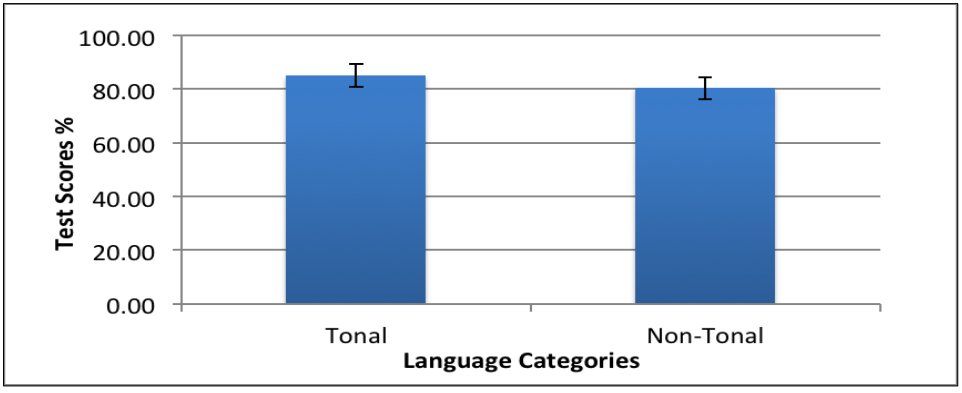
	Test 1 Scale %	**Test 2 Contour %**	**Test 3 Interval %**	**Test 4 Rhythm %**	**Test 5 Meter %**	**Test 6 Memory %**
Aged 13 years	85.86	81.08	76.85	81.08	62.61	81.26
Aged 14 years	88.38	83.94	85.15	88.08	80.10	94.75
Mean	87.12	82.51	81.00	84.58	71.36	88.00
SD	1.79	2.02	5.87	4.95	12.37	9.54

MBEA test correct responses mean and standard deviation of 70 participants for Montreal Evaluation of Amusia (MBEA) test 1 to 6 shows that there is no prevalence of congenital amusia among this group of young adolescents.

This data serves as a useful tool in determining the type of musical difficulties; in this case, the meter test has the highest level of difficulty for this age group to comprehend as compared to the rest of the tests. The results also indicate that memory appear to have a lowest level of difficulty for this age group, followed by scale, rhythm, contour and interval respectively.

In terms of relationship between the participants' first language and their MBEA scores, Figure 2 shows the results based on different first language categories, tonal and non-tonal. In this study, Chinese language, a tonal language, is classified in one category, tonal. The rest of the languages including Malay, English, Iban and Bidayuh are grouped under the category of non-tonal.

Figure 2: Distribution of Mean Composite Scores of MBEA on Tonal and Non-Tonal Language Participants



The distribution of mean composite scores of Montreal Evaluation of Amusia (MBEA) on tonal and non-tonal language participants shows that the mean for tonal is 85% and non-tonal is 80% whereas the standard deviation is 5.6 and 6.8 respectively.

Based on the MBEA scores, it appears that first languages do not have significant impact on the ability to comprehend music. The difference between tonal and non-tonal language speakers is 5% and the standard deviation differs by 1.2.

An analysis was conducted to determine if there is a relationship between MBEA and the three predictors of musical disorder. Table 2 presents findings of factor loadings with greater than 50% of the participants responded 'Agree' and 'Strongly Agree'.

Table 2: Findings of Factor Loadings Greater Than 50% of the Participants responding to 'Agree' And 'Strongly Agree' for the Three Predictors of Musical Disorder

Predictor 1. Musical Experience – Mean 58%	
Singing often occurred in my childhood environment.	53%
Recorded music (CDs, tapes, music videos, etc.) was available in my childhood environment.	51%
I often heard music in my childhood environment.	76%
I do not have family member(s) who particularly disliked music.	53%
Predictor 2. Musical Training/ Listening Habits – Mean 70%	
I often sing in private (in my car, in the shower, in my environment, etc).	84%
I often listen to music purposely.	76%
Music is very important to me.	66%
I have to have music on most of the time.	60%
I like music.	87%
I can stand having music on while I study.	64%
I find most music very comforting.	74%
I care very much about music.	60%
I spend a lot of time choosing the music I listen to.	51%
I find most music interesting.	76%
I have a favourite type of music that I like to listen to.	77%
Predictor 3. Musical Difficulties – Mean 68%	
I like to listen to music.	90%
I enjoy singing.	71%
I can remember songs very well.	61%
I am good in memorizing a short song.	70%
If I imagine the tune 'Happy Birthday', I can hear the melody in my head with perfect accuracy.	69%
I know my favourite song by heart.	77%
When music is being played, I can recognize familiar songs by the first two or three notes.	54%
I get a tune 'stuck' in my head very often.	53%

With the mean for three predictors lower than 80%, it is said that musical experience, musical training/listening habits and musical difficulties are not the predictors of the Montreal Battery of Evaluation of Amusia (MBEA) scores among young adolescents.

4. CONCLUSION

This research shows that there is no prevalence of congenital amusia among the group of young adolescents who took part in this study. However, there is a significant difference between the thirteen-year-old and the fourteen-year-old age groups. Result shows that the older ones scored

higher in the MBEA test, which indicates that the age factor may improve the level of understanding on musical elements such as scale, contour, interval, rhythm, meter and memory.

Although it appears that first languages, either tonal or non-tonal, does not have significant impact on the ability to comprehend music, the study shows that students with tonal language as their first language score higher than students whose first language is non-tonal.

The findings also show that musical experience, musical training/listening habits and musical difficulties are not the predictors of the Montreal Battery of Evaluation of Amusia (MBEA) scores among young adolescents.

Clinically, it is important to identify amusia in hope to influence brain development through earlier intervention to ameliorate such difficulties. This provides opportunity for young adolescents to appreciate and engage in music for positive emotions and self-development.

It is hoped that the study would help contribute to new knowledge about how tonal and non-tonal languages, first languages, could have an impact on the ability to comprehend music among young adolescents. This knowledge would assist future research in the possibility of music apreciation in young adolescents' second 'window of opportunity' in brain development.

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