

Possible bias in the bentley music test psychology essay



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This study investigated the widely employed Bentley Music Test and the possibility of bias towards prior musical experience, gender or age. Specifically, this study sought to determine if there were any significant predictor variables for the outcome of the Bentley Music Test. This study illuminated potential bias using gender, age, parent/guardian musical experience and finally the Child's own musical exposure as predictor variables. Priority was placed on quantitative collection and analysis, using the Bentley Music Test in conjunction with measures of musical experience and basic demographics. Data collection instruments were employed from previous research tools in all but the Child's measure of musical experience, which was developed for this study. Results revealed a significant correlation between the Child's musical experience questionnaire and their Bentley Music Test score.

Findings of this research suggest that it may be possible to predict a Child's Bentley Music score using gender and the Child's musical exposure score. These findings support the hypothesis that musical experience will influence the score on the Bentley Music Test, however interestingly gender has been shown to be an important factor in finding a model that predicts the child's outcome on the Bentley Music Test.

Keywords: Musical ability, Bentley Music Test, testing, musical experience, auditory interface.

Introduction

It was the development of Seashore's Measures of Musical Talents in 1919 that was the first in the testing of music related skills. This ground breaking

work of Seashore began the interest in our attempt to understanding the fundamentals of musical talent, which in turn was the catalyst in the creation of many subsequent music aptitude tests which include Kwalwasser and Dykema's Music Tests (1930), Wing's Standardized Measures of Musical Intelligence (1948, 1961, 1970), Drake's Musical Aptitude Tests (1939, 1957), Gordon's Musical Aptitude Profile (1965), Bentley's Measures of Musical Abilities (1966), and Davies' New Tests of Musical Aptitude (1970). In their day the data obtained from these aptitude tests over the years has been important to the fields of music and music education. This contribution is highlighted by Serafine (1986, p. 300), " The literature from the musical testing movement was, and remains, the most powerful influence on both music research and educational practice." Regardless of the history and major contributions to our knowledge of music aptitude, the testing of Children for their musical aptitude has decreased in recent years. The two major reasons that have caused the reducing interest and use of music testing are the growth of interest in developmental and cognitive advances to studying music aptitude that lean towards more observational and descriptive assessment techniques (Dowling, 1982; Serafine, 1980). Secondly is the realization of the failings of pre-existing music aptitude tests, in comparison to other school quantitative aptitude tests with most music aptitude tests being generally less efficient, reliable and valid.

Most societies past and present have used music to engage with infants (Trehub, 2007) a long time before an infant can understand language, their caregiver converse through song calming them with lullabies and arousing them with play music (Shenfield, Trehub & Nakata, 2003). Many studies

conducted with children have suggested that participation in music lessons positively affects linguistic, musical and cognitive development (Jentschke & Koelsch, 2009; Schellenberg, 2011; Schlaug, Forgeard, Zhu, Norton, Norton & Winner, 2009; Trainor & Corrigall, 2010). Fujioka, Ross, Kakigi, Pantev and Trainor (2006) study suggested that after a year of music lessons 4 to 5 year old children displayed more event related brain responses related to attention and memory, in comparison to children that do not take music lessons. Shahin, Roberts, Chau, Trainor and Miller (2008) study indicated that induced gamma band responses from electroencephalogram (EEG) recordings, which are connected to attention, attribute binding and top down processing, appear after a year of music lessons between the ages of 4 and 5, but those who did not take any lessons the gamma band responses were not present.

Furthermore MRI studies such as Schlaug et al. (2009) suggested that the corpus callosum, which is responsible for inter-hemispheric communication, shows signs of different development in 5 to 7 year old children enrolled for music lessons in comparison to those children not enrolled on any form of musical training. One main disadvantage for this study is that random assignment was not used, thus the claim that musical training was the main influence for the differences cannot be made with any certainty. Also studies that did use random assignment suggested that those children that completed a year of music lessons at 6 years old led to an

increase in IQ in comparison to a year of drama lessons (Schellenberg, 2004), with 6 months of music training at 8 years old suggested there was an increase in reading and pitch discrimination skills in comparison to 6
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months of training for painting (Moreno et al., 2009). These studies all suggest that musical training at an early age has the potential to alter mental functions and maybe even alter the structure of the brain.

Furthermore, the study of musical aptitude is made all the more difficult by the many attempts to seek a definition of musical aptitude, in addition musical aptitude tests have been constantly criticised for their low validity and measuring musical experience not aptitude. Any test that is developed to measure a psychological construct such as, in this case, musical aptitude would have to be homogeneous. Therefore, using a definition of musical aptitude such as auditory structuring ability will routinely produce a compromise between homogeneity and explanatory power. When central factors of construct validation such as auditory structuring tests are often suggested as an exemplar of theory driven validation where ecological validity is considered a secondary criterion. However, with the ever increasing research which suggests musical practice supports and strengthens cognitive functions, thus these functions have the potential to directly improve auditory skills. Therefore, the research suggests that musical training can improve higher level mechanisms thereby strengthening the corticofugal system for hearing.

Consequently, the purpose of the study is to explore any possible bias in the Bentley test towards prior musical experience, considering current research suggests that musical lessons and training will improve cognitive function it would be expected that those that receive training would perform to greater level on a musical aptitude test than those that have not received any such training. Therefore, this study was devised to test the hypothesis that there <https://assignbuster.com/possible-bias-in-the-bentley-music-test-psychology-essay/>

will be a difference in Bentley Music Test scores between those with musical experience and those without, while also exploring further hypotheses that both gender and age will be a contributing factor in the Bentley Music Test score. Musical aptitude tests may give an unfair advantage to those that receive musical training, with these tests commonly employed to decide which pupils are given instruments and training in schools this study will attempt to explore any such bias. It was decided to use the Bentley Music Test to conduct this study as this musical aptitude test has been widely employed by many schools from its creation in 1966 to the present day.

Therefore, for this study participants were required to complete both the Bentley Music Test to record the (DV) which will be the score achieved on the Bentley test and the 5 item scale to record prior musical experience of the child (IV), the Childs gender will also be recorded (IV), in addition to this we will be recording their parents/guardians score on a musical experience questionnaire (IV) and finally the participants age (IV). From this study we will gain a musical aptitude score for each of the participant from the Bentley Music Test, while also a record of musical experience for both the child and their parent/guardian will be gained from the musical experience questionnaires. This data will be analysed using a correlation and multiple regression analysis thus displaying any bias in the Bentley Music Test towards musical experience, gender or age while also highlighting any possible predictor variables. From these results conclusions will draw using current relevant research in addition to the finding from this study.

Method

Participants

All participants were approached via parent(s)/guardian(s) and only with fully informed consent using briefing, consent and information forms did we proceed to invite the child to participate in the study. In total, 83 participants were enrolled for the study, all participants were enrolled using opportunity sampling based at New Brighton rugby club of Merseyside, aged between 7 and 11. The original aim of this study was to gather 90-120 participants, however due to practicality and time constrictions 83 participants were enrolled. All participants conducted both the Bentley Music Test and a musical experience questionnaire, in addition to this a parent/guardian was required to complete the Musical Experience Questionnaire. The instructions for the participants to follow were relayed via a standardized information form issued to all participants as to operationize the study. Upon completion of the Bentley Music Test and questionnaires participants were debriefed and issued a standardized form with the relevant contact details in the case of any issues due to participation in the study.

Materials

Throughout the study different materials were utilized to facilitate the recording of the required data to establish any results, while also maintaining the operationalization of the study. Initially a participant information form or briefing form was issued to all participants' parent(s)/guardian(s) in order provide details of the study that their child may be enrolled in. Along with the briefing form a

consent form was issued giving permission for their child to participate in the study, having gained permission the child was approach and informed of the study both verbally and with a participant information form. Additional materials included a cassette player to play the Bentley Music Test, answer sheets for the test and black pens to mark the answers on the answer sheet. After the completion of the Bentley Music Test the participants were asked to complete a 5 item questionnaire on their musical experience. Upon completion of the study all participants were issued a debriefing form, informing them of contacts if they suffered any adverse reactions. Parent(s)/guardian(s) were also issued the Musical Experience Questionnaire to complete while their child was engaged with Bentley Music Test.

Procedure

This study was completed using a black pen on the provided questionnaires and answer sheets, the test and questionnaire was completed in the function room of New Brighton rugby club under supervision of the researchers Michael Cardus, Mark Bates and the coaches of the team involved, the room was well lit and closed off to others. The Bentley music test was carried out on a CD/cassette player with all instruction to the test provided via audio from the tape and the information sheet provided. Upon completion of the Childs Bentley Music Test and 5 item questionnaire the parent(s)/guardian(s) was asked to complete a musical experience questionnaire, with all the recording of data via the afore mentioned forms completed at the rugby club and were completely anonymous with all data only identifiable through a unifying reference number connecting the Childs questionnaire and Bentley

music test data with the data from the corresponding parent(s)/guardian(s) Musical Experience questionnaire.

Results

A correlation was conducted to identify possible correlations between the IV's and the DV of the Bentley Music Test score. Upon completion of this correlation analysis using fig. 1 it was found that the Childs Musical experience questionnaire ($r = 0.662$, $p < 0.0005$) was most significantly correlated with the Childs Bentley Music Test score and thus this study entered these predictors into a multiple regression for further analysis.

Correlations (fig. 1)

Gender

Months old

Childs Bentley Music Score

Childs Musical Exposure Scale

Parents Musical Experience

Gender

Pearson Correlation

1

.079

.257*

. 110

. 172

Sig. (2-tailed)

. 475

. 019

. 322

. 121

N

83

83

83

83

83

Months old

Pearson Correlation

. 079

1

. 329**

. 312**

. 481**

Sig. (2-tailed)

. 475

. 002

. 004

. 000

N

83

83

83

83

83

Childs Bentley Music Score

Pearson Correlation

. 257*

. 329**

1

. 662**

. 464**

Sig. (2-tailed)

. 019

. 002

. 000

. 000

N

83

83

83

83

83

Childs Musical Exposure Scale

Pearson Correlation

. 110

. 312**

. 662**

1

. 413**

Sig. (2-tailed)

. 322

. 004

. 000

. 000

N

83

83

83

83

83

Parents Musical Experience

Pearson Correlation

.172

.481**

.464**

.413**

1

Sig. (2-tailed)

.121

.000

.000

.000

N

83

83

83

83

83

*. Correlation is significant at the 0. 05 level (2-tailed).

** . Correlation is significant at the 0. 01 level (2-tailed). The results found in this study have suggested that both an individual's gender and musical exposure score are strong, significant predictors of the individuals Bentley Music Test score. Using an enter method regression to analysis the results for possible predictors of the Child's Bentley Music score, using fig. 2, fig. 3, and fig. 4 the results suggest a significant model emerged ($F= 20. 237, p <0. 0005$). Adjusted R square = . 484. With significant variables below:

Predictor Variable Beta p

Child's Music Exposure . 552 $p <0. 0005$

Gender . 161 $p= 0. 049$

(Parent Musical Experience and Age were not significant predictors in this model)

Model Summary (fig. 2)

Model

R

R Square

Adjusted R Square

Std. Error of the Estimate

1

. 714a

. 509

. 484

7. 987

a. Predictors: (Constant), Gender, Months old, Childs Musical Exposure Scale, Parents Musical Experience score.

Multiple Regression Coefficients (fig. 3)

Model

Unstandardized Coefficients

Standardized Coefficients

t

Sig.

B

Std. Error

Beta

1

(Constant)

-15. 939

6. 624

-2. 406

. 018

Months old

. 035

. 056

. 058

. 629

. 531

Childs Musical Exposure Scale

2. 838

. 453

. 552

6. 268

. 000

Parents Musical Experience

. 610

. 326

. 180

1. 873

. 065

Gender

3. 633

1. 820

. 161

1. 996

. 049

ANOVA (fig. 4)

Model

Sum of Squares

df

Mean Square

F

Sig.

1

Regression

5163.356

4

1290.839

20.237

.000a

Residual

4975.294

78

63.786

Total

10138.651

82

a. Predictors: (Constant), Gender, Months old, Childs Musical Exposure Scale, Parents Musical Exposure

b. Dependent Variable: Childs Bentley Music Score

Furthermore, using the ANOVA (fig. 4) it can be reported that the model tested is significant ($p < 0.0005$), with the model accounting for 48.4% of the variance in the Bentley Music Test scores as shown in (fig. 2). Fig. 3 also suggest that the Child's Music Exposure has the largest impact upon the criterion variable ($t = 6.268$, $p < 0.0005$). Consequently, using these results and analysis it is possible to state that musical experience and gender have an impact upon the outcome of the Bentley Music Test.

Discussion

Ever increasing research suggests that some cognitive functions can be improved by musical experience such as lower level auditory functions, yet the precise mechanism underlying this improvement remains uncertain. Neurophysiologic data gathered from a variety of studies has provided support for the influence of musical experience on cognitive ability, brain function and even brain structure. Data constantly displays a correlation between amount of neural enhancement in musicians and both the amount the time spent in musical practice and the age the practice began (Gaser and Schlaug, 2003; Strait et al., 2009; Wong et al., 2007). More specifically it is lower level sound processing that tend to be enhanced by musical training, also reportedly extending to influence the brainstem (Kraus et al., 2009; Strait et al., 2009; Wong et al., 2007) in addition to the cochlea (Perrot et al., 1999). As ever the precise mechanism of how this enhancing of lower level sensory happens is still not clear. However the human descending auditory system is huge, made up of a broad corticofugal circuitry of efferent fibres which have synapses at many points on the auditory pathway (Suga et al., 2000). Ahissar and Hochstein's Reverse Hierarchy Theory presents a

workable model for top down learning, although initially used for visual processing (Ahissar and Hochstein, 2004) it has now been adapted for the auditory domain (Ahissar et al., 2009; Kral and Eggermont, 2007). This model suggests that perceptual learning is the consequence of a task dependent top down investigation for a higher neural signal to noise ratios (SNRs). Therefore it is suggested that this starts with the association cortices and gravitates toward a previous input level therefore providing an improved SNRs, this implicates cognitive function in the enhancement of neural encoding for previous structures in the processing stream thus providing an enhancement in perceptual performance. It is argued by Ahissar and Hochstein that any such learning is an unavoidable by-product of any highly trained populations. However, some research has found that this is not the case for clinical disorders which include auditory processing impairment such as dyslexia and auditory deprivation (Kral and Eggermont, 2007). Some studies suggest that a more efficient top down processing places less demand on computational power to produce higher SNRs. Although, this does providing a workable, if not conclusive, model of the mechanism that may underlie any cognitive enhancement produced by musical experience.

Furthermore, some studies have shown that musicians and non musicians use different neural networks when employing auditory and cognitive processing (Gaab et al., 2005; Schlaug et al., 2005). Such research suggest that musicians recruit short term auditory storage centres such as the supramarginal gyrus to solve pitch memory tasks, non musicians employ earlier perceptual regions in the superior temporal lobe (Gaab and Schlaug, 2003). It is suggested that these more efficient neural networks may also

add to any enhancement in the auditory processing for musicians (Gaab et al., 2005).

In addition, further research continues to suggest that musicians exhibit enhanced auditory temporal processing (Kraus et al., 2009; Rammsayer and Altenmuller, 2006; Strait et al., 2009), with musicians' perceptual acuity possible relating to experience dependent neural plasticity (Kraus et al., 2009; Strait et al., 2009; Wong et al., 2007). Additional research suggested correlations between musician perceptual enhancements and musical experience, demonstrating that musical advantages can be determined by experience rather than innate abilities. These studies reinforce the notion that there is a relationship between musical experience and musical abilities through assessing cognitive, neural and musical abilities of a group of untrained children, with half the group about to start musical training. At first there was no difference between these two groups, consequently after 18 months of lessons the children that were musically trained began to show cognitive, neural and musical ability enhancements (Norton et al., 2005). Therefore, using all the research considered the data overwhelmingly suggests that experience in music via training and lessons enhances the auditory pathways and processes.

Conclusion

The data gathered by both previous research and this study support the hypothesis that musical training will have an influence on the score of a Bentley Music Test. As displayed from relevant research musicians' perceptual enhancements are supported by their cognitive processes, with these cognitive and perceptual abilities enhanced in musicians when <https://assignbuster.com/possible-bias-in-the-bentley-music-test-psychology-essay/>

compared to non musicians. Such enhancements offer a more efficient neural mechanism for performing auditory tasks, with these enhancements usually following musical training and are specific to the auditory. Further studies into musical training's effects on auditory processing in children at different developmental stages could help to resolve remaining uncertainties.

However, this research and data certainly provide support for the potential bias of the Bentley Music Test towards prior musical experience, thereby providing Children with this experience an unfair advantage over those that have not received and such training. As this Bentley Music Test is often employed as the sole determining factor as to whether a child receives access to an instrument and musical training in their school, it must be the case that changes must be made either in the form of a handicapping system through assessing a Childs musical experience and adjusting their Bentley score accordingly or to find an alternative means of assessing musical aptitude in Children.

References