The Relationship between “Music Ear” and Phonetic Coding Ability

Jihye Shin

Northern Arizona University

Abstract

The purpose of this study is two-fold. First, it examines the quality of the Musical Ear Test (MET) and the Llama Language Aptitude Test (Llama) by using the Rasch measurement. Second, it investigates the relationship between music ability and phonetic coding ability in an attempt to gain insights into music aptitude as a contributing factor of language aptitude. The MET and the Llama were administered to fifty-six adult L2 speakers of English. The results showed that there are areas to be improved in both of the measures particularly with respect to separating the examinee ability. The second part of the investigation revealed a moderate relationship between the two kinds of ability. This indicates that individuals with good musical skills may be able to perceive and remember different speech sounds of a language more accurately, which ultimately has an effect on attainment of L2 pronunciation. In this regard, the study points out that music may hold a unique place in the area of individual differences in SLA.

Keywords: music ability, phonetic coding ability, Musical Ear Test, Llama Language Aptitude Test

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Background

Music and language have been found to share various cognitive mechanisms. In particular, there seems to be a striking comparability between musical ability and phonetic coding ability which is one of the language aptitude components. Musical ability is defined as an individual's ability to hear and internalize music that is no longer present in the physical environment (Gordon, 1995). Similarly, phonetic coding ability refers to a capacity to code unfamiliar sound so that it can be retained over more than a few seconds and subsequently retrieved or recognized. This ability is also known to be a strong indication of acquisition of L2 pronunciation (Carroll, 1974). Given that these abilities in music and language domains center on coding auditory input, musical ability may be a significant part of phonetic coding ability as part of language aptitude, which may ultimately have impacts on successful attainment of L2 pronunciation. In fact, some studies have shown that having musical ability means having a "good ear" for analyzing and discriminating foreign speech sounds (Gottfried, 2007; Isaacs & Trofimovich, 2009).

However, the measures of music and language aptitude that have been used in the past studies remain controversial especially in regard to reliability. Therefore, the present study attempted to fill this gap by first examining the quality of test instruments that are used to measure music and phonetic coding ability using the Rasch measurement and then looking into the association between the two kinds of ability. By gaining insights into this relationship, this study further attempts to contribute to the issue of individual differences and aptitude in the field of second language acquisition (SLA).

Research questions

(1) To what extent is the Musical Ear Test (MET) a reliable and valid measure for music ability?

(2) To what extent is the Llama language aptitude test a reliable and valid measure for phonetic coding ability?

(3) Is there a relationship between music ability and phonetic coding ability?

Methods

Participants

Fifty-six adult L2 speakers of English (20 males and 36 females) regardless of their L1 backgrounds participated in the study. There were 13 Spanish, 12 Chinese, 11 Korean, 7 Arabic, 4 Indonesian, 4 Russian, 3 Persian speakers, 1 Japanese and 1 Thai speaker whose ages varied from 18 to 67.

Instruments

Twp types of tests were used in the study to elicit 2 sets of data: the Llama Language Aptitude Test (Type D) (Meara, 2007) to test the participants' phonetic coding ability and the Musical Ear Test (MET) to measure their sense of musicality. The Llama test is loosely based on a British Columbian Indian language and is known to be independent of the L1 of the test takers. There are 4 different types of tasks included in the test, but only Type D, a sound recognition task, was used in the study.

The MET (Wallentin et al., 2010) is a recently developed test that is designed for measuring musical abilities in both musicians and non-musicians. Unlike other musical tests, the authors reported the reliability of the instrument which is fairly high (Cronbach's alpha .87). It consists of a melody and rhythm sub-tests that included 52 paired items each.

Analysis

To investigate the reliability and validity of the instruments, Winsteps was used to generate the results based on the Rasch model. Variable maps and fit statistics were consulted which factor in the ability measure and item difficulty. The mean square values between 0.75 to 1.3 were considered as values of good fit, and items with the z-scores between -2 to +2 were regarded as statistically significant (McNamara, 1996). To find the association between the scores of the 2 tests, Pearson's correlation was used in SPSS.

Results

The results regarding the quality of the 2 instruments, the Llama and the MET, demonstrated that there is room for improvement with respect to reliability as well as validity. Overall, both of the tests reported low examinee and item separation, which was less than 2, and the examinee reliability of the Llama was particularly low (=.50). Also, the general tendency of the 2 tests was that there is a mismatch between the examinee ability estimates and the item difficulty hierarchy. (See Appendices A, B & C for the actual maps.) In other words, the items on these tests were not well matched to the persons' ability. More specifically, the items included in the tests were generally too easy for the examinees and therefore were not functioning well in terms of distinguishing high and low performers. Despite the fact that there were 52 items in each of the sub-test of the MET, over 30% of the items were found to have no matching examinees, which in turn led to being unable to classify examinees according to their latent ability. Similarly, there were only a couple of items that can measure more able examinees (logit>1) in the Llama as well. Further, a number of examinee and item misfits were detected when closely examined, which relates to the validity of the instrument.

The results obtained in this study disclosed the patterns of examinees and items and thus can suggest that on the macro level the general difficulty should be raised, and on the micro level several items that showed misfit need further examinations and revision. In regards to person misfits, it may be attributed to the small sample size or guessing, so improving instruction to minimize the guessing behavior as well as increasing the sample size should be considered. In fact, there were 14 examinee misfits (25%) in the melody test, which calls for a serious concern. McNamara (1996) states that a test which produces person misfit greater than 2% is an unworkable procedure and needs revision.

A similar problem was observed in the Llama; many of the easy items which were below zero logits may need revision and be replaced with more difficult items. Moreover, low examinee separation and reliability may suggest that more stable items are needed. Also, it should be noted that the misfitting examinees are students with low proficiency levels and that revising instruction of the test might help increase internal validity of the test.

Although there are some issues with the test used in the study, the relationship between the 2 types of ability is found and is worth addressing here as part of the investigation. Based on the correlation analysis ($r=.47$, $p=000$, $r^2=22$), it can be concluded that there is a moderate association between music ability and phonetic coding ability. That is, individuals with good musical skills may be able to perceive different sounds more accurately and may be better equipped to discriminate speech sounds of a language as well. This is in line with the findings of previous studies that hold a claim that there exists a positive transfer of sound receptive skills from one domain to another, music to language. Also, according to Dörnyei and Skehan (2003), correlations of aptitude or motivation with language achievement range between 0.20-0.60. Therefore, the

correlation between music aptitude and L2 receptive phonology reported in the present study further supports the potential significance of music ability in SLA research.

Language is a means of oral communication and thus distinguishing different speech sounds accurately is one of the first tasks that language learners will encounter, which explains the reason why phonetic coding ability is a component of language aptitude (Carroll, 1965). The results indicated that learners with greater music skills may have a head start when it comes to learning L2 pronunciation. This is a significant benefit in L2 learning because learning a new language is a burdensome process that depends highly on interaction (Fonseca-Mora, Toscano-Fuentes, & Wermke, 2011). Further support can be found in Hu, Ackermann, Martin, Erb, Winkler, and Reiterer (2012) which found that phonetic coding ability can predict L2 pronunciation aptitude. Additionally, the finding corresponds to what Slevc and Miyake (2006) argued about musical ability being an important determinant of successful attainment of L2 pronunciation. In particular, it appears that the findings of the present study concur with their claim that the ability to analyze musical sound structure would also facilitate the analysis of a novel phonological structure of an L2.

Relevance to PIE and Second Language Learning

The relationship between music ability and phonemic coding ability suggests for future research in SLA that a language aptitude component may be explored further in terms of the construct operationalization. For example, musical ability may be recognized as part of the construct of phonetic coding ability that requires a skill to code and retain unfamiliar sounds (Carroll, 1965). This can further contribute to the exploration of measurement of language aptitude as well. In addition, musical ability may also have a place as a sub area in individual differences, especially in regards to L2 pronunciation attainment. Finally, according to Dörnyei and Skehan

(2003), correlations of aptitude or motivation with language achievement range between 0.20-0.60. Therefore, the correlation (r=0.47) between music aptitude and L2 phonetic coding ability reported in the present study further supports the potential significance of music ability in SLA research.

Although the purpose of the study is oriented towards theory rather than practice, in terms of applying it to L2 teaching and PIE, a thorough examination of students' language aptitude that includes individual differences such as music ability can be considered. Students who are less skilled at acquiring L2 pronunciation may be further examined by testing their phonetic coding ability in relation to their sense of musicality. Making such a thorough diagnosis on students' phonetic coding ability may be of interest to not only students but also the institution on how to better prepare them and set them up for success for L2 learning.

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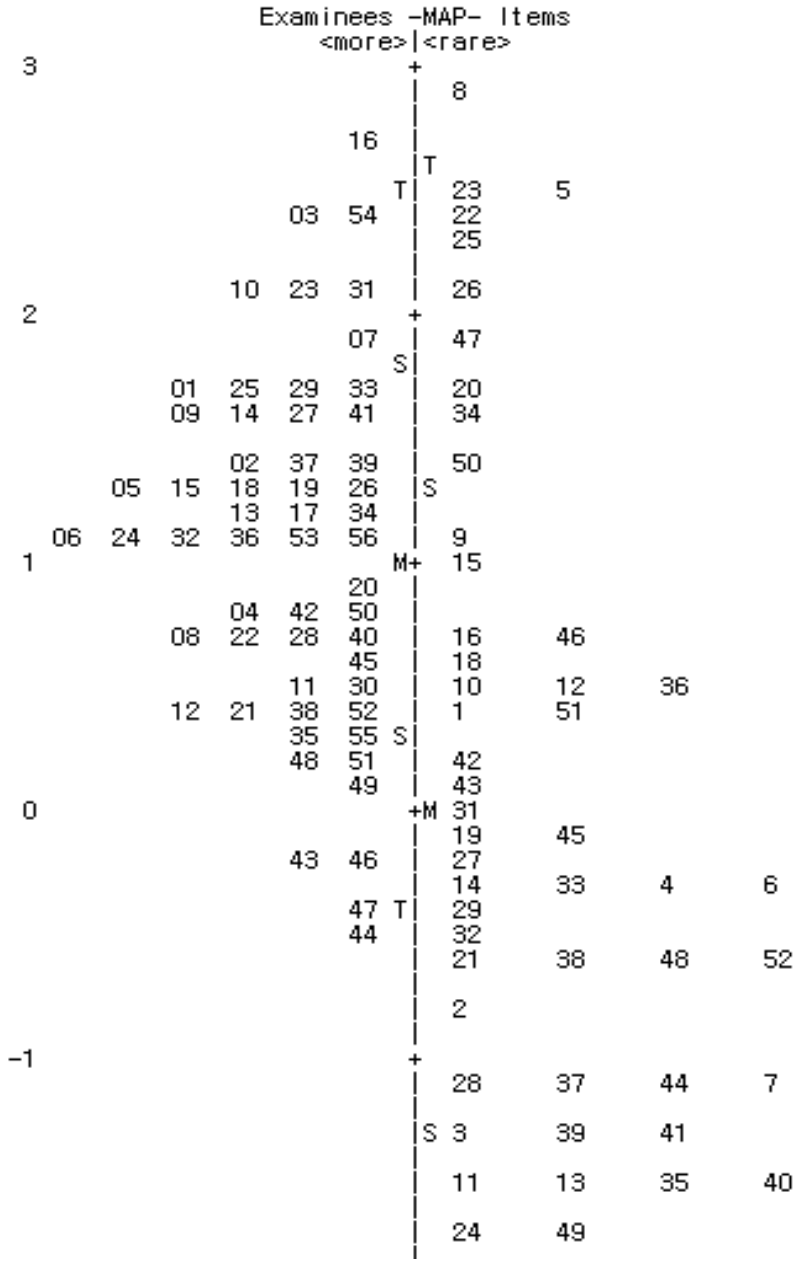
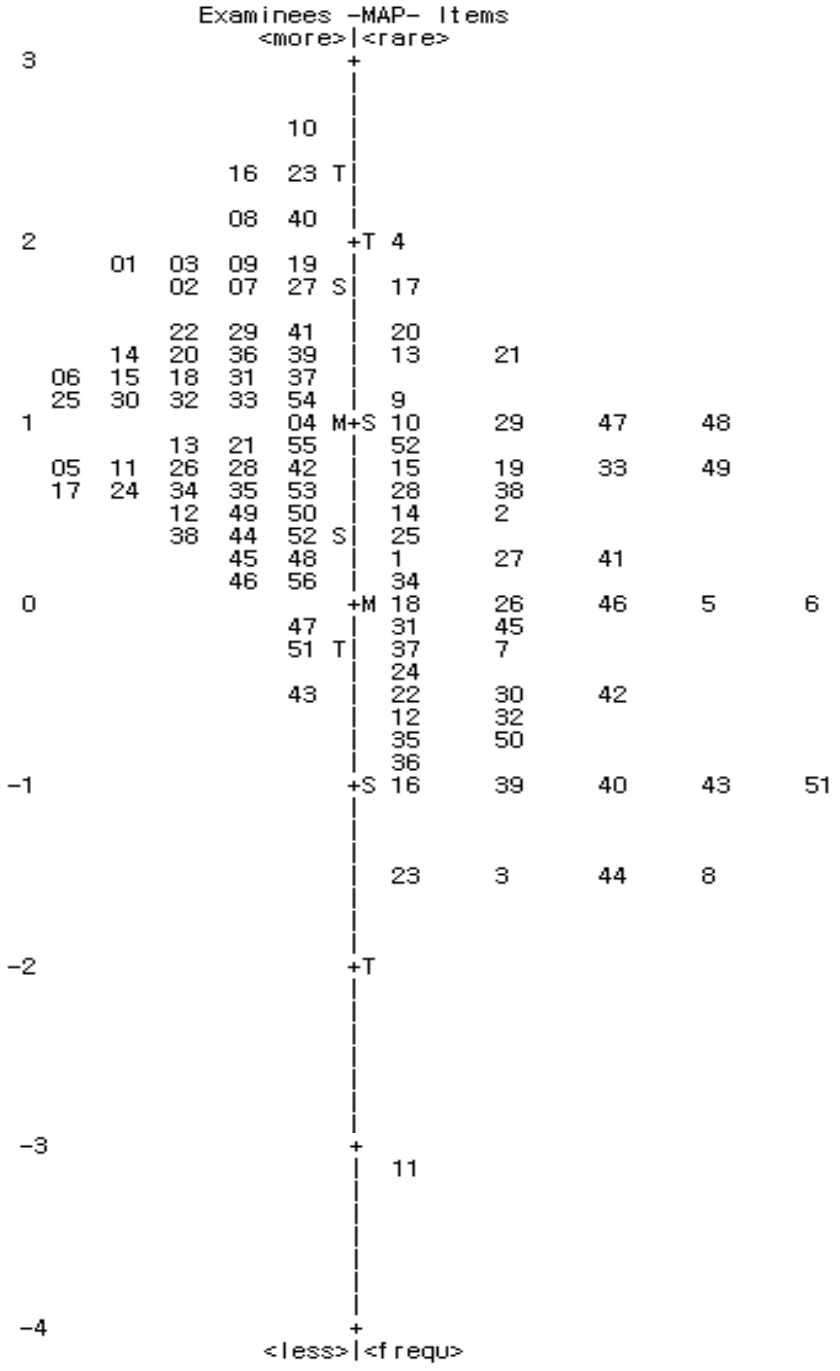
Appendix A

The MET melody variable map



Appendix B

The MET rhythm test variable map



Appendix C

The Llama test variable map