

ADAPTION TO ESTONIAN CHILDREN OF THE PROTOCOL FOR CROSS-CULTURAL RESEARCH IN SINGING

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Abstract. A Test Battery created in Canada, aimed at mapping the musical development of children of different ages and in different cultures, was piloted within a group of Estonian children ($N = 26$, age 4 to 12 years) with varying degrees of musical training. The verbal parts of the test were translated into Estonian and adapted, where necessary, to the temporal structure of the sub-tasks involving rhythmic and metric aspects. Participants were able to successfully comply with the majority of the test components. The most interesting discrepancy regarding the rationale of the original Battery was related to the different possible concepts of the term ‘song’ by the participants. As many children exhibited considerable shyness during testing, a longer warming-up period may be required for them in order to overcome the effects of an unfamiliar environment and the unexpected nature of some tasks within the Battery. Various suggestions are presented for the further development of the Test Battery.

Keywords: musical tests, test adaption, cross-cultural research, singing, AIRS

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1. Introduction

This paper reports a pilot study where a Test Battery created in Canada and aimed at mapping the musical development of children in different age groups and in different cultures was applied to children speaking Estonian as their native language and living in Estonia. The Battery (Cohen *et al.*, 2009) tests voice range, singing back the ‘easy’ minor third interval and other musical elements (scales, major triads), vocal creativity, singing back a familiar song, and learning an unfamiliar song. Speech and language abilities are captured at the beginning and end of the Battery. The purpose of the present pilot study was to learn to what extent the Test Battery is applicable in a cultural and linguistic environment different from that of Canada, and to suggest changes for individual components

of the Battery for suiting cross-cultural research. The article gives an overview of the piloting process and describes preliminary results.

The introduction section of paper presents some background information of this pilot study – why it was initiated, what the main aims are. Also for giving the process and results some reference system, an overview of Estonian music education is given.

1.1. AIRS project

Work on the Test Battery is part of a major collaborative research initiative aimed at advancing interdisciplinary research in singing (abbreviated as AIRS¹) that focus on three themes: (1) the development of singing ability, (2) singing and learning, and (3) the enhancement of health and well-being through singing. These themes may be understood, respectively, as defining what it is theoretically possible to achieve with the human voice given mental, physiological and environmental constraints, what singing behaviors occur in practice, and what the societal implications of singing are. One of the goals of the first theme mentioned is to develop a Test Battery suitable for different cultures and subjects of different ages and at different levels of education. According to Stevens (2004), the aim of cross-cultural research in music is to investigate not only the so-called universal psychological principles of music cognition, but also individual differences in music processing. Test Battery is still in the adapting and piloting phase simultaneously in several countries. There is an annual conference to discuss the progress. As Test Battery includes many components that can be related to several substantive research questions according to different interests and domains, it is quite challenging to develop a methodology that would meet everyone's needs.

A test can be evaluated at the basis of its reliability and validity. For a test of musical abilities, Karma (1973, 2007) advised to evaluate it using a theory-driven approach rather than at the basis of its ecological validity. He believes that the latter approach is not culture-free and favors participants with prior musical training. "An ideal test might be in between: abstract enough to be objective and as culture-free as possible but so close to music that interests and sufficient wideness of scope are maintained" (Karma 1973:6). Karma's (1973:13–14) criteria for constructing a good test of musical abilities require the test to be (1) as culture-free as possible; (2) as free as possible from the effects of musical training; (3) objective, so that a single right answer is possible to every item; (4) not too long and boring; (5) not affected by differences between individuals regarding sensory discrimination ability; (6) suitable for participants as young as possible. These guidelines may serve as an outline for cross-cultural validation of the AIRS Test Battery and its possible future improvement. In particular, one may argue that more experienced participants, i.e. those who are older and with more musical training, may have an advantage over less experienced participants in responding to some items of the test. If the primary purpose of the AIRS Test Battery is to

¹ For more information see webpage <http://www.airspplace.ca/>

measure musical aptitude, i.e. to predict a child's potential success in subsequent musical studies, then the possible effects of prior musical training should be kept on as low a level as possible. If, on the contrary, the purpose of the Test Battery is to measure musical achievement, then it should be evaluated on different grounds.

1.2. Estonian music education system

In Estonia, music education is part of the education curriculum from as early as kindergarten. Music lessons (singing and/or dancing) for the children of pre-kindergarten age are also very popular. Compulsory education in Estonia (9 grades) starts when children are 7 years old. For every school year during the years of compulsory education, as well as in high school, there are specific government-approved programs and study materials, including text- and song-books, CDs and DVDs, which focus on (choir) singing, music theory and music history. The national curriculum in Estonia prescribes that schools teach two 45-minute music lessons each week in grades 1 to 4 and one lesson in grades 5 to 12 (Kangron, 2011:7). The majority of music teachers hold a university degree. Many schools have a choir, where children participate voluntarily. Estonia also has a network of music schools, which provide children with 7 years of instrumental training and the basics of music theory and music history. There are three secondary-level music schools in Estonia, where 3- or 4-year instrumental training and advanced level courses in theoretical subjects are combined with the national high-school curriculum, giving students an opportunity to continue their university-level studies either in music or in other disciplines.

The three Baltic countries are famous for their Song and Dance Festivals (SDFs), which date from the mid-nineteenth century. In Estonia's recent history, the festivals culminated in 1988 as one of the key components in regaining the country's independence (the 'singing revolution'). In 2003/2008 UNESCO included the festivals on the list of the Oral and Intangible Heritage of Humanity. SDFs take place regularly, but not each year. Collectives start practicing the repertoire about a year before the event and have to pass several qualification tests to gain their place in the festival. Usually there are about 30 thousand participants, out of a total population of about 1.3 million. Most children are involved in the festival, either singing or dancing, at least once during their schooling.

In addition to the festivals, there are also important musical events for soloists, which are very popular, in the form of Estonian Public Broadcasting song competitions for children aged 3 to 16 (*Laulukarussell*, Song Carousel, since 1992, which was preceded, from 1968, by the similar *Entel-Tentel*) and for young adults aged 16 to 28 (*Kaks takti ette*, Two bars forwards, since 1972). *Laulukarussell* has semifinals for all age groups in every Estonian county and final live broadcast concert. As a commercial project, the Estonian version of Pop Idol has been broadcast since 2007. Every two years the local so-called Musical Olympic Games are organized for students from the 7th and 11th grades by the Estonian Society for Music Education, and these include competing in singing, composing, and musical knowledge. Children are involved in Estonia's professional musical life.

There are some children's choirs (for example, *Ellerhein* for girls, *Revalia* for boys, and choirs of the Estonian National Broadcasting Agency for both sexes), which frequently represent Estonia at international singing competitions. They are also involved in musical performance projects together with professional adult choirs where bigger choral forces are required.

The Estonian 'musical environment' can be overall described as Western, as the popular music is strongly influenced by international mainstream trends. In addition there is a notable community promoting and experimenting with Estonian historic singing, called *runosong*. Singing *runosongs* is also part of the national music curriculum.

Estonia was involved in the AIRS project because its national representation as a 'singing nation' and outstanding musical education program in schools described above. In the future phases of the AIRS, Estonian data could provide interesting input for cross-cultural research with countries where school system is different. As the Test Battery is piloted in different countries, there is also the important question of language as many items in the Battery need translating and adjusting to target languages.

1.3. Research questions

Pilot study described in this article has several research questions:

1. Adapting the items of the Battery – what adjustments are needed considering Estonian language and culture? What is the overall assessment about the suitability of the Test Battery for cross-cultural comparative research?
2. Testing the process itself - how long does an average testing session take, which items are most challenging for children, what suggestions can be done for improving the process?
3. Participants – which are suitable age groups for the Test Battery, are children with extracurricular musical education doing better in testing?

2. Method

2.1. Participants

Participants ($N = 26$; 17 girls and 9 boys, ages 4–12) were selected randomly. Most of the children were participants of children's summer city camp who were given an opportunity to participate in this pilot study. Two children were recruited from among the researcher's personal acquaintances. Table 1 gives an overview of the participants' age, sex and education. All participants were native speakers of Estonian. Half of the children had no special musical training except participation in activities at kindergarten or at school (e.g. singing in a choir). The other half of the children had studied an instrument at a music school or with a private teacher, and/or participated in a choir on an extracurricular basis.

Table 1. Participants

No.	Age	Sex	Extra-curricular musical activities (yes/no)
2	4	M	No
3	4	M	No
5	8	F	Yes
6	8	M	Yes
7	7	M	No
8	8	F	No
9	10	F	No
10	9	F	No
11	11	M	Yes
12	9	M	No
13	8	F	Yes
14	10	F	Yes
15	11	M	Yes
16	9	M	No
17	9	F	Yes
18	11	F	Yes
19	12	F	No
20	12	F	Yes
21	12	F	No
22	12	F	Yes
23	10	M	Yes
24	8	F	Yes
25	10	F	Yes
26	9	F	No
27	7	F	No
28	8	F	No

2.2. Procedure

All children except for two 4-year old boys (twins) were tested in a rehearsal room at a music school. All sessions were videotaped. Every child was tested only once. The duration of each testing session averaged 15–20 minutes. All audio samples and feedback during the tests were provided by the researcher using her own voice or a keyboard instrument.

2.3. Material

The 11 components of the AIRS Test Battery (Cohen *et al.* 2009), hereafter referred to as the Battery, are presented in Table 2. As the testing was to be conducted in Estonian, all the content of the test items were translated by the researcher. Pre-recorded test items exist in English, but were not applicable. It should be noted that differences between languages can manifest themselves even in non-verbal exercises².

² For example, as in *lah-lah* [English pronunciation: la-la] sequences, inter-vowel consonants tend to become geminates for native speakers of Estonian [Estonian pronunciation: lal-lal].

Table 2. AIRS Test Battery of singing skills. Modified from Cohen *et al.* (2009:113)

AIRS Test Battery of singing skills		
Component number and its description	Purpose	
1	Opening conversation (currently incorporating a sentence containing all phonemes of the relevant language)	Indicate level of speech and grammatical development; show participant's mood and interest; put participant at ease
2	Determine vocal range	Gauge vocal range; determine placement of remaining components with respect to range
3	Minor third participant name call-back	Measure ability to sing minor third (<i>sol-mi</i>); begin with an easy task of minor third, 'assumed' universally easy for children
4	Review and sing back <i>Brother John</i> : all, as 8 phrases, and whole song	Measure ability to sing a highly structured and possibly familiar piece; provide training on one simple piece; for future use of a song accessible to many cultures (translated in > 40 languages)
5	Sing favorite song or, if no favorite, a known song of choice	Obtain information about favorite songs and accuracy and consistency of its production; determine musical preferences and consistency of preference
6	Sing back interval, major triad, scale (up/down)	Measure accuracy of singing musical elements; enable modeling song performance from performance on elements
7	Improvise ending of a song	Measure musical (singing) creativity and mean length of utterance (a verbal measure); enable modeling of development of musical creativity and compare it with language creativity
8	Free composition to choice of 4 pictures (sun, apple, heart, flower)	Measure song creativity and compare with results of Stadler Elmer (2000) who also used pictures; pictures constrain themes but inspire lyrics
9	Sing back unfamiliar song <i>We Are One</i> (Carolyn McDaid)	Measure memory for unfamiliar tune with lyrics using an anthem for the natural environment and humanity, based on the Earth Charter
10	Sing <i>Brother John</i> from recent memory	Measure song memory (immediate retention) over the intervening 15 minutes since first heard
11	Closing conversation	Provide data for indexing verbal level; provide a measure of mood, attitude, and activity level at end of test; encourage returning for the next session; end session in a pleasant way

2.3.1. Description of the tasks in Test Battery and adaption to Estonian

This section gives an overview of the nature and aims of the components of the Test Battery and their adaption to Estonian. Our aim was to adopt the Test Battery as closely to the original as possible in the piloting phase.

The primary aim of the opening conversation (Component 1) was to make the participants feel relaxed and to create a friendly testing environment. Information

gained during the opening conversation shows the level of language acquisition and skills of a participant and indicates her/his overall mood and interest in the task. No standard questionnaire was used in conversations. Questions asked by the researcher were related to the participant's first name, age, school year, involvement in musical activities (playing an instrument, singing or dancing) and, in some cases, to musical activities practiced by other family members. At the end of the conversation each child had to repeat twice an Estonian pangram "*See väike mölder jõuab rongile hüpata*" (translation: "This little miller can still jump on the train"), which is equivalent to the English sentence "The quick brown fox jumped over the lazy dog". A pangram (Greek: *pan gramma*, 'every letter') or holo-alphabetic sentence is one in which every letter of the alphabet is used at least once.

Component 2 in the Test Battery is aimed at determining a participant's vocal range. In order to motivate participants to become involved in this task, we used the following phrase as an introduction: "Now we are going to do some voice warming exercises as all singers do". As there are no fixed guidelines in the protocol as to how to measure a child's vocal range, the researcher first herself demonstrated a glissando on the /a/-vowel. Then she instructed the child to produce "as low a voice as possible" as a first step and then to glide upward as high as possible using the /a/-vowel.

Component 3 is aimed for singing back minor third interval. To make it more playful, component was originally designed after a popular name call-back exercise in English as seen in Figure 1. Unfortunately it does not have an equivalent game in Estonian. Neither can it be translated literally into Estonian, as the number of syllables in corresponding Estonian words does not equal the number of syllables in the original English words and it is therefore impossible to maintain the rhythmic structure of the game in translation. As the aim of this item was not specifically related to the child's name but singing back an musical interval, we combined *lah-lah*-syllables with two easy rhythmic figures for this task; these were first sung by the researcher and then repeated by the child.

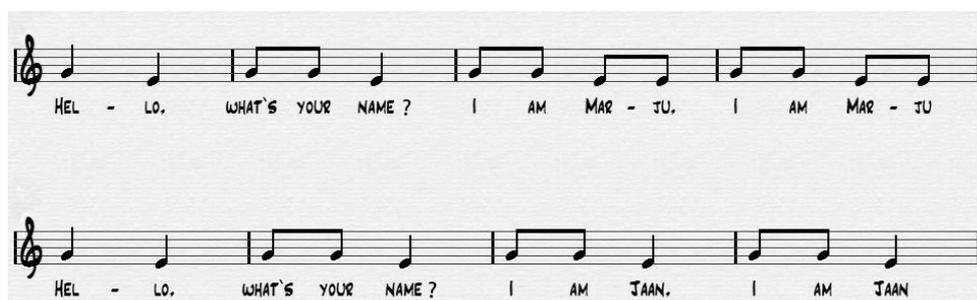


Figure 1. 'Name game' originally used in item no. 3. Experimenter sings the question and child responds with his/her name. Names of the authors are used as an example for different rhythms used in the answer according to the syllables in the name.

The nursery rhyme *Brother John* in Component 4 is widely known in Estonia under the title *Sepapoisid* and, as in other languages, is usually sung as a canon. The Estonian lyrics are mundane in nature and do not have the ‘ding-dong’ syllables imitating church bell sounds. The English lyrics “Are you sleeping / Brother John / Morning bells are ringing / Ding, dang, dong” are performed in Estonian as “*Sepapoisid / Teevad tööd / Taovad tulist rauda / Päeval, ööl*”, which can be literally translated back as “Blacksmith’s boys / Are working / Beating hot iron / Day and night”. The aim of this component is to measure the ability to sing a highly structured and possibly familiar song and provide training on one simple song. *Brother John* was chosen as it is widely known in different countries/languages and could provide interesting comparative data for cross-cultural research.

Component 5 in the Test Battery requires the participant to perform her/his favorite song without instrumental accompaniment. In case the child does not have a favorite song, some other song could be chosen, for example something learned at school, heard on the radio etc. The aim of this component is to get the participant to sing a song of his/her choice.

The task in Component 6 of the Test Battery consists of a number of pitch-matching ability exercises based on musical intervals, triads, and scales. The aim was to evaluate how accurately children can repeat those musical elements common in Western culture. This test component is similar to the voice warming-up exercises used in music lessons and in choir practice and therefore familiar to children.

For Component 7, participants had to improvise an ending for a song, in order to show their musical creativity. A short unfinished song was presented to a participant (see Figure 2). In 18 cases it was sung by the researcher using *lah-lah*-syllables, and in 8 cases with words (their free translation from Estonian being “I know a dog who barks”). The melody was presented twice: the first time for listening purposes only, and the second time for continuation by the participant.

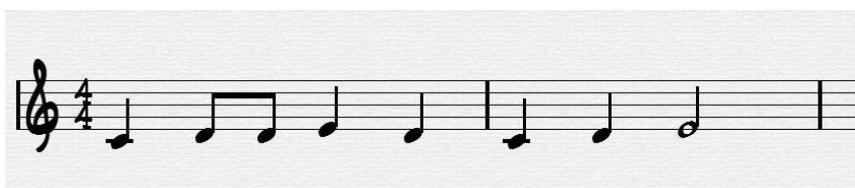


Figure 2. Melody presented in test item no. 7 to be completed by participant.

For Component 8, children were asked to invent a free song that relates to one of the available pictures. The protocol in the original Test Battery included four iconic computer drawings: a heart, a flower, a sun, and an apple, each on separate white card and colored brightly in red, blue-and-yellow, yellow, and green,

respectively. This picture set was presented to 19 children. For the remaining seven children, an alternative set of four photographs was used representing a sunflower, a goldfish, a car race, and a performance of a folk band. In response to the request by the interviewer to select the favorite picture out of the four presented, the participant chooses an item, and the other pictures are put away. Since there are no specific guidelines in the Test Battery protocol, three different instructions might have been given to a participant in the present study: (1) When you look at this picture, does any song pop into your head?; (2) Make up a song about this picture; and (3) Please describe this picture by singing.

During the next task (Component 9), children had to sing back a song, presumably unfamiliar to them, “We Are One” by Carolyn McDade (see Figure 3). “We Are One” is an anthem for the natural environment and humanity, based on the Earth Charter (a declaration of fundamental ethical principles for building a just, sustainable and peaceful global society in the 21st century). This task is aimed at estimating the short-term memory of a participant, as the song is presented only twice. After each hearing, the participant is asked how much of the song (s)he remembers, and is then requested to recall anything (subject, lyrics, or melody) and encouraged to sing it back from memory without any active learning process, rather as in the case of *Brother John* in Component 4 of the Test Battery. Only the beginning of the song (bars 1–12) was used and translated into

TEXT EXCERPTED FROM/BASED ON THE EARTH CHARTER

WE ARE ONE

CAROLYN McDADE

WE ARE ONE. ONE HU - MAN.

FROM I - LY. ONE EARTH COM - MUN - I - TY. A COM - MON.

DES - TI - NY. FOR ALL.

A COM - MON. DES - TI - NY.

A COM - MON. DES - TI - NY.

A COM - MON. DES - TI - NY.

FOR ALL.

Figure 3. Unfamiliar song “We are one” by Carolyn McDade presented in item 9. Score adapted from Cohen (2011:51).

Estonian for this study. The English original of the beginning of the song is “We are one / One human family / One Earth community / One common destiny for all”; its Estonian translation – fitted to the meter and rhythm of the original as accomplished by the interviewer – is: “Üheskoos / Me sõbrad oleme / Me üksteist toetame / Nii saabki korda kõik me Maal”, and the translation of the Estonian text back into English is “Together / We are friends / We support each other / That’s how all will be all right on Earth”. In the translation, we tried to use simple words common to children’s vocabulary, as the meaning of this song’s lyrics seems rather abstract for youngsters. The melody of “We are one” is quite difficult as it lacks easily memorable rhythmic structure, phrase repetitions, it contains difficult melodic leaps.

The last singing task (Component 10) in the Test Battery was to perform *Brother John* once again but this time from memory. The aim of this task was to compare the immediate retention of the song as in Component 4 with its retention when delayed by about 15 minutes, during which traces of its memory might have been interfered with by other tasks.

The final component of the test, Component 11, was designed to provide a measure of the mood, attitude, and activity level of participants at the end of the test and to finish the session in a pleasant way. In general, the majority of children were tired and anxious to leave the room after testing, so that the final conversation was cut short. The researcher asked the participants two questions: (1) How did it feel doing these kind of exercises? (2) Would you be willing to participate in the same kind of testing again in the future?

3. Results

This section of the article gives a concise and descriptive overview of results. No deeper acoustical analysis of collected data is presented here as the aim of this article is focused on the testing process and adaption of Test Battery to Estonian. The overall assessment of the pilot study was successful. Table 3 presents the proportion of successful accomplishers for each task out of the total of 11 tasks of the Battery. ‘Success’ is here defined as any musical activity the participant managed to produce during the task, no result was counted as ‘wrong’. Unsuccessful cases indicate the number of situations the participant did nothing in response to the researcher’s guidelines. The two groups of participants are distinguished according to whether or not they were involved in extra musical activities. Test items (components) which were modified in this experiment are marked with an asterisk. The last column in the table comprises comments related to the applicability of a specific component under the Estonian circumstances.

The following paragraphs will summarize the results in order of components in the Test Battery.

Component 1. All participants managed to engage in the opening conversation and repeat the pangram.

Table 3. The number of successful participants for each item in the Test Battery. Those items which were modified in comparison with the original Test Battery are marked with an asterisk. Group I consisted of participants with and group II of participants without extra musical activities. See also Table 2 for description of the test items.

Test item	No. of successful** participants		Comment
	Group I (n = 13)	Group II (n = 13)	
1*	13	13	
2	13	13	Some different method instead of singing the vowel /a/ could be considered.
3*	13	13	
4	13	13	In cases where the song is well known to the participants prior to the testing, training it by phrase is not necessary as they can sing it right away.
5	12	11	The word 'favorite' may confuse participants, so that it may be reasonable to ask them to perform any familiar song.
6	13	13	
7*	12	12	
8*	8	8	There are different possibilities for conceptualizing the meaning of the word 'song' (see text for details).
9*	13	12	
10	13	13	This item did not fulfill the purpose for long-term memory assessment as the song was known to the participants prior to the testing.
11	13	13	

** 'Success' is here defined as any musical activity the participant managed to produce during task; no result was counted as 'wrong'. Unsuccessful cases indicate the number of situations the participant did nothing in response to the researcher's guidelines.

Component 2. All the children were able to do this, but there was some discomfort with the task as some children needed more positive feedback and encouragement by the researcher. Another problem arose as some children tried to imitate the researcher's voicing in terms of pitch and did not adjust the exercise to their own vocal range.

Component 3. The task turned out to be easy and did not cause problems for any of the participants.

Component 4. This song was familiar to all the children and it was not necessary to rehearse it, as they were generally able to sing it right away when prompted. However, some children still asked the researcher to start performing the song phrase-by-phrase, so that they could repeat the individual phrases as responses. This approach can be interpreted as a kind of 'security measure', which some participants used in order to become familiar with this exercise and avoid singing the whole song alone.

Component 5. Participants needed to be encouraged to perform any song (s)he knew, as many claimed not to have any favorite songs at all. Three participants out of the total of 26 (two girls, 8 and 10 years old, both without special musical

education, and a boy of 10 years who studies guitar and sings in a boys' choir) refused to fulfill this task even after long negotiations. The selected songs by the rest of the participants ranged from popular Estonian nursery rhymes originating from the past century to recent popular hits from the adult repertoire in both English and Estonian, e.g. Bobby McFerrin's "Don't Worry Be Happy". One 9-year old girl sang a song about Paris in French, which she had learned in a French lesson at school. Not all performances were complete; some children sang only excerpts or the chorus of a song. An extraverted 8-year old boy said that he had a favorite song but unfortunately it was in English ("Hard Rock Hallelujah", by the Finnish heavy metal band *Lordi*) and he could not sing it. Instead, he chose to perform a long and complicated song which he had learned in the boys' choir.

Component 6. This component appeared to help participants relax after the rather challenging task of performing their favorite song. All children were able to fulfill this task. Certain individual differences relate, for example, to the ability to carry a tune and also to motivation, as this test element might have been perceived as quite long and boring. One of the youngest participants (a 4-year-old boy) approached the task creatively and did not respond with an exact repetition of the material presented by the researcher, but with his own improvisations, creating in this way a musical dialogue with the latter.

Component 7. Like the task in Component 5, this one, too, was a little more challenging for the participants and needed courage on their part. The majority of children managed this task with no problem. Only two children, a 10-year-old boy and a 7-year-old girl, declined to perform. In the first case, the song was initiated by the researcher with words and in the second case without words. In general, it can be said that children who are involved in additional voluntary musical activities tend to complete the task according to the logic of tonality (i.e. ending the melody with the first scale step) and two-/four-bar phrasing form. Seven children repeated the melody phrase first and then continued or repeated the phrase, only providing a slightly different ending.

Component 8. This task seemed to be the most difficult for the children. As many as ten children out of 26 were unable to make up a song, in other words, they did not do anything. Some reasons for this may lie in the testing procedure, but the most important one was probably the child's overall shyness and/or fear of doing something wrong. Out of 10 of the so-called failure cases, four children were attending extra music lessons or studying at a music school and should in principle have been able to do and/or been used to this kind of exercise. Among the photographs in the alternative set, only those representing a sunflower and a fish were chosen by the participants. From the original set, all the pictures were chosen. This suggests that children preferred pictures of well-defined items to pictures involving action. Out of the ten participants who failed to complete the task, nine had been presented the original set and one the alternative set. As mentioned in the methodology section, three kinds of instructions were used. As only 26 children were tested, it is difficult to say if one instruction 'worked' better than another, as each instruction could have led either to an eventual success, or to

a failure. Three participants out of the 16 who accomplished the task cited a poem with no melody in response to the task. Eight children sang an already existing song somehow related to the picture or used an existing melody (in one case *Brother John*) to improvise new lyrics related to the content of the chosen item. Only eight participants were able to create a new song with both an original melody and lyrics.

Component 9. Children seemed to use three different memory strategies for remembering this song, apparently dependent on their individual concept of a song. Both the lyrics and the melody in this task were difficult and participants struggled to fulfill the task. The most common method was to remember the lyrics only as the main identification of the song. This strategy was used equally by children both with and without special musical training. The second method was to disconnect lyrics from the melody and to try to remember them separately: first the lyrics and then (when listening to the song for the second time) the melody. When asked to perform the song, a participant of this type first recited the lyrics and then hummed the melody, or in some cases was able to sing some words but not the complete phrase. Five children out of the 26 in our study used this strategy, i.e. hummed the melody or performed it first with neutral syllables. Only two participants (11- and 10-year-old boys, both of whom were learning a musical instrument) used the third method when they (very successfully) tried to remember simultaneously both the lyrics and the melody right after the first hearing. Only one child (a 4-year-old boy) failed to complete this task, presumably due to boredom and his anxiety to leave. His twin brother however was able to remember quite a number of words. Potentially, this component of the Test Battery could provide interesting data if repeated during multiple testing sessions, possibly complemented with other memory tasks (verbal, spatial, etc.), and by analyzing the data more systematically.

Component 10. As most of the children knew the song long before testing, however, there was actually no learning process involved and the majority of participants were able to carry out this task without problems.

Component 11. Only one 10-year old boy said he did not like it and would not want to participate again. He had difficulties with the creative tasks such as singing a favorite song, completing a melody and inventing a song to a picture (in the end he did not perform any of them.) He studies guitar and sings in a boys' choir. All other children said they were happy with the testing and were willing to repeat it in the future.

4. Discussion

Discussion section will focus on interpreting important observations arising from the testing process and results to suggest possible improvements to the Test Battery. However, it should be remembered that this kind of testing process with children (especially preschoolers) can never be determined to the end in detail.

Singing is perceived as social and playful activity by children which influences their behavior during testing and researchers must always have an open mind to react accordingly.

The pangram in item 1 of the Test Battery is aimed at introducing to a test subject the phonological system of a given language, presenting her/him its complete inventory of phonemes in a single sentence. The relationship of a pangram to a test of musical abilities is not explicitly evident. Pangrams in different languages (and perhaps different possible pangrams even within a single language) may yield semantically different outputs. This is the case if we compare the English pangram (“The quick brown fox jumped over the lazy dog”) in the original Test Battery (Cohen *et al.*, 2009) with the reverse translation into English of its Estonian equivalent, which was used in the present study (“This little miller can still jump on the train”). The English original has a funny nature. It can easily be accompanied by a picture or a video clip and this way make a good introduction in order to continue testing with a shy child. The Estonian equivalent has a more abstract content which may not be comprehensible to a child at first glance. It should therefore be asked which of the two functions of the first test component is more important in the Test Battery: either to introduce the phonological inventory of a language to the test subject or to introduce her/him to the task and to create a productive atmosphere for further work. It may prove impossible to follow both functions equally well in a language environment different from English.

We did not collect any background information about participants in the present study. A few questions about the child’s age and possible musical activities were asked, but their replies were not verified by parents or teachers. There are musical aptitude studies that rely to a considerable extent on background information about the interviewees, which eventually make it possible to draw more thorough conclusions from the study. For example, in their cross-cultural study of comparing Estonian and Finnish gifted children on creativity, musical ability and environmental aspects, Ruokonen and Vikat (2005) conducted long interviews with children which focused on detailed descriptions of their everyday life, including their musical and creative activities. These interviews were complemented by questionnaires for the parents and teachers of the children interviewed, which enabled the authors to compare information obtained from three separate sources. It could be useful to add a questionnaire to be filled by a parent or music teacher to the AIRS Test Battery to verify and complement children’s background information about their musical education and experience. Also domains like a child’s temperament, motivation and home musical environment could be added to the questionnaire which then could be insightful for interpreting results. When testing small children (preschoolers) this kind of questionnaire can save valuable testing time and cut the time spent on opening conversation and focus on the actual singing exercises when the child’s concentration is still high. In the present study, the average amount of time required for completion of the test was about 15-20 minutes. At least for preschoolers, this was too long, as many of them were unable to maintain the necessary level of concentration for this timespan. If the protocol

had included an extra interview or questionnaire in order to gather additional background data, it would have made the situation even more complicated than at present.

Item 5 of the Battery requires a child to execute two tasks: first to determine her/his favorite song and subsequently to perform it. It should be noted that the first task may turn out to be complicated even for a grown-up, as the category of 'favorite' can be interpreted in different ways (favorite for now or over a longer period of time, favorite in what genre). The proposition that everyone should have 'a favorite something' (song, color, animal, etc.) is debatable, as it presumes a hierarchical world-view of favorite and non-favorite categories, which seems to be culturally forced on us. After the determination of the favorite song, the next task is to perform the song. This task, in turn, is rather challenging, as children may like music of a complicated structure which cannot be easily imitated by solo voice alone. In general, easy nursery rhymes were chosen by those children frustrated by the task (just to "get it over with"), while those children who saw it as a challenge chose more complex songs. At the same time, our experience demonstrates that it may be hard to get a child singing something at all if (s)he happens to be shy. We would suggest simplifying this item and defining the task as one over which a child may have total control, e.g. to choose whatever (s)he likes for singing. One should remember that almost all other tasks in the Battery are imitational in nature or have strong guidelines about how they are to be executed.

The structure of items 3 and 6 is based on the imitation of examples presented, where the accuracy of pitch relations, rhythm, and melodic contour can be assessed. Tasks of this kind are common for children in the formal educational system as they coincide with the voice warm-up exercises done in music lessons or choir practices. One may wonder why items 3 and 6 have not been combined into a single item (or at least into a single package), but this may be explained by the need to balance easier (potentially more boring) items in the Battery with more complicated ones. Our experience shows that younger participants (e.g. a 4-year-old boy) may approach the latter type of task with spontaneous creativity, so that the assessment of exact precision is compromised. In this study, two 4-year-old boys (twin brothers) did not necessarily listen (or even wait) for the instructions in such tasks, but reacted spontaneously from the very beginning of the item. Instructions could in some cases prevent an outcome, as for example in test item 7, where both boys reacted with an improvisation immediately after (or even during) the presentation of the beginning of the melody for the first time, but after the second listening (having heard the instruction to 'make an ending') did not do anything, as if the command had 'killed the buzz' or awakened resistance to being subjected to authority. In certain instances, it seemed even that the test subject and the tester had exchanged roles, as the former made an attempt to take the lead in the process (e.g. by continually asking questions related or unrelated to the procedures of the Test Battery).

Attempts to conduct the Battery were also made with a 2-year-old girl, but the only two items she could complete were Nos. 3 and 5, so the data is not included in this study. This child comes from a recognized Estonian family of musicians and, as previous experience has shown, had in principle no problem in performing most tasks of the type included in the Battery. However, the attempt to make her perform the tasks according to the prescribed protocol of the Battery unfortunately failed. This situation prompts us to consider the primary purpose of the Battery. Is it aimed at assessing children's ability to perform its tasks or at assessing how children are able to follow the testing protocol? In the first case, the order of items and the specific wording of instructions should not be crucially important, and a test could be conducted depending on the specific circumstances of a given situation at that time. In the second case, the results and success level will depend on a child's familiarity with this kind of setting, which to a significant extent resembles a lesson in school (some participants have pointed this affinity out themselves). Consequently, children who already attend a school are expected to have an advantage over those who do not, irrespective of their age.

The results obtained indeed demonstrated that it was easier to follow the test protocol with those participants who had already been enrolled in formal education, were older, had a longer attention span, and were used to testing. As one of the aims of the AIRS project is to develop a Test Battery suitable for different cultures and subjects of different ages and at different levels of education, the original version (Cohen *et al.*, 2009) may be considered perhaps a bit too challenging for preschoolers. Using the Bentley Measures of Musical Ability, Good *et al.* (1997) found a significant correlation in their study of better results with higher scores and age even when the age difference between two groups of participants was only one year (7- vs. 8-year-olds). They point out that musical ability may be only one of many cognitive functions being measured by this test, the other functions being task comprehension, working memory and attention. They also point out that, unless the instructions are in very simple language and the test does not presume other cognitive demands, the findings are likely to be limited in value.

In addition to levels of cognitive skills, a performance in musical tests is influenced by individual differences in affective and behavioral states during testing. Some children are shy, and it is not easy to say what a better solution for them might be: whether to follow a rigid testing protocol that structures the process and may therefore provide some comfort for the children, or to apply more playful techniques in order to ease the situation. Most of the testing for this study was conducted in a children's summer camp, and a line of participants was formed behind the testing room door. As the door was not completely soundproof, it was possible for the researcher to make some informal observations. There was a lot of communication between those children already tested and those waiting their turn. Those already tested generally did not want to reveal what was going on inside. However, some of them gave up eventually and presented some examples of the test items for their audience. Item 5 turned out to be the most frequent topic for

discussion (accompanied by such remarks as “Oh, my God, I do not have a favorite song!”), and spontaneous singing started as the children already tested shared their songs with others who were ready to join in. Children who were tested after this joint singing had taken place outside the testing room were considerably more relaxed, as they already had some idea about the test and had had time to prepare a song to be performed.

Although it was explicitly stated at the beginning of the testing that there were no ‘right’ or ‘wrong’ answers, it seemed that some children still suffered from performance anxiety. Self-confidence in testing situation varies individually. O’Neill and Sloboda (1997) showed in their study that children with high confidence improved their performance after a temporary failure while those with low confidence demonstrated helpless behavior after a failure. At the same time, they noted that not all children experienced low confidence after a failure and that self-awarded confidence ratings did not necessarily predict actual success in their performance.

In the context of this study, an epistemological question of how a song should be defined arose in connection with test items 7, 8 and 9. As was described earlier, for a participant a song could mean only lyrics, only melody, or lyrics and melody combined. In the Estonian language, the word ‘song’ (*laul*) does not have a specifically musical meaning, as it is used to indicate poems in oral or written form, epic texts, or even stories alongside singing in its narrower sense. *Laul* can be also used in the context of instrumental music, for example in kindergartens children learn to play new ‘songs’ on musical instruments (xylophones etc.) which do not include vocal singing at all. Results from component 8 in this study indicate that the meaning of the word ‘song’ (or, more precisely, its canonical translation into Estonian) may point to at least three different things: (1) lyrics, (2) melody, or (3) both lyrics and melody. An instruction to create a new song did not prevent some children from using a tune already known and improvising new words to go with it, or even from merely reciting a poem without a melody. This suggests that words may be more essentially related to the concept of a song than melody, which in some cases was borrowed without compunction. A song in our study may thus be projected on a continuum with spoken words at one end and words sung to a melody at the other. In such a situation, temporal regularity may become the primary instrument which helps a participant to decide whether a particular performance is labeled as a song or not.

Peretz and Coltheart (2003) have proposed a neuro-psychobiological model of processing singing, which expects the lyrics and the melody to be processed separately and in parallel. In test item 9, in which children were asked to learn a new song, the majority of them started the learning process by concentrating on the lyrics. This behavior agrees with a study by Hargreaves (1986), who observed that in the course of learning a new song, words are usually learned first, followed by rhythm, melodic contour, and intervals in the melody. Stadler Elmer (1994) argues that there could be other possibilities for sequencing these elements in the learning process, depending on a child’s prior musical activities and experience at home. In the present study, we observed that children with extracurricular musical

activities generally used more varied strategies to learn a new song, e.g. singing it back right after the first hearing. One of the strategies for the participants, however, was to recite the lyrics first and to add the melody to them later, or to hum the melody separately without the lyrics. Welch (2005) presents data which confirm that children are usually very accurate in remembering the lyrics of a song but often struggle with performing its melody. In another study, Welch (2006) observed that children are more accurate in learning a melody if they rehearse it without lyrics but use neutral syllables instead.

When asked to finish a melody as in test item 7, some children first repeated the given phrase but some started the follow-up improvisation immediately. These results agree with those of the study by Adachi and Carlsen (1994), where children were also asked to complete a melody. They distinguished between two types of response: those which involved repetition and those which did not. A need to repeat a given phrase in order to finish it can imply the perception of the song as a coherent whole. However, it may also refer to a more mundane strategy of simply 'buying more time' before producing the intellectually more demanding (and consequently more stressful) improvisational part of the song.

Brother John is incorporated in two items (4 and 10) of the Test Battery. This song is widely familiar across different cultures and languages all over the world. In the present study, the majority of children were familiar with this song in advance, so that the majority of participants did not need even to repeat the song phrase-by-phrase in order to reproduce it. In conclusion it may indicate that item 10 in the Battery thus lost its purpose (which was to recall the song from memory). This item could therefore be made optional, limited only to those participants who needed to learn it phrase-by-phrase during the execution of the item 4. Even then the question remains whether a child required the phrase-by-phrase learning because (s)he did not know the song, or because (s)he simply wanted to reduce his/her anxiety and to delay the need to perform the whole song alone. Perhaps it would be useful to establish (for example during the introductory conversation) whether a child knows/has known this song, whether (s)he is used to performing it solo or as a canon, and whether the song could have been sung spontaneously or only in a music lesson initiated by a teacher. To maintain the original aims for components 4 and 10, maybe a different song could be used instead of *Brother John*. This could be replaced with an easy and structural song to differentiate from song used in component 9.

5. Conclusions

This pilot study addressed several research questions about adapting the items to a different culture and language environment, testing process and characteristics of participants.

On the basis of a pilot study with 26 children of adapting a Test Battery, developed in Canada for mapping the musical development of children of different

age groups, to native Estonian speakers in northeastern Europe, the following improvements may be suggested. Firstly, additional guidelines as to how to adapt the Test Battery for a culturally different environment should be added to the protocol in order to ensure its cross-cultural validity. Further elaboration of the basic concepts of the Test Battery seems useful, as cultural and linguistic traditions may differ considerably across different countries and thus bias the outcome. Secondly, in order to better interpret the results of the application of the Test Battery, it seems desirable to have some demographic and sociological background information on interviewees, in addition to the primary data from the testing itself. As carrying out the Test Battery in its original form may be a little too long and tiring, especially for younger children, the background information may be collected in additional interviews with the children's parents before or after the test, rather than with children themselves. As items on Test Battery are somehow similar with singing exercises in school, in its original form, Test Battery gives an advantage for children who participate already in formal schooling and are familiar with performing this kind of exercises. The participants' age seemed to have a bigger impact on performing Test Battery successfully than taking part in extracurricular musical activities. Finally, minor culture-independent improvements to a few items of the Test Battery may be suggested, relating to the concept of a song in general, to the extent to which children are able to explicate their favorite songs during the interview, and to whether or not musical memory can be assessed on the basis of a song already familiar to participants prior to the test.

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