PERCEPTION OF MELODIC COMPLEXITY:
A CROSS-CULTURAL INVESTIGATION

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Tiedekunta	Laitos
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Tekijä	
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Tiivistelmä – Abstract

Sekä melodian informaatiosisältö että kuulijan tyylintuntemus vaikuttavat melodian kompleksisuuden havaitsemiseen. Tutkimuksessa suomalaiset ja eteläafrikkalaiset koehenkilöt (N=112) arvioivat eurooppalaisten ja afrikkalaisten melodioiden kompleksisuutta. Koehenkilöiden subjektiivisia arvioita verrattiin sekä keskenään että havaintomallin (expectancy-based model, EBM) piirteisiin. EBM:n piirteet mallintavat tyylistä riippumatonta tietoa sekä eurooppalaisen musiikkikulttuurin tuntemusta.

Malli ennustikin paremmin koehenkilöiden eurooppalaisten melodioiden kompleksisuusarvioita. Hieman yllättäen malli selitti parhaiten afrikkalaisen koehenkilöryhmän arvioita. Regressioanalyysissä selitysprosentti (R^2) oli peräti 80,8 %. Osittain korkeaa tulosta selittänee se, että kyseinen ryhmä tuntee myös eurooppalaista musiikkikulttuuria. Huolimatta melodioiden alkuperästä, kulttuurista riippumattomat piirteet olivat myös eurooppalaisille koehenkilöille tärkeämpiä kuin kulttuurisidonnaiset piirteet. Melodian rytmiset piirteet vaikuttivat arvioihin eniten, etenkin afrikkalaisten melodioiden kompleksisuuden arvioinnissa niiden merkitys korostui. Osa afrikkalaisista melodioista oli afrikkalaisille koehenkilöille ennalta tuttuja. Tuttuus vaikutti kompleksisuutta alentavasti.

Asiasanat: **kompleksisuus, musiikin havaitseminen, kognitio, kulttuurienvälinen tutkimus**

Säilytyspaikka: **Jyväskylän yliopisto / Musiikin laitoksen kirjasto**

Muita tietoja

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Tiivistelmä – Abstract

The information content of the melody and the style knowledge of the listener affect the perception of melodic complexity. In the study, Finnish and South-African participants (N=112) assessed the complexity of European and African melodies. Their subjective assessments were compared with each other and with the features of a perceptual model (Expectancy-based model, EBM). The predictors of the EBM represent style independent and Western style dependent knowledge.

The model predicted the assessments of the European melodies better than the African ones. Somewhat surprisingly, the model predicted best the assessments of a group of South-African participants; the prediction rate (R^2) obtained through regression analysis was 80.8%. This group is also familiar with European music, which probably contributes to the high rate. Regardless of the origin of the melodies, style independent features were more important than the style dependent features even for the European participants. The rhythmical features of the melodies were the most significant ones, especially with the African melodies. A few of the African melodies were familiar for the African participants. The familiarity reduced the perceived complexity of the melodies.

Asiasanat: **complexity, music perception, cognition, cross-cultural study**

Säilytyspaikka: **Jyväskylän yliopisto / Musiikin laitoksen kirjasto**

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CONTENT

1 INTRODUCTION

Is music perception innate, something we are born with or does the “apparatus” develop to meet the needs of our culture? Virtually all cultures have music, which would suggest that there is something in our biology that at least facilitates music perception. In Darwinian terms, this would mean that music has adaptive value (Huron 2001). However, the music cultures are also very different in what we call basic features of music: the scales, rhythmic patterns, and melodies used, not to mention the diversity of instruments and uses of music. Even the concepts used to describe these features are different. The good old nature vs. nurture debate is therefore as acute with music as with any other form of human behaviour. In this discussion, the relevant question nowadays is not so much about which one of the two influences behaviour (or development), but rather, how the two interact. As Donald Hebb (1980, p. 72) has put it, our behaviour is determined 100 % by our heredity and 100% by the environment.

Along these lines, the starting point of this study is that music perception is interplay between biological and cultural determinants. The challenge is to find out how this interplay works. In this study, one aspect of music perception, namely perceiving melodic complexity is selected for the focus of the study. The perceived complexity of a melody depends on both the general information-content of the melody, and the knowledge that the listener has about the particular style, its musical structures, tonal and melodic principles, rhythmical patterns etc.

This study compares the complexity assessments of African and European melodies by African and European listeners. These subjective assessments are analysed in relation to a model of perceiving complexity. Through these analyses, the aim is to find shared, universal features of music perception and to see how much they govern complexity ratings when the musical style in question is familiar compared to the situation where style knowledge is not available.

2 THEORETICAL BACKGROUND

2.1 EMIC, ETIC and cross-cultural approaches

The majority of research in perception in general, and music perception in particular, has been conducted in Western context. The empirical designs have been set up based on the concepts of Western music theory, the musical material has been Western and the groups of participants have usually consisted of college and university students, music students or others, strongly attuned to the Western music and its content. Since the attention has been in "elementary" processes that typically do not involve musical meaning or cultural context (the effect of these are in fact been controlled for in the experiment), the results of the studies are considered "universal" without consideration or actual testing of the claim[1].

On the other hand, ethnomusicology has a long tradition in studying "non-western" music cultures. The focus of ethnomusicologists is in understanding and describing music cultures and the rules and structures with which they operate. The systems of musical meaning are also studied. The aim has not been to compare these cultures with the Western one, but rather to accumulate knowledge of the culture as such. Comparisons between cultures have been considered as uninteresting or even dangerous or colonialist.[2] The methodology employed in ethnomusicology has been developed for these needs, and experimental designs are rarely employed. Therefore, contrasting and making comparisons between cultures is neither possible nor desirable.

This dichotomy is familiar also in general psychology. To put it bluntly, the experimental, empirical approach focuses on the individual and attempts to block out or control for the environment and assumes that the processes studied are universal, while the cultural relativists study the particularities of each culture and deny that any comparison between cultures would be possible. In cross-cultural psychology, these two approaches are called "etic" and "emic" (Segall et al. 1999[3]). Etic refers to the generalised, universal factors, and emic to the cultural knowledge, factors that are relevant within a culture. John W. Berry calls the (stereotypical) empirical approach "imposed etic", or pseudo-etic, since it falsely assumes universality, even though the concepts, tasks and research questions are based on emic knowledge of only one culture, most often the Western one (Berry & Poortinga 1996).

There have of course been many efforts to build bridges between the two approaches. Vygotsky's theory of socio-historical formation of higher mental processes is one of the first ones, social learning theory by Bandura one of the most influential ones and Helfrich's principle of triarchic resonance one of the latest ones (Lonner 1999, pp. 178-179, Helfrich 1999). All these, from different points of view, try to combine the individual, their environment and the behaviour into one, holistic view. Instead of blocking out the effect of environment as a confounding variable, these approaches remind that humans always operate in relation with their environment, be it the immediate surroundings, the social network or their cultural background. According to Lonner, the difference between "mainstream psychology" and cross-cultural psychology is that in the latter, there is an effort to reach "some sort of equilibration between individuals, tasks and culture before meaningful comparisons can be made" (Lonner 1999, p. 178).

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[1] For example, Meyer claims that the "archetypal patterns[…] arise as the result of physiological and psychological constants presumed innate in human behaviour" (Meyer 1973 p. 214)

[2] These worries are understandable since in the early years of cross-cultural psychology, heavily Western-biased tests were used to back arguments about the superiority of the Western world over the peoples in Africa, South America etc.

[3] The terms 'emic' and 'etic' were first coined by the linguist Kenneth L. Pike from the linguistic terms 'phonemics' and 'phonetics' (Pike 1954).

How then, in practical terms, do these "third way" or "integrative" approaches solve the tension between the demands of empirical science and cultural sensitivity? What is the idea of cross-cultural psychology? Lonner's notion of 'meaningful comparison' is a central one. There is no need to compromise with the empirical methodology, actually vice versa. In cross-cultural study, there are usually enough sources of error even without creating more of them deliberately. Just fine-tuning the experimental setting is, however, not enough. Similarly, adding together emic knowledge from different cultures does not constitute a more universal or true etic view of things.

Berry draws us a map of how to reach comparable results. In the starting situation, we have emic knowledge of our own culture, its concepts and structures of significance, and we are able to construct etic research designs within that culture. However, if we try to export these designs directly to other cultures, the approach would be imposed etic, we would impose our concepts and our ideas to the other culture; we would try to study issues that are not alike in the two cultures. It is therefore necessary to acquire emic knowledge of the other cultures, as well. This is a task for the ethnomusicologists and anthropologists. Having profound knowledge of the cultures and the structures of meaning and significance it is then possible to derive research questions, concepts and tasks that are understood alike and tap in same mental processes in each culture. Berry calls this approach "derived etic". In this way, it is possible to acquire empirically valid and comparable results. Cultural sensitivity and empirical approach are thus not the opposite ends of a scale but must coexist, so that meaningful comparisons can be made. (Berry & Poortinga 1996)

2.2 Cross-cultural music psychology

Carterette and Kendall define the agenda for cross-cultural music psychology research or "integrative approach" as "deriving musical questions from the cultural context and answering them with the rigor of empiricism" (Carterette & Kendall

1999, p. 725). This is identical with the derived etic approach promoted by Berry. In music research, the importance of cultural knowledge is of course even bigger than in general psychology or cognitive science, since musicology operates with a cultural phenomenon, music. For example, knowledge of music theoretical concepts used in the music cultures in question is often a necessary prerequisite for cross-cultural study of music cognition.

There are already a few examples of cross-cultural study of music perception. The focus of the studies has been in tonality and tuning systems, perception of consonance and intervals (see Carterette & Kendall for a review). In addition, learning musical skills (Hargreaves 1986) and melodic expectations (Krumhansl et al. 1999, 2000) have been studied in cross-cultural settings. So far, there are only few conclusive results, in some cases two studies have arrived in opposite conclusions about the universality of the phenomenon they have studied.

There is more and more research done on the field, however. There is a growing interest to test the universality of musical abilities[4], or discover musical universals, the common features in the rich diversity of music cultures. One particular interest, pursued in this study, is to investigate the cultural dependency of music perception, to study how music perception is constructed from universal, biological factors and the culturally dependent, learned factors.

2.3 Style-dependent and style-independent knowledge

Perceiving music is a cognitive process. This process combines bottom-up processing and top-down –processing. The auditory tract is processing the auditory signal, and physical limitations and features of the apparatus of course govern this processing. However, our attention and the schemata formed by our previous listening experiences also guide and steer this process. In this way, our perception is tuned to the

[4] Or in other words study the effect cultural background has on musical abilities, music perception etc.

needs of our environment. This tuning is not necessarily conscious. We do learn abstract knowledge about a music style through mere exposure to it (Tillmann and Bharucha 2000). We are sensitive to statistical distributions of pitch classes or structural features, and this knowledge steers our perception even though we would never explicitly "learn" those features or principles.

Our perception relies on two kinds of knowledge, style-dependent and style-independent. The universal principles, basic features and building blocks of music are reflected in the style-independent knowledge. The style-dependent knowledge is the exact and accurate knowledge about certain music style: how the basic components become music.

Even though style-dependent and style-independent knowledge and bottom-up and top-down processing are related pairs of terms, they are not synonymous. First, bottom-up and top-down refer to the direction of a process, whereas "knowledge", be it style-dependent or independent, is a resource and a capacity that the process utilises. The assumption is that style-dependent knowledge is applied to perception through top down processing, but there is one noteworthy issue: style-dependent knowledge is, by the definition used in this study, accurate and correct within the particular musical style. When encountering unfamiliar style listeners lack correct knowledge. However, top-down processing is still likely to take place, only "wrong" knowledge, the schemata of a style familiar to them might be used.

Thus, style-independent and style-dependent knowledge are used together in the process of perception. How do these two capacities facilitate perception? Through a continuing process of creating expectancies, some say.

2.4 Expectancies

The ability to generate expectancies of future events is a central feature of our perception. This faculty can even be characterised as being a central feature in the forming of our consciousness (Dennett 1996). In addition, in listening to music, we are continuously creating expectancies on the future musical events based on what we have heard (e.g. Narmour 1990). In the field of music, expectancies are widely studied, since they are created on many levels of music; harmonic, rhythmical, metrical, and melodic (Krumhansl et al. 2000). What exactly steers the formation of these expectancies? Are they based on general, first-order principles and on prior musical events in the flow of music? Is there a general, universal expectancy-creating principle or does our knowledge of the music style in question play a role?

Both innate abilities, or style-independent knowledge and style-specific knowledge have an effect on perceiving music. With style knowledge, we can create style-specific expectations that are likely to be accurate. Complexity is the measure of this predictability.

2.5 Complexity

By one definition, complexity is "measured by the amount of variability or uncertainty associated with an event" (Smith & Cuddy 1986, p. 17). The better we can predict how a melody continues, the less complex it is for us. Among the many theories of complexity of music, the most straightforward ones are the information-theoretical theories that simply measure the amount of information content in a particular melodic sequence. The transition-probability model by Dean Keith Simonton is one example of the "bottom-up" models that have been constructed based on the Western music tradition. Simonton's model is based on probabilities of two-tone transitions as based on analysis of the initial phrases of 15 618 classical pieces of music (Simonton 1984).

In addition, there are "psychological" theories based on the work of several music theorists, for example Narmour's (e.g. Narmour 1990). He presented an implication-realisation-model, which is related to the Gestalt theory that is familiar from visual perception. Leonard B. Meyer approached this issue with his concept of "archetypal schemata", suggesting that there are some archetypal patterns and schemata that appear in all music in some form, and that the listeners would at least subliminally recognise them (Meyer 1973, p.213). The essence of these theories from the point of view of this study is that music perception is a cognitive faculty, and can be seen as a kind of “knowledge”. Our musical knowledge, style-dependent or style-independent, helps us to create expectancies about the music we hear, and thus facilitates us to make some order to the audio stream, find patterns etc, and thus guide the perception to finding the essential information in the incoming stream.

Style-independent knowledge is the kind of universal, perceptual ability to process musical material that is a prerequisite for musical behaviour. Style-dependent knowledge, on the other hand, develops through exposure to a certain kind of music, and allows the listeners to make predictions that are more accurate. Based on the structural and e.g. tonal systems used in a musical style, the listeners obtain schemata concerning these features. For example, a person familiar (through musical training or mere exposure) with Western, tonal music, would develop a representation of the tonal and metrical hierarchies and structural principles (like certain harmonic progressions, e.g. V-I cadences) used in Western music, and would use these representations in predicting future events. Familiarity with a particular melody is a specific case of style-dependent knowledge. Knowing exactly how a certain melody progresses facilitates the perception of that melody.

2.6 Pleasantness and preference

Why is complexity a worthwhile concept to be studied? There are two main reasons. The first motivation for studying complexity is that it is impossible to measure style knowledge (as most of it is implicit) or style-independent knowledge or the interaction of the two directly. Instead, it is possible to measure complexity of the melodies and people’s complexity assessments and then deduct what the role of style-independent and style-dependent knowledge has been in those assessments. The tension between objective, measured complexity and the subjective, perceived complexity makes it an interesting topic of research, and especially for cross-cultural research, since complexity is in the crux of universal and culturally determined factors of perception.

Second, complexity is linked to musically interesting factors, such as pleasantness (Smith & Cuddy 1986) and musical preference (Martindale & Moore 1989). Berlyne (1971) has proposed a seminal theory of preference and complexity. Berlyne suggests that these two are related through an "inverted U" relationship. This means that we prefer music (or art) that creates "moderate arousal", in other words, is medium in complexity, rather than extremely simple or difficult (Hargreaves 1986, p. 122).

This study suggests that both objective and subjective complexity contribute to the complexity assessment. Style-dependent knowledge, which usually facilitates perception and reduces the complexity of melodies of familiar style might work the other way with an unfamiliar style: the false style-dependent knowledge can be expected to create false expectations, and since they are not met, the melody is perceived as being more complex. Subjective complexity is therefore a dynamic concept. Figure 1 summarises its relation to pleasantness and familiarity.

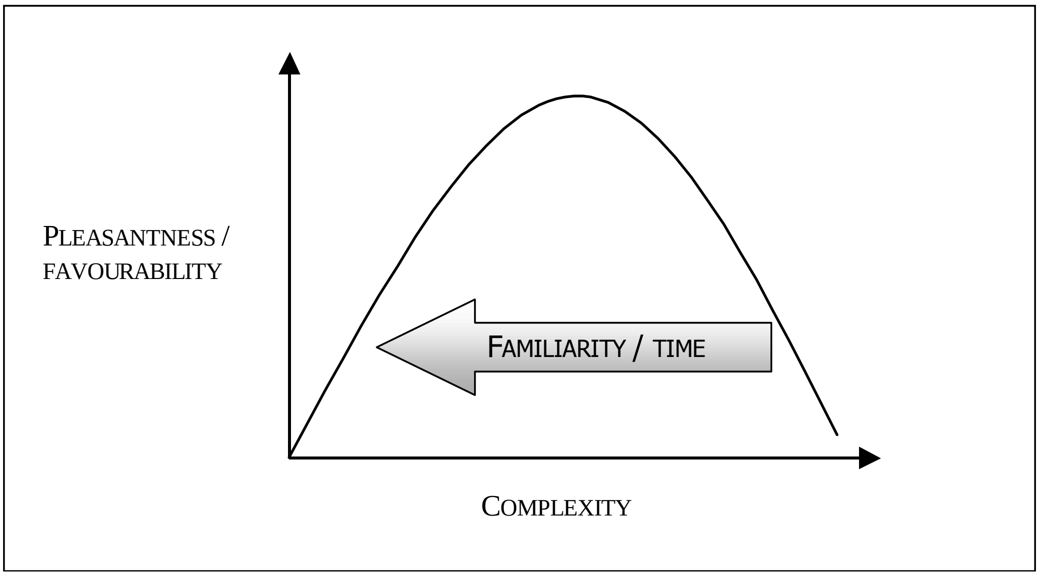


FIGURE 1, RELATION OF COMPLEXITY, FAVOURABILITY AND FAMILIARITY

2.7 Expectancy-Based Model

As mentioned, there are several different theories and models of music perception and complexity. The Expectancy Based Model (EBM) is a collection of components from different kinds of models and theories (Eerola & North 2000). The model's purpose is to predict listeners' subjective complexity ratings. Several aspects of complexity are modelled in the EBM, and the model gives melodies a complexity rating based on these aspects. In previous tests, the model has been able to predict the participants' complexity ratings with great accuracy. A pilot study has been performed with African and European participants, but this is the first time the model will be tested with non-European melody material.

The expectancy-based model of perception is based on Western music. The measures of different aspects, the so-called predictors, can be placed on the continuum from style-dependent to style-independent, depending on the kind of knowledge they simulate. The assumption is that the style-independent predictors, those based on information theory (Shannon 1948) or the ones measuring tempo, notes/minute, rhythmic activity or other "psychophysical" factor of the melody are more universal than for example tone probability or metric hierarchy predictors that are derived from the stylistic features of Western tonal music.

A selection of predictors from the EBM was utilised in this study. They measured the density, regularity and information content of the rhythmical, pitch-related and rhythm-pitch interaction factors of the melodies. There were culturally independent and Western culture based predictors.

2.7.1 Culturally independent predictors

2.7.1.1 Regularity measures

Rhythmical variability (RV) is a measure of rhythmical regularity of the melody. This predictor measures the standard deviation of durations in the melody. Taking a logarithm of the durations rescales them in a way that the shorter durations would not have too big a significance over the longer notes. A similar measure of melodic regularity is proximity (PROX). It measures the average size of pitch transitions (intervals) in semitones. The assumption is that if a melody utilises small melodic intervals and few big leaps, it is less complex than one using larger steps.

Repetition (REPET) measures regularity at the structural level. The amount of repetition in a melody is expected to have a significant impact to the perceived complexity, because when a segment is repeated, it is already familiar from the first time and thus our expectancies are very accurate on the second time, thus lowering the complexity of the segment. The repetition measure is based on an autocorrelation function that correlates segments of the melody with the rest of the melody to determine whether the melody consists of repeated segments. The more repetition, the less complex the melody is.

2.7.1.2 Density measures

There are two measures of rhythmical density. Rhythmical activity -predictor (RA) calculates the average number of note onsets in one measure. Number of notes per second (NN_P_SEC) is a very similar predictor, but the unit is seconds instead of measures. The latter predictor is independent of notation, but more sensitive to tempo changes.

Range (RANG) measures simply the ambitus of the melody in semitones. Pitch variety (ST) is in function a corresponding measure with the rhythmical variability. It measures the number of different pitch classes used in the melody.

2.7.1.3 Information theoretical measures

According to the information theory, the more information (the less redundancy) a segment contains, the more complex it is (Shannon 1948). This very simple and presumably universal notion is also the basis for several predictors of the model. Instead of just measuring the amount of information contained by the segment in for example bits, a more sophisticated measure, entropy is used (ibid.). In this way, it is possible to pinpoint the level of redundancy to the pitch class, duration or interval domains of the melody. The distributions of these three components in a melody are measured, and then the entropy is calculated to obtain the predictors EPCDIST, EIVDIST and EDURDIST, respectively. In addition, the distributions of pitch class, interval and duration transitions are treated the same way (EPCDIST2, EIVDIST2 and EDURDIS2).

2.7.2 Culturally dependent predictors

2.7.2.1 Measures linked to metrical hierarchy

Metrical position (METPOS) is one of the most important predictors in the set, since it is utilised both individually and as a component in a set of other predictors. Metrical position is based on the metrical hierarchy of Western music, as postulated by Fred Lehrdahl and Ray Jackendoff (1985). They stated that the rhythmical structure of Western music is based on the alteration of weak and strong beats, and that these beats are organised in a hierarchical manner. In the EBM, the assumption is that the better the onsets of a melody correspond to this hierarchical grid of beats, the better it rhythmically corresponds with our expectations. It can be argued that this principle of strong and weak beats is actually shared by many music cultures, but since there is little evidence that the measure actually works in the same way in other cultures, this measure and other measures based on METPOS are classified as culturally dependent measures.

The calculation of METPOS measure is relatively complicated. First, an autocorrelation-based algorithm (Brown 1993) seeks the most likely metre and period of the melody and then sets the hierarchical grid to the melody. Then the correspondence measure determines how well the rhythmic patterns of the melody fit in the metrical hierarchy. The better the fit, the lower the complexity.

This metrical hierarchy is used as a component in two other predictors. Tonality weighed by the metrical position (TONW) is a measure of the fit of the melody to the Krumhansl-Kessler tonal hierarchy weighed by the metrical position of the notes. In tonal music, different pitch classes have different functions and their status in the hierarchy is reflected by the frequency of their occurrence in the melody. Usually the tonic occurs most often, then the dominant etc. and in general, the pitches that belong to the tonal scale in question occur more often than those pitches that do not (Krumhansl 1990). Merely through exposure, listeners seem to acquire the prototypical distribution of pitch classes in the tonal system in question (Tillmann & Bharucha 2000). If the pitch class distribution of the melody corresponds well with the prototypical distribution of that style, the melody is considered as less complex than a melody that violates the usual distribution of pitch classes.

This measure, TONW, further assumes that when tonally important events (e.g. tonic and dominant) occur at rhythmically important moments and have long durations the melody is easily predictable. The weighing brings an important dimension to the tonality measure. If two melodies are equal in their distribution of pitch classes, the one that has the chromatic, “non-tonal” pitches in more prominent rhythmical positions, e.g. on the first beat of the measure, is the more complex one. If the chromatic tones occur only within beats, have shorter durations etc. the melody still is quite easily perceived.

The measure of melodic accent in EBM is based on the perceptual model of Joseph Thomassen (1982). The idea is that each note in a melody has a measurable amount of melodic accent depending on the prominence of that note in a melody. If a note is a repetition of the previous one followed by another repetition, then the note has no accent. Turning points, large leaps etc. have a stronger accent. In other words, the salience of the melody can be measured by the melodic accent. When combined with the metrical position we get the predictor METPOS_ACC that measures the structuredness of the melody. If the melodically important events (strong accent) occur at metrically significant moments, the melody is "easier to follow" than a melody where melodically and rhythmically important events do not co-occur.

2.7.2.2 Correspondence measures

Transition probability model (SIM) is based on the work of Dean Keith Simonton, who analysed the pitch class transitions of opening phrases of 15 618 classical music melodies (1984). The better the transition distribution of a melody corresponds to the average distribution in Western music, the easier its course is to predict.

The other correspondence measures have the same idea, but instead of the corpus of classical music, the Essen collection (from where the European melodies in the experiment are picked from) serves as the comparison point. The Pearson correlations of the distributions of pitch class, interval and duration transitions are measured (CFPCDIS2, CFIVDIS2 and CFDURDI2, respectively). The predictors along the various dimensions are summarised in Table 1.

TABLE 1, PREDICTORS

	Culturally independent			Culturally dependent
	Regularity	**Density**	**Information theoretical**	
Rhythmical (temporal)	Rhythmic variability (RV)	Number of notes per second (NN_P_SEC) Rhythmic activity (RA)	Entropy of duration distribution (EDURDIST) Entropy of duration transition distribution (EDURDIS2)	Metrical position (MET-POS) Correspondence to Essen duration transition matrix (CFDURDI2)
Pitch-related (tonal)	Proximity (PROX)	Range (RANG) Pitch variety (ST)	Entropy of Pitch class distribution (EPCDIST) Entropy of interval distribution (EIVDIST) Entropy of pitch class transition distribution (EPCDIS2) Entropy of interval transition distribution (EIVDIS2)	Transition probability model (SIM) Correspondence to Essen Pitch class transition matrix (CFPCDIS2) Corresp. to Essen interval transition matrix (CFIVDIS2)
Interaction (tonal + temporal)	Repetitiveness (REPET)			Structuredness of melody (MET_ACC) Tonality weighed by metrical position (TONW)

3 RESEARCH QUESTIONS AND HYPOTHESES

The main aim of this study was to investigate how style-dependent and style-independent knowledge are used in music perception. What, if any, are the universal features of perceiving complexity and how does the system operate when we encounter a musical style not familiar for us? The other aim was to study which musical features and which components of the melodies are the most important ones in determining subjective complexity of a melody: do we focus on the rhythmical or the pitch-related features, or the structural features created by the interaction of these two dimensions of the melody.

These questions were addressed to by creating a research design where participants from Finland and South Africa assessed the complexity of European and African melodies. Thus, each group of participants encountered both a familiar style and unfamiliar style of music, and each style of music was assessed by a group with relevant style knowledge and a group lacking style-dependent knowledge. The EBM model, representing style-independent and Western style-dependent knowledge, was used to predict the complexity assessments.

The following hypotheses were postulated:

1) The groups would utilise both style-independent and style-dependent knowledge in their complexity assessments.

2) When the style is familiar to the listeners, mostly style-dependent knowledge would be used. If the style were unknown, style-independent knowledge would be more decisive.

3) The music cultures involved differ in their rhythmical and pitch-related features and in the interaction of the two. These differences were expected to be reflected in the complexity assessments.

Table 2 sums the hypotheses from the model's point of view. It presents the expected predictive power of the model in different listener-music –combinations. The capitalisation of either CIP or CDP within each cell refers to which predictors should explain more of the variance in that combination of stimulus and participants. For example, according to the hypothesis, the model's culturally dependent predictors should account for more of the variance in the European listener's assessments of European music than the culturally independent predictors. Similarly, European listeners listening African music are expected to rely more on this style-independent knowledge and therefore CIP would be dominant over CDP in explaining variance there. The complexity ratings of African listeners should respectively be better predicted by CIP than CDP when European melodies are in question.

TABLE 2, MODEL'S PREDICTIVE POWER

EBM	AFRICAN MUSIC	EUROPEAN MUSIC
African listeners	CIP *cdp*	CIP *cdp*
European listeners	CIP *cdp*	cip *CDP*

The amount of variance explained by the Culturally Dependent Predictors (CDP) in relation to the amount of variance explained by the Culturally Independent Predictors (CIP) (within each cell).

The African-African-combination was expected to be the most difficult one from the point of view of making predictions. The African listeners were assumed to use their style knowledge of African music to judge the complexity of African melodies. When the choice is between Western style-dependent and (Western) style-independent knowledge, the latter should come on top. However, we can't claim to know what actually takes place in that cell. The three other cells, with at least one European component will offer the information relevant for this study. Because the model is based on Western, tonal music, it should work best with the European-European combination. Similarly, the African-African combination should prove to be the most difficult for it.

4 METHODS

4.1 Participants

There were four groups of participants, two African and two European. The African groups were South-African: students of STTEP-music school in Pretoria (hereafter referred to as *S-A youth*) and primary school children from Northern province (*S-A children*). Both European groups were Finnish, high school orchestra and choir from Cygnaeus-high school (*Finnish youth*) and primary school children from Jyväskylä University Training School (*Finnish children*). Table 3 summarises the groups.

TABLE 3, GROUPS

	N	Age	Discarded
Finnish youth	34	16.4	2
Finnish children	16	10.1	5
S-A youth	41	16.6	21
S-A children	21	11.8	7

The *S-A children* group was from countryside, only few of them even had radios at home, and none of them had listened to Western music. The *S-A youth* group was actually an intermediary group since they practice classical music at the STTEP-school. Their musical taste is quite similar to any European teenagers, with the exception that African popular music, *kwaito* for example, is part of their musical background. Even though the kind of African folk music used in this test was not the favourite music for them, most of them defined the style as being familiar.

The Finnish groups had no prior experience of African music, apart from having sometimes heard it from TV or radio. Even though none of the European melodies was known in particular, the style in general was familiar for them.

In the literature of cross-cultural and especially cultural psychology, ethnographic study of the (non-Western) groups and their culture is often depicted as the first step (e.g. Cole 1996). This would ensure that meaningful comparisons could be made on the *level of the cultures*, and that the independent variable, culture, would be "opened" in the conclusions. In this research, however, the tasks used and the following level and range of conclusions is narrower than comparing cultures with each other, and thus undertaking such task nor presenting the results here in detail is not relevant, and therefore the chosen level of analysis was set to comprise only the general musical taste and music educational background and familiarity in the musical styles used in the study. This information was gathered with a questionnaire attached to the answering sheet and post-experiment interviews. The musical background of especially the *S-A youth* –group will be discussed in some detail in the conclusions and discussion sections.

4.2 Stimulus material

The melodic material consisted of 52 European folk songs from the Essen collection (Schaffrath 1995) and 44 African folk songs from *"Sina's songs"* collection (Kutu & van Niekerk 1998) and *"Spot on"* songbook (Cock & Wood 199?).

The European melodies were chosen from the large Essen database of over 6000 melodies. The Essen collection was originally compiled in the 19th century. The melodies selected were all in duple meter, relatively short and represented different levels of complexity. The aim was to select melodies that would not be familiar to the average listener.

The African songs, on the other hand, had to be chosen from 71 songs in two collections. *Sina's Songs* is a collection compiled as a Master's dissertation at the University of Pretoria for music education, and the *Spot on* songbook is a commercial collection of South African songs. *Sina's Songs* are in one to four voices and they were notated from live performances. From songs in several voices, the melody line (usually in the soprano part) was used. The songs in *Spot on* –collection are in one voice. Songs that were in English and European in their origin were discarded. The selection of the African melodies was done in co-operation with two African musicians[5]. Songs with clear flaws in notation were discarded at this point. Because the original number of songs was so limited, equal representation of different levels of complexity could not be used as a criterion of selection. In spite of this, there was a variety of levels of complexity represented by the songs. In contrast to the European set, there were melodies in both duple and triple meter in the African melodies.

TABLE 4, MELODIES

	Number	Duration (seconds)	Range (semitones)	Tempo (bpm)	Number of notes	Major/Minor
European	52	16.0	11.77 (5-20)	120 (const.)	38.1	35 / 17
African	44	22.8	10.39 (5-15)	100.4 (75-120)	50.4	44 / 0

As can be seen from Table 4, the African melodies were a bit longer, slower in tempo and smaller in range than the European ones. All African melodies were in major mode, whereas approximately one third of the European melodies were in minor mode. Only two melodies in the African collections were in minor key, and both were discarded in the validation process. In both sets, the melodies with smallest range had a range of only a fourth. While the African melodies stretched to an octave and minor third at best, the European set had several melodies with a wider range than that, one of these reaching a respectable octave and minor sixth.

The melodies were converted to MIDI representation. The melodies were bare, all notes had equal velocity and the durations were accurate. The tempo within each melody was also constant. For the experiment, they were synthesised and played back for the participants. All melodies were transposed to C mode. A neutral, English horn sound was used in the European melodies and a more African-sounding

[5] Peter Rantho and Joseph Mathibe from the STTEP music school orchestra

calimba sound in the African ones. The tempi of the European melodies were set at constant 120 beats per minute. The tempi of the African melodies varied from 75 to 120 bpm. The timbre and tempi of the African melodies were set after consulting the two experts in African music. The choice to utilise timbre and tempi different from the European part was made to ensure that the African songs were recognised and accepted by the African participants.

The predictors of the EBM show differences of the two sets of melodies. Figures 2 and 3 sum up the most central ones. The African melodies utilised in general fewer pitch classes than the European melodies. The African melodies also utilised more repetition than the European ones.

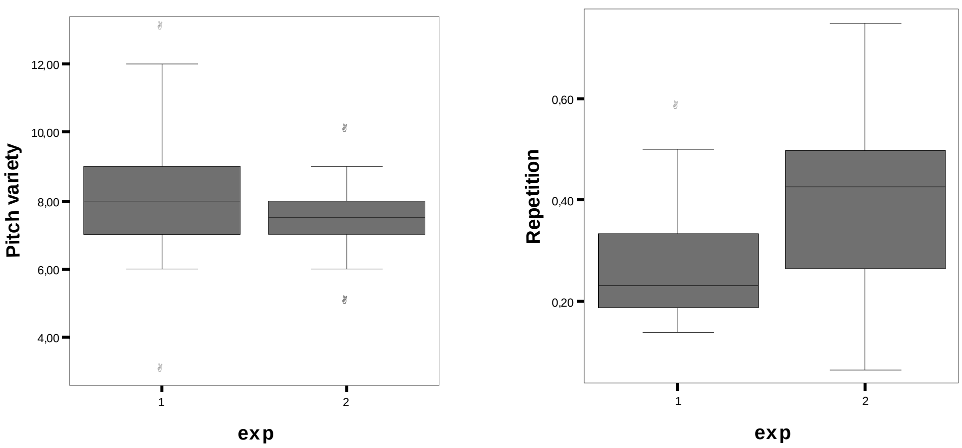


FIGURE 2, PITCH VARIETY AND REPETITION OF EUROPEAN (EXP 1) AND AFRICAN (EXP 2) MELODIES

On the other hand, the African melodies were rhythmically the more varied and more complex set of the two. The range in metrical position was wider in the African melodies, showing that some melodies were very simple and hymn-like while others were highly syncopated. Also the other rhythmical predictors showed that the African melodies as a set are rhythmically more complex than the European melodies (Figure 3).

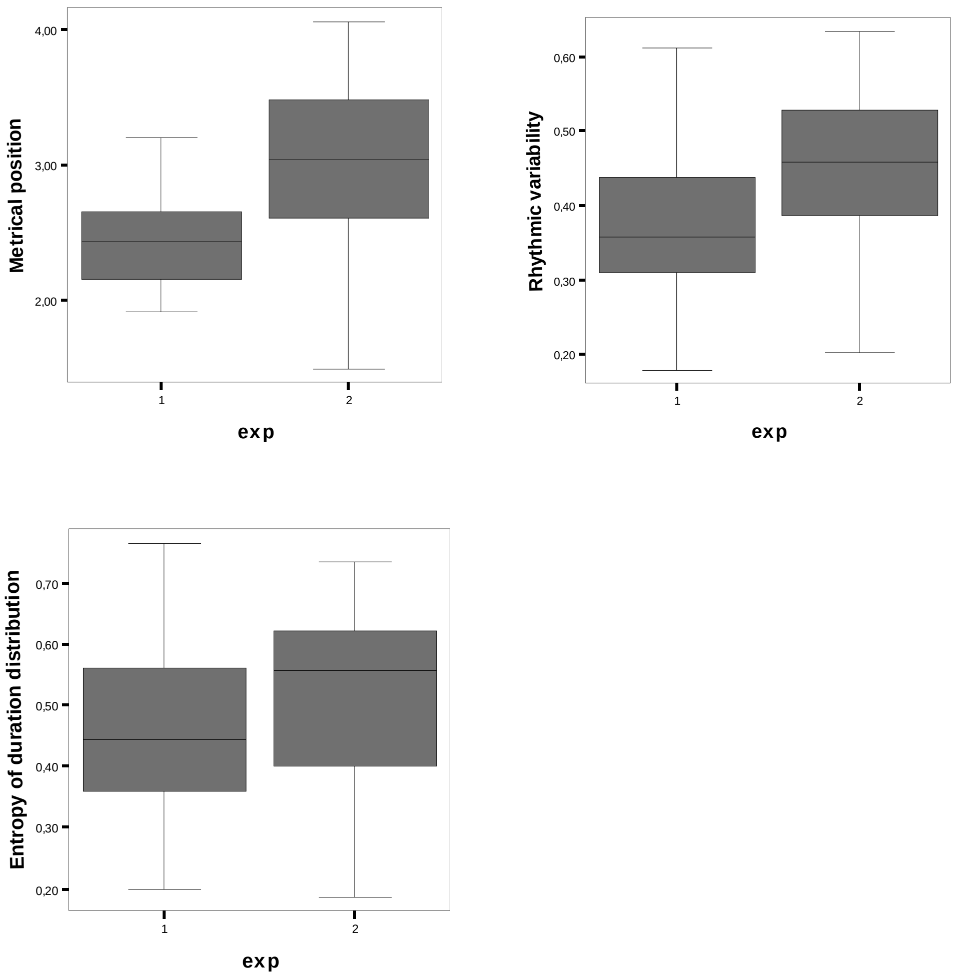


FIGURE 3, RHYTHMICAL FEATURES OF EUROPEAN (EXP 1) AND AFRICAN (EXP 2) MELODIES

In summary, the African melodies were more homogenous in terms of their melodic material but more varied in terms of rhythm. Also, rhythmically the African melodies are the more complex set. The African melodies are more complex in terms of all rhythmical predictors, that is rhythmic variability, rhythmical activity, and metrical position. The only exception is the entropy of duration transition distribution. This measure is high if there are many different transitions from one to another duration value in the melody. Hence, even though the African melodies have high metrical activity, the rhythmical patterns are relatively simple in the sense that they use regular patterns.

The most noteworthy difference between the sets of melodies is the familiarity of the songs. The European songs, as mentioned, were selected so that none of the individual melodies was familiar to the listeners, even though in general the musical styles that the songs represented were somewhat familiar to the European listeners.

The collections of African songs consisted of songs used today in different parts of Southern Africa. These collections, both just recently compiled, were intended for everyday use in for example schools. Therefore, some of the melodies selected for the experiment were familiar to some of the African participants. Familiarity has a strong effect on perceived complexity. Already few exposures to the melody may reduce the perceived complexity of a melody. Therefore, the familiarity of the African melodies and the effect of familiarity were investigated.

4.3 Procedure

The test was conducted in two parts. One part consisted of European melodies and the other of African melodies. To cancel out order effects, the S-A groups did the European part first and the Finnish groups did the African part first. The order of melodies in each part was also randomised within groups. There was a break of 5-10 minutes in between the two parts. Each part started with three example melodies to test the volume level and to allow the participants to get used to the types of melodies and the sounds used, and to rehearse the use of scale. The listeners' task was to judge the complexity of the melodies on a eleven-point scale from 0 to 10. Zero denoted *very simple, not complex*, and 10 *very difficult, very complex*.

In the actual test, each melody was preceded by a voice announcing the number of the melody in English, Finnish or Sotho depending of the group. A xylophone sound marked the ending of each melody. After the sound, participants had 8 seconds to mark their assessment to the response sheet before the next number was called. The *S-A youth* group, the first one to take the test, had only five seconds to respond. Based on their feedback[6], more time was added for the subsequent groups. For the *S-A children* -group more time was given between the melodies especially in the beginning of the test. At first, the next melody was played only after the teacher confirmed that the response to the previous one had been given. As the test progressed, the pace became quicker, being similar than in other tests by midway of the first section.

To examine the familiarity of the melodies, five participants of the *S-A youth* group were asked to circle the numbers of familiar melodies from their response sheets. After the experiment, 19 students of the *S-A youth* group were interviewed briefly to discuss about their reactions to the experiments. In this interview, they were asked how many of the melodies were familiar to them. The teacher of the *S-A children* group also marked in the response sheet those melodies that were likely to be familiar for her students. Neither of the Finnish groups were familiar with any of the melodies used.

In the post-experiment interview the *S-A youth* participants were also asked to explain the strategies they had used to determine the complexity of the melodies. In addition, they presented their opinions about the research setting, the task, the computerised melodies and the instructions in the interview.

4.4 Data Analysis

In total, there were 90 African and 57 European participants. From these 147, the responses of 112 were used. Thirty-five responses were discarded for various reasons. In the first stage the response-sheets with invalid number of responses (typically one too few or one too many) or many missing responses were discarded (N=10). The sheet was also discarded if the use of scale was limited to only 3 values or less in either set of melodies or if the respondents had used out of scale values (N=10). Five responses were discarded because of their use of scale was strongly skewed (skew-

[6] Three out of 19 interviewed participants considered the time to respond being a bit too short.

ness less than -1,5 or greater than 1,5). Additional eight were discarded because their responses correlated mostly negatively with the other responses in their group. Two of these had clearly missed one melody in the middle of the test: comparing their responses with the group averages, after some point their peaks (lows and highs) start dragging one response behind the others. Two participants filled in most of their responses at once, or several melodies in advance (the group "other" in Table 5).

TABLE 5, SELECTION OF CASES

	Total	Used (%)	Discarded	Scale	# of responses	Skewness	Correlation	Other
All	147	113 (76.9%)	35	10	10	5	8	2
African	90	63 (70%)	28	7	8	5	7	1
European	57	50 (87.7%)	7	3	2	-	1	1

The homogeneity of the group's responses is a measure of reliability. The groups are expected to demonstrate similar response strategies. The homogeneity of the group's responses can be measured by calculating the mean inter-subject correlation of the group (Figure 4). The better the responses of individual participants correlate with each other, the clearer there is a distinct strategy that the participants have followed.

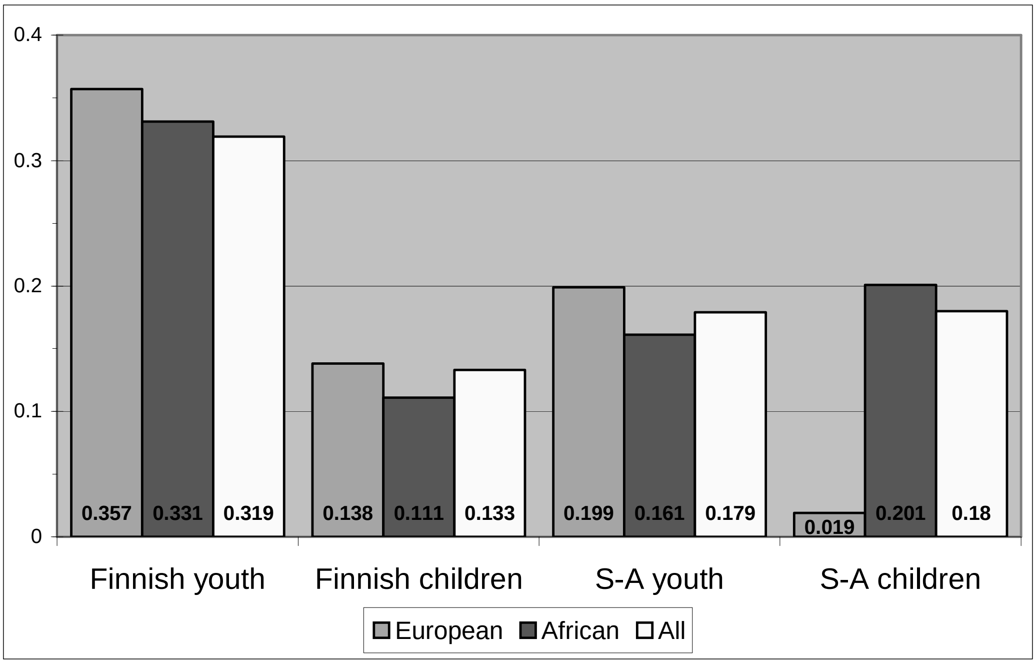


FIGURE 4, MEAN INTER-SUBJECT CORRELATIONS (M.I.S.C.)

Some children in *S-A children* group were perhaps too young for the test, since their data is quite “noisy”. It is somewhat difficult to see any consistent patterns of answering the questions, especially in the European melodies. The local music teacher selected the participants for the *S-A children* group experiment from among her pupils. At this point she was under the impression that the musicality and musical abilities of the children were to be studied, and therefore she selected the most talented ones instead the oldest ones as was intended. It is clear that especially for some of the youngest ones (eight years old) the task was very difficult to comprehend. Because of this, to maintain symmetry of the cross-cultural setting and to cancel out the age effects, the *Finnish children* group consists of fourth-graders, sharing the same average age. However, there are no children younger than 10 years in the Finnish group.

The averages of all groups across both sets of melodies separately and all melodies together were taken to examine whether the groups differ in their general assessment of complexity, and whether at a general level either set of melodies was rated as more complex than the other. The averages of the groups’ responses to each melody were correlated with each other to investigate the similarity of the responses.

The model’s predictive power and the strategies of the groups were tested with linear stepwise regression. Stepwise regression shows which predictors manage to explain most of the variance in the groups’ responses. In relation to the correlations of the individual predictors, the benefit of regression is that it eliminates those predictors that explain the same portion of variance and only selects the strongest one to the final equation. Since some predictors might be similar with each other in their function, a simple Pearson correlation would perhaps fail to just having several predictors measuring more or less the same issue might give a distorted view of what actually happens. The stepwise regression first seeks the most powerful factor that explains most of the variance of the independent variable. This is then subtracted from the variance. Next, the function searches the factor that is most powerful in explaining the residue, subtracts this etc. Therefore the R^2 can’t be raised just by adding more dependent variables into the equation.

To investigate the answering strategies of the groups, the regressions are conducted in three ways. First, all predictors are entered in a bundle to obtain the overall rates of prediction. The second step is to investigate the dimension of culturally dependent – culturally independent knowledge. For this end, the culturally dependent and culturally independent predictors are included to the regression equation separately. The third step is to look into the melodic components the predictors measure. In this third phase, the predictors measuring rhythmical or pitch-related events or the interaction of the two are entered to the equation separately.

To dig deeper into the nature of differences, the individual melodies that are responsible for most differences in ratings will be identified and analysed. The identification takes place by subtracting the average assessment of one group of listeners from the average assessment of another group.

5 RESULTS

5.1 Inter-group differences

The average assessments of the groups show on a very general level, which set of songs each group judged as more difficult. In addition, this would show if the use of scale would be skewed in some group.

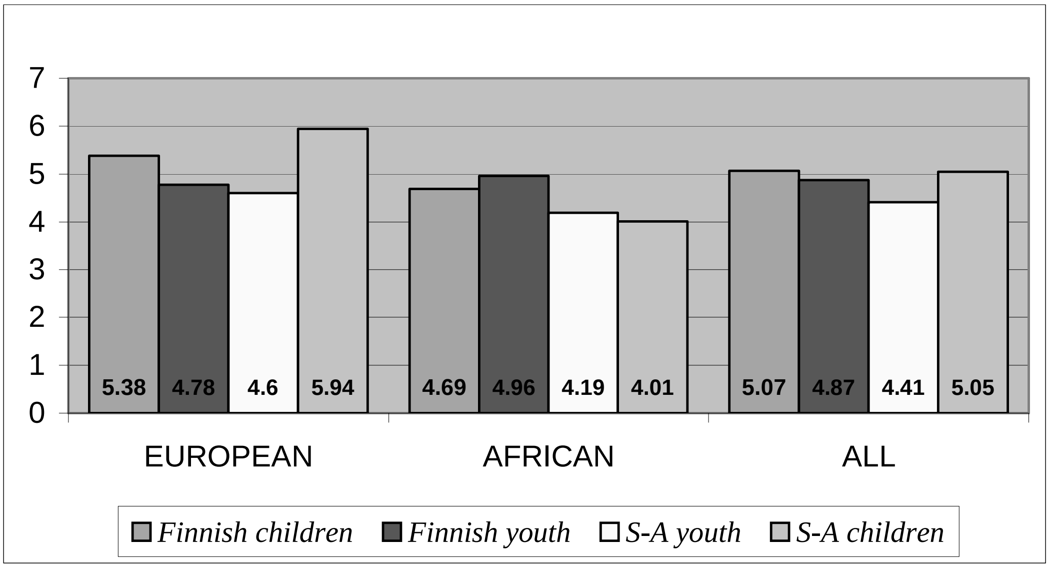


FIGURE 5: GROUP AVERAGES

The averages of all groups were around 5, the centre of the scale (Figure 5). The S-A groups assessed the African songs less complex than the European ones. Only the *Finnish youth* group assessed the African songs as more complex than the European songs. This was an expected result, but the *Finnish children* group was expected to do the same. However, both groups of children considered the European songs as being the more complex set, which could be explained by the higher tempi of the European songs. Children in both groups were non-musicians and perhaps therefore more prone to pay attention to the psychophysical features of the melodies.

As can be seen from the mean inter-subject correlations (Figure 4), all groups but *S-A children* demonstrated a similar pattern: the group agreed more when assessing European songs than when judging the African melodies. For *S-A children* group the opposite was true. Their assessments of the European melodies were almost random, while the m.i.s.c. was relatively high with the African songs. Similarly, the *Finnish children* group seems to have difficulties with the unfamiliar style. Their agreement on European melodies is much higher than with the African melodies. For the older age groups the difference in between melody groups is smaller.

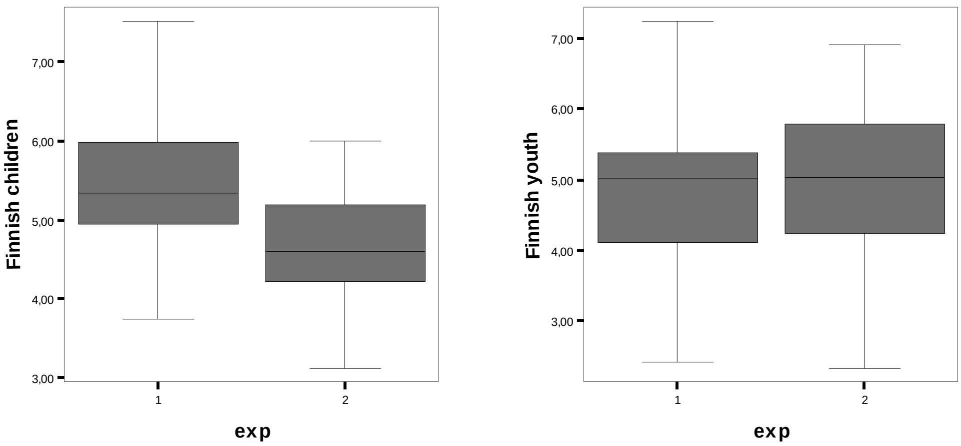


FIGURE 6, RESPONSES OF THE FINNISH GROUPS (EXP 1 = EUROPEAN, EXP 2 = AFRICAN MELODIES)

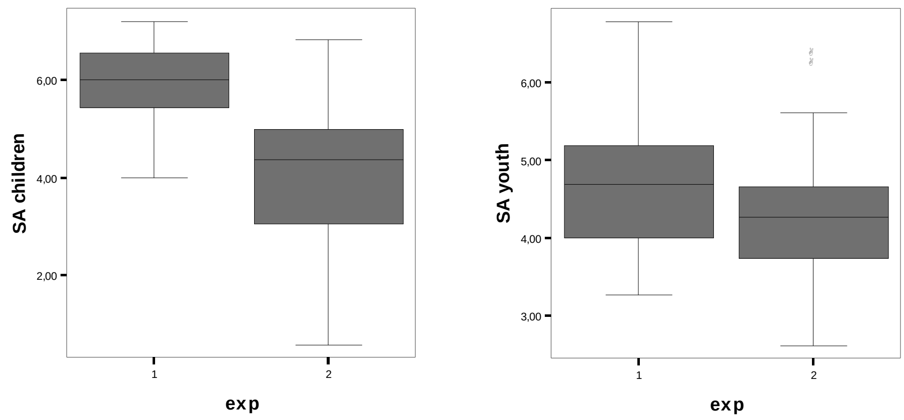


FIGURE 7, RESPONSES OF THE AFRICAN GROUPS (EXP 1 = EUROPEAN, EXP 2 = AFRICAN MELODIES)

Looking at the distributions of responses (Figures 6 & 7) we can see that the *S-A children*'s assessment of the European songs differ from all other sets. There are only a few values in use and the difference to the group's assessment of African melodies is clear. *Finnish children* and *African youth* show a similar pattern, the African melodies are overall a bit easier and produce a slightly narrower distribution. *Finnish youth* utilises the scale almost equally evenly in both cases.

5.2 Inter-group similarities

As a measure of similarity, correlations between groups were calculated. As can be seen from the tables 6-8, the *S-A children* group does not correlate with any of the other groups. This group also had very low mean inter-subject correlation, especially in the European part (only 0.019), which would suggest that the data is "noisy" and quite incoherent. Some children in this group were probably too young, and there were many problems in the testing situation (technical, language barrier, use of translator etc.). Hence, the reliability of the data is questionable. Interestingly enough, however, the judgements of African songs of the *S-A children* show a quite high negative correlation with those of the *Finnish children* (Table 8). In addition, even though the data in the European test seems random, the m.i.s.c. in the African part is relatively high, 0.20.

TABLE 6: CORRELATION COEFFICIENTS (ALL MELODIES)

	Finnish Children	Finnish Youth	S-A Children	S-A Youth
Finnish Children	1			
Finnish Youth	0.52	1		
S-A Children	0.12	-0.12	1	
S-A Youth	0.55	0.56	0.19	1

TABLE 7: CORRELATION COEFFICIENTS (EUROPEAN MELODIES)

	Finnish Children	Finnish Youth	S-A Children	S-A Youth
Finnish Children	1			
Finnish Youth	0.63	1		
S-A Children	-0.25	-0.09	1	
S-A Youth	0.68	0.74	-0.21	1

TABLE 8: CORRELATION COEFFICIENTS (AFRICAN MELODIES)

	Finnish Children	Finnish Youth	S-A Children	S-A Youth
Finnish Children	1			
Finnish Youth	0.67	1		
S-A Children	-0.31	-0.08	1	
S-A Youth	0.23	0.48	0.15	1

Looking at the other three groups, the correlations seem to support the first hypothesis. The European groups have similar ratings; especially noteworthy are the assessments of African melodies (Table 8), where the two European groups correlate more strongly with each other than with the *S-A youth* group. In all, agreement about the European songs is highest (Table 7). The high correlation of the *S-A youth* group with the European groups was not predicted in the hypothesis, but this deviation might result from the *S-A youth* group's familiarity with European music; the STTEP-music school orchestra plays mostly Western classical music.

In the pilot study a year ago, the same 52 European melodies were used with two groups: 60 students from Leicester (group *Leicester*) and 13 STTEP-students that made the test in Tulane Music Camp in 2001 (group *Tulane*). The correlation matrix of assessments of the European songs by all the groups tested so far is presented in Table 9.

TABLE 9: CORRELATION COEFFICIENTS (EUR. MELODIES, PILOT DATA INCLUDED)

	Finnish youth	Finnish children	S-A youth	S-A children	Leicester	Tulane
Finnish youth	1					
Finnish children	0.63	1				
S-A youth	0.74	0.68	1			
S-A children	-0.09	-0.25	-0.21	1		
Leicester	0.87	0.64	0.87	-0.12	1	
Tulane	0.74	0.71	0.90	-0.15	0.82	1

Most of the participants of the Tulane-group were also present in STTEP camp in 2002, and they participated in the test again. Those participants who had taken part in Tulane were identified also in STTEP camp 2002, so that data from these two occasions can be compared. The correlation of these two sets of data serves as a test – retest reliability measure. The correlation between the responses in 2001 and 2002 is very high, 0.86[7].

5.3 EBM-model's predictive power

In the first stage, all predictors were subjected to regression analysis to obtain the overall prediction rates for each group. Certain caution should be exercised when comparing the prediction rates across the sets of melodies. They are comparable only at a general level since the two sets of melodies and the two parts of the experiment have certain differences, as discussed in chapter 2.4. The amount of melodies, differences in the distributions of features of complexity and the different timbre and tempi used are factors that may affect the prediction rates.

As expected, the model predicted the complexity assessments of European melodies better than those of African songs (Figure 8). The model seemed to explain the variance in the assessments of European melodies fairly well throughout. However, it was surprising that the European groups were not more predictable than their African counterparts. On the contrary, the model explained an outstanding 80.8% of variance of the *S-A youth* group's complexity ratings of the European songs. The *S-A youth* group's familiarity with European music might have contributed to this result. The group did possess style-dependent knowledge of European music, since the group consisted of students in STTEP music school where they practice and play mostly European classical music. Therefore, they were in fact an intermediary group, possessing style-independent knowledge and style-dependent knowledge from both music cultures involved in the study. Their responses are thus of particular interest.

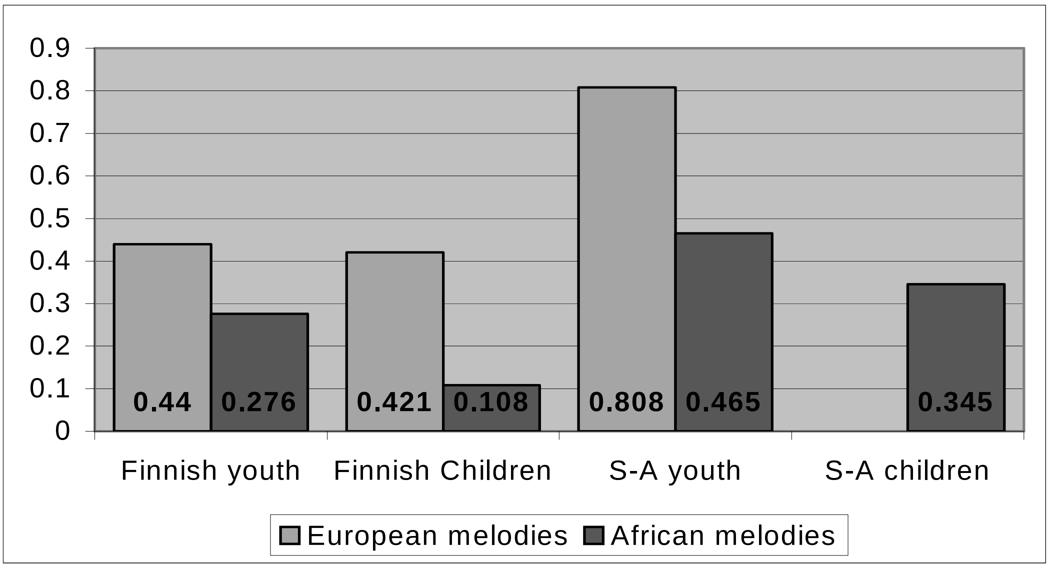


FIGURE 8: PREDICTION RATES (R^2)

On the other hand, the model seems to have virtually no predictive power with the *S-A children* group with European stimuli. The relatively high figures in the African section for this group are likely to be coincidental, since some of the correlations of their responses and the predictors are in the "wrong" direction. For example, the TONW-predictor correlates significantly but negatively with the assessments of the *S-A children* group. As mentioned, the *S-A children* group correlated negatively with the *Finnish children* group. It is possible that even in spite of visual aids and multiple

[7] this correlation is not presented in the table

explanations at least a part of the group had misunderstood the instructions and used the scale upside down.

5.3.1 Culturally dependent vs. culturally independent knowledge

According to the first hypothesis, the listeners would employ both style-independent and style-dependent knowledge in their complexity assessments. The culturally dependent and culturally independent predictors (see Table 1) were entered to the regression equation separately, to assess what is the amount of variance explained by each set. The results of these regressions are summarised in Table 10, with the overall prediction rates as a comparison. Within each cell, the predictors are in the order they were entered to the equation and the R^2 value is the cumulative value.

TABLE 10, RESULTS OF THE REGRESSION MODELS, CI AND CD KNOWLEDGE

Melodies	Listeners	Finnish		South-African	
		Children	Youth	Children	Youth
European	CI	NN_P_SEC .421	PROX .315 NN_P_SEC .415 RV .465	-	NN_P_SEC .742 EIVDIST .779 RV .801 EDURDIST .823
	CD	METPOS_ACC .141	METPOS_ACC .199 CFEIVDIS2 .282	-	METPOS_ACC .371 TONW .471
	Total	NN_P_SEC .421	PROX .315 METPOS_ACC .440	-	NN_P_SEC .742 EIVDIST .779 METPOS_ACC .808
African	CI	RA .108	EDURDIST .124	REPET .111 RA .198	NN_P_SEC .193 EDURDIST .291
	CD	METPOS .095	METPOS_ACC .203	TONW .070 SIM .164	METPOS_ACC .078
	Total	RA .108	METPOS_ACC .203 EDURDIST .276	REPET .111 TONW .207 CFPCDIST2 .345	NN_P_SEC .193 EDURDIST .324 ST .405 RA .465

The CI and CD-rows consist of variables of regression equations and their R^2-values when only culturally independent or culturally dependent predictors, respectively, were used. The Total-row consists of variables (and their R^2-values) entered in the equation when all predictors were available.

Considering the European melodies, the first hypothesis was supported by the results. For both youth groups, both kinds of predictors appeared in the model (Figure 9). For the Finnish children's group however, only a culturally independent predictor, number of notes per second reached statistical significance and was entered to the equation. For the youth groups as well, the culturally independent predictors were stronger, suggesting that all three groups relied more on their style-independent knowledge than on the style-dependent knowledge that they both possess. One possible explanation for this unexpected balance might be found in the model: style-independent knowledge and style-dependent knowledge are not necessarily equally represented in it.

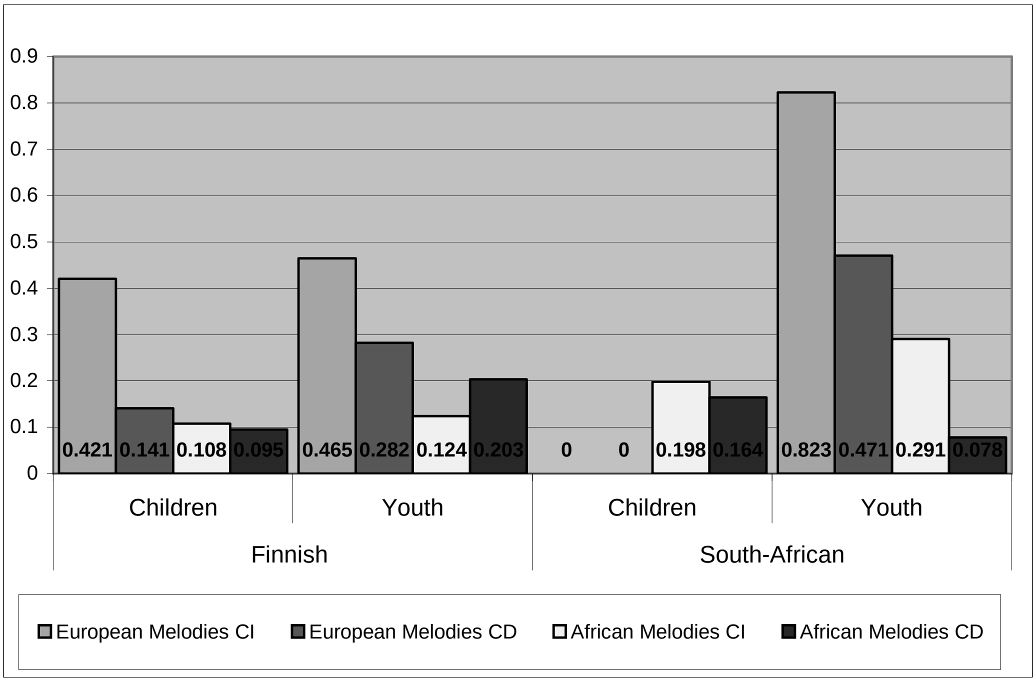


FIGURE 9, CULTURALLY DEPENDENT AND INDEPENDENT PREDICTORS

In the domain of African melodies, the second hypothesis was supported only partly. The *Finnish children* and *S-A youth* seemed to resort only to culturally independent knowledge (the culturally dependent predictors reached statistical significance only when alone), which was expected, since the Western style knowledge is not relevant when assessing African melodies. However, the results of the *Finnish youth* group were exactly the opposite. The culturally dependent predictors dominated, and

Western style knowledge seemed more important in relation to style-independent knowledge than in European melodies. Perhaps the group attempted to use the style knowledge they have, even though it is not "correct", just because it was the only knowledge they had. Alternatively, perhaps the predictor in question, MET-POS_ACC fits the African melodies as well. Another noteworthy feature is that the prediction rates for African melodies were relatively low. Therefore, another factor, not captured in this model, would explain the complexity assessments of African melodies. In any case, the hypothesis about style-independent knowledge taking over when encountering an unfamiliar style was only partially supported.

5.3.2 Components of the melody

In addition to the question of style-independent and style-dependent knowledge, the other point of interest was, whether the participants would mostly focus on the durational or pitch-related features of the melodies or to the features that integrate these two. To explore this question, the predictors were grouped along this dimension (Table 1), and then entered into the regression equation group by group. Table 11 summarises the prediction rates represented by the component that they measure. Again, within each cell, the predictors are in the order they were included in the regression equation and the number associated with them is the cumulative rate of prediction (R^2).

TABLE 11, THE RESULTS OF THE REGRESSION MODELS, MELODIC COMPONENTS

		Finnish		South-African	
		Children	**Youth**	**Children**	**Youth**
European melodies	**Rhythm**	NN_P_SEC .421	NN_P_SEC .287	-	NN_P_SEC .742 RV .768 EDURDIST .799
	Pitch	EIVDIST2 .140	PROX .315 EPCDIST .396	-	EIVDIST2 .299
	Interaction	METPOS_ACC .141	METPOS_ACC .199	-	METPOS_ACC .371 TONW .471
African Melodies	**Rhythm**	RA .108	CFDURDI2 .151	RA .106	NN_P_SEC .193 EDURDIST .324
	Pitch	-	-	-	-
	Interaction	-	METPOS_ACC .203	REPET .111 TONW .207	METPOS_ACC .099

The prediction rates are also illustrated in Figure 10. The rhythmical features seemed to be the most important ones. All except the *Finnish youth* group had mainly focused on the rhythmical features of the European melodies. For the *Finnish youth*, the pitch-related features were the most important ones.

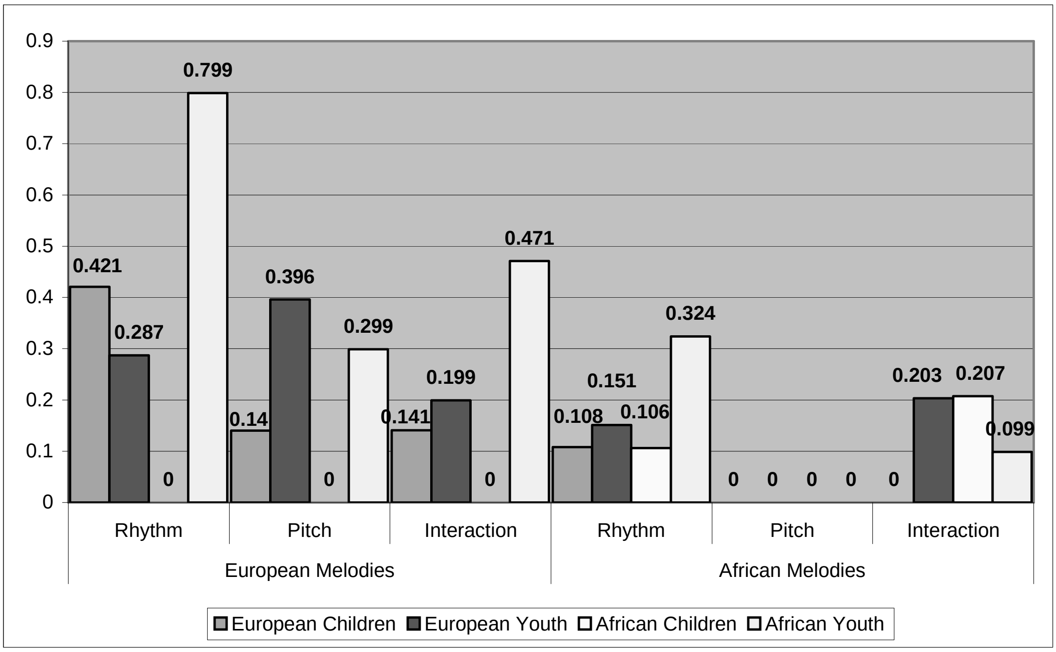


FIG-
URE 10. MELODIC COMPONENTS´ INFLUENCE TO COMPLEXITY JUDGEMENTS

Interaction features were present, but not as prominently as the rhythmical features. With the African melodies, the most noteworthy issue was the absence of pitch-related predictors. *Finnish children* and *S-A youth* again relied mostly on rhythmical features, while for *Finnish youth*, the rhythm was again secondary, this time the interaction features dominated their assessments.

5.3.2.1 Rhythmical predictors

Number of notes per second (NN_P_SEC) was in general the most important predictor for all the groups. This is a very simple measure, but also a very logical one. It can be positioned to the culturally independent end of the continuum. The *S-A youth* group had also paid attention to the rhythmic variability and the entropy of duration distribution (Table 12). Both are culturally independent measures that reflect the amount of different durations used in the melody. This suggests that the *S-A youth* group had focused on all aspects of rhythm, while the other groups seemed to have paid attention to density only.

TABLE 12, RHYTHMICAL PREDICTORS. R^2 ADDED BY EACH COMPONENT

		RV	RA	NN_P_SEC	EDURDIST	CFDURDI2	TOTAL R^2
European melodies	Finnish children			0.421			0.421
	Finnish youth			0.287			0.287
	S-A children						-
	S-A youth	0.026		0.742	0.031		0.799
African melodies	Finnish children		0.108				0.108
	Finnish youth					0.151	0.151
	S-A children		0.106				0.106
	S-A youth			0.193	0.131		0.324

In African melodies, number of notes per second was relevant only for the *S-A youth* group. Both children's group had opted for another density measure, rhythmical activity instead. As mentioned, this is a similar measure. The only difference is that rhythmical activity calculates the number of notes per measure, not per second.

Rhythmical activity is therefore more sensitive to notational factors. These notational factors might also have an effect here, since both music cultures in question are orally transmitted. When notating the melodies with Western system, sometimes the time signature and the duration values are difficult to determine. One person might use a 2/4 signature where the other would opt for 4/4, or one could decide to utilise quarter notes where the other resorts to quavers. Depending on the choices, the amount of note onsets in a measure varies, and so would the calculated rhythmical activity, even though the melody as such would be unchanged. On the other hand, the NN_P_SEC measure is more sensitive to tempo changes.

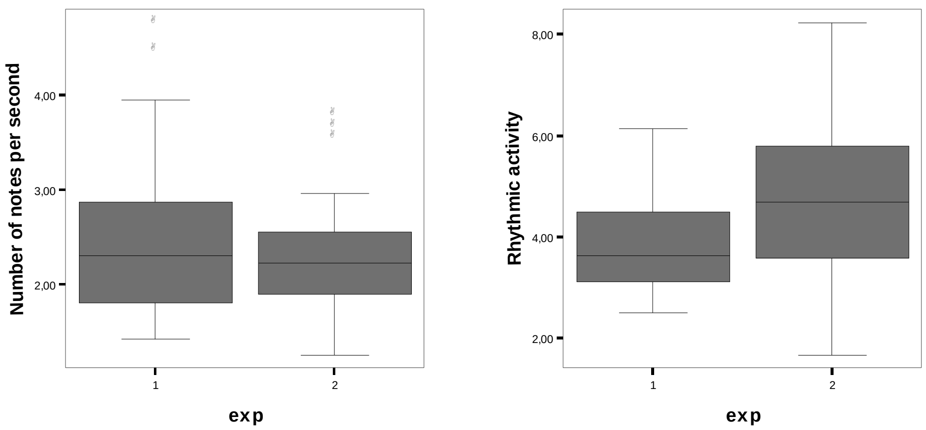


FIGURE 11, DISTRIBUTIONS OF NN_P_SEC AND RA IN EUROPEAN (EXP 1) AND AFRICAN (EXP 2) MELODIES

These slight differences are sufficient to produce differences in the distribution of these two predictors. Figure 11 shows that NN_P_SEC is more evenly distributed in the European melodies while RA is more evenly distributed in the African melodies. More even distribution makes the predictor more likely to explain the variance in the subjective assessments. These differences in distribution reflect mostly differences in notation and tempi of the melodies, but both predictors measure essentially the same perceptual phenomenon.

Seemingly, for the *S-A youth* the same rhythmical features (NN_P_SEC and EDURDIST) were in use no matter what the melodic material is. Surprisingly the *Finnish youth* group resorted to Western style-dependent knowledge again, the rhythmical feature that explains their responses in the African melodies is the correspondence measure to the duration transition distributions in the Essen collection.

5.3.2.2 Pitch-related features

The pitch-related features were significant for the listeners only when the melodies were European. For the *Finnish youth* group, the pitch related features were the most important feature. A measure of melodic density, proximity (PROX), explained a third of the variance in their responses. Entropy of pitch class distributions (EPCDIST) was also entered to their equation. Even though the two Finnish groups had otherwise very similar results, their approach to pitch-related factors differ (Table 13). Instead, the *Finnish children* share their melodic focus with the *S-A youth* group; the entropy of interval transition distributions (EIVDIST2) explained a proportion of the variance of their responses. This measure taps into the small-scale melodic events, if certain melodic interval always precedes certain melodic interval, then the melodic passage is lower in complexity compared to another melody where no such regularity is observed. The EIVDIST2 measure is a distant relative to the implication – realisation model by Narmour (1990).

TABLE 13, PITCH-RELATED PREDICTORS, R^2 ADDED BY EACH COMPONENT

		PROX	EPCDIST	EIVDIST2	TOTAL R^2
European melodies	Finnish children			0.140	0.140
	Finnish youth	0.315	0.081		0.396
	S-A children				-
	S-A youth			0.299	0.299

In total, all significant pitch-related predictors were culturally independent. The culturally dependent measures, correspondence to the pitch class transition distribution of the Essen collection or Simonton's transition probability model were not relevant for these listeners. It was rather surprising that most of the pitch-related predictors failed to make it to any of the equations.

5.3.2.3 Interaction features

The structuredness of the melody (METPOS_ACC) was the most important of the predictors that measure interaction features of the melodies. This measure combines the metrical position and the melodic accent. All groups (but *S-A children*) considered melodies with melodically salient features co-varying with the rhythmically important events as more predictable than those where the two components are not "in sync". Weighed tonality and repetition also appeared in the assessments of the S-A groups (Table 14).

TABLE 14, INTERACTION PREDICTORS, R^2 ADDED BY EACH COMPONENT

		REPET	METPOS_ACC	TONW	TOTAL R^2
European melodies	Finnish children		0.141		0.141
	Finnish youth		0.199		0.199
	S-A children				-
	S-A youth		0.371	0.100	0,471
African melodies	Finnish children				-
	Finnish youth		0.203		0.203
	S-A children	0.111	0.096		0.207
	S-A youth		0.099		0.099

Even though TONW and METPOS_ACC are culturally dependent predictors, they seemed to work also with African melodies and with African listeners. METPOS_ACC measures a feature of the melodies that might be more significant in this experiment than in natural environment. When giving instructions to the participants, one of the illustrations of "complexity" was that the more difficult it is to sing or play along with the melody, the more complex the melody is. In this sense, the listeners were encouraged to focus on a feature that is perhaps best reflected in the METPOS_ACC measure.

This might also explain the weakness of repetition as a predictor. Repetition does in general reduce complexity, but the repeated segment is still as difficult to play with an instrument, and thus repetition would not affect the subjective assessment for a listener focusing on playability of the tunes. In the post-experiment interviews, many *S-A youth* participants confirmed that they had focused on playability of the melodies, and therefore for example rated melodies consisting of a lot of notes with short duration as more complex than those with predominantly long notes.

It also seems that the metrical hierarchy of Western music at least to some extent is a concept relevant for this style of African music. The predictors might have been developed in the Western culture, but the same general principle might apply for the African melodies, and therefore the two sets of melodies are rather similar in these terms.

5.3.3 Familiarity

Familiarity of the African melodies was investigated in the post-experiment interview and by giving five volunteer participants of *S-A youth* group the task to circle the familiar melodies from the response sheet. Table 15 summarises the responses in the post-experiment interview, performed with 19 participants of the *S-A youth* group. As can be seen, most interviewees recognised 4 to 7 African melodies out of 44 played (app. 10 – 15%). Everyone recognised some African melodies, but no one recognised any of the European ones, even though some reported being somewhat familiar with that style.

TABLE 15, FAMILIARITY OF AFRICAN MELODIES

African melodies known	most of them	4-7	few	none	missing value
Number of participants	5	7	2	0	5

The teacher of *S-A children* group gave a corresponding testimony of the familiarity of melodies to that group: little under half of the songs were such that some of the children would recognise them, and approximately five of them were definitely familiar for all of the participants of that group.

The data produced by the five *S-A youth* participants by circling the familiar melodies was used to investigate the effect of familiarity to the assessments. Twenty out of 44 melodies were recognised by at least one of the five volunteered listeners.

Only one song was known by all of these five, two songs by four of them and five songs by three. The rest of the songs were familiar for only one or two of these participants.

The analysis confirmed the effect of familiarity. The *S-A youth* group rated the familiar songs easier than average. Those songs that have been marked familiar by at least two out of five volunteer participants have a mean score of 3.79 compared with 4.22 of all songs and 4.40 of the non-familiar songs. This difference is statistically significant ($p < 0.05$, independent samples T-test, p(two-tailed) = 0.021).

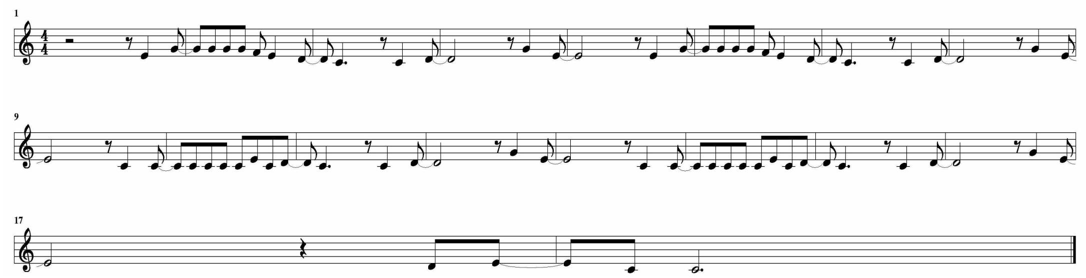
Another predictor, FAMILIARITY, was constructed based on the familiarity markings. The range was from 0 to 5, zero being given to any melody all these five participants failed to recognise and five to the one melody that they all had recognised. When familiarity of the songs was included to the regression equation, it became the second most important predictor for the *S-A youth* group. It explained 20.2% of variance of the assessments. For the other groups it had no effect.

5.4 Critical Melodies

The melodies that are causing most disagreement between groups can be identified by subtracting the average scores of a group from the scores of the other group. In addition to the subtractions of individual groups, the combined average scores of both African groups were subtracted from the combined average scores of the European groups to obtain a measure of cultural differences.

Two melodies that appeared to be more difficult for the European listeners were *Mokgonyana* and *Sina wee (Examples 1 & 2)*. Both European groups assessed these melodies on average at least two units more difficult than the *S-A youth*. A quick look at the songs reveals that they both are highly syncopated, a feature very prominent for this style of African folk music but virtually absent in the European material used.

EXAMPLE 1, MOKGONYANA

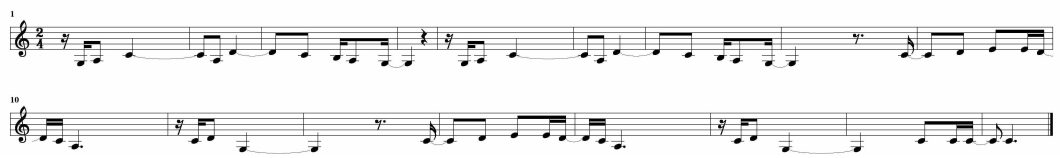


EXAMPLE 2, SINA WEE

Interestingly, among the African melodies that were easier for Europeans than Africans were two melodies: *EMonti* and *We makoti* (Examples 3 & 4). Both are relatively complex, *EMonti* contains large intervals and *We makoti* is syncopated. The feature that they have in common, however, is the fact that they both are clearly *aabb* in structure, one phrase first repeated and this followed by another phrase that is also repeated. The structure of these melodies is therefore very simple and the repetition of course lowers the overall complexity of the melody. This is an interesting finding. Could there be a difference in instructions or participants' strategies? As mentioned, many of the participants in the *S-A youth* group had assessed the playability of the melodies, and in particular relating the complexity of the melodies to their current skills in their own instrument. And clearly, even though the repetition would lower the complexity, since half of the "material" in both songs is already familiar for the listener, this wouldn't affect someone who is rating the songs by their playability: both songs would be relatively difficult to play.

EXAMPLE 3, EMONTI

EXAMPLE 4, WE MAKOTI



Of the European songs, none would appear to produce clearly higher average scores for the other cultural group than the other. Instead, for both African and European listeners, one melody was clearly dividing the assessments by age: both youth groups assessed the melody *Onds Liebe Das Halte Mer* easier than their compatriot children's group.

EXAMPLE 5, ONDS LIEBE DAS HALTE MER

This song is high in complexity in terms of number of notes, since it includes a lot of short time values. As was seen earlier, these features seem to be more important for the children's groups than for the older listeners.

6 CONCLUSIONS

Perceiving melodic complexity is a process that employs both style-dependent and style-independent knowledge. The psychophysiological properties of the melody determine its objective complexity that is independent of the music culture. We acquire, through exposure and training, style knowledge of the music we are surrounded with. We develop schemata of structural features of that music culture (Tillmann & Bharucha 2000). These schemata steer our perception and allow us to create more accurate expectations. This subjective, style-dependent knowledge is combined with the style-independent knowledge to form the perceived complexity of a melody. In this study, this interplay was in focus, and this process was approached by utilising participants and stimuli from two different musical cultures, European and Southern African.

6.1 Unexpected success

The assumption was that the EBM-model would manage to predict the complexity assessments of the European listeners, at least when they assess European melodies. It did, but the model also predicted the responses of the South African youth group with amazing accuracy. The prediction rate was over 80%. Why was this so high? On the other hand, how big a surprise was it?

The *S-A youth* group plays and studies Western classical music and therefore possesses Western style knowledge. They are also somewhat familiar with the Western popular music. The model reflects style-independent knowledge and Western style knowledge, and the *S-A youth* group possesses both kinds. But so does the *Finnish youth*, and the model was not even nearly as successful with them. Could it be that the style knowledge they possess is somehow different from the knowledge that the *S-A youth* has acquired? The *S-A youth* is clearly less familiar with Western music and they are learning it mostly in a formal setting, whereas the *Finnish youth* has grown up surrounded by that style. Perhaps the S-A youth group has a similar, "scholarly" or more analytical approach to Western music as the model has. The style knowledge of the *Finnish youth* group could be more profound and more automated. The profile of responses of this group was clearly distinctive from all other groups, the role of style-dependent knowledge and focus on pitch-related features characterised this group and none of the others.

It is also possible that the reasons for high predictability of the *S-A youth* group's responses are merely situational. The data was collected in the middle of a very intensive music camp, where the youth played and rehearsed practically around the clock. Thus, the mindset of the participants was already unusually analytical. The post-experiment interviews also revealed a few distinct strategies the participants had used. Many had taken the task as the experimenters expected, listening on a general level, how complex or difficult the melodies were to anticipate. However, since the "sing along or play along" metaphor was also used, some had taken that very seriously, and had related the melodies to their own playing skills. One participant told that the melodies sounded quite easy, but since she is not very good in her instrument yet, she had marked many easy melodies as quite complex. This mindset, taking the sing along metaphor literally, also explains the prominence of predictors such as number of notes per second, since in terms of playability, having more to play increases complexity even though the melodic and rhythmical patterns were simple.

6.2 Perceptual excuse for conservative musical taste

The results supported the main assumption of the study. The perception of complexity in music is based on a range of features: perception of musical complexity employs both style-independent, and style-dependent or schematic knowledge.

In terms of how adaptive the perceptual system is, the results are inconclusive. Top-down processing does play a role in this study, since the participants knew that the other part consisted of European and the other of African melodies. Therefore it is possible that the group, especially the *S-A youth* group, familiar with both styles employed, would shift strategies in between the parts of the test. Two groups, *Finnish children* and *S-A youth* responded as expected, resorted to style-independent knowledge when assessing the complexity of African songs. However, one of the groups, *Finnish youth* showed the opposite effect: the listeners attempted to apply their Western style knowledge to a different context. Perhaps it is possible that because of using inappropriate style knowledge the perceived complexity of the African melodies was higher for the *Finnish youth* than it would have been otherwise. Even though the other groups had considered that the European melodies were the more complex set, the *Finnish youth* group assessed the African melodies more complex than the European ones.

The *Finnish youth* group is the most expert group in Western music in this study. It seems that adapting to the perceptual needs of a previously unknown musical culture does not happen that easily, especially if the listeners possess strong style knowledge of their own style. Even being aware of the fact that the music is from another culture doesn't prevent the "false" style knowledge from interfering. The fact that in this case the "unfamiliar" culture did not differ too much from the home culture probably facilitated the use of Western style knowledge throughout the different parts of the experiment. Perhaps if the style-dependent knowledge would be completely inapplicable, resorting to that knowledge would be less likely and a completely new strategy would be used. This question remains to be answered by future studies.

6.3 Rhythmical factors raise interest

Rhythmical factors proved interesting. The *S-A youth* group listened to a whole range of rhythmical features while the Finnish groups were more focused on density. The hierarchical concept of rhythm was relevant only in connection to melodic factors, tonality or melodic accent. The African concept of rhythm is allegedly more manifold than the hierarchical, Western concept of rhythm (Temperley 2000). This notion is perhaps a cliché, but the results of this study would seem to support that notion, at least to some extent. However, the results in this respect are far from conclusive, but suggest that further study of differences and similarities in perceiving rhythm would be useful and worthwhile, since the rhythmical features seem to have a central role also in perceived complexity.

When comparing the prominence of different kinds of predictors, it is good to remember that the musical material used in the study is not fully representative, and therefore some predictors are less likely to perform. For example, the tonal variability of the stimulus used was rather small. The melodies are clearly tonal, and the extreme cases of atonal music are absent. The tonal measure is almost constant, and thus fails to correlate with the responses, even though tonality is expected to be an important feature in complexity assessments in general. The melodic passages used lack modulations, which also contributes to the relative simplicity of the melodies along the tonal dimension.

6.4 Methodological challenges

The Expectancy-based model (EBM) seems to predict the participants' responses very well, when the melodies in question are European and the group has at least some style knowledge of European music. As was expected, the success with the African melodies was little less, but this also reflected quite accurately the rate of Western style knowledge that was applicable for that style of music. A challenge for the future would be to form "meta-predictors", fewer but more powerful predictors that would more readily tell whether style-independent or style-dependent knowledge has been decisive in the complexity assessments, or what kind of features (e.g. tonal-melodic, information content, rhythmical or density features) were paid attention to. It also seems that there is a need for predictors that focus on more abstract, structural features and style-dependent factors of the melodies.

Unfortunately the data of one of the four groups, namely the S-A children -group, was almost unusable due to problems in sampling and conducting the experiment. However, performing the experiment and obtaining this data in what can truly be called field conditions, was very educational.

7 DISCUSSION

Perceived complexity of music has proved to be an interesting measure for cross-cultural study. Its versatility is both a blessing and a curse. Many musical features and aspects can be linked to it; on one hand, it is linked to the cultural background of the listener, the very basic perceptual processes, and on the other hand, it has a role in the cognitive processes in determining preference and pleasantness of music. At the same time, the versatility of the concept makes studying and measuring it challenging, to say the least. As this study has shown, there are many different, subjective measuring poles along which the complexity of a musical excerpt is assessed. The researcher is bound to meet a number of different definitions of complexity when collecting those subjective assessments. In spite of the different measuring poles, there seems to be a general agreement about what makes music complex. The real-time complexity assessments (Eerola, Toiviainen & Krumhansl 2002) seem to produce quite uniform patterns. This continuous assessment perhaps leaves less room for the personal strategies of answering than giving one, collective rating for the whole melody.

As discussed, complexity is linked to pleasantness and preference. According to a widely accepted theory, these two are related to each other by an inverted U-curve. This theory has been tested in studies that employ global ratings of preference or complexity, one value given for the whole piece of music. The real-time complexity rating would perhaps help shed new light to this question as well. The fluctuation of complexity during the course of the melody would form a second order measure of complexity. This measure would reflect the internal dynamics and structural features of the melody. The structural features, or measures that tell how the melody is constructed, are otherwise underrepresented in the EBM.

In this study the melodic material of the two cultures were kept separate. The experiment was in two parts, European stimuli were used in the other and African stimuli in the other part. All listeners were aware of the style change in the middle. To further highlight the difference, different sound was used in the two parts, English horn for the European melodies and calimba for the African ones. This opens the door for top down processing and a conscious shift in perception. The role of top down processing is a very interesting one, especially if it is true that casting style-dependent knowledge aside is not so easy. Studying the cognitive processes related to shifting from one musical style to another (and from using one scheme to another) would be an interesting field for future research. What factors contribute to the ability of shifting perceptual strategies while shifting musical styles?

In addition to the obvious theoretical problems, the cross-cultural setting of the experiment brought up few practical problems. These were mainly, as anticipated, challenges to explaining the task to the participants. This was of course emphasised due to the young age of many of the participants. The study was designed to be culturally sensitive but not age-sensitive!

According to the post-test interviews of the *S-A youth* group, the setting itself, the "bare" MIDI melodies and the use of questionnaires did not seem to bring about any specific problems. The melodies were identifiable even though they usually are played with accompaniment and/or sung in many voices. The use of synthesised melodies has been criticised for lacking ecological validity. The use of natural music would of course be desirable, but that would bring about many difficulties for analysis of results. Not only the factors modelled here contribute to perceived complexity, but the expressional content of the melody; timbre, tuning, rubato, dynamics etc. all contribute to the assessment as well. Even though the melodies used in this experiment were stripped from expression, they still convey more than just melodic and rhythmical content. Juslin has found that using synthesised musical material does not hinder the recognition of the emotions the melodies convey (Juslin 1997).

On the other hand, it is easy to understand those who criticise experimental music psychology for lack of ecological validity. As the post-experiment interviews of the *S-A youth* showed, many participants had a very elaborate strategy in responding. It can be argued that in the experimental situation, the listening strategy needed for fulfilling the task is already different from the listening strategy used in real world situations, and therefore the results are not ecologically valid. However, the problem is not in the experimental approach itself but rather in the instructions given to the participants. As long as all participants have the same starting point to the task, meaningful comparisons can be made even though the starting point would be different than in real life listening situations.

Altogether, it seems that possible problems in this study stem more likely from the methodology used, and not so much from the cross-cultural setting as such. In the future, these aspects, "technical" methods and cultural understanding need to be developed. The symmetry of the research setting needs to be developed. In addition, the African style knowledge should be defined and modelled.

The results obtained and the experiences gained in this study are encouraging: meaningful comparisons can be made and the questions about nature or nurture can be answered, so long as teamwork and cooperation between experimental cognitive scientists and ethnomusicologists is advanced.

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Instructions

This 20-minute experiment is about the complexity of the melody in music.
Your will hear different melodies which vary in their level of complexity. Your task is to judge the melodic complexity of the melodies on scale of zero (0, "extremely simple") to ten (10, "extremely complex"). You are encouraged to use the whole scale you have available. Music that is low on complexity is regular, simple and easily predictable. Music that is high on complexity is difficult to predict, erratic and surprising.

If you recognise any of the melodies, indicate it by circling the number in question.

First you will hear 3 example melodies. These are to allow you to become familiar with musical material used in the experiment. The experiment lasts approximately 20 minutes. You can also ask if you have any questions about the procedure.

Scale

0	1	2	3	4	5	6	7	8	9	10
Extremely simple					**Midway**					**Extremely complex**

Examples	Melodies 1-10	Melodies 11-20	Melodies 21-30	Melodies 31-40	Melodies 41-52
01.	1.	11.	21.	31.	41.
02.	2.	12.	22.	32.	42.
03.	3.	13.	23.	33.	43.
	4.	14.	24.	34.	44.
	5.	15.	25.	35.	45.
	6.	16.	26.	36.	46.
	7.	17.	27.	37.	47.
	8.	18.	28.	38.	48.
	9.	19.	29.	39.	49.
	10.	20.	30.	40.	50.
					51.
					52.

Questionnaire

Age?		Gender?	Female ☐ Male ☐

What is your mother tongue?	
Did you study music at school?	No ☐ Yes, ☐ for ___ years
Are you taking part to the STTEP school?	No ☐ Yes, ☐ for ___ years
Have you taken other music lessons (private etc.)?	No ☐ Yes, ☐ for ___ years
If yes, describe what kind of lessons?	
Do you sing in a choir?	No ☐ Yes, ☐ for ___ years
Do you play in a band?	No ☐ Yes, ☐ for ___ years
If yes, describe what kind of band(s)?	

How regularly do you play or sing?				
Not at all	Few times a year	Few times a month	Few times a week	Every day
☐	☐	☐	☐	☐

What instruments do you play and how long have you played each of them?
1.
2.
3.
4.

What style of music do you mostly play? (please describe also for how long have been playing those musical styles)
1.
2.
3.
4.

What kind of music do you listen to?
1.
2.
3.
4.
5.

On a scale of 0 to 10 (10=very difficult), how difficult was the experiment for you?	______

What do you think of the experiment? (what was interesting, what was boring, difficult, etc.):

☺ **Thanks for participating in the experiment!**

Ohjeet

Tämä koe käsittelee melodian kompleksisuutta eli monimutkaisuutta. Koe suoritetaan kahdessa osassa (A ja B), jotka kumpikin kestävät n. 20 minuuttia.

Toisessa osiossa kuunnellaan ja arvioidaan afrikkalaisia ja toisessa eurooppalaisia melodioita. Kuulemasi melodioiden monimutkaisuus vaihtelee. Sinun tehtävänäsi on arvioida, kuinka monimutkaisia tai yksinkertaisia melodiat mielestäsi ovat. **Kokeessa ei ole oikeita tai vääriä vastauksia, sinun mielipiteesi ratkaisee.**

Asteikko on nollasta (0, erittäin yksinkertainen) **kymmeneen** (10, erittäin monimutkainen)**.** Pyri mahdollisuuksien mukaan käyttämään koko asteikkoa.

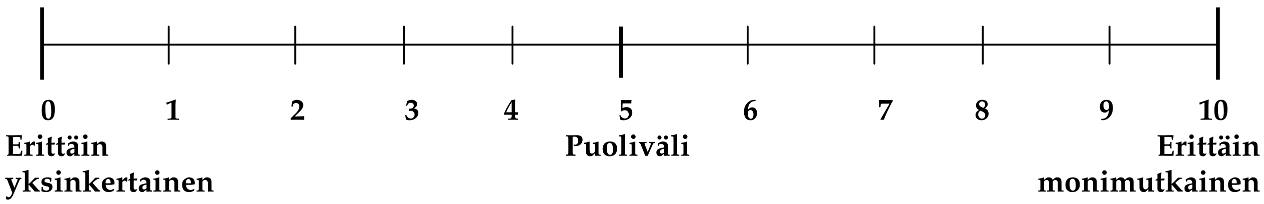
<u>Yksinkertainen musiikki on säännöllistä, helposti ennakoitavaa. Monimutkainen musiikki taas on vaikeata ennakoida, yllätyksellistä ja epäsäännöllistä.</u>

Ennen jokaista melodiaa kuulet sen numeron. Jokaisen melodian jälkeen on pieni tauko, jonka aikana sinun tulee antaa arviosi ja kirjoittaa sitä vastaava numero kysymyslomakkeeseen. **Melodiat ovat varsin lyhyitä ja aikaa niiden välillä on hyvin vähän, joten toimi ripeästi.**

Kuulet ensiksi 3 esimerkkimelodiaa. Näiden tarkoituksena on esitellä, minkä tyyppisiä melodioita kokeessa käytetään. Samalla voit harjoitella vastaamista harjoituskertoja varten varattuun tilaan. Kokeen A ja B-osat kestävät kumpikin n. 20 minuuttia. Voit vapaasti esittää kysymyksiä vielä harjoituksen aikana, mikäli haluat tietää jotain kokeesta tai jokin kohta jäi epäselväksi.

Kokeen onnistumisen kannalta on erittäin tärkeää säilyttää hiljaisuus koko kokeen ajan.

Asteikko



Kyselylomake

Ikä?		Sukupuoli?	tyttö ☐ poika ☐

Oletko ottanut soitto- tai laulutunteja?	En ☐ Kyllä, ☐ ___ vuoden ajan
Mitä tunteja ja missä?	
Laulatko kuorossa?	En ☐ Kyllä, ☐ ___ vuoden ajan
Soitatko jossain yhtyeessä tai orkesterissa?	En ☐ Kyllä, ☐ ___ vuoden ajan
Millaisessa yhtyeessä/orkesterissa?	

Kuinka usein soitat tai laulat?				
En lainkaan	Joitakin kertoja vuodessa	Joitakin kertoja kuukaudessa	Joitakin kertoja viikossa	Joka päivä
☐	☐	☐	☐	☐

Mitä soittimia soitat ja kuinka pitkään olet niitä soittanut?
1.
2.
3.
4.

Minkä tyylistä musiikkia yleensä soitat? (kerro myös kuinka kauan olet soittanut kutakin tyyliä)
1.
2.
3.
4.

Millaista musiikkia kuuntelet?
1.
2.
3.
4.

Asteikolla 0-10 (10=erittäin vaikea), kuinka vaikea koe mielestäsi oli?	______

Muita kommentteja ja ajatuksia kokeesta. (mikä oli mielenkiintoista, mikä tylsää, mikä vaikeaa jne.

☺ Kiitokset osallistumisestasi kokeeseen!

Appendix 3

The African songs

(1 = Sina's songs, 2 = Spot On songbook)

Bašimane	1
Demazana	2
Dikgomo	1
Dinaledi	1
Emonti	2
Ge ngabe ke le	1
Ge re sila	2
Impuku nekati	2
Ke llata	1
Ke ne ke nkile	2
Lebake	1
Le mmone	1
Mangwane mpulele	1
Mapimpana	1
Mašilo wee	1
Mmagwe ke moloi	1
Mma Selina	1
Mokgonyana	1
Nganginehhashi	2
Ngwana malome	1
Nkuke	1
O jele tamati	2
Pela	1
Pula ya na	2
Ra šila	2
Re Bananyana	1
Sebakanyana	1
Sehlekehleke	1
Serantabola	1
Silang mabele	2
Sina wee	1
Siyanibulisa	2
Samati sososo	2
Thereline	1
Thula thu'	2
Tsela di matlapa	1
Tšhaba dimaketše	1
Tšhelete	1
Tsoga	1
Tweba dili tharo	2
Uthando lwakhe	2
We makoti	1
Wena	1
Wen' osematholeni	2

The European songs
(Essen collection)

Absage
Auf D Alma Geh I Aufe
Auf Ihr Brueder Lasst Uns Wallen
Auf Muntre Brueder
Bald Prangt Den Morgen Zu Verkuenden
Brauns maedchen an dem laden lag
Das Schwabentoechterlein Kejseren havde de Dotre
Der Bauer ins Holz
Der Duwakwak, der Duwackelwak, der Duwak ist...
Der grausame Bruder Herr Ake han rider pa sin...
Der grausame Bruder Konung och Drottning de tala
Der grosse Kaiser Napoleon
Der heimkehrende Soldat ohne Text
Der Maedchenmoerder
Der Mutter und Tochter dasselbe gefaellt
Die Bernauerin Es reisten drei Herren aus Muenchen
Die brave Stiefmutter Bie vrie ischt auf dai Vra...
Die drei Hexen De Hiender kranent ze Mitternocht
Die Frankfurter Messe
Die Rheinbraut Ach Mutter, liebe Mutter mein...
Dir Moecht Ich Diese Lieder Weihen
Dreikoenigslied Nun macht euch auf ihr Koenige...
Es Fuhr Ein Fuhrknecht Uebern Rhein
Finster Ist Die Mitternacht
Graf und Nonne (Die Nonne) Det var tva sata vaen...
Graf und Nonne (Die Nonne) Du hast gesagt...
Graf und Nonne (Die Nonne) Ich steig auf hohe...
Hermann Fla Laerm An
Hoffnung Komm Nur Bald
Horcht Ihr Lieben Leute
Ihr Gedanken Haltet Ein
In den schoenen Monat Mai, trueholda, duholda...
Jaegers Beruf
Jetzt Danzt Hannemann
Joseph Lieber Joseph
Jungfer Doertchen Es war ein Reiter hochgemut...
Komm Wir Wollen Wandern
Kuhreigen 'Es Isch Kei Soliche Stamme'
Maedchen als Stallknecht Stoji, stoji beli grad...
Nichts bessres gibt es weit und breit
Nu Fall Du Reif
Onds Liebe Das Halte Mer
Satyre auf das Papstthum
Schifferlied zur Arbeit
Schoen Adelheid Skoen Anna hon kasta en halver...
Schoen Adelheid Unga bruden kastade en halver...
Unser Lieben Fraue
Verschlafener Jaeger Es wollt ein Jaeger wohl ja...
Verschneiter Weg
Verstohlen Geht Der Mond Auf
Winterrosen Es kam ein Fraeulein mit ein'm Krueg
Wolauf Gut Gsell