

# HOW DOES LULLABIES OF DIFFERENT ETHNICITIES INFLUENCE THE SUBJECTIVE TIME ESTIMATION?

José Lino Oliveira Bueno, Alexandre Antônio Mateus Moisés  
*Faculdade de Filosofia Ciências e Letras de Ribeirão Preto, Universidade de São Paulo*

## Abstract

*The present study examined the subjective time estimation of lullabies of different ethnicities. Participants were graduate non-musicians students, both sex, Brazilians in the experiment I and foreigners (Africans, Asians and Europeans) in the experiment II. The stimuli were nine 44 seconds long musical excerpts; 3 African, 3 Asian and 3 European Stimuli. In the experiment I were used nine stimuli separated in 3 series, containing 6 lullabies each: 2 African, 2 Asian and 2 European; in the experiment II were used 3 stimuli, one of each ethnicity. The results showed that there were no differences in the subjective time estimation of lullabies from different ethnicities, by Brazilian, African, Asian and European participants. These data suggest that despite the cultural elements of each lullaby, the common comfort property of them influences indifferently the participants of the different ethnicities.*

## Introduction

Different cultures have different musical traditions that, in many cases, have developed themselves independently from each others, and their common characteristics provide evidences of innate components (Hauser & McDermott, 2003). This suggests that, even in different cultures, there are universal characteristics of music (musical scales, lullabies and antique musical instruments) that reflect adaptations of shared brain structures among the human species (Peretz, 2002).

Pinker (2004) considers that the musical appreciation is not the result of an adaptive process, but a consequence of auditory system properties that is involved in other functions. Trehub (2003) however considers that in terms of its prevalence and impact, music seems much more like a necessity than a cognitive processing of “cocktail party” language, anticipated by Pinker (2004). Levitin (2006) enumerates factors that support the hypothesis that music puts an adaptive function in the evolution of the human being. Nevertheless, these hypotheses do not need to be mutually excluding: certain aspects of music may result of general mechanisms of the auditory system and others from music-specific adaptations.

The origin of the lullabies and their particular characteristics remain unknown. As the property of comfort can be found at musical events of all cultures, lullabies may contain one of the general characteristics of music that according to Hauser & McDermott (2003) reinforce the hypothesis that music is innate to human beings.

The integrated study of musical cognition and time estimation has become an important branch of cognitive psychology (Krumhansl, 2000). Music might be an appropriate event in the programs of research involving subjective time estimation (Fraisse, 1963; Berlyne, 1974).

This study aimed to verify if subjective time estimation is influenced by different musical contexts. The experiment I investigates the cognitive-temporal processing of lullabies of different ethnicities (African, Asian and Europeans) by participants of a same ethnicity, Brazilian graduate students. The participants of the experiment II were foreign graduate students (Africans, Asians and Europeans). The examined hypotheses were: (a) cultural elements present in the musical stimuli may modulate subjective time estimation and (b) adaptive properties of comfort, typical of the human specie, present in every stimulus may undifferentiate the subjective time estimations.

### Experiment I

Third nine Brazilian graduate students of both sexes, with ages ranging from 18 to 35 years, participated in the study. The materials were a Koss R-80 headphone, a Hewlett Packard Pavilion ze5300 laptop with the Wave Surfer software and a keyboard with three keys nominated as: “listen”, “start” and “end”. The stimuli consisted of nine 44 seconds long musical excerpts of 44 seconds, lullabies from the African (Sudan), Asian (Vietnam) and European (England) continents, with similar vocal timbres. Three of the lullabies were recorded on cassette tape and later digitalized in files of Wave type, configured in the desired duration, with a short initial and final “bip” sound added, of a senoidal pure ton 400Hz of 100ms duration, through the Sony Sound Forge 7.0 software. Other 6 stimuli were taken from the [www.youtube.com.br](http://www.youtube.com.br) website and from the CD “Cultural Songs” produced by UNESCO. Each participant received instructions to listen to each musical excerpt and, afterwards, reproduce its duration.

The stimuli were distributed in 3 random series, each containing 2 among 3 lullabies of each ethnicity: African (Afri), Asian (Asi) and European (Eur) stimuli:

Series1: Afri1, Eur1, Asi1, Afri2, Eur2, Asi2;

Series2: Afri1, Eur1, Asi1, Afri3, Eur3, Asi3;

Series3: Afri2, Eur2, Asi2, Afri3, Eur3, Asi3;

Each participant was submitted to one of the series. The stimuli of each series were also assorted in 6 different sequences so that every lullaby occupied all the possible positions of the series of stimuli presented to the participants.

The Table 1 shows the time estimations of the first stimulus from each series.

Table 1: Mean and standard deviations of time estimations of the 3 first lullabies selected from each experimental sequence (in seconds). N is the number of participants that estimated each musical stimulus.

<b>Stimuli</b>	<b>Means (St. Dev.)</b>	<b>N</b>
Afri1	44.663(±9.400)	13
Afri2	42.768(±10.079)	15
Afri3	42.659(±12.046)	11
Asi1	42.089(±8.949)	16

Asi2	41.933(±16.610)	11
Asi3	50.711(±10.194)	12
Eur1	41.107(±10.902)	14
Eur2	35.942(±5.982)	10
Eur3	43.283(±8.764)	15

---

The ANOVA test ( $p < 0.05$ ) showed that the values of time estimations from the lullabies of the three different ethnicities did not have any significant statistical differences [ $F = 1.493$ ;  $p = 0.15$ ]. Likewise, there were not significant differences among the values of the time estimations of a same ethnicity: African lullabies [ $F = 0.14$ ;  $p > 0.05$ ], Asian lullabies [ $F = 2.211$ ;  $p > 0.05$ ] and European lullabies [ $F = 2.009$ ;  $p > 0.05$ ]. The T-Student test ( $p < 0.05$ ) did not pointed out significant differences among the real duration of the stimuli and the values of the time estimations, except for two lullabies: temporal underestimation for the song Eur2 [ $p = 0.002$ ] and overestimation for the song Asi3 [ $p = 0.04$ ].

The results of the present experiment confirm the data of Bueno et al. (submitted), that also had not found significant statistical differences in time estimation utilizing only one stimulus of each ethnicity. In this study, each participant was submitted to 3 stimuli of each ethnicity, to guarantee that the time estimations were not due to the particular properties of the stimulus utilized.

## Experiment II

The experiment II used the same method of the experiment I, with some changes. Thirty six foreign graduate students (Africans, Europeans and Asians), both sexes, with ages ranging from 18 to 35 years participated in the study. The stimuli were the same first three musical excerpts of the experiment I (Afri3, Asi3 and Eur3). A questionnaire on the participants musical previews experience was also applied at the end of each session.

The Figure 1 shows the group means and standard deviations of time estimations for each lullaby from different ethnic origins.

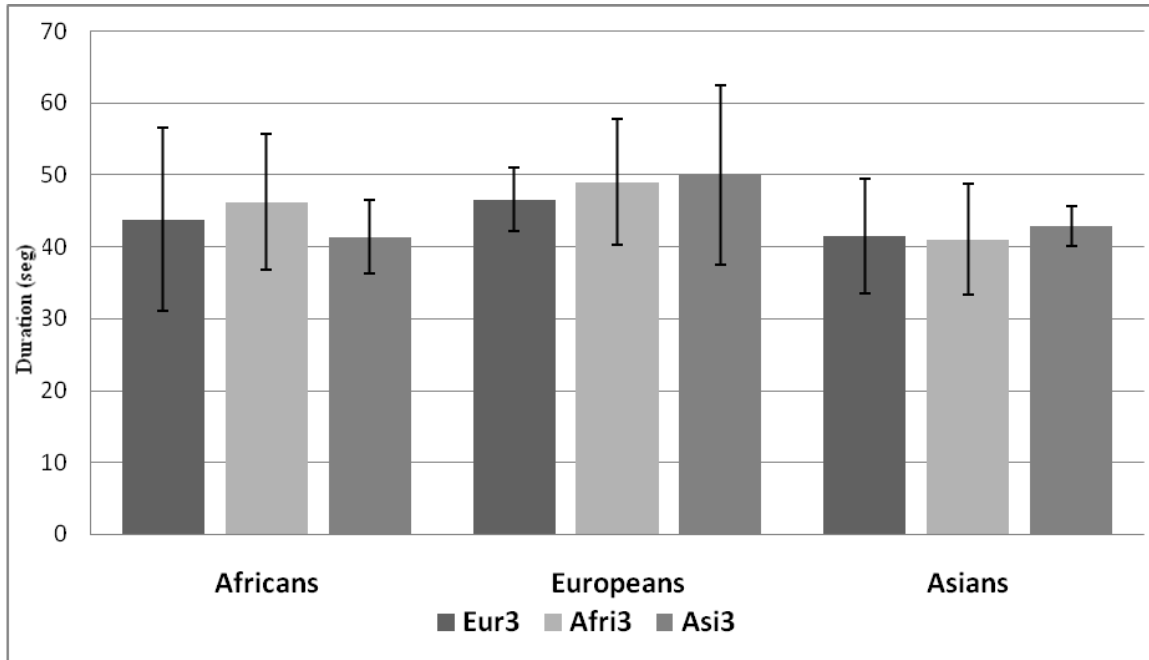


Figure 1: Mean and standard deviation of time estimations of each group of participants (Africans, Europeans and Asians) for each of the lullabies (English (Eur3), Sudanese (Afri3) and Vietnamese (Asi3)).

The intra group time estimations did not show any statistical differences for African [F= 0.892; p= 0.42], European [F= 0.414; p=0.66] and Asian [F=0.917; p=0.41] groups. The comfort has an adaptive function that may be present equally in the lullabies of diverse ethnic groups. This adaptive function may generate time estimations similar to lullabies of different cultures, no matter what the ethnic group of listeners. Therefore, for each ethnic group, the specific comfort components of the lullabies may have lead to similar time estimations among the three musical excerpts (Trehub et al. 1993; Hauser & McDermott, 2003).

The ANOVA test (p<0.05) showed differences in time estimations of songs among the three groups of participants [F= 5.512; p=0.04]. The time estimations of Asians are shorter than that of Europeans (Newman-Keuls Post Test, [F= 11.864; p<0.05]). The distortions of the 44 s real durations were overestimations by Europeans and underestimations by Asians. The Africans estimations were similar to the real duration. These differences between the European and Asian groups showed that there are differences among groups relating to the estimation of musical excerpts, independently of the origin of the pieces. Although it was not found any intra group differences in time estimation of lullabies, the inter-groups differences indicate that it is not absent some influence of the cultural component in the musical appreciation.

The questionnaires showed that the participants maintained strong links with their native cultures and report higher familiarity with them. Nevertheless, the results of this experiment show that this familiarity does not seem to interfere selectively on the subjective time estimation of lullabies from different ethnicities.

## General Discussion

Bueno *et al.* (submitted) and the experiments I and II of this study showed that the results obtained utilizing lullabies of different ethnicities support the hypotheses that the lullaby comfort characteristic is more determinant for the subjective time than the stimuli cultural characteristics.

Pinker (2004) associates the brain processing of music to a great “cocktail party”. Thus, music suffers from the same brain process responsible for the processing of language, but with a great hedonic charge. However, Levitin (2006) and Trehub (2003) present diverse arguments to defend that music has an adaptive function to human being. Levitin points out that music is present in all human cultures and since a very long time; that the men used the first musical instruments fifty thousand years ago, being this the time required by the evolutionists for a characteristic to be considered adaptive. Trehub and Levitin sustain that human being needs social links to make society work, and music is one of that links. Trehub consider that music promotes cognitive development in babies. Musical audition is a complex activity that prepares children to their future mental life as a form of practice of perception, since we do not learn our language by memorization (Levitin and Trehub). Another adaptive function that Levitin gives to music comes from the fact that we share the musical ability with other species of animals.

Thus, there may be a brain adaptation for the musical processing (Peretz, 2002). This study suggests that the lullabies comfort characteristic may have influenced the estimates of time so as not to differentiate them. These data support the idea that music has a specific brain organization, since all the ethnic groups surveyed seem to be influenced by the same comfort property of lullabies originated from distant different cultures.

Data obtained by comparison of subjective time estimation of stimuli with comfort and non-comfort characteristics, from different ethnicities, may give more support to the idea that lullabies have comfort species specific properties, regardless the ethnicity that produce them.

## References

Berlyne, D. E. (1974). Studies in the new experimental aesthetics: steps toward an objective psychology of aesthetic appreciation. In D. E. Berlyne (Org.), *The new experimental aesthetics*. (pp.1-25), Washington, D. C.: Hemisphere Publishing Corporation.

Bueno, J. L. O. Moisés, A. A. M. (2009). Canções de ninar de diferentes etnias podem influenciar a estimação subjetiva de tempo? (Lullabies of different ethnic groups can influence the subjective time estimation?) [CD-ROM]. In: *XVII International Symposium of Scientific Initiation*, São Paulo: Universidade de São Paulo.

Bueno, J. L. O., Pinto, L. F. S. de S., Ramos, D. (submitted) O tempo subjetivo é afetado pela escuta de canção de ninar? (Is the subjective time affected by listening to lullabies?). *Claves*.

Fraisse. J.P. (1984). Perception and estimation of time. *Annual Review of Psychology*, 35. 1-36.

Hauser, M.D., Mcdermott, J. (2003). The evolution of the music faculty: a comparative perspective. *Nature Neuroscience*, 6 (7), 663-668.

Krumhansl, C.L. (2000). Rhythm and pitch in music cognition. *Psychological Bulletin*, 126 (1), 159-179.

Levitin, D. J. (2006). The music instinct . In D. J. Levitin (org), *This is your brain on music: the science of a human obsession* (pp. 247-306). New York: Dutton/Penguin.

Peretz, I. (2002). Brain specialized for music. *The Neuroscientist*. 4(8), 374-382.

Pinker, S. (2002). *The Blank slate: the denial of human nature in modern intellectual life*. New York: Viking. Penguin.

Trehub, S.E., Unik, A.M., Trainor, L.J. (1993). Adults identify infant-directed music across cultures. *Infant Behaviour & Development*, 16(2), 193-211.

Trehub, S. E. (2003). The developmental origins of musicality. *Nature Neuroscience*, 7(6), 669-673.