

ON THE SCIENTIFIC APPROACH TO UNDERSTAND IMPROVISATION: A PILOT STUDY

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ABSTRACT

Rabindra -Sangeet is a genre of song relatively new (19th century). Singers are supposed to adhere strictly to the discipline regarding pronunciation, notation and rhythm prescribed by the composer-poet himself. In these songs lyric, emotion, melody and esthetics are related with a very high level of sensitivity. It therefore provides a good testing ground for improvisation where a singer has to strive hard to put his characteristic signature. A small part of a popular Rabindra-Sangeet sung by a number of contemporary and the previous generation singers are used as the database. The results reveal that aspects of duration (matra), pitch contour offers interesting area of marking individuality.

INTRODUCTION

Music of modern times has gone a long extra mile from its primary role of simple communication in the primeval music of early human beings. In its long journey from its origin in lullaby of Neanderthal mothers [1] through its social role related to hunting-gathering, warning of natural calamity or war, expression of joy and sorrow to the present role of creating an aesthetic and emotional expression of the self, it has acquired an rigid armor of rules, that of grammar lexicon and rhythm. Does this armor strangle the innate spontaneity of free expression of soul? Esthetic abhors total rigidity as well as total chaos.

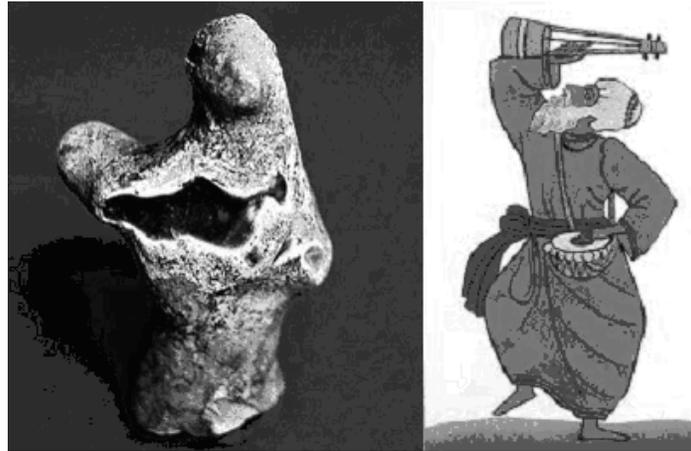


Figure 1 Music Neanderthal to Modern

Therefore the artists find the gaps to improvise. This improvisation is personal to the artist and this provides the stamps for the great artists. An artist will add nuances, ornamentation or variations that are not pre-determined in the performance even of a pre-composed musical work, fully notated by the composer. Most musicologists recognize such elements as “improvisation” [2]. This improvisation becomes quite interesting in those genres of music where the composition is said to be quite rigid (Figure 1).

In this context improvisation in Rabindra-Sangeet (RS) calls for attention. The genre of RS was established by Poet-laureate Rabindra Nath Tagore in early 20th century. Of the basic notable features of the genre the most important is that the songs are based on lyrics of intense philosophically emotional content. As a consequence the Poet-laureate composer firmly believed that the composition, which he so meticulously crafted in consonance with classical raga-rasa relations to do justice to the content, must not be trifled with. The distortion in the early years, even in his lifetime, worried the bard so much that he used printing press to print the musical notations of each of his 3000 songs leaving the authorial signature on the work of art, including music, for use of posterity. Unlike literature, sculpture, painting and other forms of “high” art, music, as Tagore himself noted, is not an “author”/ composer-centric art, but a singer/performer-centric one, which also has traditionally sought and enriched itself through the assistance of the accompaniment of musicians/ instrument-artists. The immense sensitivity and possessiveness of Tagore about his musical compositions can easily be understood in this context [3]. It is not that Tagore was against the idea of the artistic freedom of improvisation, provided the structure of his musical composition for a particular song remained unimpaired, and the artist was powerful enough. But he had a very selective—to put it mildly—idea of a ‘powerful artist. In fact, in a discussion with Dilip Kumar Roy in 1938, he said that “a lot of people sing my songs, but they always disappoint me, if I had a good voice perhaps I could have shown what gem I have in my mind”. He always mentioned to ‘catch the spirit’ of his song [3]. In the communication with Sahana Devi, he accepted the freedom of expression of a song sung by a singer. He said that a singer tries to interpret a song in his own way which may or may not corroborate with the composer [3]. Tagore also believed in the scientific analysis of the expression of various melodies and its impact on human mind [4].

The present paper presents a pilot probe on the possibility of using of scientific method to study improvisation in the relatively tough case with RS, tough because unlike khayal it does not encourage improvisation. Like any other genre of music in this case too various schools evolved having their own styles despite the strict surveillance of a formidable watchdog until quite recently. In Indian musical notation temporal segments (matra, rhythm, beat) and pitch divisions (notes) are defined. Pitch movements like glissandos are also indicated. It seems that the timbral qualities and loudness information are loosely indicated in rhythm structure lie in the ‘taali’ (full) or ‘khaali’ (void) distinction. However timbre in Indian music was never considered to be a basic information unit. It therefore seems that the area of investigation has to lie mainly in both the time and the pitch domain. For this purpose the audio recordings of a single line from the middle of a well-known RS sung by early exponents as well as contemporary singers were used for the analysis. Most of the signal processing and extraction of parameters was done using the software ‘Wave-Surfer’ developed by KTH, Stockholm.

METHODOLOGY

The selected portion ‘o^per hote e^fer^h elo’ from a popular RS was collected from the commercially available recordings of five well-known senior exponents of RS. The same portion was also selected from three young contemporary singers. Figure 2 shows the notation of the song.

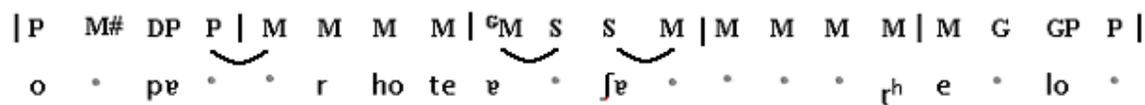


Figure 2. Notation of the song.

Thus there are eight sound files. Pitch and amplitude profiles are extracted from each of these sound files. The syllables endings are carefully marked by looking at all these parametric graphs and the 3-D spectra and in synchrony with the listening of the sound thus segmented. Figure 3 shows an example of the waveform, amplitude and the pitch contour of one file. Vertical lines show the segments of the sung syllables.

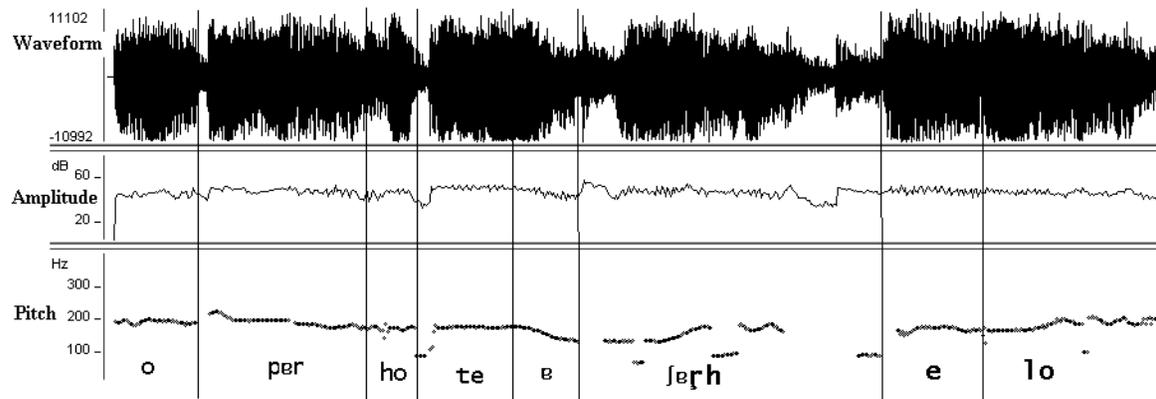


Figure 3. Example showing extracted basic physical parameters from a song.

The personal characteristics of the singers are assumed to lie, inter alia, in taking some liberty with timing (matra), dynamics of the pitch contour, exact positioning of the note and loudness control. There are 18 matras covering the piece of the song. As the tempo varied from singer to singer theoretical value of matra in each case was determined by dividing the total duration by 18.

RESULTS AND DISCUSSIONS

Table 1 gives the percentage of deviation from the matra value prescribed in the musical notation for each syllables for different singers. The rows are sorted vertically in descending order of total error. Assuming that this is one parameter where a singer takes liberty, it is interesting to note that the first four are the most popular and revered senior exponents of RS. Singer 5, 7 and 8 are young contemporary singers. Apparently experience encourages to explore and to experiment. Generally more liberty is taken when syllables are longer. Though singer 6 is a member of the senior group of artists his data reveals an exception.

Table 1: Deviation in length of sung syllable from prescribed value (in %)

Syllable of Lyric	/o/	/ per /	/ho/	/ te/	/e/	/ fer ^h /	/e/
Matra	2	4	1	1	2	6	2
Singer							
One	16.01	8.98	13.31	77.79	3.99	42.43	19.01
Two	12.33	26.27	10.93	11.77	11.3	59.8	9.03
Three	24.21	16.18	5.56	5.54	0.71	25.67	16.91
Four	10.1	5.8	12.1	39	14.1	1.2	9.7
Five	13.68	3.74	3.94	28.56	18.8	1.97	2.12
Six	19.03	9.73	6.77	6.23	2.47	14.2	6.83
Seven	9.4	2.1	8.1	13.1	13.5	3.1	6.1
Eight	4.59	3.38	9.79	17.71	6.59	4.23	2.41

Table 2 gives the correlation of matra values across sung syllables between different singers. The values in bold letters indicate good correlation. It is interesting to note that the values for the senior singers reveal poor correlation indicating strong individualistic characteristics. The only exception is singer No. 6 who also is considered as a member of the senior group. One way to explain the

correlation is that the selected contemporary singers are influenced by this singer.

Table 2: Correlation of error sequences in Table 1 between different singers.

	One	Two	Three	Four	Five	Six	Seven
Two	0.579711						
Three	0.682146	0.462744					
Four	0.445375	0.764158	0.802683				
Five	0.45286	0.785745	0.782903	0.99457			
Six	0.438268	0.783505	0.774765	0.992786	0.99472		
Seven	0.379745	0.571973	0.820196	0.984627	0.97531	0.96427	
Eight	0.516931	0.659792	0.894353	0.970339	0.961532	0.946898	0.978259

The examination of the pitch contour for different singers revealed that singer 1 used vibrato on the first syllable while singers 2 and 6 used vibrato extensively. Singer 4 prefers steady hindering of notes. Singer 3 has very large jitter. However jitter is not a voluntary phenomenon.

A proper through examination of pitch contour, which could have revealed intricacies related to use of exact positioning of notes, vis-à-vis shrutis, was not undertaken because of the short duration of the song. One needs to have a good length of the song to examine the exactness of using different notes.

CONCLUSION

Present study indicates the potential of using objective scientific approach for the study of improvisation and that for characterizing styles of singing. RS being a class of songs where lyric, emotion, melody and esthetics are intricately related and where discipline regarding pronunciation, notation and rhythm are supposedly quite strict, offers a really good test bed for study in this direction.

REFERENCE

1. Aniruddh Patel: "Music, Biological Evolution, and the Brain", <http://cnx.org/content/m34255/1.7/>
2. Nettl, Bruno: "Thoughts on improvisation: a comparative approach", *Musical Quarterly* 60:1-19, (1974).
3. Tagore Rabindranath: 'Sangeetchinta', In the complete works of Tagore, Vol.16, Visva-Bharati publications Kolkata, (Bangla 1407).
4. Tagore Rabindranath: 'Sangeet o Bhaab', In the complete works of Tagore, Vol.17, Visva-Bharati publications Kolkata, (Bangla 1407).