

## A Statistical Analysis Of A Raga-Based Song

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### **Abstract**

*The origins of Indian classical music lie in the cultural and spiritual values of India and go back to the Vedic Age. The art of music was, and still is, regarded as both holy and heavenly giving not only aesthetic pleasure but also inducing a joyful religious discipline. Emotion and devotion are the essential characteristics of Indian music from the aesthetic side. From the technical perspective, we talk about melody and rhythm. A raga, the nucleus of Indian classical music, may be defined as a melodic structure with fixed notes and a set of rules characterizing a certain mood conveyed by performance.. The strength of raga-based songs, although they generally do not quite maintain the raga correctly, in promoting Indian classical music among laymen cannot be thrown away. The present paper analyzes an old and popular playback song based on the raga Bhairavi using a statistical approach, thereby extending our previous work from pure classical music to a semi-classical paradigm. The analysis consists of forming melody groups of notes and measuring the significance of these groups and segments, analysis of lengths of melody groups, comparing melody groups over similarity etc. Finally, the paper raises the question "What % of a raga is contained in a song?" as an open research problem demanding an in-depth statistical investigation.*

**Keywords:** Raga-based song; melody; segment; statistical analysis

### **1. Introduction**

The origins of Indian classical music lie in the cultural and spiritual values of India and go back to the Vedic Age. The art of music was, and still is, regarded as both holy and heavenly giving not only aesthetic pleasure but also inducing a joyful religious discipline. Emotion and devotion are the essential characteristics of Indian music from the aesthetic side. From the technical perspective, we talk about melody and rhythm. However, the present paper analyzes only the structure and hence rhythm analysis is omitted. Indian classical music does not support harmonic analysis. Harmony is created when two different pitches are rendered simultaneously. This can destroy the *shruti* (microtone) concept in the ragas. A *raga*, the nucleus of Indian classical music, may be defined as a melodic structure with fixed notes and a set of rules characterizing a certain mood conveyed by performance [1]. Further insight into ragas can be found in [2]. See also appendix for a comprehensive description of raga *bhairavi*.

One must accept that light music essentially is a *composite art* in which contributions are threefold: the *lyrics* (this comes from the song writer), the *composition* (this comes from the music director) and the *singer(s)*. Of course, all these can come from the same person (if he/she is talented enough!) but the point is: there are three *categories* of contributions coming from one or more than one individual [3]. The interactive processing of speech and music takes place in the brain [4]. To realize the importance of the interaction of speech and music it suffices to quote E. Y. Harburg: "Words make you think a thought. Music makes you feel a feeling. A song makes you *feel a thought*." The strength of raga-based songs, although they generally do not quite maintain the raga

correctly, in promoting Indian classical music among laymen cannot be thrown away. The present paper analyzes an old and popular playback song based on the raga *Bhairavi* using a statistical approach, thereby extending our previous work from pure classical music to a semi-classical paradigm. The analysis consists of forming melody groups of notes and measuring the significance of these melody groups and segments, analysis of lengths of melody groups, comparing melody groups over similarity etc.

## 2. Statistical Analysis

**Melody** may be mathematically defined as a sequence of notes “complete” in some sense, as determined by music theory, taken from a musical piece [1]. A melody need not be a complete musical sentence. It suffices if it is a complete musical phrase. In the absence of completeness, it is very difficult to mathematically capture its musical meaningfulness or the “feel good” part.

A **Segment** is a sequence of notes which is a subset of melody but is itself incomplete. For example, {n, S, g, M, P, d, P} is a melodic phrase in raga *bhairavi* while {S, g, M} is one of its segments. The meaning of the letters has been explained later.

**Length** of a melody or its segment refers to the number of notes in it. **Significance** of a melody or its segment (in monophonic music such as Indian classical music) is defined as the product of the length of the melody and the number of times it occurs in the musical piece. *Thus both frequency and length are important factor to assess the significance of a melody or its segment.* For a more technical definition of significance of melody in polyphonic music, see [5].

By **Shape** of a melody is meant the difference of successive pitches of the notes in it represented by the numbers given in appendix B. Two melodies are in **translation** if the correlation coefficient  $r$  of their shapes equals +1. Two melodies are in **inversion** if the correlation coefficient  $r$  of their shapes equals -1. Two melodies are called **different** if the correlation coefficient of their shapes approaches 0. Thus correlation coefficient here is a measure of similarity between melodies.

Musical data is certainly chronological and the numbers representing pitches in different octaves (detailed below) will be the possible response entry  $Y_t$  corresponding to the argument time  $t$  which would in our case be just the instance (1, 2, 3...) at which a note is realized. The full sequence of the song notes are given in table 2. The song being analyzed here is a devotional raga-based song “*Jyot se jyot jagate chalo...*” composed by Laxmikant Pyarelal and taken from the Hindi film *Sant Gyaneshwar*. Based on the raga *bhairavi* as is clear from the note combinations (see the melody groups given later), the beautiful lyrics for this song were written by Bharat Vyas and rendered independently by the renowned playback singers Lata Mangeshkar and late Mukesh. Lest any injustice be done to the lyricist, we are providing below the lyrics of this song in entirety:-

*Jyot se jyot jagate chalo, prem ki ganga bahate chalo  
Raah mein aye jo deen dukhi, sabko gale lagate chalo*

*Kaun hai ucha, kaun hai nicha, sab mein wohi samaya  
Bhedbhav ke jhuthhe bharam mein ye manab bharmaya  
Dharam dhawaja fahrata chalo, prem ki .....*

*Sare jag ke kan kan mein hai divye amar ek atma  
Ek brahm hai, ek satya hai, ek hi hai parmatma  
Prano se pran milate chalo, prem ki.....*

Numbers representing pitch of notes [1] are given in table1.

Table 1: Numbers representing pitches in three octaves

|   |
|---|
| C Db D Eb E F F# G Ab A Bb B                            |
| <i>S r R g G M m P d D n N</i> ( <b>lower octave</b> )  |
| -12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1                  |
| S r R g G M m P d D n N ( <b>middle octave</b> )        |
| 0 1 2 3 4 5 6 7 8 9 10 11                               |
| <b>S r R g G M m P d D n N</b> ( <b>higher octave</b> ) |
| 12 13 14 15 16 17 18 19 20 21 22 23                     |

**Abbreviations:** The letters S, R, G, M, P, D and N stand for Sa, *Sudh* Re, *Sudh* Ga, *Sudh* Ma, Pa, *Sudh* Dha and *Sudh* Ni respectively. The letters r, g, m, d, n represent *Komal* Re, *Komal* Ga, *Tibra* Ma, *Komal* Dha and *Komal* Ni respectively. Normal type indicates the note belongs to middle octave; italics implies that the note belongs to the octave just lower than the middle octave while a bold type indicates it belongs to the octave just higher than the middle octave. Sa, the tonic in Indian music, is taken at C. Corresponding Western notation is also provided. The terms “*Sudh*”, “*Komal*” and “*Tibra*” imply, respectively, natural, flat and sharp.

**Table 2: Song based on bhairavi (notes appear sequentially)**

| Instance (t) | Notes                     | Pitch (Y <sub>t</sub> ) |
|--------------|---------------------------|-------------------------|
| 1            | <u>Melody Group1</u><br>P | 7                       |
| 2            | <b>R</b>                  | 14                      |
| 3            | <b>R</b>                  | 14                      |
| 4            | <b>R</b>                  | 14                      |
| 5            | <b>R</b>                  | 14                      |
| 6            | <b>R</b>                  | 14                      |
| 7            | <b>g</b>                  | 15                      |
| 8            | <b>R</b>                  | 14                      |
| 9            | <b>S</b>                  | 12                      |
| 10           | n                         | 10                      |
| 11           | <b>S</b>                  | 12                      |
| 12           | <b>R</b>                  | 14                      |
| 13           | <b>S</b>                  | 12                      |
| 14           | <b>S</b>                  | 12                      |
| 15           | n                         | 10                      |
| 16           | P                         | 7                       |
| 17           | <u>Melody Group2</u><br>P | 7                       |
| 18           | <b>S</b>                  | 12                      |
| 19           | <b>S</b>                  | 12                      |
| 20           | <b>S</b>                  | 12                      |
| 21           | D                         | 9                       |
| 22           | n                         | 10                      |
| 23           | D                         | 9                       |

|    |                       |    |
|----|-----------------------|----|
| 24 | P                     | 7  |
| 25 | D                     | 9  |
| 26 | M                     | 5  |
| 27 | P                     | 7  |
|    | <u>Melody Group3</u>  |    |
| 28 | P                     | 7  |
| 29 | <b>R</b>              | 14 |
| 30 | <b>R</b>              | 14 |
| 31 | <b>R</b>              | 14 |
| 32 | <b>R</b>              | 14 |
| 33 | <b>R</b>              | 14 |
| 34 | <b>G</b>              | 15 |
| 35 | <b>R</b>              | 14 |
| 36 | <b>S</b>              | 12 |
| 37 | n                     | 10 |
| 38 | <b>S</b>              | 12 |
| 39 | <b>R</b>              | 14 |
| 40 | <b>S</b>              | 12 |
| 41 | <b>S</b>              | 12 |
| 42 | n                     | 10 |
| 43 | P                     | 7  |
|    | <u>Melody Group 4</u> |    |
| 44 | P                     | 7  |
| 45 | <b>S</b>              | 12 |
| 46 | <b>S</b>              | 12 |
| 47 | <b>S</b>              | 12 |
| 48 | D                     | 9  |
| 49 | N                     | 10 |
| 50 | D                     | 9  |
| 51 | P                     | 7  |
| 52 | D                     | 9  |
| 53 | M                     | 5  |
| 54 | P                     | 7  |
|    | <u>Melody Group5</u>  |    |
| 55 | M                     | 5  |
| 56 | P                     | 7  |
| 57 | g                     | 3  |
| 58 | M                     | 5  |
| 59 | P                     | 7  |
| 60 | P                     | 7  |
| 61 | P                     | 7  |
| 62 | D                     | 9  |
| 63 | n                     | 10 |
| 64 | D                     | 9  |
| 65 | n                     | 10 |
| 66 | <b>S</b>              | 12 |
| 67 | n                     | 10 |
|    | <u>Melody Group6</u>  |    |
| 68 | D                     | 9  |
| 69 | P                     | 7  |

|     |                |    |
|-----|----------------|----|
| 70  | M              | 5  |
| 71  | P              | 7  |
| 72  | D              | 8  |
| 73  | S              | 12 |
| 74  | d              | 8  |
| 75  | P              | 7  |
| 76  | R              | 14 |
| 77  | S              | 12 |
| 78  | n              | 11 |
| 79  | S              | 12 |
| 80  | S              | 12 |
|     | Melody Group 7 |    |
| 81  | n              | 10 |
| 82  | d              | 8  |
| 83  | P              | 7  |
| 84  | M              | 5  |
| 85  | P              | 7  |
| 86  | G              | 3  |
| 87  | M              | 5  |
| 88  | P              | 7  |
| 89  | P              | 7  |
| 90  | P              | 7  |
| 91  | P              | 7  |
| 92  | D              | 9  |
| 93  | n              | 10 |
| 94  | D              | 9  |
| 95  | n              | 10 |
|     | Melody Group 8 |    |
| 96  | S              | 12 |
| 97  | n              | 10 |
| 98  | D              | 9  |
| 99  | P              | 7  |
| 100 | M              | 5  |
| 101 | P              | 7  |
| 102 | P              | 7  |
| 103 | D              | 9  |
| 104 | S              | 12 |
| 105 | d              | 8  |
| 106 | P              | 7  |
| 107 | R              | 14 |
| 108 | S              | 12 |
|     | Melody Group 9 |    |
| 109 | n              | 10 |
| 110 | d              | 8  |
| 111 | P              | 7  |
| 112 | R              | 14 |
| 113 | R              | 14 |
| 114 | R              | 14 |
| 115 | R              | 14 |
| 116 | M              | 17 |

|     |                     |    |
|-----|---------------------|----|
| 117 | <b>g</b>            | 15 |
| 118 | <b>R</b>            | 14 |
| 119 | <b>S</b>            | 12 |
| 120 | n                   | 10 |
| 121 | <b>S</b>            | 12 |
| 122 | <b>R</b>            | 14 |
| 123 | <b>S</b>            | 12 |
| 124 | Melody Group10<br>D | 9  |
| 125 | n                   | 10 |
| 126 | P                   | 7  |
| 127 | <b>S</b>            | 12 |
| 128 | <b>S</b>            | 12 |
| 129 | <b>S</b>            | 12 |
| 130 | D                   | 9  |
| 131 | n                   | 10 |
| 132 | D                   | 9  |
| 133 | P                   | 7  |
| 134 | D                   | 9  |
| 135 | M                   | 5  |
| 136 | P                   | 7  |

Our analysis is summarized in tables 3-8 and thereafter in tables 9A, 9B and fig. 1-2.

**Table 3: Similarity between melody groups of equal length**

| <u>Melody Groups</u> | <u>Correlation coefficient</u> |
|----------------------|--------------------------------|
| 1 3                  | 1                              |
| 2 4                  | 1                              |
| 5 6                  | 0.261                          |
| 6 8                  | 0.429                          |
| 5 8                  | 0.312                          |
| 7 9                  | -0.144                         |
| 5 10                 | 0.324                          |
| 6 10                 | 0.192                          |
| 7 10                 | 0.419                          |

**Table 4: 3 note sequences (chorus)**

| <u>Sequence</u> | <u>occurrence</u> | <u>Significance</u> |
|-----------------|-------------------|---------------------|
| 7 14 14         | 2                 | 6                   |
| 14 14 14        | 6                 | 18                  |
| 14 14 15        | 2                 | 6                   |
| 14 15 14        | 2                 | 6                   |
| 15 14 12        | 2                 | 6                   |
| 14 12 10        | 2                 | 6                   |

|          |   |   |
|----------|---|---|
| 12 10 12 | 2 | 6 |
| 10 12 14 | 2 | 6 |
| 12 14 12 | 2 | 6 |
| 14 12 12 | 2 | 6 |
| 12 12 10 | 2 | 6 |
| 12 10 7  | 2 | 6 |
| 10 7 7   | 2 | 6 |
| 7 7 12   | 2 | 6 |
| 7 12 12  | 2 | 6 |
| 12 12 12 | 2 | 6 |

**Table 5: 4 note sequences (chorus)**

| <u>Sequence</u> | <u>occurrence</u> | <u>Significance</u> |
|-----------------|-------------------|---------------------|
|                 |                   |                     |
| 10 9 7 9        | 2                 | 8                   |
| 9 7 9 5         | 2                 | 8                   |
| 7 9 5 7         | 2                 | 8                   |

**Table 6: 3 note sequences (stanza)**

| <u>Sequence</u> | <u>occurrence</u> | <u>Significance</u> |
|-----------------|-------------------|---------------------|
|                 |                   |                     |
| 5 7 3           | 2                 | 6                   |
| 7 3 5           | 2                 | 6                   |
| 3 5 7           | 2                 | 6                   |
| 5 7 7           | 3                 | 9                   |
| 7 7 7           | 3                 | 9                   |
| 7 7 9           | 3                 | 9                   |
| 7 9 10          | 2                 | 6                   |
| 9 10 9          | 3                 | 9                   |
| 10 9 10         | 2                 | 6                   |
| 9 10 12         | 2                 | 6                   |
| 10 12 10        | 2                 | 6                   |
| 12 10 9         | 2                 | 6                   |
| 10 9 7          | 3                 | 9                   |
| 9 7 5           | 2                 | 6                   |
| 7 5 7           | 3                 | 9                   |
| 12 8 7          | 2                 | 6                   |
| 8 7 14          | 2                 | 6                   |
| 7 14 12         | 2                 | 6                   |
| 12 10 8         | 2                 | 6                   |
| 10 8 7          | 2                 | 6                   |
| 14 12 10        | 2                 | 6                   |
| 14 14 14        | 2                 | 6                   |
| 12 9 10         | 2                 | 6                   |

**Table 7: 4 note sequences (stanza)**

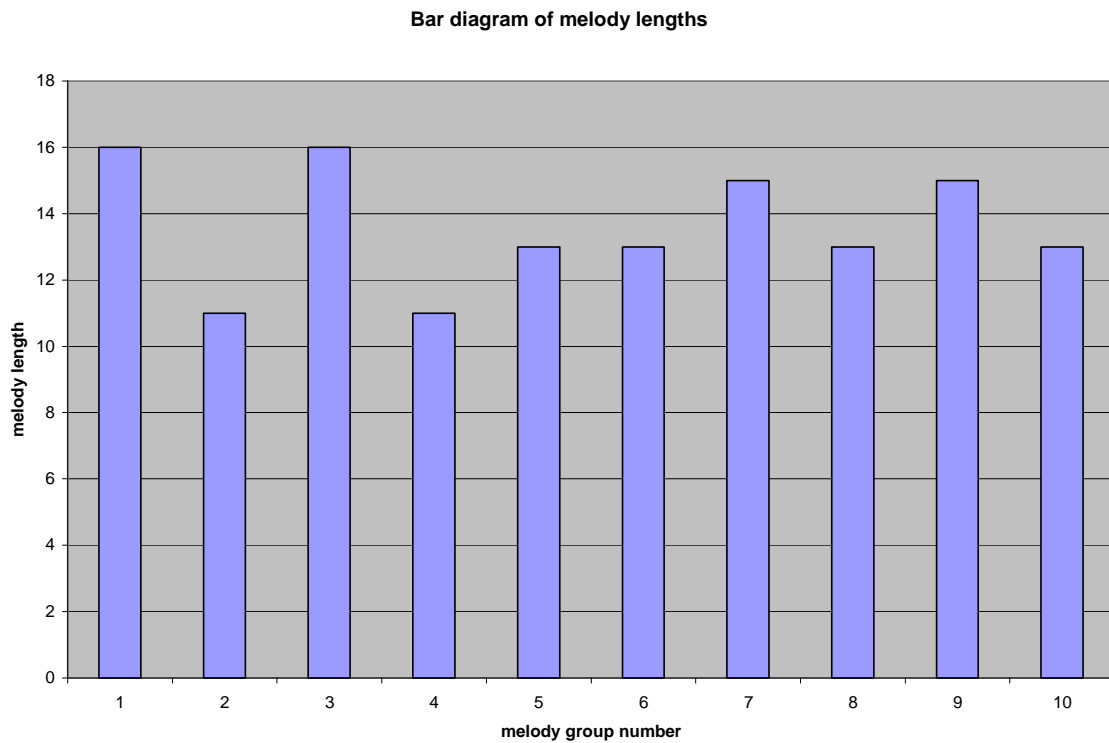
| <u>Sequence</u> | <u>occurrence</u> | <u>Significance</u> |
|-----------------|-------------------|---------------------|
| 5 7 3 5         | 2                 | 8                   |
| 7 3 5 7         | 2                 | 8                   |
| 3 5 7 7         | 2                 | 8                   |
| 5 7 7 7         | 2                 | 8                   |
| 7 7 7 9         | 2                 | 8                   |
| 7 7 9 10        | 2                 | 8                   |
| 7 9 10 9        | 2                 | 8                   |
| 9 10 9 10       | 2                 | 8                   |
| 10 9 10 12      | 2                 | 8                   |
| 9 10 12 10      | 2                 | 8                   |
| 10 12 10 9      | 2                 | 8                   |
| 12 10 9 7       | 2                 | 8                   |
| 10 9 7 5        | 2                 | 8                   |
| 9 7 5 7         | 2                 | 8                   |
| 12 8 7 14       | 2                 | 8                   |
| 8 7 14 12       | 2                 | 8                   |
| 12 10 8 7       | 2                 | 8                   |
|                 |                   |                     |

**Table 8: Significance of the melody groups in the song**

| <u>Group number</u> | <u>Significance</u> |
|---------------------|---------------------|
| 1                   | 16                  |
| 2                   | 11                  |
| 3                   | 16                  |
| 4                   | 11                  |
| 5                   | 13                  |
| 6                   | 13                  |
| 7                   | 15                  |
| 8                   | 13                  |
| 9                   | 15                  |
| 10                  | 13                  |

**Mean melody length: 13.6; standard deviation: 1.74;  $m_3=-0.23$  (-ve skewness);  $m_4=16.6$ ;  $\beta_1=0.003$ ;  $\beta_2= 1.8$ . Fig. 1 gives a bar diagram of melody lengths.**





**Fig 1: Bar diagram of melody lengths**

Simple exponential smoothing was tried to capture the sequence of notes of the song. Simple exponential smoothing is achieved by the model

$$F_{t+1} = \alpha Y_t + (1-\alpha)F_t, 0 < \alpha < 1, \text{ to the data } (t, Y_t) \text{ where } F_t \text{ is the predicted against } Y_t \text{ and initially } F_0 = Y_0$$

Fig. 2 gives a graphical comparison of the observed and the predicted values of  $Y_t$ . The SPSS statistical software examined different exponential smoothing based on different values of  $\alpha$  (damping factor) and produced the one which it found to be the best. Q(18) in table 9A is only a notation of Box-Ljung test up to the 18-th lag which follows a Chi-Square distribution [6].

**Time Series Modeler (SPSS statistical package used; version 16.0)**

**Model Summary: Tables 9A and 9B**

| Model Fit statistics |       |        |       |         |       | Ljung-Box Q(18) |    |      |
|----------------------|-------|--------|-------|---------|-------|-----------------|----|------|
| R-squared            | RMSE  | MAPE   | MAE   | MaxAPE  | MaxAE | Statistics      | DF | Sig. |
| .404                 | 2.328 | 21.316 | 1.828 | 120.925 | 7.083 | 20.574          | 17 | .246 |

**Exponential Smoothing Model Parameters**

| Model  | Estimate | SE   | t     | Sig. |
|--|----------|------|-------|------|
| VAR00001-Model_1    No Transformation    Alpha (Level) | .699     | .079 | 8.800 | .000 |

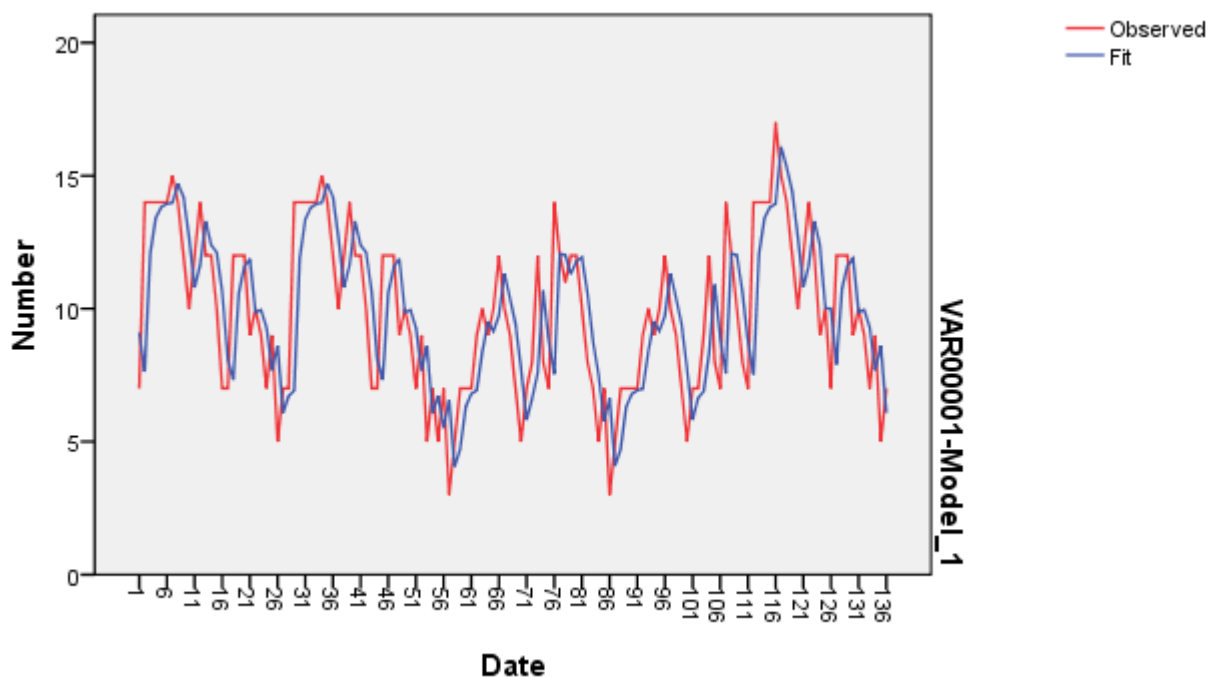


Fig. 2: Graphical comparison of observed and predicted values of  $Y_t$  for Simple Exponential Smoothing

### 3. Conclusion and future works

As Beran and Mazzola [7] have rightly put it, there is no unique way of analyzing a musical structure or performance stressing the role of statistics in modeling, melody and rhythm analysis. Our paper clearly brings out the role statistics can play in analyzing a song. Although we did not analyze the lyricist or the singer's recorded performances, the results tell us something very general about the song structurally. If we went for performance data, we could additionally provide an inter-onset interval graph depicting the rhythmic properties of notes in the song. But these graphs would vary from one performance to another. Readers interested in performance data analysis are referred to [8]. Rhythmic and melodic properties of notes can also be studied using RUBATO. Chakraborty, Solanki, Roy, Tripathy and Mazzola [9] have given the first use of this software in north Indian music.

The present paper analyzes a raga-based song and not the raga itself. Being a song it comes under composite art. From a critical angle, composite art is very valuable in that

- (1) one can intuitively guess that those songs must be the coveted ones where the strength of composite art is fully realized: that is to say, the three categories of contributions (as mentioned in the introduction) are all lucid (the present song easily fits)
- (2) Distributing credits among the three different categories is accepted as an imbroglio by music critics.

As a final comment, we raise the question “*What % of a raga is contained in a song?*” as an open research problem demanding an in-depth statistical investigation.

Here we feel it important to distinguish a *raga* with a *raga*-based song in Indian music. While purity apart from pleasantness is crucial in a raga rendition, *hiding the raga is what beautifies a song* [3]. In most of the raga based songs, the ragas are not maintained correctly. But the role of these pleasant songs in promoting Indian classical music among laymen cannot be denied and this argument is especially true for film music. Secondly, in classical music, the stress is more on the

depth and seriousness. Light music is more *interesting* than serious (this difference between serious and interesting is somewhat similar to that between a research paper and a popular science article on the same topic). It is to be understood, however, that in both forms of music the ear-brain coordination plays an active role. Thus, although we say "we heard a pleasant song," the decision that it was "pleasant" actually took place in the (*paralimbic* part of) the brain. [10]

In order to give this paper a sense of completeness, the "*chalan*" (melodic movement) of raga *bhairavi* is described in the appendix. Western Art music (WAM) readers new to Indian music are referred to [11].

#### APPENDIX: Raga Bhairavi

Here is Rajan P. Parrikar's description of raga *bhairavi* (reproduced with permission from <http://www.sawf.org/newedit/edit05132002/musicarts.asp>). Parrikar is a recognized expert in Indian classical music.

"Our voyages in the ocean of Raga have connected us with worlds both familiar and alien. We now stand in sight of what shall mark our *terminus ad quem* - Raga Bhairavi. A synoptic account of this melody, universally prescribed for ringing down the curtain on a Hindustani mehfil, makes for the final chapter of these chronicles.

The word "Bhairavi" derives from one of the eight forms of the Devi, born in the burial grounds. So fanatically loved and widely embraced is Raga Bhairavi that its elemental imprint is firmly fixed in the mind of even the untutored Indian rasika. Bhairavi is also one of the ten fundamental Hindustani thATs proposed by the great sangeetaggya Pandit Vishnu Narayan Bhatkhande. Its swara-set hews to the 8th Carnatic melakartA, Hanumatodi (**M**=shuddha and **m**=teevra madhyam): **S r g M P d n**.

Although Bhairavi is a major league Raga, it stands apart from other Ragas of like stature in one important way: its use of all 12 swaras, a signal feature of the Bhairavi praxis. The five vivAdi swaras that are not members of the original set are implemented judiciously, without injury to the basic Raga-swaroopa. In this latter form the melody so instantiated is often termed "Mishra Bhairavi." Dhrupad and Dhamar compositions abound in Bhairavi. Khayal treatment is usually dispensed through druta compositions. Bhairavi finds extensive application in auxiliary genres such as Tarana, Tappa and Thumri. Vilambit Khayal presentations are extremely rare although such compositions have been conceived (eg. S.N. Ratanjankar). Outside the Classical realm proper, it is well-nigh impossible to tread without frequent run-ins with Bhairavi: it thickly inhabits every conceivable Indian musical form - Bhajan, Geet, Ghazal, Qawwali, Natyasangeet, Rabby Shongheet and so on.

The central Bhairavi themes will be first sketched followed by a brief discussion of the normative variations. Clearly, much detail will be left unwritten. The curious student will have opportunities aplenty to partake of the minutiae at the accompanying audio banquet.

The driving phrases of the poorvAnga are:

**S n' S r g M [g] r S**

The square brackets on the *gandhAr* denote a shake of that swara that is sui generis to Bhairavi. This cluster, if properly intoned, at once precipitates the essence of Bhairavi.

**g M d P, d P M P (M)g, M (g)r S**

The rishab and/or the pancham are often skipped in Arohi prayogas, viz.,

## **n' S g M d P**

The uttarAnga forays are launched via: **g M d n S''**

This cluster is very Malkauns-like. Since Bhairavi is a sampoorNa Raga, straight ("sapAT") runs of the **S r g M P d n S''** kind are frequently admitted. A more complete sentence is: **g M d n S'', d n S'' r'' n S'' (n)d P**

Stitching together these elemental patches, a chalan of the 'shuddha' swaroopa of Bhairavi is formulated:

**S n S g M d P, (M)g M P d M P (M)g, d' n' S r [g] r S**  
**g M d n S'', S'' r'' n S'' (n)d P, d P M P (M)g, S r g M, (g)r S**

The typical modus operandi for each the five vivAdi swaras is now outlined.

### **Shuddha rishab:**

Arohi: **S, d' n' S R [g] r S**

Avarohi: **P, d P M P (M)g R g, r S**

This vivAdi **R** is frequently invoked.

### **Shuddha dhaivat: g M P d P, D n d P**

### **Teevra madhyam: P d M P (M)g, g M m g r S**

### **Shuddha nishAd: S, r N' S, d' n' S r [g] r S r N' S**

### **Shuddha gandhAr: S r g M, M G M, S r G r S**

The shuddha gandhAr is the odd one out and does not lend itself to as good a fit in the aesthetic landscape of Bhairavi.

The nyAsa swaras are **S, g** and **P**; in addition, **M** and **d** are often sought for elongation. As to the vAdi no consensus prevails. Traditionally, **M** has been considered for the role but in recent times the accent has shifted to other swaras. For instance, Jha-sahab argues in his classic volumes of **Abhinava Geetanjali** that **d** and **G** are the vAdi and samvAdi, respectively. These differences in outlook and interpretation notwithstanding, there is no mistaking the core of Bhairavi.

A variation known as Sindhu Bhairavi retains all the mannerisms of the parent Bhairavi with the rishab augmented to its shuddha shade. These days Sindhu Bhairavi is sung with both the rishabs and both the dhaivats. Then there are other variants such as Jangla Bhairavi, Kasuri Bhairavi and such like. These are relatively minor offshoots originating from the Bhairavi stem; I prefer to locate them all under the "Mishra Bhairavi" rubric.

This just about completes the prolegomenon concerning Bhairavi's internal matters. The Raga affords a wide compass for rumination and numerous melodic templates with which to direct and develop its motif have evolved.

**Obiter dictum:** The profoundly significant Raga Bilaskhani Todi is carved out of swaras from the Bhairavi campus. The kinship ends there, for Bilaskhani Todi is a horse of an entirely different colour with its special prayogas, its Todi-anga ucchAraNa and its meeNDs. A step into Bhairavi territory may deal the kiss of death to Bilaskhani."

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