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SAGGI

An interesting comparison between a morning raga with an evening one using graphical statistics

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§ Ragas in Indian classical music are suitable for rendition at specific time periods. There are some exceptions though such as *Bhairavi* which fit at any time of the day. Such exceptions are called *Sadabahaar* ragas. The present paper makes an interesting comparison between a morning raga (*Ahir Bhairav*) with an evening raga (*Yaman*) using graphical statistics.

§ Nella musica classica indiana l'esecuzione di un *raga* è destinata a un preciso momento della giornata. Il *Bhairavi* invece appartiene a un gruppo di *raga*, chiamati *Sadabahaar*, che possono essere eseguiti in qualsiasi momento. Il contributo presenta un interessante confronto tra un *raga* del mattino (*Ahir Bhairav*) e un *raga* della sera (*Yaman*) da un punto di vista statistico.

Introduction

Ragas in Indian classical music are suitable for rendition at specific time periods.[1, 2] According to Kumar Prasad Mukherji, a well known musicologist, the idea of rendering a raga at a designated time is credited to Bishnu Narayan Bhatkhande and it is fascinating to know that the concept is as old as 1920! A highly appreciated book by Mukherji is *The lost World of Hindustani Music*.[3] There are some exceptions though such as *Bhairavi* which fit at any time of the day. Such exceptions are called *Sadabahaar* ragas. The present paper makes an interesting comparison between a morning raga (*Ahir Bhairav*) with an evening raga (*Yaman*), using primarily graphical statistics, based on two vocal recordings each of one minute duration by the same artist (*Sa* set to natural C) and recorded in the Laptop at 44.100 KHz, 16 bit mono, 86 kb/sec mode. We first describe the fundamental musical features of these two ragas before moving to the analysis part (Table 1).

Table 1. Fundamental musical features of raga *Yaman* and raga *Ahir Bhairav*.

	Raga *Yaman**	**Raga *Ahir Bhairav***
Thaat (a specific way of grouping ragas)	*Kalyan*	Not specific, generally taken as *Mishra Bhairav*
Aroh (ascent)	*N* R G m P D N **S**	S r G M P D n **S**
Awaroh (descent)	**S** N D P m G R S	**S** n D P M G r S
Jati	Sampooorna-Sampoorna**	
Vadi Swar (most important note)	G	M
Samvadi Swar (second most important note)	N	S
Prakriti (nature)	Restful	
Pakad (catch)	*N* R G R *N* R S	S r G M G M r *n D n* r S
Nyas Swar (Stay notes)	R G N P	M and S
Time of rendition	*First phase of night (6 PM to 9 PM)*	*Morning*

**Amir Khusru created this raga.*
***Seven distinct notes allowed in ascent and descent; however, since there are only 12 possible notes, some notes have to be common between ascent and descent.*

[1] SCHMIDT-JONES (August 8, 2008).

[2] CHAKRABORTY *et al.* (October 25, 2008).

[3] MUKHERJI (2006).

S	R	G	M	P	D	N
Sa (always Sudh)	Sudh Re	Sudh Ga	Sudh Ma	Pa (always Sudh)	Sudh Dha	Sudh Ni
	r	g	m		d	n
	Komal Re	Komal Ga	Tibra Ma		Komal Dha	Komal Ni

Normal type	note belongs to middle octave
Italic	note belongs to the octave just lower than the middle octave
Bold	note belongs to the octave just higher than the middle octave

Comparison of *Ahir Bhairav* and *Yaman* using graphical statistics

Ragas are not merely about fixed notes and typical note combinations. How these notes and note combinations are used is also important. The *Varnalankars* (musical ornaments) with which notes and note sequences are decorated can be *arohi* (ascending transition), *awarohi* (descending transition), *sanchari* (mixed transition) and *sthayi* (no transition or stay on a note). It is held that the emotions of the raga are embedded by these transitory and non-transitory pitch movements between notes.[4] *Solo Explorer 1.0* software, a wave to midi converter and an automatic music transcriber, was used extensively crosschecked by ingenious MATLAB programs to generate the relevant musical features such as onset, fundamental frequency and hence pitch, notes, transitory and non-transitory pitch movements. See the two typical samples from this software one for each raga (Figure 3 and 4). This yielded Tables 2 and 3. Those knowing western music but new to Indian music are referred to *Indian Classical Music. Tuning and Ragas*[5] and the references cited therein.

Table 2. Transitory & non-transitory pitch movements for *Ahir Bhairav*.

Rising Transitions			Falling Transitions			Mixed Transitions	No Transition
12			12			07	19
Convex	*Concave*	*Linear*	*Convex*	*Concave*	*Linear*		
04	04	04	01	08	03		

Table 3. Transitory and non-transitory pitch movements for *Yaman*.

Rising Transitions			Falling Transitions			Mixed Transitions	No Transition
64			69			18	9
Convex	*Concave*	*Linear*	*Convex*	*Concave*	*Linear*		
04	08	52	12	16	41		

[4] CHAKRABORTY *et al.* (October 25, 2008).

[5] SCHMIDT-JONES (August 8, 2008).

Interpretation

The rising and falling transitions are equal for *Ahir Bhairav*. They are also nearly equal for *Yaman*. We conclude that these two ragas cannot be classified as *Arohi* or *Awarohi varna* ragas as the tendency to ascend and the tendency to descend are equal. However, these transitions for *Yaman* are remarkably higher than the corresponding transitions in *Ahir Bhairav*. This suggests that although both the ragas are of restful nature, the evening raga *Yaman* is comparatively less restful than the morning raga *Ahir Bhairav*. It can be argued that we expect some movement in the evening and peace in the morning. Thus this finding could be valuable if it can be taken to objectively suggest that one raga is a morning raga and the other one is not! This claim is further supported by the finding that the non-transitory movements in *Ahir Bhairav* are about twice those of *Yaman* indicating more stay on the notes in the former.

Notice that most of the rising and falling transitions in *Yaman* are linear whereas in *Ahir Bhairav*, the falling transitions are mostly concave while the rising transitions are uniformly distributed as linear, convex and concave. This suggests that the notes were rendered in a straighter manner and not much in the form of a glide (*meend*) in *Yaman*.

Mixed transitory movements are more in *Yaman* again suggesting less restful nature.

Non-transitory movements are about twice in *Ahir Bhairav* compared to that in *Yaman* indicating greater stay on the notes. This is expected in a morning raga as morning is more peaceful than evening. See also Figures 1 and 2 for confirmation of this fact from another angle.

Remark

We also made a count of hats (shaped roughly as « ^ ») and valleys (shaped roughly as « V ») but their musical meaningfulness is under investigation. We next provide the inter onset interval (difference between two successive onset times) graphs for *Ahir Bhairav* and *Yaman* respectively (Figures 1 and 2). *Notes are said to be in rhythm if the inter onset interval times are equal.*

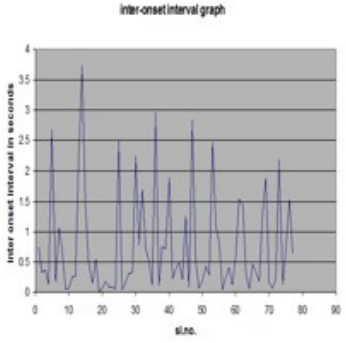

Figure 1.
Ahir Bhairav inter onset interval graph.

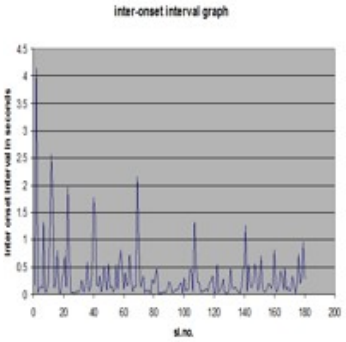

Figure 2.
Yaman inter onset interval graph.

Interpretation

The level of the peaks in Figure 2 are more along a horizontal line for *Yaman* indicating more rhythmic properties among notes probably because the artist rendered a *bandish* (gut composition) after a brief *alaap* (introductory description of the raga). However, the heights of the peaks for *Ahir Bhairav* in Figure 1 are certainly greater indicating greater stay on notes confirming previous finding depicting peace expected in a morning raga.

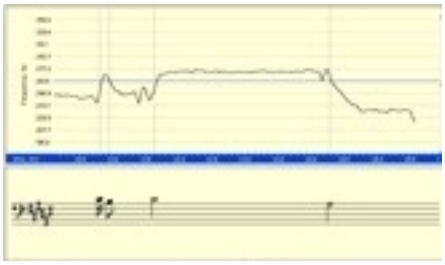

Figure 3.
Solo Explorer sample for *Ahir Bhairav*.

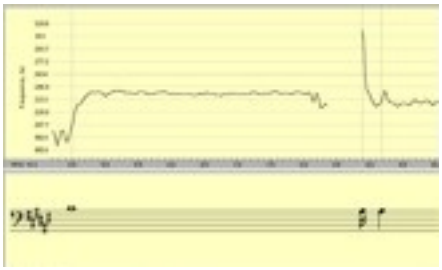

Figure 4.
Solo Explorer sample for *Yaman*.

Audio sample: raga *Yaman* and raga *Ahir Bhairav*.

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Conclusion

Although our aesthetic sense in relating ragas to different time periods of the day is important, they are also subjective. The strength of graphical statistics as an objective tool for the purpose cannot be thrown away especially *if the listener cannot hear but can see*. We strongly emphasize music teachers to use this and similar strategies for such handicapped group of listeners.

Bibliography

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