AN ANALYSIS OF THYAGRAJA KRITIS IN KALYANI

Sudha and Padmalata

A reference to *Kritis of Thyagaraja* (1968))[1] shows that there are 21 *kritis* in Kalyani for which some details are available. They are:

1	*Amma Ravamma*	*Jhampa*
2	*Endukonee manasu*	*Adi*
3	*Etavunara*	*Adi*
4	*Evaramadugudu*	*Roopaka*
5	*Kamalabhavudu*	*Chapu*
6	*Karuvelpulu*	*Adi*
7	*Sundari needivya*	*Adi*
8	*Sive pahimam*	*Adi*
9	*Bhajana seyave*	*Roopaka*
10	*Nidhi chala sukhama*	*Chapu*
11	*Vasudevayani*	*Adi*
12	*Nammivachchina*	*Roopaka*
13	*Sandehamuela*	*Roopaka*
14	*Eespahimam*	*Roopaka*
15	*Ninnanavalesina*	*Chapu*
16	*Rama neevadu*	*Adi*
17	*Rama rama rama*	*Chapu*
18	*Vachchunhari*	*Adi*
19	*Bhajare raghu*	*Adi*
20	*Evidhamu*	*Adi*
21	*Mandagamana*	*Adi*

The song *Evidhamu* (20 above) is listed only in Chinaswamy Mudaliar's[2] book and in no other. The song *Mandagamana* (21) is listed under

Nalinakanti raga in Vissa Appa Rao[3], Raghavan[4] and Rangaramanuja Ayyangar[5]. *Hence our analysis pertains only to the first* 19 *songs.*

Some Changes

The song *Evaramadugudu* (*Roopaka*) is listed as in *Adi* by Appa Rao. The songs *Kamala bhavudu, Nidhi chala, Ninnanavalesina, Rama rama rama* are listed as in *Triputa* although they were first listed under *Chapu.* Three of the songs—*Vasudevayani, Kamala-bhavudu* and *Vachunu hari* are part of the opera *Prahlada Bhakti Vijayam. Sundari nee divya roopamu* was sung at Tiruvotriyur, *Sivepahimama* at Tiruvaiyaru and *Eesa pahimam* at Lalgudi.

Nine of these are in *Adi,* while five as in *Roopaka* and four are in *Triputa talas.* There is only one *kriti* in *Jhampa.* All the songs are only in Telugu—even though Tyagaraja has composed a few songs in Sanskrit also.

Only two songs have one *pallavi* and *samasti charanams* (*Rama rama rama* and *Bhajare raghu veeram*). All the others have all the three adjuncts of a *kriti.* There are six songs with only one *charanam* while the rest of the eleven songs have between 3 and 6 *charanams.*

Eduppu: For 8 songs the *eduppu* or the beginning is of the *sama* type, the *raga* and *tala* beginning simultaneously. For the rest, there is *vishama eduppu,* the *tala* beginning first and the song later. There is no song of the type of *anaagatha eduppu.* All *Triputa tala kritis* belong to *ateeta eduppu* only.

Choice of Raga Kalyani

We have been interested in trying to see whether it would be possible to give a new definition for a *raga*—rather a mathematical one—or an expression in a mathematical setting. There have been plenty of definitions for a *raga* and schemes of classification—the most widely known being the 72 *melakarta* scheme. Recently attempts have been made to use modern scientific techniques to start a more sophisticated scheme of *raga* classification and Chaitanya Deva[6] may said to have broken new ground in this direction. We too have adopted some of these techniques in two of our papers (Gift Siromoney[7] and Rajagopalan[8]).

To define or delineate a *raga,* one has to go to the *svaras* which comprise the *raga.* It is granted that the *svaras* by themselves do not give the *raga*—but only when sung in proper combination. If there is complete freedom in the choice of the *svaras,* the singing of the *svaras* could be as independent as the throwing of a dice—where you could get any particular number at any particular stage. In a *raga* there are some restrictions regarding the way *svara*-patterns are formed and so there is less freedom in one *svara* following another.

Hence the analysis of any *raga* has to start basically with its *arohana* and *avarohana svaras.* The best thing would be to take *melakarta raga* as

these have the largest (seven) possible *svaras*. Also, we avoid one single *svara* occurring either in *arohana* only or in *avarohana* only. The next requisite is that the *raga* should be "fairly well known" (and not one which is rarely heard of) so that a good number of *svara*-patterns can be got out of it. It is better to choose *ragas* like *Sankarabharanam, Todi* or *Kharaharapriya* rather than *Ratnangi, Rupavati, Pavani* or *Divyamani* (all *melakartaragas*). Since our music is tradition bound it is better to choose a *raga* which has been handled by our great *vaaggeyakaras* like Tyagaraja. The *svara*-pattern would be, to a large extent, determined by the *kritis* which are available in that *raga*. Out of all Tyagaraja *kritis* which are available in *svara*-notation, the following are more frequent than others (the numbers in brackets give the number of songs in that *raga*)—*Bhairavi* (19), *Kalyani* (21), *Sankarabharanam* (30), *Saurashtra* (21) and *Todi* (29). *Bhairavi* and *Saurashtra* being *janya ragas* were not taken up for study. They also contain accidental notes and *vakra prayogas*. This leaves us with *Sankarabharanam, Kalyani* and *Todi*. Between the first two, the only difference is the *madhyama* note and *Todi* is a *raga* which is handled almost too much in modern concerts. Hence *Kalyani* was chosen as the *raga* to be analysed.

Different musical composers have different styles of their own and their compositions show distinct *swara*-patterns as given by the application of analyses of variance techniques to *kritis* on *Madhyamavati* of the three composers who form the trinity of Karnatak music. We shall not go into this now. Also, the system of notations is equally important. Hence the songs of Tyagaraja and those that have seen set to score by Rangaramanuja Ayyangar alone are analysed. These are the nineteen songs earlier referred to.

Raga Kalyani

This is the sixtyfifth *melakarta raga*—being the fifth *raga* in the eleventh *chakra*, the classification being "*Rudra Ma*". According to the *katapayadi* formula it is referred to as *Mechakalayani*. (It was also called *Santakalyani** earlier). All the notes are of the *tivra* type or sharp. They have the following frequency ratios: (FR is the ratio of the frequency of any note to that of *Sa*)

Sa	*Ri*	*Ga*	*Ma*	*Pa*	*Dha*	*Ni*	*Sa*
1	9/8	5/4	45/32	3/2	5/3	15/8	2

The ratios are given relative to *Sa*. It is seen that except the FR for *Ma*, all the others are made of simple numbers only. Even that of *Ma* is a complex ratio only in relation to *Sa*. In singing *Kalyani raga* it is very rarely that the note *Ma* comes immediately after *Sa*—so that there is no necessity for the use of this FR. All the FRs become simple if each *svara*

* a rule for getting the number (here 65) of any *melakarta* raga by reading the first TWO letters in the name of the *raga*.

is referred to its previous *svara*. These are in order:—9/8, 10/9, 9/8, 16/15, 10/9, 9/8, 16/15. The simplicity of the FRs indicates the popularity of the *raga*.

Subtle *srutis* like *tivra antara gandhara* (81/64) and *tivra kakali nishada* (243/128) figure in some places.

It is the earliest known *pratimadhyama raga* in musical history and is met with in Hungarian music[9]. It corresponds to the *Yaman* in Hindustani music and to the Greek mode *Phrygian*[10]. There does not appear to be any Tamil *pann* corresponding to this *raga*.

Kalyani is considered to be one of the majestic *ragas* capable of affording a large scope for elaboration in *alapana*. It has been handled extensively by almost all of our famous composers. It is called a *sarvasvaragamaka varika raga* in which all the notes are fairly well distributed.

We now seek to analyse the occurrence of the various *svaras* as found in the nineteen *kritis* listed earlier.

Spectrum of each Song

The number of times each *svara* or note occurs in a song is counted and listed—due allowance being made for long notes and notes in the second or third *kala*. Then the proportions (percentages) of each of the notes for each song is found—and also the proportions for the totality of all the nineteen songs. These are listed in TABLE I. The notes have been taken from *mandra panchama* (lower pa-LP) to *tara panchama* (higher *panchama*-HP)—or two full octaves. The distribution of the *svaras* has been pictorially represented in the diagrams (called HISTOGRAMS in Statistics)—which could be referred to as the *svara* spectrum for each song. The spectrum for all the songs together is also given. The lower octave notes are written with an L-suffix and higher octave notes with a H-suffix. (Diagrams 1 to 20. See pp 11-20).

It will be seen that some songs specialise in *tara sthayi* and some in *mandra sthayi*—but there are few *sancharas* below the *Sa*.

On an average only 1.5 per cent of the notes belong to the *mandra sthayi*, while nearly a fifth of the *svaras* belong to the *tara sthayi*. This appears to be a peculiarity of the *Kalyani Raga*. There are seven songs in which practically no *mandra sthayi svaras* occur (less than 1 percent), but all songs contain at least 12% (or one eighth nearly) of *tara sthayi svaras*. The song *Etavunara* contains the smallest *tara svaras*; belonging to the same category perhaps are the songs—*Bhajana seyave*, *Nidhi chala* and *Rama neevadu*. Songs clearly classifiable as *tara sthayi kritis* are: *Rama rama rama* and *Vachchunu Hari* (greater than 30%); *Nammi vachchina*, *Sundari nee*, *Enduko nee* and *Karuvelpulu* (all greater than 25%).

Distribution of the Seven Svaras

If we ignore the *sthayi* (register) and consider only the seven notes themselves, it is seen that for all the 19 songs together, the percentages are:—19, 14, 13, 10, 16, 15 and 13 respectively: Thus *Sa* and *Pa* are the largest occurring notes (a feature common to any *raga* or song) followed closely by *Dha* and *Ri*. *Ga* and *Ni* occur comparatively in less cases and the *pratimadhyama* has the lowest percentage of 10. There are some differences when individual songs are concerned. Full details are available in TABLE II.

The percentages of the two non-variable notes (*Sa* and *Pa*) together vary between 30 to 41 percent of all the seven notes. The popular song *Vasudevayani* has 41 % of its notes as either *Sa* or *Pa*.

If there is complete freedom of occurrence of the notes, then in general, there should be nearly 14 percent of each note occurring. The most uniform of the songs is *Bhajanaseyave* (song 9) with the percentages of the notes as : 12.5, 13.9, 16.3, 13.5, 17.4, 15.0 and 11.4. Incidentally, the largest occurrence of *Ma* is only in this song (13.5). *Eesa pahimam* also has a fairly uniform pattern with the percentages as:—17.8, 11.3, 13.3, 12.7, 17.0, 14.5 and 13.4. Some of the songs in which there is one other predominant *swara* occuring are:—*Amma ravamma* (*Dha*-18 percent); *Ethavunara* (*Ri*-20 per cent); *Evaramaduguthu* (*Ri*-20 per cent); *Sive pahimam* (*Ni*-18 per cent); *Rama rama rama* (*Dha*-18 per cent) and *Vachchunu Hari* (*Ri*-19 per cent).*

Songs in which a particular note (barring *Ma*) is less than 10 per cent frequent are: *Etavunara* (*Ni*-10 per cent); *Sive pahimam* (*Ri*-7 per cent); *Rama rama rama* (*Ga*-8 per cent); *Vachchunu Hari* (*Ni*-11 per cent); *Evaramadugudu* (*Ni*-11 per cent). It is significant that whenever *Ri* is infrequent, then *Ni* is more frequent; and whenever *Ga* is infrequent *Dha* is more frequent. We do not know whether there is any musical explanation for this.

Entropy or Information

If there is absolute freedom in the occurrence of the notes we could have any note occuring after any other note. This would be just like throws of a coin wherein at any stage either head or tail may be shown up. But music does not allow such complete freedom and hence some restrictions are placed on the pattern of *svaras*. We seek a measure to mathematically assess the amount of such restriction.

We define

$$H = -\Sigma p \ (\text{ldp})$$

*Cf. B.C. Deva's concept of auto-and tele-centricity as applied to Karnatak and Hindustani *ragas* in his *Psychoacoustics*.

where p is the proportion of *each note* and *ld p* denotes the logarithm of p to the base 2. When a *raga* like *Kalyani* is concerned we take only the seven *svaras Sa, Ri, Ga, Ma, Pa, Dha, Ni* and find the proportions in each of the 19 songs and for all the songs put together. The values of H are given in TABLE III.

We recall that this is a *sarvasvara gamaka raga* and almost all the *svara's* are of good occurrence. The maximum possible value of H for a seven *svara raga* is 2.8074. So, if in a song, the value of H is near about this value, we can assert that that song has brought out the *raga* well; values of H away from this would indicate that the scope of the *raga* has not been fully utilised in that song. Judged by this criterion it would be seen that the following songs have higher values of H and hence can be taken to depict the *raga sancharas* well:—

Bhajanaseyave (2.7940), *Eesa pahi mama* (2.7908), *Bhajare, raghu* (2.7904), *Enthukini* (2.7815), *Ramaneevadu* (2.7812). Out of these at least three are not heard in ordinary concerts! Very low values of H are got for *Sivpahmam* (2.7075), *Ethavunara* (2.7180), *Karuvelpa* (2.7149), *Kamlabhavudu* (2.7376), and *Vasudevyani* (2.7376). Three of these are very popular. According to R.R. Ayyangar, the *kriti, Endukoni* is the best of all Tyagaraja's *kritis* from the point of view of majestic musical setting, a broad spectrum of the *raga* and full use of the *gamakas*. But this song, according to H criterion exploits the notes of the *raga* to a lesser extent than three other songs in *Kalyani*.

For all the songs put together, we can find a value for H by combining the *svaras* for all songs and recalculating a set of proportions of the seven *svara-s* for the *raga* as a whole. Such a value is 2.77944.*

From this one could say that in a majority of cases, the values of H should lie between the limits: 2.7682 to 2.7906. Most of the H-values are significantly different from these limits, indication of perhaps that H *should not be taken as a criterion of classification of the raga Kalyani.* But it still shows whether any particular song has brought out the full capability of the *raga* or not.

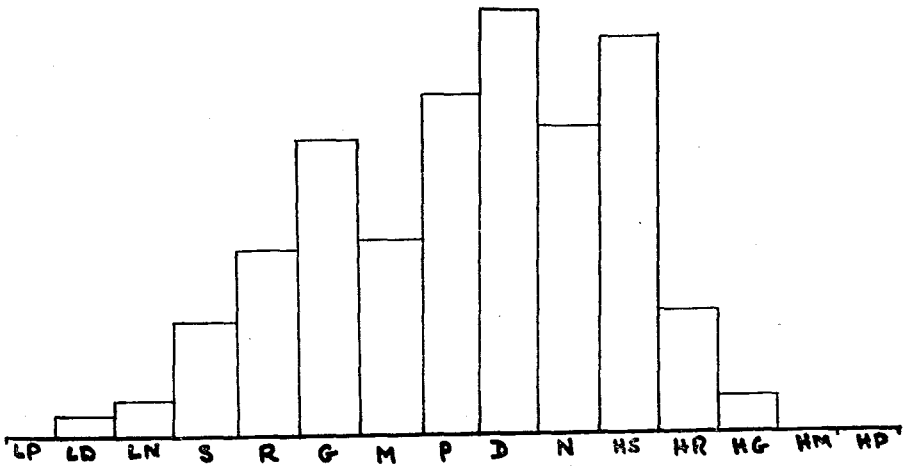
It can perhaps be used to give a numerical measure of the spectrum of each song.

Some of the songs are merely of an invocatory type—praising the deities of a particular shrine. To this category belong the songs—*Amma ravamma, Sundari nee, Sive pahi mam, Nammi vachchina* and *Eesa pahi mmam.*

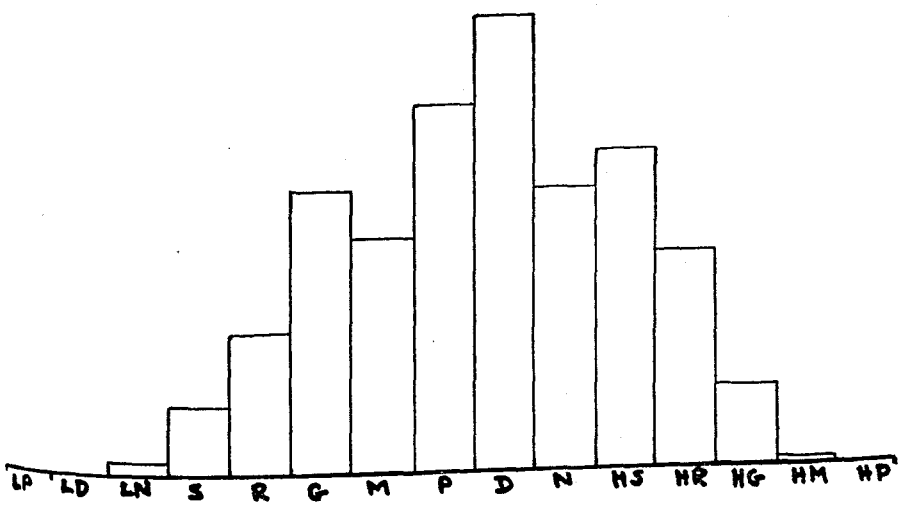
The three songs from *Prahlada Bhakti Vijayam* (*Kamalabhavudu,*

*Variance of H=0000112962. S. E. (H)=0034 using statistical theory one could assert that the individul values of H should lie between 2.77944±2 (S.E.)

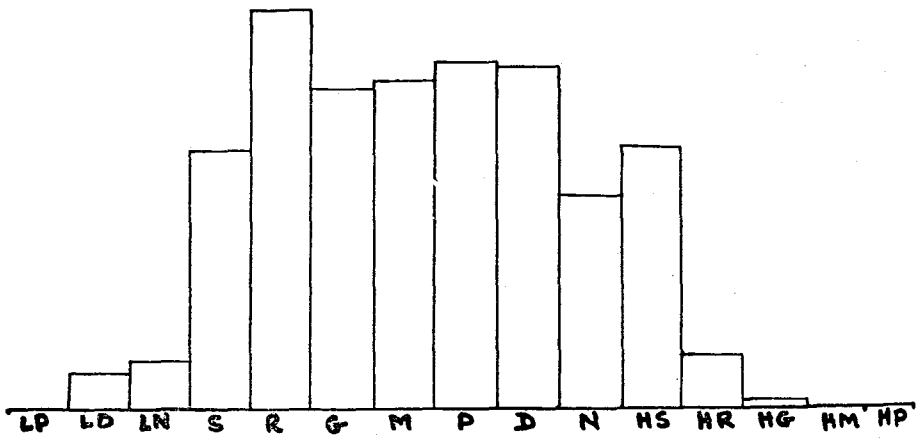
1. *Amma ravamma*



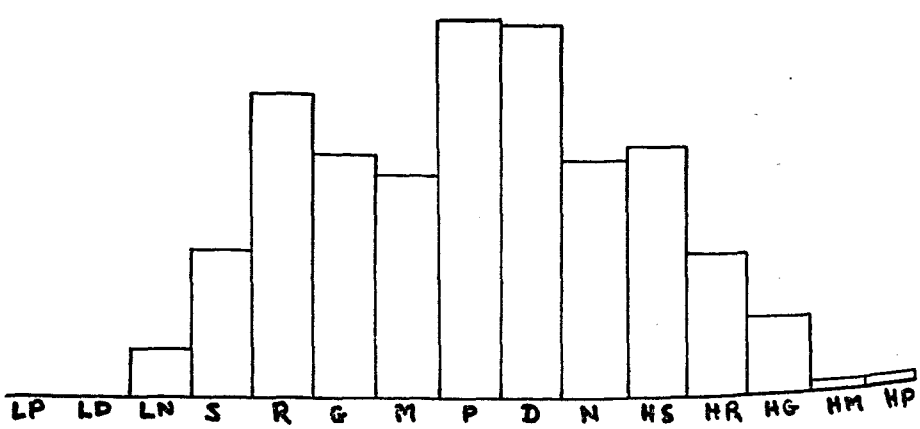
2. *Endukonee manasu*



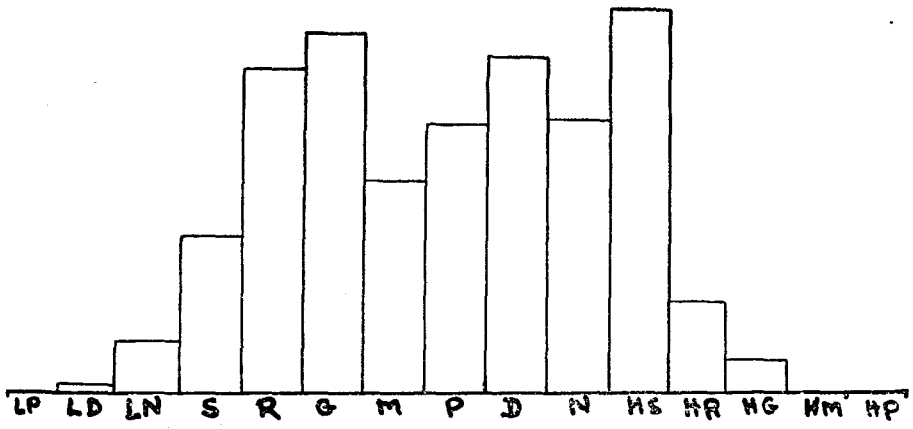
3. *Etavunara*



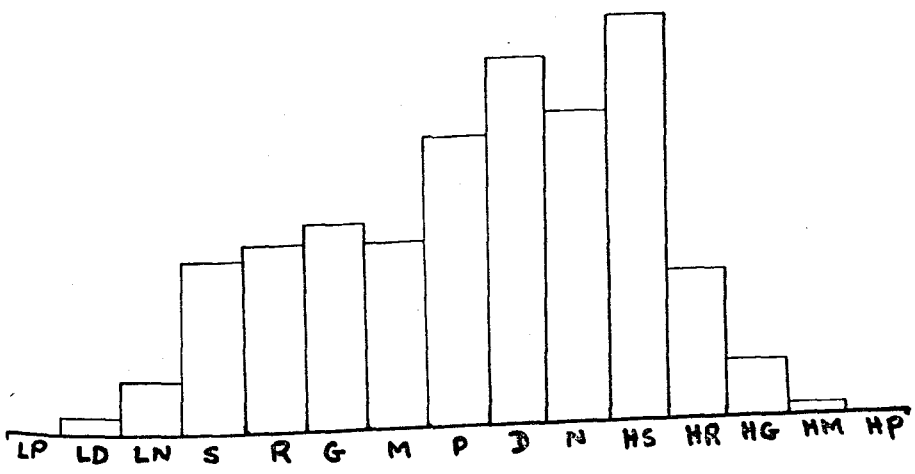
4. *Evaramadugudu*



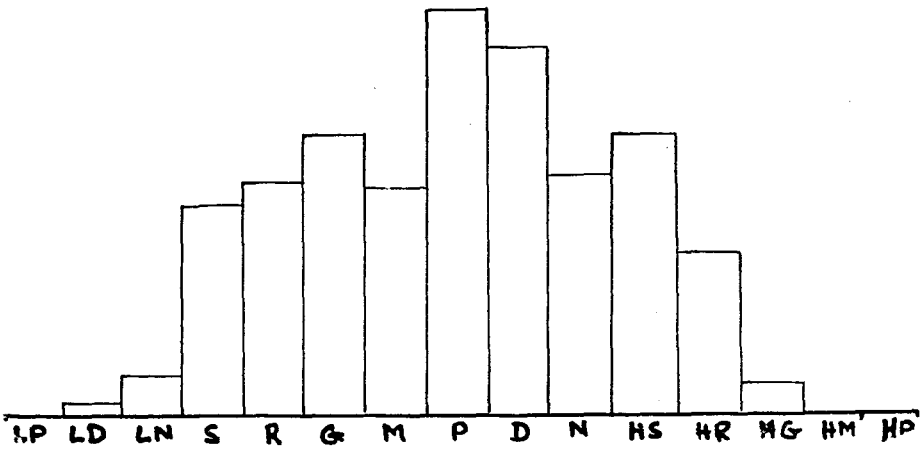
5. *Kamalabhavudu*



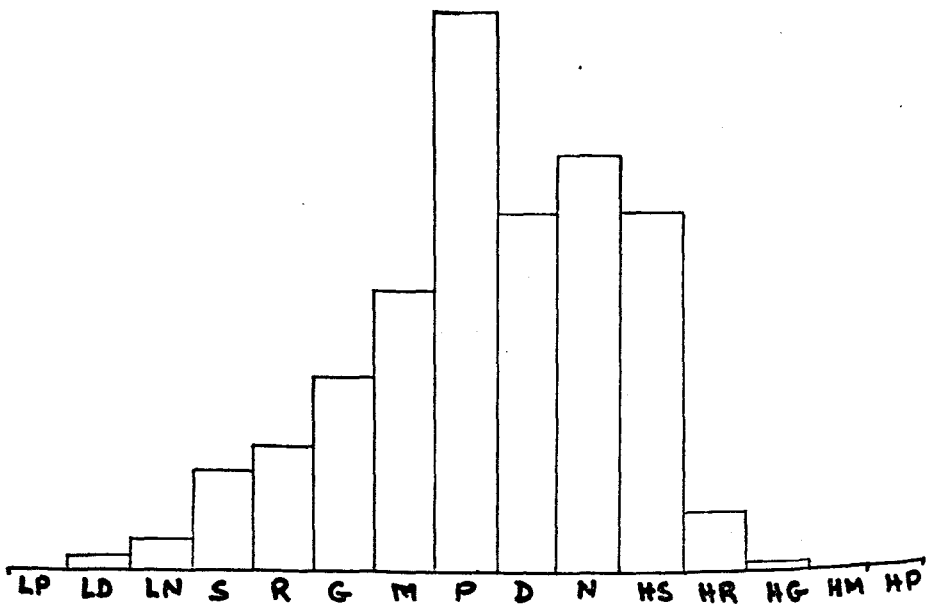
6. *Karuvelpulu*



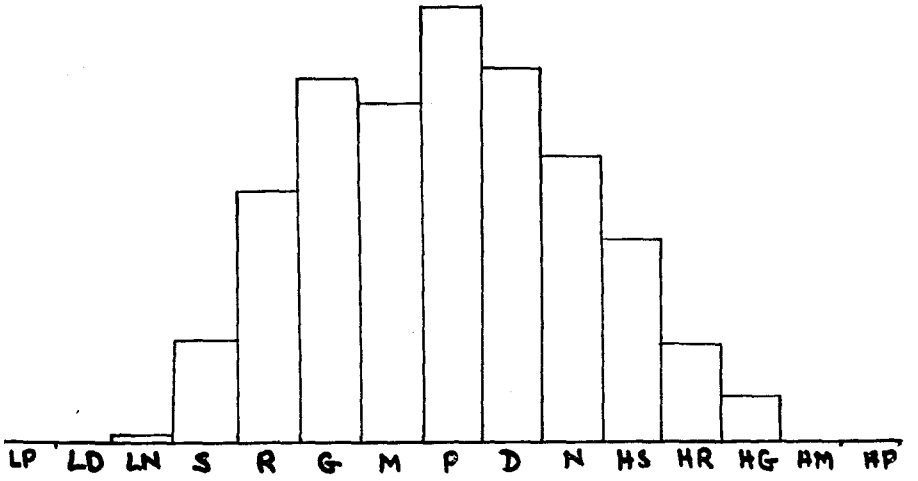
7. *Sundari needivya*



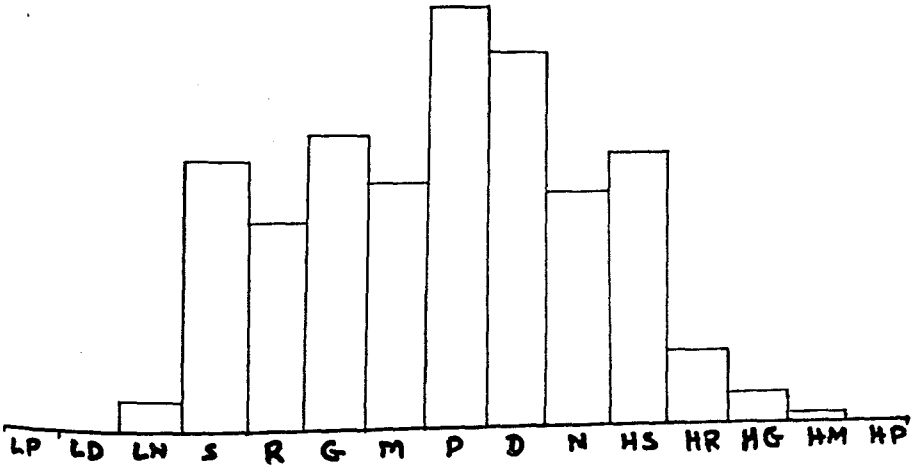
8. *Sive pahi mam*



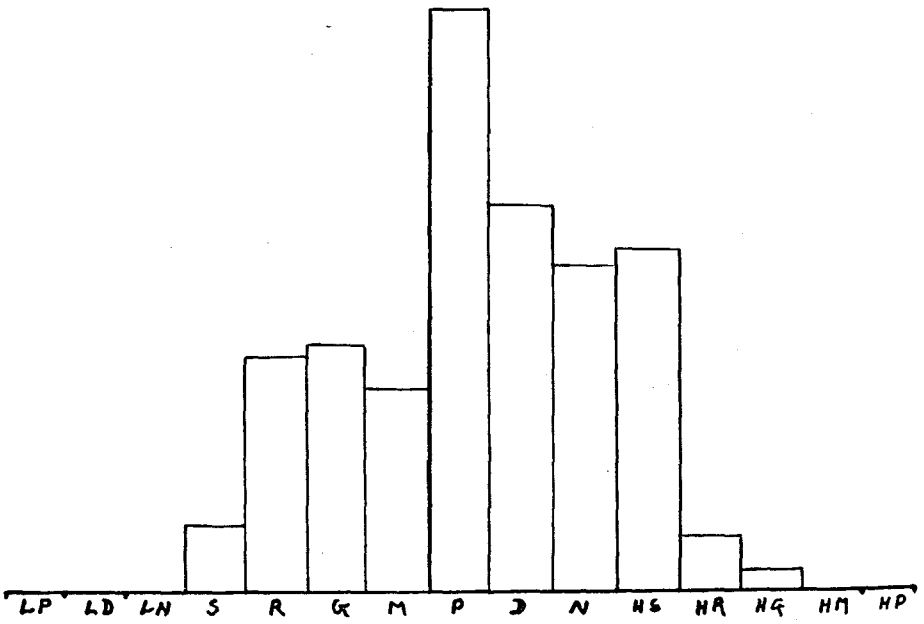
9. *Bhajaua seyave*



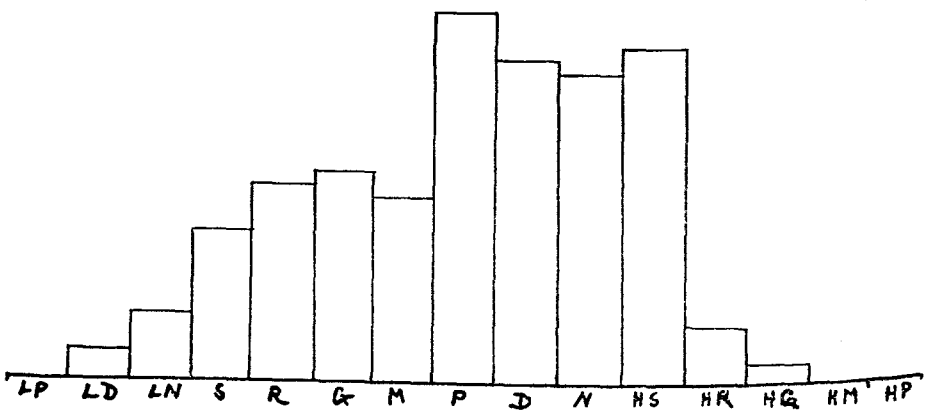
10. *Nidhi chala sukhama*



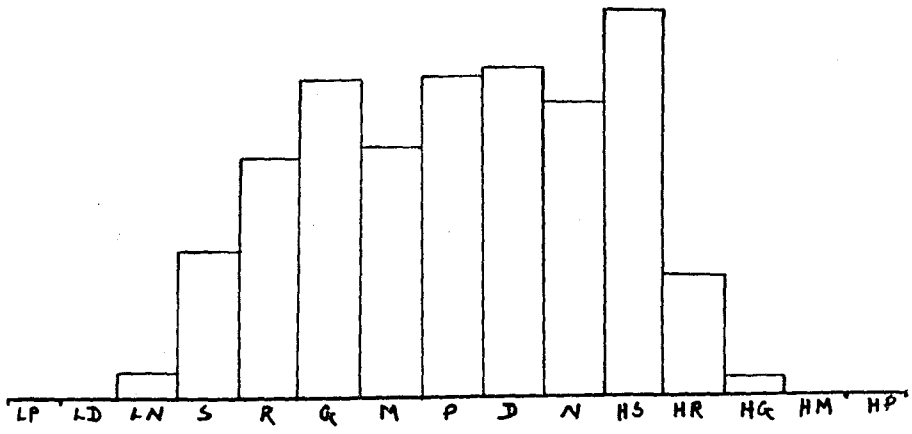
11. *Vasudeva yani*



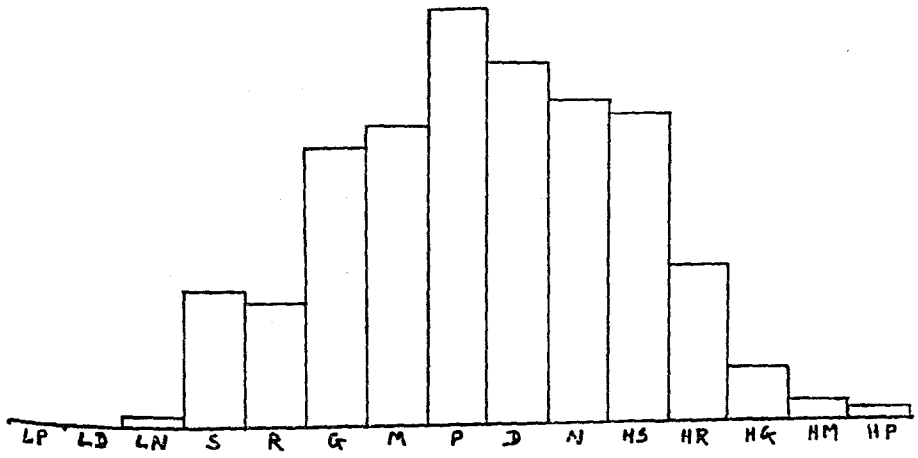
12. *Nammi vacchina*



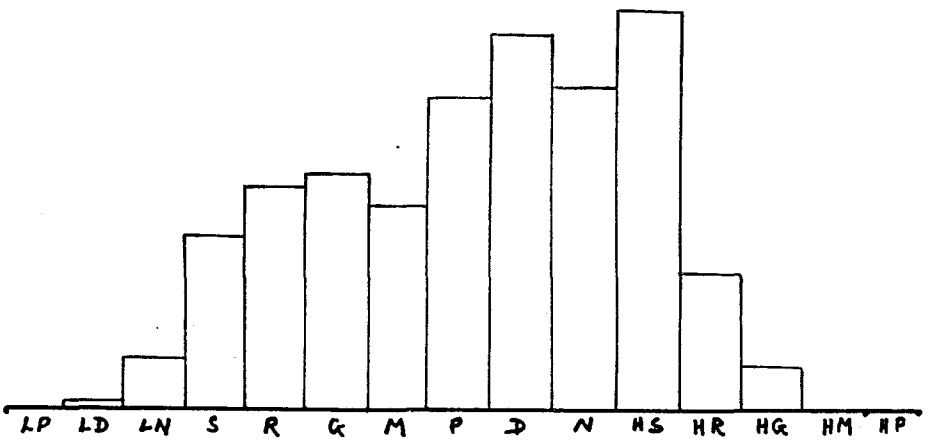
13. *Sandehamu ela*



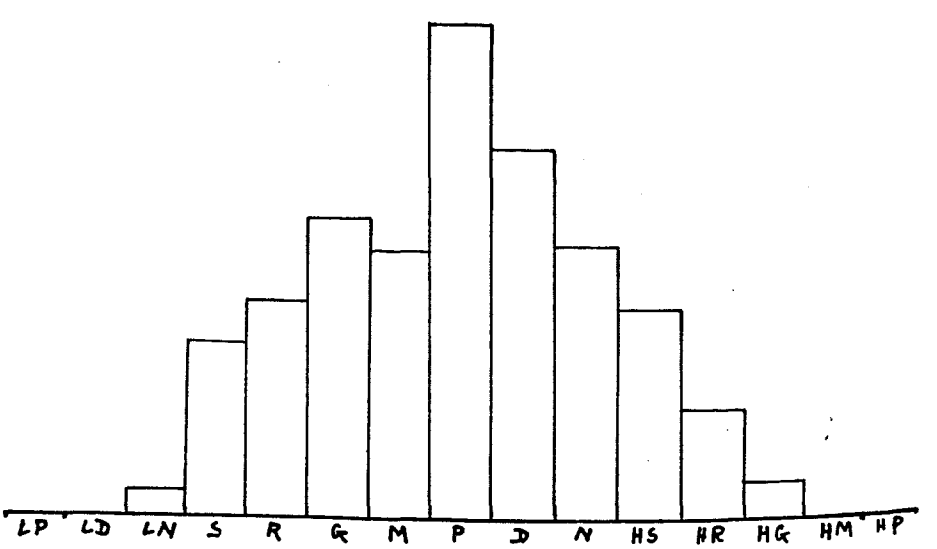
14. *Eespahimam*



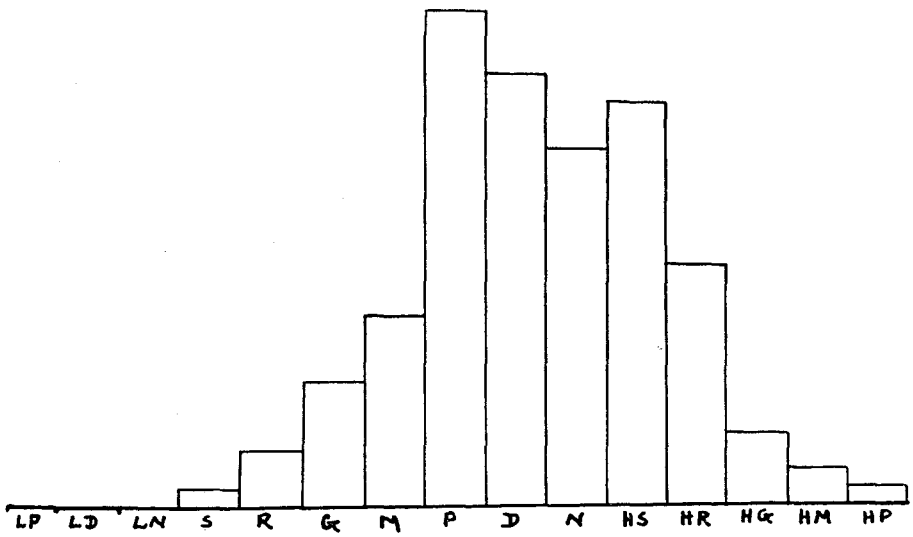
15. *Ninnanavalasina*



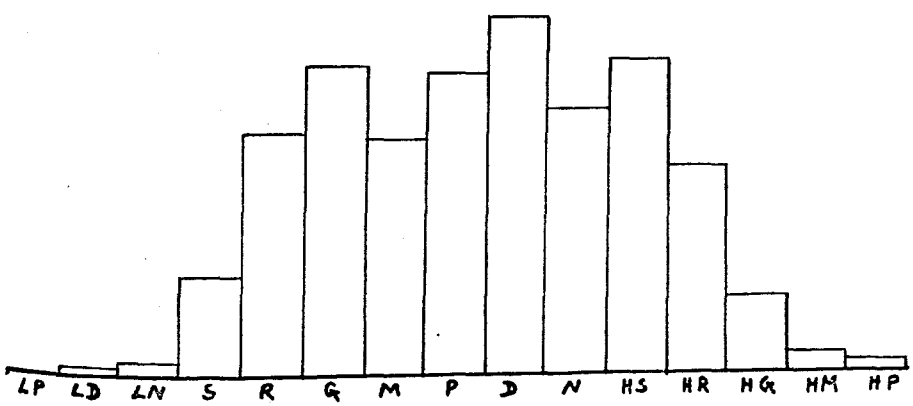
16. *Rama neevadu*



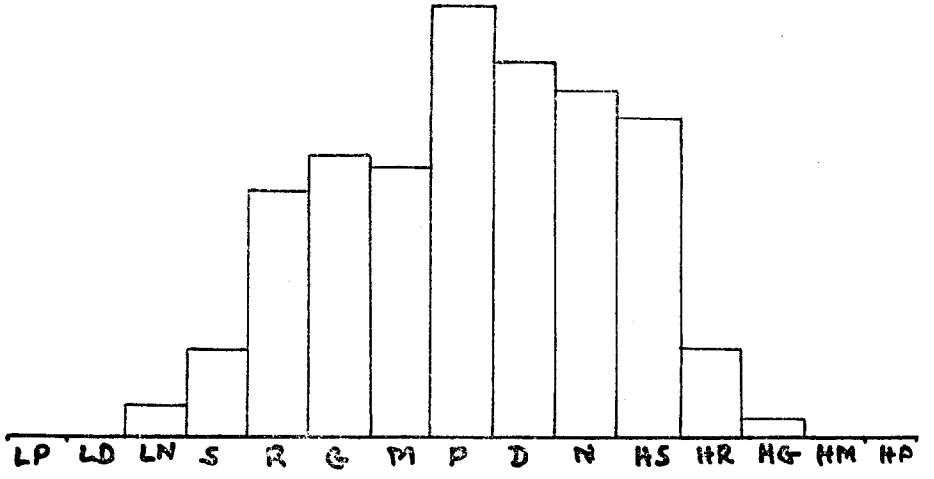
17. *Rama Rama Rama*



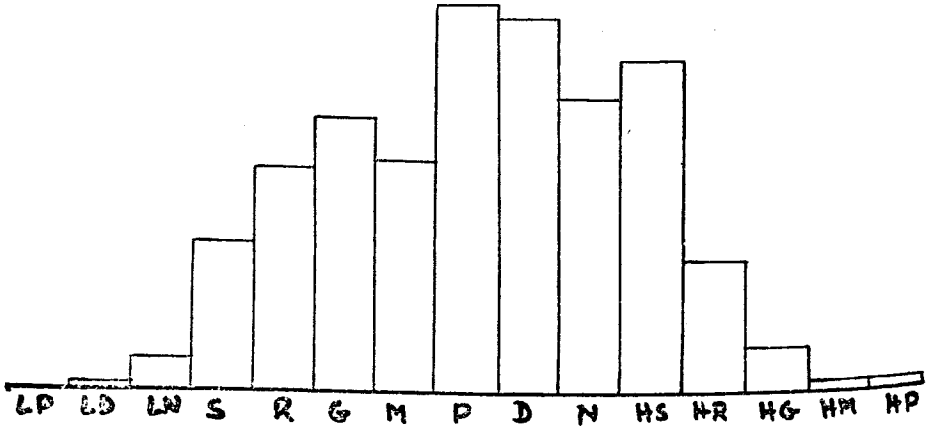
18. *Vachchunhari*



19. *Bhajare*



Total of all songs in KALYANI RAGA



Vasudevayani, Vachchunu Hari) are noteworthy for the beautiful dramatic "setting" provided by the saint-composer showing his dramatic skill also. In the first of the songs, Tyagaraja pictures Lord Brahma as having been fascinated by Sri Rama's beautiful form as He makes ready to leave for His exile for fourteen years and has come down from his abode to witness the departure. In the second, he picturises a *dvarapalaka* who enters the stage shouting "*Vasudeva*" and singing and dancing on the stage—thinking rather highly of his own capabilities. In the third, is the Samudraraja who explains the efficacy of Sri Rama's name to the child devotee Prahlada.

The rest of the songs deal with the various facets in a devotee's life and approach to reach God. The *bhakta's* goal is *saranagati* or absolute surrender to the Lord. But this cannot be achieved in a trice. One has to go through many steps and stages. The first perhaps is the acute desire to find where the Lord is: the song *Etavunara* picturises this siutation. How should one pray to his own *Ishtadevata* is vividly portrayed in the song *Mandagamana* in its nine *charanams*. Then is the realisation that there have been *bhaktas* before who have served the Lord and benefited by it—Tyagaraja runs through such a list in *Evaramadugudura* naming Anjaneya, Shatrughna, Bharata, Laksmana and Sita as the lucky ones who had been with Rama. The *bhakta* has to be different from the ordinary run of mortals who crave after material wealth and prosperity only. In his famous song *Nidhichala* he makes such a comparison and concludes that there is nothing sweeter than reciting Rama's name and being near Him. In *Endukoneemanasu*, Tyagaraja pleads that he is different from other people, who are after money and material wealth. He pleads with the Lord to come to his succour forgetting the sins he might have unknowingly committed. In the attainment of Godhead, literary didaction and incisive logic have no place; even chanting of the Vedas could be given up if only one takes to the chanting of *Sree Rama Nama. Bhajana Seyave* praises the efficacy of such chanting.

The realisation of his own failings and shortcomings could be said to be starting point in the *saranagati tatva.* In *Ninnanavalesina*, the sage feels that perhaps he alone is at fault: his love has not been devout enough; his attention has not been without blemish; his longing has not been intense enough. The next stage would be the realisation of the greatness of the Lord to whom one is offering oneself. This finds mention in the song *Karuvelpulu*, wherein the greatness of Sri Ram is depicted. That the Lord is merciful and is known to be good to his devotees; that one must have faith in Him as the only Saviour and there is none else to come to one's rescue are brought out in *Ramaneevadu* and *Rama rama rama.*

Tyagaraja sometimes makes very mundane comparisons also—he compares Rama to the *samba* (long term paddy) crop and the lesser Gods to the *kaar* (short term paddy) crop !

It would be noted that the sentiments expressed in all these songs are not of extreme variety but of the normal type only. *Kalyani raga* having only simple frequency ratios is good for expressing qualities like poise, tenderness and yearnings. More intense qualities and passionate outbursts require perhaps *ragas* with complex frequency ratios.

Conclusions

1. The entropy (H) is not useful as a *raga* characteristic but could be used as a method of measuring whether a particular piece has brought out the full capabilities of the *raga* in which it is set.

2. More than a third of the notes that we sing are of the *Sa-Pa* variety only.

3. *Kalyani raga* has more *tara sthayi sancharas* than *mandara sthayi* ones.

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TABLE I

Showing the percentage of the various notes in each song; the suffix L indicates lower and H the higher sthayi

Song No.	LP	LD	LN	S	R	G	M	P	D	N	HS	HR	HG	HM	HP
1.	—	0.6	1.6	4.7	7.5	11.9	7.8	13.8	17.2	12.5	15.9	5.0	1.5	—	—
2.	—	—	0.3	2.7	5.8	11.5	9.3	14.9	18.5	11.5	13.0	8.8	3.3	0.2	0.2
3.	—	1.3	1.7	10.4	18.5	13.0	5.9	14.1	14.1	8.6	10.4	1.8	0.2	——	—
4.	—	—	1.9	6.0	14.7	9.6	9.1	15.2	15.0	9.4	10.0	5.6	3.1	0.2	0.2
5.	—	0.4	1.9	8.7	10.5	14.3	8.5	10.7	13.5	11.0	15.5	3.7	1.3	—	—
6.	0.1	0.6	1.8	7.0	7.5	8.4	7.4	11.8	15.1	12.6	19.0	6.0	2.3	0.4	—
7.	—	0.5	1.7	8.4	9.4	11.3	9.3	16.2	14.7	9.6	11.2	6.5	1.2	—	—
8.	—	0.1	1.3	3.9	4.9	7.8	11.2	22.4	14.6	16.4	14.4	2.4	0.2	—	—
9.	—	—	0.3	4.2	9.9	14.6	13.4	17.4	15.0	11.2	8.3	4.0	1.7	—	—
10.	—	—	1.2	10.9	8.5	12.1	10.0	17.1	15.4	9.6	10.9	3.1	1.1	0.1	—
11.	—	—	—	2.9	9.6	10.0	8.4	23.5	15.6	13.0	13.8	2.3	0.9	—	—
12.	—	1.2	2.4	6.0	7.9	8.6	7.5	15.0	12.9	12.5	13.4	9.6	3.0	—	—
13.	—	—	1.1	6.1	9.8	12.9	10.2	13.1	13.4	11.9	15.8	4.9	0.8	—	—
14.	—	—	0.3	5.5	4.9	11.4	12.0	16.7	14.5	13.1	12.3	6.4	2.0	0.6	0.3
15.	—	0.2	2.0	6.9	9.1	9.6	8.3	12.6	15.1	12.9	16.0	5.5	1.8	—	—
16.	—	—	0.8	7.0	8.9	12.1	10.8	20.0	14.8	11.0	8.6	4.5	1.5	—	—
17.	—	—	—	0.7	2.2	5.1	7.9	20.2	17.5	14.6	16.6	9.9	3.1	1.5	0.7
18.	—	0.2	0.5	3.9	9.9	12.6	9.5	12.3	14.6	10.7	12.8	8.7	3.1	0.7	0.5
19.	—	—	1.4	3.6	9.9	11.3	10.8	17.3	14.9	13.7	12.8	3.6	0.7	—	—
Total	0.1	0.2	1.2	6.0	9.0	11.0	9.4	15.8	15.0	11.8	13.2	5.3	1.8	0.2	0.1

TABLE II

Showing the percentage of occurance of the seven notes

Song No.	S	R	G	M	P	D	N
1.	20.48	12.50	13.44	7.81	13.75	17.97	14.05
2.	15.73	14.56	14.72	9.58	15.11	18.54	11.76
3.	20.72	20.29	13.19	5.94	14.13	15.30	10.36
4.	16.00	20.30	12.70	9.30	15.40	15.00	11.30
5.	24.17	14.21	15.68	8.49	10.70	13.84	12.91
6.	26.03	13.53	10.69	7.84	11.86	15.64	14.40
7.	19.71	15.87	12.50	9.38	16.22	15.02	11.30
8.	18.29	7.36	8.01	11.19	22.40	15.04	17.71
9.	12.50	13.91	16.30	13.48	17.40	15.01	11.40
10.	21.94	11.52	13.17	10.11	17.08	15.36	10.82
11.	16.61	11.96	10.89	8.39	23.48	15.62	13.05
12.	19.35	17.47	11.67	7.53	14.98	14.08	14.92
13.	21.89	14.67	13.67	10.22	13.11	13.44	13.00
14.	17.84	11.30	13.33	12.65	17.02	14.46	13.40
15.	22.96	14.59	11.43	8.26	12.56	15.27	14.93
16.	15.63	13.37	13.54	10.76	19.97	14.84	11.89
17.	17.34	12.04	8.21	9.31	20.99	17.52	14.59
18.	16.71	18.54	15.61	10.24	12.80	14.88	11.22
19.	16.44	13.52	11.93	10.82	17.34	14.86	15.09
For Total	19.26	14.34	12.70	9.56	15.86	15.31	12.97

TABLE III

Values of H and Unbiased estimate of H for the nineteen songs

		H	Unbiased estimate
1	*Amma Ravamma*	2.75648	2.74295
2.	*Enthkoni*	2.78147	2.76799
3.	*Ethavunara*	2.71797	2.70543
4.	*Evaramadugu*	2.76846	2.75980
5.	*Kamalabavudu*	2.73758	2.72161
6.	*Karuvelpulu*	2.71490	2.70641
7.	*Sundari nee*	2.77039	2.74958
8.	*Sive pahi mam*	2.70747	2.69620
9.	*Bhajana seyave*	2.79397	2.78337
10.	*Nidhi Chala*	2.75645	2.74967
11.	*Vasudvayani*	2.73759	2.72214
12.	*Nammivachina*	2.75892	2.74589
13.	*Sandehamu*	2.77085	2.76124
14.	*Eesa pahi mam*	2.79075	2.77771
15.	*Ninnanavalasi di*	2.74692	2.73713
16.	*Rama neevadu*	2.78124	2.76621
17.	*Rama Rama Rama*	2.73924	2.72345
18.	*Vachchunu Hari*	2.77978	2.76922
19.	*Bhajare raghu*	2.79033	2.77084

Prepared by Sudha and Padma Lata. Communicated by Prof. K.S. Rajagopalan, Dept. of Statistics, Christian College, Tambaram, Madras and Dr. B.C. Deva, Sangeet Natak Akademi, New Delhi.