

A GENTLE INTRODUCTION TO SOUTH INDIAN CLASSICAL (KARNATIC) MUSIC

PART II of IV

BY MAHADEVAN RAMESH
mahadevan_ramesh@maxtor.com

LET US MAKE A TUNE! (THE CONCEPT OF A SCALE)

We have learnt about the keyboard, labeled the various keys under the Eastern and Western schemes and even quarreled about whether it should have 12 keys or 22 to an octave. We now know that these keys are like the alphabets in creating music. How then do we compose music?

Before we answer this question, let us see if we can say something about the structure of a 'tune' or the 'melody' itself. If we listen to any musical piece such as 'Jana gana mana' or 'Roop tera mastana', we notice that their second lines and subsequent lines are not just mindless imitation or repetition of the first lines. There is an elaboration of a theme as the song unfolds. You could listen to any line of 'Roop tera mastana' and feel that it is connected to the first line, in a musical sense. If someone played a musical phrase from the song at random, the odds are you would guess that it is from 'Roop tera mastana'. And it may sound trivial, but you also notice that 'Roop tera mastana' does not at all sound like 'Jana gana mana'. There is a character, a structure and an identity to the song, however vague the concept may sound. (note the pun on the word 'sound' !) If you have grasped this abstract concept, you have almost understood the concept of a 'Ragam' (or 'raga' or 'rag') because a Ragam is also an embodiment of a particular musical identity.

For example, if you heard the song 'Vande maataram, Shujalaam shuphalaam...' you can tell that it has its own identity, which is different from the way 'Jana gana mana..' or 'Roop tera mastana ..' sound. This song is in fact, based on a Ragam called 'Desh'.

How do we forge such special musical identities using a keyboard ? The answer lies in choosing just a SUBSET of keys out of the twelve keys available in an octave (instead of all twelve) and sticking to just this subset of keys while making music. If you used all the keys in the keyboard to compose one song, you may not create anything with an identity. (You will see, as you understand more about music that this statement is strictly not true. There are nice-sounding musical compositions where almost all the keys are used)

Let us take an example. Let us choose just all the white keys in an octave - that is, use only seven out of the twelve keys. And let us play the keys in any order, even stay on one key for whatever length of time if we choose to do so. Let us allow ourselves to go to the white keys in the octaves below and above the standard octave as well. After a few minutes, you may sense an 'effect', a 'whole-ness' ('Gestalt!') or a personality to the sound. If you don't believe me, have your friend play the keyboard with only the white keys.

Now close your eyes and ask him (or her) to occasionally hit any black key. You can easily tell whenever the black keys are hit, because you are now sensitive to the 'structure' or 'character' produced by the seven white keys.

Is there a lower limit on how FEW keys we can choose in our subset and still get by ? If we chose a subset of just three keys (say, the first three white keys) in an octave and limit ourselves to those keys, we see that we don't have much variety to the melodies we can produce. It may sound like a drum beating. But is devoid of any special melodic personality. In general, (note that this is not an absolute law) one chooses five or six or seven keys out of the twelve keys available in an octave. More about these selection rules later. Once these keys are selected, the corresponding keys in the other octaves are also automatically selected and used in melody making.

In the context of Indian music, one has an extra degree of freedom. One can choose one set of keys to go up in frequency in the octave and choose an entirely different set to come down the octave, if we so desire. The key sequence to go up is called 'Arohanam' and the key sequence which forms the descending order is called the 'Avarohanam'. More about it later as well ! Let us now stick to 'symmetric' choices while going up or down. At the risk of sounding repetitive, let me say that you can always decide to be a non-conformist and follow none of these so-called rules and conventions. Music is after all, a creative art and the final criterion is whether it sounds pleasing.

How do we select the 'subset' of keys ? Our ancestors have done quite a bit of research on such selection rules and have come up with algorithms. Let us look at the Western music first. The 'Major' Scale is a very typical selection algorithm. This helps you select seven keys in an octave. The rules are as follows:

First key - Choose ANY key in the octave.

Second key - Skip the adjacent key to the right, choose the one after that. In effect, you have moved a 'whole tone' from the first key. Remember the concept of 'whole tones' and 'semitones' from the previous chapter. And that the whole tone equals shifting two semitones.

Third key - Again, skip the adjacent key to the right, choose the second one (again, you have moved a 'whole tone')

Fourth key - select the adjacent key. (you have moved a 'half tone' or a semitone)

Fifth key - Skip the next key, but select the one after that. Once again, you have moved a full tone.

Sixth key - Skip the next key and select the one after that.

Seventh key - Select the adjacent key.

In short, your frequency selection is:

Select a key and then move,

Whole tone - whole tone - half tone - whole tone - whole tone - whole tone - half tone

If you started with the usual C key, the first white key, you will see that the 'C Major scale' is simply all white keys. This is a very 'major' scale, really, with a lot of popular compositions. And in the process of introducing this algorithm, we have also defined the term 'scale', which is simply a sequence of keys. Also, the algorithm 'wraps around itself'. That is, if you started out with the F key for example, and created the F Major Scale, you will spill over to the next octave. But that is okay, because you can fill up the rest of your scale by starting out with the F key of the PREVIOUS octave. That is, with this algorithm, you will always select seven keys in an octave. A question to ask is - will we get unique sequences using this algorithm every time we start off with a new key ? Or is there a possibility of our sequence repeating itself for two different starting keys, i.e, is the C Major scale different from D Major and are there twelve unique Major scales ? (I will leave this as an exercise for the very enthusiastic reader !)

Similarly, other algorithms can also be defined. One other choice is called the Minor scale - which is in reality a generic name for three different algorithms. One of them goes as

Whole - half - whole - whole - half - whole - whole (with the freedom to choose the first key)

I am not giving the selection rules for the other two 'Minor' algorithms. Again there are twelve keys we can select as our first key and therefore we can generate twelve sequences per Minor algorithm and there are three such 'Minor' algorithms, bringing a grand total of twelve times three, thirty six possible Minor scales. But we discover that many of the scales repeat themselves and in reality the number of unique 'scales' are fewer than thirty six Minor plus twelve Major scales.

Coming back to Indian system, even the ancient Tamil literary work, Silappadhikaram talks of an algorithm called 'Ilikramam', fascinating as it sounds. The rules of Ilikramam are quite similar to the selection of Major and Minor scales. It is really fun to work out this algorithm and derive a bunch of scales. (If you are more interested in this, refer to Prof. Ramanathan's book in the Reference section) In fact, nothing stops you at this point to go ahead and create your own selection rules to choose seven keys out of the twelve in the octave.

But let us turn our attention to Karnatic music. (Also, at this point, I will depart from talking about Indian classical music in general and stick only to South Indian music. Wherever relevant, references will be made to Hindustani music)

In Karnatic music, a very famous algorithm exists to select the keys in an octave, which forms the basis of important scales, which are called the 'Melakarta Scheme'. The Melakarta scheme selection algorithm is as follows: Please refer to Fig. 3 or Table II)

Rule 1: Always select the first white key ! The 'Sa'.

Rule 2: Always select the Pa key. This is a convenient midpoint of the octave, sort of.

Rule 3: Select one of the two Ma keys (Ma1 or Ma2 - note that one of them is black and the other one is white) Once selected, this key is your 'Ma'.

Rule 4: Select ANY two keys out of the four keys in the lower tetrachord. (From Keys 2, 3, 4 and 5) Once selected, the first of these two keys will be your 'Ri' and the second your 'ga'.

Rule 5: Select ANY two keys out of the four keys in the upper tetrachord. (From keys 9, 10, 11 and 12) Once selected, the first of the two keys will be your 'dha' and the second will be your 'ni'. This rule is exactly like Rule 4.

Once all the seven keys are chosen, you have your complete sa ri ga ma pa dha ni.

Let us see how many Melakartas or scales we can build this way. By Rule 4, you can choose two keys out of four in SIX different ways going by the elementary combination theory. Similarly, going by Rule 5, we can choose two keys out of four in SIX different ways. By Rule 3, you can choose one key out of two in TWO different ways. So we get

SIX times SIX times TWO = Seventy Two Melakartas or Melakarta ragams.

And they are all unique.

By definition, the Melakarta Ragams are symmetric with respect to going up in octave or down. Saying the same thing more technically, in Melakarta Ragams, the Arohanam and the Avarohanams are simply reversed. The sequence Sa ri ga ma pa dha ni is Arohanam. The reversed sequence Sa ni dha pa ma ga ri is Avarohanam. The Melakarta Ragams are also called 'Sampoorna ragams' or Complete ragams.

Interestingly, even the Melakarta selection algorithm allows us to choose all seven white keys, the same as the Western C Major scale. In Karnatic music, we call the resulting Melakarta ragam as Shankarabharanam. (You may have even heard of this ragam) In Hindustani music, the set of all white keys is called the 'Bilaval thaat', one of the major building blocks of Hindustani musical system.

Let us now go back to Table II and see why notation 1 makes sense. For example, you can pick up any two keys from the keys 2, 3, 4 and 5 and still call the first one of those as Ri and the second one as Ga. If you chose keys 2 and 5 then, you will sing out 'ri' when you strike key 2 and 'ga' when you strike key 5. On the other hand, if you chose keys 3

and 4 you will say 'ri' for key 3 and 'ga' for key 4. Finally if you chose keys 2 and 3, then key 3 will be a 'ga' (and not 'ri') in this situation. The rule is, the first key used among these four keys is a 'ri' and the second one is 'ga' no matter which absolute position the keys are located at. Keys 3 and 4 have the dubious honor of being a ri or a ga depending on the situation. These arguments are also valid in the upper tetrachord and in the choice of 'dha' and 'ni'. Now perhaps we can understand why three keys were designated as 'ri' or 'ga' or 'dha' or ni.

A caveat. I am using the word 'Ragam' in a loose sense here. A Ragam is not just a scale or a bunch of keys - it is more than that. Remember, I told you over and over and over that microtones are everything in Indian classical music and keys in a keyboard are simply digitized approximations. The seven white keys alone are not enough to give the resulting music the flavor of ragam 'Shankarabharanam' - it is those seven keys PLUS all the associated microtones (I know, I am being vague, but there is no simple way to get around it !) which constitute the 'Shankarabharanam' ragam. In fact, you may hear shades of Shankarabharanam when someone plays the Western C Major or Hindustani Bilaval. But the 'shades' are different for C Major and Bilaval and Shankarabharanam. C Major does not have any gamakam, Bilaval has some and Shankarabharanam has another set of gamakams. It is important to listen to some music and figure out if you can identify an artiste go through gamakams. A simple rolling of the tongue, subtle jumps and modulation or vibrattos are all indicative of gamakams.

Also, if you are the type that questions authority, you may equally well question the Melakarta selection rules. Why should we include Pa always and why can't we include BOTH the Ma1 and Ma2 keys in the same scale ? In Hindustani music there are ragams which use both the Ma keys, although it is a no-no in Karnatic. (once you become more advanced you will see that even in Karnatic music some pieces use both the Mas)

Finally, we should notice a fundamental difference between the Western system of scale building compared to the Melakarta scheme. In the Western classical music, you started off on a specific key, used the algorithm to generate the next key, which in turn led you to the third key of the scale and so forth. You sequentially generated the keys one after another by just shifting a whole tone or half a tone. By a curious coincidence even the Ilikkramam algorithm in Silappadhikaram is a similar 'Mode shifting' or 'tone shifting' algorithm. By contrast, the Melakarta scheme is a brutally mathematical scheme where you selected 7 keys out of a possible 12 keys, subject to certain constraints - here you figured out the frequency relationship between the keys much later. One important consequence: In the Western scale system, the keys in a scale are not more than a 'whole tone' apart, i. e., in any Major or Minor scale, you 'skip' at the maximum just one key. Whereas in Melakarta scheme, you can choose Key 1, Key 2, Key 3, Key 7, key 8, key 11 and key 12 by the algorithm. (This corresponds to Ragam Raghupriya) Notice the big gap between key 3 and key 7 (between the 'ga' and 'ma') where we skipped over three keys (This amounts to skipping two whole tones or four semitones). Also, we skipped two keys between 'pa' and 'dha'. (keys 8 and 11) Such large 'Intervals' ('Interval' is yet another musical term !) can produce 'unpleasant' listening experience. And although Raghupriya is a legitimate Ragam, it is about as popular as rain during a picnic.

SOME MORE DISCUSSION ON MELAKARTA RAGAMS

(Skip this chapter if you want to during the first reading ! But, on other hand, the Melakarta scheme is a fascinating piece of classification. You might want to read it for the fun of it)

A scholar named Venkatamakhin invented the Melakarta scheme, way back in the seventeenth century. He was the first to comprehensively classify Ragams in a 'Periodic table' like arrangement. A complete list of the 72 Melakarta Ragams is given in Table IV with the corresponding scales. When Venkatamakhin devised his Table, only a few of the 72 Ragams were known. Using his schematization Venkatamakhin not only cataloged the existing Melakarta Ragams, but also filled in the 'gaps' by coming up with the key sequence for the rest of the Melakarta Ragams. Thus this scheme helped 'discover' new Melakarta Ragams, which in turn led to even newer derivative or child Ragams using those. Composers and performers lapped it up and made songs in the newer, hitherto unknown Ragams. In Table IV, the ragam number 29 is our friendly ragam, Shankarabharanam, although its less well-known official name DhheeraShankarabharanam is used in the table.

Table IV

The 72 Melakarta Ragams and their scales

#	Name	Ri ga Dha ni	#	Name	Ri ga Dha ni
	Suddha Madhyamam (M1)			Prati Madhyamam (M2)	
1	Kanakanki	R1 G1 D1 N1	37	Salagam	R1 G1 D1
N1					
2	Ratnangi	R1 G1 D1 N2	38	Jalarnavam	R1 G1 D1
N2					
3	Ganamurti	R1 G1 D1 N3	39	Jhalavarali	R1 G1 D1
N3					

4	Vanaspati N2	R1 G1 D2 N2	40	Navaneetam	R1 G1 D2
5	Manavati N3	R1 G1 D2 N3	41	Pavani	R1 G1 D2
6	Tanarupi N3	R1 G1 D3 N3	42	Raghupriya	R1 G1 D3
7	Senavati N1	R1 G2 D1 N1	43	Gavambodhi	R1 G2 D1
8	Hanumatodi N2	R1 G2 D1 N2	44	Bhavapriya	R1 G2 D1
9	Dhenuka N3	R1 G2 D1 N3	45	Subhapantuvarali	R1 G2 D1
10	Natakapriya N2	R1 G2 D2 N2	46	Shadvigamargini	R1 G2 D2
11	Kokilapriya N3	R1 G2 D2 N3	47	Suvarnangi	R1 G2 D2
12	Rupavati N3	R1 G2 D3 N3	48	Divyamani	R1 G2 D3
13	Gayakapriya N1	R1 G3 D1 N1	49	Dhavalambari	R1 G3 D1
14	Vakulabharanam N2	R1 G3 D1 N2	50	Namanarayani	R1 G3 D1
15	Mayamalavagoulai N3	R1 G3 D1 N3	51	Kamavardhini	R1 G3 D1
16	Chakravaham N2	R1 G3 D2 N2	52	Ramapriya	R1 G3 D2
17	Suryakantam N3	R1 G3 D2 N3	53	Gamanasrama	R1 G3 D2
18	Hatakambhari N3	R1 G3 D3 N3	54	Viswambhari	R1 G3 D3
19	Jhankaradhwani N1	R2 G2 D1 N1	55	Syamalangi	R2 G2 D1
20	Natabhairavi N2	R2 G2 D1 N2	56	Shanmukhapriya	R2 G2 D1
21	Keeravani N3	R2 G2 D1 N3	57	Simhendramadhyamam	R2 G2 D1
22	Kharaharapriya N2	R2 G2 D2 N2	58	Hemavati	R2 G2 D2

23 Gourimanohari N3	R2 G2 D2 N3	59 Dharamavai	R2 G2 D2
24 Varunapriya N3	R2 G2 D3 N3	60 Nitimati	R2 G2 D3
25 Mararanjani N1	R2 G3 D1 N1	61 Kantamani	R2 G3 D1
26 Charukesi N2	R2 G3 D1 N2	62 Rishabhapriya	R2 G3 D1
27 Sarasangi N3	R2 G3 D1 N3	63 Latangi	R2 G3 D1
28 Harikambhoji N2	R2 G3 D2 N2	64 Vachaspati	R2 G3 D2
29 Dheerasankarabharanam N3	R2 G3 D2 N3	65 Mechakalyani	R2 G3 D2
30 Naganandini N3	R2 G3 D3 N3	66 Chitrambhari	R2 G3 D3
31 Yagapriya N1	R3 G3 D1 N1	67 Sucharitra	R3 G3 D1
32 Ragavardhini N2	R3 G3 D1 N2	68 Jyotiswarupini	R3 G3 D1
33 Gangeyabhusani N3	R3 G3 D1 N3	69 Dhatuwardhini	R3 G3 D1
34 Vagadheeswari N2	R3 G3 D2 N2	70 Nasikabhusani	R3 G3 D2
35 Sulini N3	R3 G3 D2 N3	71 Kosalam	R3 G3 D2
36 Chalanattai N3	R3 G3 D3 N3	72 Rasikapriya	R3 G3 D3

This brings out another interesting aspect of the Melakarta Scheme. The names of the ragams are not arbitrary. The names contain mnemonics which spell out which keys are used in the ragam. From the name DhheeraShankarabharanam, we could figure out that it is all white keys ! (Venkatamakhin was lucky that most of the 72 ragams were not known then, so he could assign names to them or add a prefix to the existing ones. Imagine if all the ragams were to exist first and then you try to group them, you may not have such

mnemonics possible) In fact, in Hindustani music, such schemes were not invented and now we have hundreds of ragams which are tough to classify using such simple mnemonics. Of course, the absence of such a comprehensive scheme is by no means a negative or a deficiency on the Hindustani musical system. In music, like in most things in life, we don't (and should not) want to make value judgements !

Let me now explain you the mnemonic or the Katayapadi System. (Thanks to R. Pichumani for the notes in this section) A look-up table is created, given in Table V that assigns syllables to numbers.

Table V

Katayapadi system of naming the Melakarta ragams

Number	0	1	2	3	4	5	6	7	8
9									
Syllable		ka	kha	ga	gha	-	cha	chha	ja
jha									
ddha		ta	tta	da	dda	-	tha	thha	dha
	na	pa	pha	ba	bha	ma			
ha		ya	ra	la	va		sha	shha	sa

The above scheme works as follows:

(1) Assign numbers to the first two syllables of the Melakarta ragam. Example, Harikambhoji, the syllable 'Ha' is 8 and 'ra' is 2 and thus Hari is 82. The melakarta number of this ragam is obtained by simply interchanging the digits, i. e 82 becomes 28 and in fact, Harikambhoji is the 28 th melakarta ragam.

(2) A few more example, Kanakangi. Ka is 1 and Na is 0 and thus Kana is 10. Interchanging the digits we get 10 -- 01 and thus this is the first melakarta ragam.

DhheeraShankarabharanam, here Dhha is 9 and ra is 2 and thus Dhheera is 92, transposing which we get 29 which is the position of the ragam. You can see that Shankarabharanam probably existed before the scheme was invented and thus the author had to alias it to conform to his look-up table scheme. There are other such aliased ragams. The popular ragam Todi is aliased to become Hanumatodi and Kalyani is officially Mechakalyani, just so that they follow the Katayapadi naming scheme. Another example, Mayamalavagaulai, (used to be called just Malavagaulai) has Ma which is 5 and Ya which is 1 and thus yielding 51, which when inverted gives 15, which is the place in the order.

Take SimhendraMadhyamam. Sa is 7 and Ma is 5 and thus Simha is 75 and the melakarta number is 57. However you must notice that the second syllable, Mha is a compound syllable combining ma and ha. In these cases, we usually take the first of the two sounds. There are some exceptions too. In Ratnangi, Ra is 2 and we take the 'Na' part of 'Thna' and arrive at the destination 02. If you used 'Th' instead of 'Na', you will get the number 62 for this melakarta, which is firmly occupied by ragam Rishabhapriya.

What are the advantages of such mathematical and almost 'hackers' kind of scheme ?

(1) The melakarta scheme does not tell you if a given ragam is a melakarta or not. If you know it is a melakarta ragam, you can find out what number it has in the sequence. For example, you can try to see what number is ragam Poorvikalyani, which is not a melakarta. This would be 21 if you consider Pa ra. (or if you considered Pa and Va it is 41) However, it is not even a melakarta ragam and you cannot use the above look-up table.

(2) Incidentally, if you look up Table IV which lists all the melakarta ragam, you will see that the two very famous ragams Shankarabharanam (called DhheeraShankarabharanam) and Kalyani (called Mechakalyani) have almost identical notes except for the Ma. Shankarabharanam uses Ma1, which is called Shuddha Madhyamam, whereas Kalyani uses Ma2 which is called Prati Madhyamam. Thus the table is divided into two groups of 36 ragams each and the only difference between the ragam on the left and the one on the right is the Ma key used. The first 36 from Kanakangi to Chalanattai are called Suddha Madhyamam ragams and the other 36 are called Prati Madhyamam ragams. Melakartas which differ from each other by 36 (Such as Harikambhoji and Vachaspati, Keeravani

and Simhendramadhyamam) have the same Arohanam and Avarohanam except for the Ma.

(3) How do we figure out the Arohanam and Avarohanam or which keys to use from the name of the melakarta ragam ? If somebody tells you Keeravani, can you quickly locate the keys on a keyboard corresponding to the ragam ? You just have to look at the Table IV to see how cyclical the whole thing is. All melakarta ragams in the same group of six (i. e, 1 to 6, 7 to 12, 25 to 30 etc) have the same Sa ri ga ma. All ragams which differ from each other by six have the same Pa dha ni sa. (Karaharapriya(22), Harikambhoji(28), Hemavati(58), Nasikabhoosani(70) all have the same Pa dha ni sa, because they all leave a remainder of 4 when divided by 6)

Just to summarize:

(i) All Melakarta Ragams from 1 to 36 use Ma 1. Those from 37 to 72 use Ma 2.

(ii) The ri ga assignment is as follows:

Ri 1 - Ga 1 Melakartas 1 through 6, 37 through 42

Ri 1 - Ga 2 Melakartas 7 through 12, 43 through 48

Ri 1 - Ga 3 Melakartas 13 through 18, 49 through 54

Ri 2 - Ga 2 Melakartas 19 through 24, 55 through 60

Ri 2 - Ga 3 Melakartas 25 through 30, 61 through 66

Ri 3 - Ga 3 Melakartas 31 through 36, 67 through 72

(iii) The dha ni assignment is as follows:

Take the Melakarta number and divide it by six and look at the remainder.

Dha 1 - Ni 1 if the remainder is 1

Dha 1 - Ni 2 if the remainder is 2

Dha 1 - Ni 3 if the remainder is 3

Dha 2 - Ni 2 if the remainder is 4

Dha 2 - Ni 3 if the remainder is 5

Dha 3 - Ni 3 if the remainder is zero

So all you have to do is take a melakarta ragam. From its name determine its number in the scheme. From the number, figure out the Arohanam and Avarohanam. Simple enough !

Again, among the 72 such major ragams, not all of them are equally popular. Some of them are quite obscure, especially the ones whose keys are not spread apart well throughout the octave. However, many musicians have composed in all 72 melakartas - Koteeswara Iyer for one. Musicians like M. S. Subbulakshmi and S. Balachandar have recorded all 72 melakartas. The Suddha Madhyamam (Suddha Madhyamam is just the official name for Ma 1) group of 36 ragams are by and large more popular than the Prati Madhyamam (Prati Madhyamam is the same as Ma 2) group. The Ma2 is supposed to be more 'negative' and 'sad' !! The more unpopular ragams are the ones like Kanakangi, which use closely spaced keys. The ragam Mayamalavagaulai on the other hand has a well spread out keys - Sa-ri1-space-ga2-ma1-space-pa-dha1-space-ni2-sa. This is the ragam all beginners are taught, essentially because such a dispersed set of notes is more easy for a beginner to learn.

>From these complete ragams, you can derive 'child ragams' omitting a key here and a key there in the arohanam or avarohanam. Some melakartas are parents of a large number of popular 'child' or 'janya' or 'derived' ragams - melakartas like Natabhairavi, Kharaharapriya, Harikambhoji for example. We will see this in the next section.

You may wonder how just one key makes a difference. I just told you that the ragams Kalyani and Shankarabharanam have identical arohanam and avarohanam, except for the key used to produce the 'ma' syllable. You have to listen to your keyboard. Play Kalyani and Shankarabharanam on the keyboard (and even though you don't produce the 'microtones' and even though you are playing an 'equally tempered instrument') you can tell the two apart. The ma key makes a big difference and one has to simply listen to music a lot to train one's ears.

Since melakartas have the maximum allowed seven notes in a ragam, they have an enormous scope for melody making, compared to a derived ragam which may have less than seven notes. Thus melakarta ragams are very popular in concerts. Musicians choose them for the 'heavy' part of the concert and try to exhibit their mastery.

WHAT IS A 'RAGAM'? Now that we have studied the Melakarta scheme inside and out, let us go on to generate the secondary or 'janya' or derived Ragams (the rest of the Ragams, that is) based on some simple guidelines. These are only guidelines and are not hard and fast rules:

(1) A Ragam should use at least five keys in an octave and utmost seven keys in the Arohanam as well as the Avarohanam.

(2) The Arohanam or ascending order of the notes (or Avarohanam or descending order, for that matter) is obtained by simply taking a Melakarta scale and omitting none or one

note or two notes. (Remember, the Melakarta scale has seven notes and so we can end up with seven or six or five notes in the derived scale)

For example, let us (yet again !) take Ragam Shankarabharanam. If we omit the keys 'Ma' and 'Ni' and use only the five white keys Sa, Ri, Ga, Pa, Dha then we obtain a famous Ragam called Mohanam. (Hindustani equivalent is Bhoop or Bhopali)

(Usually, the the next octave's Sa is also included for completion and hence the Arohanam will be more correctly given as Sa-ri-ga-pa-dha-Sa. Similarly, the Avarohanam is given by Sa dha pa ga ri sa. You will notice that almost all ragams start with the key Sa. Also, from now on, we will omit saying 'Ri 1' or 'Ri 2' etc. IF THERE IS NO AMBIGUITY AS TO WHICH KEY WE ARE USING.

If we used Sa, Ri, Ga, Pa, Ni, Sa then we get Ragam Hamsadhwani.

If we used Sa, Ri, Ma, Pa, Dha, Sa then we get Ragam Suddha Saveri. (The Hindustani equivalent for this scale is Rag Durga)

If you have a keyboard try to play just these keys and see if you can get a feel for the identities of these Ragams. For example, in Mohanam, the jump from Ga to Pa or for that matter Dha to upper Sa is quite characteristic. Besides Karnatic and Hindustani music, a lot of Oriental tunes are based on the scale of Mohanam!

(3) The five note scale, such as Mohanam, is called a Pentatonic Ragam. The Indian equivalent term is 'Oudava Ragam'. Similarly, the six note Ragam is called Shadva Ragam in India or Sextatonic in Western terminology. And the seven note Ragam is called Septatonic or Sampoorana. While the Ragam Mohanam is pentatonic with an implicit assumption that Arohanam and Avarohanam are reverses of each other, other asymmetric possibilities are allowed.

A ragam can have five notes on the way up (in Arohanam) and seven on the way down. (Avarohanam) For example, you can have a ragam which is exactly Mohanam in terms of Arohanam (Sa ri ga pa dha sa) but is Kalyani (Sa ni dha pa ma 2 ga ri sa) on the way down. This oudava - sampoorana Ragam is called Mohanakalyani. So you can have oudava-oudava, oudava-sampoorana, sampoorana-shadva etc. combinations. (Melakarta Ragams are of course, Sampoorana-Sampoorana) Also, the Avarohanam need not be the reverse of the Arohanam. For example, you can have a ragam that goes Sa-ri1-ma1-dha1-ni2-Sa (Arohanam) and Sa-ni1-dha2-pa-ma2-ga2-Sa. (Avarohanam) A good lot of ragams are however symmetric. (The same keys used to go up the octave or down the octave)

Once you have chosen the keys, you are restricted to play only those keys, however you can play them any way you want. You can compose a phrase that goes Sa-ma1-ma1-dha1-Sa-dha2-dha2-ga2. You can skip notes if you wish.

(4) Some other ragams, instead of going up or down simply, can go up or down in a zig zag manner - such as Sa-ri1-ma1-ga2-pa-ni2-dha1-sa etc. That is, you cannot simply go up in scale by merely pressing the keys, but you should spiral to the top of the scale. There are not too many such ragams, but such a meandering structure is called 'Vakram', which literally means crooked. This is an additional constraint imposed on the Ragam, besides the key selection.

(5) In some other instances, it may not be easy to define uniquely the Arohanam and Avarohanam of a ragam. Many Arohanams and Avarohanams (i.e, definitions) can exist for one ragam itself. An example of such a Ragam is Ananda Bhairavi. Of course, those Arohanams and Avarohanams will be close to each other and won't be radically apart. This situation exists especially when we try to extract the Ragam equivalent of folk melodies or alien tunes.

(6) And finally here is a confusing possibility. There can be two Ragams which have identical Arohanams and Avarohanams, but DIFFERENT MICROTONAL ASSOCIATIONS or Gamakams ! The only way to tell these two Ragams apart is to sensitize your ears to the differences to the Gamakams. Of course, you can never possibly play them on the keyboard as two different Ragams!

You can go ahead and create your own ragam by selecting your own five keys (or six or seven) following the above rules and name it after yourself. (But make sure it doesn't already exist !) However, if you created your own pentatonic-pentatonic ragam, you probably did not choose just the first five keys of the octave. You might have distributed the five keys such that they were spread out in the octave instead of being bunched together, just so that your ragam sounded better. In fact, such subjective criteria have given resulted in only a few Ragams being popular.

Mathematically, there are many, many ragams possible. Choosing five, six or seven keys out of possible twelve keys gives rise to a huge number of combinations. Fortunately, many of the possibilities have been deemed 'boring to the ear' by musicians throughout history. Only about six thousand or so ragams have been even cataloged and of these, only about two hundred or so are even used these days. A ragam's popularity can go up and down, depending on people's taste and the existing political climate of the Karnatic music caucus. So, it is really not a tremendous task to learn about fifty or so of the more popular ragams and be good at identifying them, if at least to impress your friends.

It is always possible to break down any song, even the non-Karnatic music songs into its constituent Swarams and define a corresponding Ragam. Even 'Baa baa black sheep' can be broken into a Ragam. Musicians more clever than we are have done such things and created Ragams out of truly Dravidian folk melodies such as 'Aadu Pambey' (the snake song) or Kavadi Sindhu songs like 'Nandavanathil or aandi' and created ragams like Ananda Bhairavi or Kurunji. Sometimes, the ragam corresponding to songs like 'Baa baa black sheep' may not have enormous scope to create a lot of 'characteristic phrases' and thus limiting creating any more songs based on the ragam.

In general, if two songs sound strikingly similar, the odds are they are based on the same set of notes and thus in the same Ragam. Their basic Ragam is identified typically by pattern recognition, if you are not willing to do detailed decomposition into the constituent keys of their scale.

The basis of Ragams is (1) the use of a restrictive number of keys in an octave (2) go up and down in the octave in a prescribed manner. (3) And yes, throw in the appropriate microtones. These generate specific melodious personalities. The term microtones presents a major difficulty in understanding the totality of the concept 'Ragam'. How exactly can one specify which microtones are involved ? What is the best way to 'notate' the millions of intermediate frequencies ? Instead of getting very analytical about 'microtones' Karnatic music just gets away by omitting a precise definition of a Ragam. In some sense, the 'Arohanam'-'Avarohanam' - this is the ascending sequence and this is the descending order definition of a Ragam is only an 'operational definition' at best. Since the 'associated microtones' or 'Gamakam' cannot be defined numerically, it has also become fashionable to simply say that a Ragam is a 'Mood' or a feeling or an emotion, if you can even relate to such unmusical terms.

Another way to define a Ragam is by analogy or how it should 'sound' like. And compare it with an established historical 'standard' or 'primitives'. It is always much easier to sing the 'Gamakams' associated with the Ragam - produce the basic patterns - rather than Fourier analyze it. A ragam is alternatively defined in terms of its 'characteristic musical phrases'. These characteristic phrases are called 'Pakads', (in Hindustani music) literally meaning 'catch' phrases.

All these lend a certain amount of mystery to the concept of Ragam. Like blind men trying to figure out an elephant, we are supposed to only know 'a part of the personality' of a ragam. Never its wholeness. We can only know so many 'characteristic phrases' of a ragam, not a complete set of them, even if there exists such a complete set. One song may have twenty of them. Another song in the same ragam might use just ten of them, but a ten other new ones. Musicians are always trying to create newer and newer 'characteristic phrases' to bring out newer and newer aspects of the ragam. One might have thought that they would have composed every possible phrase in the Ragam Shankarabharanam. But people are still making new melodies in this centuries old Ragam ! We will perhaps never run out of tunes in this Ragam.

The easiest way to identify a ragam then is by analogy and trying to figure out if there is a recurring characteristic phrase. Figuring out a Ragam has always been a natural thing for a Karnatic music enthusiast, especially if the Ragam happens to be an obscure one. It is almost like solving a crime. Some of the ragams can be so distinctive that you can recognize them when only two or three notes are played, thanks to the characteristic microtones.

Sometimes, life is not quite simple. Our definitions of the term Ragam may be violated. Some talented musicians might introduce extraneous notes occasionally into a well-defined ragam, for nice musical effect. Such a process is called 'Misra'fying. You can

have a ragam Sivaranjani played pure - this is a pentatonic ragam. Or you can have Misra Sivaranjani where you occasionally introduce a sixth or seventh note not prescribed in the definition of the ragam. Note that this requires expertise. If you or I play Sivaranjani and try to Misra-fy it, we may go so far off the original ragam that we might sound horrible - resulting in 'besur' or 'Abaswaram'.

Equally incredibly, we have other violations as well. Ragams like Sindhu Bhairavi and Kapi are often played with many more notes than just the traditional maximum of seven. On the low side, people have laid claims to Ragams with just four notes. Again, let your ears be the judge.

Play some classical sounding music and try to see if any particular Ragam thrills you. Anything that turns you off completely ? Play instrumental or light classical music at first before embarking on a heavy-duty vocal piece. Is there a piece that moves you? Puts you in a sublime mood? Helps you drive your car ? Goes well in the background when you cook?

The reason for asking these questions is to figure out a little bit about the psychoacoustics. While I do not believe that a particular Ragam could inherently be an 'Angry' Ragam or a Midnight Ragam or bring the rains or tame an elephant, Ragams could very well produce individual psycho-acoustical effects.