

VIKRUTHA PANCHAMA SCALES IN CARNATIC MUSIC (CONTAINING BOTH PERFECT FOURTH AND DIMINISHED FIFTH)

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ABSTRACT

The Carnatic classical music system which is prevalent in South India uses 12 semitones within an octave, as in Western classical music. There are seven syllables in the solfa system named S, R, G, M, P, D, and N (pronounced Sa, Ri, Ga, Ma, Pa, Da, and Ni, respectively). The first note S, and the perfect fifth P, are fixed in frequency in a melody scale according to convention. In any fundamental melody scale (parent raga), either the perfect fourth M1 or the augmented fourth M2 will be present exclusively. The second, third, sixth and the seventh notes can have three variations, some of which overlap as follows: R1 (minor second), R2 = G2 (major second), R3 = G2 (minor third), G3 (major third), D1 (minor sixth), D2 = N1 (major sixth), D3 = N2 (minor seventh), N3 (major seventh). With the above notation and using each solfa symbol S, R, G, M, P, D, N only once in the ascending order, traditionally 72 fundamental melody scales have been formed. Each one of them can have many derived scales excluding some notes, or using the notes in a convoluted fashion.

This paper presents 36 new fundamental melody scales for the first time, by using both perfect fourth (M1) and the augmented fourth (M2) in the same fundamental melody scale. Since the augmented fourth (M2) is also the diminished fifth, the perfect fifth is discarded and the unused solfa syllable P is attached to the diminished fifth. By varying the solfa syllables R, G, D, N as before will give 36 new fundamental melody scales. This will bring the total fundamental melody scales to 108.

INTRODUCTION

The fundamental melody scales in Carnatic music system were first propounded by Raamamaatya in his work *Svaramelakalanidhi* c. 1550 [1]. Later Venkatamakhi expounded in the 17th century in his work *Caturdandi Prakaasikaa* a new fundamental melody scale system known today as *melakarta* [2]. He had made some bold and controversial claims and defined 16 notes from the known 12 semitones in an octave at that time to arrive 72 fundamental melody scales. The double counting of R2 etc., his exclusive selection of the perfect fourth and the augmented fourth notes in a scale are arbitrary. However, today these 72 fundamental melody scales have gained acceptance, though to this day this system is being criticized.

Out of the 12 semitones in an octave, each fundamental melody scale (complete scale) shall consist of all the seven notes denoted by S, R, G, M, P, D, and N, pronounced as Sa, Ri, Ga, Ma, Pa, Da, and Ni. When two adjacent semitones are used in a melakarta scale, in order not to repeat the syllable in a given scale, the same semitone note is denoted with different syllables. For example, if the 2nd semitone R (R1, the minor second) is used in a scale, then the 3rd semitone is named as G (G1, the major second). However, if 3rd semitone is named R (R2, major second), the 4th semitone is named as G (G2, minor third). If the 4th semitone is named R (R3, minor third), then 5th semitone is named as G (G3, major third). Therefore the overlapping notes are R2=G1 (major second), R3=G2 (minor third), D2=N1 (major sixth), D3=N2 (minor seventh). As per agreed convention, P is held fixed without any gamaka (frequency modulations) given on that note. The 6th and 7th semitones are named as M1 and M2 (perfect fourth and augmented fourth). As per convention, a fundamental scale must necessarily have S and P, one of the M's, one each of the R's and G's, and one each of the D's and N's. Also, R must necessarily precede G and D must precede N. This gives $2 \times 6 \times 6 = 72$ melakarta ragas.

The notes Sa and Pa which do not admit variations are called suddha svaras or prakruti svaras or fixed notes. The suddha svara in modern south Indian Music refers to the lowest pitched notes in each note in the ascending scale. While the suddha S, suddha M (M1) and suddha P have retained their values from ancient times, the suddha R, suddha G, suddha D and suddha N have acquired different values at present.

Vikrutha Panchama Melakarta Scales

The note P (G in C major) is normally taken as fixed note. But this has not been always like that. In order to use both M1 (5th semitone) and M2 (7th semitone) in a new set of scales, the note P (8th semitone) is abandoned and the 7th semitone is named as P. This way all the seven syllables, S, R, G, M, P, D, and N are used in the set. Since the perfect fifth note is discarded, it cannot be used in the shruthi or the drone, and the perfect fourth should replace the perfect fifth in the shruthi. This scheme will generate 36 more ragas. The first six of these are listed in Table 1. The remaining 30 scales can be obtained by the following formula:

$S, R_i, G_j, M_1, M_2 (= P), D_k, N_l$

where $i = 2, 3, 4, j = 3, 4, 5, k = 9, 10, 11, l = 10, 11, 12$ and always $j > i$, and $l > k$.

CONCLUSIONS

A new set of 36 melakarta scales are proposed which consider both perfect fourth and diminished fifth in the same scale. In the process, the perfect fifth is discarded so as to retain the all seven notes S, R, G, M, P, D, and N only once in a scale. The addition of these 36 scales makes the total number of melakarta scales to be 108. The number of derived scales from these additional 36 scales is unlimited.

The total number of scales will now be 108 including the 72 propounded by Venkatamakhi. In Hinduism the number 108 has a special significance.

REFERENCES

1. Ramaswami Aiyar, Ramamatya's Svaramelakalanidhi, The Annamalai University Publications, Chidambaram, India, 1932.
2. Sathyanarayana R., Chaturdandiprakasika by Venkatamakhi, Indira Gandhi National Centre for the Arts in association with Motilal Banarsidass Publishers, Delhi, 2002.
3. Sambamurthy P., South Indian Music, The Indian Music Publishing House, Madras, 1983.

Table 1. The first Six Vikrutha Panchama Melakarta Scales (Numbers refer to the semitone number)

1	2	3	6	7	9	10
1	2	3	6	7	9	11
1	2	3	6	7	9	12
1	2	3	6	7	10	11
1	2	3	6	7	10	12
1	2	3	6	7	11	12

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