

# Vedic Scales, Chords and Tonalities

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## Introduction—Harmonic and Melodic Values

Musical intervals are not equal; they differ in their harmonic and melodic values. Generally, an interval that is harmonically strong is melodically weak, and vice-versa; in other words, the harmonic and melodic values of intervals are complimentary. In this paper, I present a method of calculating the harmonic and melodic values of musical intervals, scales and chords based on their acoustic properties that can be used as a basis for a very broad, inclusive ontology of musical expression. This is by no means a comprehensive treatment of the subject, nor is it meant to be the last word on it; but hopefully it will inspire musicians to further explore Vedic-inspired musical theory and use it in their compositions.

The harmonic and melodic values of musical intervals are derived from the harmonics comprising the interval. For example, the interval of a perfect unison is a 1:1 ratio of frequencies; therefore it may be derived from the 1<sup>st</sup> harmonic or fundamental of any tonality. Because it is derived from the 1<sup>st</sup> harmonic, it is harmonically the strongest interval, but melodically the weakest interval. On the other hand, the augmented (sharp) 4<sup>th</sup> or tritone, with a frequency ratio of 7:5, is derived from the 7<sup>th</sup> and 5<sup>th</sup> harmonics. It is therefore much weaker harmonically, but stronger and more interesting melodically, than the unison.

The composer can use the science of harmonic and melodic values to evaluate the raw materials of scales, chords, melodies and tonalities to help express his intended meaning in the language of music. In fact, music has meaning and expression precisely because of these values. If all tones had identical value, they would be meaningless because they would be all the same. Therefore some range of values is necessary to understand the meaning of the building blocks of music, putting them into perspective and giving the composer a coordinate system, a palette of tonal colors and values for designing his compositions.

Music is fundamentally about emotion, just as cooking is about taste and visual art is about light. Especially spiritual music is, or should be, directly an expression of transcendental *rasa*, or ecstatic loving personal relationship with God. These transcendental emotions are ranked in the Esoteric Teaching of the *Vedas* according to their spiritual purity and pleasure-giving capacity. The language of music can certainly express them all, but where is the dictionary that defines the meaning of the language of music?

This work is an attempt to create such a lexicon for transcendental music to facilitate composition in this medium. Its axiomatic foundation is that musical intervals have particular subjective emotional meanings based on their harmonic structure. It is built upon the concepts expressed in my 1985 thesis *Svara Saptah: Intonation in Vaisnava Music*. Many fundamental concepts that are not explained in detail herein may be found in that work.

## Harmonic Value

The harmonic value of an interval is calculated by this formula:

Where  $V_h$  = Harmonic Value

$f_1, f_2, \dots$  = Numerators and Denominators of the intervals' harmonic ratio

$n$  = the total number of factors in the calculation.

$$V_h = \left[ \frac{1}{\left( \frac{f_1 + f_2 \dots f_n}{n} \right)} \right]$$

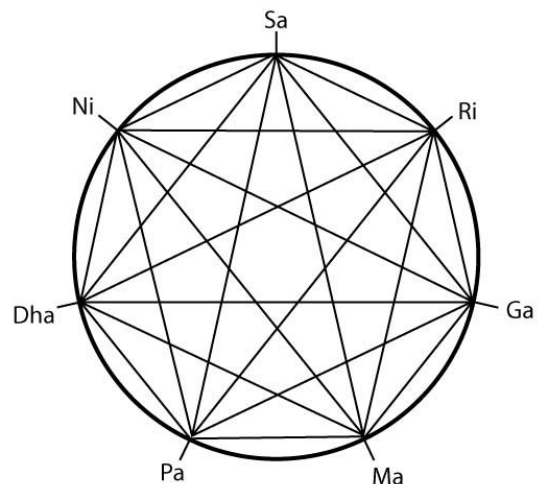
For example, the harmonic value of a perfect fifth (harmonic ratio 3:2) would be  $1 / ((3 + 2) / 2) = 0.667$ . Similarly, the 12 intervals of the octave are calculated as follows:

<b>Svaras, Ratios and Harmonic Value</b>			
<b>Interval</b>	<b>Numerator</b>	<b>Denominator</b>	<b>Harmonic Value</b>
Octave	2	1	0.667
N	9	5	0.143
n	7	4	0.182
D	5	3	0.250
d	8	5	0.154
P	3	2	0.400
M	7	5	0.167
m	4	3	0.286
G	5	4	0.222
g	6	5	0.182
R	9	8	0.118
r	10	9	0.105
Unison	1	1	1.000

The highest possible harmonic value is 1, and it approaches zero as an interval is derived from higher harmonics. For a complete discussion of the derivation of the intervals, see *Sapta Svarah*.

Now the harmonic value of a scale is simply the aggregate or matrix sum of all the intervals in the scale. For example, the matrix of all 21 possible intervals in the ordinary major scale is as follows:

<b>S</b>	<b>R</b>	<b>G</b>	<b>m</b>	<b>P</b>	<b>D</b>
<b>R</b>					
<b>G</b>	R				
<b>m</b>	g	r			
<b>P</b>	m	g	R		
<b>D</b>	P	m	G	R	
<b>N</b>	D	P	M	G	R



In general, among any  $n$  entities there are  $(n-1) + (n-2) \dots + 1$  unique possible relationships; so there are 21 intervals among the seven scale tones. The simple geometric proof at right shows that there are indeed 21 possible intervals among the *svaras* of any heptatonic scale:

If we substitute the harmonic values ( $V_h$ ) for the *svaras* in the table above and perform the matrix sums, we obtain the following matrix:

S	R	G	m	P	D
0.118					
0.222	0.118				
0.286	0.182	0.105			
0.400	0.286	0.182	0.118		
0.250	0.400	0.286	0.222	0.118	
0.143	0.250	0.400	0.167	0.222	0.118

Totals: 1.419 1.236 0.973 0.507 0.340 0.118 **4.593**

Now if we perform the same analysis on the Lydian Mode scale (Kalyan Thata), we obtain the following:

S	R	G	M	P	D
R					
G	R				
M	G	R			
P	m	g	r		
D	P	m	g	R	
N	D	P	m	G	R

S	R	G	m	P	D
0.118					
0.222	0.118				
0.167	0.222	0.118			
0.400	0.286	0.182	0.105		
0.250	0.400	0.286	0.182	0.118	
0.143	0.250	0.400	0.286	0.222	0.118

Totals: 1.300 1.276 0.986 0.573 0.340 0.118 **4.593**

In other words, although the internal intervals of the two scales differ, their harmonic values are equivalent. The first scale is used as the principal reference scale in both Western and North Indian music, while the second is the principal scale in the South Indian musical system. The difference between them is largely emotional, with the strong relationship of **m** to the tonic in the first scale suggesting a strong motherly feminine presence, while the leading tone of **M** in the second scale suggests that the feminine is subordinated to a masculine personality with an emphasis on the conjugal mood of **P**. Sure enough, the traditional *ragas* based on both scales express sacred moods, but the mood of SRGmPDN is more general devotion in the mode of *vaidhi-bhakti*, while SRGMPDN almost always expresses conjugal love in *raganuga-bhakti*.

When we perform this matrix analysis for all 32 common Vedic scales, we obtain the following results:

<b>Scale</b>	<b>Name</b>	<b>Harmonic Value</b>
SRGmPDN	Ionian	4.593
SrGmPDN	b2	4.251
SRGmPDn	b7	4.369
SrGmPDn	b27	4.191
SRGmPdN	b6	4.211
SrGmPdN	b26	4.348
SRGmPdn	b67	3.936
SrGmPdn	b267	4.237
SRgmPDN	b3	4.228
SrgmPDN	b23	3.835
SRgmPDn	b37	4.483
SrgmPDn	b237	4.254
SRgmPdN	b36	4.082
SrgmPdN	b236	4.128
SRgmPdn	b367	4.220
SrgmPdn	b2367	4.470
SRGMPDN	#4	4.593
SrGMPDN	b2#4	4.275
SRGMPDn	b 7#4	4.146
SrGMPDn	b 27#4	4.032
SRGMPdN	b 6#4	4.187
SrGMPdN	b26#4	4.348
SRGMPdn	b 67#4	3.729
SrGMPdn	b 267#4	4.054
SRgMPDN	b 3#4	4.151

When the list of scales derived in the previous section (*32 Vedic Scales*) is sorted in descending order of harmonic values, this is the result:

Scale	Name	Harmonic Value
SRGMPDN	#4	4.593
SRGmPDN	Ionian	4.593
SRgmPDn	b37	4.483
SrgmPdn	b2367	4.470
SRGmPDn	b7	4.369
SRgMPDn	b 37#4	4.351
SrGMPdN	b26#4	4.348
SrGmPdN	b26	4.348
SrgMPdn	b 2367#4	4.338
SrGMPDN	b2#4	4.275
SrgmPDn	b237	4.254
SrGmPDN	b2	4.251
SrGmPdn	b267	4.237
SRgmPDN	b3	4.228
SRgmPdn	b367	4.220
SRGmPdN	b6	4.211
SrGmPDn	b27	4.191
SRGMPdN	b 6#4	4.187
SrgMPdN	b236#4	4.179
SRgMPDN	b 3#4	4.151
SrgMPDn	b 237#4	4.146
SRGMPDn	b 7#4	4.146
SrgmPdN	b236	4.128
SRgmPdN	b36	4.082
SRgMPdn	b 367#4	4.064

This helpful list allows us to make some interesting observations. For example, we see that most of the familiar Western scales and modes are near the top; but there are some others of equivalent value that are little known and used in Western music, or even common *ragas*. If we play these scales or even construct melodies with them, we find them pleasing to the ear and heart, if unfamiliar, like a beautiful exotic stranger; to me this just increases their allure.

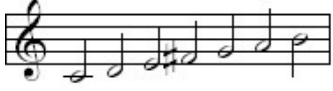


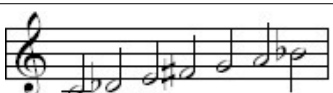
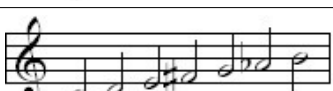
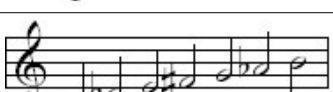
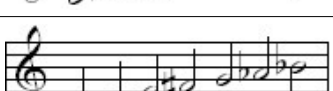
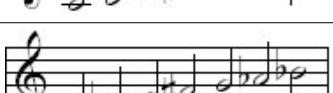
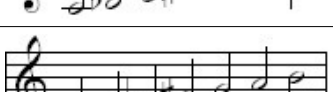
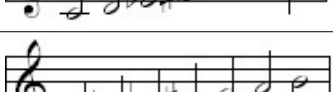
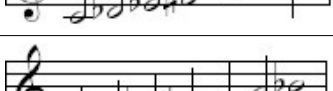
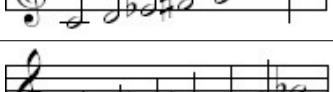
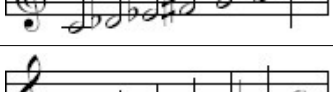
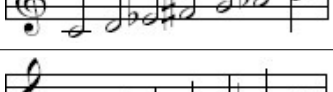
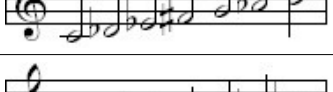
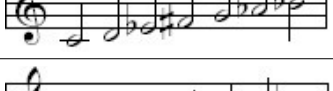
When we investigate the scale-tone chords and tonalities of these scales in the next section, we will see that the tonalities they offer are already part of our contemporary musical language, especially jazz; but until now we simply have not had the language to define and talk about them in the context of their scale-tone origins. Hence the value of our effort to create a comprehensive musical ontology is that it will enrich the tonal and melodic resources appropriate to extended seventh- and ninth-chord chromatic harmony.

The following chart lists the 32 possible Vedic scales systematically according to their intervals:

# Vedic Scales – Natural Fourth

♩4	♩3	♩6	♩2	SRGmPDN		Ionian (Major) Bilaval Thata	
			♩7	♭2	SrGmPDN		♭2
			♩7	♩2	SRGmPDn		Mixolydian Mode ♭7
			♭7	♭2	SrGmPDn		♭27
		♩6	♩2	SRGmPdN		♭6	
			♩7	♭2	SrGmPdN		Bhairava Thata ♭26
			♩7	♩2	SRGmPdN		♭67
			♭7	♭2	SrGmPdN		♭267
	♩3	♩6	♩2	SRgmPDN		♭3	
			♩7	♭2	SrgmPDN		♭23
			♩7	♩2	SRgmPDn		Dorian Minor ♭37
			♭7	♭2	SrgmPDn		♭237
		♩6	♩2	SRgmPdN		Minor Large ♭36	
			♩7	♭2	SrgmPdN		Melodic Minor ♭236
			♩7	♩2	SRgmPdN		Aeolian Minor ♭367
			♭7	♭2	SrgmPdN		Phrygian Mode ♭2367

# Vedic Scales – Sharp Fourth

#4	#3	♯6	♯7	♯2	SRGMPDN		Lydian Mode ♯4
				b2	SrGMPDN		Marava Thata b2♯4
			b7	♯2	SRGMPDn		b7♯4
				b2	SrGMPDn		b27♯4
		b6	♯7	♯2	SRGMPdN		b6♯4
				b2	SrGMPdN		Sri Thata b26♯4
			b7	♯2	SRGMPdn		b67♯4
				b2	SrGMPdn		b267♯4
	b3	♯6	♯7	♯2	SRgMPDN		b3♯4
				b2	SrgMPDN		b23♯4
			b7	♯2	SRgMPDn		b37♯4
				b2	SrgMPDn		b237♯4
		b6	♯7	♯2	SRgMPdN		b36♯4
				b2	SrgMPdN		Todi Thata b236♯4
			b7	♯2	SRgMPdn		b367♯4
				b2	SrgMPdn		b2367♯4

## Vedic Scales Chart—Explanation

### 32 Vedic Scales.mp3

This chart, meant to be used as a reference, shows the 32 basic Vedic scales. All Vedic scales (*thatas*) are heptatonic, or have seven scale tones (*svaras*). These are denoted as follows:

Scale Tone	Svara	Abbreviation
I	Sa	S
II	Ri	R
III	Ga	G
IV	Ma	M
V	Pa	P
VI	Dha	D
VII	Ni	N

In Vedic scales, S and P are always perfect (natural); M may be natural (*shuddha*) or sharp (*tivra*), and R, G, D and N may be natural or flat (*komal*). A controversy exists between the Northern and Southern schools of Vedic music whether Shuddha Ma is actually the natural or the sharp Ma, in which case the natural Ma would become Komal (flat) Ma. This argument is based on the acoustic roots and harmonic values of all the intervals in the scale combined, and has some merit on this basis. Consequently we notate the scale tones as follows:

Degree	Svara	Abbreviation
I	Sa	S
II	Komal Ri	r
	Shuddha Ri	R
III	Komal Ga	g
	Shuddha Ga	G
IV	Komal Ma	m
	Shuddha Ma	M
V	Pa	P
VI	Komal Dha	d
	Shuddha Dha	D
VII	Komal Ni	n
	Shuddha Ni	N

For example, the ordinary Western Major scale is notated SRGmPDN, the Lydian Mode is notated SRGMPDN and the ordinary Dorian Minor is notated SRgmpDn. We also categorize the scales by natural or sharp 4 (according to the Western conception), and natural or flat 3, 6, 7 and 2. These categorizations are divided in order of the harmonic significance of the intervals concerned. Finally, the scale is shown in Western musical notation as it is spelled in the key of C.

## Scale-tone Chords and Harmony

The subject of harmony and its relation to melody unfortunately is shrouded in mystery for many musicians. This is primarily because the harmonic system is generally presented separately from its source, which are the various scales and modes in use in musical cultures around the world. Viewing a harmonic system in the context of its parent scale demystifies and clarifies the subject of harmony, which is simply patterns of chords based on the scale root and tones, and built in thirds.

Harmonic systems generally are derived from scales. The Western system of chromatic harmony is actually just a set of chords built in thirds from the diatonic major scale. Other, more exotic tonalities may be derived from the 32 scales of the Vedic musical system. These tonalities have expressive properties related to their parent scales, and which are the actual tools of a sophisticated system of musical composition that is capable of expressing any material or spiritual emotion.

### Thirds and Chords

Chords are built in thirds, and these thirds are derived from scales. Consider, for example, the Western Major scale:



Scale of C Major.mp3

If we play the Major scale in thirds:



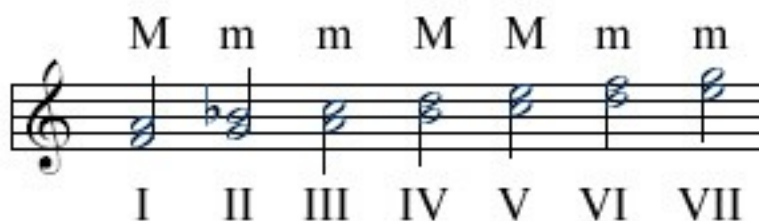
Scale of C Major in Thirds.mp3

These are called the **scale-tone thirds** of the scale. There are two qualities or kinds of thirds: **Major** and **minor**. A Major third is when the upper tone is 4 chromatic steps on the keyboard or fretboard from the lower tone; a minor third is three half-steps. If we analyze the scale-tone thirds of the Major scale, we get:

Third	Degree	Quality
C-E	I	Major
D-F	II	minor
E-G	III	minor
F-A	IV	Major
G-B	V	Major
A-C	VI	minor
B-D	VII	minor

In the Major scale of any key, the third built on the first degree of the scale (I) is **always** Major, the II third is **always** minor, and so on. The Roman numerals refer to scale degrees, not any particular note or key, and they help us identify structures and patterns in any key. For example, if we analyze the scale-

tone thirds in the scale of F Major, we find the same pattern:



Scale of F Major in Thirds.mp3

So to summarize, the scale-tone thirds of any Major scale in any key are always Major thirds for the I, IV and V degrees of the scale, and minor thirds for the II, III, VI and VII degrees.

### Scale-tone Triads

Now let us examine the scale-tone triads of the C Major scale:



Scale-tone Triads C Major.mp3

These are analyzed as follows:

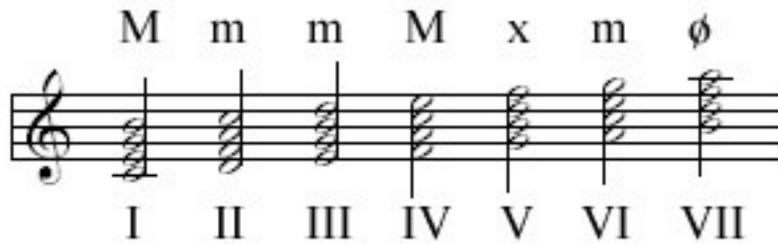
Triad	Degree	Lower	Upper	Quality
C-E-G	I	M	m	Major
D-F-A	II	m	M	minor
E-G-B	III	m	M	minor
F-A-C	IV	M	m	Major
G-B-D	V	M	m	Major
A-C-E	VI	m	M	minor
B-D-F	VII	m	m	diminished

- When a triad's **lower third is Major** and **upper third is minor**, it is called a **Major Triad**.
- When a triad's **lower third is minor** and **upper third is Major**, it is called a **minor Triad**.
- When a triad's **lower and upper thirds are both minor**, it is called a **diminished Triad**.

This same pattern repeats in every key. So the **Scale-tone Triads of any Major scale are always Major Triads for the I, IV and V degrees of the scale, always minor for the II, III and VI degrees, and diminished for the VII degree.**

### Scale-tone Seventh Chords

Finally, let us examine the scale-tone seventh chords of the C Major scale:



Scale-tone Chords C Major.mp3

Seventh	Degree	Lower	Mid	Upper	Quality	Symbol
C-E-G-B	I	M	m	M	Major	CM <sup>7</sup>
D-F-A-C	II	m	M	m	minor	Dm <sup>7</sup>
E-G-B-D	III	m	M	m	minor	Em <sup>7</sup>
F-A-C-E	IV	M	m	M	Major	FM <sup>7</sup>
G-B-D-F	V	M	m	m	Dominant	G <sup>7</sup> , Gx
A-C-E-G	VI	m	M	m	minor	Am <sup>7</sup>
B-D-F-A	VII	m	m	M	half-diminished	Bø <sup>7</sup>

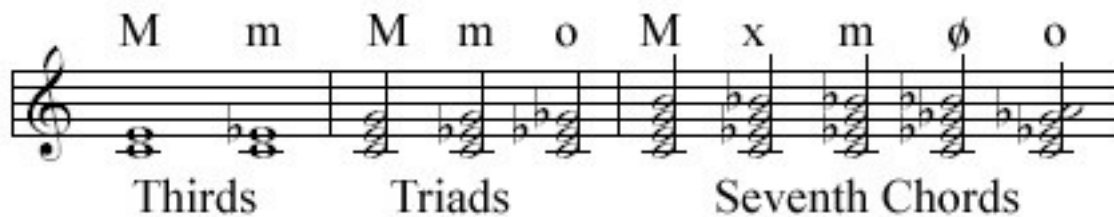
- When a seventh chord's **lower third is Major**, its **middle third is minor** and its **upper third is Major**, it is called a **Major seventh chord**.
- When a seventh chord's **lower third is minor**, its **middle third is Major** and its **upper third is minor**, it is called a **minor seventh chord**.
- When a seventh chord's **lower third is Major**, its **middle third is minor** and its **upper third is minor**, it is called a **Dominant seventh chord**.
- When a seventh chord's **lower third is minor**, its **middle third is minor** and its **upper third is Major**, it is called a **half-diminished seventh chord**.

This same pattern repeats in every key. So the **Scale-tone Seventh Chords of any Major scale are always Major Triads for the I and IV degrees of the scale, always Dominant for the V degree, always minor for the II, III and VI degrees, and always half-diminished for the VII degree.**

The Dominant seventh chord is very common, so much so that the generic term 'seventh' usually is taken to mean a Dominant seventh chord; it appears in the scale-tone chords of the Major scale and all its modes, and is denoted by the symbol 7 or x. The fully-diminished seventh chord has all minor thirds, and while common, does not appear in the scale-tone chords of any Major scale or mode based on the Major scale; it is denoted by the symbol ø. The half-diminished seventh chord is very common in jazz (where it is often incorrectly termed the 7<sup>b</sup>5 or 'diminished twelfth' chord), and appears in the scale-tone chords of all Major scales and modes based on the Major scale; it is denoted by the symbol ø.

## Harmonic Qualities

To sum up: the thirds, triads and seventh chords used in diatonic harmony are derived from the tones of the scale. Intervals and chords have different harmonic qualities according to their arrangement of Major and minor thirds, as follows:



### Harmonic Qualities.mp3

Here the thirds, triads and seventh chords are shown spelled from the root of C for comparison. Thirds can be Major or minor; triads can be Major, minor or diminished; and seventh chords can be Major, Dominant, minor, half-diminished or fully diminished, according to their arrangement of Major and minor thirds.

### Composite Harmonic Values

Like scales, intervals, triads and chords also exhibit harmonic values that are composites of their intervals. Using the Harmonic Value Formula at right, we can calculate the composite harmonic value for any interval, triad or chord.

$$V_k = \left[ \frac{1}{\left( \frac{f_1 + f_2 \dots f_n}{n} \right)} \right]$$

Interval or Chord	Symbol	Harmonic Value
Major third	M3	0.222
minor third	m3	0.182
Major triad	M	0.804
minor triad	m	0.804
diminished triad	o	0.530
Major seventh	M <sup>7</sup>	1.169
Dominant seventh	x <sup>7</sup>	1.168
minor seventh	m <sup>7</sup>	1.168
half-diminished	ø <sup>7</sup>	0.934
diminished seventh	o <sup>7</sup>	0.962

Since these values are composites, intervals, triads and chords can be compared meaningfully only with like items. Still, the calculation gives us insight into the value and use of these harmonic structures. Even though a minor third has less harmonic value or acoustic weight than a Major third, the Major and minor triads are equal in strength because these triads each have a Major and a minor third. Then why does the Major third sound stronger to our ears? I think it is because the Major third is lower in the Major triad.

Thus position also affects harmonic value; but to keep these calculations reasonably simple I do not consider it explicitly here. After all, we are just trying to establish a rule of thumb to guide our creative intuition, not a scientifically rigorous mathematical method to replace it. Nevertheless it is clear that the closer an interval is to the root of the chord, the more harmonic weight it acquires from this position.

Similar considerations apply to the seventh chords. Although it is surprising that the Major, Dominant and minor seventh chords are so close in harmonic value, the difference to our ears is easily explained by the differences in position of the Major and minor thirds in the chord structures. One surprise is that the diminished seventh chord appears harmonically stronger than the half-diminished. But this is not so surprising when one considers that the only difference between them is that the diminished seventh

chord contains a diminished seventh (identical to the Major sixth), which is harmonically stronger than the half-diminished seventh chord's minor seventh.

### Chord Progressions

Now Diatonic Harmony is simply patterns or progressions of scale-tone chords. The most common patterns are scale-wise, either up or down the scale; and the circle of fifths. Patterns based on thirds are also common, as are substitutions of chords with chords a third distant. Some familiar examples:

Scale-wise	Circle of fifths	Thirds
I-II-III-IV-I	II-V-I	I-III-I-VI
I-IV-III-II-I	III-VI-II-V-I	I-VI-IV-II-I
I-V-VI-VII-I	I-IV-VII-III-VI-II-V-I	II-V-VI-I

**Chord Patterns.mp3**

Note that, especially in classical music, chord progressions tend to move from chords with lower harmonic value to chords of higher harmonic value. While other types of patterns are certainly possible, they do not give the same satisfying feeling of resolution of harmonic or emotional tension. Composers intuitively apply the harmonic and melodic values of chords and intervals to generate patterns of emotional tension and release that give expression to their music.

Chromatic Harmony simply takes the process of chord substitution a step further, inserting or replacing chords in common patterns with harmonically altered chords, or chords from related keys. The same chord patterns used with familiar scales can also be used with the Vedic scales to create novel harmonic progressions.

Diatonic Progression	Chromatic Substitution
II-V-I	II- $\flat$ II $_x$ -I
III-VI-II-V-I	III- $\flat$ III $_x$ -II- $\flat$ II $_x$ -I
I-II-III-IV-I	I- $\sharp$ I $_o$ -II- $\sharp$ II $_o$ -III-IV-I
I-IV-III-II-I	I-IV $_x$ -III $_M$ -III $\emptyset$ -II- $\flat$ II $_x$ -I
I-III-I-VI	I-III $_x$ -I $_x$ -VI $_o$ -I
I-VI-IV-II-V-I	I-VI $_x$ -IV-II- $\flat$ II $_x$ -I

**Chromatic Substitution.mp3**

Of course there is much more to the subject of harmony; we have not touched on inversions, higher partials, voicings, voice-leading and so many other topics. But our purpose here is not to explore harmony elaborately, which has already been done competently by others; it is to build a theoretical foundation of terminology and notation that will allow us to explore the applications of the Vedic scales that we presented in the first section.

### Melody and Tonality

Before we can explore the complete theoretical structures of the many alternate tonalities available from the Vedic scales, we need to define tonality, establish its relationship with harmony and melody, and

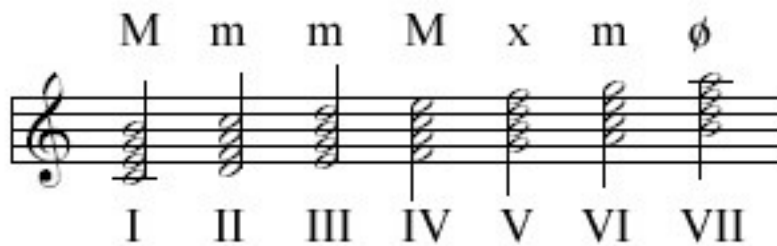
demystify the relationship between scales and chords. The relationship of melody, harmony and tonality can be deep and apparently complex, but it is actually very simple: the melody is based on a temporary scale that is appropriate to the current chord progression, but the chord progression is derived from an underlying, more permanent scale. The underlying scale from which the chord progressions are derived is called the **tonality** of the piece. Of course the tonality may also change, particularly in a longer piece with contrasting sections; but the scale of the melody may change with each chord, especially when chromatic harmony is used.

### Chords and Scales

Which scales are appropriate to play with which chords? This knowledge is the key to the art of improvisation and the gateway to the craft of musical composition. Consider again the scale and scale-tone chords of the key of C Major:



Scale of C Major.mp3



Scale-tone Chords C Major.mp3

Now if we build a modal scale on the root of each scale-tone chord, we get the following:



Mixolydian Aeolian Locrian

V (Dominant) VI (minor) VII (half-diminished)

### Chords and Scales.mp3

Now let us analyze the C Major scale-tone chords and their scale modes in terms of their intervals:

Degree	Chord Quality	Chord Intervals	Scale Name	Scale Mode	Mode Intervals
I	Major	M-m-M	Major	Ionian	SRGmPDN
II	minor	m-M-m	$\flat 37$	Dorian	SRgmPDn
III	minor	m-M-m	$\flat 2367$	Phrygian	SrgmPdn
IV	Major	M-m-M	$\sharp 4$	Lydian	SRGMPDN
V	Dominant	M-m-m	$\flat 7$	Mixolydian	SRGmPDn
VI	minor	m-M-m	$\flat 367$	Aeolian	SRgmPDn
VII	half-diminished	m-m-M	$\flat 23567$	Locrian	Srgmpdn

Thus the following is true for **any Major scale in any key**:

- The I chord takes the Major scale, Ionian mode or SRGmPDN, based on its root.
- The II chord takes the  $\flat 37$  scale, Dorian mode or SRgmPDn, based on its root.
- The III chord takes the  $\flat 2367$  scale, Phrygian mode or SrgmPdn, based on its root.
- The IV chord takes the  $\sharp 4$  scale, Lydian mode or SRGMPDN, based on its root.
- The V chord takes the  $\flat 7$  scale, Mixolydian mode or SRGmPDn, based on its root.
- The VI chord takes the  $\flat 367$  scale, Aeolian mode or SRgmPDn, based on its root.
- The VII chord takes the  $\flat 23567$  scale, Locrian mode or Srgmpdn, based on its root.

This knowledge allows us to compose or improvise an appropriate melody to any chord or progression. In general, any Major chord may be treated as a I chord; any Dominant chord may be treated as a V chord; any minor chord may be treated as a II or VI chord, and any half-diminished chord may be treated as a VII chord. A chord that does not belong to the current tonality, such as a chromatic or altered chord, implies a new temporary key and takes a scale from that key. For example, consider the chromatic progression II- $\flat$ IIx-I:

### Chromatic Progression.mp3

The II chord is a minor seventh, so it takes the Dorian scale mode, SRgmPDn; as expected, the I chord takes the Major scale or Ionian mode. But the ♭IIx is not native to the key of C; it is actually the V chord of the key of G♭, so it takes the Dominant or Mixolydian mode, SRGmPDn, from the root of D♭. The ♭IIx chord establishes a temporary key or scale of G♭ Major, because it is naturally the V chord of that key. This does not create a modulation, because the underlying tonality is still C. But it does reference another set of scale-tone chords, and thus the melody for that chord is drawn from an appropriate mode of that scale.

This example very nicely illustrates the difference between a scale and a tonality. While the ♭IIx chord references a temporary key or scale, it does not change the underlying tonality of C Major. The tonal center of C exerts a harmonic attraction, forcing the progression to resolve to the I chord to resolve the harmonic tension. The use of chromatic chord substitutions increases this harmonic tension by temporarily introducing foreign keys into the tonality of a piece, and can be used very effectively to enhance its emotional expression.

## Vedic Tonalities

Well it has been a long and interesting journey through the world of music to reach this point, but we now have sufficient background to address our main subject: the harmonic value and use in musical composition of the 32 Vedic scale tonalities. The amazing thing about this is that here is a piece of work that has occupied me for a substantial fraction of my life, which has embedded in it infinite possibilities for creation of beautiful and profound spiritual art, and it is all derived from two lines of Sanskrit code in *Srimad-Bhagavatam*:

*svarāḥ sapta vihāreṇa  
bhavanti sma prajāpateḥ*

"Brahmā's sensual activities were manifested as the seven notes of music." [*Srimad-Bhagavatam* 3.12.47]

Actually just the two words *svarāḥ sapta* contain the whole system of Vedic music. Once you start investigating the deep implications of the meaning of *svarāḥ sapta* [seven scale tones based on integral harmonic ratios], the whole thing just unravels before the mind's eye and one is struck with wonder. All this complex structure and beauty is implied by the Law of Harmonics, which affects every type of

energy and every object in the universe. I can understand the deep meaning of this particular *sloka* because I happen to have some training and background as a musician; but I can understand that there are many profound sciences contained within the *slokas* of the *Bhagavatam* and other Vedic works, if we just have the eyes to see them and the intelligence to expand the Sanskrit in which they are encoded.

### 32 Vedic Scales and Scale-tone Chords

This chart and accompanying MP3 file present the 32 principal Vedic scales, their spelling in *sargams*, names, scale-tone chords, chord qualities and harmonic values. It is meant to be a reference for the musician and composer to help in selecting and implementing the appropriate scales and modes. All are shown with a C root; transposing them to other keys is left, as it is said, as an exercise for the reader.

Also, don't forget that like any scales and chords, these can be used in various modes and inversions as well. The whole point is to spark the artists' creativity, not limit it. This is a treasure trove of material, not a finished work. Especially the MP3 is not meant for listening pleasure, but as a reference of tonal resources for the composer. We have all heard these sonorities before, especially in modern music; but seldom is the composer fully aware of the corresponding scales and tonalities, and must proceed on the strength of his musical intuition alone instead of a comprehensive music theory.

The table below explains the chord symbols used in the chart, some of which may be unfamiliar. Many of the scale-tone chords are not really seventh chords, but can only be interpreted as voicings based on inversions, often including upper partials.

Symbol	Name	3 <sup>rd</sup>	5 <sup>th</sup>	7 <sup>th</sup>
M	Major Seventh	M	P	M
M <sup>+6</sup>	Major + 6	d	d	m
x	Dominant Seventh	M	P	m
m	minor seventh	m	P	m
ø	half-diminished seventh	m	d	m
o	diminished seventh	m	d	d
mL	minor large	m	P	M
M+	Major Augmented	M	A	M
x+	Dominant Augmented	M	A	m
m+	minor augmented	m	A	m
x <sup>sus4</sup>	Dominant Suspended 4th	A	P	m
x <sup>69</sup>	Dominant Ninth + 6	M	d	M
m <sup>6</sup>	minor + 6	d	P	d
o <sup>9</sup>	diminished + 9	M	d	m
o <sup>6</sup>	diminished + 6	A	A	M
oL	diminished large	m	d	M

To explain this chart, we must revisit the subjects of the categories of intervals and the qualities of

chords built with them. Intervals may have the following qualities and designations:

Interval	Quality	Half-steps	Symbol	Example
3 <sup>rd</sup>	Augmented	5	+	C - E#
	Major	4	M	C - E
	minor	3	m	C - E $\flat$
	diminished	2	o	C - E $\flat\flat$
5 <sup>th</sup>	Augmented	8	+	C - G#
	Perfect	7	P	C - G
	diminished	6	o	C - G $\flat$
7 <sup>th</sup>	Major	11	M	C - B

All the scale-tone seventh chords discussed herein are built in thirds, and the qualities of these thirds are given in the three columns on the right of the table. If we define a seventh chord as a tone cluster with a third, fifth and seventh, then there are  $4 \cdot 3 \cdot 3 = 36$  theoretically possible seventh chords. However, only about half of these are in practical use, and acoustically many of those are inversions or voicings of other chords. After all, an augmented third is equivalent to a perfect fourth, and a diminished seventh is acoustically identical to a sixth.

The sixteen different variations on the seventh chord that appear in the scale-tone chords of the 32 Vedic scales provide a large variety of tonalities, from the familiar to quite exotic, that may be explored by composers to provide interest and color to their works while remaining on theoretically solid ground. Many unique and interesting tone colors, melodies and harmonic progressions may be built from these musical materials. For example, here we use the familiar I-V-I-IV-V-I progression with the  $b67\#4$  scale to create an interesting comic effect:

1: Melody

2: Chords I V I IV

3: Drone

**SRGMPdn**

1: Melody



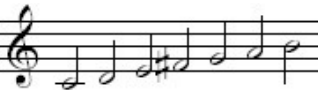
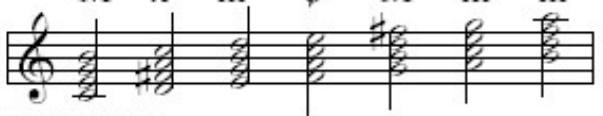
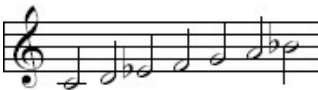
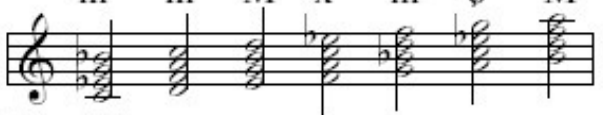
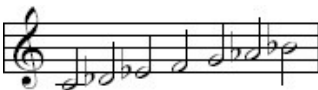
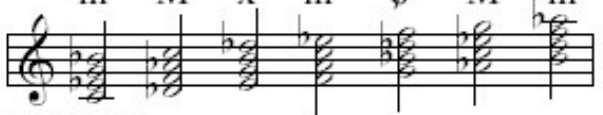

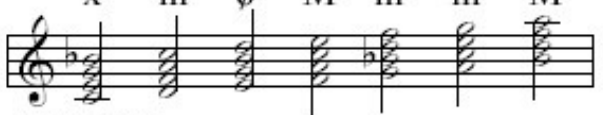

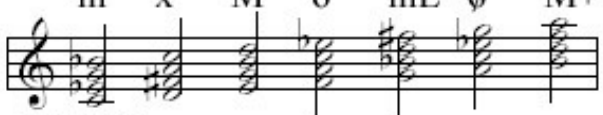
2: Chords V I

**Example b67#4.mp3**



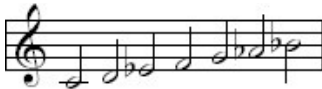





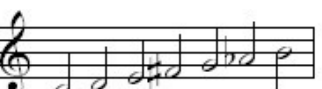
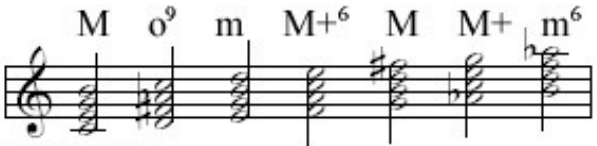
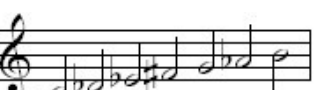
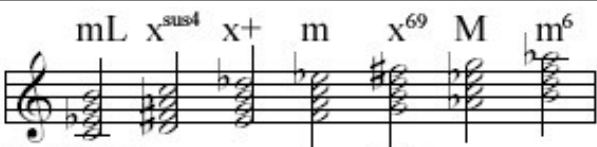
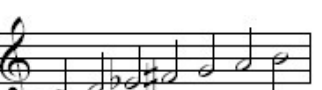
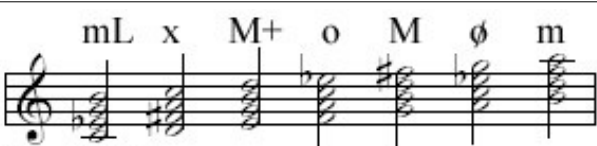
The 32 Vedic scales are a treasure of untapped tonal and melodic resources. They open a vast territory of unexplored sonorities to competent, adventurous musicians eager for new sounds. They have the potential to revive our interest in music, the way a fresh palette can revive our interest in painting or exotic foods and gourmet spices can give us new interest in food. Please use them well and enjoy God's gift to the world of music.

David Bruce Hughes  
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Las Margaritas Village,  
Lake Catemaco, Mexico  
April 13, 2008

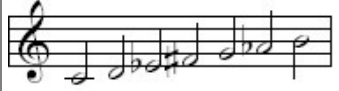



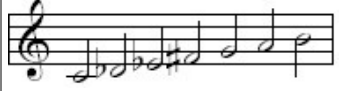

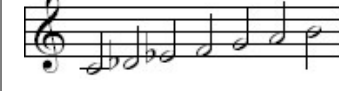
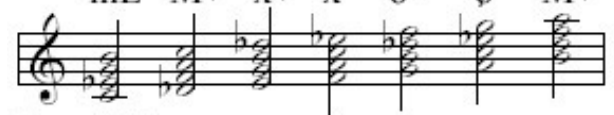
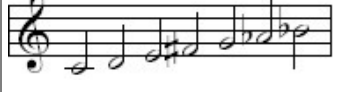

# 32 Vedic Scales and Scale-tone Chords

Sargam	Name	Scale	Scale-tone Chords and Qualities	Value
SRGmPDN	Ionian (Major) Bilaval Thata		<p>M m m M x m <math>\emptyset</math></p>  <p>SRGmPDN</p>	4.593
SRGMPDN	Lydian Mode #4		<p>M x m <math>\emptyset</math> M m m</p>  <p>SRGMPDN</p>	4.593
SRgmPDn	Dorian Minor b37		<p>m m M x m <math>\emptyset</math> M</p>  <p>SRgmPDn</p>	4.483
SrgmPdn	Phrygian Mode b2367		<p>m M x m <math>\emptyset</math> M m</p>  <p>SrgmPdn</p>	4.470
SRGmPDn	Mixolydian Mode b7		<p>x m <math>\emptyset</math> M m m M</p>  <p>SRGmPDn</p>	4.369
SRgMPDn	b37#4		<p>m x M o mL <math>\emptyset</math> M+</p>  <p>SRgMPDn</p>	4.351

SrGMPdN	Sri Thata b2#4		<p>M x<sup>sus4</sup> o ∅ x<sup>9+6</sup> M+ m<sup>6</sup></p> <p>SrGMPdN</p>	4.348
SrGmPdN	Bhairava Thata b26		<p>M M m<sup>6</sup> mL o<sup>9</sup> M+ x</p> <p>SrGmPdN</p>	4.348
SrgMPdn	b2367#4		<p>m x<sup>sus4</sup> x x oL M x<sup>69</sup></p> <p>SrgMPdn (Ab)</p>	4.338
SrGMPDN	Marava Thata b2#4		<p>M o<sup>6</sup> o ∅ oL m m</p> <p>SrGMPDN</p>	4.275
SrgmPDn	b237		<p>m M+ x x ∅ ∅ mL</p> <p>SrgmPDn</p>	4.254
SrGmPDN	b2		<p>M M+ o M o<sup>9</sup> m ∅</p> <p>SrGmPDN</p>	4.251
SrGmPdN	b267		<p>x M o mL ∅ M+ ∅</p> <p>SrGmPdN</p>	4.237

SRgmPDN	b3		<p>mL m M+ x x ø ø</p>  <p>SRgmPDN</p>	4.228
SRgmPdn	Aeolian Minor b367		<p>m ø M m m M x</p>  <p>SRgmPdn</p>	4.220
SRGmPdN	b6		<p>M ø m mL x M+ o</p>  <p>SRGmPdN</p>	4.211
SrGmPDn	b27		<p>m M+ x x ø ø mL</p>  <p>SrGmPDn</p>	4.191
SRGMPdN	b6#4		<p>M o° m M+<sup>6</sup> M M+ m<sup>6</sup></p>  <p>SRGMPdN</p>	4.187
SrgMPdN	Todi Thata b236#4		<p>mL x<sup>sus4</sup> x+ m x<sup>69</sup> M m<sup>6</sup></p>  <p>SrgMPdN (A)</p>	4.179
SRgMPDN	b3#4		<p>mL x M+ o M ø m</p>  <p>SRgMPDN</p>	4.151

SrgMPDn	$b237\#4$		<p>m o<sup>6</sup> x o oL ø m<sup>+</sup></p>  <p>SrgMPDn</p>	4.146
SRGMPDn	$b7\#4$		<p>M o<sup>6</sup> o ø oL m m</p>  <p>SrGMPDN</p>	4.146
SrgmPdN	Melodic Minor $b236$		<p>mL M x<sup>+</sup> m o<sup>9</sup> M m</p>  <p>SrgmPdN</p>	4.128
SRgmPdN	Minor Large $b36$		<p>mL ø M<sup>+</sup> x x M o</p>  <p>SRgmPdN</p>	4.082
SRgMPdn	$b367\#4$		<p>m o<sup>9</sup> M x mL M x<sup>+</sup></p>  <p>SRgMPdn</p>	4.064
SrGMPdn	$b267\#4$		<p>x x<sup>sus4</sup> ø M<sup>+9</sup> oL M<sup>+</sup> m<sup>6</sup></p>  <p>SrGMPdn</p>	4.054
SrGMPDn	$b27\#4$		<p>x o<sup>6</sup> o ø x m o</p>  <p>SrGMPDn</p>	4.032

SRgMPdN	$b36\#4$		<p>mL o<sup>9</sup> M+ o M M m<sup>6</sup></p>  <p>SRgMPdN</p>	4.005
SRGmPdn	$b67$		<p>x ø ø mL m M+ x</p>  <p>SRGmPdn</p>	3.936
SrgMPDN	$b23\#4$		<p>mL o<sup>6</sup> x+ o x<sup>69</sup> ø x<sup>69</sup></p>  <p>SrgMPDN (A) (A)</p>	3.910
SrgmPDN	$b23$		<p>mL M+ x+ x o<sup>9</sup> ø M+</p>  <p>SrgmPDN</p>	3.835
SRGMPdn	$b67\#4$		<p>x x<sup>sus4</sup> ø x+ mL M+ x</p>  <p>SRGMPdn</p>	3.729