BASIC MUSICAL INTERVALS AND COLOUR SYMBOLISM

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Colour can be used symbolically to represent or classify the emotional quality of a certain acoustic order of musical notes, where each successive note of that order qualitatively makes an increasingly intensified or an increasingly attenuated musical interval with a given fixed note. There are two principal series of musical notes so related, namely: the *quintals* and the *tertians*.

Acoustics and Aesthetics

If acoustics is a branch of physics, aesthetics is a branch of philosophy. But we are not interested in the aesthetics of the abstruse metaphysician who for centuries has vainly tried to abstract cold Beauty from without, as if it were an elusive thing apart and he himself was not emotionally involved in or affected by it.

We are interested in the approach of the psychologist according to whom the stimulus has the power to appeal to our feelings, and the experience, aesthetic or emotional, direct or indirect, is in us since it is our reaction to that stimulus.

The sense-impression created by a phenomenon like a concordant musical interval, is direct and immediate. While the aesthetic experience gained from a well-designed melody, made of many such organized intervals in good proportion and balance, is indirect being mediated through the intellect.

Music has two aspects: the scientific and the psychological, the acoustics and the aesthetic. We know all about physical acoustics and physiological acoustics, but there are other phenomena which are psychological.

Psychological Acoustics

If a man can intuitively take the positive interval of the tertian major-third (*swayambhu gandhar*) upwards, impelled by the physiologically innate urge for that consonance, he can, just as easily, reverse that interval guided by memory alone, and take the negative interval of the same major-third downwards. But the results are strangely antithetical. While the active

major-third sounds major in relation to the starting note, the passive *major-third* sounds *minor*. Similarly, an ascending *minor-third* sounds a vague *minor:* and a descending *minor-third* sounds a vague *major*. This is what I would like to call *psychological acoustics*.

Ascriptive Colour Symbolism

We may subjectively choose the *pink* colour, which is usually ascribed to gaiety and pleasure, to symbolise the active principle of the *rising major-third*. We may then choose the *blue* colour, which is just as commonly taken to signify sadness and pain, to symbolise the passive principle of the same *major-third falling* — now turned *minor* in the process.

Though music without words can be an abstract medium, we sometimes like to experience, and possibly give descriptive names or attributes to, the emotional qualities of musical intervals, symbolically or otherwise, before we can apprehend the cumulative effect of a well designed melody. Just as we must concretely know the meaning of words before we can understand a language.

In giving descriptive names to all his *sruti*-s, Shrangadeva tried to do precisely this, but the epochal circumstances were against him. Not all the intervallic relations were reckoned from one fixed point of reference. The intervals had no fundamentality of the Universal Basic Scale. Shrangadeva believed in more than one scale and tried to account for the other intervals as well.

Categories of Intervals

With respect to a given fixed note representing the tonic SA, most of the basic intervals, scientifically selected above that fundamental to form a rational scale, come under two positive categories: the active quintals governed by the prime number 3 e.g. Pa and Ri, and the active tertians governed by the prime number 5 e.g. Ga and Ni.

Contrariwise,the two above mentioned positive categories, when reversed, bring about the other two negative categories, their corresponding counterparts; the passive quintals governed by the inverted prime number 3 e.g. Ma and Ni. k, and the passive tertians governed by the inverted prime number 5 e.g. Dha k and Ri. k.

Basic Musical Intervals

All the scalic systems of the world were founded primarily on the above scientific basis, consciously or unconsciously. Contrary to the opinion of musicologists, it is my view, therefore, that the Universal Basic Scale of Unicentric Tonality is common to all the musical systems of the world. Hence for the purpose of this discussion, there arises the necessity of our determining the limit of the Basic Musical Intervals, consisting of consonances and dissonances.

Thousands of years before Marin Mersenne (1636 A.D.) discovered the Natural Law of the Harmonic Series and the Law of Vibrations, the Egyptian, the Sumerian, the Chinese, the Indian, the Greek the Arabic and the Persian systems of music were arrived at solely by mens of string lengths and the Ear Method.

All these systems were derived either from the cyclic, the equipartitive, the auricular or the divisive principles. They can now be tested for accu-

racy against the modern harmonic laws of acoustics. All these systems obtained the same results, namely: the Universal Basic Scale.

The Indian *sruti* system of Bharata was so far supposed to be a vaguely descriptive and indeterminate Ear Method, without any ratios or measurements. Having evolved an algebraic formula, during my recent studies in undamental research, to prove the exact values of Bharata's *sruti*-s, I would call the Indian system an Algebraic Method.

The Pancham or Quintal Age

Chronologically speaking, the use of the quintal interval *swayambhu pancham* came first, for, in recorded history, this innate consonace of the fifth was first used by man to construct his scale-degrees.   I call this pre-Buddhistic Period the *Pancham* or the *Quintal Age*.

In China, the legendary Ling Lun (c. 2700 B.C.) is reported to have cut twelve bamboo pipes into a chain of ascending fifths, by cutting each successive pipe 2/3 in length of the previous one. The series of the first five positive-fifths, he thus obtained, consists of SA Pa Ri Dha Ga.   This cycle of five fifths, arranged in scalic order, resulted in the consistent Chinese tradition consisting of the practical major-pentatonic, corresponding to the Indian *Bhoop:* SA Ri Ga Pa Dha.

According to an ancient Greek tradition, the earlier Egyptian bow-shaped harp, seen in reliefs and paintings of 3rd millenium B.C. — the same as the Sumerian harp or that of the Indus Valley Civilization — was tuned in falling fourths to a descending minor-pentatonic: SA Dha. k Pa Ga. k Ri.

The Generating Centre

The musical interval of the fifth in relation to a given fixed note can be either a positive fifth or a negative fifth. Hence, these contrasting fifths can be represented by opposite colours — conventionally — RED and GREEN; they are governed by the prime number 3 in the numerator and the denominator respectively.

Thus, if SA be the generating centre, representing unity in *black*, the active and the passive fifths on the two sides of the centre will be Pa (Red) and Ma (Green) respectively:

Fig. (i) The Centre and the Opposite Fifths:

Ma	SA	Pa
2/3	1	3/2
Green	Black	Red

Ascending Tartivra Fifths

The next step taken by man, to extend the above skeletonic frame to a 7-note quintal series, was to continue the positive series of *tartivra* fifths, thus intensifying progressively the active RED principle by higher powers of 3 in the numerator, namely: 3, 9, 27, 81, 243.

This extended quintal series of five positive fifths above the central unity SA, with just one negative fifth Ma, is shown below in the form of continuous ascending-series of 7 degrees. The notes are indicated by their initial consonants.

Fig. (ii) Ascending Degrees of Fifths:

M	S	P	R	D	G	N
3	1	3	9	27	81	243
Green	Black	Red	Red	Red	Red	Red

Note: Later in the post-Buddhistic Period, which I call the Tertian Age, the above-mentioned last three quintal notes, the *tartivra* Dha Ga Ni were substituted by the more consonant tertian *tirva* notes.   This improvement was made possible through the use of the *swayambhu gandhar* which discovery was first made in India in the 5th Cdntury B.C.

The Upright Quintal Scale

The rearrangement of the above quintal series of fifths provided the Indian type of upright diatonic scale, a rough precursor model of the future perfect-scale to come: the Universal Basic *Saptak* (MA-*Grama* of Bharata). The rearranged quintal notes, represented by initial consonants, are given below with their respective ratios and colours.   I call this tabulation the Upright Quintal Scale.

Fig. (iii) The Upright Quintal Scale, Ascending:

Notes:	S	R	G	M	P	D	N
Ratios:	1	9/8	81/64	4/3	3/2	27/16	243/128
Colour:	Black	Red	Red	Green	Red	Red	Red

Descending Atikomal Fifths

While the Upright Quintal Scale was being evolved in the Quintal Age, the Greeks were constructing a descending quintal scale by extending downwards the negative series of *atikomal* fifths, thus intensifying progressively the passive Green principle by higher powers of 3 in the denominator, namely: 3, 9, 27, 81, 243.

This extended quintal series of five negative fifths below the central unity SA, with just one positive fifth Pa, is shown below in the form of continuous descending-sries of 7 degrees.

Fig. (iv) Descending Degrees of Fifths:

Rk	Dk	Gk	Nk	M	S	P
243	81	27	9	3	1	3
Green	Green	Green	Green	Green	Black	Red

Note: Later in the post-Buddhistic Period, that is in the Tertian Age, the above-mentioned last three quintal notes, the *atikomal* Gk, Dk, Rk, were substituted by the more consonant tertian *komal* notes. This improvement was made possible by the discovery of *swayambhu gandhar* in India in the 5th century B.C.

The Upturned Pythagorean Scale

The rearrangement of the above quintal series of fifths provided the Greek type of upturned diatonic scale, a rough precursor model of the future upturned scale which the Greeks (including Didymus and Ptolemy) somehow failed to perfect. The rearranged quintal notes, represented by initial consonants, are given below with their respective ratios and colours. The sequence of intervals being the exact reversal of the Upright Qunital Scale, I call this tabulation the Upturned Quintal Scale.

Fig. (v) The Upturned Quintal Scale, Descending:

Notes:	S	Nk	Dk	P	M	Gk	Rk
Ratios:	1	8/9	64/81	3/4	2/3	16/27	128/243
Colour:	Black	Green	Green	Red	Green	Green	Green

The Swayambhu Gandhar Age

The epochal discovery of the *swayambhu gandhar* in India, in the 5th century B.C., introduced a new tertian *tivra-gandhar* as a subsidiary positive centre which immediately rendered consonant the last three dissonant *tartivra* notes Dha Ga Ni in the series given in Fig. (ii).

The last three, harsh, quintal, *red* notes were substituted by concordant, tertian, *pink* notes governed by multiples of 5 in the numerator, each tertian *tivra* note being a Didymian comma *pramana sruti lower* than the corresponding quintal *tartivra* note. In the illustration given below, the new low-tertian *tivra* notes are marked with *a comma at the bottom* of the letter, to distinguish them from the old high-quintal *tartivra* notes.

The following illustration shows the old series in juxtaposition with the new series, wherein the three new low-tertain consituents are substituted for the three old high-quintals.

Fig. (vi) — The Old and the New Ascending Series:

Old Series:

M	S	P	R	D	G	N
3	1	3	9	27	81	243
Green	Black	Red	Red	Red	Red	Red
				x	x	x
				/	/	/

New Series:

M	S	P	R	D₁	G₁	N₁
3	1	3	9	5	5	15
Green	Black	Red	Red	Pink	Pink	Pink

3 Tivra Notes

The Negative Gandhar or Komal Dhaivat

Similarly the *komal dhaivat*, the negative counterpart of the positive *swayambhu gandhar*, introduced a new tertian *komal dhaivat* as a subsidiary negative centre which immediately rendered consonant the last three dissonant *atikomal* notes Ga. k Dha. k Ri. k in the series given in Fig. (iv).

The last three, harsh, quintal, *green* notes were substituted by concordant, tertian *blue* notes governed by multiples of 5 in the denominator, each tertian *komal* note being a Didymian comma *pramana sruti higher* than the corresponding quintal *atikomal* note.

In the illustration given below, the new high-tertian *komal* notes are marked with a *comma at the top* of the letter, to distinguish them from the old low-quintal *atikomal* notes.

The following illustration shows the old series in juxtaposition with the new series, wherein the three new high-tertian constituents are substituted for the old low-quintals.

Fig. (vii) The Old and the New Descending Series:

Old Series:	Rk	Dk	Gk	Nk	M	S	P
	243	81	27	9	3	1	3
	Green	Green	Green	Green	Green	Black	Red
	x	x	x				
New Series:	R^1k	D^1k	G^1k	Nk	M	S	P
	15	5	5	9	3	1	3
	Blue	Blue	Blue	Green	Green	Black	Red

3 Komal Notes

Collecting the scale-degrees of the main generating centre S and those of the two subsidiary centres formed by the *positive grandhar* G_1 and the *negative gandhar* D^1k we get the essential constituents of the ascending and the descending series. These are the elements that make up the Upright Universal Basic Scale and the Upturned Basic Scale.

Fig. (viii): One Main and Two subsidiary Centres:

	Nk	M	S	P	R		
	9	3	1	3	9		
	Green	Green	Black	Red	Red		
R^1k	D^1k	G^1k			D_1	G_1	N_1
15	5	5			5	5	15
Blue	Blue	Blue			Pink	Pink	Pink

The Universal Basic Scale

Ma-Grama of Bharata (5th-4th cent. B.C.)[1]

We now come to the greatest Indian event in the World History of Music as a sequel to the epochal Indian discovery of *swayambhu gandhar*. Bharata in his *Natya Shastra* finally formulated the *Ma-Grama*, the only perfect scale based on rational consonances. He thus provided what I call the Universal Basic Scale of Unicentric Tonality, about 2,000 years before Zarlino advocated the superiority of this scale in Europe in 1558 A.D. This 2400 year old 7-note Basic Scale of Bharata has since not been and cannot possibly be improved upon.

Zarlino had called it the "natural scale", a term that is not quite adequate. This scale is not a "natural" law or phenomenon, though, in my publications elsewhere, I have proved it to be indisputably Universal, Basic and Unicentric. Every other scale is either bi-centric or irrational.

Zarlino, however, had wrongly called it the Ptolemaic Sequence by mistaking the erroneous order of one of Ptolmy's many descending permutations of the Greek Dorian. Didymus and Ptolemy[2] had each missed-the Greek Dorian by just one comma. *I* have drawn the True Greek Dorian in Fig. (x).

Describing the Sa-Grama as being more symmetrical in the two tetrachords, Bharata seems to uphold its sequence, which to my mind is an imperfect double-scale of bi-centric tonality. Sa-*grama*, precisely because it is symmetrical falls short of the Universal Basic Scale just by one comma. It has two tonic-centres. Its first-half is Sa-scale and the second-half is Pa-scale.

Fig. (ix): MA-GRAMA — The Universal Basic Scale and Sa-Grama,

compared:

		204		182		112			182		204		112	
MA-GRAMA Unicentric	S		R		G$_I$		M	P		D$_I$		N$_I$		S
Non-Symmetrical	1		9/8		5/4		4/3	3/2		5/3		15/8		2
Tivra-Pink, D$_I$										Pink				

		204		182		112			204		182		112	
Sa-Grama Bi-centric	S		R		G$_I$		M	P		D		N$_I$		S
[Symmetrical *Tartivra*-	1		9/8		5/4		4/3	3/2		27/16		15/8		2
Red D										Red				

Fundamentality of Basic Intervals — The Fourfold Rule

The *Fourfold Rule* is the method I have devised to test the fundamentality of Basic Intervals — The first five harmonics provide two Facts of Acoustics from the *Shadj:* Sa — Pa and Sa — Ga$_I$; and two other Facts of Acoustics from the *Pancham:* Pa — sa and Pa — ga$_I$. The Fourfold Rule consists of these Four Facts of Acoustics, namely: the major-third, the perfect fourth, the perfect fifth and the perfect sixth. This Fourfold Rule, when applied upwards to a low Note and its Fifth above, produces the Universal Basic Scale. But if applied downwards to a high note and its Fifth below produces the Upturned Greek Dorian.

The Greek Dorian — Upturned Basic Scale

Throughout the 1000 years of their musical history, the Greek theorists failed to achieve the True Greek Dorian. Even the two most enlightened of them — Didymus and Ptolemy — missed it, each, *by just one comma*. The former in the *purvanga* and the latter in the *uttaranga*.

Fig. (x)   For comparison, the three Dorian Sequences, descending:

		4		3		2			4		3		2	
Didymus	s	.	N k		D$_I$k		P	M		Gk		R$_I$k		S
Symmet			Green							Green				
Green: Gk														

		4		3		2			3		4		2	
Lobo	s		Kk		D$_I$k		P	M		G$_I$k		R$_I$k		S
Un-Sym.			Green							Blue				
Correct														

		3		4	D$_I$k	2			3		4		2	
Ptolemy	s		N$_I$k				P	M		G$_I$k		R$_I$k		S
Symmet			Blue							Blue				
Blue: N$_I$k														

Upright Basic and Up turned Basic Scales

While, according to my findings, the intervalic sequence of the Greek Dorian, (the Upturned Basic Scale), should be identical with that of the Upright Universal Basic Scale, there is a difference between the two which is radical. The Upright Scale is an ascending sequence, a rational structure above the fundamental base; and the Upturned Scale is a descending sequence, a baseless upside-down water-reflection of that structure.

The two scales are diametrically opposed from the view points of source, direction, intent and affect. In the next illustration the two scales with identical intervals are given in juxtaposition proceeding in opposite directions. Note that the *Pink* degree in the Upright turns *Blue* in the Upturned; also, the *Red* in the one turns *Green* in the other and vice versa.

Fig. (xi): Ascending Upright Basic and Descending Upturned Basic Scales

Black	Red	Pink	Green	Redj	Pink	Pink	Black
S	R	Gɪ	M	P	Dɪ	Nl	s
	4	3	2		3	4	2
	4	3	2		3	4	2
s	Nᵏ	Dɪk]	P	M	Gɪk	Rɪk	S
Black	Green	Blue	Red	Green	Blue	Blue	Black

Colour Categories and Subjective Synonyms

There are four objectives categories of colour: the active *Tivratar—Red* and the passive *Atikomal — Green*; the active *Tivra — Pink* and the passive *Komal — Blue*. Their vowel-symbols in phonetic notation are: 0 for *Atikomal*, A for *Komal*, E for *Tivra* and I for *Tivratar*. Their number-symbols are also given.

The series of notes belonging to each of the four categories, progressively increase either in Intensity or Depression as they move away from the Centre-S. In each of the four objectified categories, the subjective emotional qualities are synonymous; but they also vary and intensify.

Objectified colour-symbolism with subjective variations of emotional qualities, ascriptive of the four categories of basic intervals, is the only order of associated correspondence admissible in psychology. All other theories, including that of Sir Isaac Newton, relating scale-degrees to spectrum-colours have no scientific basis.

	Increasing Depression					CENTRE		Increasing	Intensity			
Vowel- Symbol: 0	Ro	Do	Go	No	Mo	S	Pi	Ri	Di	Gi	Ni	Vowel- Symbol: I
Number- Symbol: n/3	Rk	Dk	Gk	Nk	M		PR		D	G	N	Number- Symbol: 3/n

	GREEN-ATIKOMAL	RED-TIVRATAR
	Passivity	Activity
	Shade	Sunshine
	Introspection	Flamboyance
	Submission	Domination
	Security	Danger
	Non-Violence	Violence
'	Pallor	Blood
	Peace	War
	Freeze	Fire

Increasing Depression	CENTRE	Increasing Intensity
	S	

Vowel-Symbol: A	Ra	Da	Ga	Na	Ma		Pe	Re	De	Ge	Ne	Vowel-Symbol: E
Number-Symbol: n/5	Rɪk	Dɪk	Mɪk	Nɪk	Mɪ		Pɪ	Rɪ	Dɪ	Gɪ	Nɪ	Number-Symbol: 5/n

	BLUE-KOMAL	PINK-TIVRA
	Indifference	Devotion
	Nostalgia	Affection
	Sadness	Gaiety
	Blight	Bloom
	Yearning	Love
	Melancholia	Voluptiousness
	Repulsion	Eroticism
	Pain	Pleasure

The 22 Srutis of the Basic Scale

The diatonic Basic Scale, *Ma-Grama* of Bharata, is made up of 3 *chatusruti* intervals (each C=204 cents): 2 *trisruti* intervals (each T= 182 cents); and 2 *dvisruti* intervals (each D=112 cents). The total span, from *Sa* to *tar sa*, is 1200 cents.

The 22 *sruti*-s are not all of equal value. There are 10 *pramana sruti*-s (each p=22 cents); 7 *sesha sruti*-s (each s=90 cents); and 5 *vikrita sruti*-s (each v=70 cents). The total span, from *Sa* to *tar sa*, is 1200 cents.

The algebraic formula as I have deduced it from the description given by Bharata in *Natya Sastra* is given below:

$$D=p+s=112; \quad T=p+s+v=182; \quad C=p+s+v+p=204.$$

Each *svara* has four shades of increasing sharpness: *atikomal* (green) *komal* (blue), *tivra* (pink) and *tivratar* (red). These four shades are phonetically represented by the vowels O, A, E, I, as the phonodeik graphs of these four vowels taken by D. C. Miller register an increasing degree of sharpness. Thus the four shades of *gandhar*, *atikomal komal*, *tivra tivratar*, phonetically expressed, will be *Go Ga Ge Gi*. These shades can also be notated as follows:

Gk, G¹k, G₁, G. The blue tertian *komal G¹'k* is *one comma higher* than the quintal green *atikomal Gk,;* and the pink tertian *tivra G₁* is *one comma lower* than the red quintal *tivratar G.*

Fig. (xii)   ،

S	Ro	Ra	Re	Ri	Go	Ga	Ge	Gi	Mo	Ma	Me	Mi	P
90	22	70	22	90	22	70	22	90	22	70	22	90	

P	Do	Da	De	Di	No	Na	Na	Ni	S
90	22	70	22	90	22	70	22	90	

There are 7 *svara-s; SA* and *PA* are fixed notes; the remaining 5 *svaras* have four shades each.   The total number of *sruti-s* is 22.

Misconceptions about the Scale   ٠

Those who read the *Natya Sastra,* the ancient treatise of Bharata, should take note of the following incontrovertible facts:—

(a)   The old names of standard notes have changed,

(b)   There is absolutely no difference between the *Saptak* and the *Octave.*

Changed Note-Names

When I say that the standard modern *pancham* is nature-born, I mean the old indestructible *madhyam;* and when I say the standard modern *madhyam* is man-made, I mean the old *gandhar.*

The change is standard note-names is as follows:

Old note-names: *n   S   R   G   M   P   D*
Modern note-names: *S   R   G   M   P   D   N*

The Saptak and Octave

It is wrong to say that the *Saptak* is an Indian concept and that the *Octave* is an European concept.   There is absolutely no difference between the two terms.   Both the concepts visualise precisely the same *Seven* musical intervals in the basic diatonic scale.

The ancients, both in India and the West, took the *purvanga* and the *uttaranga* conjunctly, the tetrachords having *Madhyam* as the common middle note.   The *chatusruti* disjunction would thus come either at the beginning or at the end of the seven notes, *Saptak.*

S   R   G   M   P   D   N
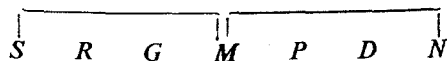
The moderns, both in India and the West, take the *purvanga* and the *uttaranga* disjunctly, the two tetrachords having the *chatussruti* disjunction in the middle of the eight notes, between the two halves of the *Octave*. The result is identical.

$$S \quad R \quad G \quad M \qquad P \quad D \quad N \quad s$$
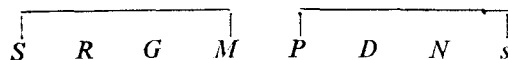
It is absolutely wrong to think that the *Madhyam* is the middle point of the span of seven intervals. This is a delusion. The absolute middle point is provided by the square root of 2, which is an unmusical tempered note.

If there are 7 pillars in a row, the pillar number 4 will be the central pillar as well as the mid-point. But if the length of 7 feet is marked on the floor by 7 digits, the digit number 4 will not be the mid-point of the 7-foot length. The mid-point is 3 feet and a half.

Ancient Indians and Europeans took for granted the *Zero* point, which is actually the marking point number 8, and used only 7 digits to mark 7 intervals.

Modern Indians and Europeans mark the *zero* with digit *one*, .. and use 8 digits to contain the same 7 intervals. The digits number 1 and number 8 represent the fixed extreme boundaries containing the 7 intervals. Hence, the misconception about the *Octave*, the *Saptak* and the diatonic scale of 7 intervals. There is a difference between 7 intervals and even scale-degrees.

Any rational notation based on the principle of the key-signature can admit only 7 normal degrees to a modal Scale or *Mela* even through the notated *Raga* may use more than 7 equally important scale-degrees. From the strict view-point of the key-signature, all such other-than-normal notes have perforce to be treated as chromatic accidentials. The key-signature notation system is independent of regional conventions and *raga* traditions.

Graphic Representations of the Scale

Any attempt to represent the Scale as something more than a mere frequency-rise from the tonic to its higher octave will be unsatisfactory. The tortuous convolutions of a helical or conical spiral are too elaborate to depict adequately the steady 3-dimensional rise of the Scale through time. A vertical straight line would perhaps be the simplest representation of the Scale. But, considering that frequency-rise of a note can occur merely with increase in tension, without any decrease in string-length, even a straight line would be inadequate.

Similarly, 22/7 the relation between the diameter and the circle, has no connection with any Indian concept of *sruti*-s or the Scale. It represents

the unmusical division of an equally tempered Scale, divided into 7 irrational parts. Rene Guenon's explanation of 22/7 in "L'Esoterisme de Dante" is meaningless superstition.
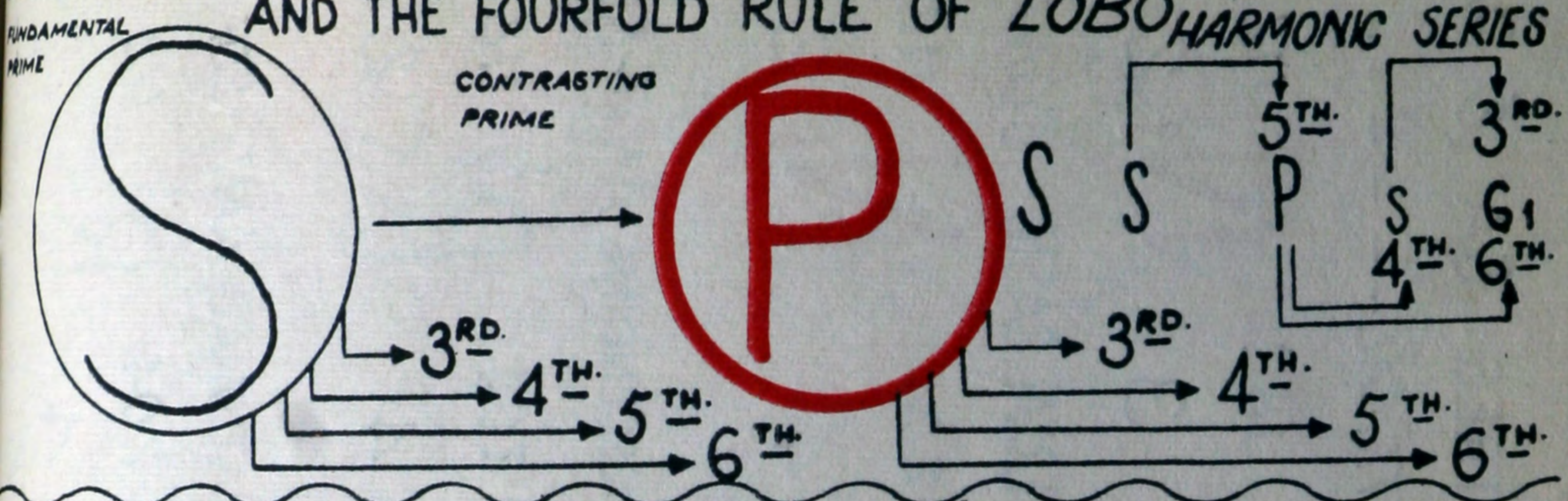

Note:—

Only the initial consonants of Indian Solfa-names *Sa, Ri, Ga, Ma, Pa, Dha, Ni,* are used in the diagrams. Thus the Basic Scale in Indian and Western notations would be written as follows:—

Indian Notation	S	R	G_1	M	P	D_1	N_1
European Notation	C	D	E_1	F	G	A_1	B_1

THE TWO CONTRASTING CENTRES
AND THE FOURFOLD RULE OF *LOBO*

FUNDAMENTAL PRIME

CONTRASTING PRIME

HARMONIC SERIES

S → P

3RD.
4TH.
5TH.
6TH.

3RD.
4TH.
5TH.
6TH.

S S P S G₁
5TH. 3RD.
4TH. 6TH.

MAN-MADE

NATURE-BORN

M

NEGATIVE QUINTAL

P

POSITIVE QUINTAL
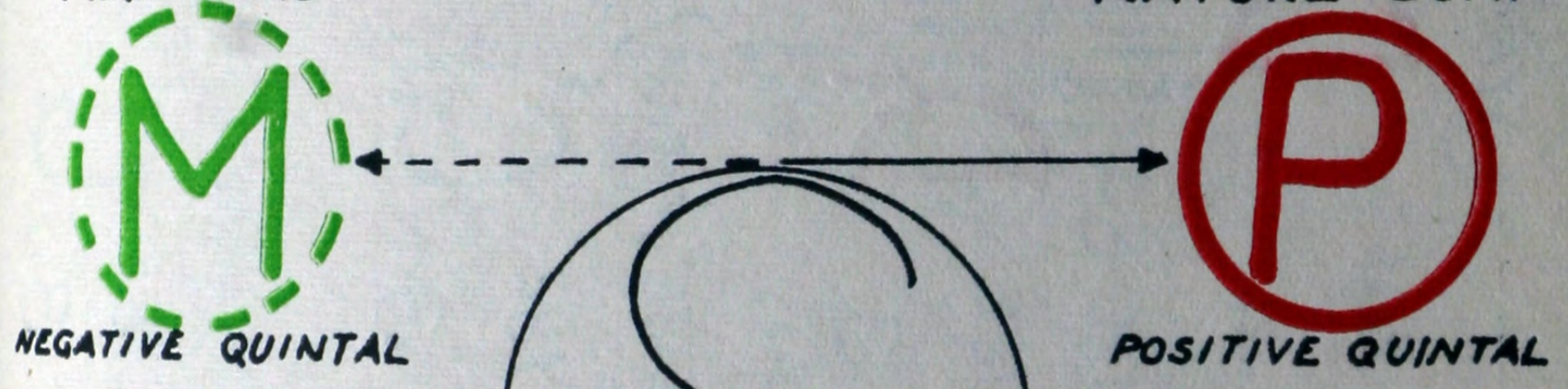
NEGATIVE TERTIAN

POSITIVE TERTIAN

S

D K

MAN-MADE

G₁

NATURE-BORN

UNICENTRIC
UNIVERSAL BASIC SCALE OF *LOBO*

M

QUINTAL
MAN-MADE

S

P

QUINTAL

R

QUINTAL

G₁

TERTIAN

N₁

TERTIAN

D₁

TERTIAN
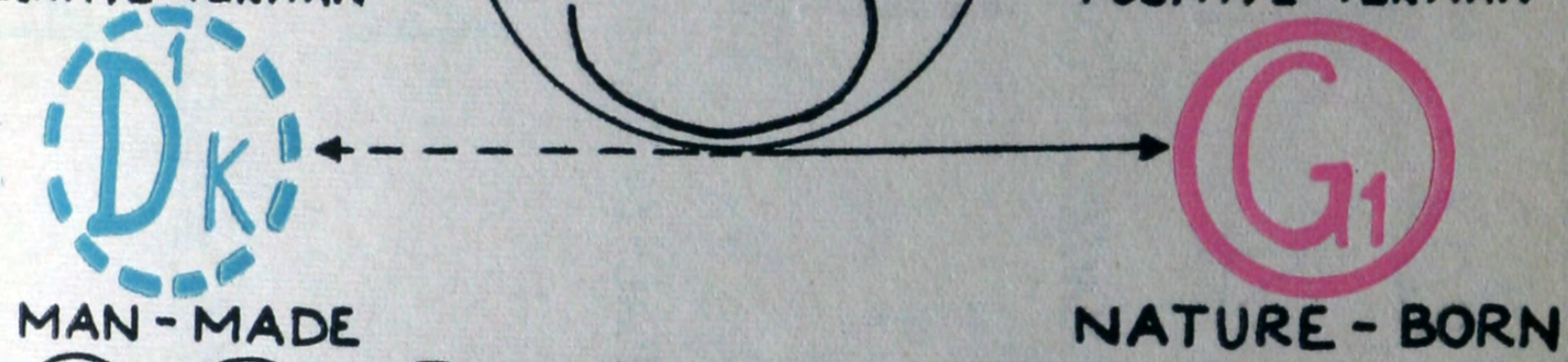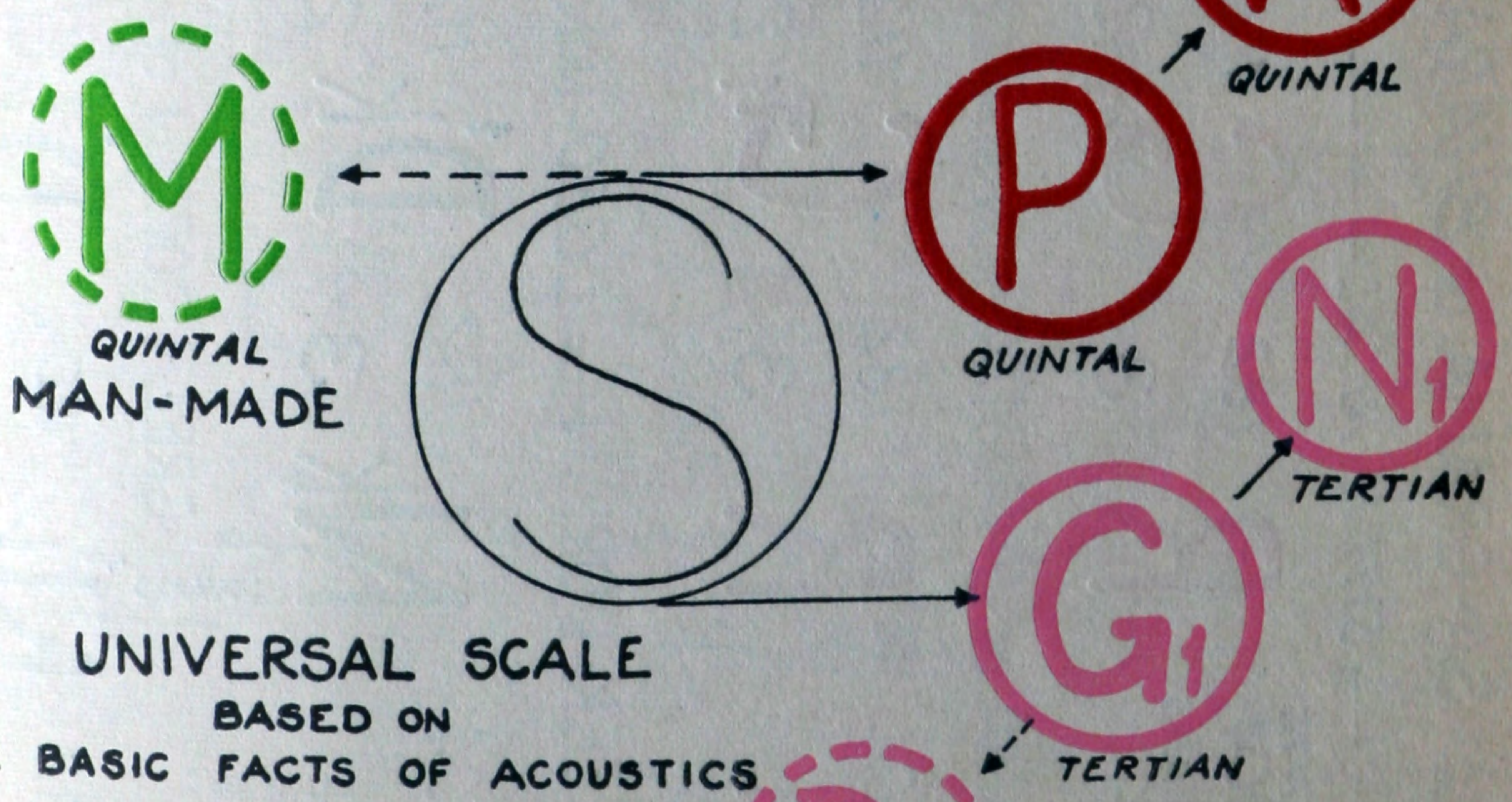
UNIVERSAL SCALE
BASED ON
FOUR BASIC FACTS OF ACOUSTICS

PERFECT THIRD = 5/4
PERFECT FOURTH = 4/3
PERFECT FIFTH = 3/2
AND

SA-GRAMA of *BHARATA* – SYMMETRICAL – *BI-CENTRIC* – TWO CENTRES: SA & PA

$\ulcorner$ – – – – – *SYMMETRICAL* – – – – – $\urcorner$ 204 $\ulcorner$ – – – – *SYMMETRICAL* – – – $\urcorner$

CENTS										
204	**R**	182	**G₁**	112	**M**	**P**	204	**D**	182	**N₁**	112	**S**

CENTS 204 **R** 182 **G**₁ 112 **M** 204 **P** 204 **D** 182 **N**₁ 112 **S**
SHRUTIS 4 3 2 4 4 3 2

A-GRAMA of *BHARATA* – NON-SYMMETRICAL – *UNICENTRIC* – ONE CENTRE: SA | UNIVERSAL BASIC – *SONIC* COMMA

204 **R** 182 **G**₁ 112 **M** **P** 182 **D**₁ 204 **N**₁ 112 **S**
4 3 2 3 4 2

RUE GREEK DORIAN of *LOBO* – NON-SYMMETRICAL – *UPTURNED BASIC (MINOR)* – DESCENDING *ANTI-SONIC*

204 **N**k 182 **D'**k 112 **P** **M** 182 **G'**k 204 **R'**k 112 **S**
4 3 2 3 4 2

| COMMA

GREEK DORIAN of *PTOLEMY* – SYMMETRICAL – *UPTURNED* – IRRATIONAL *ANTI-SONIC*

182 **N'**k 204 **D'**k 112 **P** **M** 182 **G'**k 204 **R'**k 112 **S**
3 4 2 3 4 2

– – – – *SYMMETRICAL* – – – – – – – – *SYMMETRICAL* – – – –

GREEN-ATIKOMAL-QUINTAL   PRIME CENTRE   RED-TIVRATAR-QUINTAL

R_k — D_k — G_k — N_k ← M   S → P → R — D — G — N

COMMA   COMMA   COMMA   COMMA   COMMA   COMMA

← BLUE KOMAL
← ONE COMMA HIGHER

R'_k ← D'_k → G'_k PINK TIVRA → D_1 → G_1 → N_1
                   ONE COMMA LOWER →

TERTIAN CENTRE   TERTIAN CENTRE

S   SHRUTIS 4   R   3 G_1 2   M   4   P

CENTS 90 |22| 70 |22| 90 |22| 70 |22| 90 |22| 70 |22| 90

S   RO RA   RE RI   GO GA   GE GI   MO MA   ME MI   P

P   3 D_1 4 N_1 2   S   22 SHRUTIS
&
P   90 |22| 70 |22| 90 |22| 70 |22| 90   UNICENTRIC
                       UNIVERSAL BASIC SCALE
D   DO DA   DE DI   NO MA   NE NI   S   (MA-GRAMA OF BHARATA)

Erratum : The blue MA in the last line may please be read as NA (blue).

M ← S → P → R --→ D --→ G --→ N

3   1   3   9   27   81   243

g. iii   UPRIGHT QUINTAL SCALE, ASCENDING →

	204		204		90		204		204		204		204		90
NTS															
CUTIS	S	4	R	4	G	1	M	4	P	4	D	4	N	1	S
BRATION-ATIOS	1		9/8		81/64		4/3		3/2		27/16		243/128		2

← DESCENDING DEGREES OF FIFTHS

R k --← D k --← G k --← N k ← M ← S → P

243   81   27   9   3   1   3

g. v   UPTURNED QUINTAL SCALE, DESCENDING →

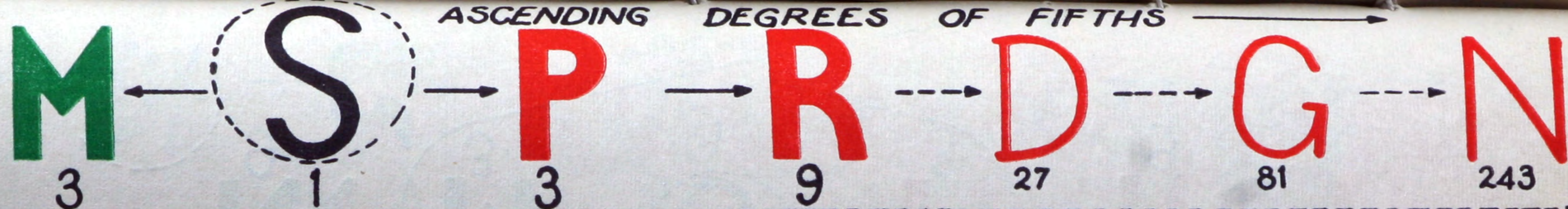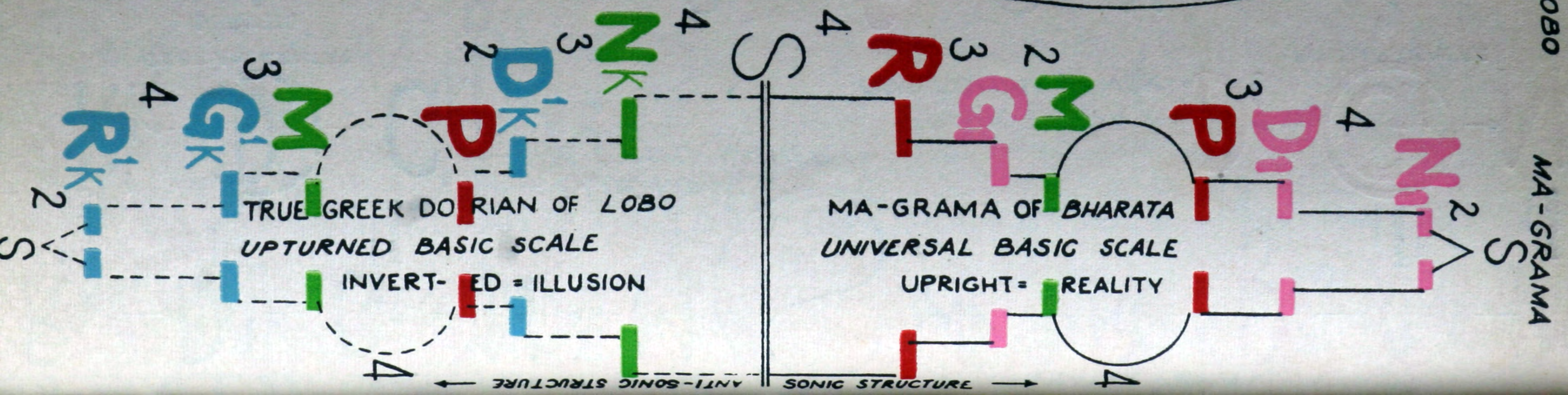|	204		204		90		204		204		204		90
NTS													
CUTIS	S	4	N k	4	D k	1	P	4	M	4	G k	4	R k	1	S
RTHMETIC NGTH ATIOS	1/2		9/16		81/128		2/3		3/4		27/32		243/256		1

UNIVERSAL BASIC SCALE OF *LOBO*

Fig. XI. THE TWO CONTRASTING CENTRES AND THE FOURFOLD RULE OF *LOBO*

UPRIGHT BASIC

SONIC VIEW

PERFECT 3RD. PERFECT 4TH. PERFECT 5TH. PERFECT 6TH.

G₁ M P D N S R G₁

PERFECT 3RD. PERFECT 4TH. PERFECT 5TH. PERFECT 6TH.

UPTURNED BASIC

UPTURNED BASIC DORIAN OF *LOBO*

PERFECT 6TH. PERFECT 5TH. PERFECT 4TH. PERFECT 3RD.

N S R G₁ M P D

ANTI-SONIC VIEW

PERFECT 6TH. PERFECT 5TH. PERFECT 4TH. PERFECT 3RD.

MA-GRAMA

TRUE GREEK DORIAN OF *LOBO*
UPTURNED BASIC SCALE
INVERT-ED = ILLUSION

MA-GRAMA OF *BHARATA*
UNIVERSAL BASIC SCALE
UPRIGHT = REALITY

ANTI-SONIC STRUCTURE   SONIC STRUCTURE

UNIVERSAL BASIC SCALE (UPRIGHT)

MAIN CENTRE & POSITIVE TERTIAN CENTRE

$$M \leftarrow (S) \rightarrow P \rightarrow R$$

$$M_3 \quad S_1 \quad P_3 \quad R_9$$

$$D_1 \leftarrow (G_1) \rightarrow N_1$$

$$D_5 \quad G_5 \quad N_{15}$$

MAIN CENTRE & NEGATIVE TERTIAN CENTRE

TRUE GREEK DORIAN (UPTURNED)

$$N_K \leftarrow M \leftarrow (S) \rightarrow P$$

$$N_{K\,9} \quad M_3 \quad S_1 \quad P_3$$

$$R^1_K \leftarrow (D^1_K) \rightarrow G^1_K$$

$$R^1_{K\,15} \quad D^1_{K\,5} \quad G^1_{K\,5}$$
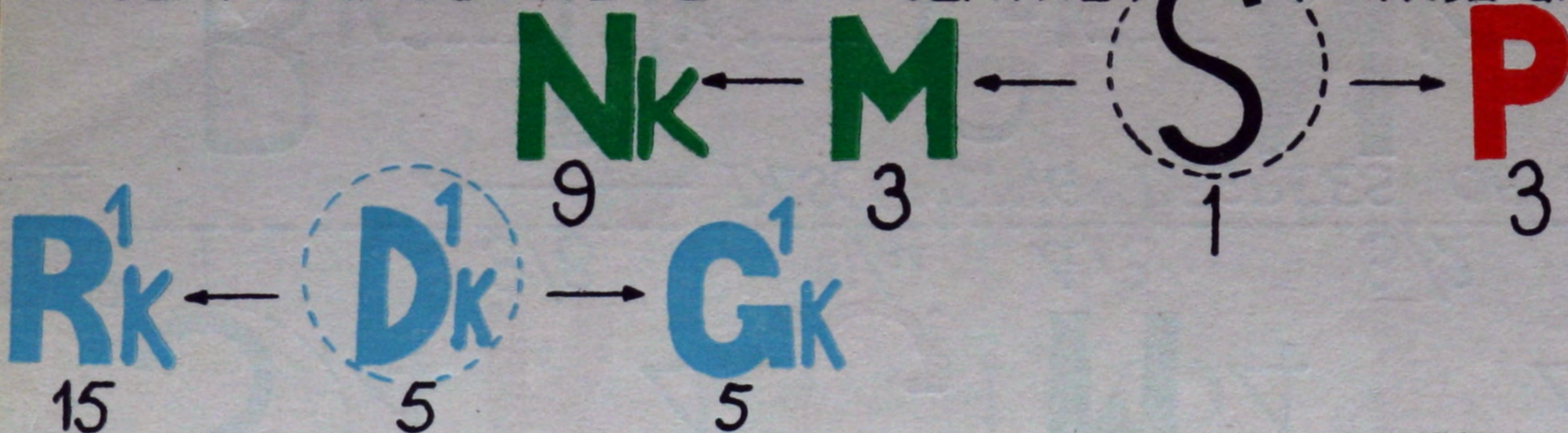
(UPTURNED) TRUE GREEK DORIAN of LOBO

(UPRIGHT) UNIVERSAL BASIC SCALE

$$N_K \leftarrow M \leftarrow (S) \rightarrow P \rightarrow R$$

$$N_{K\,9} \quad M_3 \quad S_1 \quad P_3 \quad R_9$$

$$R^1_K \leftarrow (D^1_K) \rightarrow G^1_K$$

$$R^1_{K\,15} \quad D^1_{K\,5} \quad G^1_{K\,5}$$

$$D_1 \leftarrow (G_1) \rightarrow N_1$$

$$D_5 \quad G_5 \quad N_{15}$$

ONE MAIN & TWO SUBSIDIARY CENTRES
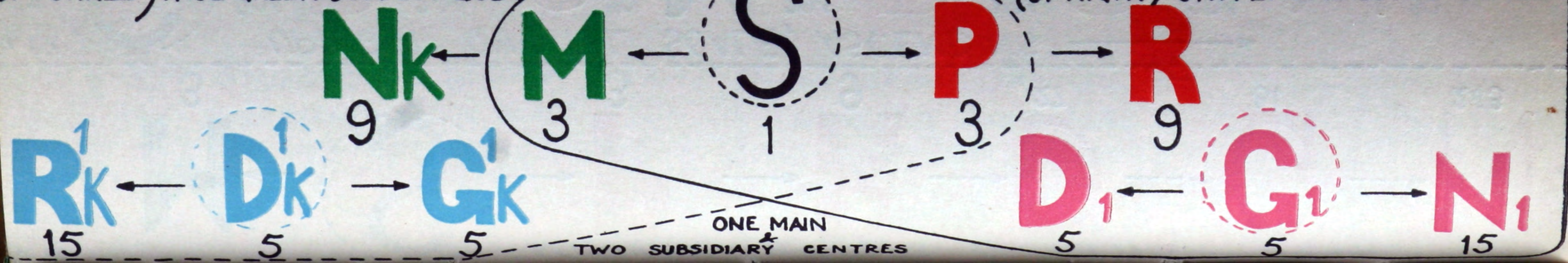
Notes and References

1   While most historians now concede that the lower date of the *Natya Shastra* is not
    later than 200 B.C., M.S. Ramaswami Aiyar places the lower limit higher. Since
    Matsya Purana not only mentions Bharata's name but attributes to him a new dramatic
    work called *Lakshmi Svayamvara*, and the upper limit of *Matsya Purana* according
    to V. R. Ramachandra Dikshitar is fourth or third century B.C., the lower limit of
    Bharata's date will be fifth or fourth century B.C., *M. S. Ramaswami Aiyar*, "Biblio-
    graphy of Indian Music" in Journal of the Royal Asiatic Society of Great Britain and
    Ireland, 1941 pp. 236-7.

2   Ptolemy (2nd cent. A.D.), who was a mathematician, astronomer and geographer had
    his own System which held the Earth to be the centre of the Universe until corrected by
    the Solar System of Copernicus (15th cent. A.D.). Ptolemy who had miscalculated
    the Earth's circumference was also responsible, thirteen centuries later, in misguiding
    Columbus, the discoverer of America, to seek a westward sea-route to India.