Early Indian Music

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In recent years the connections between the cognitive centers of neuroscience and the *devas*, the Vedic gods, of mythology have become clear.[1] This makes it possible for us to revisit early texts and understand them in a new light. Not only are we able to find new meaning in the language of myth, but we can also obtain a deeper understanding of music.

Music's influence on the mind is well known. Stammerers with acute disability sing perfectly as soon as they abandon themselves to the tune of the song. Some Parkinson's patients, who are frozen on one side with tics and chorea on the other, become perfectly coordinated when they play music. Even the EEG from their two hemispheres becomes synchronized as if by an inner music, something that medication is unable to achieve.

We are told that the gods especially like music because, unlike ordinary language, it is not constrained by linear rules and the burden of commonplace associations. The word gāndharva was used in the Vedic times to describe musical language and the gandharva were the mythical beings who had mastery over it.

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In the Ṛgveda, the outward appearance of the gandharva is left vague, but in later writing he is shown with a horse's head and a man's torso who lives in a supernatural world of his own. The gandharva (used also in plural) are drinkers who steal the soma and carry off women and nymphs, apsarās. The gandharva have chariots and horses because they are the swift carriers of musical experience to the inner sun. The are half-men because they live in a world between that of men and the gods. The gandharva are remembered in the horse-headed Greek centaur – wild drinkers, sensual, ravishers of women.

The superiority of music over the spoken word is stressed in many ways. The Sāmaveda, meant to be sung, is equated to heaven while the Ṛgveda is equated to the earth. It is through music that the earthly human is advised to seek divinity. The hymns of the Ṛgveda are for grounding, but song and sacred theatre (provided by the ritual of the Yajurveda) are essential to soar.

Vedic hymns have several layers of structure which appear to be matched to different levels of reality. The metres of the hymns are like bricks that go to form larger structures, and one may speak of a chandaspuruṣa, the body of the metres, and also of saṅgītapuruṣa, the body of music.

In one view, cosmic sound (nāda) is the cause of the material universe and it is identified with the Brahman of the Upaniṣads. Nāda is synonymous with parāvāk, and it comes in two forms: āhata (perceptible sound), and anāhata (unstuck or absolute sound). Music is the elevated form of āhata nāda whereas anāhata nāda can be cognized only through Yoga. The two kinds have a close relationship, and a śruti, a small interval of sound, represents their joining.

The texts tell us that 22 śrutis span the seven notes of the *saptaka*. The problem as to why this subdivision

has 22 elements has concerned musicologists for a long time.[2] It is also not clear why the śrutis are divided non-uniformly into groups of four, three, and two into musical notes in Bharata's Nāṭya Śāstra.

The saptaka, the "series of seven" – the same as the *octave* or the "series of eight" of Western music – spans a doubling of frequency. The seven notes of the saptaka are named *sa* (for ṣaḍja), *ri* (ṛṣabha), *ga* (gāndhāra), *ma* (madhyama), *pa* (pañcama), *dha* (dhaivata), and *ni* (niṣāda).

It must be said that we are speaking of a very old tradition. Manomohan Ghosh, who prepared the critical edition of NatS and translated it, assigns it to about 5th century BC. He based his estimate on a variety of considerations[3] that include archaic features of the language and the fact that Bharata speaks of the Arthaśāstra of Bṛhaspati and not of Kauṭilya, making him prior to the Mauryas.

Pāṇini in his Aṣṭādhyāyī (4.3.110-1) (c. 450 BC) speaks about Śilālin and Kṛśāśva as the authors of the Naṭa-sūtras, which appears to have preceded the Nāṭya Śāstra. It seems that Bharata's text was in the same tradition as Śilālin's, and the evidence indicating that Bharata preceded the Mauryas makes him a near contemporary of Pāṇini. Their two works have similarity in that they analyze language, speech in the case of Pāṇini and drama, dance, and music in the case of Bharata, in terms of their primitives. One can see that these works would have appeared in the same intellectual atmosphere.

The śrutis of music are like the words of poetry or gestures of dance. The śrutis are given different sentiment and feeling in groups of five: moderate (madhyā), keen (dīptā), large (āyatā), compassionate (karuṇā) and tender (mṛdu). Śārṅgadeva (13th century) in his Saṅgīta-Ratnākara (SR 1.3.24-25) says that sound is first heard

as śruti and through resonance it expands into a note (svara) to create an expression in the mind of the hearer.

The notes are viewed to have an organic unity. Thus *sa* is said to be the ātman, *ri* the head, *ga* the arms, *ma* the chest, *pa* the throat, *dha* the lips, and *ni* the feet. These seven limbs evoke a presence, and give birth to the devas.

Music, as a constituent of Indian art, is best understood from the point of view of rasa. The sounds, presented through the body of sentiments and moods, evoke a state (rasāvasthā) in which transcendental bliss is experienced. Eight or nine states of being can be experienced through the sequence of states (bhāvas) that are transitory (vyabhicārī) or involuntary (sāttvika), expressed through dominant moods (sthāyī), explaining the functioning of the rāgas. There are eight rasas: heroism, fury, wonder, love, mirth, compassion, disgust and terror. Bharata lists another 33 less permanent sentiments. The artist, through movement, voice, music or any other creative act, attempts to evoke them in the listener and the spectator. This evocation helps to plumb the depths of the soul, thereby facilitating self-knowledge.

The texts speak of three registers across three octaves. Within each register, there are three scales (grāma): the ṣaḍjagrāma, the madhyamagrāma, and the gāndhāragrāma. The third of these, the gāndhāragrāma, is rarely referred to by Bharata, suggesting that it had long ago gone out of use and that it represents an early scale used in sacred ritual. The presiding deities of the three grāmas are Brahmā, Viṣṇu, and Śiva, respectively.

The notes are consonant (saṃvādin), assonant (anuvādin) and dissonant (vivādin) depending on the distance in śrutis with respect to the sonant (vādin). According to NatS 28.22-23:

> Notes that are at distance of 9 or 13 śrutis from each other are mutually saṃvādin. Examples are *sa* and *ma*, *sa* and *pa*, *ri* and *dha*, and *ga* and *ni* in the ṣaḍjagrāma. Similar is the case in the madhyamagrāma, except that *sa* and *pa* are not consonant while *pa* and *ri* are.
>
> The notes that are at the distance of two or twenty śrutis are vivādin, for example *ri* and *ga*, *dha* and *ni*.
>
> The vādin, saṃvādin and vivādin notes having been determined, the remaining notes are to be called anuvādin.

The mention of the distance between the saṃvādin and vivādin notes is helpful in the understanding of the measure of śruti, and we will return to this later. Another definition is provided in NatS 22.24 where it is said that in the madhyamagrāma pañcama should be made deficient in one śruti, and this is the standard (pramāṇa) śruti.

Śārṅgadeva (SR 1.3.10-22) tells us of how the seven notes can be produced on two twenty-two stringed vīṇās. One of the vīṇās is kept invariable and the other one is used in a variable mode. He shows how the notes one śruti apart merge. By this he establishes that there is a natural division into 22 audible pitch differences. But his method works because the number of stings in the vīṇās is 22, and it does not answer the more basic question of the number of microtones in a saptaka.

One theory is that the division of the śrutis provides a convenient division in terms of simple ratios. A combination of the cycle of fourths and fifths is invoked to generate 23 values from the twelve notes and the extra value of the fifth is dropped, leaving us with 22 values.

Considering the cycle of fifths, and ignoring the varying number of śrutis amongst the notes, *ri* is fifth from *pa* (in the next octave). Since *pa* is midway through the octave (*pa* is 3/2), *ri* should be: $1/2 \times 3/2 \times 3/2 = 9/8$. This, in turn, implies that *ma* should be $3/2 \times 8/9 = 4/3$. The fourth from *ma* is *ni*, so it becomes $4/3 \times 4/3 = 16/9$. The fifth from *ri* is *dha*, so its value should be $9/8 \times 3/2 = 27/16$. Now *ga* can be calculated either as the fifth from *dha* or the fourth from *ni* and this gives us the values of 81/64 or 32/27.

This gives us the ratios upto the *sa* of the next octave:

$(1, 9/8, 81/64, 4/3, 3/2, 27/16, 16/9, 2)$

or

$(1, 9/8, 32/27, 4/3, 3/2, 27/16, 16/9, 2)$

But there is no certainty that this reasoning was followed by the ancient musicologists. These ratios do not contain the small proportions 5/3 and 5/4, which are pleasing to the ear. It is plausible that *ga* was pegged at 5/4 and *dha* was fixed at 5/3. If that was the case then the difference in the ratios for *dha* would be $27/16 \times 3/5 = 81/80$. We get the same difference at *ga* for one of the two values. This ratio is the comma.

Using the modified ratios for *ga* and *dha* we can generate new values for the other notes, and it has been argued that this leads to a total of 22 notes. But it is not clear what ratios of the seven notes were used in the ancient period, especially because a shift in the ratios appears to have occurred as the arched harp type of vīṇā was replaced by the stickzither vīṇā. But it is clear that the śrutis did not represent a uniform division of the saptaka into 22 parts.

Scholars have reconstructed the ratios variously:[4]

$(1, 9/8, 32/27, 4/3, 3/2, 5/3, 16/9, 2)$

$(1, 9/8, 5/4, 4/3, 3/2, 5/3, 15/8, 2)$

$(1, 9/8, 6/5, 4/3, 3/2, 5/3, 9/5, 2)$

$(1, 16/15, 9/8, 4/3, 3/2, 8/5, 5/3, 2)$
$(1, 9/8, 5/4, 11/8, 3/2, 27/16, 31/16, 2)$
$(1, 11/10, 7/6, 4/3, 3/2, 33/20, 7/4, 2)$

Clearly, other choices can be made, especially since the śruti interval between the notes in not the same.

It has been suggested that the 22 śrutis may be connected to the 7 notes via the value of π in a diameter to circle mapping. But no plausible theory for such a connection has been sketched. In particular, we cannot justify the specific non-uniform assignment of the śrutis to the different notes in a diameter to circle mapping.

Another theory is that the number 22 is rather connected to the number of Rudras (11), where a multiplier of 2 is used to include the corresponding śakti. The plausibility of this theory becomes stronger when it is noted that the expanded list of śrutis[5] totals 66, which will then equal twice the number of devatās mentioned in the Vedas. It is noteworthy that according to whe NatS 29.23-74 there are 33 alaṅkāras (ornamentations) in instrumental music.

The number associated with the earth and also with the sun in the Vedic literature is 21. The number 22 then represents a point that goes beyond the earth or the sun.

Still another possibility may be the connection with the number of rāgas in each scale, which is $484 = 22^2$. Might this knowledge have prompted the theorists to pick 22 as the number of subdivisions based on some numerical considerations? One or more than one of these reasons may have been behind the choice of the number 22.

Here we investigate connections between Vedic chanting and the saptaka in the early texts prior to the Nāṭya Śāstra of Bharata Muni. In particular, we examine evidence from the Śikṣā texts and the Chāndogya Upaniṣad, and we examine if the antecedents of the number 22 go

before the time of Bharata.

More on the Saptaka

The seven notes commencing with ṣaḍja are said to be produced respectively by the peacock, ox or cātaka, goat, crane, blackbird, frog, and the elephant (SR 1.3.46). Each note can be low (mandra), medium (madhya), or high (tāra).

Śārṅgadeva (SR 1.4.5) speaks of the rare use of the gāndhāragrāma by the phrase that it is used in the heavens, and not in this world. This is why there is no unanimity regarding the assignment of the śrutis in the gāndhāragrāma.

From each grāma are derived a number of secondary scales (mūrchanā). The names of the ṣaḍjagrāma mūrchanās are: uttaramandrā, rajanī, uttarāyatā, śuddhaṣaḍjā, matsarīkṛtā, aśvakrāntā, abhirudgatā (SR 1.4.10-11). The first is the original scale, the remaining are the permutations. Thus rajanī is *ni sa ri ga ma pa dha.*

The names of the madhyamagrāma mūrchanās are: sauvīrī, hariṇāśvā, kalopanatā, śuddhamadhyā, mārgī, pauravī, hṛṣyakā. The gāndhāragrāma mūrchanās are: nāndī, ālāpā, sukhā, citravatī, citrā, sumukhī, viśālā (SR 1.4.22-26).

Each grāma is the foundation for pentatonic and hexatonic series of notes (tāna), melodic line (varṇa), figuration and ornamentation (alaṅkāra) and mode (jāti).

Each note (like *sa, ri*) not only represents that particular frequency but also the interval from the preceding note upto that note. Thus *sa* represents the entire interval from *ni* to *sa*. The notes that form the basic scale are called śuddha, notes lowered a śruti are called cyuta or komala (soft), and those raised by a śruti or two are

called tīvra (sharp), sādhāraṇa or kaiśika (for one śruti) or antara or kākalī (for two śrutis). The altered notes are called vikṛta. SR 1.3.39-45 gives the following 19 notes that consist of 7 śuddha and 12 vikṛta notes:[6]

> sādhāraṇa sa (1), cyuta ri (2), śuddha ri (3), śuddha ga (5), sādhāraṇa ga (6), antara ga (7), cyuta ma (8), śuddha ma (9), sadhāraṇa ma (10), triśruti pa (12), śuddha pa (13), kaiśika pa (14), śuddha dha (16), kaiśika dha (17), śuddha ni (18), kaiśika ni (19), kākalī ni (20), cyuta sa (21) śuddha sa (22).

With this as the background, here is the traditional division of the śrutis in the three grāmas, where the distribution for the gāndhāragrāma is the most likely reconstruction:[7]

Table 1: *Śrutis in the three different grāmas*

ṣaḍjagrāma		*madhyamagrāma*		*gāndhāragrāma*	
interval	śrutis	interval	śrutis	interval	śrutis
ni-sa	4	ga-ma	4	ri-ga	4
sa-ri	3	ma-pa	3	ga-ma	3
ri-ga	2	pa-dha	4	ma-pa	3
ga-ma	4	dha-ni	2	pa-dha	3
ma-pa	4	ni-sa	4	dha-ni	4
pa-dha	3	sa-ri	3	ni-sa	3
dha-ni	2	ri-ga	2	sa-ri	2

It is noteworthy that in the ṣaḍjagrāma the distribution of the śrutis displays a symmetry about *ma*: 4, 3, 2/4/4, 3, 2. This indicates that *pa* must have been at the precise ratio of 3/2 with respect to *sa*. This also means that the notes could not have been powers of a simple ratio and that vikṛta notes must have been a part of the entire set from early on.

Śārṅgadeva says only the ṣadja- and the madhyama-grāmas are used in the world (*dvau dharātale*, SR 1.4.1). The gāndhāragrāma must have fallen into disuse very early on. The names of the śrutis given by Śārṅgadeva are as follows:

Table 2: *Names of the śrutis*

svara	śrutis
Ṣadja	*Tīvrā, Kumudvatī, Mandā, Chandovatī*
Ṛṣabha	*Dayāvatī, Ranjanī, Raktikā*
Gāndhāra	*Raudrī, Krodhā*
Madhyama	*Vajrikā, Prasāriṇī, Prīti, Mārjanī*
Pañcama	*Kṣiti, Raktā, Sandīpanī, Ālāpinī*
Dhaivata	*Madantī, Rohiṇī, Ramyā*
Niṣāda	*Ugrā, Kṣobhiṇī*

The division of śrutis into five classes is as follows:

1. dīptā (dazzling): tīvrā, raudrī, vajrikā, and ugra
2. āyatā (vast, extended): kumudvatī, krodhā, prasāriṇī, sandīpanī, rohiṇī
3. karuṇā (compassion): dayāvatī, alāpinī, madantī
4. mṛdu (tender): mandā, raktikā, prīti, kṣiti
5. madhyā (moderate): chandovatī, ranjanī, mārjanī, raktikī, ramyā, kṣobhinī

The names used in this classification evoke different emotional states.

Early Texts

Singing is mentioned at several places in the Ṛgveda.[8] The ṛcas were chanted in three notes: anudātta, svarita,

and udātta, or "grave", "medium", and "acute". Furthermore, there were the five sāman notes prathama, dvitīya, tṛtīya, caturtha, and mandra. The saptaka was completed with the addition of the the upper seventh kruṣṭa before prathama and the lower sixth atisvārya after mandra. The sāmans were sung in a descending order. Vedic chanting and the singing of the Sāman were two separate musical styles.

The notes were associated with the Vedic metres: anuṣṭup, gāyatrī, tṛṣṭup, bṛhatī, paṅkti, uṣṇik and jagatī (SR 1.3.58-59).

The metres are central to the Vedic hymns. Although, the above sequence seems to be jumbled up in terms of the lengths of the metres, with its ratios of 8, 6, 11, 9, 10, 8, 12, I think that the ratios of the notes may have had something to do with the syllables in the metres. One sequence that is plausible is:

24, 27, 30, 32, 36, 40, 45, 48

corresponding to gāyatrī (24), uṣṇik (28), atiśakkarī (30 for half), anuṣṭup (32), bṛhatī (36), paṅkti (40), tṛṣṭup (44), and jagatī (48). A sequence of the metre names is given in NatS 15.43-49.

The lengths of the hymns varies with the metre. The gāyatrī is used in a 9-versed hymn called rathantara, the tṛṣṭup in a 15-versed hymn called bṛhat, the jagatī in a 17-versed hymn called vairūpa, the anuṣṭup in a 21-versed hymn called vairāja, the paṅkti in a 27-versed hymn called śakvara, and the atichandas (56) in a 33-versed hymn called raivata. The significance of the number of verses is not clear.

The Pāṇinīya Śikṣā (PS 12) maps the Vedic notes to the seven svaras:

> *uddāte niṣādagāndhārāvānuddātte ṛṣbhadhaivatau*
> *svaritaḥ prabhavā hyete ṣaḍja madhyama pañcamāḥ*

> Of the seven musical notes niṣāda and gāndhāra can arise in the high pitch (udātta), ṛṣabha and dhaivata in the low pitch (anudātta), while śaḍja, madhyama, and pañcama have their source in the medium pitch (svarita).

The same thing is said by the Nāradīya Śikṣā (NarS 1..8.8) and the Yājñavalkya Śikṣā (YS 8).

In NarS 1.5.1-2, Nārada equates the tones of the veṇu flute to the seven notes of the sung sāman:

> *yaḥ sāmagānāṃ prathamaḥ sa veṇormadhyamaḥ*
> *svaraḥ yo dvitīyaḥ sa gāndhārastṛtīyastvṛṣbhaḥ*
> *smṛtaḥ*
>
> *caturthaḥ ṣaḍja ityāhuḥ pañcamo dhaivato bhavet*
> *ṣaṣṭe niṣādo vijñeyaḥ saptamaḥ pañcamaḥ smṛtaḥ*

In other words, the order is *ma, ga, ri, sa, dha, ni, pa*, which is the standard saptaka in descending order excepting for a transposition of *dha* and *ni*.

The grāmegeyagāna and the āraṇyegeyagāna of the Sāmaveda provide a musical notation for the melodies. The Brāhmaṇa and the sūtra literature have references to singing and playing of musical instruments. Nārada of the Nāradīya Śikṣā associates musical notes with deities, social classes, animals, colours, and with fingers.

The notes with 4 śrutis are called brāhmaṇa, with 3 śrutis are termed kṣatriya, with 2 śrutis are termed vaiśya, and the half-notes are called śūdra (NarS 1.4.3-4). SR 1.3.53-55 says: "Ṣaḍja, madhyama, and pañcama are brahmins, ṛṣabha and dhaivata are kṣatriya, niṣāda and gāndhāra are vaiśya, while the notes antara-gāndhāra and kākali-niṣāda are śūdra.

The classification of the notes as the sounds of the deities is as (NarS 1.4.13-14): *sa* is Agni's, *ri* is Brahman's, *ga* is Soma's, *ma* is Viṣṇu's, *pa* is Nārada's, *dha* and *ni* are Tumburu's notes.

Their respective colours are: red, pale yellow, golden yellow, sparkling white, black, plain yellow, and variegated (SR 1.3.54-55).

The Chāndogya Upaniṣad has considerable discussion of the structure of sāmans. While examining this material, it should be noted that the Vedic system of knowledge is recursive and what is described at the gross level is also applicable at finer levels.

CU 2.10 informs us that the seven-fold sāman has twenty two parts. The counting is done in terms of the syllables of the names of the seven parts of the sāman which are hiṅkāra, prastāva, ādi, udgītha, pratihāra, upadrava, and nidhana. Their individual syllable counts are 3, 3, 2, 3, 4, 4, 3, respectively.

Although this division of the sāman is for the different parts of the song, the recursive system at the basis of Vedic narrative could suggest that it was also applied to notes. If that were the case, we find an exact match with the division of the śrutis for the gāndhāragrāma.

As to the special significance of the number 22, CU 2.10.5 says:

> *ekaviṃśatyā"dityamāpnotyekaviṃśo vā ito'sāvādityo dvāviṃśena paramādityājjayati tannākaṃ tadviśokam*

> With twenty-one intervals (syllables) a man reaches the sun, for the sun is the twenty-first from here. With the twenty-second he conquers what is beyond the sun, that is glory, that is freedom from sorrow.

Other very early texts describing music include the Mārkaṇḍeya Purāṇa (chapter 23), Devīmāhātmya Purāṇa (chapters 81-93), and the Vāyu Purāṇa (chapters 86-87).

The division of the saptaka To return to the question of the division of the saptaka, consider the fixed ratio of 1.104 which takes us through the range in seven steps, as a straightforward calculation will show. In a similar manner, one śruti in the series of 22 represents a ratio of 1.032. Table 3 presents a match between the two series:

Table 3: *The svara and the śruti series*

number	svara ratio	śruti ratio	error
1	1.104	1.099 (3)	0.005
2	1.2188	1.208 (6)	0.010
3	1.346	1.3278 (9)	0.018
4	1.486	1.5060 (13)	0.02
5	1.64	1.6553 (16)	0.0153
6	1.81	1.8193 (19)	0.0093
7	1.998	2.0 (22)	0.002

The match is excellent. The error between the two series is extremely small. The mapping maps the śrutis in groups of 3, 3, 3, 4, 3, 3, 3.

If one takens 21 śrutis instead of 22, the match turns out to be even closer, as expected. For this the ratio for each śruti is 1.0336. This theoretical exercise shows that the saptaka couldn't have been divided in this fixed manner. Neither could this reasoning have been at the basis of the choice of 22 śrutis. The view that the śrutis are non-uniformly distributed is supported by this calculation.

The number of rāgas The Nāṭya Śāstra describes eighteen melodic tunes called jātis: of these seven were

considered pure and eleven as hybrid. The pure jātis made 146 modified forms and the hybrid ones had many variations. The total number of these melodic tunes was nearly two hundred. The modern rāga is an evolution of the idea of jāti.

A rāga must have a combination of rising (āroha) and falling (avaroha) notes that are at least five in number. The combinations of pentatonic are called auḍava, of hexatonic ṣāḍava, and of heptatonic saṃpūrṇa. In addition, there are the sādhāraṇa tānas (NatS 28.32-36). Without going into further constraints – and there are many of those –, the combinations of rāgas that are obtained are as follows (Table 4):[9]

Table 4: *Number of rāgas in a scale*

Category of rāga	Number of rāgas
auḍava-auḍava	$15 \times 15 = 225$
auḍava-ṣāḍava	$15 \times 6 = 90$
auḍava-saṃpūrṇa	$15 \times 1 = 15$
ṣāḍava-auḍava	$6 \times 15 = 90$
ṣāḍava-ṣāḍava	$6 \times 6 = 36$
ṣāḍava-saṃpūrṇa	$6 \times 1 = 6$
saṃpūrṇa-auḍava	$1 \times 15 = 15$
saṃpūrṇa-ṣāḍava	$1 \times 6 = 6$
saṃpūrṇa-saṃpūrṇa	$1 \times 1 = 1$
Total	484

This number, as mentioned before, equals 22^2. If the rāga is a late concept, we can only speculate if its definition was influenced by the choice of such a number.

Alain Daniélou suggests that the śruti interval is the comma diesis 81/80, defined as the difference between *pa* considered as the upper fourth from *ri*, and *pa* as the lower fourth from *sa*. Daniélou also presents a detailed reconstruction of the intervals of the 66 śrutis.

Although we cannot be certain as to what precise ratios were used by Bharata, scholars have argued tthat 22 śrutis provide a natural division of the saptaka.

From the evidence we reviewed, it appears that the question of the origin of the 22 śrutis cannot be answered unambiguously. The choice could have been based on the significance of the number 22 that goes back to Vedic ritual, as a number that transcends the earth or the sun. The number 22 may have even been arrived at from $3 \times 7 + 1$ where the basic number is the 7 of the number of notes and the tripling is from the "three worlds" and the 1 represents the usual transcendence. Or it may be related to the capacity to distinguish the śrutis and a division that provides cycles of fourths and fifths.

If the choice of the 22 śrutis was based on the mapping of Table 3, then the original distribution of the śrutis for the various svaras must have been uniform with a single exception. From there the mapping of Bharata in his Nāṭya Śāstra represented further development. But the śrutis were not uniformly distributed, clear from the fact that the transition from a five-tone octave to a seven-tone octave is not uniform.

On the other hand, we do have evidence pointing to a logical basis to the division. But, irrespective of that basis, Bharata may have received the system from his predecessors, because the number 22 appears earlier in the Upaniṣads.

Drama and Music

In the Viṣṇudharmottara Purāṇa, Mārkaṇḍeya tells King Vajra that in order to learn the art of icon-making one needs to learn the art of dance, and the art of music before learning dance. Indian arts are interrelated not

only at the level of aesthetic experience but also at the level of technique. It is not surprising then to see the number 22 (and the related numbers of 11 and 33) appear in so many different contexts.

The nāṭya is created by taking significant details from each of the Vedas: pāṭhya or recitative text from the Ṛgveda, song or melody from the Sāmaveda, abhinaya or acting from the Yajurveda, and sentiments from the Atharvaveda. Since the four Vedas come together in the dramatic performance, nāṭya is called the Fifth Veda.

Bharata Muni locates the various deities in different places in the theatre. Jarjara, Indra's flagpole to ward off demons and to protect the actors, is installed on the stage. The performance is offered to Brahmā.

The pūrvaraṅga, performed prior to the performance, included the nāndī, a prayer for divine blessings. The performance concluded with the benedictory bharata-vākya.

Kālidāsa describes nāṭya as a visual sacrifice to the gods, where the stage symbolizes the cosmos and the gods are invited to inspire the actors to be creative. The visual sacrifice transforms the actors as well as the audience.

Of Three Languages

Although most ancient narrative is as myth, a code language intermixing history, psychology, astronomy and metaphysics, three ancient sages wrote about language with great directness. Euclid (c 300 BC) in his *Elements* describes the language of mathematical ideas, Pāṇini in his *Aṣṭādhyāyī* describes the language of universal grammar, and Bharata Muni writes about the languages of gesture, dance and music in his Nāṭya Śāstra.

Euclid, educated in Plato's academy, presented Greek mathematics and geometry in terms of axioms and the-

orems. His approach was so elegant that his book remained the textbook of elementary geometry and logic up to the early twentieth century. Its formal method became the standard to be emulated for every new discipline. The idea of a short constitution to which all pay allegiance may ultimately be traced to Euclid's framework.

Pāṇini described the grammar of Sanskrit algebraically in complete detail, an achievement that has not been matched for any other language until today.[10] Pāṇini's grammar is as intricate in its structure as the most powerful computing machine. The scope of his achievement qualifies Pāṇini as one of the greatest geniuses who ever lived. He influenced attitudes in the East for centuries, his ideas also led to the development of the subject of philology in the West.

Bharata Muni's Nāṭya Śāstra not only presents the language of creative expression, it is the world's first book on stagecraft. It is so comprehensive that it lists different postures that can be combined to give the various movements of dance. Bharata's ideas are the key to an understanding of Indian arts, music and sculpture. They provide the insight of how different Indian arts are expressions of a celebratory attitude to the universe. He describes the dhruvapada songs that were part of musical performance.

Euclid and Pāṇini are well known to scholars and the general public. The ideas of the Nāṭya Śāstra are less known, but they make intelligible the sculpture, temple architecture, performance, dance and story-telling of many cultures of east and southeast Asia.

Bharata's great text lay forgotten in India for almost a thousand years, his ideas remembered mainly through secondary sources. This is surprising considering this work has a sweep broader than that of Euclid or Pāṇini.

It is easy to understand success in devising a method of geometrical reasoning or finding the algebra of grammar as they are inherently structured. But imagine the audacity of creating a language for gesture, dance and music! Also, Euclid and Pāṇini wrote for the scholar, whereas Bharata's work influenced millions directly or indirectly. For these reasons alone, the Nāṭya Śāstra is one of the most important books ever written.

The comprehensiveness of the Nāṭya Śāstra forged a tradition of tremendous pride and resilience that survived the westward movement of Indian musical imagination through the agency of itinerant musicians. Several thousand Indian musicians were invited by the fifth century Persian king Behram Gaur. Turkish armies used Indians as professional musicians.

The large Roma exodus from north India as a consequence of the Ghaznavid invasions gives us a clearer link between Indian music and the West. The Roma in Europe, living as tinkers, craftsmen, horsetraders and entertainers – a despised minority in the fringes of society – were able to maintain cultural continuity, especially in music.

Their devotion to their ways earned them grudging respect for exemplifying "freedom" which by the late 18th century had caught the imagination of Europe fighting the suffocation of the Church. Slowly, the Roma (Gypsy) singers began to enjoy the patronage of the middle-class and the aristocracy.

According to Linda Burman-Hall: "Gypsy bands ... travelled from village to village accompanying the 'strong' dancing of soldiers who recruited continuously for Nicolas the Magnificent's military operations. The style of this *verbunkos* (the so-called 'recruiting' music), – a deliberate fusion of earlier Gypsy music (such as the 16th century works preserved in organ tablature) and elements

of the western European tradition, – influenced Haydn and other classical composers because it was favored by public taste. As a national fashion this style remained popular through the 19th century with composers such as Beethoven, Hummel, Schubert, Brahms, von Weber, Doppler and especially Liszt writing in a 'style Hongrois' influenced by the jagged rhythms and fantastic cadences of the *verbunkos* style."[11]

Bharata stresses the transformative power of creative art. He says, it teaches duty to those who have no sense of duty, love to those who are eager for its fulfillment, and it chastises those who are ill-bred or unruly, promotes self-restraint in those who are disciplined, gives courage to cowards, energy to heroic persons, enlightens men of of poor intellect and gives wisdom to the learned.

Concluding Remarks

This essay has been written to provide an Indian perspective, limited here mainly to music, for the effort to find a common basis in the cultures and sciences of Asia and Europe. The Indian theories are most interesting because they provide ideas that apply not only to music but also to dance, temple architecture, psychology and astronomy. If they are universal archetypes, then they will have applicability to other cultures as well; if not, their usefulness in elucidating other cultures may be a consequence of the difusion of Indic ideas.

José Maceda has argued that the court musics of Asia are based on counts of four and a hierarchy of music intervals dictated by four counts.[12] This may reflect the connection of music with dance and ritual conducted in square-shaped temples, where this square shape itself relates to the four cardinal directions of space. There may also be a shared linguistic and cultural ground behind

this commonality, but to understand that one needs to consider ideas of overlapping language families[13] and acknowledge that the ancient world was much more interconnected than has been hitherto believed.

Notes

1. See, for example, Kak, 1996a, 2000a, 2001b, for an overview.
2. See, e.g., Daniélou, 1980; Nijenhuis, 1974; McClain, 1978; Shringy and Sharma, 1978, 1989. See also, Clough *et al*, 1993.
3. Ghosh, 1967.
4. Bṛhaddeśī (Sharma, 1992, 1994); see also Shringy and Sharma, 1989, vol. 1, page 404.
5. Shringy and Sharma, 1989, vol. 1, pages 141-2.
6. SR 1.4.1-5. See also Shringy and Sharma, 1989, vol. 1, page 164.
7. Prajñānanda, 1960; see also Gupt, 1996.
8. Shringy and Sharma, 1989.
9. Shringy and Sharma, 1989.
10. Kak, 2001a,c.
11. Burman-Hall, 2000.
12. Maceda, 2001.
13. Kak, 1996b.

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